

GW INSTEK

Simply Reliable

2023~2024 Good Will Instrument Co., Ltd.

GENERAL CATALOG



www.gwinstek.com

World-Class Quality and Performance

Affordable Price

A Wide Range of Selections

Originally known and founded in 1975 as Good Will Instrument, GW Instek is the first professional manufacturer in Taiwan specializing in electrical test and measurement instruments. GW Instek began as a manufacturer of power supplies and quickly expanded into developing high precision electronic test and measurement instruments. After 48 years in the test and measurement industry, GW Instek has grown to become one of the most recognized manufacturers of instruments in the world. Today, GW Instek has more than 300 items ranging from oscilloscopes, spectrum analyzers, signal sources, DC power supplies, AC power sources, digital meters, LCR meters, other specific application meters to video surveillance systems.

Think of the word "innovation" and it's easy to think of R&D, new inventions, faster processing and groundbreaking technologies. At GW Instek, we focus on another type of innovation that is based on flexibility, manageability and efficient performance in real-world test applications. We call this "customer-focused" innovation and we strongly believe in it. By listening to our customers around the world, we are able to anticipate their needs and respond quickly to emerging trends. So when one of our customers introduces an exciting new technology, GW Instek is ready to test it.

Whether our customers are designing products with the ability to change people's lives, educating and training the engineers of tomorrow, or discovering new technologies that solve complex problems, GW Instek can be trusted to perform reliably and accurately in even the most demanding test environments. How can we be sure? We have the numbers to back it up. Actually, we have just one : 40. That's the number of in-house quality and performance verification tests each GW Instek product must pass before it leaves our facilities. This thorough process starts with environmental, safety and durability testing in the product design phase, through to burn-in and shipping tests ahead of final inspection and packing. Furthermore, our two manufacturing facilities in Taiwan and China all adhere to ISO quality and environmental management standards, as well as European CE safety regulations. That's why GW Instek products can be trusted to test.

At GW Instek, quality is reflected not in higher cost, but in greater value. We pride ourselves on the quality, reliability and affordability of our test and measurement instruments. With each of our products often in use for decades, it's not hard to understand the importance of measuring a product's value not by price, but by lifetime cost. This importance is deep-rooted to us; we have consistently produced products with some of the industry's lowest total cost per ownership. Reducing the total cost per ownership of our products allows us to provide exceptional value, reliability and performance with leading service and support over the lifetime of a product. That's why year after year, GW Instek can be trusted to perform reliably.

The industries we serve are as diverse as they are specialized. Our experience and expertise allow us to deliver high-performance test solutions that address the unique requirements of each client. GW Instek provides customized solutions that are backed by reliable products, comprehensive after-sales support, warranty, calibration services, and one of the industry's lowest Total Cost per Ownership.

SINCE
1975



48 Years of Reputation
& Trust

We take prides in creating more than 48 years of satisfied customer experiences throughout the world. Today, GW Instek is considered the most Reliable Brand for professional measurement instruments with supreme quality and the **lowest TCO - Total Cost per Ownership**.

We invite you to be part of GW Instek success story and help perpetuate this value.

DURABLE



Uncompromised
Durability

With an overriding commitment to provide highly durable products, GW Instek is your most **Reliable choice** when it comes to selecting the best measurement instruments with the **lowest TCO - Total Cost per Ownership**. Highly durable products mean long product lifetime capable of reducing operation & maintenance costs. This is definitely what you need to consider before investing.

TRUST &
PROMISE



Your Most Trustworthy
Partner

Being your most trustworthy and **Reliable Partner**, GW Instek promises to proactively provide insightful business solutions and products with the **lowest TCO – Total Cost per Ownership**, assisting your business to thrive in the highly competitive world. From feasibility evaluation, product selection, solution adaptation to timely after-sales service, we are dedicated to serving each individual customer and making your professional life easier than ever.

Milestones

- 
- 1975** Good Will Instrument Co., Ltd was established as a Power Supply manufacturer.
 - 1983** The Kaohsiung branch was established.
 - 1985** The Taichung branch was established.
 - 1989** Good Will Southeast Asia (Malaysia) was established.
 - 1991** Instek America Corp. was established.
 - 1993** Taiwan headquarters was ISO-9002 certified.
Granted the National Small and Medium Enterprise Award.
Granted the Industrial Technology Advancement Award of Distinction.
 - 1996** Good Will Southeast Asia (Malaysia) was ISO-9002 certified.
 - 1998** Taiwan headquarters was ISO-9001 certified.
 - 1999** Taiwan headquarters was ISO-14001 Environmental Management certified.
Good Will Instrument Co., Ltd. delivered Initial Public Offer on Taiwan's Over-The-Counter Security Exchange (OTC).
 - 2000** The CNLA Electricity Calibration Laboratory certification was granted.
Good Will Instrument was went public on the Taiwan Stock Exchange.
 - 2001** Good Will Instrument Suzhou was established.
 - 2002** Taiwan headquarters was ISO-9001 : 2000 certified.
 - 2003** Suzhou subsidiary was ISO-9001 : 2000 certified.
 - 2004** Instek Electronics Shanghai was established.
 - 2005** Global operational headquarters was established in Taiwan.
The brand new CIS (Corporate Identity System) was introduced.
 - 2006** Instek Japan Corporation was established.
 - 2007** Good Will Instrument Korea was established.
 - 2009** The Group Quality Award of Business Excellence Performance Model from the Chinese Society for Quality was granted.
 - 2010** Marketing office was set up in India.
 - 2011** GW Instek won Taiwan Excellence Award for GDS-1000-U Series, AFG-3000 Series, PEL-2000 Series and GDM-8261.
 - 2012** GW Instek won Technology Innovation Award for GDS-3000 Series and GSP-930.
Acquired Japan TEXIO technology corporation.
 - 2013** Instek Digital was merged to become a member of GW Instek business group.
GW Instek cooperated with Hitachi and EMIC to establish GW Alliance in Suzhou, China.
GW Instek won Technology Innovation Award for PPH-1503 and AFG-2225.
 - 2014** GW Instek won Technology Innovation Award (Gold) for GDS-300 full touch screen oscilloscope.
European subsidiary was established in the Netherlands.
 - 2015** GW Instek won Taiwan Excellence Award for GDS-300/200 Series and PEL-3000 Series.
 - 2016** GW Instek won Taiwan Excellence Award for GDS-2000E Series and GSP-9330.
 - 2017** GW Instek won Taiwan Excellence Award for C-1100 and GPM-8213.
 - 2018** GW Instek won Taiwan Excellence Award for C-1200 and GDM-906X Series.
 - 2019** GW Instek INDIA LLP was established.
GW Instek won Taiwan Excellence Award for GPT-12000 Series and SKTS-5000.
 - 2020** GW Instek won Taiwan Excellence Award for C-3200 and GPM-8310.
 - 2021** GW Instek won Taiwan Excellence Award for GDS-3000A Series, PPX-Series, GPP-3060/6030 and GSM-20H10 and GPM-8310.



Global Network



Suzhou Plant



Headquarters & Plant



Europe Subsidiary

Malaysia Subsidiary

India Subsidiary

China Subsidiary

Japan Subsidiary

Korea Subsidiary

U.S.A. Subsidiary





OSCILLOSCOPES

- Digital Storage Oscilloscope
- Mixed-signal Oscilloscope
- Mixed-domain Oscilloscope
- Handheld Digital Storage Oscilloscope
- Oscilloscope Education And Training Kit



SPECTRUM ANALYZERS & DEDICATED TESTER SERIES

- 3.25 GHz Spectrum Analyzer
- 3 GHz Spectrum Analyzer
- 1.8 GHz Spectrum Analyzer
- RF Training System



SIGNAL SOURCES

- Arbitrary Function Generator
- Multi-Channel Function Generator
- DDS Function Generator
- Audio Generator
- RF Signal Generator



DC POWER SUPPLIES

- Programmable & Single Channel DC Power Supply
- Non-Programmable & Single Channel DC Power Supply
- Programmable & Multiple Channel DC Power Supply
- Non-Programmable & Multiple Channel DC Power Supply
- Precision Source Meter

AC POWER SOURCES

- AC + DC Power Source
- AC Power Source

ELECTRONIC LOADS

- Multi-channel Electronic Loads
- DC Electronic Load
- High Power DC Electronic Load
- AC & DC Electronic Load



DIGITAL MULTIMETERS

- Digital Multimeter

SAFETY TESTERS

- AC/DC/IR/GB Electrical Safety Analyzer
- AC/DC Withstanding Voltage/Insulation Resistance/Ground Bond Tester
- AC Ground Bond Tester
- Multiplex Scanner Box
- Leakage Current Tester

LCR METERS

- Benchtop LCR Meter
- Handheld LCR Meter

OTHER METERS

- DC Milli-Ohm Meter
- Battery Meter
- Digital Power Meter
- Automatic Distortion Meter
- AC Millivolt Meter
- Precision Current Shunt Meter

New Products

A 650/350 MHz Digital Storage Oscilloscope



VPO
Visual Persistence Oscilloscope



GDS-3000A Series

- * 650/350MHz Bandwidth, 2 or 4 Input Channels
- * 5GSa/s Real-time Sampling Rate(half channels); 2.5GSa/s Real-time Sampling Rate(all channels)
- * Per Channel 200Mpts Memory Depth
- * 200,000 wfm/s of Waveform Update Rate
- * 10.2 inch 800 x 480 TFT LCD Display
- * 490,000 Segments of Segmented Memory and the Waveform Search Function to Optimize the Efficiency of Record Length
- * Zoom Window and Play/Pause Rapidly Navigate the Waveforms
- * 38 sets of Automatic Measurement Offer Various Measurement Selections
- * High Resolution Acquisition Mode
- * I²C/SPI/UART/CAN/LIN Serial Bus Trigger and Decoding Functions
- * Dual Channel Spectrum Analyzer (DC~2.5GHz) with Spectrogram
- * Dual Channel 25MHz Arbitrary Waveform Generator
- * Optional 13 Sets of Power Analysis Measurements
- * Optional 16 Digital Channels with a Logic Analyzer(MSO)
- * Flexible Remote Control Connectivity (Standard: USB/LAN/RS-232; Option: GPIB)

Page A5-10

D Two-channel/Three-channel Programmable Switching D.C. Power Supply



PSW-Multi Series

- * Multi-channel: Maximum 720W for Dual-channel Module and Maximum 1080W for Triple-channel Models; The PSW-Multi Series Also Features a New Built-in Function That Allows Individual or Synchronized Output Control of Each Voltage Module Output Latency Between Channels with the Same Voltage Module is Less Than 0.1ms
- * Multiple Voltage Combinations: Low Voltage Combinations Can be Selected From 30V/40V/80V/160V; High Voltage Combinations Can be Selected From 250V/800V
- * Advanced Web Server: Executes SCPI Commands; Web Controls Through Server; Data Log; Edit Sequence
- * CC/CV Priority Mode Selection is Ideal for Battery and LED Industries
- * Adjustable Rising and Falling Slew Rate
- * 720W/1080W Adopt 1/3, 1/2 Rack Mount Frame Designs (Standard EIA/JIS)
- * Standard Communications Interfaces: LAN, USB, External Analog Remote Control Terminal
- * Optional Communications Interfaces: GPIB-USB Adapter, RS232-USB Cable
- * Support LabVIEW Driver

Page D9-14

D Source Measure Unit



GSM-20H10

- * 4.3-inch TFT LCD
- * Maximum Output $\pm 210V/\pm 1.05A/22W$
- * 0.012% Basic Measurement Accuracy with 6 $\frac{1}{2}$ -digit Resolution
- * Variable Sampling Rate (Fast/Medium/Normal)
- * 2-, 4-, and 6-wire Remote V-source and Measurement Sensing
- * Provide SDM (Source Delay Measure) Cycle
- * Built-in 4 Sequence Output Modes (Stair, Log, SRC-MEM, Custom), up to 2500 Points
- * Built-in Limit Function, Supports 11 Groups of Limit Tests
- * Built-in 5 Calculation Functions
- * OVP/OTP Protection Function
- * Provide Digital Number Keyboard Input
- * Interface : RS-232, USBTMC, LAN, GPIB (Optional)

Page D39-42

D Programmable High-precision D.C. Power Supply



PPX-Series

- * CV, CC Priority Start Function
- * Four Levels of Current Measurement Resolution (min. 0.1 μ A)/Two Levels of Voltage Measurement Resolution (min. 0.1mV)
- * Power Output ON/OFF Delay Function
- * Adjustable Voltage and Current Slew Rate
- * Bleeder Circuit Control
- * Delayed Over-current Protection(OCP Delay)
- * Sequential Power Output Function
- * Remote Sensing Function & Data Logger
- * 10 Sets of Memory Function
- * Over Voltage Protection, Under Voltage Limit, Over Current Protection, Over Temperature Protection, AC Alarm Function
- * Supports K Type Thermocouple Temperature Measurement
- * Interfaces: USB, LAN, RS-232, RS-485, Analog Control; Opt: GPIB

Page D47-51

New Products

D Triple-channel Programmable DC Power Supply

CE RS-232 GPIB USB LAN Ext I/O



GPP-3060/6030/3650

- * 4.3" TFT LCD Display
- * Setting Resolution: 1mV/0.1mA; Read Back Resolution: 0.1mV/0.1mA
- * Low Ripple Noise: $\leq 1\text{mVrms}/\leq 2\text{mArms}$
- * Transient Response Time: $\leq 100\mu\text{s}$
- * Load Function (CC, CV, CR mode)
- * Tracking Series and Parallel Function without Additional External Wiring
- * Utilizing Hardware to Realize Over Voltage Protection/Over Current Protection/Over Temperature Protection
- * Delay Function/Output Monitoring Function/Output Recorder Function
- * Supports Setting Value, Measurement Value and Output Waveform Display
- * Sequential Output Function and Built-in 8 Template Waveforms
- * The Output Recorder Function Records the Output Voltage & Current Parameters with a Minimum Recording Interval of 1 Second
- * Provides 10 Sets of Memory for Each Sequence/Delay/Recorder/Panel Setting Condition
- * GPP-3060/6030 Supports a USB (Type A) Output Terminal
- * Intelligent Temperature Control Fan Effectively Reduces Noise
- * Standard: RS-232, USB, Ext I/O Optional (manufacturer installed only): LAN, LAN+GPIB

Page D52-55

D Programmable AC/DC Power Source

CE RS-232 GPIB USB LAN Ext I/O



ASR-3000 Series

- * Output Rating: AC 0 ~ 400 Vrms, DC 0 ~ $\pm 570\text{V}$
- * Output Frequency up to 999.9 Hz
- * DC Output (100% of Rated Power)
- * Measurement Items: Vrms, Vavg, Vpeak, Irms, IpkH, Iavg, Ipeak, P, S, Q, PF, CF
- * Voltage and Current Harmonic Analysis (THDv, THDi)
- * Remote Sensing Capability
- * OCP, OPP, OTP, AC Fail Detection and Fan Fail Alarm
- * Support Arbitrary Waveform Function
- * Output Capacity: 2kVA/ 3kVA/4kVA
- * Customized Phase Angle for Output On/Off
- * Sequence and Simulation Function (up to 10 sets)
- * Interface(std): USB, LAN, RS-232, GPIB
- * Built-in External Control I/O and External Signal Input
- * Built-in Output Relay Control & Memory Function (up to 10 sets)
- * Built-in Web Server

Page D73-78

D Programmable D.C. Electronic Load

CE RS-232 GPIB USB LabVIEW Driver LAN



PEL-2000A(B) Series

- * Sequence Function to do High Speed Load Simulations
- * Flexible Configuration with Mainframes and Load Capacity
- * Program Mode to Create Work Routines for Repetitive Tests
- * OPP/OCP/OVP/OTP/RVP/UVF Protections
- * External Channel Control/Monitoring via Analog Control Connector
- * Multi Interface :
 PEL-2000A Series : (Standard) USB and RS-232; (Option) LAN and GPIB
 PEL-2000B Series : (Standard) USB, RS-232C/RS485 and LAN;
 (Option) GPIB

Page D105-108

D High Power DC Electronic Load

CE RS-232 GPIB USB LAN



PEL-5000C Series

- * Maximum Power up to 192kW
- * Up to 8 units of Master/Slave Parallel Control
- * 5-digit Digital Voltage, Current and Power Meter
- * Large LCD Display
- * Display Voltage Value, Current Value, Watt Value at the Same Time
- * Suitable for Power Factor Regulator (PFC) Testing (600V, 1200V Models)
- * Automatically Perform OCP, OPP Test
- * The Power-on State Value Can be Set
- * Constant Current, Constant Resistance, Constant Voltage, Constant Power, Constant Current + Constant Voltage, Constant Power + Constant Voltage, Dynamic and Short Circuit Modes
- * Short Circuit Time Can be Set During Short Circuit Test
- * Over Current, Over Power, Over Temperature Protection and Over Voltage Warning
- * Voltage Polarity Display Can be Set to Positive Value ("+") or Negative Value ("-")
- * Support Solar Panel MPPT Test
- * Optional Interface: GPIB, RS232, USB, LAN

Page D109-116

D DC Electronic Load

CE RS-232 USB



PEL-500 Series

NEW

- * 5-digit Digital Voltage, Current and Power Meter
- * Simultaneous Display of Voltage, Current, and Watts
- * Short-circuit Time Can be Set During Short-circuit Test
- * Automatic Test Function of Overcurrent Protection/Overpower Protection
- * The Battery Discharge Test Function Can Set the Discharge Stop Voltage(V_{batt}), Discharge Capacity(AH, WH) and Stop Discharge Time
- * Surge Test Can Simulate Boot Overshoot Current and Transient Current From Hot Plugging
- * Constant Current, Constant Resistance, Constant Voltage, Constant Power and Dynamic Mode
- * Overvoltage, Overcurrent, Overpower, Over Temperature Protection and Reverse Polarity Detection
- * Voltage Polarity Display Can be set to Positive Value "+" or Negative Value "-"
- * Communications Interface: RS232, USB

Page D117-118

D AC & DC Electronic Load

CE RS-232 GPIB USB LAN



AEL-5000 Series

NEW

- * Turbo Mode (Multiplier Mode) Can Withstand up to 2 Times the Rating Current and Power of the Electronic Load in a Short Period of Time
- * Operating Mode: CC, linear CC, CR, CV, CP and AC Rectifier Loads
- * Measurement Items: Voltage Value(V_{rms}, V_{peak}, V_{max}, V_{min}), Current Value(I_{rms}, I_{peak}, I_{max}, I_{min}), Watt Value, Volt-ampere Value(VA), Frequency Value, Crest Factor, Power Factor, Voltage Total Distortion(V THD, VH), Current Total Distortion(I THD, IH), Etc
- * Eight Units Connected in Parallel up to 180kW for Single-phase and 540kW for Three-phase
- * Support Loading and Unloading Angle Control, Loading and Unloading Angle Control Can be set at the Full Range of 0-359 Degrees
- * Support Positive Half Cycle or Negative Half Cycle Load
- * Support SCR/TRIAC Current Phase Modulation Waveform, 90-degree Trailing Edge and Leading Edge
- * Support the Capacitive Load (Inrush Current) when the Power Supply is Turned on and the Transient Current (Surge Current) Test when the Load is Suddenly Connected (Hot Plug-in) During Operation
- * Crest Factor Range: 1.414-5.0
- * Power Factor Range: 0.1-1.0 Leading or Trailing
- * Frequency Range: DC, 40-440Hz(AEL-5003-480-18.75/AEL-5004-480-28: DC, 40-70Hz) , and 800Hz and 1kHz Need to be Customized
- * Optional Control Interfaces: GPIB, RS-232, USB, LAN

Page D119-124

D High Power DC Electronic Load

CE RS-232 GPIB USB LAN UK CA



PEL-5000G Series

NEW

- * 4U/6K High Power Density Design Also for Bench Testing
- * Turbo Mode Function, Which Allows 1.5 Times the Rated Power or Current to be Used Within Two Seconds
- * Turbo Mode can be Used with OCP/OPP/BMS/Short Mode/Surge Mode/ Hot Plug-In Testing
- * High Tolerance to Environmental Temperature, with 4k/5kW Models not Affected by Environmental Temperature in Power Usage
- * Can set the Power-on Status Value
- * Short Circuit Duration Can be set Within Short Circuit Test Voltage Meter Display Can be Configured as Polarity Positive ("+") or Negative("-")
- * Optional Interface : GPIB, RS232, USB, LAN
- * Protection function Testing for Battery BMS
- * Protection Against V, I, W, and °C

Page D125-128

E High Frequency LCR Meter

CE USB Device USB Host LAN RS-232 Handler Trigger GPIB PC Software



LCR-8200(A) Series

NEW

- * Wide Test Frequency :
LCR-8200A : DC, 10Hz ~ 50/30/20/10/5 MHz
LCR-8200 : DC, 10Hz ~ 30/20/10/5/1 MHz
- * 7" LCD color Display
- * 0.08% Basic Accuracy
- * Displaying Four Measurement Results Simultaneously From 17 Selectable Measurement Parameters Freely
- * 15 Steps List Measurement
- * Two Curves Sweep Mode
- * Equivalent Circuit Model Analysis (LCR-8200A only)
- * Internal DC Bias Voltage ±12V
- * USB Storage Available
- * ALC Function Available
- * Standard Interfaces : RS-232C, USB Host/Device, LAN, GPIB and Handler
- * Universal Power Input

Page E21-24

New Products

E AC/DC/IR/GB Electrical Safety Analyzer



NEW

GPT-15000 Series

- * 500VA AC Test Capacity (short circuit current > 200mA)
- * 7" TFT LCD
- * Comply with IEC 61010-2-034 Design Requirement
- * Manual Test Mode/Auto Test Mode
- * RMS Current Measurement
- * Zero Crossing Turn-on Operation
- * Controllable Ramp-up & Ramp-down Time
- * Statistics & Analysis Function
- * Capacitive Load Testing Capability up to 47 μ F
- * Sweep Function for DUT Characteristic Analysis
- * Convenience Listed AUTO Mode Easy to Read Result and Judge
- * Internal Storage and USB Storage Available
- * Barcode Function Available
- * Setting Data Export/Import
- * Rear Panel Output Available
- * Standard Interface : RS-232C, USB host/device and Signal I/O
- * Optional Interface : GPIB or LAN
- * Universal Power Input

Page E33-38

E Multi-Channel Hipot Tester



NEW

GPT-9500 Series

- * 150VA AC Test Capacity
- * 3 in 1 Tester : AC, DC, IR
- * Built-in 8 Channel Scanner
- * 480 x 272 Color TFT LCD
- * Test Parameter Export/Import Through USB Host
- * Statistics (Counter) Function
- * Insulation Resistance Measurement up to 10G Ω
- * Open/Short Check (OSC)
- * ARC Detection
- * Multi-language : Traditional/Simplified Chinese, English
- * Interface : RS-232C, USB Host/Device and Signal I/O

Page E47-50

E Leakage Current Tester



NEW

GLC-10000

- * Suitable for Medical Electrical & General Electrical of Leakage Current Measurement
- * 7" Touch Pane with Color LCD
- * 11 Different Measurement Network to Simulate the Resistance of Human Body (Including IEC 60601-1:2020 3.2rd)
- * The Measurement of Maximum Allowable Leakage Current is Up to 50mA
- * External Terminal for Extension MD Connection
- * MD OUT Terminal can be Connected to an Oscilloscope for Convenient Comparison of Measured Waveforms
- * 30 Sets Memories for Test Parameter; 1000 Sets Memories for Measured Data.
- * Test Parameter Export/Import Function Through USB Host
- * USB Storage for Measurement Data/Screen Capture
- * Various Standard Interfaces: RS-232C, USB Host & Device, LAN, Signal I/O and GPIB (Optional)

Page E51-52

E Digital Power Meter



NEW

GPM-8320/8330

- * 5" TFT LCD
- * Voltage/Current Meter Test Freq. Bandwidth: DC, 0.1Hz ~ 100kHz
- * Waveform Display : V (Voltage), I (Current), P (Wattage)
- * Distorted wave Current/Voltage Measurement: Full Range for CF=3, and Half Range for CF=6 (or 6A)
- * Meeting IEC 61000-4-7 Harmonic Measurement (50/60Hz)
- * Wiring Selecting Button (1P3W, 3P3W, 3P4W, 3V3A)
- * Harmonic Measurement & Analysis up to 50 Orders
- * Auto Ranging Function for Integration Mode
- * Screen Capture Through USB Host
- * Provide External Current Sensor Input (EXT1/EXT2)
- * Standard Interface: RS-232C, USB Device/Host, LAN
- * Optional Interface: GPM-DA12 - GPIB + Digital I/O (Factory Installed Only)

Page E63-68

Model Number Index

AD		
ADB-002	Accessory – DC Block BNC 50 Ohm 10MHz to 2.2GHz	B25
ADB-006	Accessory – DC Block N-TYPE 50 Ohm 10MHz to 6GHz	B25
ADB-008	Accessory – DC Block SMA 50 Ohm 0.1MHz to 8GHz	B25
ADP-001	Accessory – Adaptor, 50Ω, BNC(I/F) - N(P/M)	B25
ADP-002	Accessory – Adaptor, 50Ω, SMA(I/F) - N(P/M)	B25
ADP-003	Accessory – Adaptor, 50Ω, N(I/F) - SMA(I/F)	C34
ADP-101	Accessory – Adaptor, 75Ω BNC(I/F) - 50Ω BNC(P/M)	B25
AE		
AEL-5002-350-18.75	50V/18.75A/1875W AC & DC Electronic Load	D119
AEL-5003-350-28	350V/28A/2800W AC & DC Electronic Load	D119
AEL-5004-350-37.5	350V/37.5A/3750W AC & DC Electronic Load	D119
AEL-5006-350-56	350V/56A/5600W AC & DC Electronic Load	D119
AEL-5008-350-75	350V/75A/7500W AC & DC Electronic Load	D119
AEL-5012-350-112.5	350V/112.5A/11250W AC & DC Electronic Load	D119
AEL-5015-350-112.5	350V/112.5A/15000W AC & DC Electronic Load	D119
AEL-5019-350-112.5	350V/112.5A/18750W AC & DC Electronic Load	D119
AEL-5023-350-112.5	350V/112.5A/22500W AC & DC Electronic Load	D119
AEL-5002-425-18.75	425V/18.75A/1875W AC & DC Electronic Load	D119
AEL-5003-425-28	425V/28A/2800W AC & DC Electronic Load	D119
AEL-5004-425-37.5	425V/37.5A/3750W AC & DC Electronic Load	D119
AEL-5006-425-56	425V/56A/5600W AC & DC Electronic Load	D119
AEL-5008-425-75	425V/75A/7500W AC & DC Electronic Load	D119
AEL-5012-425-112.5	425V/112.5A/11250W AC & DC Electronic Load	D119
AEL-5015-425-112.5	425V/112.5A/15000W AC & DC Electronic Load	D119
AEL-5019-425-112.5	425V/112.5A/18750W AC & DC Electronic Load	D119
AEL-5023-425-112.5	425V/112.5A/22500W AC & DC Electronic Load	D119
AEL-5003-480-18.75	480V/18.75A/2800W AC & DC Electronic Load	D119
AEL-5004-480-28	480V/28A/3750W AC & DC Electronic Load	D119
AF		
AFG-2005	5MHz Arbitrary Waveform Function Generator	C26
AFG-2012	12MHz Arbitrary Waveform Function Generator	C26
AFG-2025	25MHz Arbitrary Waveform Function Generator	C26
AFG-2105	5MHz Arbitrary Waveform Function Generator with Sweep Mode, AM/FM/FSK Modulation & Ext. Counter	C26
AFG-2112	12MHz Arbitrary Waveform Function Generator with Sweep Mode, AM/FM/FSK Modulation & Ext. Counter	C26
AFG-2125	25MHz Arbitrary Waveform Function Generator with Sweep Mode, AM/FM/FSK Modulation & Ext. Counter	C26
AFG-2225	25MHz True Dual Channel, Arbitrary Function Generator	C26
AFG-3031	30MHz Single Channel Arbitrary Function Generator	C6
AFG-3032	30MHz Dual Channel Arbitrary Function Generator	C6
AFG-3021	20MHz Single Channel Arbitrary Function Generator	C6
AFG-3022	20MHz Dual Channel Arbitrary Function Generator	C6
AFG-3051	50MHz Arbitrary Function Generator	C14
AFG-3081	80MHz Arbitrary Function Generator	C14
AP		
APS-001	Accessory – GPIB Interface Card	D129
APS-002	Accessory – RS-232/USB Interface Card	D129
APS-003	Accessory – Output Voltage Capacity (0 – 600Vrms)	D129
APS-004	Accessory – Output Frequency Capacity (45–999.9Hz)	D129
APS-007	Accessory – RS-232 Interface Card	D129
APS-008	Accessory – Air Inlet Filter	D129
APS-7050	500VA Programmable Linear AC Power Source	D83
APS-7100	1000VA Programmable Linear AC Power Source	D83
APS-7050E	500VA AC Power Source	D87
APS-7100E	1000VA AC Power Source	D87
APS-7200	2000VA Programmable Linear AC Power Source	D83
APS-7300	3000VA Programmable Linear AC Power Source	D83
AS		
ASR-001	Accessory – Air Inlet Filter	D129
ASR-002	Accessory – External Three Phase Control Unit	D129
ASR-2050	500VA Programmable AC/DC Power Source	D79
ASR-2100	1000VA Programmable AC/DC Power Source	D79
ASR-2050R	500VA Programmable AC/DC Power Source for 3U 1/2 Rack Mount	D79
ASR-2100R	1000VA Programmable AC/DC Power Source for 3U 1/2 Rack Mount	D79
ASR-3200	2kVA Programmable AC/DC Power Source	D73
ASR-3300	3kVA Programmable AC/DC Power Source	D73
ASR-3400	4kVA Programmable AC/DC Power Source	D73
ASR-3400HF	4kVA Programmable AC/DC Power Source	D73
AT		
ATA-001	Accessory – Antenna, General FM Antenna, BNC(M)	B25
ATN-100	Accessory – Adaptor, 10dB Attenuator, 50Ω, N(I/F)-N(P/M)	B25
DS		
DS2-08LA	Accessory – 8-Channel Logic Analyzer, Includes 8-channel Logic Analyzer Card(GLA-08) and 8-channel Logic Analyser Probe(GTL-08LA)	A42
DS2-16LA	Accessory – 16-Channel Logic Analyzer, Includes 16-channel Logic Analyzer Card(GLA-16) and 16-channel Logic Analyser Probe(GTL-16LA)	A42
DS2-FGN	Accessory – DDS Function Generator, 5MHz, Sine/Square/Triangle/Pulse Function	A42
DS2-GPIB	Accessory – GPIB Interface	A42
DS2-LAN	Accessory – Ethernet & SVGA Output	A42
DS3A-PWR	Accessory – 13 sets of Power Analysis Measurements	A42
DS3A-GPIB	Accessory – GPIB Interface	A42
DS3A-16LA	Accessory – 16 Channel Logic Analyzer	A42
DS3-PWR	Accessory – Power Analysis Software: Power Quality/Harmonic/Ripple/In-rush Current Measurement	A42
DS3-SBD	Accessory – Serial Bus Analysis Software I2C / SPI/ UART (for 4 Channel Model Only)	A42
GA		
GAD-201G	Automatic Distortion Meter	E75
GAG-810	1MHz Audio Generator with Low Distortion	C31
GAK-001	Accessory – Adaptor, 50Ω Termination, N(P/M)	B25
GAK-002	Accessory – Adaptor, Cap with Chain, N(P/M)	B25
GAK-003	Accessory – Adaptor, 50Ω Termination, BNC(P/M)	A42
GAP-001	Accessory – AC-DC Adaptor	A42
GB		
GBK-001	Accessory – GRF-1300 Experiment Text Book of Teacher Version	B25
GBK-002	Accessory – GRF-1300A Experiment Text Book of Teacher Version	B25
GBM-3080	80V Battery Meter	E60
GBM-3300	300V Battery Meter	E60
GBM-01	Accessory – 4 Wire (kelvin clip) Test Lead, 90V (max.), Approx. 1100mm	E61
GBM-02	Accessory – 4 Wire (single pin) Test Probe, 80V (max.), Approx. 1100mm	E61
GBM-03	Accessory – 4 Wire (twin pin) Test Probe, 300V (max.), Approx. 1400mm	E61
GBM-S1	Accessory – Short Bar (for GBM-02/GBM-03)	E61
GC		
GCL-001	Accessory – Vertical Calibration Cable	A42
GCP-206P	Accessory – Current Probe - Power Supply, 2 Channel Power Supply for GCP-530/1030	A46
GCP-300	Accessory – 300kHz/400A Current Probe	A46
GCP-425P	Accessory – Current Probe - Power Supply, 4 Channel Power Supply for GCP-530/1030	A46
GCP-500	Accessory – 500kHz/200A Current Probe	A46
GCP-530	Accessory – Current Probe, DC – 50MHz, 30Arms	A46
GCP-1000	Accessory – 1MHz/70A Current Probe	A46
GCP-1030	Accessory – Current Probe, DC ~ 100MHz, 30Arms	A46
GCT-9040	AC Ground Bond Tester	E43
GD		
GDB-03	Oscilloscope Education & Training Kit	A41
GDM-01	Accessory – Calibration Key	E7
GDM-531	6000 Counts Hand-Held DMM	E17
GDM-532	9999 Counts Hand-Held DMM with True RMS Measurement	E17
GDM-533	6000 Counts Hand-Held DMM with True RMS Measurement and USB Interface	E17
GDM-541	22000 Counts Hand-Held DMM with True RMS Measurement and USB Interface	E17
GDM-8245	50,000 Counts Dual Display Digital Multimeter	E15
GDM-8255A	5 ½ Digit (199,999 Counts) Dual Measurement Multimeter	E9
GDM-8261A	6 ½ Digit (1,200,000 Counts) Dual Measurement Multimeter	E7
GDM-82G1	Accessory – GPIB Card	E7
GDM-82L1	Accessory – LAN Card	E7
GDM-8341	50,000 Counts Dual Measurement Multimeter	E13
GDM-8342	50,000 Counts Dual Measurement Multimeter	E13
GDM-8351	5 ½ Digit (120,000 Counts) Dual Measurement Multimeter	E11
GDM-83G1	Accessory – GPIB Card	E13
GDM-9060	6 ½ Digit (1200,000 Counts) Dual Measurement Multimeter	E3
GDM-9061	6 ½ Digit (1200,000 Counts) Dual Measurement Multimeter	E3
GDM-90G1	Accessory – GPIB Card	E3
GDM-SC1A	Accessory – Scanner Card, 16+2 Channels	E83
GDM-TL1	Accessory – Test Lead Set	E83
GDS-207	70MHz, 2-Channel, Full Touch Panel, Digital Storage Oscilloscope	A33
GDS-2072A	70MHz, 2-Channel, Digital Storage Oscilloscope	A13
GDS-210	100MHz, 2-Channel, Full Touch Panel, Digital Storage Oscilloscope	A33
GDS-220	200MHz, 2-Channel, Full Touch Panel, Digital Storage Oscilloscope	A33

Model Number Index

GDS-307	70MHz, 2-Channel, Full Touch Panel, Digital Storage Oscilloscope	A33	GLC-9000	Leakage Current Tester	E53
GDS-310	100MHz, 2-Channel, Full Touch Panel, Digital Storage Oscilloscope	A33	GLC-10000	Leakage Current Tester	E51
GDS-320	200MHz, 2-Channel, Full Touch Panel, Digital Storage Oscilloscope	A33	GLN-5040A	Accessory -- Line Impedance Stabilization Network	B25
GDP-025	Accessory -- 25MHz High Voltage Differential Probe	A46	GO		
GDP-040D	Accessory -- 40MHz High Voltage Differential Probe	A46	GOM-804	50,000 Counts Programmable D.C. Milli-Ohm Meter	E57
GDP-050	Accessory -- 50MHz High Voltage Differential Probe	A46	GOM-805	50,000 Counts Programmable D.C. Milli-Ohm Meter	E57
GDP-100	Accessory -- 100MHz High Voltage Differential Probe	A46	GOM-80G1	Accessory -- GPIB Card	E57
GDS-1072B	70MHz, 2-Channel, Digital Storage Oscilloscope	A35	GP		
GDS-1054B	50MHz, 4-Channel, Digital Storage Oscilloscope	A35	GPC-3060D	375W, 3-Channel, Linear D.C. Power Supply	D66
GDS-1074B	70MHz, 4-Channel, Digital Storage Oscilloscope	A35	GPC-6030D	375W, 3-Channel, Linear D.C. Power Supply	D66
GDS-1102B	100MHz, 2-Channel, Digital Storage Oscilloscope	A35	GPD-2303S	180W, 2-Channel, Programmable Linear D.C. Power Supply	D58
GDS-1104B	100MHz, 4-Channel, Digital Storage Oscilloscope	A35	GPD-3303D	195W, 3-Channel, Programmable Linear D.C. Power Supply	D58
GDS-1202B	200MHz, 2-Channel, Digital Storage Oscilloscope	A35	GPD-3303S	195W, 3-Channel, Programmable Linear D.C. Power Supply	D58
GDS-2074A	70MHz, 4-Channel, Digital Storage Oscilloscope	A13	GPD-4303S	195W, 4-Channel, Programmable Linear D.C. Power Supply	D58
GDS-2102A	100MHz, 2-Channel, Digital Storage Oscilloscope	A13	GPE-1326	192W, Single Channel, Linear D.C. Power Supply	D64
GDS-2104A	100MHz, 4-Channel, Digital Storage Oscilloscope	A13	GPE-2323	192W, 2-Channel, Linear D.C. Power Supply	D64
GDS-2202A	200MHz, 2-Channel, Digital Storage Oscilloscope	A13	GPE-3323	217W, 3-Channel, Linear D.C. Power Supply	D64
GDS-2204A	200MHz, 4-Channel, Digital Storage Oscilloscope	A13	GPE-4323	212W, 4-Channel, Linear D.C. Power Supply	D64
GDS-2302A	300MHz, 2-Channel, Digital Storage Oscilloscope	A13	GPF-700	Accessory -- Protection Films for 7" Touch Screen	A34
GDS-2304A	300MHz, 4-Channel, Digital Storage Oscilloscope	A13	GPL-5010	Accessory -- Transient Limiter	B25
GDS-2072E	70MHz, 2-Channel, Digital Storage Oscilloscope	A31	GPM-001	Accessory -- Test Fixture (Universal or Europe Type Socket)	E83
GDS-2074E	70MHz, 4-Channel, Digital Storage Oscilloscope	A31	GPM-002	Accessory -- Terminal Cover	E63
GDS-2102E	100MHz, 2-Channel, Digital Storage Oscilloscope	A31	GPM-DA4	Accessory -- DA4 Interface (factory install)	E69
GDS-2104E	100MHz, 4-Channel, Digital Storage Oscilloscope	A31	GPM-DA12	Accessory -- GPIB+DA12 Interface (including cable, GTL-214)	E63
GDS-2202E	200MHz, 2-Channel, Digital Storage Oscilloscope	A31	GPM-8213	Digital Power Meter	E75
GDS-2204E	200MHz, 4-Channel, Digital Storage Oscilloscope	A31	GPM-82G1	Accessory -- GPIB Card	E75
GDS-3354	350MHz, 4-Channel, Visual Persistence Oscilloscope	A11	GPM-8310	Digital Power Meter	E69
GDS-3502	500MHz, 2-Channel, Visual Persistence Oscilloscope	A11	GPM-8320	Digital Power Meter	E63
GDS-3504	500MHz, 4-Channel, Visual Persistence Oscilloscope	A11	GPM-8330	Digital Power Meter	E63
GDS-3352A	350MHz, 2-Channel, Visual Persistence Oscilloscope	A5	GPP-1326	Single-Output Programmable DC Power Supply	D56
GDS-3354A	350MHz, 4-Channel, Visual Persistence Oscilloscope	A5	GPP-2323	Dual-Output Programmable DC Power Supply	D56
GDS-3652A	650MHz, 2-Channel, Visual Persistence Oscilloscope	A5	GPP-3323	Three-Output Programmable DC Power Supply	D56
GDS-3654A	650MHz, 4-Channel, Visual Persistence Oscilloscope	A5	GPP-3060	385W Triple-channel Programmable DC Power Supply	D52
GE			GPP-3650	385W Triple-channel Programmable DC Power Supply	D52
GET-001	Accessory -- Extended Terminal for 30V/80V/160V Models	D129	GPP-4323	Four-Output Programmable DC Power Supply	D56
GET-002	Accessory -- Extended Terminal for 250V/800V Models	D129	GPP-6030	385W Triple-channel Programmable DC Power Supply	D52
GET-003	Accessory -- Extended Universal Power Socket	D129	GPR-0830HD	240W Linear D.C. Power Supply	D67
GET-004	Accessory -- Extended European Power Socket	D129	GPR-11H30D	330W Linear D.C. Power Supply	D67
GET-005	Accessory -- Extended European Terminal for 30V/80V/160V Models	D129	GPR-1810HD	180W Linear D.C. Power Supply	D68
GH			GPR-1820HD	360W Linear D.C. Power Supply	D67
GHT-108	Accessory -- H.V. Wiring Lead, Approx. 500mm	E83	GPR-3060D	180W Linear D.C. Power Supply	D68
GHT-109	Accessory -- G.B Wiring Lead, Approx. 450mm	E83	GPR-30H10D	300W Linear D.C. Power Supply	D67
GHT-113	Accessory -- High Voltage Test Pistol, Approx. 2000mm	E83	GPR-3510HD	350W Linear D.C. Power Supply	D67
GHT-114	Accessory -- High Voltage Test Lead, Approx. 1000mm	E83	GPR-6030D	180W Linear D.C. Power Supply	D68
GHT-115	Accessory -- High Voltage/Continuity Test Lead, Approx. 1000mm	E83	GPR-6060D	360W Linear D.C. Power Supply	D67
GHT-116B	Accessory -- High Voltage Test Lead (Black only), Approx. 1500mm	E83	GPR-7550D	375W Linear D.C. Power Supply	D67
GHT-116R	Accessory -- High Voltage Test Lead (Red only), Approx. 1500mm	E83	GPS-001	Accessory -- Knob, Voltage/Current Protection Knob	D129
GHT-117	Accessory -- High Voltage Adapter Box	E83	GPS-1830D	54W Linear D.C. Power Supply	D69
GHT-117(EU)	Accessory -- High Voltage Adapter Box	E83	GPS-1850D	90W Linear D.C. Power Supply	D69
GHT-118	Accessory -- High Voltage/Ground Bond Adapter Box	E83	GPS-3030D	90W Linear D.C. Power Supply	D69
GHT-118(EU)	Accessory -- High Voltage/Ground Bond Adapter Box	E83	GPS-3030DD	90W Linear D.C. Power Supply	D69
GHT-119	Accessory -- Remote Terminal Cable, Approx. 500mm	E83	GPS-2303	180W, 2-Channel, Linear D.C. Power Supply	D65
GHT-205	Accessory -- High Voltage Test Probe, Approx. 1100mm	E83	GPS-3303	195W, 3-Channel, Linear D.C. Power Supply	D65
GI			GPS-4303	200W, 4-Channel, Linear D.C. Power Supply	D65
GIT-5060	Accessory -- Isolated Transformer	B25	GPT-9503	AC 150VA Multi-Channel Hipot Tester	E47
GK			GPT-9513	AC 150VA Multi-Channel Hipot Tester	E47
GKT-001	Accessory -- General Kit Set, Including ADP-002, ATN-100, GTL-303, GSC-002	B25	GPT-9601	100VA AC Withstanding Voltage Tester	E45
GKT-002	Accessory -- CATV Kit Set, Including ADP-001, ADP-101, GTL-304, GSC-003	B25	GPT-9602	100VA AC/DC Withstanding Voltage Tester	E45
GKT-003	Accessory -- RLB Kit Set, Including GAK-001, GAK-002, GTL-302, GSC-004	B25	GPT-9603	100VA AC/DC Withstanding Voltage/Insulation Resistance Tester	E45
GKT-008	Accessory -- EMI Probe Kit Set, Including ANT-04, ANT-05, PR-01, PR-02, ADP-002, GTL-303	B25	GPT-9612	100VA AC Withstanding Voltage/Insulation Resistance Tester	E45
GKT-100	Accessory -- Deskew Fixture	A44	GPT-9801	200VA AC Withstanding Voltage Tester	E39
GL			GPT-9802	200VA AC/DC Withstanding Voltage Tester	E39
GLC-01	Accessory -- Alligator Clips	E83	GPT-9803	200VA AC/DC Withstanding Voltage/Insulation Resistance Tester	E39
GLC-02	Accessory -- Foil Probe	E83	GPT-9804	200VA AC/DC Withstanding Voltage/Insulation Resistance/ Ground Bond Tester	E39
GLC-03	Accessory -- Power Cord for EUT	E51	GPT-9901A	500VA AC Withstanding Voltage Tester	E39
GLC-04	Accessory -- Input & output terminal cover	E51	GPT-9902A	500VA AC/DC Withstanding Voltage Tester	E39
GLC-10KG1	Accessory -- GPIB Card	E51	GPT-9903A	500VA AC/DC Withstanding Voltage/Insulation Resistance Tester	E39
			GPT-9904	500VA AC/DC Withstanding Voltage/Insulation Resistance/ Ground Bond Tester	E39
			GPT-9KG1	Accessory -- GPIB Card	E35
			GPT-10KG1	Accessory -- GPIB Card	E35
			GPT-10KL1	Accessory -- LAN Card	E35
			GPT-12001	AC Electrical Safety Analyzer	E33

GPT-12002	AC/DC Electrical Safety Analyzer	E33
GPT-12003	AC/DC/IR Electrical Safety Analyzer	E33
GPT-12004	AC/DC/IR/GB Electrical Safety Analyzer	E33
GPT-15001	AC Electrical Safety Analyzer	E33
GPT-15002	AC/DC Electrical Safety Analyzer	E33
GPT-15003	AC/DC/IR Electrical Safety Analyzer	E33
GPT-15004	AC/DC/IR/GB Electrical Safety Analyzer	E33
GPW-001	Accessory -- UL/CSA Power Cord, 3000mm	D129
GPW-002	Accessory -- VDE Power Cord, 3000mm	D129
GPW-003	Accessory -- PSE Power Cord, 3000mm	D129
GPW-005	Accessory -- Power Cord, 3000mm	D129
GPW-006	Accessory -- Power Cord, 3000mm	D129
GPW-007	Accessory -- Power Cord, 3000mm	D129

GR

GRA-401	Accessory -- Rack Adapter Kit, 19", 4U Size	D129
GRA-403	Accessory -- Rack Adapter Kit, 19", 4U Size	D129
GRA-407	Accessory -- Rack Adapter Kit, 19", 4U Size	D129
GRA-408	Accessory -- Rack Adapter Kit, 19", 4U Size	D129
GRA-409	Accessory -- Rack Adapter Kit, 19", 4U Size	D129
GRA-410-E	Accessory -- Rack Mount Kit (EIA), 19", 3U Size	D129
GRA-410-J	Accessory -- Rack Mount Kit (JIS), 19", 3U Size	D129
GRA-411	Accessory -- Rack Mount Kit	A45
GRA-413-E	Accessory -- Rack Mount Kit (EIA), 19", 3U Size for PEL-3211	D129
GRA-413-J	Accessory -- Rack Mount Kit (JIS), 19", 3U Size for PEL-3211	D129
GRA-414-E	Accessory -- Rack Mount Kit (EIA), 19", 3U Size for PEL-3021/3041/3111	D129
GRA-414-J	Accessory -- Rack Mount Kit (JIS), 19", 3U Size for PEL-3021/3041/3111	D129
GRA-415	Accessory -- Rack Mount Kit, 19", 6U Size	B25
GRA-417	Accessory -- Rack Mount Kit, 19", 4U Size	E83
GRA-418-E	Accessory -- Rack Mount Kit (EIA), 19", 2U Size	D129
GRA-418-J	Accessory -- Rack Mount Kit (JIS), 19", 2U Size	D129
GRA-419-E	Accessory -- Rack Mount Kit (EIA), 19", 2U Size	E83
GRA-419-J	Accessory -- Rack Mount Kit (JIS), 19", 2U Size	E83
GRA-420	Accessory -- Rack Mount Kit	A45
GRA-422	Accessory -- Rack Mount Kit, 19", 2U Size	E83
GRA-423	Accessory -- Rack Mount Kit, 19", 2U Size	D129
GRA-424	Accessory -- Rack Mount Kit, 19", 2U Size	D129
GRA-426	Accessory -- Rack Mount Kit	A45
GRA-428	Accessory -- Rack Mount Kit (EIA), 19", 3U Size	D129
GRA-429	Accessory -- Rack Mount Kit, 7U Size	D129
GRA-430	Accessory -- Rack Mount Kit, 9U Size	D129
GRA-431-J	Accessory -- Rack Mount Kit (JIS)	D129
GRA-431-E	Accessory -- Rack Mount Kit (EIA)	D129
GRA-432	Accessory -- Rack Adapter Kit	C34
GRA-433	Accessory -- Rack Mount Kit, 19", 4U Size	E83
GRA-438	Accessory -- Rack Mount Kit 19", 4U Size	E83
GRA-439-J	Accessory -- Rack Mount Kit (JIS), 19", 4U Size	D129
GRA-439-E	Accessory -- Rack Mount Kit (EIA), 19", 4U Size	D129
GRA-440	Accessory -- Rack Mount Kit 19", 4U Size	E83
GRA-441-J	Accessory -- Rack Mount Kit (JIS), 19", 4U Size	D129
GRA-441-E	Accessory -- Rack Mount Kit (EIA), 19", 4U Size	D129
GRA-442-J	Accessory -- Rack Mount Kit (JIS), 19", 4U Size	D129
GRA-442-E	Accessory -- Rack Mount Kit (EIA), 19", 4U Size	D129
GRA-443	Accessory -- Rack Mount Kit	A45
GRA-445	Accessory -- Rack Mount Kit, 19", 4U Size	E83
GRA-449-J	Accessory -- Rack Mount Kit (JIS), 19", 3U Size	D129
GRA-449-E	Accessory -- Rack Mount Kit (EIA), 19", 4U Size	D129
GRA-452	Accessory -- Rack Mount Kit, 19" 3U Size	E83
GRF-1300	RF & Spectrum Analyzer Training System	B19
GRF-1300A	RF & Spectrum Analyzer Training System	B19
GRJ-1101	Accessory -- Module Cable (0.5m)	D129
GRM-001	Accessory -- Slide Bracket 2pcs/set	D129

GS

GSB-01	Multiplex Scanner Box, 8-Channel High Voltage	E40
GSB-02	Multiplex Scanner Box, 6-Channel High Voltage & 2-Channel Ground Bond	E40
GSC-008	Accessory -- Soft carrying Case	A42
GSC-009	Accessory -- Soft Carrying Case	B25
GSC-010	Accessory -- Soft Carrying Case	A42
GSC-011	Accessory -- Soft Carrying Bag	A42
GSC-014	Accessory -- Soft Carrying Case for DMM Accessory	E83
GSM-20H10	Source Measure Unit	D39
GSP-730	3GHz Spectrum Analyzer	B19

GSP-818	1.8GHz Spectrum Analyzer	B16
GSP-9300B	3GHz Spectrum Analyzer	B13
GSP-9330	3.25GHz Spectrum Analyzer	B5

GT

GTL-08LA	Accessory -- Logic Analyzer Probe, 8-Channel Logic Analyzer Probe for A42 DS2-8LA	
GTL-16E	Accessory -- 16-Channel Logic Analyzer Probe	A42
GTL-101	Accessory -- Test Lead, BNC(P/M) to Alligator Test Lead, 1100mm	C34
GTL-103	Accessory -- Test Lead, Banana to Alligator, Approx. 1200mm	E83
GTL-104A	Accessory -- Test Lead, U-type to Alligator Test Lead, Max. Current 10A, 1000mm	D129
GTL-108A	Accessory -- 4 Wire (Kelvin Clip) Test Lead, Approx. 1100mm	E83
GTL-110	Accessory -- BNC Cable, BNC(P/M)-BNC(P/M), 1000mm	A42
GTL-115	Accessory -- G.B. Test Lead, U Type to Alligator, Approx. 1000mm	E83
GTL-116B	Accessory -- G.B. Test Lead (Black Only), U Type to Alligator, Approx. 1500mm	E83
GTL-116R	Accessory -- G.B. Test Lead (Red Only), U Type to Alligator, Approx. 1500mm	E83
GTL-117	Accessory -- Test Lead, Banana to Probe, Approx. 1200mm	E83
GTL-120	Accessory -- Test Lead, O-type to O-type Test Lead, Max. 40A, 1200mm	D129
GTL-121	Accessory -- Sense Lead, O-type to free Lead, 1200mm	D129
GTL-122	Accessory -- Test Lead, U-type to Alligator Test Lead, Max. Current 40A, 1200mm	D129
GTL-123	Accessory -- Test Lead, O-type to O-type Test Lead, 1200mm	D129
GTL-130	Accessory -- Test Leads: 2 x red, 2 x Black, for 250V/800V Models, 1200mm	D129
GTL-131	Accessory -- Test Clip, Suitable for GDP-040D	A42
GTL-132	Accessory -- LINK Cable, Approx. 250mm	E83
GTL-134	Accessory -- Test Leads for Rear Panel, 1200mm, 10A, 16 AWG	D129
GTL-137	Accessory -- Output Power wire(load wire_10AWG:50A, 600V/sense wire_16AWG:20A, 600V)	D129
GTL-202	Accessory -- Sense Lead, Banana to Banana Lead, European Terminal, 200mm	D129
GTL-203A	Accessory -- Test Lead, Banana to Alligator, European Terminal, Max. Current 3A, 1000mm	D129
GTL-204A	Accessory -- Test Lead, Banana to Alligator, European Terminal, Max. Current 10A, 1000mm	D129
GTL-205A	Accessory -- Temperature Probe Adaptor with Thermocouple (K-type), Approx. 1000mm	A42
GTL-207A	Accessory -- Test Lead, Banana to Probe Test Lead, 800mm	A42
GTL-209	Accessory -- Test Lead, Banana to Bare-wire, Approx. 1000mm	E83
GTL-210	Accessory -- Test Lead, Banana to Banana, Approx. 1000mm	E83
GTL-212	Accessory -- Test Lead, O-Type to Bare-wire, Approx. 1000mm	E83
GTL-212A	Accessory -- Test Lead, O-Type to Bare-wire, Approx. 1000mm	E83
GTL-213	Accessory -- Test Lead, O-Type to Banana, Approx. 1000mm	E83
GTL-214	Accessory -- Da4 Cable, Approx. 1000mm	E83
GTL-215	Accessory -- G.B. Test Lead, U Type to Alligator, Approx. 1000mm	E83
GTL-217	Accessory -- Test Lead, Banana to Probe, Approx. 1400mm	E83
GTL-218	Accessory -- Test Lead, O-type to O-type Test Lead, Max. 200A, 1500mm	D129
GTL-219	Accessory -- Test Lead, O-type to O-type Test Lead, Max. 200A, 3000mm	D129
GTL-220	Accessory -- Test Lead, O-type to O-type Test Lead, Max. 300A, 1500mm	D129
GTL-221	Accessory -- Test Lead, O-type to O-type Test Lead, Max. 300A, 3000mm	D129
GTL-222	Accessory -- Test Lead, O-type to O-type Test Lead, Max. 400A, 1500mm	D129
GTL-223	Accessory -- Test Lead, O-type to O-type Test Lead, Max. 400A, 3000mm	D129
GTL-232	Accessory -- RS-232C Cable, 9-pin, F-F Type, Null Modem, 2000mm	D129
GTL-234	Accessory -- RS-232C Cable, 9-pin F-F type, Null Modem for computer, Approx. 2000mm	E83
GTL-235	Accessory -- Communication Cable, Approx. 700mm	E83
GTL-236	Accessory -- RS-232C Cable, 9-pin F-M type, Approx. 2 000mm	E83
GTL-238	Accessory -- RS-232 Cable, 9-pin, M-F type, 1000mm	D129
GTL-240	Accessory -- USB Cable, USB 2.0, A-B type (L type), 1200mm	D129
GTL-246	Accessory -- USB Cable, USB 2.0, A-B type, 1200mm	D129
GTL-247	Accessory -- USB Cable, USB 1.1 A-A type, Approx. 1800mm	E83
GTL-248	Accessory -- GPIB Cable, Double Shielded, 2000mm	D129
GTL-249	Accessory -- Frame Link Cable, 300mm	D129
GTL-250	Accessory -- GPIB Cable, Double Shielded, 600mm	A42
GTL-253	Accessory -- USB Cable, USB 2.0, A-mini B Type, 1400mm	C34
GTL-255	Accessory -- Frame Link Cable, 300mm	D129
GTL-258	Accessory -- GPIB Cable, 25 pins Micro-D Connector	D129
GTL-259	Accessory -- RS-232 Cable with DB9 connector to RJ45	D129
GTL-260	Accessory -- RS-485 Cable with DB9 connector to RJ45	D129

Model Number Index

GTL-261	Accessory – Serial Master Cable+Terminator, 0.5M	D129	LCR-8210A	10Hz ~ 10MHz High Frequency LCR Meter	E21
GTL-262	Accessory – RS-485 Slave cable	D129	LCR-8220A	10Hz ~ 20MHz High Frequency LCR Meter	E21
GTL-264	Accessory – Signal I/O Converted Cable, 15-pin Male to 9-pin Female. Approx. 200mm	E83	LCR-8230A	10Hz ~ 30MHz High Frequency LCR Meter	E21
GTL-301	Accessory – RF Cable, RG223 Assembly, 1000mm, N(P/M)	B25	LCR-8250A	10Hz ~ 50MHz High Frequency LCR Meter	E21
GTL-302	Accessory – RF Cable, RG223 Assembly, 300mm, N(P/M)	B25	LCR-914	100Hz/120Hz/1kHz Handheld LCR Meter	E27
GTL-303	Accessory – RF Cable, RG316 Assembly, 600mm, SMA(P/M)	B25	LCR-915	100Hz/120Hz/1kHz/10kHz Handheld LCR Meter	E27
GTL-304	Accessory – RF Cable, RG223 Assembly, 280mm, N(P/M) - N(J/F)	B25	LCR-916	100Hz/120Hz/1kHz/10kHz/100kHz Handheld LCR Meter	E27
GTL-308	Accessory – 4 Wire (kelvin clip) + Shield Test Lead, Approx. 1500mm	E83	M		
GTL-309	Accessory – 4 Wire (kelvin clip) + Shield Test Lead, Approx. 3000mm	E83	MSO-2204E(A)	200MHz, 4+16Channel, Mixed-signal Oscilloscope	A15
GTP-033A	Accessory – Oscilloscope Probe, 35MHz 1:1 Passive Probe	A45	MSO-2202E(A)	200MHz, 2+16Channel, Mixed-signal Oscilloscope	A15
GTP-070B-4	Accessory – Oscilloscope Probe, 70MHz (10:1/1:1) Switching Passive Probe, BNC(P/M)	A43	MSO-2104E(A)	100MHz, 4+16Channel, Mixed-signal Oscilloscope	A15
GTP-100B-4	Accessory – Oscilloscope Probe, 100MHz (10:1/1:1) Switching Passive Probe, BNC(P/M)	A43	MSO-2102E(A)	100MHz, 2+16Channel, Mixed-signal Oscilloscope	A15
GTP-150A-2	Accessory – Oscilloscope Probe, 150MHz (10:1/1:1) Switching Passive Probe, BNC(P/M)	A43	MSO-2074E(A)	70MHz, 4+16Channel, Mixed-signal Oscilloscope	A15
GTP-150B-2	Accessory – Oscilloscope Probe, 150MHz (10:1/1:1) Switching Passive Probe, BNC(P/M)	A43	MSO-2072E(A)	70MHz, 2+16Channel, Mixed-signal Oscilloscope	A15
GTP-151R	Accessory – Oscilloscope Probe, 150MHz 10:1 Passive Probe, BNC(P/M)	A44	MDO-2204E(G/X)	200MHz, 4Channel, Digital Storage Oscilloscope, Spectrum Analyzer, Dual channel 25MHz AWG	A21
GTP-200B-4	Accessory – Oscilloscope Probe, 200MHz (10:1/1:1) Switching Passive Probe, BNC(P/M)	A43	MDO-2202E(G/X)	200MHz, 2Channel, Digital Storage Oscilloscope, Spectrum Analyzer, Dual Channel 25MHz AWG	A21
GTP-250A-2	Accessory – Oscilloscope Probe, 250MHz (10:1/1:1) Switching Passive Probe, BNC(P/M)	A43	MDO-2104E(G/X)	100MHz, 4Channel, Digital Storage Oscilloscope, Spectrum Analyzer, Dual Channel 25MHz AWG	A21
GTP-250B-2	Accessory – Oscilloscope Probe, 250MHz (10:1/1:1) Switching Passive Probe, BNC(P/M)	A44	MDO-2102E(G/X)	100MHz, 2Channel, Digital Storage Oscilloscope, Spectrum Analyzer, Dual Channel 25MHz AWG	A21
GTP-251R	Accessory – Oscilloscope Probe, 250MHz 10:1 Passive Probe, BNC(P/M)	A44	MDO-2074E(G/X)	70MHz, 4Channel, Digital Storage Oscilloscope, Spectrum Analyzer, Dual Channel 25MHz AWG	A21
GTP-300A-4	Accessory – Oscilloscope Probe, 300MHz (10:1/1:1) Switching Passive Probe, BNC(P/M)	A44	MDO-2072E(G/X)	70MHz, 2Channel, Digital Storage Oscilloscope, Spectrum Analyzer, Dual Channel 25MHz AWG	A21
GTP-350A-2	Accessory – Oscilloscope Probe, 350MHz (10:1/1:1) Switching Passive Probe, BNC(P/M)	A44	MFG-2110	10MHz Single Channel Arbitrary Function Generator with Pulse Generator	C16
GTP-351R	Accessory – Oscilloscope Probe, 350MHz 10:1 Passive Probe, BNC(P/M)	A44	MFG-2120	20MHz Single Channel Arbitrary Function Generator with Pulse Generator	C16
GTP-352R	Accessory – Oscilloscope Probe, 350MHz 20:1 Passive Probe, BNC(P/M)	A44	MFG-2120MA	20MHz Single Channel Arbitrary Function Generator with Pulse Generator, Modulation, Power Amplifier	C16
GTP-501R	Accessory – Oscilloscope Probe, 500MHz 10:1 Passive Probe, BNC(P/M)	A45	MFG-2130M	30MHz Single Channel Arbitrary Function Generator with Pulse Generator, Modulation	C16
GU			MFG-2160MF	60MHz Single Channel Arbitrary Function Generator with Pulse Generator, Modulation, 160MHz RF Signal Generator	C16
GUG-001	Accessory – GPIB-USB Adaptor, GPIB to USB Adaptor	D129	MFG-2160MR	60MHz Single Channel Arbitrary Function Generator with Pulse Generator, Modulation, 320MHz RF Signal Generator	C16
GUR-001A	Accessory – RS232-USB Cable, 300mm	D129	MFG-2220HM	200MHz Dual Channel Arbitrary Function Generator with Pulse Generator, Modulation	C16
GUR-001B	Accessory – RS-232 to USB Adapter with #4-40 UNC Rivet Nut	D129	MFG-2230M	30MHz Dual Channel Arbitrary Function Generator with Pulse Generator, Modulation	C16
GV			MFG-2260M	60MHz Dual Channel Arbitrary Function Generator with Pulse Generator, Modulation	C16
GVT-417B	1-Channel A.C. Millivolt Meter	E78	MFG-2260MFA	60MHz Dual Channel Arbitrary Function Generator with Pulse Generator, Modulation, 160MHz RF Signal Generator, Power Amplifier	C16
GVT-427B	2-Channel A.C. Millivolt Meter	E78	MFG-2260MRA	60MHz Dual Channel Arbitrary Function Generator with Pulse Generator, Modulation, 320MHz RF Signal Generator, Power	C16
GWS			MFG-2220HM	200MHz Dual Channel Arbitrary Function Generator with Pulse Generator, Modulation	C16
GWS-001	Accessory – Wrist Strap	A42	PC		
LC			PCS-001	Accessory – Basic Accessory Kit	E80
LCR-05	Accessory – Test Fixture for Axial & Radial Leaded Components	E89	PCS-1000I	High Precision Current Shunt Meter	E79
LCR-05A	Accessory – 50MHz Test Fixture for Axial & Radial Leaded Components (Including STD-LOAD kit)	E89	PE		
LCR-06B	Accessory – Test Lead with Kelvin Clip (4 wire type), Approx. 750mm	E89	PEL-001	Accessory – GPIB Card	D105
LCR-07	Accessory – Test Lead with Alligator Clip (2 wire type), Approx. 750mm	E89	PEL-002	Accessory – Rack Mount Kit, PEL-2000 Series	D105
LCR-08	Accessory – Test Fixture (Tweezers) for SMD/Chip Components, Approx. 750mm	E89	PEL-003	Accessory – Panel Cover	D105
LCR-10A	Accessory – 10MHz Test Fixture for Bottom Electrode Components (Including STD-LOAD kit)	E89	PEL-004	Accessory – GPIB Card	D129
LCR-12	Accessory – Test Lead with Kelvin clip (4 wire type), Approx. 600mm	E89	PEL-005	Accessory – Connect Cu Plate	D129
LCR-15	Accessory – Test Fixture for SMD/Chip Components	E89	PEL-006	Accessory – Connect Cu Plate	D129
LCR-15A	Accessory – 50MHz Test Fixture for SMD/Chip Components (Including STD-LOAD kit)	E89	PEL-007	Accessory – Connect Cu Plate	D129
LCR-16	Accessory – DC Bias Voltage Box (+/- 45V)	E89	PEL-008	Accessory – Connect Cu Plate	D129
LCR-17	Accessory – DC Bias Current Box (+/- 2.5A)	E89	PEL-009	Accessory – Connect Cu Plate	D129
LCR-6002	10Hz ~ 2kHz Precision LCR Meter	E25	PEL-010	Accessory – Dust Filter	D129
LCR-6020	10Hz ~ 20kHz Precision LCR Meter	E25	PEL-011	Accessory – Load Input Terminal Cover	D129
LCR-6100	10Hz ~ 100kHz Precision LCR Meter	E25	PEL-012	Accessory – Terminal Fittings Kits	D129
LCR-6200	10Hz ~ 200kHz Precision LCR Meter	E25	PEL-013	Accessory – Flexible Terminal Cover	D129
LCR-6300	10Hz ~ 300kHz Precision LCR Meter	E25	PEL-014	Accessory – J1/J2 Protection Plug	D129
LCR-8201	10Hz ~ 1MHz High Frequency LCR Meter	E21	PEL-016	Accessory – LAN Card	D105
LCR-8205	10Hz ~ 5MHz High Frequency LCR Meter	E21	PEL-018	Accessory – LAN Card	D129
LCR-8210	10Hz ~ 10MHz High Frequency LCR Meter	E21	PEL-022	Accessory – GPIB Card	D110
LCR-8220	10Hz ~ 20MHz High Frequency LCR Meter	E21	PEL-023	Accessory – RS-232 Card	D110
LCR-8230	10Hz ~ 30MHz High Frequency LCR Meter	E21	PEL-024	Accessory – LAN Card	D110
LCR-8205A	10Hz ~ 5MHz High Frequency LCR Meter	E21	PEL-025	Accessory – USB Card	D110
			PEL-026	Accessory – Hook Ring	D110
			PEL-027-1-4	Accessory – Rack Mount Kit	D110

PEL-028	Accessory -- HANDLES, U-shaped Handle(Fixed to the Bracket)	D110
PEL-029	Accessory -- HANDLES, Rack Accessories	D124
PEL-030	Accessory -- GPIB+RS-232 Card	D111
PEL-031	Accessory -- Rack Mount Kit	D125
PEL-032	Accessory -- 9923 Current Waveform Generator + RS232 Interface	D125
PEL-503-80-50	80V/50A/250W DC Electronic Load	D117
PEL-504-80-70	80V/70A/350W DC Electronic Load	D117
PEL-504-500-15	500V/15A/350W DC Electronic Load	D117
PEL-507-80-140	80V/140A/700W DC Electronic Load	D117
PEL-507-500-30	500V/30A/700W DC Electronic Load	D117
PEL-2002A(B)	2-Slot Programmable D.C. Electronic Load Mainframe	D105
PEL-2004A(B)	4-Slot Programmable D.C. Electronic Load Mainframe	D105
PEL-2020A(B)	200W, Dual Channel D.C. Electronic Load Module, (1-80V, 20A, 100W) x 2	D105
PEL-2030A(B)	200W, Dual Channel D.C. Electronic Load Module, (1-80V, 5A, 30W) & (1-80V, 40A, 250W)	D105
PEL-2040A(B)	350W, Single Channel D.C. Electronic Load Module, (1-80V, 70A, 350W)	D105
PEL-2041A(B)	350W, Single Channel D.C. Electronic Load Module, (2.5-500V, 10A, 350W)	D105
PEL-3021	175W Programmable D.C. Electronic Load	D93
PEL-3041	350W Programmable D.C. Electronic Load	D93
PEL-3111	1050W Programmable D.C. Electronic Load	D93
PEL-3211	2100W Booster Unit for PEL-3111 only	D93
PEL-3212	2100W Programmable D.C. Electronic Load	D93
PEL-3322	3150W Programmable D.C. Electronic Load	D93
PEL-3323	3150W Programmable D.C. Electronic Load	D93
PEL-3424	4200W Programmable D.C. Electronic Load	D93
PEL-3533	5250W Programmable D.C. Electronic Load	D93
PEL-3535	5250W Programmable D.C. Electronic Load	D93
PEL-3744	7350W Programmable D.C. Electronic Load	D93
PEL-3955	9450W Programmable D.C. Electronic Load	D93
PEL-3021H	175W Programmable D.C. Electronic Load	D93
PEL-3041H	350W Programmable D.C. Electronic Load	D93
PEL-3111H	1050W Programmable D.C. Electronic Load	D93
PEL-3211H	2100W Booster Unit for PEL-3111 only	D93
PEL-3212H	2100W Programmable D.C. Electronic Load	D93
PEL-3322H	3150W Programmable D.C. Electronic Load	D93
PEL-3323H	3150W Programmable D.C. Electronic Load	D93
PEL-3424H	4200W Programmable D.C. Electronic Load	D93
PEL-3533H	5250W Programmable D.C. Electronic Load	D93
PEL-3535H	5250W Programmable D.C. Electronic Load	D93
PEL-3744H	7350W Programmable D.C. Electronic Load	D93
PEL-3955H	9450W Programmable D.C. Electronic Load	D93
PEL-3031E	150V/60A/300W Programmable Single-channel D.C. Electronic Load	D99
PEL-3032E	500V/15A/300W Programmable Single-channel D.C. Electronic Load	D99
PEL-5006C-150-600	150V/600A/6kW High Power DC Electronic Load	D109
PEL-5008C-150-800	150V/800A/8kW High Power DC Electronic Load	D109
PEL-5010C-150-1000	150V/1000A/10kW High Power DC Electronic Load	D109
PEL-5012C-150-1200	150V/1200A/12kW High Power DC Electronic Load	D109
PEL-5015C-150-1500	150V/1500A/15kW High Power DC Electronic Load	D109
PEL-5018C-150-1800	150V/1800A/18kW High Power DC Electronic Load	D109
PEL-5020C-150-2000	150V/2000A/20kW High Power DC Electronic Load	D109
PEL-5024C-150-2000	150V/2000A/24kW High Power DC Electronic Load	D109
PEL-5006C-600-420	600V/420A/6kW High Power DC Electronic Load	D109
PEL-5008C-600-560	600V/560A/8kW High Power DC Electronic Load	D109
PEL-5010C-600-700	600V/700A/10kW High Power DC Electronic Load	D109
PEL-5012C-600-840	600V/840A/12kW High Power DC Electronic Load	D109
PEL-5015C-600-1050	600V/1050A/15kW High Power DC Electronic Load	D109
PEL-5018C-600-1260	600V/1260A/18kW High Power DC Electronic Load	D109
PEL-5020C-600-1400	600V/1400A/20kW High Power DC Electronic Load	D109
PEL-5024C-600-1680	600V/1680A/24kW High Power DC Electronic Load	D109
PEL-5006C-1200-240	1200V/240A/6kW High Power DC Electronic Load	D109
PEL-5008C-1200-320	1200V/320A/8kW High Power DC Electronic Load	D109
PEL-5010C-1200-400	1200V/400A/10kW High Power DC Electronic Load	D109
PEL-5012C-1200-480	1200V/480A/12kW High Power DC Electronic Load	D109
PEL-5015C-1200-600	1200V/600A/15kW High Power DC Electronic Load	D109
PEL-5018C-1200-720	1200V/720A/18kW High Power DC Electronic Load	D109
PEL-5020C-1200-800	1200V/800A/20kW High Power DC Electronic Load	D109
PEL-5024C-1200-960	1200V/960A/24kW High Power DC Electronic Load	D109
PEL-5004G-150-400	150V/400A/4000kW High Power DC Electronic Load	D125
PEL-5005G-150-500	150V/500A/5000kW High Power DC Electronic Load	D125
PEL-5006G-150-600	150V/600A/6000kW High Power DC Electronic Load	D125
PEL-5004G-600-280	600V/280A/4000kW High Power DC Electronic Load	D125
PEL-5005G-600-350	600V/350A/5000kW High Power DC Electronic Load	D125
PEL-5006G-600-420	600V/420A/6000kW High Power DC Electronic Load	D125

PEL-5004G-1200-160	1200V/160A/4000kW High Power DC Electronic Load	D125
PEL-5005G-1200-200	1200V/200A/5000kW High Power DC Electronic Load	D125
PEL-5006G-1200-240	1200V/240A/6000kW High Power DC Electronic Load	D125
PF		
PFR-100M	Fanless Multi-range D.C. Power Supply	D27
PFR-100L	Fanless Multi-range D.C. Power Supply	D27
PP		
PPE-3323	207W, 3-Channel, Programmable Linear D.C. Power Supply	D61
PPH-1503	45W Programmable High Precision Linear D.C. Power Supply	D43
PPH-1503D	45W/18W Programmable High Precision Linear D.C. Power Supply	D43
PPH-1506D	45W/36W Programmable High Precision Linear D.C. Power Supply	D43
PPH-1510D	45W/36W Programmable High Precision Linear D.C. Power Supply	D43
PPT-1830	138W, 3-Channel, Programmable Linear D.C. Power Supply	D62
PPT-3615	126W, 3-Channel, Programmable Linear D.C. Power Supply	D62
PPX-1005	10V/5A/50W Programmable High-precision DC Power Supply	D47
PPX-2002	20V/2A/40W Programmable High-precision DC Power Supply	D47
PPX-2005	20V/5A/100W Programmable High-precision DC Power Supply	D47
PPX-3601	36V/1A/36W Programmable High-precision DC Power Supply	D47
PPX-3603	36V/3A/108W Programmable High-precision DC Power Supply	D47
PPX-10H01	100V/1A/100W Programmable High-precision DC Power Supply	D47
PPX-G	Accessory -- GPIB Interface(Factory Installed)	D47
PS		
PSB-001	Accessory -- GPIB Card	D29
PSB-003	Accessory -- Parallel Connection kit (for horizontal installation), Kit includes: (PSB-007 Joint Kit,Horizontal bus bar x 2 , PSB-005 x1)	D29
PSB-004	Accessory -- Parallel Connection kit (for vertical installation) Kit includes:(PSB-007 Joint Kit,Verical bus bar x 2,PSB-005x1)	D29
PSB-005	Accessory -- Parallel Connection Signal Cable	D29
PSB-006	Accessory -- Serial Connection Signal Cable	D29
PSB-007	Accessory -- Joint Kit: Includes 4 joining plates, [M3x6]screws x 4 ; [M3x8]screw x 2	D29
PSB-008	Accessory -- RS232C Cable (PSB-2000 Only)	D29
PSB-101	Accessory -- Cable for 2 units	D33
PSB-102	Accessory -- Cable for 3 units	D33
PSB-103	Accessory -- Cable for 4 units	D33
PSB-104	Accessory -- Cable for 2 units	D33
PSB-105	Accessory -- GPIB Card	D33
PSB-106	Accessory -- Basic Accessory Kit	D33
PSB-1400L	40V/40A/400W Programmable Multi-Range D.C. Power Supply	D33
PSB-1400M	160V/10A/400W Programmable Multi-Range D.C. Power Supply	D33
PSB-1800L	40V/80A/800W Programmable Multi-Range D.C. Power Supply	D33
PSB-1800M	160V/20A/800W Programmable Multi-Range D.C. Power Supply	D33
PSB-2400H	400W Multi-Range Programmable Switching D.C. Power Supply	D29
PSB-2400L	400W Multi-Range Programmable Switching D.C. Power Supply	D29
PSB-2400L2	800W Multi-Range, 2-Channel, Programmable Switching D.C. Power Supply	D29
PSB-2800H	800W Multi-Range Programmable Switching D.C. Power Supply	D29
PSB-2800L	800W Multi-Range Programmable Switching D.C. Power Supply	D29
PSB-2800LS	800W Slave (Booster) Unit For Current Extension Only	D29
PSH-2018A	360W Programmable Switching D.C. Power Supply	D35
PSH-3610A	360W Programmable Switching D.C. Power Supply	D35
PSH-3620A	720W Programmable Switching D.C. Power Supply	D35
PSH-3630A	1080W Programmable Switching D.C. Power Supply	D35
PSM-2010	200W Programmable Dual-Range Linear D.C. Power Supply	D59
PSM-3004	120W Programmable Dual-Range Linear D.C. Power Supply	D59
PSM-6003	200W Programmable Dual-Range Linear D.C. Power Supply	D59
PSP-2010	200W Programmable Switching D.C. Power Supply	D36
PSP-405	200W Programmable Switching D.C. Power Supply	D36
PSP-603	200W Programmable Switching D.C. Power Supply	D36
PSS-2005	100W Programmable Linear D.C. Power Supply	D60
PSS-3203	96W Programmable Linear D.C. Power Supply	D60
PST-3201	96W Triple Output Programmable D.C. Power Supply	D63
PST-3202	158W Triple Output Programmable D.C. Power Supply	D63
PSU 6-200	1200W Programmable Switching DC Power Supply	D19
PSU 8-180	1440W Programmable Switching DC Power Supply	D19
PSU 12.5-120	1500W Programmable Switching DC Power Supply	D19
PSU 15-100	1500W Programmable Switching DC Power Supply	D19
PSU 20-76	1520W Programmable Switching DC Power Supply	D19
PSU 30-50	1500W Programmable Switching DC Power Supply	D19
PSU 40-38	1520W Programmable Switching DC Power Supply	D19
PSU 50-30	1500W Programmable Switching DC Power Supply	D19
PSU 60-25	1500W Programmable Switching DC Power Supply	D19
PSU 80-19	1520W Programmable Switching DC Power Supply	D19
PSU 100-15	1500W Programmable Switching DC Power Supply	D19
PSU 150-10	1500W Programmable Switching DC Power Supply	D19
PSU 300-5	1500W Programmable Switching DC Power Supply	D19
PSU 400-3.8	1520W Programmable Switching DC Power Supply	D19
PSU 600-2.6	1560W Programmable Switching DC Power Supply	D19

Model Number Index

PSU-001	Accessory -- Front Panel Filter kit(factory Installed)	D19	PSW-004	Accessory -- Basic Accessory Kit for 30V/80V/160V Models	D15
PSU-01A	Accessory -- Joins a Vertical Stack of 2 PSU Units Together. 2U-Sized Handles x2, Joining Plates x2	D19	PSW-005	Accessory -- Series Operation Cable for 2 units(for 30V/80V/160V)	D15
PSU-01B	Accessory -- Bus Bar for 2 units in Parallel Operation	D19	PSW-006	Accessory -- Parallel Operation Cable for 2 units	D15
PSU-01C	Accessory -- Cable for 2 units in Parallel Operation	D19	PSW-007	Accessory -- Parallel Operation Cable for 3 units	D15
PSU-02A	Accessory -- Joins a Vertical Stack of 3 PSU units Together. 3U-sized handles x2, Joining Plates x2	D19	PSW-008	Accessory -- Basic Accessory Kit for 250V/800V Models	D15
PSU-02B	Accessory -- Bus Bar for 3 units in Parallel Operation	D19	PSW-009	Accessory -- Output Terminal Cover for 30V/80V/160V Models	D15
PSU-02C	Accessory -- Cable for 3 units in Parallel Operation	D19	PSW-010	Accessory -- Large Filter (Type II/III)	D15
PSU-03A	Accessory -- Joins a Vertical Stack of 4 PSU units Together. 4U-sized Handles x2, Joining Plates x2	D19	PSW-011	Accessory -- Output Terminal Cover for 250V/800V Models	D15
PSU-03B	Accessory -- Bus Bar for 4 units in Parallel Operation	D19	PSW-012	Accessory -- High Voltage Output Terminal for 250V/800V Model	D15
PSU-03C	Accessory -- Cable for 4 units in Parallel Operation	D19	PT		
PSU-232	Accessory -- RS232 Cable with DB9 Connector kit	D19	PT-100	Accessory -- Temperature Probe, Approx. 1500mm	E83
PSU-485	Accessory -- RS485 Cable with DB9 Connector kit	D19	RL		
PSU-GPIB	Accessory -- PSU GPIB Interface Card (Factory Installed)	D19	RLB-001	Accessory -- Return Loss Bride, 10MHz - 1GHz, Source/Load: N(J/F), B25 Coupling: N(P/M)	
PSU-ISO-I	Accessory -- Isolated Current Remote Control Card (Factory Installed)	D19	SF		
PSU-ISO-V	Accessory -- Isolated Voltage Remote Control Card (Factory Installed)	D19	SFG-1003	3MHz DDS Function Generator	C29
PSW160-14.4	720W Multi-Range Programmable Switching D.C. Power Supply	D15	SFG-1013	3MHz Dual Display DDS Function Generator	C29
PSW160-21.6	1080W Multi-Range Programmable Switching D.C. Power Supply	D15	SP		
PSW160-7.2	360W Multi-Range Programmable Switching D.C. Power Supply	D15	SPD-3606	375W, 3-Channel, Programmable Switching D.C. Power Supply	D38
PSW250-13.5	1080W Multi-Range Programmable Switching D.C. Power Supply	D15	SPS-1230	360W Switching D.C. Power Supply	D37
PSW250-4.5	360W Multi-Range Programmable Switching D.C. Power Supply	D15	SPS-1820	360W Switching D.C. Power Supply	D37
PSW250-9	720W Multi-Range Programmable Switching D.C. Power Supply	D15	SPS-2415	360W Switching D.C. Power Supply	D37
PSW30-108	1080W Multi-Range Programmable Switching D.C. Power Supply	D15	SPS-3610	360W Switching D.C. Power Supply	D37
PSW30-36	360W Multi-Range Programmable Switching D.C. Power Supply	D15	SPS-606	360W Switching D.C. Power Supply	D37
PSW30-72	720W Multi-Range Programmable Switching D.C. Power Supply	D15	US		
PSW40-27	1080W Multi-Range Programmable Switching D.C. Power Supply	D15	USG-LF44	35MHz -- 4400MHz, USB RF Signal Generator	C32
PSW40-54	360W Multi-Range Programmable Switching D.C. Power Supply	D15			
PSW40-81	720W Multi-Range Programmable Switching D.C. Power Supply	D15			
PSW-720L11	30V/36A*2 720W Multi-Range D.C. Power Supply	D9			
PSW-720L12	30V/36A*1 40V/27A*1 720W Multi-Range D.C. Power Supply	D9			
PSW-720L14	30V/36A*1 80V/13.5A*1 720W Multi-Range D.C. Power Supply	D9			
PSW-720L15	30V/36A*1 160V/7.2A*1 720W Multi-Range D.C. Power Supply	D9			
PSW-720L22	40V/27A*2 720W Multi-Range D.C. Power Supply	D9			
PSW-720L24	40V/27A*1 80V/13.5A*1 720W Multi-Range D.C. Power Supply	D9			
PSW-720L25	40V/27A*1 160V/7.2A*1 720W Multi-Range D.C. Power Supply	D9			
PSW-720L44	80V/13.5A*2 720W Multi-Range D.C. Power Supply	D9			
PSW-720L45	80V/13.5A*1 160V/7.2A*1 720W Multi-Range D.C. Power Supply	D9			
PSW-720L55	160V/7.2A*2 720W Multi-Range D.C. Power Supply	D9			
PSW-720H66	250V/4.5A*2 720W Multi-Range D.C. Power Supply	D9			
PSW-720H68	250V/4.5A*1 800V/1.44A*1 720W Multi-Range D.C. Power Supply	D9			
PSW-720H88	800V/1.44A*2 720W Multi-Range D.C. Power Supply	D9			
PSW800-1.44	360W Multi-Range Programmable Switching D.C. Power Supply	D15			
PSW800-2.88	720W Multi-Range Programmable Switching D.C. Power Supply	D15			
PSW800-4.32	1080W Multi-Range Programmable Switching D.C. Power Supply	D15			
PSW80-13.5	360W Multi-Range Programmable Switching D.C. Power Supply	D15			
PSW80-27	720W Multi-Range Programmable Switching D.C. Power Supply	D15			
PSW80-40.5	1080W Multi-Range Programmable Switching D.C. Power Supply	D15			
PSW-1080L111	30V/36A*3 1080W Multi-Range D.C. Power Supply	D9			
PSW-1080L112	30V/36A*2 40V/27A*1 1080W Multi-Range D.C. Power Supply	D9			
PSW-1080L114	30V/36A*2 80V/13.5A*1 1080W Multi-Range D.C. Power Supply	D9			
PSW-1080L115	30V/36A*2 160V/7.2A*1 1080W Multi-Range D.C. Power Supply	D9			
PSW-1080L122	30V/36A*1 40V/27A*2 1080W Multi-Range D.C. Power Supply	D9			
PSW-1080L124	30V/36A*1 40V/27A*1 80V/13.5A*1 1080W Multi-Range D.C. Power Supply	D9			
PSW-1080L125	30V/36A*1 40V/27A*1 160V/7.2A 1080W Multi-Range D.C. Power Supply	D9			
PSW-1080L144	30V/36A*1 80V/13.5A*2 1080W Multi-Range D.C. Power supply	D9			
PSW-1080L145	30V/36A*1 80V/13.5A*1 160V/7.2A*1 1080W Multi-Range D.C. Power Supply	D9			
PSW-1080L155	30V/36A*1 160V/7.2A*2 1080W Multi-Range D.C. Power Supply	D9			
PSW-1080L222	40V/27A*3 1080W Multi-Range D.C. Power Supply	D9			
PSW-1080L224	40V/27A*2 80V/13.5A*1 1080W Multi-Range D.C. Power Supply	D9			
PSW-1080L225	40V/27A*2 160V/7.2A*1 1080W Multi-Range D.C. Power Supply	D9			
PSW-1080L244	40V/27A*1 80V/13.5A*2 1080W Multi-Range D.C. Power Supply	D9			
PSW-1080L245	40V/27A*1 80V/13.5A*1 160V/7.2A*1 1080W Multi-Range D.C. Power Supply	D9			
PSW-1080L255	40V/27A*1 160V/7.2A*2 1080W Multi-Range D.C. Power supply	D9			
PSW-1080L444	80V/13.5A*3 1080W Multi-Range D.C. Power supply	D9			
PSW-1080L445	80V/13.5A*2 160V/7.2A*1 1080W Multi-Range D.C. Power supply	D9			
PSW-1080L455	80V/13.5A*1 160V/7.2A*2 1080W Multi-Range D.C. Power supply	D9			
PSW-1080L555	160V/7.2A*3 1080W Multi-Range D.C. Power supply	D9			
PSW-1080H666	250V/4.5A*3 1080W Multi-Range D.C. Power Supply	D9			
PSW-1080H668	250V/4.5A*2 800V/1.44A*1 1080W Multi-Range D.C. Power Supply	D9			
PSW-1080H688	250V/4.5A*1 800V/1.44A*2 1080W Multi-Range D.C. Power Supply	D9			
PSW-1080H888	800V/1.44A*3 1080W Multi-Range D.C. Power Supply	D9			
PSW-001	Accessory -- Accessory Kits	D15			
PSW-002	Accessory -- Simple IDC Tool	D15			
PSW-003	Accessory -- Contact Removal Tool	D15			

NOTE





OSCILLOSCOPES

The frequency bandwidth ranges from 50MHz to the high-class 650MHz. In addition, up to 5GSa/s realtime sampling rate and 200M points memory depth can pick up and hold the complete signal in order to preserve the accuracy. PC interfaces such as USB, LAN, GPIB, RS-232C, and Printer Port are integrated to the panel to satisfy data transmit/save needs.

The GDS-3000A Series is the flagship product of GW Instek's digital storage oscilloscope. Its highest frequency bandwidth has been elevated to 650MHz, and the 350MHz model is also available. The memory depth of each channel is up to 200Mpts. The sampling rate is 5GSa/s interleaved. The display is 10.2" TFT LCD and the RGB display output is 8bits each, allowing users to clearly analyze the strength distribution of the measured signal.

The MSO-2000E Series is a mixed-signal oscilloscope, which offers dual analog channels+16 digital channels or 4 analog channels+16 digital channels. MSO-2000E has a built-in 16-channel logic analyzer and MSO-2000EA has a built-in 16-channel logic analyzer and a dual channel 25MHz arbitrary function generator. The MDO-2000A series is multi-functional mixed domain oscilloscope. While entering the spectrum mode, MDO-2000A Series will display a full screen of frequency domain. Users can input Center frequency, Span, Start frequency, and Stop frequency based upon test requirements so as to rapidly and intuitively observe required frequency range that allows users to experience the user interface of a real spectrum analyzer. MSO-2000EA, MDO-2000AG and MDO-2000E also provide frequency response analysis function, it allows users to obtain DUT's FRA characteristic curve plot (Bode plot).

PRODUCTS

- Digital Storage Oscilloscope
 - Mixed-signal Oscilloscope
 - Mixed-domain Oscilloscope
 - Handheld Digital Storage Oscilloscope
 - Oscilloscope Education and Training Kit
-

OSCILLOSCOPES

OSCILLOSCOPE OVERVIEW

Oscilloscopes are considered the most widely used instruments in the Electrical T&M field. With an Oscilloscope, it is possible to understand how an electrical signal changes over a time period graphically. In every electric application, from electronics laboratories, electronics R&D, product development, manufacturing QA, to After-Sales Service, there is a need for waveform representation by an Oscilloscope.

With the rapid advancement of technology, the oscilloscope market has also been shifting from conventional analog oscilloscopes, which displays the electronic waveforms through a CRT, towards Digital Storage Oscilloscopes (DSO). The major function of a DSO not only converts signals from analog to digital, but also stores testing data, allowing remote control and transmitting data through various interfaces. In spite of the strengths of DSOs, analog oscilloscopes still play an important role of providing real-time signal and waveform display.

There has been a growing need for detecting digital signals which are usually presented by 2 discrete voltage levels, a distinction from analog signals presented by continuous voltages. A logic analyzer is better suited for such digital signal measurements compared with an oscilloscope. A logic analyzer also has the benefit of multiple channel input measurements, which is usually limited to 2 or 4 channels in oscilloscopes.

To satisfy various needs of waveform observation in time domain, GW Instek provides an entire series of oscilloscope solutions, consisting of three groups: Digital Storage Oscilloscopes, Analog Oscilloscopes and Real Time/Digital Storage Oscilloscopes.

Oscilloscope Lineup	Bandwidth	Type	650MHz	500MHz	350MHz	300MHz	250MHz	200MHz	150MHz	100MHz	70MHz	50MHz	Page
GDS-3000A Series	Digital	✓		✓									A5-10
GDS-3000 Series	Digital		✓										A11-12
GDS-2000A Series	Digital				✓			✓		✓	✓		A13-14
MSO-2000E Series	Digital							✓		✓	✓		A15-20
MDO-2000A Series	Digital				✓			✓		✓			A21-26
MDO-2000E Series	Digital							✓		✓	✓		A27-30
GDS-2000E Series	Digital							✓		✓	✓		A31-32
GDS-300/200 Series	Digital							✓		✓	✓		A33-34
GDS-1000B Series	Digital							✓		✓	✓	✓	A35-40

MODEL	FUNCTION	Collocation Instrument	Page
GDB-03		GDS-3000A/GDS-3000/GDS-2000A/GDS-2000E/MSO-2000E/GDS-1000B Series	A41

VPO TECHNOLOGY

When using a DSO to measure serial transmission signals, address/data/control buses on digital circuits, noise on signal components, composite video signals or modulated signals, the biggest challenge is that these signals have random, rapidly changing, incidental components or have components with non-periodic characteristics. Therefore it is necessary for a DSO to reduce the acquisition processing time (Dead time) to have the opportunity to capture these signal characteristics.

DSOs equipped with VPO (Visual Persistence Oscilloscope) technology use a high-density IC for hardware acceleration to transfer all the acquired data into the displayed waveform image. Figure A shows the compression and quantification of waveform data. GDS-3000 has a waveform display region of 750 frames in width, while the record length is 25k dots long. The hardware circuit cuts the waveform data into a number of data frames. The data in each data frame is passed through a count array and then written into a three-dimensional memory array. When all the frames have been quantized, a virtual 3D structure is created, shown in Figure B. The value in the memory array designates the appearance frequency of signal points constructing a waveform.

In Figure A, a count array consists of 256 computing units. Each unit is made of several comparators and counters. When 8-bit data passes through Acquire Memory, and then reaches counter array, comparators select corresponding counter that follows an increment in its value then. After some amount of data is processed, part of input waveform is statistically calculated by counter array.

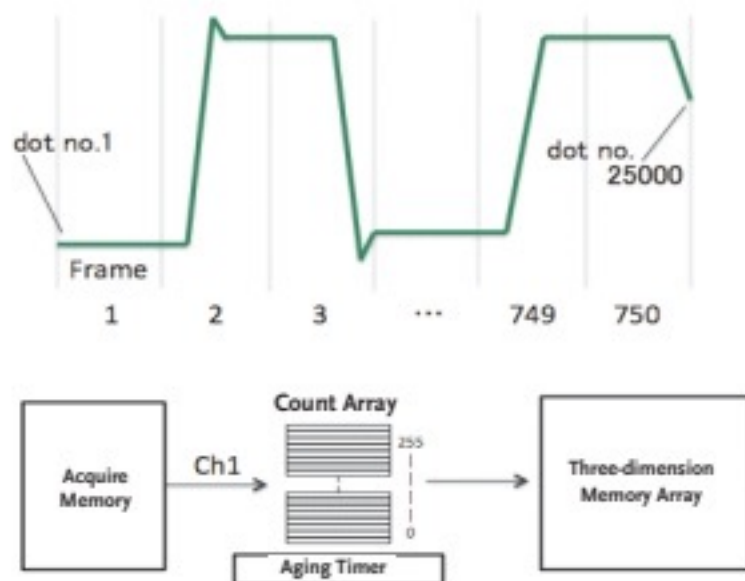


Figure A. The compression and quantization of waveform data

This process holds only for hundreds of micro seconds even if the calculation implemented by hardware architecture repeats for 750 times. The GDS-3000 Series uses such parallel processing structures to shorten the dead time. Take 4-channel GDS-3000 as an example. It has 1024 counter arrays to simultaneously process input waveform data.

In general it takes approximately 16ms for the LCD panel to read data sequentially from the 3D memory array, display the data on the screen, and to update the counter array. Obviously, if the count array doesn't do any processing and only writes (overwrites) the existing information, the 3D memory array will have changed several times during an LCD update and results in users not seeing these changes. Therefore a mechanism called an Aging timer, as shown in the figure, has been added to the VPO circuit to simulate the persisting and aging property of traditional CRTs. The Aging timer will operate with value in 3D memory array when count array is writing and result in only partial value of the value in the 3D memory array been changed. For example, if the count array is not 0 in value, the 3D memory array will gradually increase in value. On the contrary, if the count array is 0 in value, the 3D memory array will gradually decrease in value until it reaches to 0. In this way the latest waveform data can be updated while the previous waveform can be retained for some time, from 100ms up to several seconds. As a result, we can say that the 3D structure of the memory array is dynamic. Users can change this feature by adjusting the Persist time. The time for the circuit to process this data is too short to be detected by the eyes and the overall effect is that the entire screen is aging all together at the same time.

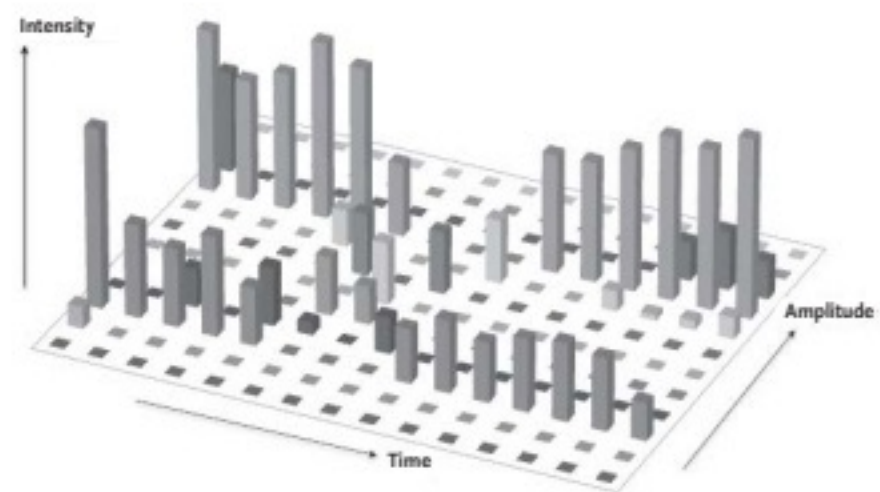


Figure B. Structure of 3D waveform data array

MEMORY DEPTH

Three major factors, including bandwidth, sample rate and memory depth, contribute the selection of a digital oscilloscope. The number of samples an oscilloscope can store is defined as memory depth. Memory depth can be calculated by Record duration divided by Sample period as shown in the formula below. As indicated, memory depth has a positive relationship with the sampling rate. In other words, waveforms can be recorded over a long period of time when stored in a larger memory depth.

$$\text{Total Waveform Points Sampled} = \text{Record Duration} / \text{Sample Period} = \text{Record Duration} \times \text{Sampling Rate}$$

If Total Waveform Points Sampled > DSO Memory Depth, all excessive points sampled need to be abandoned and the effective sampling rate is forced to slow down

$$\text{Memory Depth} = \text{Record Duration} \times \text{Effective Sampling Rate}$$

$$\text{Effective Sampling Rate} = \text{Memory Depth} / \text{Record Duration}$$

When Record Duration is long, Longer DSO Memory Depth means Faster Effective Sampling Rate

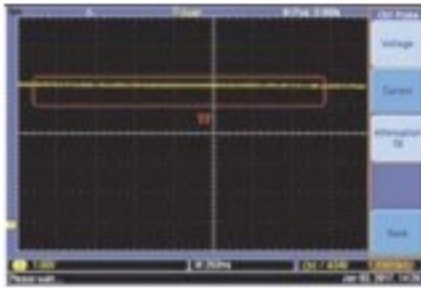
*Sample period is 1/sample rate **Record duration = Time Base X 10 div

DIGITAL STORAGE OSCILLOSCOPES

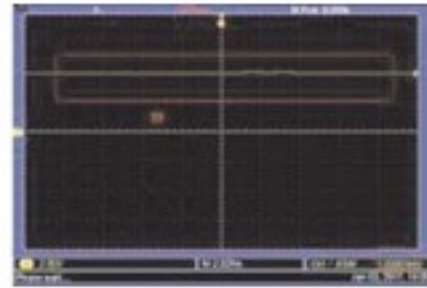
For relatively slow and repetitive signals, memory depth should be the primary consideration rather than sampling rate. The biggest shortcoming of short memory depth is Aliasing due to the lack of sample rate. Oscilloscope's sample rate should be 2x higher than DUT's frequency in order to restore the original waveforms. The following example is done by providing 1KHz/1V sine wave to TEK 1052B-EDU(2.5k memory depth) and GDS-1102B (10M/ch memory depth) via a GW Instek AFG-3021 function generator.

For TEK1052B-EDU under 250ms/div, its 1kSa/s sample rate cannot satisfy the Nyquist theory: Sample rate should be at least 2x higher than input frequency. As a result, TEK1052B-EDU produced Aliasing.

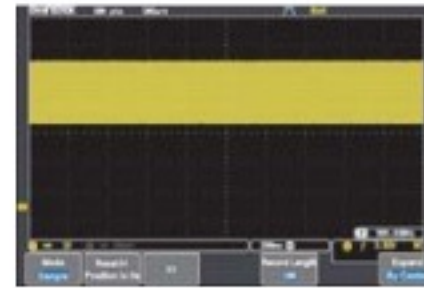
For GDS-1102B under 200ms/div, its 5MSa/s can satisfy the requirement of sample rate which is 2x higher than input frequency. As a result, GDS-1102B revealed genuine waveforms without Aliasing.



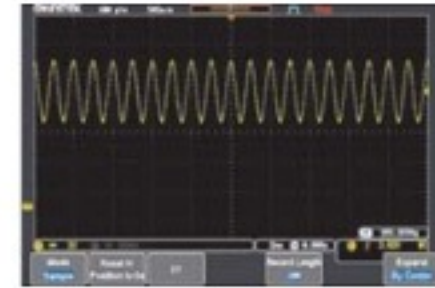
Aliasing due to the insufficient sample rate



After pressing pause and zooming in, signal is obviously distorted



Waveforms entered roll mode under 200ms/div



After pressing pause and zooming in, signal is restore without distortion

DIGITAL STORAGE OSCILLOSCOPE SELECTION GUIDE

MODEL	GDS-3000A Series	GDS-3000 Series	GDS-2000A Series	MSO-2000E Series	MDO-2000A Series	MDO-2000E Series	GDS-2000E Series	GDS-1000B Series
Bandwidth	650/350MHz	500MHz	300/200/100/70 MHz	200/100/70MHz	300/200/100MHz	200/100/70MHz	200/100/70MHz	200/100/70/50MHz
Display	10.2" TFTLCD WVGA	8" TFT LCD SVGA	8" TFT LCD SVGA	8" TFT LCD WVGA	8" TFT LCD WVGA	8" TFT LCD WVGA	8" TFT LCD WVGA	7" TFT LCD WVGA
VPO	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Memory Depth	200M/ch	25k/ch	2M	10M/ch	20M/ch	10M/ch	10M/ch	10M/ch
Real Time Sampling Rate	5GSa/s	4GSa/s	2GSa/s	1GSa/s	2GSa/s	1GSa/s	1GSa/s	1GSa/s
Channel	2 or 4	2 or 4	2 or 4	2 or 4	2	2 or 4	2 or 4	2 or 4 ☆
Input Impedance	1M/50 Ω	1M/75/50 Ω	1MΩ (50Ωadapter is option)	1MΩ (50Ωadapter is option)	1MΩ (50Ωadapter is option)	1MΩ (50Ωadapter is option)	1MΩ (50Ωadapter is option)	1MΩ (50Ωadapter is option)
Vertical Resolution	8 bits 1mV-10V/div (@1MΩ) 1mV-1V/div (@50Ω)	8 bits 2mV-5V/div (@1MΩ) 2mV-1V/div (@75/50Ω)	8 bits 1mV-10V/div	8 bits 1mV-10V/div	8 bits 1mV-10V/div	8 bits 1mV-10V/div	8 bits 1mV-10V/div	8 bits 1mV-10V/div
Time Base Range	1ns-1000s/div	1ns-100s/div	1ns-100s/div	1ns-100s/div	1ns-100s/div	1ns-100s/div	1ns-100s/div	5ns-100s/div
Auto Measurement	38	28	36	38	38	38	38	36
1M FFT	Yes	-	-	Yes	Yes	Yes	Yes	Yes
Split Screen	-	Yes	-	-	-	-	-	-
Auto Range	-	Yes	-	-	-	-	-	-
Power Analysis	Optional	Yes	-	-	-	-	-	-
Serial Bus Decode	Yes (I ² C,SPI,UART,CAN,LIN)	Optional (I ² C,SPI,UART)	Yes (I ² C,SPI,UART,CAN,LIN)	Yes (I ² C,SPI,UART,CAN,LIN)	Yes (I ² C,UART,CAN,LIN)	Yes (I ² C,SPI,UART,CAN,LIN)	Yes (I ² C,SPI,UART,CAN,LIN)	-
Waveform Search	Yes	-	Yes	-	Yes	Yes	-	-
Segmented Memory	Yes	-	Yes	-	Yes	Yes	-	-
Logic Analyzer	Optional 16CH	-	Optional 8 or 16 CH	Standard 16CH	-	-	-	-
Arbitrary Waveform Generator	Standard provide dual Channel 25MHz	-	Optional 5 or 25MHz	EA series provide dual channel 25MHz	Standard provide dual channel 25MHz	Standard provide dual channel 25MHz	-	-
Interface	USB host/device; LAN;SVGA output; RS232C;Go/NoGo BNC; GPIB (optional)	USB host/device; LAN;SVGA output; RS232C;Go/NoGo BNC GPIB (optional)	USB host/device; LAN;SVGA output; (optional) ; Go/NoGo BNC GPIB (optional)	USB host/device; LAN;Go/NoGo BNC	USB host/device; LAN;Go/NoGo BNC	USB host/device; LAN;Go/NoGo BNC	USB host/device; LAN;Go/NoGo BNC	USB host/device; LAN;Go/NoGo BNC *LAN only 4th ch model
Page	A5-10	A11-12	A13-14	A15-20	A21-26	A27-30	A31-32	A35-40

☆ 200/100/70MHz:2CH
100/70/50MHz:4CH

650/350 MHz Digital Storage Oscilloscope



Visual Persistence Oscilloscope



GDS-3000A Series (650/350 MHz)

NEW



FEATURES

- 650/350MHz Bandwidth, 2 or 4 Input Channels
- 5GSa/s Real-time Sampling Rate(half channels); 2.5GSa/s Real-time Sampling Rate(all channels)
- Per Channel 200Mpts Memory Depth
- 200,000 wfm/s of Waveform Update Rate
- 10.2 inch 800 x 480 TFT LCD Display
- 490,000 Segments of Segmented Memory and the Waveform Search Function to Optimize the Efficiency of Record Length
- Zoom Window and Play/Pause Rapidly Navigate the Waveforms
- 38 sets of Automatic Measurement Offer Various Measurement Selections
- High resolution acquisition mode
- I²C/SPI/UART/CAN/LIN Serial Bus Trigger and Decoding Functions
- Dual Channel Spectrum Analyzer (DC~2.5GHz) with spectrogram
- Dual Channel 25MHz Arbitrary Waveform Generator
- Optional 13 Sets of Power Analysis Measurements
- Optional 16 Digital Channels with a Logic Analyzer(MSO)
- Flexible Remote Control Connectivity (Standard: USB/LAN/RS-232; Option: GPIB)

GDS-3000A digital storage oscilloscopes have 650MHz and 350MHz models with two-channel, four-channel and 16-channel logic analyzer options. The series features the memory length of each channel up to 200Mpts; the sampling rate of 5GSa/s half channels and 2.5GSa/s on all channels. Its display is 10.2" TFT LCD and it provides the color display mode.

Accurate Signal Acquisition and Analysis

GDS-3000A strengthens many functions and specifications required for oscilloscope measurements including the memory depth of up to 200Mpts per channel. The advantage of long memory is that it allows users to maintain high sampling rate even at low speed time settings; the waveform update rate is up to 200,000wfm/s; and the segmented memory can capture and analyze up to 490,000 segments. For measurement, GDS-3000A incorporates the Fine scale function to allow users to fine-tune the vertical scale according to the requirements so as to achieve full scale measurement to improve its measurement accuracy. With a 10.2" large screen display and the acquisition method with the high resolution mode allow low-noise signals under high-bandwidth measurements.

In addition, the series is equipped with 1M ohm and 50 ohm input impedance selections, which can be set according to different DUT measurement requirements to achieve the effect of impedance matching. The search function can quickly find the signals that meet the conditions according to the needs of the test. The cursor mark function allows users to clearly observe the voltage (or current), time and delta data of each point measured by the cursor. Via the indicator function, the measured range is to be shown at the specific section of the waveform.

Dual Domain Measurement

For frequency domain measurement, it is equipped with a dual channel spectrum analyzer, which allows users to measure and analyze the frequency domain signals of two channels at the same time. It is also equipped with Spectrogram function, which allows users to easily observe complex frequency domain fluctuations that are proportionally decomposed into simple superimposed waves so as to understand the signal strength distribution. The soft keys allow users to have more intuitive settings for operation, which can improve the measurement efficiency.

13 Sets of Switching Mode Power Supply Measurements

GDS-3000A provides a rich measurement items for switch mode power supply testing. The provided power supply test items include AC input analysis items: Power Quality, Harmonics, Inrush Current; DC output analysis required test items: Ripple/ Noise, Transient Response Analysis, Turn On/OFF, Efficiency; Control Loop response(Bode) and PSRR(Power Supply Rejection Ratio); Complete switching component analysis items: Modulation, Switching loss, SOA(Safe Operation Area) and Magnetics analysis: B-H curve. On one side of GDS-3000A, a power supply for 50MHz (GCP-530) and 100MHz(GCP-1030) current probes is provided. This feature can save users the cost of purchasing the power supply for current probes and relief the burden of carrying the power supply when going out. GDS-3000A is standardly equipped with a dual-channel 25MHz arbitrary waveform generator and the frequency response analysis function. The FRA has the load function, which can load multiple FRA measurement results for comparison. User define shortcut key provides user-definable shortcut keys. The use of the shortcut key can improve measurement efficiency. GDS-3000A provides a rich communication interfaces. In addition to the commonly used USB Host, USB Device port, and LAN port, it also includes a highly stable RS232 interface and an optional GPIB interface.

SPECIFICATIONS

	GDS-3352A	GDS-3354A	GDS-3652A	GDS-3654A
VERTICAL				
Channels	2Ch+EXT	4Ch+EXT	2Ch+EXT	4Ch+EXT
Bandwidth	DC~350MHz(-3dB)@50Ω/1MΩ input impedance		DC~650MHz(-3dB)@50Ω input impedance; DC~500MHz(-3dB)@1MΩ input impedance	
Calculated Rise Time	1ns		535ps	
Bandwidth Limit	20M/100M/200MHz ⁻¹		20M/100M/200M/300MHz ⁻¹	
Vertical Resolution	8 bits(Max.12bits with Hi Res)		*1. The tolerance of bandwidth limit is±10%.	
Vertical Resolution(1MΩ)	1mV ² ~ 10V/div		*2. The bandwidth is limited to 20MHz at 1mV/div and 2mV/div.	
Vertical Resolution(50Ω)	1mV ² ~ 1V/div			
Input Coupling	AC, DC, GND			
Input Impedance	1MΩ// 22pF approx.			
DC Gain Accuracy	1mV : ±5% full scale ; ≥2mV : ±3% full scale			
Polarity	Normal , Invert			
Maximum Input Voltage(1MΩ)	300Vrms , CAT II			
Maximum Input Voltage(50Ω)	5 Vrms			
Offset Position Range	For 1MΩ input impedance:1mV/div~20mV/div±1V;50mV/div~500mV/div±10V; 1V/div~5V/div:±100V;10V/div:±1000V			
Waveform Signal Process	For 50Ω input impedance:1mV/div~50mV/div±1V;100mV/div~1V/div:±10V +, -, X, ⊕, FFT, User Defined Expression FFT: Spectral magnitude. Set FFT Vertical Scale to Linear RMS or dBV RMS, and FFT Window to Rectangular, Hamming, Hanning or Blackman			
TRIGGER				
Source	2CH models: CH1, CH2, Line , EXT ; 4CH models: CH1 , CH2 , CH3 , CH4 , Line , EXT			
Trigger Mode	Auto(Supports Roll Mode for 100ms/div and slower), Normal, Single			
Trigger Type	Edge, Pulse Width(Glitch), Video, Pulse Runt, Rise & Fall(Slope),Time out, Alternate, Event-Delay(1~65,535 events),Time-Delay(Duration, 4ns~10s),Bus(I ² C,SPI,UART,CAN,LIN)			
Trigger Holdoff Range	4ns~10s			
Coupling	AC, DC, LF rej. , HF rej. , Noise rej.			
Sensitivity	1div			
EXT TRIGGER				
Range	±20V			
Sensitivity	DC ~ 100MHz Approx. 100mV 100MHz ~ 350MHz Approx. 150mV			
Input Impedance	1MΩ±3% ~ 22pF			
HORIZONTAL				
Range	1ns/div ~ 1000s/div (1-2-5 increments); ROLL : 100ms/div ~ 1000s/div			
Pre-trigger	10 div maximum			
Post-trigger	10,000,000 div max (depend on time base)			
Accuracy	±5ppm, about ±2ppm increase in error per year			
X-Y MODE				
X-Axis Input/Y-Axis Input	Channel 1, Channel 3 (for 4CH models); Channel 2, Channel 4 (for 4CH models)			
Phase Shift	±3° at 100kHz			
SIGNAL ACQUISITION				
Real Time Sample Rate	5GSa/s half channels; 2.5GSa/s all channels			
Record Length	Max.200M pts/CH			
Acquisition Mode	Normal, Average, Peak detect, High resolution, Single			
Number of Segments	Average: Selectable from 2 ~ 256, Peak detect: 400ps 1 ~ 490,000 maximum			
CURSORS AND MEASUREMENT				
Cursors	Amplitude, Time, Gating available;Unit:Seconds(s),Hz(1/s),Phase(degree),Ratio(%)			
Automatic Measurement	38 sets with indicator: Pk-Pk, Max, Min, Amplitude, High, Low, Mean, Cycle Mean, RMS, Cycle RMS, Area, Cycle Area, ROVShoot, FOVShoot, RPREShoot, FPREShoot, Frequency, Period, RiseTime, FallTime, +Width, -Width, Duty Cycle, +Pulses, -Pulses, +Edges, -Edges, %Flicker, Flicker Idx, FRR, FRF, FFR, FFF, LRR, LRF, LFR, LFF, Phase.			
Cursors Measurement	Voltage difference between cursors (ΔV) Time difference between cursors (ΔT)			
Auto Counter	6 digits, range from 2Hz minimum to the rated bandwidth			
CONTROL PANEL FUNCTION				
Autoset	Single-button, automatic setup of all channels for vertical, horizontal and trigger systems, with "Undo Autoset", "Fit Screen"/ "AC Priority" mode, and "Fine Scale" functions.			
Save Setup	20 sets			
Save Waveform	20 sets			
Save Reference Waveform	4 sets			
POWER MEASUREMENTS (Option)				
	Power Quality, Harmonics, Ripple, In-rush current, Switching Loss, Modulation, SOA, Transient, Efficiency, B-H curve, Control Loop Response, PSRR, Turn On/Off			

SPECIFICATIONS				
	GDS-3352A	GDS-3354A	GDS-3652A	GDS-3654A
AWG				
Channels	2			
Sample Rate	200 MSa/s			
Vertical Resolution	14 bits			
Max. Frequency	25 MHz			
Waveforms	Sine, Square, Pulse, Ramp, DC, Noise, Sinc, Gaston, Lorentz, Exponential Rise, Exponential Fall, Haversine, Cardiac			
Output Range	20 mVpp to 5 Vpp, HighZ; 10 mVpp to 2.5 Vpp, 50Ω			
Output Resolution	1mV			
Output Accuracy	2% (1 kHz)			
Offset Range	±2.5 V ac+dc, High Z; ±1.25 V ac+dc, 50Ω			
Offset Resolution	1mV			
Sine	Frequency Range:100mHz~25MHz;Flatness(relative to 1kHz):±0.5 dB<15MHz,±1dB(15MHz~25MHz); Harmonic Distortion:40 dBc; Stray(Non-harmonic):-40 dBc; Total Harmonic Distortion:1%; S/N Ratio:40 dB			
Square/Pulse	Frequency Range:100mHz~15MHz ; Rise/Fall time:<15ns ; Overshoot: <3% ; Duty cycle Square: 50% & Pulse:0.4%~99.6% ; Min. Pulse Width:30 ns ; Jitter:500 ps			
Ramp	Frequency Range:100mHz~1MHz ; Linearity: 1% ; Symmetry: 0~100%			
SPECTRUM ANALYZER				
Frequency Range	DC ~ 2.5GHz(Max.) dual channel with spectrogram (based on advanced FFT). Notice: Frequency which exceeds analog front end bandwidth is uncalibrated			
Span	1kHz ~ 2.5GHz(Max.)			
Resolution Bandwidth	1Hz ~ 2.5MHz(Max.)			
Reference Level	-80 dBm to +40dBm in steps of 5dBm			
Vertical Units	dBV RMS; Linear RMS; dBm			
Vertical Position	-12divs to +12divs			
Vertical Scale	1dB/div to 20dB/div in a 1-2-5 Sequence			
Display Average Noise Level	1V/div < -40dBm, Avg : 16 ; 100mV/div < -60dBm, Avg : 16 ; 10mV/div < -80dBm, Avg : 16			
Spurious Response	2nd harmonic distortion<35dBc ; 3rd harmonic distortion< 40dBc			
Frequency Domain Trace Types	Normal ; Max Hold ; Min Hold ; Average (2 ~ 256)			
Detection Methods	Sample ; +Peak ; -Peak ; Average			
FFT Windows	FFT Factor : Hanning 1.44 ; Rectangular 0.89 ; Hamming 1.30 ; Blackman 1.68			
LOGIC ANALYZER (Option)				
Sample Rate	Per Channel 1GSa/s			
Bandwidth	200MHz			
Record Length	Per Channel 10M pts (max)			
Input Channels	16 Digital (D15 - D0)			
Trigger Type	Edge, Pattern, Pulse Width, Serial bus (I ² C, SPI, UART, CAN, LIN), Parallel Bus			
Thresholds Quad	D0~D3, D4~D7,D8~D11 ,D12~D15 Thresholds			
Threshold Selections	TTL, CMOS(5V,3.3V,2.5V), ECL, PECL,0V ,User Defined			
User-defined Threshold Range	±5V			
Maximum Input Voltage	±40 V			
Minimum Voltage Swing	±250 mV			
Vertical Resolution	1 bit			
FREQUENCY RESPONSE ANALYSIS				
Frequency Range	20 Hz ~ 25 MHz			
Input and Output Sources	Channel 1 ~ 2 for 2CH models ; Channel 1 ~ 4 for 4CH models			
Number of Test Points	10,15,30,45,90 points per decade selectable for logarithm scale;2~1000 points selectable for linear scale > 80 dB (typical)			
Dynamic Range	10mVpp to 2.5Vpp into 50Ω, 20mVpp to 5Vpp into High-Z, Fixed test amplitude or custom amplitude for each decade			
Test Amplitude	Logarithmic or linear overlaid gain and phase plot, may also overlay with reference plots for cross comparison. Test results saved in csv format for offline analysis			
Test Results	Tracking gain and phase markers			
Manual Measurements	Auto-scaled during test			
Plot Scaling				
DISPLAY SYSTEM				
TFT LCD Type	10.2" TFT LCD WVGA color display			
Waveform Update Rate	200,000 wfms/sec max.			
Display Resolution	800 horizontal x 480 vertical pixels (WVGA)			
Interpolation	Sin(x)/x			
Waveform Display	Dots, Vectors, Variable persistence(16ms~4s), Infinite persistence,gray and color waveforms			
Display Graticule	8 x 10 divisions			
Display Mode	Y,X,Y			
INTERFACE				
RS-232C	DB-9 male connector			
USB Port	USB 2.0 high-speed host port x 1 ; USB high-speed 2.0 device port x 1			
Ethernet Port	RJ-45 connector, 10/100Mbps with HP Auto-MDIX			
VGA Video Port	DB-15 female connector, monitor output for display on VGA monitor			
Optional GPIB Module	Fully programmable with IEEE488.2 compliance			
Go/NoGo BNC	5V Max/10mA open collector output			
Kensington Style Lock	Rear-panel security slot connects to standard Kensington-style lock			
Power Supply Receptacles	±12V/500mA for current probe usage;2 sets for 2CH models;4 sets for 4CH models			
MISCELLANEOUS				
Operating	0°C ~ 50°C, Relative Humidity≤80% at 40°C or below ; ≤ 45% at 41°C~50°C			
Line Voltage Range	AC 100V ~ 240V, 50Hz ~ 60Hz, auto selection. power consumption:100W			
Multi-Language Menu	Available			
On-Line Help	Available			
Time Clock	Time and date, provide the date/time for saved data			
Internal Flash Disk	800M bytes Single-Level Cell flash memory			
Installed APP	Go/NoGo, DVM, DataLog, Digital Filter, Frequency Response Analyzer, Mask, Mount Remote Disk, Demo			
User Define Key	User can select one of the several different preset functions as shortcut key			
DIMENSIONS & WEIGHT				
420(W) X 253(H) X 113.8(D)mm, Approx. 4.6 kg				

Note : Three-year warranty, excluding probes & LCD display panel.

ORDERING INFORMATION

GDS-3652A	650MHz, 2-Channel, Digital Storage Oscilloscope
GDS-3654A	650MHz, 4-Channel, Digital Storage Oscilloscope
GDS-3352A	350MHz, 2-Channel, Digital Storage Oscilloscope
GDS-3354A	350MHz, 4-Channel, Digital Storage Oscilloscope

ACCESSORIES

User manual CD x 1, Power cord x 1
 GTP-351R:350MHz 10:1 passive probe for GDS-3352A/3354A(one per channel)
 GTP-501R:500MHz 10:1 passive probe for GDS-3652A/3654A (one per channel)

Option

DS3A-PWR	Power Analysis Software	DS3A-GPIB	GPIB Interface	DS3A-16LA	16 Channel Logic Analyzer
----------	-------------------------	-----------	----------------	-----------	---------------------------

Optional Accessories

GTP-033A	35MHz 1:1 Passive probe	GCP-1030	100MHz/30A Current probe
GTP-352R	350MHz 20:1 Passive probe	GTL-248	GPIB Cable, Double Shielded, 2000mm
GDP-025	25MHz High voltage differential probe	GTL-110	Test lead, BNC to BNC connector
GDP-050	50MHz High voltage differential probe	GTL-232	RS-232C cable, 9-pin female to 9-pin female, Null modem for computer
GDP-100	100MHz High voltage differential probe	GTL-246	USB 2.0 cable, A-B type cable 4P, 1800mm
GCP-300	300kHz/200A Current probe	GRA-443	Rack Adapter Panel
GCP-500	500kHz/150A Current probe	GKT-100	Deskew Fixture
GCP-530	50MHz/30A Current probe		
GCP-1000	1MHz/70A Current probe		

Free Download

PC Software	OpenWave software	Driver	LabView driver
-------------	-------------------	--------	----------------

Rear Panel



DS3A-16LA 16 Channel Logic Analyzer



GRA-443 Rack Adapter Panel

Rack Mounting (19" , 6U)



GKT-100 Deskew Fixture

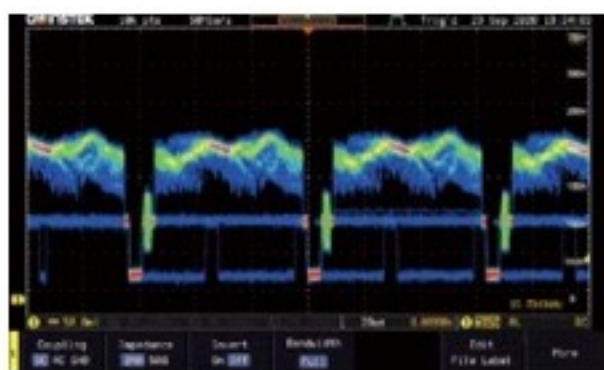


650/350 MHz Digital Storage Oscilloscope

GDS-3000A Series

OSCILLOSCOPES

A. 10.2 INCH, 8 BITS RGB COLOR GRADIENT DISPLAY



With respect to the waveform display technology, the GDS-3000A series oscilloscope is capable of displaying RGB color gradients with 8 bits each which can delineate the profound gradational fluctuations; as if it can recreate the analog oscilloscope display capability. When a composite signal is input, the GDS-3000A series, has the ability to precisely reveal the colored burst signal and to show details of layers with the brightness. Hence, the dull monochrome waveform is imbued with vitality, it allows users to easily determine and analyze waveforms.

B. 200M MEMORY DEPTH PER CHANNEL INDEPENDENTLY



The GDS-3000A series oscilloscope has a powerful and incomparable memory depth for the data retrieving. 200M memory depth per channel independently surpasses the specification of the industry's 3000 series DSO boundary. 200M memory depth allows users to easily seize the waveform detail while conducting fundamental measurement applications.

C. FINE SCALE



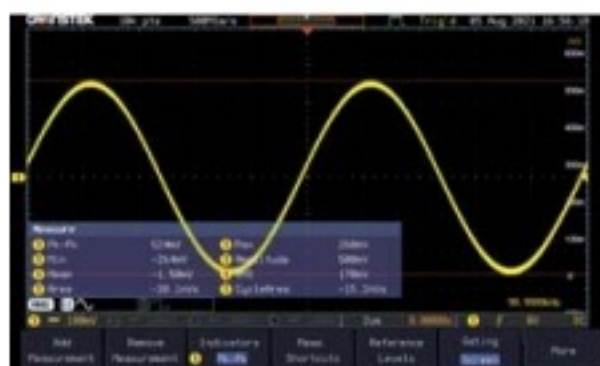
The Fine scale function is incorporated to allow users to fine-tune the vertical scale according to their needs to achieve full-scale measurement and improve the accuracy of the voltage or current measurements.

D. HIGH RESOLUTION ACQUISITION MODE



The acquisition method with high resolution mode is provided to effectively remove noise and improve the accuracy of automatic measurement.

E. 38 ITEMS OF AUTO MEASUREMENT SELECTION AND THE STATISTICS FUNCTION

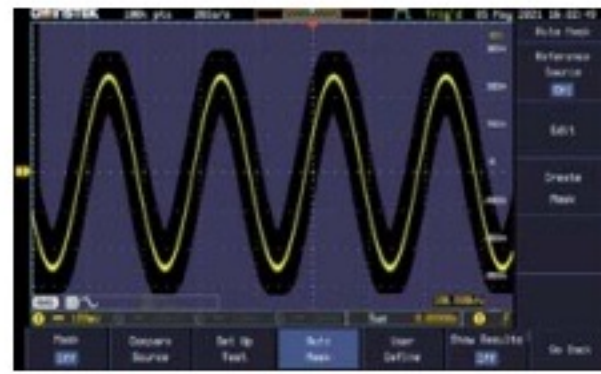
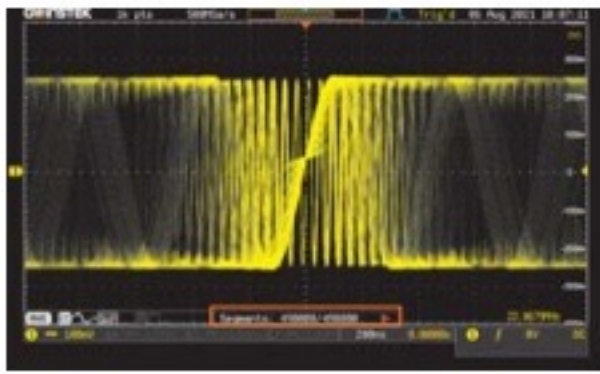


The GDS-3000A series soundly provides 38 measurement items. Based upon the parameters such as voltage, current, time, frequency, and delay measurement, users can decide which measurement items to choose. On the single display screen, the GDS-3000A series provides 8 measurement selections.

The statistics mode can also be selected for users to analyze the mean value, the maximum, the minimum, and standard deviation of the retrieved waveforms to ensure signal's integrity and identify abnormal waveforms.

Users can also use the Measure Shortcuts function to select the item to be measured, and then store the selected item in Shortcut 1~4, which can be selected to conduct measurements for the same product next time. Users just select the previously stored Shortcut 1~4 without making new selections from Add measurement, and all the measurement items will be displayed on the screen to improve the measurement efficiency.

F. 490,000 SEGMENTED MEMORY



In addition, GDS-3000A incorporates the Mask determination function under Segment, allowing users to quickly analyze abnormal waveforms that exceed the target range.

As the length of the sampling memory increases to 200Mpts, the number of acquisitions that can be set in the GDS-3000A's segmented memory at one time has also increased significantly, and up to 490,000 waveforms can be stored continuously (under the condition of the memory length of 1,000pts).

The segmented memory allows users to capture and observe interesting waveforms. Through the statistical function, it is especially helpful for finding sporadic problems in continuous events.

G. WAVEFORM SEARCH FUNCTION



Users can rapidly search desired waveforms according to the trigger condition. After activating the search function, hollow inverted triangles will show the location met the trigger condition. The upper left hand corner Overall will show the total number of waveforms met the trigger condition. Users can set waveform search by the trigger condition such as Edge, pulse width, Runt, Rise/Fall, and Bus.

When the trigger condition is met, hollow inverted triangles will appear. Users can save all marks to compare with the next input signal. The front panel of the GDS-3000A Series controls waveform zoom-out and play/pause function to swiftly identify each desired event. The function allows users to conveniently complete waveform search and save marks for rapid comparison and analysis.

H. USER DEFINE KEY



GDS-3000A incorporates a User Define key to allow users to set any one of the ten functions of User Define based upon the measurement requirement, including XY/YT; Reset all positions to 0; Measure all On/Off; Measure statistics On/Off; Segments On/Off; AWG output On/Off; Auto/Normal; Clear persistence; Freeze display and transparent readouts On/Off.

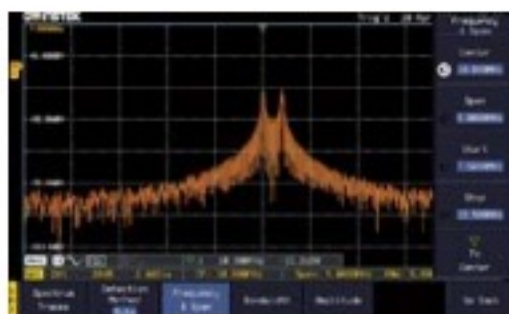
Users can quickly select the function setting by just pressing a key to quickly meet the measurement needs so as to improve the measurement efficiency.

650/350 MHz Digital Storage Oscilloscope

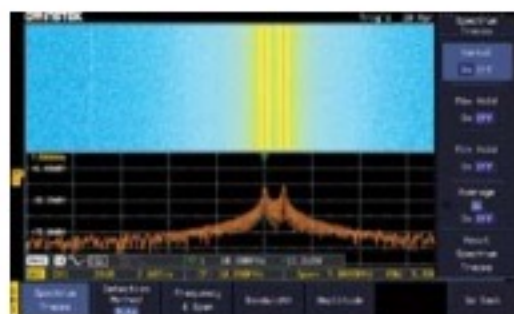
GDS-3000A Series

OSCILLOSCOPES

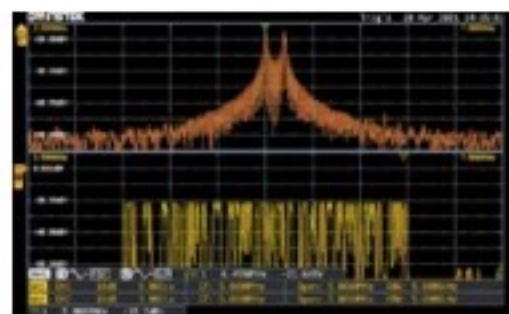
I. SPECTRUM ANALYZER FUNCTION



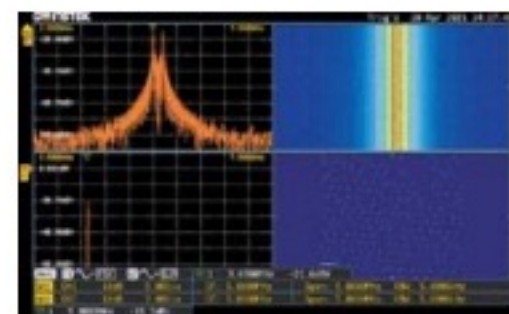
Spectrum Analyzer



Spectrum Analyzer + Spectrogram



Dual Spectrum Analyzer



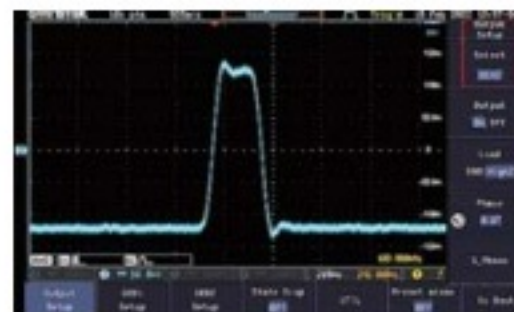
Dual Spectrum Analyzer + Spectrogram

For frequency domain measurement, dual channel spectrum analyzer is equipped. Users can measure and analyze dual channel frequency domain signals at the same time. It also includes the Spectrogram function, which allows users to easily observe the signal's strength distribution and the relationship of the spectrum distribution over time. The independent numeric key input on the panel makes the operation more convenient for users, thereby improving the measurement efficiency. For promotion selling point, dual Spectrum Analyzer and Spectrogram can test the frequency response of the left and right channels of the Audio Amplifier at the same time.

The above displays are :

1. Spectrum Analyzer
2. Spectrum Analyzer + Spectrogram
3. Dual Spectrum Analyzer
(Dual channels can set different conditions)
4. Dual Spectrum Analyzer + Spectrogram

J. 25MHZ DUAL CHANNEL ARBITRARY WAVEFORM GENERATOR



* The above two displays are load from CH1, and then it was generated by AWG to CH3

GDS-3000A is standardly equipped with a 25MHz dual channel arbitrary waveform generator, and provides built-in Sine, Square, Pulse, Ramp, DC, Noise, Sinc, Gaston, Lorentz, Exponential Rise, Exponential Fall, Haversine, Cardiac and other waveforms. Users can be directly input the amplitude and frequency of the signal through the numeric keys. Compared with the previous model, the new function is that users can select the arbitrary waveform

function of the AWG to store the signal measured by the analog channel of the oscilloscope to the arbitrary waveform of the signal source (UAW file), or it can directly output this signal from the signal generator, which is a new function that allows users to conveniently generate various measured signals to simulate diversified signal outputs.

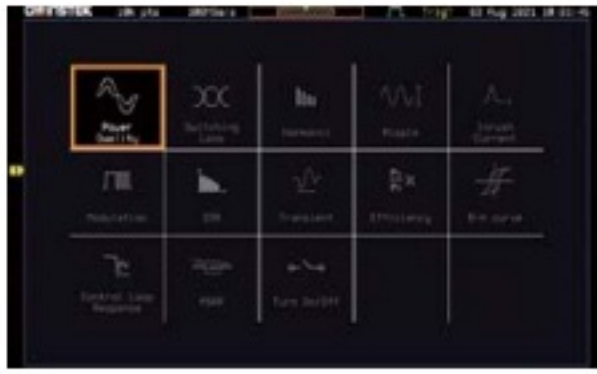
K. PC REMOTE CONTROL (WEB SERVER FUNCTION)



GDS-3000A has a built-in Web Server function to allow users to connect GDS-3000A's Web Server by using a browser in the same network domain via Ethernet connection. System information can be obtained and the oscilloscope screen (. png file) can be observed and captured remotely.

GDS-3000A can be controlled remotely through GUI to download and upload configuration files and test SCPI commands. Users can use this function to obtain oscilloscope information and configuration files, and operate remote control even if they are not on-site.

L. POWER ANALYSIS FUNCTIONS



13 Sets of Switching Mode Power Supply Measurements

In daily life, switching power supplies have become the mainstream of power supplies. Engineers often have to rack their brains in order to improve product performance and reduce switching loss, and Ripple/Noise. GDS-3000A has an option of rich measurement items for switching mode power supply testing. To meet engineers' measurement needs for switching mode power supply, rich measurement function can help engineers save a lot of measurement computing time and improve product development efficiency.



Power Quality

For AC voltage and current measurement, its distortion and other abnormal phenomena will affect the power consumption, efficiency and reliability of the power supply. Measurement items: current/voltage root mean square value, actual power, reactive power, frequency, power factor, phase angle, +/- V Peak, +/- I Peak, AC/DC voltage and current, voltage/current crest factor, impedance, resistance and reactance.



Transient Response Analysis

Output analysis required test items: Ripple/Noise, Transient response analysis, Turn On/OFF and Efficiency. It measures the time required for the output DC voltage to reach the stable level expected by users when the output load changes suddenly. Measurement item: transient response value (s).



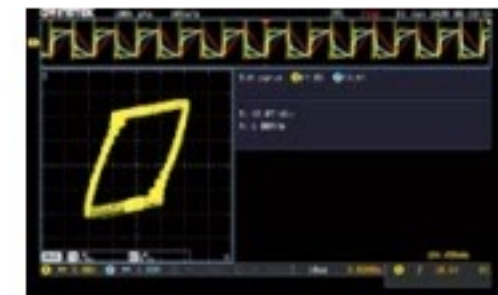
Switching Loss

Switching component analysis items: Switching loss, SOA (Safe Operation Area) and Modulation analysis. Analyze the integral of the product of the voltage and current of the switching device (MOSFET or IGBT) in the power supply, and then measure the switching loss of the device, including Turn-on switching loss, Turn-off switching loss and Conduction loss. The higher the switching frequency, the higher the Turn-on and Turn-off switching loss. Measurement items: power loss, energy loss & $R_{ds(on)}/V_{ce(sat)}$.



Control Loop Response

Control Loop Response and PSRR (Power Supply Rejection Ratio) PSRR: Power supply rejection ratio (PSRR) analysis, which is used to confirm that power equipment suppresses ripple noise in different frequency ranges. Measurement items: frequency and PSRR (dB).



Magnetics Analysis

Magnetics Analysis (B-H Curve): The characteristics of magnetic materials are divided into magnetic flux density (B), magnetic field strength (H) and material magnetic permeability (μ). The B-H diagram is usually used to verify the saturation of the magnetic components in the switch power supply. Measurement items: Measure the voltage and current flowing through the magnetic component and draw a B-H diagram.

M. OPTIONAL 16-CHANNEL LOGIC ANALYZER



GDS-3000A can be upgraded to a mixed-signal oscilloscope (MSO) by selecting an optional 16-channel logic analyzer, which is a plugin. When you have several GDS-3000As, you can plug in an optional logic analyzer to other unit at any time without installing any software.

Users can analyze digital signals, I²C, SPI, UART, CAN, LIN and parallel bus through a logic analyzer.

500 MHz Digital Storage Oscilloscope



Visual Persistence Oscilloscope

Patent No. ZL201220307783.4
ZL20121021617.9



GDS-3000 Series (500MHz)



FEATURES

- ✦ 500MHz Bandwidth, 2/4 Input Channels
- ✦ 4GSa/s Real-time Sampling Rate and 100GSa/s Equivalent Time Sampling Rate
- ✦ 25k Points Memory for Each Input Channel
- ✦ VPO (Visual Persistence Oscilloscope) Technology to Display Less-Frequently-Occurred Signals
- ✦ 8" 800 x 600 High Resolution TFT LCD Display
- ✦ Unique Split Screen System with Independent Setting and Display for Each Input Channel
- ✦ Three Built-in Input Impedance Selections : 50Ω/75Ω/1MΩ
- ✦ Optional Power Analysis Software for Power Source Measurement and Analysis
- ✦ Optional Serial bus Analysis Software for Trigger & Decode of I²C, SPI and UART Interfaces

SPECIFICATIONS		
	GDS-3502	GDS-3504
VERTICAL		
Channels	2Ch+EXT	4Ch+EXT
Bandwidth	DC-500MHz(-3dB)	DC-500MHz(-3dB)
Calculated Rise Time	700ps	700ps
Bandwidth Limit	20M/100M/200/350MHz	20M/100M/200/350MHz
Vertical Resolution	The bandwidth of the 75Ω input impedance is limited to 150MHz only. 8 bits	
Vertical Resolution(1MΩ)	2mV-5V/div	
Vertical Resolution(50/75Ω)	2mV-1V/div	
Input Coupling	AC, DC, GND	
Input Impedance	1MΩ // 15pF	
DC Gain Accuracy	±3% full scale	
Polarity	Normal, Invert	
Maximum Input Voltage(1MΩ)	300Vrms, CAT I	
Maximum Input Voltage(50/75Ω)	5 Vrms	
Offset Position Range	2mV/div - 100mV/div : ±0.5V ; 200mV/div - 5V/div : ±25V	
Waveform Signal Process	Add, Subtract, Multiply, and Divide waveforms, Differentiation, Integration (App installation required)FFT ; FFT : Spectral magnitude. Set FFT vertical scale to Linear RMS or dBV RMS, and FFT window to Rectangular, Hamming, Hanning or Blackman	
TRIGGER		
Source	2CH model: CH1, CH2, Line, EXT ; 4CH model: CH1, CH2, CH3, CH4, Line, EXT	
Trigger Mode	Auto (Supports Roll Mode for 100 ms/div and slower), Normal, Single	
Trigger Type	Edge, Pulse Width, Video, Runt, Rise & Fall, Alternate, Glitch Trigger, Duration Trigger, Slope Trigger Event-Delay(1-65,535 events), Time-Delay(10ns-10s), I ² C, SPI, UART (optional)	
Trigger Holdoff Range	10ns - 10s	
Coupling	AC, DC, LF rej., HF rej., Noise rej.	
Sensitivity	DC-30MHz Approx. 1div or 10mV; 50MHz-150MHz Approx. 1.5div or 15mV; 150MHz-350MHz Approx. 2div or 20mV; 350MHz-500MHz Approx. 2.5div or 25mV	
EXT TRIGGER		
Range	±15V	
Sensitivity	DC - 150MHz Approx. 100mV; 150MHz - 250MHz Approx. 150mV; 250MHz - 350MHz Approx. 150mV; 350MHz - 500MHz Approx. 200mV	
Input Impedance	1MΩ ±3%, -16pF	
HORIZONTAL		
Range	1-2.5-5 increments; ROLL: 100ms/div - 100s/div	
Pre-trigger	10 div maximum	
Post-trigger	1,000 div max (depend on time base)	
Accuracy	±20 ppm over any ≥ 1 ms time interval	
X-Y MODE		
X-Axis Input/Y-Axis Input	Channel 1; Channel 3/Channel 2; Channel 4	
Phase Shift	±3° at 100kHz	
SIGNAL ACQUISITION		
Real Time Sample Rate	4GSa/s	4GSa/s
ET Sample Rate	100GSa/s maximum for all models	
Memory Depth	25k points	
Acquisition Mode	Normal, Average, Peak detect, High resolution, Single Average: 2 - 256 waveforms ; Peak detect: 2ns	
Cursors and MEASUREMENT		
Cursors	Amplitude, Time, Gating available	
Automatic	28 sets: Vpp, Vamp, Vavg, Vrms, Vhi, Vlo, Vmax, Vmin, Rise Preshoot/Overshoot, Fall Preshoot/Overshoot	
Measurement	Freq, Period, Rise time, Fall time, Positive width, Negative width, Duty cycle, Phase, and eight different delay measurements (FRR, FRF, FFR, FFF, LRR, LRF, LFR, LFF)	
Cursors Measurement	Voltage difference between cursors (ΔV) Time difference between cursors (ΔT)	
Auto Counter	6 digits, range from 2Hz minimum to the rated bandwidth	
POWER MEASUREMENTS(OPTION)		
Power Quality Measurements	V RMS, I RMS, True Power, Apparent Power, Reactive Power, Frequency, Power Factor, Phase Angle, V Crest Factor, I Crest Factor, (+)V Peak, (-)V Peak, (+)I Peak, (-)I Peak, DC Voltage, DC Current, Impedance, Resistance, Reactance	
Harmonics	Frequency(Hz), Magnitude(%), Mag. RMS(A), Phase(°), Limit(A), Limit(%), Pass / Fail, Max all, Windows(A), 200% Limit, POHC Limit, THD-F, THD-R, RMS, Overall, POHL, Input Power, Power Factor, Fundamental Current, Harmonic 3, Harmonic 5	
Ripple Measurements	Ripple, Noise	
In-rush Current	First peak, second peak	
CONTROL PANEL FUNCTION		
Autoset	Single-button, automatic setup of all channels for vertical, horizontal and trigger systems, with undo autoset	
Auto-range	Allow automatically adjusts the time base and/or the vertical scale of displayed waveform when the frequency and/or the amplitude of input signal changed.	
Save Setup	20 sets	
Save Waveform	24 sets	
DISPLAY SYSTEM		
TFT LCD Type	8" TFT LCD SVGA color display(LED Back-light)	
Waveform Update Rate	3500 wfms/sec	
Display Resolution	800 horizontal x 600 vertical pixels (SVGA)	
Interpolation	Sin(x)/x & Equivalent time sampling	
Waveform Display	Dots, Vectors, Variable persistence, Infinite persistence	
Display Graticule	8 x 10 divisions	
Display Brightness	Adjustable	

GDS-3000 Series

OSCILLOSCOPES



GDS-3000 Series

SPECIFICATIONS		GDS-3502	GDS-3504
INTERFACED			
RS-232C		DB-9 male connector	
USB Port		2 sets USB 2.0 high-speed host port ; 1 set USB high-speed 2.0 device port	
Ethernet Port		RJ-45 connector, 10/100Mbps	
SVGA Video Port		DB-15 female connector, monitor output for display on SVGA monitors	
GPIB		GPIB-to-USB Adapter (Optional)	
Go/NoGo BNC		5V Max/10mA open collector output	
Internal Flash Disk		64MB	
Kensington Style Lock		Rear-panel security slot connects to standard Kensington-style lock	
Line Output		3.5mm stereo jack for Go/NoGo audio alarm	
POWER SOURCED			
Line Voltage Range		AC 100V – 240V, 50Hz – 60Hz, auto selection; Power Consumption 96VA	
OPERATING ENVIRONMENT			
Temperature		0°C – 50°C, Relative Humidity ≤ 80% at 40°C or below ; ≤ 45% at 41°C–50°C	
MISCELLANEOUS			
Multi-Language Menu		Available	
On-Line Help		Available	
Time clock		Time and data, provide the date/time for saved date	
DIMENSIONS & WEIGHT			
400(W) X 200(H) X 130(D)mm, Approx. 4 kg			

The specifications apply when the oscilloscope is powered on for at least 30 minutes under +20°C ~ +30°C.

ORDERING INFORMATION

GDS-3502	500MHz, 2-Channel, Digital Storage Oscilloscope
GDS-3504	500MHz, 4-Channel, Digital Storage Oscilloscope

ACCESSORIES

User manual CD x 1 , Power cord x 1
GTP-501R : 500MHz 10:1 passive probe for GDS-3502/3504 (one per channel)

Option

DS3-PWR	Power analysis software: Power quality/Harmonic/Ripple/In-rush current measurements
DS3-SBD	Serial Bus analysis software: I ² C/SPI/UART(only 4 channel models support SPI function)

Optional Accessories

GUG-001	GPIB to USB adapter	GDP-025	25MHz High voltage differential probe
GTP-033A	35MHz 1:1 Passive probe	GDP-050	50MHz High voltage differential probe
GCP-300	300kHz/200A Current probe	GDP-100	100MHz High voltage differential probe
GCP-530	50MHz/30A Current probe	GSC-008	Soft Carrying Case
GCP-500	500kHz/150A Current probe	GTL-110	Test lead, BNC to BNC connector
GCP-1030	100MHz/30A Current probe	GTL-232	RS-232C cable, 9-pin female to 9-pin female, Null modem for computer
GCP-1000	1MHz/70A Current probe	GTL-246	USB 2.0 cable, A-B type cable 4P,1800mm
GCP-206P	Power supply for current probe (2 input channel)	GRA-411	Rack Mount Kit
GCP-425P	Power supply for current probe (4 input channel)	GDB-03	Oscilloscope Education and Training Kit
GTL-248	GPIB Cable, Double Shielded, 2000mm	GKT-100	Deskew fixture

Free Download

PC Software	FreeWave software	Driver	USB driver ; LabView driver
--------------------	-------------------	---------------	-----------------------------

Rear Panel



GUG-001 GPIB to USB Adapter

For: GDS-3000 Series, PSW-Series



GRA-411 Rack Adapter Panel

Rack Mounting (19" , 6U)



GDB-03 Oscilloscope Education and Training Kit

For : GDS-3000/2000A/2000E/1000B Series
MSO-2000E Series/MDO-2000A/2000E Series



GSC-008 Soft Carrying Case



300MHz/200MHz/100MHz/70MHz Digital Storage Oscilloscope



Visual Persistence Oscilloscope



GDS-2000A Series (300/200/100/70 MHz)



FEATURES

- ✦ 300/200/100/70MHz Bandwidth, 2 or 4 Input Channels
- ✦ 2GSa/s Maximum Real-Time Sampling Rate and 100GSa/s Equivalent Time Sampling Rate
- ✦ 2M points Maximum Record length
- ✦ VPO Technology to Display Less-Frequently-Occurred Signals
- ✦ Fast Update Rate of 80,000 Waveform Per Second
- ✦ Segmented Memory Acquisition and Waveform Search Function
- ✦ Standard Model Provides I²C, UART, SPI, CAN and LIN Serial Bus Trigger and Analysis Functionality
- ✦ Optional 8 or 16 Additional Digital Channels with Logic Analyzer(MSO)
- ✦ Upgradable DVM, H-Expansion, Data Log and Advanced Logic Functionality
- ✦ Optional 5MHz Function Generator
- ✦ Flexible Remote Control Connectivity (Standard : USB ; Optional : LAN/GPIB)

GDB-03 Oscilloscope Education and Training Kit

For : GDS-3000/2000A/2000E/1000B Series
MSO-2000E Series/MDO-2000A/2000E Series



GSC-008 Soft Carrying Case



SPECIFICATIONS

SPECIFICATIONS								
VERTICAL								
	GDS-2072A	GDS-2074A	GDS-2102A	GDS-2104A	GDS-2202A	GDS-2204A	GDS-2302A	GDS-2304A
Channels	2Ch+EXT	4Ch+EXT	2Ch+EXT	4Ch+EXT	2Ch+EXT	4Ch+EXT	2Ch+EXT	4Ch+EXT
Bandwidth	DC-70MHz(-3dB)		DC-100MHz(-3dB)		DC-200MHz(-3dB)		DC-300MHz(-3dB)	
Calculated Rise Time	5ns		3.5ns		1.75ns		1.17ns	
Bandwidth Limit	20MHz		20MHz		20M/100MHz		20M/100M/200MHz	
Vertical Resolution	8 bits@1M : 1mV [*] -10V (* : When the vertical scale is set to 1mV/div, the bandwidth limit will be set to 20MHz automatically)							
Input Coupling	AC, DC, GND							
Input Impedance	1MΩ // 16pF approx.							
DC Gain Accuracy(**)	±(3% X Readout + 0.1div + 1mV) when 2mV/div or greater is selected ±(5% X Readout + 0.1div + 1mV) when 1mV/div is selected (** : The measurement type is average of ≥16 waveforms with vertical position at zero)							
Polarity	Normal, Invert							
Maximum Input Voltage	300Vrms, CAT I							
Offset Position Range	1mV/div - 20mV/div : ±0.5V ; 50mV/div - 200mV/div : ±5V ; 500mV/div - 2V/div : ±25V ; 5V/div-10V/div : ±250V							
Waveform Signal Process	+, -, x, ÷, FFT, d/dt, ∫dt, √ FFT : Spectral magnitude. Set FFT Vertical Scale to Linear RMS or dBV RMS, and FFT Window to Rectangular, Hamming, Hanning, or Blackman							
TRIGGER								
Source	CH1, CH2, CH3*, CH4*, Line, EXT, D0-D7 or D0-D15** ; *four channel models only **Logic analyzer option only							
Trigger Mode	Auto (Supports Roll Mode for 100 ms/div and slower), Normal, Single							
Trigger Type	Edge, Pulse Width, Video, Pulse Runt, Rise & Fall, Alternate, Glitch Trigger, Duration Trigger, Slope Trigger, Time out, Event-Delay (1-65,535 events), Time-Delay(10ns-10s), Logic*, Bus, *with DS2-08LA or DS2-16LA option							
Trigger Holdoff Range	10ns - 10s							
Coupling	AC, DC, LF rej., Hf rej., Noise rej.							
Sensitivity	DC - 100MHz Approx. 1div or 1.0mV ; 100MHz - 200MHz Approx. 1.5div or 15mV ; 200MHz - 300MHz Approx. 2div or 20mV							
EXT TRIGGER								
Range	±15V							
Sensitivity	DC - 100MHz Approx. 100mV 100MHz - 200MHz Approx. 150mV ; 200MHz - 300MHz Approx. 150mV							
Input Impedance	1MΩ ±3%, -16pF							
HORIZONTAL								
Time Base Range	1ns/div - 100s/div (1-2-5 increments); ROLL : 100ms/div - 100s/div							
Pre-trigger	10 div maximum							
Post-trigger	1,000 div max (depend on time base)							
Accuracy	±20 ppm over any ≥ 1 ms time interval							
Real Time Sample Rate	Max. : 2GSa/s							
ET Sample Rate	100GSa/s maximum for all models							
Record Length	Max. : 2Mpts							
Acquisition Mode	Normal, Average, Peak Detect, Single							
Peak Detection	2ns (typical)							
Average	Selectable from 2 to 256							
X-Y MODE								
X-Axis Input	Channel 1 ; Channel 3* (* : four channel models only)							
Y-Axis Input	Channel 2 ; Channel 4* (* : four channel models only)							
Phase Shift	±3° at 100kHz							
CURSORS AND MEASUREMENT								
Cursors	Amplitude, Time, Gating Available; Unit : Seconds(S), Hz(1/S), Phase (Degrees), Ratio(%)							
Automatic Measurement	36 sets: Pk-Pk, Max, Min, Amplitude, High, Low, Mean, Cycle Mean, RMS, Cycle RMS, Area, Cycle Area, ROVShoot, FOVShoot, RPRESshoot, FPRESshoot, Frequency, Period, RiseTime, FallTime, +Width, -Width, Duty Cycle, +Pulses, -Pulses, +Edges, -Edges, FRR, FRF, FFR, FFF, LRR, LRF, LFR, LFF, Phase							
Control Panel Function	Cursors measurement							
Auto Counter	6 digits, range from 2Hz minimum to the rated bandwidth							
Autoset	Single-button, automatic setup of all channels for vertical, horizontal and trigger systems, with undo Autoset							
Save Setup	20set							
Save Waveform	24set							
DISPLAY SYSTEM								
TFT LCD Type	8" TFT LCD SVGA color display(LED Back-light)							
Display Resolution	800 horizontal x 600 vertical pixels (SVGA)							
Interpolation	Sin(x)/x & Equivalent time sampling							
Waveform Display	Dots, Vectors, Variable persistence(16ms-10s), Infinite persistence							
Waveform Update Rate	80,000 waveforms per second, maximum							
Display Graticule	8 x 10 divisions							
INTERFACE								
RS-232C	DB-9 male connector							
USB Port	USB 2.0 Full-speed host port, USB 2.0 Full-speed device port							
Ethernet Port	RJ-45 connector, 10/100Mbps with HP Auto-MDIX (option)							
SVGA Video Port	SVGA output (option)							
GPIB	GPIB module (option)							
Go/NoGo BNC	5V Max/10mA open collector output							
Kensington Style Lock	Rear-panel security slot connects to standard Kensington-style lock							

The specifications apply when the oscilloscope is powered on for at least 30 minutes under +20°C--+30°C.
Note : Three-year warranty, excluding probes & LCD display panel.



GDS-2000A Series

SPECIFICATIONS

LOGIC ANALYZER (OPTION)

Sample Rate	500MSa/s
Bandwidth	200MHz
Record Length	2M max
Input Channels	16 Digital (D15 - D0) or 8 Digital (D7-D0)
Trigger Type	Edge, Pattern, Pulse Width, Serial bus (I ² C, SPI, UART, CAN, LIN), Parallel
Thresholds	Quad-D0 - D3, D4 - D7..Thresholds D8-D11*, D12-D15* (*: DS2-16LA only)
Threshold Selections	TTL, CMOS, ECL, PECL, User Defined
Threshold Accuracy	±100mV
User-defined Threshold Range	±10V
Maximum Input Voltage	±40V
Minimum Voltage Swing	±500mV
Input Impedance	101KΩ probe loading 8 pF
Vertical Resolution	1 bit

OPERATING ENVIRONMENT

Temperature	0°C - 50°C, Relative Humidity ≤ 80% at 40°C or below; ≤ 45% at 41°C-50°C
-------------	--

POWER SOURCE MISCELLANEOUS

Line Voltage Range	AC 100V - 240V, 50Hz - 60Hz, auto selection
Multi-Language Menu	Available
On-Line Help	Available
Time clock	Time and date, provide the date/time for saved data

DIMENSIONS & WEIGHT

380(W) X 220(H) X 145(D)mm, Approx. 4.2 kg
--

ORDERING INFORMATION

GDS-2304A	300MHz, 4-Channel, Digital Storage Oscilloscope
GDS-2302A	300MHz, 2-Channel, Digital Storage Oscilloscope
GDS-2204A	200MHz, 4-Channel, Digital Storage Oscilloscope
GDS-2202A	200MHz, 2-Channel, Digital Storage Oscilloscope
GDS-2104A	100MHz, 4-Channel, Digital Storage Oscilloscope
GDS-2102A	100MHz, 2-Channel, Digital Storage Oscilloscope
GDS-2074A	70MHz, 4-Channel, Digital Storage Oscilloscope
GDS-2072A	70MHz, 2-Channel, Digital Storage Oscilloscope

Accessories :

User manual CD x 1, Power cord x 1

GTP-070B-4	: 70MHz (10:1/1:1) Switchable passive probe for GDS-2072A/2074A(one per channel)
GTP-150A-2	: 150MHz (10:1/1:1) Switchable passive probe for GDS-2102A/2104A(one per channel)
GTP-250A-2	: 250MHz (10:1/1:1) Switchable passive probe for GDS-2202A/2204A(one per channel)
GTP-350A-2	: 350MHz (10:1/1:1) Switchable passive probe for GDS-2302A/2304A(one per channel)

OPTION

DS2-LAN	Ethernet & SVGA output	DS2-GPIB	GPIB Interface	DS2-FGN	DDS Function Generator
DS2-16LA	16-Channel Logic Analyzer includes 16 Channel Logic Analyzer Card(GLA-16) 16-Channel Logic Analyzer Probe(GTL-16LA)	DS2-08LA	8-Channel Logic Analyzer : includes 8-Channel Logic Analyzer Card(GLA-08) 8-Channel Logic Analyzer Probe(GTL-08LA)		

OPTIONAL ACCESSORIES

GTL-08LA	8-Channel Logic Analyzer Probe	GCP-300	300kHz/200A Current probe
GTL-16LA	16-Channel Logic Analyzer Probe	GCP-530	50MHz/30A Current probe
GLA-08	8-Channel Logic Analyzer Card	GCP-500	500kHz/150A Current probe
GLA-16	16-Channel Logic Analyzer Card	GCP-1030	100MHz/30A Current probe
GRA-420	Rack Mount Kit	GCP-1000	1MHz/70A Current probe
GAK-003	50Ω Impedance Adapter	GCP-206P	Power supply for current probe (2 input channel)
GTL-232	RS-232C Cable, 9-pin, F-F Type, null modem, 2000mm	GCP-425P	Power supply for current probe (4 input channel)
GTL-246	USB Cable, USB 2.0, A-B Type, 1200mm	GSC-008	Soft Carrying Case
GTL-248	GPIB Cable, Double Shielded, 2000mm	GDP-025	25MHz High voltage differential probe
GTP-033A	Oscilloscope Probe, 35MHz 1:1 Passive Probe, BNC(P/M)	GDP-050	50MHz High voltage differential probe
GDB-03	Oscilloscope Education & Training Kit	GDP-100	100MHz High voltage differential probe

FREE DOWNLOAD

PC Software	FreeWave software	Driver	USB driver, LabView Driver
-------------	-------------------	--------	----------------------------

Rear Panel



DS2-16LA 16-Channel Logic Analyzer



DS2-08LA 8-Channel Logic Analyzer



DS2-LAN Ethernet & SVGA Output



DS2-GPIB GPIB Interface



DS2-FGN DDS Function Generator



200MHz/100MHz/70MHz Mixed-signal Oscilloscope



Visual Persistence Oscilloscope



MSO-2000E Series (200/100/70 MHz)



FEATURES

- * 200/100/70MHz Bandwidth Selections : 2 or 4 Channels
- * Real Time Sample Rate Per Channel : 1GSa/s (2 Channel Models); Maximum Real Time Sample Rate : 1 GSa/s (4 Channel Models)
- * MSO-2000E Equips with a 16 Channel Logic Analyzer
- * MSO-2000EA Equips with a 16 Channel Logic Analyzer and a Dual Channel 25MHz Arbitrary Waveform Generator
- * Free Frequency Response Analyzer Software for MSO-2000EA
- * Per Channel 10M Memory Depth and VPO Waveform Display Technology
- * Waveform Update Rate up to 120,000 wfm/s
- * 8" WVGA TFT LCD
- * Maximum 1M FFT Provides Higher Frequency Domain Resolution Measurements
- * High Pass, Low Pass and Band Pass Filter Functions
- * 29,000 Segmented Memory Sections and Waveform Search Function
- * I²C/SPI/UART/CAN/LIN Serial Bus Trigger and Decoding Functions
- * Data Log Function is Able to Track Signal Changes up to 1000 Hours
- * Mask Test Function
- * Network Storage Function

SPECIFICATIONS

	MSO-2072E(A)	MSO-2074E(A)	MSO-2102E(A)	MSO-2104E(A)	MSO-2202E(A)	MSO-2204E(A)
VERTICAL SENSITIVITY						
Channels	2Ch+EXT	4Ch	2Ch+EXT	4Ch	2Ch+EXT	4Ch
Bandwidth	DC-70MHz(-3dB)		DC-100MHz(-3dB)		DC-200MHz(-3dB)	
Calculated Rise Time	5ns		3.5ns		1.75ns	
Bandwidth Limit	20MHz		20MHz		20M/100MHz	
Vertical Resolution	8 bits : 1mV - 10V/div					
Input Coupling	AC, DC, GND					
Input Impedance	1MΩ // 16pF approx.					
DC Gain Accuracy	±(3% when 2mV/div or greater is selected ; ±(5%) when 1mV/div is selected					
Polarity	Normal & Invert					
Maximum Input Voltage	300Vrms , CAT I (300Vrms CAT II with GTP-070B-4/100B-4/200B-4, 10 : 1 probe)					
Offset Position Range	1mV/div - 20mV/div : ±0.5V ; 50mV/div - 200mV/div : ±5V ; 500mV/div - 2V/div : ±25V ; 5V/div-10V/div : ±250V					
Waveform Signal Process	+ , - , × , ÷ , FFT, User Defined Expression FFT : 1Mpts ; FFT : Spectral magnitude. Set FFT Vertical Scale to Linear RMS or dBV RMS ; FFT Window Displays : Rectangular, Hamming, Hanning, Blackman-Harris					
TRIGGER						
Source	CH1 ,CH2, CH3, CH4, Line, EXT* ; *dual channel models only					
Trigger Mode	Auto (Supports Roll Mode for 100 ms/div and slower), Normal, Single Sequence					
Trigger Type	Edge, Pulse Width(Glitch), Video, Pulse Runt, Rise & Fall(Slope), Alternate, Time out, Event-Delay (1-65,535 events), Time-Delay(Duration;4ns-10s), Bus					
Trigger Holdoff Range	4ns - 10s					
Coupling	AC, DC, LF rej. , HF rej. , Noise rej.					
Sensitivity	1div					
EXT TRIGGER						
Range	±15V					
Sensitivity	DC - 100MHz Approx. 100mV; 100MHz - 200MHz Approx. 150mV					
Input Impedance	1MΩ±3%, -16pF					
HORIZONTAL						
Time Base Range	1ns/div - 100s/div (1-2-5 increments); ROLL : 100ms/div - 100s/div					
Pre-trigger	10 div maximum					
Post-trigger	2,000,000 div maximum					
Time Base Accuracy	±50 ppm over any ≥ 1 ms time interval					
Real Time Sample Rate	Max. : 1GSa/s (4ch model); Per channel 1GSa/s (2ch model)					
Record Length	10Mpts/CH					
Acquisition Mode	Normal, Average, Peak Detect, Single					
Peak Detection	2ns (typical)					
Average	Selectable from 2 to 256					
X-Y MODE						
X-Axis Input	Channel 1 ; Channel 3* (* : four channel models only)					
Y-Axis Input	Channel 2 ; Channel 4* (* : four channel models only)					
Phase Shift	±3° at 100kHz					
CURSORS AND MEASUREMENT						
Cursors	Amplitude, Time, Gating Available; Unit : Seconds(S), Hz(1/S), Phase (Degrees), Ratio(%)					
Automatic Measurement	38 sets : Pk-Pk, Max, Min, Amplitude, High, Low, Mean, Cycle Mean, RMS, Cycle RMS, Area, Cycle Area, ROVShoot, FOVShoot, RPREShoot, FPRESShoot, Frequency, Period, RiseTime, FallTime, +Width, -Width, Duty Cycle, +Pulses, -Pulses, +Edges, -Edges, %Flicker, Flicker Idx., FRR, FRF, FFR, FFF, LRR, LRF, LFR, LFF, Phase Cursors measurement					
Control Panel Function	Cursors measurement					
Auto Counter	6 digits, range from 2Hz minimum to the rated bandwidth					
Autoset	Single-button, automatic setup of all channels for vertical, horizontal and trigger systems, with undo Autoset					
Save Setup	20set					
Save Waveform	24set					
DISPLAY SYSTEM						
TFT LCD Type	8" TFT LCD WVGA color display					
Display Resolution	800 horizontal x 480 vertical pixels (WVGA)					
Interpolation	Sin(x)/x					
Waveform Display	Dots, Vectors, Variable persistence(16ms-10s), Infinite persistence					
Waveform Update Rate	120,000 waveforms per second, maximum					
Display mode	YT ; XY					
Display Graticule	8 x 10 divisions					
INTERFACE						
USB Port	USB 2.0 High-speed host port x 1, USB 2.0 High-speed device port x 1					
Ethernet Port (LAN)	RJ-45 connector, 10/100Mbps with HP Auto-MDIX					
Go/NoGo BNC	5V Max/10mA open collector output					
Kensington Style Lock	Rear-panel security slot connects to standard Kensington-style lock					
LOGIC ANALYSER SPECIFICATIONS						
Sample Rate	Per Channel 1GSa/s					
Bandwidth	200MHz					
Record Length	Per Channel 10M pts (max)					
Input Channels	16 Digital (D15 - D0)					
Trigger Type	Edge,Pattern,Pulse Width,Serial bus (I ² C,SPI,UART(RS232/422/485),CAN,LIN),Parallel Bus					
Thresholds Quad	D0-D3, D4-D7,D8-D11 ,D12-D15 Thresholds					
Threshold Selections	TTL, CMOS(5V,3.3V,2.5V), ECL, PECL,0V ,User Defined					
User-defined Threshold Range	±5V					
Maximum Input Voltage	±40 V					
Minimum Voltage Swing	±250 mV					
Input Impedance	101KΩ probe loading 8pF					
Vertical Resolution	1 bit					



MSO-2000E Series

Rear Panel



SPECIFICATIONS

	MSO-2072E(A)	MSO-2074E(A)	MSO-2102E(A)	MSO-2104E(A)	MSO-2202E(A)	MSO-2204E(A)
AWG SPECIFICATIONS (MSO-2000EA only)						
Channels	2					
Sample Rate	200 MSa/s					
Vertical Resolution	14 bits					
Max. Frequency	25 MHz					
Waveforms	Sine, Square, Pulse, Ramp, DC, Noise, Sinc, Gaussian, Lorentz, Exponential Rise, Exponential Fall, Haversine, Cardiac					
Output Range	20 mVpp to 5 Vpp, High Z; 10 mVpp to 2.5 Vpp, 50 Ω					
Output Resolution	1mV					
Output Accuracy	2% (1 kHz)					
Offset Range	±2.5 V ac+dc, High Z; ±1.25 V ac+dc, 50 Ω					
Offset Resolution	1mV					
FREQUENCY RESPONSE ANALYSIS						
Dynamic Range	> 80 dB (typical)					
Input and Output Sources	Channel 1 or 2 (3 or 4 for four channel model)					
Frequency Range	20 Hz to 25 MHz					
Number of Test Points	10 to 90 points per decade					
Test Amplitude	20 mVpp to 5 Vpp into High-Z Fixed amplitude across entire sweep					
Test Results	Logarithmic overlaid gain and phase plot					
Manual Measurements	Two pairs of tracking gain and phase markers					
Plot Scaling	Auto-scaled during test					
POWER SOURCE MISCELLANEOUS						
Line Voltage Range	AC 100V – 240V, 50Hz – 60Hz, auto selection					
Multi-Language Menu	Available					
On-Line Help	Available					
Time clock	Time and date, provide the date/time for saved data					
Operation Environment	Temperature: 0°C to 50°C. Relative Humidity: < 80%, 40°C or below; < 45%, 41°C – 50°C					
DIMENSIONS & WEIGHT						
	384(W) X 208(H) X 127.3(D)mm, Approx. 2.8 kg					

Note : Three-year warranty, excluding probes & LCD display panel.

ORDERING INFORMATION

MSO-2204E(A)	200MHz, 4 + 16 Channel, Mixed-signal Oscilloscope
MSO-2202E(A)	200MHz, 2 + 16 Channel, Mixed-signal Oscilloscope
MSO-2104E(A)	100MHz, 4 + 16 Channel, Mixed-signal Oscilloscope
MSO-2102E(A)	100MHz, 2 + 16 Channel, Mixed-signal Oscilloscope
MSO-2074E(A)	70MHz, 4 + 16 Channel, Mixed-signal Oscilloscope
MSO-2072E(A)	70MHz, 2 + 16 Channel, Mixed-signal Oscilloscope

"(A)" have built-in a Dual Channel 25MHz Arbitrary Waveform Generator

ACCESSORIES :

User manual CD x 1, Power cord x 1

GCP-201:Probe Clip, 20PCS **GTL-16E**:16-Channel Logic Analyzer Probe

GTP-070B-4:70MHz(10:1/1:1)Switchable passive probe for MSO-2072E(A)/2074E(A)(one per channel)

GTP-100B-4:100MHz(10:1/1:1)Switchable passive probe for MSO-2102E(A)/2104E(A)(one per channel)

GTP-200B-4:200MHz(10:1/1:1)Switchable passive probe for MSO-2202E(A)/2204E(A)(one per channel)

OPTIONAL ACCESSORIES

GTL-16E	16-Channel Logic Analyzer Probe	GCP-530	50MHz/30A Current probe
GRA-426	Rack Mount Kit	GCP-500	500kHz/150A Current probe
GAK-003	50Ω Impedance Adapter	GCP-1030	100MHz/30A Current probe
GSC-008	Soft Carrying Case	GCP-1000	1MHz/70A Current probe
GTL-246	USB Cable, USB 2.0, A-B Type, 1200mm	GCP-206P	Power supply for current probe (2 input channel)
GDB-03	Oscilloscope Education & Training Kit	GCP-425P	Power supply for current probe (4 input channel)
GTP-033A	Oscilloscope Probe, 35MHz 1:1 Passive Probe, BNC(P/M)	GCP-201	Probe Clip, 20PCS
GCP-300	300kHz/200A Current probe	GDP-025	25MHz High voltage differential probe
		GDP-050	50MHz High voltage differential probe
		GDP-100	100MHz High voltage differential probe

FREE DOWNLOAD

PC Software	OpenWave software	Driver	USB driver ; LabView driver
-------------	-------------------	--------	-----------------------------

GDB-03 Oscilloscope Education and Training Kit

For : GDS-3000/2000A/2000E/1000B Series
MSO-2000E Series/MDO-2000A/2000E Series



GTL-16E 16-Channel Logic Analyzer Probe

For : MSO-2000E Series



GCP-201 Probe Clip , 20PCS

For : MSO-2000E Series



200MHz/100MHz/70MHz Mixed-signal Oscilloscope

MSO-2000E SERIES SELECTION GUIDE

MODEL	MSO-2204E	MSO-2202E	MSO-2104E	MSO-2102E	MSO-2074E	MSO-2072E
Bandwidth	200MHz	200MHz	100MHz	100MHz	70MHz	70MHz
Channels	4	2	4	2	4	2
Record Length	10M / ch	10M / ch	10M / ch	10M / ch	10M / ch	10M / ch
Real-time Sampling Rate	Max. 1 GSa/s	Per channel 1 GSa/s	Max. 1 GSa/s	Per channel 1 GSa/s	Max. 1 GSa/s	Per channel 1 GSa/s
Built-in	16 Channel Logic Analyzer					

MSO-2000EA SERIES SELECTION GUIDE

MODEL	MSO-2204EA	MSO-2202EA	MSO-2104EA	MSO-2102EA	MSO-2074EA	MSO-2072EA
Bandwidth	200MHz	200MHz	100MHz	100MHz	70MHz	70MHz
Channels	4	2	4	2	4	2
Record Length	10M / ch	10M / ch	10M / ch	10M / ch	10M / ch	10M / ch
Real-time Sampling Rate	Max. 1 GSa/s	Per channel 1 GSa/s	Max. 1 GSa/s	Per channel 1 GSa/s	Max. 1 GSa/s	Per channel 1 GSa/s
Built-in	16 Channel Logic Analyzer and Dual Channel 25MHz Arbitrary Waveform Generator					

The MSO-2000E series is a mixed-signal oscilloscope, which offers dual analog channels + 16 digital channels or 4 analog channels + 16 digital channels. The MSO-2000E series includes MSO-2000E and MSO-2000EA. MSO-2000E has a built-in 16-channel logic analyzer and MSO-2000EA has a built-in 16-channel logic analyzer and a dual channel 25MHz arbitrary waveform generator. The entire series features bandwidth selections of 200MHz, 100MHz, and 70MHz. Dual analog channel models provide 1GSa/s real-time sampling rate per channel; four analog channel models provide 1GSa/s maximum real-time sampling rate. The 8-inch 800*480 TFT LCD and the minimum 1mV/div vertical range allow the MSO-2000E series to measure complex feeble signals and clearly display measurement results.

For analog channels, the MSO-2000E series provides 10M long memory for users to completely retrieve and analyze waveforms. Users, based upon the application requirements, can select 1k, 10k, 100k, 1M or 10M memory depth. Short memory depth collocating with the high sampling rate allows users to observe fast-changing waveforms and, on the other hand, long memory depth aims for continuously changing waveforms. The MSO-2000E series is equipped with waveform search and segmented memory functions to expand the flexible applications of 10M long memory. The segmented memory can be divided the maximum into 29,000 sections for users to bypass any unimportant waveforms so as to swiftly search all required waveforms. With the segmented memory function, more meaningful waveforms can be saved and target waveforms can be displayed rapidly. Users, by using the waveform search function, can rapidly search desired waveforms according to the required trigger conditions.

16-channel logic analyzer has a memory depth of 10Mpts per channel, which can retrieve more and longer digital signals as well as clearly display digital signals to obtain sufficient information for analysis. The minimum input swing of logic analyzer represents the minimum operating voltage of ± 250 mV, which demonstrates that digital channels are highly sensitive with respect to input. The standard bus trigger and decoding functions include serial and parallel bus such as I²C, SPI, UART (RS232/422/485) and CAN/LIN bus for automotive communications. The parallel bus function is only for digital channels. Bus waveforms can be triggered and decoded in real time. The MSO-2000E series offers complete analysis and debugging capabilities with the economical pricing.

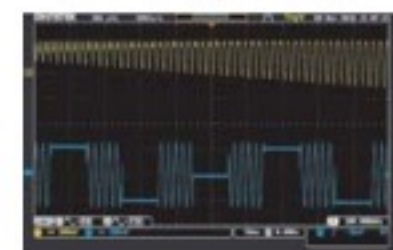
In addition to a 16-channel logic analyzer, MSO-2000EA has a built-in dual channel 25MHz arbitrary waveform generator with the modulation capability and also features 14 bits vertical resolution; sample rate of 200MSa/s; 13 standard output waveforms Sine, Square, Pulse, Ramp, DC, Noise, Sinc, Gaussian, Lorentz, Exponential Rise, Exponential Fall, Haversine, Cardiac; AM/FM/FSK modulation and sweep function. The user friendly interface is the ideal choice for applications such as circuit simulation and education tests.

MSO-2000EA also provides the frequency response analysis function (Bode plot). The FRA software can be directly downloaded from GW Instek website. Via arbitrary waveform generator, oscilloscope, and FRA software, users can obtain DUT's FRA characteristic curve plot. FRA has a very wide application range, including product circuit and component performance verification and analysis such as Feedback of Circuit Design, Filter Design, Amplifier Design, Resonant Circuit Design, Cable Frequency Response, and Signal Transformer Performance. Via FRA, users can preliminarily verify product and analyze component's characteristics without the expensive instrument.

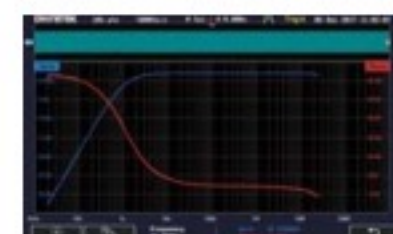
The frequency range of FRA is from 20Hz to 25MHz; the number of test point can be selected from 10 to 90 points per decade. After completing the Bode plot, users can select measurement curve by Cursor so as to retrieve each point's amplitude and phase on the curve.



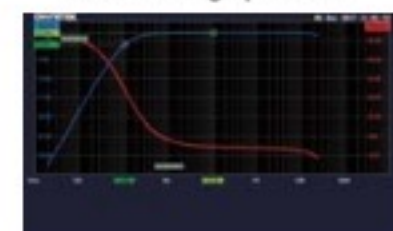
CAN Bus Trigger and Decode



Dual Channel Arbitrary Waveform Generator



FRA of RC high-pass filter



Cursor measurement for the determination at 3dB cut-off frequency of the high-pass filter.

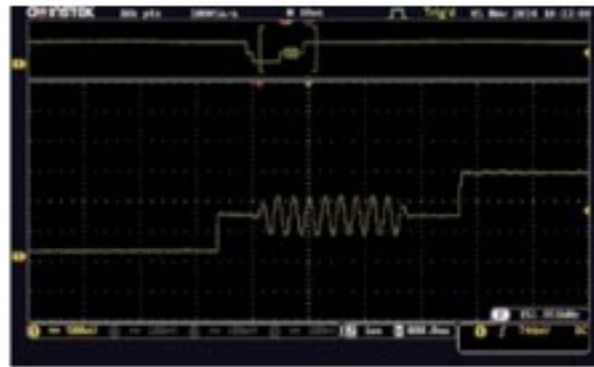
A. 120,000wfm/s WAVEFORM UPDATE RATE AND VPO WAVEFORM DISPLAY TECHNOLOGY



The MSO-2000E series oscilloscope allows users to easily and completely observe inrush signals and rare transient waveforms to increase waveform debugging efficiency by using features, including advanced VPO (Visual Persistence Oscilloscope) signal processing technology, waveform update rate as high as 120,000 wfm/s, and multi-layered afterglow display to enhance waveform display efficiency. Oscilloscope with VPO technology

displays signals with three dimensional waveforms constructed by amplitude, time and signal strength to show each waveform point. 256 color gradients yield clear waveform changes. Comparing with the conventional digital storage oscilloscope, the MSO-2000E series provides more natural and more genuine signal display effect which is very close to the original analog signal.

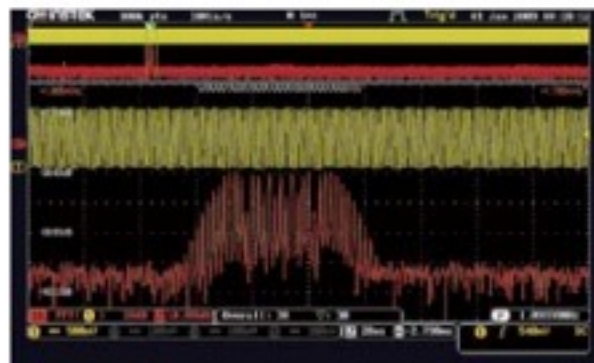
B. DUAL DISPLAY SCREEN ZOOM-IN AND PLAY/PAUSE FUNCTIONS



The MSO-2000E series provides the dual display screen zoom-in function to simultaneously display waveforms and major target areas. Users can zoom in display area by adjusting time/div. Under zoom-in mode, waveform can be played or paused so as to automatically view all input waveforms on the moving zoom-in screen. User can swiftly identify each desired event. Manual control play speed and direction can be adjusted according to users'

requirements. Press "Pause" to stop the play function. With "waveform search", all desired events from different stages can be rapidly identified and examined back and forth. The MSO-2000E series is capable of swiftly searching signals and observing signals' details. 10M long memory depth provides the function of complete waveform retrieval and analysis.

C. 1M FFT FREQUENCY DOMAIN DISPLAY FUNCTION



The FFT function of the MSO-2000E Series provides the maximum 1M display for more precision frequency domain display. The function supports four-window displays, including Rectangular, Hamming, Hanning, and Black-harris. Users select window display for frequency domain analysis according to test requirements. The

MSO-2000E series not only provides the FFT function but also FFTrms, vertical adjustment, and local zoom-in functions for users to adjust waveforms of frequency domain by their requirements. Via rapid waveform update rate and waveform search functions, users can precisely observe the test results of frequency domain.

200MHz/100MHz/70MHz Mixed-signal Oscilloscope

MSO-2000E Series

OSCILLOSCOPES

D. 38 ITEMS OF AUTO MEASUREMENT SELECTION AND THE STATISTICS FUNCTION



The MSO-2000E series soundly provides 38 measurement items. Based upon the parameters such as voltage, current, time, frequency, and delay measurement, users can decide which measurement items to choose. On the single display screen, the MSO-2000E series

provides 8 measurement selections. The statistics mode can also be selected for users to analyze the mean value, the maximum, the minimum, and standard deviation of the retrieved waveforms to ensure signal's integrity and identify abnormal waveforms.

E. SUPPORT I²C, SPI, UART, CAN, LIN BUS TRIGGER AND DECODING FUNCTION



Decode by Analog Channel



Decode by digital Channel

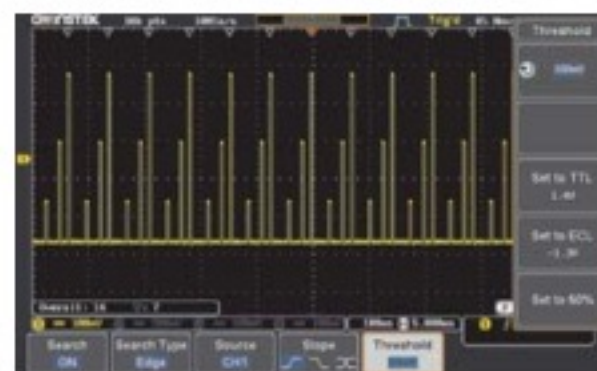


Display analog waveform converted from digital signal

The serial bus technology has been widely applied in the present embedded application design. To rapidly and correctly trigger and analyze serial bus data has posed a difficult challenge to engineers. The MSO-2000E series provides parallel and serial bus analysis function with 10M long memory depth. Users can select either analog or digital channels to trigger, decode, and analyze frequently used I²C, SPI and UART serial bus and CAN/LIN bus, which is often used by automotive communications. While using digital

channels, the analog waveform converted from digital channels can be observed so as to examine and analyze time-related analog and digital signals. The above-mentioned function can verify and analyze the conversion between analog and digital signals. Currently, many embedded designs are digital signals. The MSO series also provides digital channels for parallel bus analysis and decoding. The above standard serial and parallel bus functions are the best test platform for school courses and embedded circuit designs.

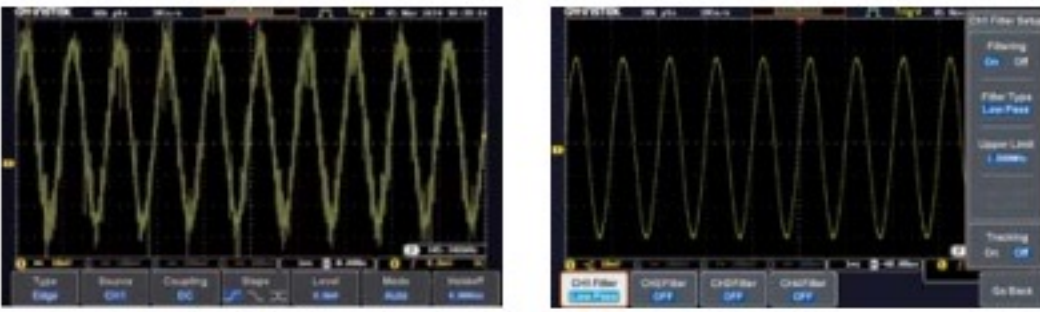
F. WAVEFORM SEARCH FUNCTION



Users can rapidly search desired waveforms according to the trigger condition. After activating the search function, hollow inverted triangles will show the location met the trigger condition. The upper left hand corner Overall will show the total number of waveforms met the trigger condition. Users can set waveform search by the trigger condition such as Edge, pulse width, Runt, Rise/Fall, and Bus.

When the trigger condition is met, hollow inverted triangles will appear. Users can save all marks to compare with the next input signal. The front panel of the MSO-2000E series controls waveform zoom-out and play/pause function to swiftly identify each desired event. The function allows users to conveniently complete waveform search and save marks for rapid comparison and analysis.

G. DIGITAL FILTER FUNCTION



Unfiltered Waveform with Noise Interference

Filtered Waveform, Noise Removed

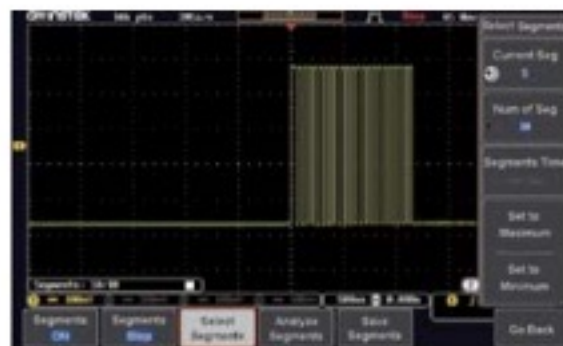
Engineers are often troubled by noise interference while measuring signals in the electric circuit tests. The MSO-2000E series features the digital filter function which can be set to high pass or low pass digital filter. Digital filter allows users to independently set filter frequency for each channel. The tracking on function rapidly sets same filter frequency for all channels.

H. DATA LOG FUNCTION



Users, via the data log function, can observe waveform changes in long periods of time to ensure product reliability or measure sporadically appeared signals. The data log function, based on the requirements, can set record time and interval. Record time can be selected from 5 minutes to 1000 hours, and record interval is 5 seconds, the minimum. Waveform type for record data and CSV file format for each channel can also be selected. Data can be stored in USB drive, the MSO-2000E series or the remote computer via LAN.

I. SEGMENTED MEMORY FUNCTION

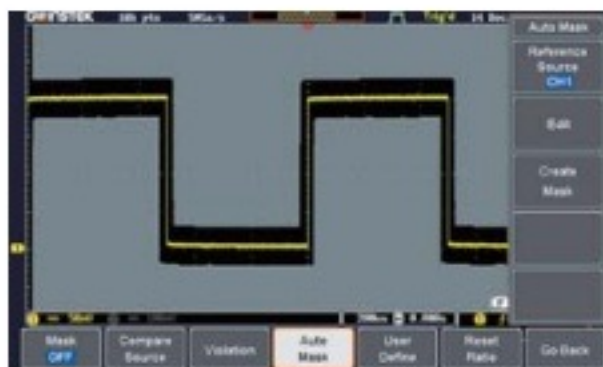


Users Can Also Select “Analyze Segments” to Conveniently Obtain The Analysis Results.

To achieve the most ideal application for memory depth, the MSO-2000E series has the built-in segmented memory function. The segmented memory function allows users to select the desired important signals for observation. Hence, insignificant signals can be neglected and serial bus decoding; pulse or inrush signals can be identified when retrieving signals. The segmented memory

function of the MSO-2000E series allows users to select the number of sections. The maximum sections can be selected are 29,000. After activating the function, users can select and observe waveform for each segment by turning the Variable knob. The ultimate application of memory depth, therefore, is completely realized.

J. MASK FUNCTION



The MSO-2000E series provides the Mask function, which allows users to apply Auto Mask and user-defined Mask to determine whether the quality of the product meets the regulation. Via user-defined mask, users can set up to 8 areas and each area is up to

10 points to meet test requirements. Users can also refer to the examples from user manual to edit Mask by the PC to satisfy all test needs. By setting Save On, users can log and monitor signals, which violate test conditions.

300/200/100MHz Mixed-domain Oscilloscope



Visual Persistence Oscilloscope



MDO-2000A Series (300/200/100 MHz)



FEATURES

- * 300/200/100MHz Bandwidth Selections: 2 Channels
- * Maximum Real Time Sampling Rate: 2 GSa/s
- * MDO-2000A Equips with a Spectrum Analyzer
MDO-2000AG Equips with a Spectrum Analyzer ; a Dual Channel 25MHz AWG
- * Per Channel 20M Memory Depth and VPO Waveform Display Technology
- * Waveform Update Rate up to 120,000 wfm/s
- * 8" WVGA TFT LCD
- * MDO-2000AG Provides Frequency Response Analysis Function
- * Maximum 1M FFT Provides Higher Frequency Domain Resolution Measurements
- * High Pass, Low Pass and Band Pass Filter Functions
- * 29,000 Segmented Memory Sections and Waveform Search Function
- * I²C/UART/CAN/LIN Serial Bus Trigger and Decoding Functions
- * Data Log Function is able to Track Signal Changes up to 1000 Hours
- * Mask Test Function
- * Network Storage Function

SPECIFICATIONS

	MDO-2102A/G	MDO-2202A/G	MDO-2302A/G
VERTICAL SENSITIVITY			
Channels	2Ch+EXT	2Ch+EXT	2Ch+EXT
Bandwidth	DC~100MHz(-3dB)	DC~200MHz(-3dB)	DC~300MHz(-3dB)
Calculated Rise Time	3.5ns	1.75ns	1.17ns
Bandwidth Limit	20MHz	20M/100MHz	20M/100M200MHz
Vertical Resolution	8 bits : 1mV ~ 10V/div		
Input Coupling	AC, DC, GND		
Input Impedance	1M Ω // 16pF approx.		
DC Gain Accuracy	\pm (3% when 2mV/div or greater is selected ; \pm (5%) when 1mV/div is selected		
Polarity	Normal & Invert		
Maximum Input Voltage	300Vrms , CAT I		
Offset Position Range	1mV/div ~ 20mV/div : \pm 0.5V ; 50mV/div ~ 200mV/div : \pm 5V ; 500mV/div ~ 2V/div : \pm 25V ; 5V/div~10V/div : \pm 250V		
Waveform Signal Process	+ , - , \times , \div , FFT , User Defined Expression FFT : 1Mpts ; FFT : Spectral magnitude. Set FFT Vertical Scale to Linear RMS or dBV RMS and FFT Window to Rectangular, Hamming , Hanning, or Blackman		
TRIGGER			
Source	Ch1 ,CH2, Line, EXT		
Trigger Mode	Auto (Supports Roll Mode for 100 ms/div and slower), Normal, Single Sequence		
Trigger Type	Edge, Pulse Width(Glitch), Video, Pulse Runt, Rise & Fall(Slope), Alternate, Time out, Event-Delay (1~65,535 events),Time-Delay(Duration:4ns~10s), Bus		
Trigger Holdoff Range	4ns ~ 10s		
Coupling	AC, DC, LF rej. , Hf rej. , Noise rej.		
Sensitivity	1div		
EXT TRIGGER			
Range	\pm 15V		
Sensitivity	DC ~ 100MHz Approx. 100mV; 100MHz ~ 200MHz Approx. 150mV; 200MHz ~ 300MHz Approx. 150mV		
Input Impedance	1M Ω \pm 3%, ~16pF		
HORIZONTAL			
Time Base Range	1ns/div ~ 100s/div (1-2-5 increments); ROLL : 100ms/div ~ 100s/div		
Pre-trigger	10 div maximum		
Post-trigger	2,000,000 div maximum		
Time Base Accuracy	\pm 50 ppm over any \geq 1 ms time interval		
Real Time Sample Rate	Max. : 2GSa/s (shared)		
Record Length	Per Channel 20Mpts		
Acquisition Mode	Normal, Average, Peak Detect, Single		
Peak Detection	2ns (typical)		
Average	Selectable from 2 to 256		
X-Y MODE			
X-Axis Input	Channel 1		
Y-Axis Input	Channel 2		
Phase Shift	\pm 3° at 100kHz		
CURSORS AND MEASUREMENT			
Cursors	Amplitude, Time, Gating Available; Unit : Seconds(S), Hz(1/S), Phase (Degrees), Ratio(%)		
Automatic Measurement	38 sets : Pk-Pk, Max, Min, Amplitude, High, Low, Mean, RMS, Cycle RMS, Area, Cycle Area, ROVShoot, FOVShoot, RPRESshoot, FPRESshoot, Frequency, Period, RiseTime, FallTime, +Width, -Width, Duty Cycle, +Pulses, -Pulses, +Edges, -Edges, %Flicker, Flicker Idx., FRR, FRF, FFR, FFF, LRR, LRF, LFR, LFF, Phase		
CONTROL PANEL FUNCTION			
Auto Counter	6 digits, range from 2Hz minimum to the rated bandwidth		
Autoset	Single-button, automatic setup of all channels for vertical, horizontal and trigger systems, with undo Autoset		
Save Setup	20 sets		
Save Waveform	24 sets		
DISPLAY SYSTEM			
TFT LCD Type	8" TFT LCD WVGA color display		
Display Resolution	800 horizontal x 480 vertical pixels (WVGA)		
Interpolation	Sin(x)/x		
Waveform Display	Dots, Vectors, Variable persistence(16ms~4s), Infinite persistence		
Waveform Update Rate	120,000 waveforms per second, maximum		
Display Mode	YT ; XY		
Display Graticule	8 x 10 divisions		
INTERFACE			
USB Port	USB 2.0 High-speed host port x 1, USB 2.0 High-speed device port x 1		
Ethernet Port (LAN)	RJ-45 connector, 10/100Mbps with HP Auto-MDIX		
Go/NoGo BNC	5V Max/10mA open collector output		
Kensington Style Lock	Rear-panel security slot connects to standard Kensington-style lock		
SPECTRUM ANALYZER SPECIFICATIONS			
Frequency Range	DC~1GHz(Max.) (Max. bandwidth ~1GHz uncalibrated)		
Span	1kHz ~ 1GHz(Max.)		
Resolution Bandwidth	1Hz ~ 1MHz(Max.)		
Reference Level	-50 dBm to +40dBm in steps of 5dBm		
Vertical Units	dBV RMS; Linear RMS; dBm		
Vertical Position	-12divs to +12divs		
Vertical Scale	1dB/div to 20dB/div in a 1-2-5 Sequence		
Display Average Noise Level	1V/div < -50dBm, Avg : 16 ; 100mV/div < -70dBm, Avg : 16 ; 10mV/div < -90dBm, Avg : 16		
Spurious Response	2nd harmonic distortion< 40dBc ; 3rd harmonic distortion< 45dBc		
Frequency Domain	Normal ; Max Hold ; Min Hold ; Average (2 ~ 256)		
Trace Types	Sample ; +Peak ; -Peak ; Average		
Detection Methods	FFT Factor : Hanning 1.44 ; Rectangular 0.89 ; Hamming 1.30 ; Blackman 1.68		
FFT Windows			
AWG SPECIFICATIONS (MDO-2000AG only)			
Channels	2		
Sample Rate	200 MSa/s		
Vertical Resolution	14 bits		
Max. Frequency	25 MHz		
Waveforms	Sine, Square, Pulse, Ramp, DC, Noise, Sinc, Gaston, Lorentz, Exponential Rise, Exponential Fall, Haversine, Cardiac		
Output Range	20 mVpp to 5 Vpp, HighZ;10 mVpp to 2.5 Vpp, 50 Ω		
Output Resolution	1mV		
Output Accuracy	2% (1 kHz)		
Offset Range	\pm 2.5 V ac+dc, High Z; \pm 1.25 V ac+dc, 50 Ω		
Offset Resolution	1mV		



Rear Panel



MDO-2000A Series

SPECIFICATIONS

	MDO-2102A/G	MDO-2202A/G	MDO-2302A/G
Sine	Frequency Range: 100MHz~25MHz; Flatness(relative to 1kHz): $\pm 0.5\text{dB} < 15\text{MHz}$; $\pm 1\text{dB} 15\text{MHz} \sim 25\text{MHz}$;		
Square/Pulse	Harmonic Distortion: -40dBc ; Stray(Non-harmonic): -40dBc ; Total Harmonic Distortion: 1%; S/N Ratio: 40dB		
Ramp	Frequency Range: 100MHz~15MHz; Rise/Fall time: $< 15\text{ns}$; Overshoot: $< 3\%$; Duty cycle Square: 50% & Pulse: 0.4%~99.6%; Min. Pulse Width: 30 ns; Jitter: 500 ps		
	Frequency Range: 100MHz~1MHz; Linearity: 1%; Symmetry: 0~100%		
FREQUENCY RESPONSE ANALYSIS (MDO-2000AG only)			
Dynamic Range	$> 80\text{dB}$ (typical)		
Input and Output Sources	Channel 1 or 2		
Frequency Range	20 Hz to 25 MHz		
Number of Test Points	10 to 90 points per decade		
Test Amplitude	20 mVpp to 5 Vpp into High-Z; Fixed test amplitude or custom amplitude for each decade		
Test Results	Logarithmic overlaid gain and phase plot		
Manual Measurements	Two pairs of tracking gain and phase markers		
Plot Scaling	Auto-scaled during test		
MISCELLANEOUS			
Line Voltage Range	AC 100V ~ 240V, 50Hz ~ 60Hz, auto selection		
Multi-Language Menu	Available		
On-Line Help	Available		
Time Clock	Time and date, provide the date/time for saved data		
Operation Environment	Temperature: 0°C to 50°C . Relative Humidity: $< 80\%$ at 40°C or below; $< 45\%$, $41^{\circ}\text{C} \sim 50^{\circ}\text{C}$		
Dimensions & Weight	384(W) X 208(H) x 127.3(D) mm, Approx. 3kg		

Note: Three-year warranty, excluding probes & LCD display panel.

ORDERING INFORMATION

- MDO-2302AG** 300MHz, 2-channel, Digital Storage Oscilloscope, Spectrum Analyzer, dual channel 25MHz AWG
MDO-2202AG 200MHz, 2-channel, Digital Storage Oscilloscope, Spectrum Analyzer, dual channel 25MHz AWG
MDO-2102AG 100MHz, 2-channel, Digital Storage Oscilloscope, Spectrum Analyzer, dual channel 25MHz AWG
MDO-2302A 300MHz, 2-channel, Digital Storage Oscilloscope, Spectrum Analyzer
MDO-2202A 200MHz, 2-channel, Digital Storage Oscilloscope, Spectrum Analyzer
MDO-2102A 100MHz, 2-channel, Digital Storage Oscilloscope, Spectrum Analyzer

Accessories:

- User manual CD x 1, Power cord x 1,
GTL-110 BNC-BNC cable x 2 (only on MDO-2000AG)
GTP-100B-4: 100MHz(10:1/1:1) Switchable passive probe for MDO-2102A/2102AG (one per channel)
GTP-200B-4: 200MHz(10:1/1:1) Switchable passive probe for MDO-2202A/2202AG (one per channel)
GTP-300B-4: 300MHz(10:1/1:1) Switchable passive probe for MDO-2302A/2302AG (one per channel)

OPTIONAL ACCESSORIES

- | | |
|--|---|
| GRA-426 Rack Adapter Panel | GCP-300 300kHz/200A Current probe |
| GAK-003 50 Ω Impedance Adapter | GCP-530 50MHz/30A Current probe |
| GSC-008 Soft Carrying Case | GCP-500 500kHz/150A Current probe |
| GTL-246 USB Cable, USB 2.0, A-B Type, 1200mm | GCP-1030 100MHz/30A Current probe |
| GTP-033A Oscilloscope Probe, 35MHz 1:1 Passive Probe | GCP-1000 1MHz/70A Current probe |
| GDP-025 Differential Probe, 25M High Voltage Differential Probe | GCP-206P Power supply for current probe (2 input channel) |
| GDP-050 Differential Probe, 50M High Voltage Differential Probe | GCP-425P Current Probe - Power Supply, 4 Channel Power Supply for GCP-530/1030 |

FREE DOWNLOAD

- | | |
|--------------------------------------|--|
| PC Software OpenWave software | Driver USB driver; LabView driver |
|--------------------------------------|--|

300/200/100MHz Mixed-domain Oscilloscope

SELECTION GUIDE

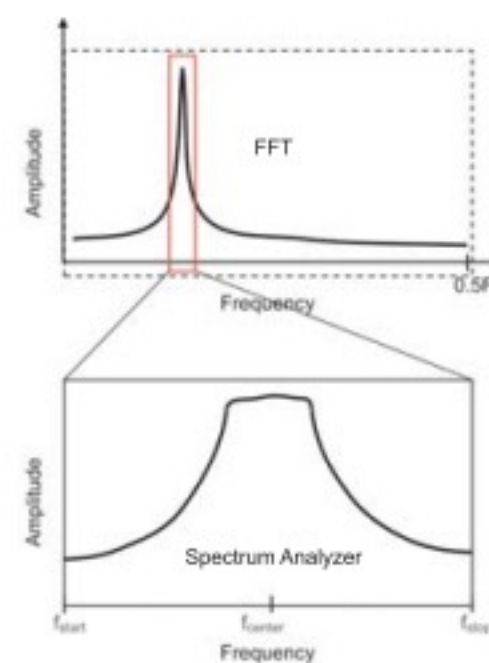
MODEL	MDO-2302AG	MDO-2202AG	MDO-2102AG	MDO-2302A	MDO-2202A	MDO-2102A
Bandwidth	300MHz	200MHz	100MHz	300MHz	200MHz	100MHz
Channels	2	2	2	2	2	2
Record Length	20M / ch	20M / ch	20M / ch	20M / ch	20M / ch	20M / ch
Real-time Sampling Rate	Max. 2 GSa/s	Max. 2 GSa/s	Max. 2 GSa/s	Max. 2 GSa/s	Max. 2 GSa/s	Max. 2 GSa/s
Built-in	MDO-2000A : Spectrum Analyzer MDO-2000AG : Spectrum Analyzer ; Dual Channel 25MHz Arbitrary Waveform Generator					

MDO-2000A is an advanced version of MDO-2000E. The selectable bandwidth range is upgraded to 300MHz. The full bandwidth ranges include 300MHz, 200MHz and 100MHz. The sampling rate has upgraded to Max. 2GSa/s and the memory depth has also been upgraded to 20M/CH. Hence, the three major specifications of oscilloscopes have been improved. The new models of the series feature 2 channels including MDO-2000A and MDO-2000AG. The entire series offers the functions of oscilloscope and spectrum analyzer. On top of that, MDO-2000AG features a dual-channel 25MHz arbitrary waveform generator. The new generation MDO-2000A series provides better sampling rate and memory depth for users to obtain more realistic signal integrity, and higher bandwidth selections meet the measurement requirements of higher frequencies.

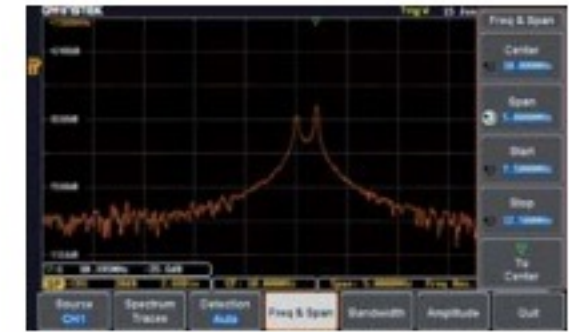
In addition to advanced oscilloscope specifications, the MDO-2000A series is also a dual-domain test platform. For frequency domain analysis, the spectrum analyzer measurement mode is provided to allow users to have frequency domain analysis with higher resolution. The FFT operation on the oscilloscope is limited by the horizontal level setting (sampling rate), and most oscilloscopes only provide 1k FFT points, so users often cannot get the correct frequency domain display. The frequency domain provided by MDO-2000A has an operation interface the same as the general spectrum analyzer. Its fast frequency domain update is like a real time spectrum analyzer. While operating the spectrum analyzer of MDO-2000A, users can input Center frequency, Span, Start frequency, and Stop frequency based upon test requirements so as to rapidly and intuitively observe required frequency range that allows users to experience the user interface of a real spectrum analyzer. While observing frequency domain display, engineers can observe waveform characteristics, which are not easily to be seen from time domain waveforms, for instance, the harmonic composition of a waveform and the frequency characteristics of a modulation signal.

The figure on the right shows why the resolution of the spectrum analysis is better than that of the FFT of the general oscilloscope. Therefore, using the frequency domain signal of the spectrum analysis, the frequency domain peaks and the components of each composition can be correctly captured, which is impossible for the general FFT. Conventional DSO's FFT always calculates the entire signal bandwidth up to half the sampling rate (F_s). However, the insufficient calculation capability can't conduct FFT calculation with more points. Users can't have the signal's detailed frequency information due to the insufficient frequency resolution from the calculation result. Whereas MDO-2000A analyzes signal spectrum of interest. The start frequency and stop frequency of the spectrum analyzer can be selected according to the characteristics of the test signal, so that the frequency domain signal can be displayed on the screen. Compared with oscilloscope' FFT, the MDO-2000A series allows engineers to effectively conduct signal measurements on frequency domain. Right illustration shown the conventional DSO's FFT (above figure) VS. MDO-2000A's Spectrum analyzer (below figure).

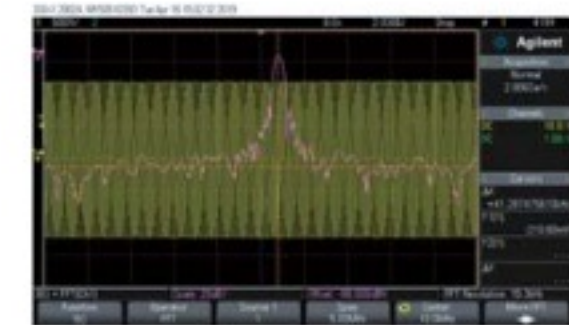
MDO-2000A's spectrum analyzer's frequency measurement range is from DC to 1GHz, which can meet the requirements of the low frequency test of audio and vibration. The general spectrum analyzer cannot measure the signals below 9kHz. The highest frequency of 1GHz is shown on the right. MDO-2000A uses a BNC Cable to connect to the RF Signal Generator to obtain the maximum 1GHz signal frequency. Although the 1GHz signal has attenuated in the time domain, the input signal can still be obtained in the frequency domain.



The spectrum analyzer of MDO-2000A can automatically adjust to the most appropriate sample rate according to users' input frequency range. The required data for calculation is also from the same sampling. By the tremendous calculation efficiency of Zynq SoC, a large amount of calculation can be done in a very short period of time. Therefore, MDO-2000A can complete a spectrum faster than a conventional spectrum analyzer. The screen display on the right shows the spectrum results of MDO-2000A's spectrum analyzer of FSK signal. The parameters of FSK signal: 500mVpp sine wave, fmax: 10.2MHz, fmin: 10.0MHz, bit rate: 10.0kHz. Users can directly input Center and Span Frequency by an intuitive and swift setting. Fmax and fmin can be clearly identified from the screen display.



When the same signal is tested by FFT (the right display was the result tested by Keysight DSOX2000A), most users do not know the correlation between the sampling rate of the time domain signal and the frequency of the DUT signal, so the FFT waveform display is not easy to adjust correctly. The slow update, time domain waveform overlapping with the frequency domain waveform, and most DSOs do not provide the search function together make it impossible to clearly analyze the frequency domain waveform and simultaneously measure the components of more than two modulated signals. FFT without RBW setting does not allow users to adjust the output waveform with the best resolution according to the characteristics of the actual waveform.



MDO-2000A's Spectrum Analyzer also includes Spectrum Trace Type settings (Normal, Max-hold, Min-hold, and Average). Users can freely select various Spectrum Traces for simultaneous display. Detection method (Sample, +Peak, -Peak, and Average) can be individually set for each Trace. Additionally, users, via Cursor, can manually mark the corresponding positions to reflect Frequency and Amplitude. The Search function can also be applied to log spectrum's Peak Table. Amplitude is displayed with dB and Marker can obtain measurement data. Display on the right is a FM signal's spectrum.



Users can use the Search function to search and mark several amplitudes and frequencies. Search methods include Max. peak and threshold. Measurement results can be displayed and saved.



The display on the right shows the frequency domain display of the AM signal. Via the Search function, users can easily capture more than two spectral components

300/200/100MHz Mixed-domain Oscilloscope

MDO-2000A Series

OSCILLOSCOPES

A. 120,000wfm/s WAVEFORM UPDATE RATE AND VPO WAVEFORM DISPLAY TECHNOLOGY



The MDO-2000A series oscilloscope allows users to easily and completely observe inrush signals and rare transient waveforms to increase waveform debugging efficiency by using features, including advanced VPO (Visual Persistence Oscilloscope) signal processing technology, waveform update rate as high as 120,000 wfm/s, and multi-layered afterglow display to enhance waveform display efficiency. Oscilloscope with VPO technology

displays signals with three dimensional waveforms constructed by amplitude, time and signal strength to show each waveform point. 256 color gradients yield clear waveform changes. Comparing with the conventional digital storage oscilloscope, the MDO-2000A series provides more natural and more genuine signal display effect which is very close to the original analog signal.

B. SUPPORT I²C, UART, CAN, LIN BUS TRIGGER AND DECODING FUNCTIONS



The serial bus technology has been widely applied in the present embedded application design. The IoT devices connecting sensors and the peripheral components are using serial bus such as UART, I²C. To rapidly and correctly trigger and analyze serial bus data has posed a difficult challenge to engineers. The MDO-2000A series

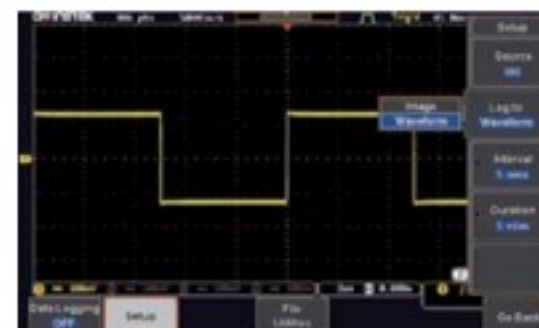
provides serial bus analysis function with 20M long memory depth. Users can trigger, decode, and analyze frequently used I²C and UART serial bus and CAN/LIN bus, which is often used by automotive communications.

C. WAVEFORM SEARCH FUNCTION



Users can rapidly search desired waveforms according to the trigger condition. After activating the search function, hollow inverted triangles will show the location met the trigger condition. The upper left hand corner Overall will show the total number of waveforms met the trigger condition. Users can set waveform search by the trigger condition such as Edge, pulse width, Runt, Rise/Fall, and Bus. When the trigger condition is met, hollow inverted triangles will appear. Users can save all marks to compare with the next input signal. The front panel of the MDO-2000A series controls waveform zoom-out and play/pause function to swiftly identify each desired event. The function allows users to conveniently complete waveform search and save marks for rapid comparison and analysis.

D. DATA LOG FUNCTION



Users, via the data log function, can observe waveform changes in long periods of time to ensure product reliability or measure sporadically appeared signals. The data log function, based on the requirements, can set record time and interval. Record time can be selected from 5 minutes to 1000 hours, and record interval is 2 seconds, the minimum. Waveform type for record data and CSV file format for each channel can also be selected. Data can be stored in USB drive, the MDO-2000A series or the remote computer via LAN.

E. SEGMENTED MEMORY FUNCTION

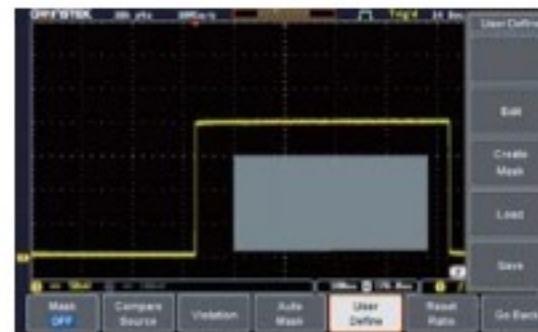


Users Can Select "Analyze Segments" to Conveniently Obtain The Analysis Results.

To achieve the most ideal application for memory depth, the MDO-2000A series has the built-in segmented memory function. The segmented memory function allows users to select the desired important signals for observation. Hence, insignificant signals can be neglected and serial bus decoding; pulse or inrush signals can be identified when retrieving signals.

The segmented memory function of the MDO-2000A series allows users to select the number of sections. The maximum sections can be selected are 29,000. After activating the function, users can select and observe waveform for each segment by turning the Variable knob. The ultimate application of memory depth, therefore, is completely realized.

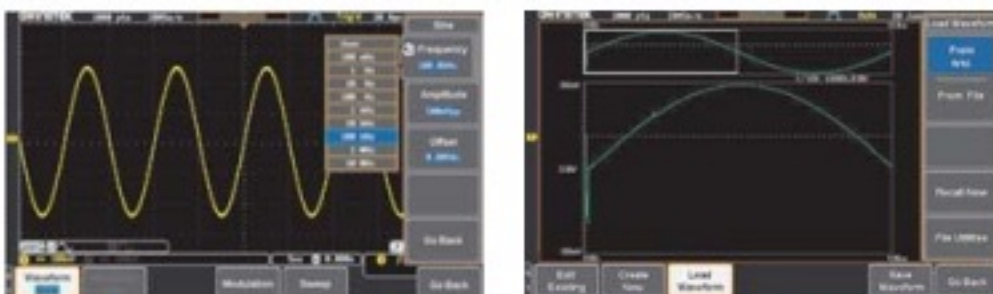
F. MASK FUNCTION



The MDO-2000A series provides the Mask function, which allows users to apply Auto Mask and user-defined Mask to determine whether the quality of the product meets the regulation. Via user-defined mask, users can set up to 8 areas and each area is up to

10 points to meet test requirements. Users can also refer to the examples from user manual to edit Mask by the PC to satisfy all test needs. By setting Save On, users can log and monitor signals, which violate test conditions.

G. 25MHz DUAL CHANNEL ARBITRARY WAVEFORM GENERATOR

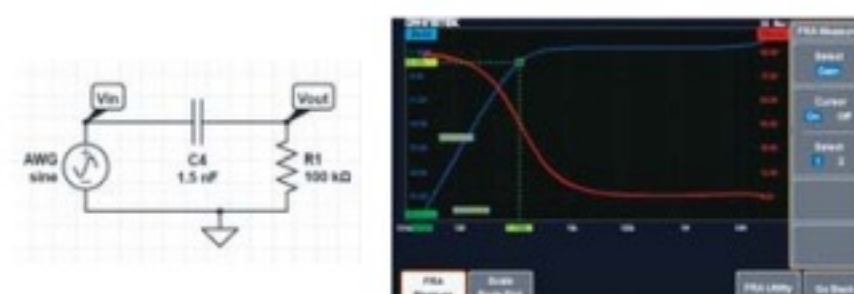


✧ MDO-2000AG only



With respect to signal source, MDO-2000AG features a built-in dual channel 25MHz arbitrary waveform generator with modulation capability and also provides 14 bits vertical resolution; sample rate of 200MSa/s; 13 output waveforms (Sine, Square, Pulse, Ramp, DC, Noise, Sinc, Gaussian, Lorentz, Exponential Rise, Exponential Fall, Haversine, Cardiac); and AM/FM/FSK modulation and sweep function. The friendly user interface is the ideal choice for education and applications such as circuit simulation tests. Arbitrary waveform generator provides users with 16k memory length. The arbitrary waveform can be edited through the PC software, and the edited arbitrary waveform(CSV file) can be recalled by the AWG function.

H. PROVIDE FREQUENCY RESPONSE ANALYSIS (FRA) FUNCTION



✧ MDO-2000AG only

FRA (bode plot) has a very wide application range ,including product circuit and component performance verification and analysis, such as negative feedback networks of switch mode power supplies design (loop response), feedback of circuit design, filter design, amplifier design, resonant Circuit design, cable frequency response and signal transformer performance etc. The diagram above is a RC high pass filter. The -3dB cut-off frequency= $1.06\text{kHz}(F=1/2*\pi*R*C)$ and the measurement result is 1.1kHz which is quite close to the theoretical value. The frequency test range of FRA and the max. 90 points per decade of test point are higher than that of Keysight InfiniiVision 3000T's option. More points per decade allow users to get higher accurate test results.

200/100/70MHz Mixed-domain Oscilloscope



Visual Persistence Oscilloscope



MDO-2000E Series (200/100/70 MHz)



FEATURES

- * 200/100/70MHz Bandwidth Selections: 2 or 4 Channels
- * Real Time Sample Rate Per Channel 1GSa/s (2 Channel Models); Maximum Real Time Sample Rate: 1 GSa/s (4 Channel Models)
- * MDO-2000EG Equips with a Spectrum Analyzer and a Dual Channel 25MHz AWG
- * MDO-2000EX Equips with a Spectrum Analyzer ; a Dual Channel 25MHz AWG; DMM and Power Supply
- * Per Channel 10M Memory Depth and VPO Waveform Display Technology
- * Waveform Update Rate up to 120,000 wfm/s
- * 8 " WVGA TFT LCD
- * Free Frequency Response Analyzer Software
- * Maximum 1M FFT Provides Higher Frequency Domain Resolution Measurements
- * High Pass, Low Pass and Band Pass Filter Functions
- * 29,000 Segmented Memory Sections and Waveform Search Functions
- * I²C/SPI/UART/CAN/LIN Serial Bus Trigger and Decoding Functions
- * Data Log Function is Able to Track Signal Changes up to 1000 Hours
- * Mask Test Function
- * Network Storage Function
- * True RMS Measurement in DMM Function

SPECIFICATIONS

	MDO-2072E(G/X)	MDO-2074E(G/X)	MDO-2102E(G/X)	MDO-2104E(G/X)	MDO-2202E(G/X)	MDO-2204E(G/X)
VERTICAL SENSITIVITY						
Channels	2Ch+EXT	4Ch	2Ch+EXT	4Ch	2Ch+EXT	4Ch
Bandwidth	DC~70MHz(-3dB)		DC~100MHz(-3dB)		DC~200MHz(-3dB)	
Calculated Rise Time	5ns		3.5ns		1.75ns	
Bandwidth Limit	20MHz		20MHz		20M/100MHz	
Vertical Resolution	8 bits : 1mV – 10V/div					
Input Coupling	AC, DC, GND					
Input Impedance	1MΩ // 16pF approx.					
DC Gain Accuracy	±(3% when 2mV/div or greater is selected ; ±(5%) when 1mV/div is selected					
Polarity	Normal & Invert					
Maximum Input Voltage	300Vrms , CAT I					
Offset Position Range	1mV/div – 20mV/div: ±0.5V ; 50mV/div – 200mV/div: ±5V ; 500mV/div – 2V/div: ±25V ; 5V/div–10V/div: ±250V					
Waveform Signal Process	+ , - , × , ÷ , FFT , User Defined Expression FFT : 1Mpts ; FFT : Spectral magnitude. Set FFT Vertical Scale to Linear RMS or dBV RMS and FFT Window to Rectangular, Hamming, Hanning, or Blackman					
TRIGGER						
Source	CH1 ,CH2, CH3, CH4, Line, EXT* ; *dual channel models only					
Trigger Mode	Auto (Supports Roll Mode for 100 ms/div and slower), Normal, Single Sequence					
Trigger Type	Edge, Pulse Width(Glitch), Video, Pulse Runt, Rise & Fall(Slope), Alternate, Time out, Event-Delay (1–65,535 events),Time-Delay(Duration;4ns–10s), Bus					
Trigger Holdoff Range	4ns – 10s					
Coupling	AC, DC, LF rej. , HF rej. , Noise rej.					
Sensitivity	1div					
EXT TRIGGER						
Range	±15V					
Sensitivity	DC – 100MHz Approx. 100mV; 100MHz – 200MHz Approx. 150mV					
Input Impedance	1MΩ±3%, ~16pF					
HORIZONTAL						
Time Base Range	1ns/div – 100s/div (1-2-5 increments); ROLL : 100ms/div – 100s/div					
Pre-trigger	10 div maximum					
Post-trigger	2,000,000 div maximum					
Time Base Accuracy	±50 ppm over any ≥ 1 ms time interval					
Real Time Sample Rate	Max. : 1GSa/s (4ch model); Per channel 1GSa/s (2ch model)					
Record Length	10Mpts/CH					
Acquisition Mode	Normal, Average, Peak Detect, Single					
Peak Detection	2ns (typical)					
Average	Selectable from 2 to 256					
X-Y MODE						
X-Axis Input	Channel 1 ; Channel 3* (* : four channel models only)					
Y-Axis Input	Channel 2 ; Channel 4* (* : four channel models only)					
Phase Shift	±3° at 100kHz					
CURSORS AND MEASUREMENT						
Cursors	Amplitude, Time, Gating Available; Unit : Seconds(S), Hz(1/S), Phase (Degrees), Ratio(%)					
Automatic Measurement	38 sets : Pk-Pk, Max, Min, Amplitude, High, Low, Mean, Cycle Mean, RMS, Cycle RMS, Area, Cycle Area, ROVShoot, FOVShoot, RPREShoot, FPREShoot, Frequency, Period, RiseTime, FallTime, +Width, -Width, Duty Cycle, +Pulses, -Pulses, +Edges, -Edges, %Flicker, Flicker Idx., FRR,FRF,FFR,FFF,LRR,LRF,LFR,LFF,Phase					
CONTROL PANEL FUNCTION						
Auto Counter	6 digits, range from 2Hz minimum to the rated bandwidth					
Autoset	Single-button, automatic setup of all channels for vertical, horizontal and trigger systems, with undo Autoset					
Save Setup	20 sets					
Save Waveform	24 sets					
DISPLAY SYSTEM						
TFT LCD Type	8" TFT LCD WVGA color display					
Display Resolution	800 horizontal x 480 vertical pixels (WVGA)					
Interpolation	Sin(x)/x					
Waveform Display	Dots, Vectors, Variable persistence(16ms–4s), Infinite persistence					
Waveform Update Rate	120,000 waveforms per second, maximum					
Display mode	YT ; XY					
Display Graticule	8 x 10 divisions					
INTERFACE						
USB Port	USB 2.0 High-speed host port x 1, USB 2.0 High-speed device port x 1					
Ethernet Port (LAN)	RJ-45 connector, 10/100Mbps with HP Auto-MDIX					
Go/NoGo BNC	5V Max/10mA open collector output					
Kensington Style Lock	Rear-panel security slot connects to standard Kensington-style lock					
SPECTRUM ANALYZER SPECIFICATIONS						
Frequency Range	DC–500MHz(Max.) (Max. bandwidth ~500MHz uncelebrated)					
Span	1kHz – 500MHz(Max.)					
Resolution Bandwidth	1Hz – 500kHz(Max.)					
Reference Level	-50 dBm to +40dBm in steps of 5dBm					
Vertical Units	dBV RMS; Linear RMS; dBm					
Vertical Position	-12divs to +12divs					
Vertical Scale	1dB/div to 20dB/div in a 1-2-5 Sequence					
Display Average Noise Level	1V/div < -50dBm, Avg : 16 ; 100mV/div < -70dBm, Avg : 16 ; 10mV/div < -90dBm, Avg : 16					
Spurious Response	2nd harmonic distortion< 40dBc ; 3rd harmonic distortion< 45dBc					
Frequency Domain Trace Types	Normal ; Max Hold ; Min Hold ; Average (2 – 256)					
Detection Methods	Sample ; +Peak ; -Peak ; Average					
FFT Windows	FFT Factor : Hanning 1.44 ; Rectangular 0.89 ; Hamming 1.30 ; Blackman 1.68					
AWG SPECIFICATIONS						
Channels	2					
Sample Rate	200 MSa/s					
Vertical Resolution	14 bits					
Max. Frequency	25 MHz					
Waveforms	Sine, Square, Pulse, Ramp, DC, Noise, Sinc, Gaston, Lorentz, Exponential Rise, Exponential Fall, Haversine, Cardiac					
Output Range	20 mVpp to 5 Vpp, High Z ; 10 mVpp to 2.5 Vpp, 50Ω					
Output Resolution	1mV					
Output Accuracy	2% (1 kHz)					
Offset Range	±2.5 V ac+dc, High Z ; ±1.25 V ac+dc, 50Ω					
Offset Resolution	1mV					
Sine	Frequency Range: 100mHz–25MHz ; Flatness(relative to 1kHz): ±0.5dB<15MHz; ±1 dB 15MHz–25MHz; Harmonic Distortion: -40dBc; Stray(Non-harmonic): -40dBc; Total Harmonic Distortion:1%; S/N Ratio: 40dB					
Square/Pulse	Frequency Range:100mHz–15MHz ; Rise/Fall time:<15ns ; Overshoot: <3% ; Duty cycle Square:50% & Pulse: 0.4%–99.6% ; Min. Pulse Width: 30 ns ; Jitter: 500 ps					
Ramp	Frequency Range:100mHz–1MHz ; Linearity: 1% ; Symmetry: 0–100%					

MDO-2000E Series

OSCILLOSCOPES



MDO-2000E Series

Rear Panel



SPECIFICATIONS

	MDO-2072E(G/X)	MDO-2074E(G/X)	MDO-2102E(G/X)	MDO-2104E(G/X)	MDO-2202E(G/X)	MDO-2204E(G/X)
FREQUENCY RESPONSE ANALYSIS						
Dynamic Range	> 80 dB (typical)					
Input and Output Sources	Channel 1 or 2 (3 or 4 for four channel model)					
Frequency Range	20 Hz to 25 MHz					
Number of Test Points	10 to 90 points per decade					
Test Amplitude	20 mVpp to 5 Vpp into High-Z Fixed amplitude across entire sweep					
Test Results	Logarithmic overlaid gain and phase plot					
Manual Measurements	Two pairs of tracking gain and phase markers					
Plot Scaling	Auto-scaled during test					
DMM SPECIFICATIONS (MDO-2000EX only)						
Digit Level	5,000 counts ; CAT II 600Vrms, CAT III 300Vrms					
DC Voltage	50mV, 500mV, 5V, 50V, 500V, 1000V 6 ranges					
Accuracy	50mV, 500mV, 5V, 50V, 500V, 1000V ±(0.1% reading + 5 digits)					
Input Impedance	10M Ω					
DC Current	50mA, 500mA, 10A 3 ranges					
Accuracy	50mA~500mA (0.5% reading+0.05mA), 10A ±(0.5% reading + 50mA)					
AC Voltage	50mV, 500mV, 5V, 50V, 700V 5 ranges					
Accuracy	50mV, 500mV, 5V, 50V, 700V ±(1.5% reading + 15 digits) at 50Hz~1kHz * Amplitude greater than 0.2% of the full scale reading.					
AC Current	50mA, 500mA, 10A 3 ranges					
Accuracy	50mA, 500mA, ±(1.5% reading + 0.05mA) at 50Hz~1kHz ; 10A ±(3% reading + 50mA) at 50Hz~1kHz * Measure range: >10mA					
Resistance	500 Ω, 5k Ω, 50k Ω, 500k Ω, 5M Ω, 5 ranges					
Accuracy	500 Ω, 5k Ω, 50k Ω, 500k Ω ±(0.3% reading + 3 digits); 5M Ω ±(0.5% reading + 5 digits)					
POWER SUPPLY SPECIFICATIONS (MDO-2000EX only)						
Output Channel	CH1 & CH2					
Output Voltage Range	1.0V~5.0V					
Output Current(Max.)	1A					
Voltage Step	0.1V Continuously Adjustable					
Output Voltage Accuracy	±3%					
Ripple and Noise	50mVrms					
POWER SOURCE MISCELLANEOUS						
Line Voltage Range	AC 100V ~ 240V, 50Hz ~ 60Hz, auto selection					
Multi-Language Menu	Available					
On-Line Help	Available					
Time Clock	Time and date, provide the date/time for saved data					
Operation Environment	Temperature: 0°C to 50°C. Relative Humidity: < 80% at 40°C or below; < 45%, 41°C ~ 50°C					
DIMENSIONS & WEIGHT						
	384(W) X 208(H) X 127.3(D)mm, Approx. 3 kg					

Note : Three-year warranty, excluding probes & LCD display panel.

ORDERING INFORMATION

MDO-2204E(G/X)	200MHz,4Channel,Digital Storage Oscilloscope,Spectrum analyzer,dual channel 25MHz AWG
MDO-2202E(G/X)	200MHz,2Channel,Digital Storage Oscilloscope,Spectrum analyzer,dual channel 25MHz AWG
MDO-2104E(G/X)	100MHz,4Channel,Digital Storage Oscilloscope,Spectrum analyzer,dual channel 25MHz AWG
MDO-2102E(G/X)	100MHz,2Channel,Digital Storage Oscilloscope,Spectrum analyzer,dual channel 25MHz AWG
MDO-2074E(G/X)	70MHz,4Channel,Digital Storage Oscilloscope,Spectrum analyzer,dual channel 25MHz AWG
MDO-2072E(G/X)	70MHz,2Channel,Digital Storage Oscilloscope,Spectrum analyzer,dual channel 25MHz AWG

"(X)" built in 5,000 counts DMM and power supply

Accessories :

User manual CD x 1, Power cord x 1, **GTL-110** BNC-BNC cable x 2, **GTL-105A** Alligator Clip test lead (only on MDO-2000EX), **GTL-207A** Banana plug test lead (only on MDO-2000EX)

GTP-070B-4 : 70MHz(10:1/1:1)Switchable passive probe for MDO-2072E(X)/2074E(X) (one per channel)

GTP-100B-4 : 100MHz(10:1/1:1)Switchable passive probe for MDO-2102E(X)/2104E(X) (one per channel)

GTP-200B-4 : 200MHz(10:1/1:1)Switchable passive probe for MDO-2202E(X)/2204E(X) (one per channel)

OPTIONAL ACCESSORIES

GRA-426	Rack Adapter Panel	GCP-300	300kHz/200A Current probe
GAK-003	50 Ω Impedance Adapter	GCP-530	50MHz/30A Current probe
GTL-246	USB Cable, USB 2.0, A-B Type, 1200mm	GCP-500	500kHz/150A Current probe
GTL-205A	Temperature probe adaptor with thermocouple (K type)	GCP-1030	100MHz/30A Current probe
GDP-025	25MHz High voltage differential probe	GCP-1000	1MHz/70A Current probe
GDP-050	50MHz High voltage differential probe	GCP-206P	Power supply for current probe (2 input channel)
GDP-100	100MHz High voltage differential probe	GCP-425P	Current Probe - Power Supply, 4 Channel Power Supply for GCP-530/1030
GSC-008	Soft Carrying Case	GTP-033A	Oscilloscope Probe, 35MHz 1:1 Passive Probe, BNC(P/M)

FREE DOWNLOAD

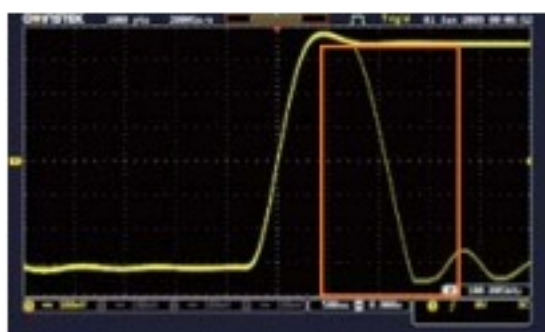
PC Software	OpenWave software	Driver	USB driver ; LabView driver
--------------------	-------------------	---------------	-----------------------------

200/100/70MHz Mixed-domain Oscilloscope

MDO-2000E Series

OSCILLOSCOPES

A. 120,000wfm/s WAVEFORM UPDATE RATE AND VPO WAVEFORM DISPLAY TECHNOLOGY



The MDO-2000E series oscilloscope allows users to easily and completely observe inrush signals and rare transient waveforms to increase waveform debugging efficiency by using features, including advanced VPO (Visual Persistence Oscilloscope) signal processing technology, waveform update rate as high as 120,000 wfm/s, and multi-layered afterglow display to enhance waveform display efficiency. Oscilloscope with VPO technology displays signals with three dimensional waveforms constructed by amplitude, time and signal strength to show each waveform point. 256 color gradients yield clear waveform changes. Comparing with the conventional digital storage oscilloscope, the MDO-2000E series provides more natural and more genuine signal display effect which is very close to the original analog signal.

B. SUPPORT I²C,SPI,UART,CAN,LIN BUS TRIGGER AND DECODING FUNCTIONS



The serial bus technology has been widely applied in the present embedded application design. The IoT devices connecting sensors and the peripheral components are using serial bus such as UART, I²C, and SPI. To rapidly and correctly trigger and analyze serial bus data has posed a difficult challenge to engineers. The MDO-2000E series provides serial bus analysis function with 10M long memory depth. Users can trigger, decode, and analyze frequently used I²C, SPI and UART serial bus and CAN/LIN bus, which is often used by automotive communications.

C. WAVEFORM SEARCH FUNCTION



Users can rapidly search desired waveforms according to the trigger condition. After activating the search function, hollow inverted triangles will show the location met the trigger condition. The upper left hand corner Overall will show the total number of waveforms met the trigger condition. Users can set waveform search by the trigger condition such as Edge, pulse width, Runt, Rise/Fall, and

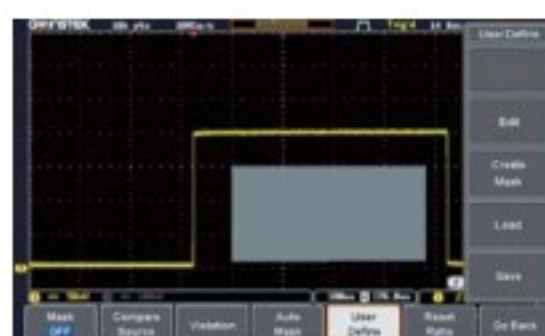
Bus. When the trigger condition is met, hollow inverted triangles will appear. Users can save all marks to compare with the next input signal. The front panel of the MDO-2000E series controls waveform zoom-out and play/pause function to swiftly identify each desired event. The function allows users to conveniently complete waveform search and save marks for rapid comparison and analysis.

D. DATA LOG FUNCTION



Users, via the data log function, can observe waveform changes in long periods of time to ensure product reliability or measure sporadically appeared signals. The data log function, based on the requirements, can set record time and interval. Record time can be selected from 5 minutes to 1000 hours, and record interval is 5 seconds, the minimum. Waveform type for record data and CSV file format for each channel can also be selected. Data can be stored in USB drive, the MDO-2000E series or the remote computer via LAN.

E. MASK FUNCTION



The MDO-2000E series provides the Mask function, which allows users to apply Auto Mask and user-defined Mask to determine whether the quality of the product meets the regulation. Via user-defined mask, users can set up to 8 areas and each area is up to 10 points to meet test requirements. Users can also refer to the examples from user manual to edit Mask by the PC to satisfy all test needs. By setting Save On, users can log and monitor signals, which violate test conditions.

F. SEGMENTED MEMORY FUNCTION

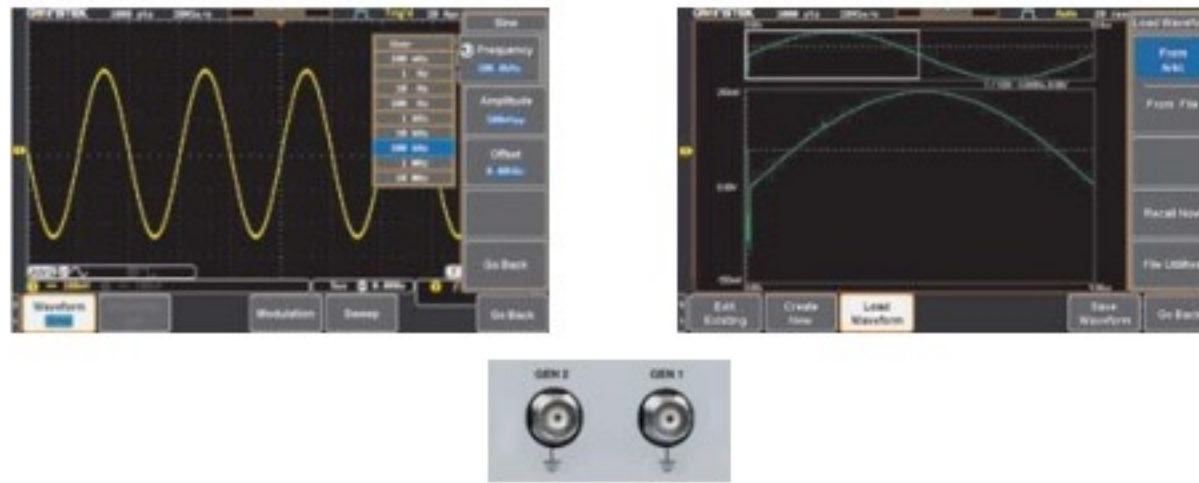


Users Can Select "Analyze Segments" to Conveniently Obtain The Analysis Results.

To achieve the most ideal application for memory depth, the MDO-2000E series has the built-in segmented memory function. The segmented memory function allows users to select the desired important signals for observation. Hence, insignificant signals can be neglected and serial bus decoding; pulse or inrush signals can be identified when retrieving signals. The segmented memory function

of the MDO-2000E series allows users to select the number of sections. The maximum sections can be selected are 29,000. After activating the function, users can select and observe waveform for each segment by turning the Variable knob. The ultimate application of memory depth, therefore, is completely realized.

G. 25MHz DUAL CHANNEL ARBITRARY WAVEFORM GENERATOR



With respect to signal source, MDO-2000E features a built-in dual channel 25MHz arbitrary waveform generator with modulation capability and also provides 14 bits vertical resolution; sample rate of 200MSa/s; 13 output waveforms (Sine, Square, Pulse, Ramp, DC, Noise, Sinc, Gaussian, Lorentz, Exponential Rise, Exponential Fall, Haversine, Cardiac); and AM/FM/FSK modulation and sweep function. The friendly user interface is the ideal choice for education

and applications such as circuit simulation tests. Arbitrary waveform generator provides users with 16k memory length. Users can upload basic waveforms, including Sine, Square, Pulse, Ramp, and Noise to edit arbitrary waveforms. Normal and Function Edit can edit waveforms. The edited waveforms can be saved as UAW file for data access.

H. POWER SUPPLY AND DMM FUNCTIONS (MDO-2000EX only)



MDO-2000EX has expanded its capabilities by incorporating a 5,000 count DMM and a 5V/1A power supply. DMM provides tests for ACV, DCV, ACA, DCA resistance, diode and temperature. The highly accurate DMM can strengthen DSO's capabilities of voltage and current measurement accuracy. Power supply provides 5V/1A; 0.1V incremental adjustment which can supply power for the development

board and IoT (Internet of Things) module of the often used 8051/Arduino/ESP8266/MSP430 in Microprocessors and Micro controllers experiment courses. For education and digital circuit tests, it can satisfy the voltage input requirements of 5V or 3.3V. Each increment is 0.1V and over load protection is available.

200/100/70MHz Digital Storage Oscilloscope



GDS-2000E Series (200/100/70 MHz)



FEATURES

- * 200/100/70MHz Bandwidth
- * Sampling Rate : Max. 1GSa/s (4ch Model) ; Per Channel 1GSa/s (2ch Model)
- * 10M/CH Memory Depth and VPO Waveform Display Technology
- * Waveform Update Rate of 120,000 wfm/s
- * 8" 800 x 480 TFT LCD Display
- * Max. 1M pts of FFT to Get Higher Resolution in Frequency Domain
- * Digital Filter Function
- * Segmented Memory and Waveform Search Functions
- * I²C/SPI/UART/CAN/LIN Serial Bus Trigger and Decoding Function
- * Data Log Function for Waveform Observation in Long Periods of Time
- * Network Storage Function

SPECIFICATIONS						
VERTICAL SENSITIVITY						
	GDS-2072E	GDS-2074E	GDS-2102E	GDS-2104E	GDS-2202E	GDS-2204E
Channels	2Ch+EXT	4Ch	2Ch+EXT	4Ch	2Ch+EXT	4Ch
Bandwidth	DC-70MHz(-3dB)		DC-100MHz(-3dB)		DC-200MHz(-3dB)	
Calculated Rise Time	5ns		3.5ns		1.75ns	
Bandwidth Limit	20MHz		20MHz		20M/100MHz	
Vertical Resolution	8 bits : 1mV - 10V/div					
Input Coupling	AC, DC, GND					
Input Impedance	1MΩ // 16pF approx.					
DC Gain Accuracy	±(3% when 2mV/div or greater is selected ; ±(5%) when 1mV/div is selected					
Polarity	Normal & Invert					
Maximum Input Voltage	300Vrms , CAT I (300Vrms CAT II with GTP-070B-4/100B-4/200B-4, 10 : 1 probe)					
Offset Position Range	1mV/div - 20mV/div : ±0.5V ; 50mV/div - 200mV/div : ±5V ; 500mV/div - 2V/div : ±25V ; 5V/div-10V/div : ±250V					
Waveform Signal Process	+ , - , × , ÷ , FFT , FFTrms , Uesr defined expression. FFT : 1Mpts ; FFT : Spectral magnitude. Set FFT Vertical Scale to Linear RMS or dBV RMS ; FFT Window Displays : Rectangular, Hamming , Hanning, Blackman-Harris					
TRIGGER						
Source	CH1 , CH2, CH3, CH4, Line, EXT* ; *dual channel models only.					
Trigger Mode	Auto (Supports Roll Mode for 100 ms/div and slower), Normal, Single Sequence					
Trigger Type	Edge, Pulse Width(Glitch), Video, Pulse Runt, Rise & Fall(Slope), Alternate, Time out, Event-Delay(1-65,535 events), Time-Delay(Duration;4ns-10s), Bus					
Trigger Holdoff Range	4ns - 10s					
Coupling	AC, DC, LF rej. , HF rej. , Noise rej.					
Sensitivity	1div					
EXT TRIGGER						
Range	±15V					
Sensitivity	DC - 100MHz Approx. 100mV 100MHz - 200MHz Approx. 150mV					
Input Impedance	1MΩ ±3% , -16pF					
HORIZONTAL						
Time Base Range	1ns/div - 100s/div (1-2-5 increments); ROLL : 100ms/div - 100s/div					
Pre-trigger	10 div maximum					
Post-trigger	2,000,000 div maximum					
Time Base Accuracy	±50 ppm over any ≥ 1 ms time interval					
Real Time Sample Rate	Max. : 1GSa/s (4ch model); Per channel 1GSa/s (2ch model)					
Record Length	Max. : 10Mpts					
Acquisition Mode	Normal, Average, Peak Detect, Single					
Peak Detection	2ns (typical)					
Average	Selectable from 2 to 256					
X-Y MODE						
X-Axis Input	Channel 1 ; Channel 3* (* : four channel models only)					
Y-Axis Input	Channel 2 ; Channel 4* (* : four channel models only)					
Phase Shift	±3° at 100kHz					
CURSORS AND MEASUREMENT						
Cursors	Amplitude, Time, Gating Available; Unit : Seconds(S), Hz(1/S), Phase (Degrees), Ratio(%)					
Automatic Measurement	36 sets: Pk-Pk, Max, Min, Amplitude, High, Low, Mean, Cycle Mean, RMS, Cycle RMS, Area, Cycle Area, ROVShoot, FOVShoot, RPREShoot, FPREShoot, Frequency, Period, RiseTime, FallTime, +Width, -Width, Duty Cycle, +Pulses, -Pulses, +Edges, -Edges, FRR, FRF, FFR, FFF, LRR, LRF, LFR, LFF, Phase					
Control Panel Function	Cursors measurement					
Auto Counter	6 digits, range from 2Hz minimum to the rated bandwidth					
Autoset	Single-button, automatic setup of all channels for vertical, horizontal and trigger systems, with undo Autoset					
Save Setup	20set					
Save Waveform	24set					
DISPLAY SYSTEM						
TFT LCD Type	8" TFT LCD WVGA color display					
Display Resolution	800 horizontal x 480 vertical pixels (WVGA)					
Interpolation	Sin(x)/x					
Waveform Display	Dots, Vectors, Variable persistence(16ms-10s), Infinite persistence					
Waveform Update Rate	120,000 waveforms per second, maximum					
Display mode	YT ; XY					
Display Graticule	8 x 10 divisions					
INTERFACE						
USB Port	USB 2.0 Full-speed host port x 1, USB High-speed 2.0 device port x 1					
Ethernet Port (LAN)	RJ-45 connector, 10/100Mbps with HP Auto-MDIX					
Go/NoGo BNC	5V Max/10mA open collector output					
Kensington Style Lock	Rear-panel security slot connects to standard Kensington-style lock					
POWER SOURCE MISCELLANEOUS						
Line Voltage Range	AC 100V - 240V, 50Hz - 60Hz, auto selection					
Multi-Language Menu	Available					
On-Line Help	Available					
Time clock	Time and date, provide the date/time for saved data					
Operation Environment	Temperature: 0°C to 50°C. Relative Humidity: ≤80%, 40°C or below; ≤45%, 41°C - 50°C					
DIMENSIONS & WEIGHT						
	384(W) X 208(H) X 127.3(D)mm, Approx. 2.8 kg					



GDS-2000E Series

ORDERING INFORMATION

GDS-2204E	200MHz, 4-Channel, Digital Storage Oscilloscope
GDS-2202E	200MHz, 2-Channel, Digital Storage Oscilloscope
GDS-2104E	100MHz, 4-Channel, Digital Storage Oscilloscope
GDS-2102E	100MHz, 2-Channel, Digital Storage Oscilloscope
GDS-2074E	70MHz, 4-Channel, Digital Storage Oscilloscope
GDS-2072E	70MHz, 2-Channel, Digital Storage Oscilloscope

Accessories :

User manual CD x 1, Power cord x 1
 GTP-070B-4 : 70MHz(10:1/1:1) Switchable passive probe for GDS-2072E/2074E(one per channel)
 GTP-100B-4 : 100MHz(10:1/1:1) Switchable passive probe for GDS-2102E/2104E(one per channel)
 GTP-200B-4 : 200MHz(10:1/1:1) Switchable passive probe for GDS-2202E/2204E(one per channel)

OPTIONAL ACCESSORIES

GRA-426	Rack Adapter Panel
GAK-003	50Ω Impedance Adapter
GSC-008	Soft Carrying Case
GTL-246	USB Cable, USB 2.0, A-B Type, 1200mm
GCP-300	300kHz/200A Current probe
GCP-530	50MHz/30A Current probe
GCP-500	500kHz/150A Current probe
GCP-1030	100MHz/30A Current probe
GCP-1000	1MHz/70A Current probe
GCP-206P	Power supply for current probe (2 input channel)
GCP-425P	Power supply for current probe (4 input channel)
GTP-033A	Oscilloscope Probe, 35MHz 1:1 Passive Probe, BNC(P/M)
GDP-025	25MHz High voltage differential probe
GDP-050	50MHz High voltage differential probe
GDP-100	100MHz High voltage differential probe

FREE DOWNLOAD

PC Software	OpenWave software
Driver	USB driver ; LabView driver

Rear Panel



GDB-03 Oscilloscope Education and Training Kit

For : GDS-3000/2000A/2000E/1000B Series
 MSO-2000E Series/MDO-2000A/2000E Series



200/100/70 MHz Digital Storage Oscilloscope

Patent No. :
13/671702
ZL201420272063.8
ZL201430150303.2



GDS-200 Series (200/100/70 MHz)



GDS-300 Series (200/100/70 MHz)



FEATURES

- * 200/100/70MHz Bandwidth Selections, Two Input Channels
- * 1GSa/s Maximum Sample Rate
- * Maximum 5M/1M Memory Depth Per Channel
- * 7" 800 x 480 Full Touch Panel Capacitive LCD Multi-Point Control, Landscape and Portrait Display
- * Built-In 50,000/5,000 Counts DMM
- * True RMS Measurement in DMM Function
- * 30,000 Consecutive Waveform Records Logging Function, Replay Measurement Results Any Time
- * Temperature Measurement and Logging Function
- * Built-In Engineering Calculator, SMD Resistance Coding, Color Coding Info, and Attenuator Calculation Application Software
- * Optional Differential Probe to Achieve Isolation Effect

GWS-001 Wrist Strap



The portable 7" full touch panel capacitive LCD, featuring multi-point touch panel method which allows engineers to move waveform position, adjust waveform size, and set trigger conditions easily, subverts the traditional handheld instrument. With this unique feature, engineers can retrieve DUT's signals easily under the complex working environment. Landscape or portrait measurement display not only clearly shows waveforms under full screen status but also combines multi-functional measurement environment to achieve unimaginable measurement results.

Built-in, the second to none, the longest 5M sample memory depth helps engineers diagnose waveforms in great details. The long memory depth can record detailed waveform data and help engineers reproduce the original waveforms while engineers are conducting long observation or retrieving detailed transient signals. Any delicate changes of analog waveforms can be clearly presented in front of engineers when they adjust time scale from long to short that leaves no measurement problems unanswered.

Built-in 50,000 counts (GDS-300) or 5,000 counts (GDS-200) DMM helps engineers accurately measure DUT's electric parameters including not only measurements of D.C. voltage, A.C. voltage, D.C. current, A.C. current, resistance and diode polarity, but also temperature measurement and monitoring. The analysis of trend diagrams further completes test and measurement. DMM can simultaneously work with oscilloscope to conduct multi-measurement tasks.

Normally, engineers wish to effectively record intermittent signals while retrieving a series of signals during a long period of time. GDS-300/GDS-200's built-in 30,000 consecutive waveform records logging function not only records 30,000 waveform records in a long period of time but also replays the recorded data that allows engineers to identify intermittent problems occurred during the recorded time. Leave no problems unidentified.

Engineers need to isolate power and solve corresponding grounding issue while conducting circuit debugging. One of the criteria engineers must overcome is to maintain system grounding and isolation safety in the strict test and measurement environment such as no grounding system or no isolation. GDS-300/200 provide optional differential probe to effectively assist engineers in solving isolation and grounding problems that elevates the efficiency and safety of test and measurement.

Engineers often need some calculation tool software to conduct circuit design and debugging analysis during the R&D process. GDS-300/200 oscilloscopes, with the built-in standard engineering calculator, allow engineers to verify parameters during the test and measurement process. While using unknown resistance, engineers can obtain resistance value via color coding calculation software. If any attenuator was designed in the circuit, GDS-300/200 can also provide corresponding attenuator model and attenuation value calculation.

SPECIFICATIONS						
	GDS-307	GDS-310	GDS-320	GDS-207	GDS-210	GDS-220
VERTICAL						
Channels	2 (BNC-Shield)					
Input Impedance	1MΩ±2%, 16.5pf approx.					
Maximum Input	CAT II 300VRMS					
Input Coupling	AC, DC, GND					
Bandwidth	DC-70MHz (-3dB)	DC-100MHz (-3dB)	DC-200MHz (-3dB)	DC-70MHz (-3dB)	DC-100MHz (-3dB)	DC-200MHz (-3dB)
Calculated Rise Time	5ns	3.5ns	1.75ns	5ns	3.5ns	1.75ns
Sensitivity	2mV/div-10V/div (1-2-5 increments)					
Accuracy	±(3% x Readout + 0.1 div + 1mV)					
Bandwidth Limit	20MHz(-3dB)					
Polarity	Normal, Invert					
Offset Position Range	2mV/div-50mV/div:±0.4V;100mV/div-500mV/div:±4V;1V/div-5V/div:±40V;10V/div:±300V					
Waveform Signal Process	+, -, ×, ÷, FFT, FFTrms					
SIGNAL ACQUISITION						
Realtime Sample Rate	1GSa/s					
Memory Depth	5Mpoints per ch			1Mpoints per ch		
Acquisition Mode	Average : 2-256 waveforms; Peak detect : 10ns; sin(x)/x or ET					
Replay Wfms.	30,000 wfms.					
TRIGGER						
Source	Ch1 or Ch2					
Trigger mode	Auto, Normal, Single, Force					
Trigger type	Edge, Pulse Width, Video, Alternate					
Trigger Holdoff	10ns - 10s					
Coupling	AC, DC, LFR, HFR, NR					
Sensitivity	DC-25MHz : approx. 0.5div or 5mV; 25MHz- 70/100/200MHz : approx. 1.5div or 15mV					
HORIZONTAL						
Range	5ns-100s/Div (1-2-5 increments)					
Roll	100ms/div - 100s/div					
Pre-trigger	10 div max.					
Post-trigger	1,000 div max(depend on time base)					
Accuracy	±20ppm over any > 1ms time interval					
XY MODE						
Phase Shift	±3° at 100kHz					
CURSOR AND MEASUREMENT						
Cursors	Voltage difference between cursors(ΔV), Time difference between cursors(ΔT), frequency measure(1/ΔT)					
Auto-measurement	36 sets.					
Auto-counter Autoset	6 digits. Range: 2Hz to rated bandwidth					
TEMPERATURE MEASUREMENT						
	Available			Non-Available		

SPECIFICATIONS						
	GDS-307	GDS-310	GDS-320	GDS-207	GDS-210	GDS-220
MISCELLANEOUS						
Multi-Language Menu	Available					
On-line Help	Available					
Time and Clock	Available					
BATTERY						
Battery power	Li-polymer 6000mAh, 7.4V (Built-in)					
Charge time	5.0 hour (75%)					
Operation time	4 hour, depending on operating condition					
PROBE COMPENSATION						
	2V, 1kHz, 50% Duty cycle					
INTERFACE						
USB	USB Device (Isolation)					
Internal Flash Disk	120MB					
DISPLAY						
Type	7 inch					
Display Resolution	480 x 800 pixels					
Display Direction	Landscape & Portrait					
Backlight Control	Manual adjustable, ECO mode					
Touch Panel	Capacitive					
DMM						
Digit Level	50,000 counts		5,000 counts			
DC Voltage [±]	Range	CAT II 600VRMS, CAT III 300VRMS				
	Accuracy	50mV, 500mV, 5V, 50V, 500V, 1000V 6 ranges *Input protection 10V only on mV ranges. GDS-320/310/307: 50mV, 500mV, 5V, 50V, 500V: ±(0.05%+0.1%); 1000V: ±(0.1%+0.1%) GDS-220/210/207: 50mV, 500mV, 5V, 50V, 500V: ±(0.1%+0.1%); 1000V: ±(0.1%+0.1%)				
Input Impedance	Range	10MΩ				
	Accuracy	50mA, 500mA, 10A 3 ranges GDS-320/310/307: 50mA, 500mA: ±(0.1%+0.1%), 10A: ±(0.5%+0.1%) GDS-220/210/207: 50mA, 500mA: ±(0.5%+0.1%), 10A: ±(0.5%+0.5%)				
AC Voltage [±]	Range	50mV, 500mV, 5V, 50V, 700V 5 ranges *Input protection 10V only on mV ranges.				
	Accuracy	50mV, 500mV, 5V, 50V, 700V: ±(1.5%+1.5%) at 50Hz~1kHz				
AC Current	Range	50mA, 500mA, 10A 3 ranges				
	Accuracy	50mA, 500mA, ±(1.5%+0.1%) at 50Hz~1kHz; 10A: ±(3%+0.5%) at 50Hz~1kHz				
RESISTANCE [±]	Range	500Ω, 5KΩ, 50KΩ, 500KΩ, 5MΩ 5 ranges				
	Accuracy	500Ω, 5KΩ, 50KΩ, 500KΩ ±(0.3%+0.01%); 5MΩ ±(0.5%+0.1%) *Measure range:50Ω~5MΩ				
Diode Test	Maximum forward voltage 1.5V, Open voltage 2.8V					
Temperature (thermocouple)	Range	-50°C ~ +1000°C				
	Resolution	0.1°C				
	Thermocouple	B, E, J, K, N, R, S, T *Specifications do not include probe accuracy. Temperature specifications only apply to the GDS-320/310/307				
Continuity Beep	< 15 Ω					
Functions	Auto Range, Max, Min, Hold, Trend plot *Accuracy:±(% of Reading + % of Range).					
POWER ADAPTOR						
Line Voltage	AC 100V~240V, 50~60Hz, Power Consumption 40W; DC Output : 12V/3A, Double Shield					
OPTION						
Differential Probe	Dual-channel, 40MHz, CAT II 600V					
DIMENSIONS & WEIGHT						
	240.2(W) x 136.0(H) x 59.7(D) mm; Approx. 1.5 Kg					

ORDERING INFORMATION

GDS-320	200MHz, 2 Channels, Digital Storage Oscilloscope
GDS-310	100MHz, 2 Channels, Digital Storage Oscilloscope
GDS-307	70MHz, 2 Channels, Digital Storage Oscilloscope
GDS-220	200MHz, 2 Channels, Digital Storage Oscilloscope
GDS-210	100MHz, 2 Channels, Digital Storage Oscilloscope
GDS-207	70MHz, 2 Channels, Digital Storage Oscilloscope

ACCESSORIES

User manual CD x 1	GSC-010	Soft Carrying Case
GTP-150B-2 150MHz Probe, Suitable for GDS-307/207, GDS-310/210	GSC-011	Soft Carrying Bag
GTP-250B-2 250MHz Probe, Suitable for GDS-320/220	GAP-001	AC-DC Adaptor
GTL-207A Multimeter Test Lead x 1	GWS-001	Wrist Strap

Optional Accessories

GDP-040D 40MHz Dual-Channel Differential Probe	GCL-001	Vertical Calibration Cable
GTL-253 USB Cable, USB 2.0, A-mini B Type, 1400mm	GPF-700	Protective Films for 7" Touch Screen
GTL-131 Test Clip, Suitable for GDP-040D	GTL-253	USB Cable, USB 2.0 A-mini B type, Approx. 1400mm
GTL-205 Temperature probe adaptor with thermocouple (K type)		

Free Download

OpenWave 200 Software

SELECTION GUIDE

MODEL	GDS-307	GDS-310	GDS-320	GDS-207	GDS-210	GDS-220
Bandwidth	70MHz	100MHz	200MHz	70MHz	100MHz	200MHz
Sample Rate	1GSa/s	1GSa/s	1GSa/s	1GSa/s	1GSa/s	1GSa/s
Memory Length	5M pts	5M pts	5M pts	1M pts	1M pts	1M pts
DMM Count	50,000	50,000	50,000	5,000	5,000	5,000
Temperature Measurement	✓	✓	✓	-	-	-

GDS-300 Series Rear Panel



GDS-200 Series Rear Panel



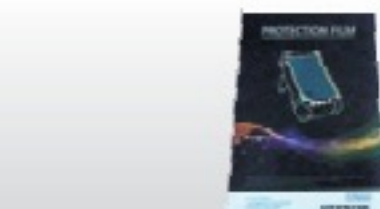
GSC-010 Soft Carrying Case



GSC-011 Soft Carrying Bag



GPF-700 Protective Films



GAP-001 AC-DC Adaptor



200/100/70/50MHz Digital Storage Oscilloscope



GDS-1000B Series



FEATURES

- * 200/100/70/50MHz Bandwidth Selections, 2ch or 4ch Input
- * 1GSa/s Maximum Sampling Rate
- * 10M Maximum Memory Depth For Each Channel
- * 7" 800 x 480 WVGA LCD Display
- * 256 Color Gradient Display Function to Strengthen Waveform Performance
- * 1Mpts FFT Frequency Domain Signal Display
- * I²C/SPI/UART/CAN/LIN Serial Bus Trigger and Decoding Functions
- * Zero Key Function For Horizontal Time, Vertical Voltage and Triggering
- * Compact And Innovative Exterior Design

The GDS-1000B Series features four bandwidth selections - 200MHz, 100 MHz, 70 MHz, 50MHz and equips with analog signal input terminals by four or two channels. The maximum sampling rate for each single channel is 1GSa/s, and the memory depth is 10Mpts per channel independently. The GDS-1000B Series has a waveform update rate of 50,000wfms/s, which helps users to precisely observe the detailed waveform variation. Additionally, 7" WVGA color LCD display and the 256 color gradient display function together allow waveforms to be observed with the senses of transparency and gradation. With respect to the horizontal time scale adjustment knob and trigger level adjustment knob, GW Instek provides a very thoughtful design -the zero key function, which allows engineers to work more effectively. For mathematical analysis mode, 1Mpts FFT signal display makes the dull frequency domain signal analysis more delicate.

Moreover, the innovative exterior design and compact design also bring much convenience to users. Other diversified and charming multi-functional operation demonstrates the concept of complete technology integration.

SPECIFICATIONS						
	GDS-1054B	GDS-1072B	GDS-1074B	GDS-1102B	GDS-1104B	GDS-1202B
VERTICAL						
Channels	4	2 + Ext	4	2 + Ext	4	2 + Ext
Bandwidth	DC-50MHz (-3dB)	DC-70MHz (-3dB)	DC-70MHz (-3dB)	DC-100MHz (-3dB)	DC-100MHz (-3dB)	DC-200MHz (-3dB)
Calculated Rise Time	7ns	5ns	5ns	3.5ns	3.5ns	1.75ns
Bandwidth Limit	20MHz	20MHz	20MHz	20MHz	20MHz	20MHz
Vertical Sensitivity Resolution	8 bit : 1mV-10V/div					
Input Coupling	AC, DC, GND					
Input Impedance	1MΩ // 16pF approx. ; GDS-1202B : 1MΩ // 14pF approx.					
DC Gain Accuracy*	±3%					
Polarity	Normal & Invert					
Maximum Input Voltage	300Vrms, CAT I (300Vrms CAT II with GTP-070B- 4/100B-4, 200B-4 10:1 probe)					
Offset Position Range	1mV/div : ±1.25V ; 2mV/div - 100mV/div : ±2.5V ; 200mV/div - 10V/div : ±125V					
Waveform Signal Process	+., ×, ÷, FFT, FFTrms, User Defined Expression ; FFT: 1Mpts; FFT: Spectral magnitude. Set FFT Vertical Scale to Linear RMS or dBV RMS ; FFT Window Display : Rectangular, Hamming, Hanning , or Blackman-Harris					
TRIGGER						
Source	CH1, CH2, CH3*, CH4*, Line, EXT** ; *four channel models only. ; **two channel models only					
Trigger Mode	Auto (supports Roll Mode for 100 ms/div and slower), Normal, Single Sequence					
Trigger Type	Edge, Pulse Width, Video, Pulse Runt, Rise & Fall, Timeout, Alternate, Event-Delay (1-65535 events), Time-Delay (Duration, 4nS-10S)					
Holdoff range	4ns to 10s					
Coupling	AC, DC, LF rej., HF rej., Noise rej.					
Sensitivity	1div					
EXTERNAL TRIGGER						
Range	±2.5V					
Sensitivity	DC - 100MHz Approx. 100mV ; 100MHz - 200MHz Approx. 150mV					
Input Impedance	1MΩ±3% - 16pF ; GDS-1202B : 1MΩ±3% - 14pF					
HORIZONTAL						
Time base Range	5ns/div - 100s/div (1-2-5 increments)					
ROLL	100ms/div - 100s/div					
Pre-trigger	10 div maximum					
Post-trigger	2,000,000 div maximum					
Timebase Accuracy	±50 ppm over any ≥1 ms time interval					
Real Time Sample Rate	1GSa/s max.					
Record Length	Max. 10Mpts					
Acquisition Mode	Normal, Average, Peak Detect, Single					
Peak Detection	2ns (typical)					
Average	selectable from 2 to 256					
X-Y MODE						
X-Axis Input	Channel 1; Channel 3*(four channel models only)					
Y-Axis Input	Channel 2; Channel 4*(four channel models only)					
Phase Shift	±3° at 100kHz					
CURSORS AND MEASUREMENT						
Cursors	Amplitude, Time, Gating available; Unit : Seconds(s), Hz(1/s), Phase(degree), Ration(%)					
Automatic Measurement	36 sets: Pk-Pk, Max, Min, Amplitude, High, Low, Mean, Cycle Mean, RMS, Cycle RMS, Area, Cycle Area, ROVShoot, FOVShoot, RPREShoot, FPREShoot, Frequency, Period, RiseTime, FallTime, +Width, -Width, Duty Cycle, +Pulses, -Pulses, +Edges, -Edges, FRR, FRF, FFR, FFF, LRR, LRF, LFR, LFF, Phase					
Cursors Measurement Auto Counter	Voltage difference between cursors (ΔV) Time ; difference between cursors (ΔT) 6 digits, range from 2Hz minimum to the rated bandwidth					
CONTROL PANEL FUNCTION						
Autoset	Single-button, automatic setup of all channels for vertical, horizontal and trigger systems, with undo Autoset					
Save Setup	20set					
Save Waveform	24set					



GDS-1000B Series

SPECIFICATIONS	
	GDS-1054B GDS-1072B GDS-1074B GDS-1102B GDS-1104B GDS-1202B
DISPLAY	
TFT LCD Type	7" TFT WVGA color display
Display Resolution	800 horizontal x 480 vertical pixels (WVGA)
Interpolation	Sin(x)/x
Waveform Display	Dots, vectors, variable persistence (16ms-4s), infinite persistence
Waveform Update Rate	50,000 waveforms per second, maximum
Display Graticule	8 x 10 divisions
Display Mode	YT, XY
INTERFACE	
USB Port	USB 2.0 High-speed host port x1, USB High-speed 2.0 device port x1
Ethernet Port(LAN)	RJ-45 connector, 10/100Mbps with HP Auto-MDIX (only for 4 channel models)
Go-NoGo BNC	5V Max/10mA open collector output
Kensington Style Lock	Rear-panel security slot connects to standard kensington-style lock
POWER SOURCE	
	AC 100V – 240V , 50Hz – 60Hz , Auto selection , Power consumption: 30 Watts
MISCELLANEOUS	
Multi-Language Menu	Available
Operation Environment	Temperature : 0°C – 50°C. Relative Humidity <= 80% at 40°C or below; <= 45% at 41°C – 50°C
Online Help	Available
DIMENSIONS & WEIGHT	
	380(W) x 208 (H) x 127.3(D)mm, Approx. 2.8kg

Note : The specifications apply when the GDS-1000B is powered on for at least 30 minutes under +20°C--+30°C.

ORDERING INFORMATION

GDS-1202B	200MHz, 2 channels, Digital Storage Oscilloscope
GDS-1104B	100MHz, 4 channels, Digital Storage Oscilloscope
GDS-1102B	100MHz, 2 channels, Digital Storage Oscilloscope
GDS-1074B	70MHz, 4 channels, Digital Storage Oscilloscope
GDS-1072B	70MHz, 2 channels, Digital Storage Oscilloscope
GDS-1054B	50MHz, 4 channels, Digital Storage Oscilloscope

ACCESSORIES :

User manual CD x 1, Power cord x 1
 GTP-070B-4 : 70MHz(10:1/1:1) Switchable passive probe for GDS-1074B,GDS-1072B,GDS-1054B(one per channel)
 GTP-100B-4 : 100MHz(10:1/1:1) Switchable passive probe for GDS-1104B, GDS-1102B(one per channel)
 GTP-200B-4 : 200MHz(10:1/1:1) Switchable passive probe for GDS-1202B(one per channel)

OPTIONAL ASSESSORIES

GRA-426	Rack Adapter Panel
GAK-003	50Ω Impedance Adapter
GSC-008	Soft Carrying Case
GTL-246	USB Cable, USB 2.0, A-B Type, 1200mm
GCP-300	300kHz/200A Current probe
GCP-530	50MHz/30A Current probe
GCP-500	500kHz/150A Current probe
GCP-1030	100MHz/30A Current probe
GCP-1000	1MHz/70A Current probe
GCP-206P	Power supply for current probe (2 input channel)
GCP-425P	Power supply for current probe (4 input channel)
GTP-033A	Oscilloscope Probe, 35MHz 1:1 Passive Probe, BNC(P/M)
GDP-025	25MHz High voltage differential probe
GDP-050	50MHz High voltage differential probe
GDP-100	100MHz High voltage differential probe

FREE DOWNLOAD

Software	OpenWave Software
Driver	USB Driver ; LabView Driver

Rear Panel



GDB-03 Oscilloscope Education and Training Kit

For : GDS-3000/2000A/2000E/1000B Series
MSO-2000E Series

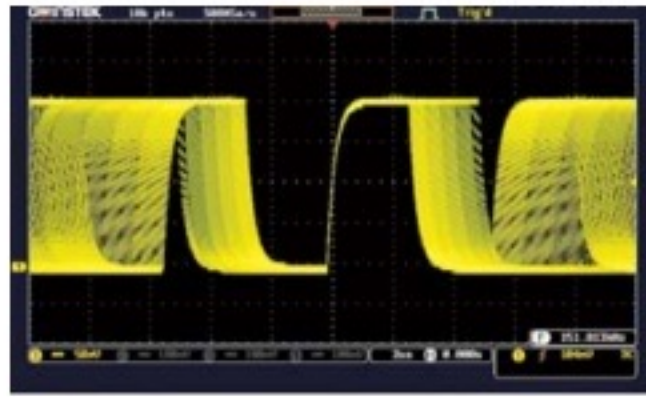


200/100/70/50MHz Digital Storage Oscilloscope

GDS-1000B Series

OSCILLOSCOPES

A. WAVEFORM UPDATE RATE UP TO 50,000wfms/s AND VPO DISPLAY TECHNOLOGY



The GDS-1000B Series oscilloscope is under the category of general and fundamental oscilloscope by the market segmentation. Nevertheless, the series arms itself with the waveform update rate up to 50,000wfms/s and VPO waveform display technology. Users can input a rapid frequency modulation carrier signal as shown on the diagram. An unsmooth temporarily holding phenomenon will occur while using conventional digital oscilloscopes to measure this signal. As a result, the conventional digital oscilloscopes could not

clearly yield the modulation variation process of frequency modulation signals. With the GDS-1000B Series oscilloscope, the measurement result will produce not only a smooth waveform modulation variation, but also detailed changes by distinct layers. Engineers could easily grasp the root cause of electric circuits while measuring the unexpected and fast changing signals. The GDS-1000B Series is indeed an excellent debugging weapon for the test and measurement industry.

B. 256 COLOR GRADIENT DISPLAY & 10M MEMORY DEPTH PER CHANNEL INDEPENDENTLY



With respect to the waveform display technology, the GDS-1000B Series oscilloscope is capable of displaying 256 color gradients which can delineate the profound gradational fluctuations; as if it can recreate the analog oscilloscope display capability. When a multi-layer video signal is input, the GDS-1000B Series, with 256 color gradient display, has the ability to precisely reveal the colored burst signal and to show details of layers with the brightness. Hence, the dull monochrome waveform is imbued with vitality, which is precisely the unlimited measurement fascination the GDS-1000B Series intends to bring to the general purpose oscilloscope arena.



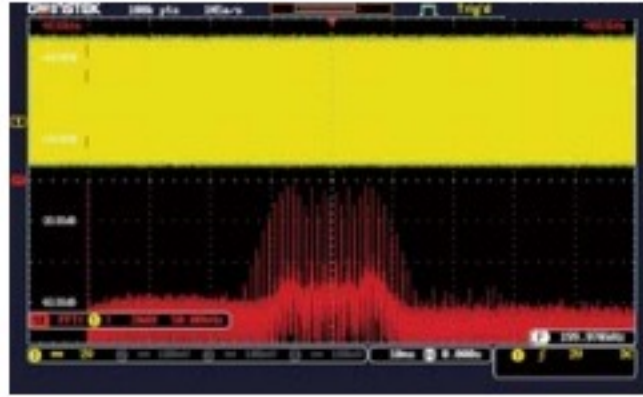
The GDS-1000B Series oscilloscope has a powerful and incomparable memory depth for the data retrieving. 10M memory depth per channel independently surpasses the specification of the industry's 1000 Series boundary. 10M memory depth allows users to easily seize the waveform detail while conducting fundamental measurement applications. If a long serial sequent sine waveform is input and the time scale is adjusted to 1mv/div, other GDS-1000 Series oscilloscopes for lack of sufficient memory depth will appear a distorted waveform while enlarging the waveform for its details. The GDS-1000B Series while enlarging the waveform to 20ns/div reveals a very clear sine waveform detail which is precisely the true value of the GDS-1000B Series oscilloscope.

C. SUPPORT I²C ,SPI ,UART,CAN, LIN BUS TRIGGER AND DECODING FUNCTIONS



The serial bus technology has been widely applied in the present embedded application design. The IoT devices connecting sensors and the peripheral components are using serial bus such as UART, I²C, and SPI. To rapidly and correctly trigger and analyze serial bus data has posed a difficult challenge to engineers. The GDS-1000B series provides serial bus analysis function with 10M long memory depth. Users can trigger, decode, and analyze frequently used I²C, SPI and UART serial bus and CAN/LIN bus, which is often used by automotive communications.

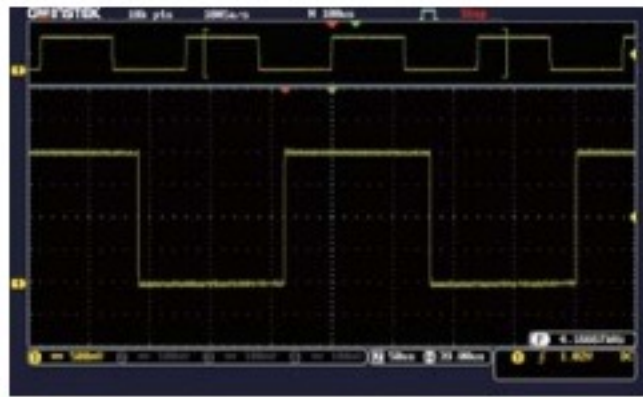
D. 1M FFT MATHEMATICAL SAMPLING ANALYSIS MODE



The GDS-1000B Series oscilloscope, under the Fast Fourier Transform mathematical analysis mode, is equipped with the 1M memory depth retrieving mode. For the conventional digital oscilloscopes, the FFT mode often has only 1000 point retrieving length; therefore, they can not show the strength distribution of each spectrum quantity under the frequency domain mode. The GDS-1000B Series oscilloscope leads the industry to provide the display mode of 1M retrieving points, which can clearly show the detail of each spectrum quantity. On top of that, the 50,000 wfms/s waveform update rate augments the FFT

analysis mode to be fast and precise as if a real time spectrum analyzer is used. These features substantially elevate oscilloscope's signal processing capability for the frequency domain analysis. The diagram illustrates a 200 kHz carrier waveform to be modulated as a standard FM signal with 40 kHz and 5 kHz frequency deviation. Since the GDS-1000B Series is equipped with 1M memory depth, a 5 kHz frequency deviation interval can be clearly revealed that allows engineers to fully grasp the measurement details.

E. ZOOM IN/PLAY AND PAUSE FUNCTION



The GDS-1000B series provides engineers with partial waveform zoom in function to observe waveform in great details. The display screen can be split into two windows: the upper window shows waveform data log in a long period of time and the marked vicinity of the waveform needed to be zoomed in; the lower window shows the enlarged partial waveform. The function not only allows engineers to

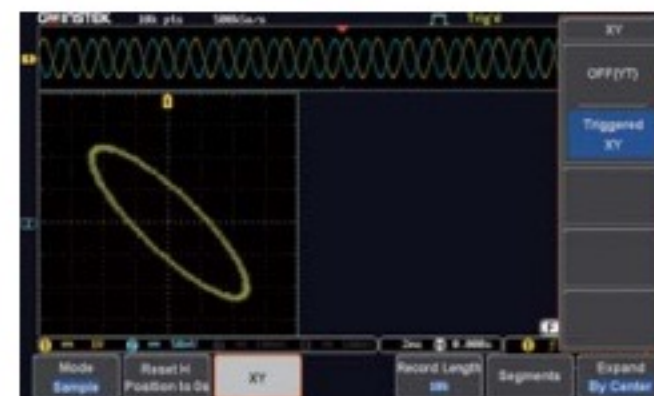
make a comparison but also grasp waveform details in the different time frame. Additionally, the GDS-1000B series also features the play/pause function. For the long waveform observation, the play/pause function facilitates engineers to rapidly skim through the whole section of DUT's waveforms as well as to swiftly identify waveform's problems.

F. DIVERSIFIED TRIGGER FUNCTIONS



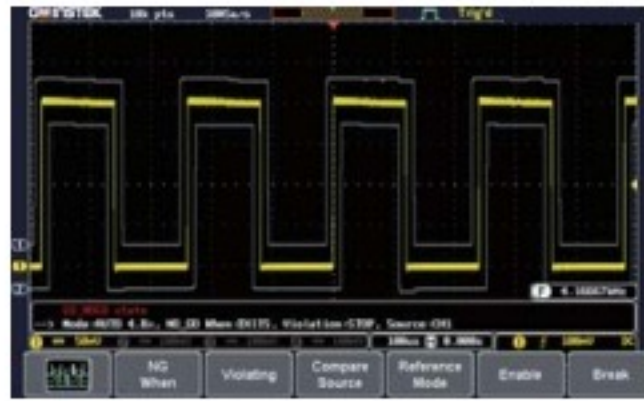
The GDS-1000B series oscilloscope is equipped with diversified trigger functions, including Edge Trigger, Delay Trigger, Pulse Width Trigger, and Video Trigger. Engineers, based upon different waveform measurements, can select different trigger functions to lock waveforms in order to identify the root cause of the complicated circuit designs to save development time and to accomplish tasks.

G. X-Y MODE DISPLAY



The GDS-1000B series oscilloscope provides the educational market with some powerful measurement functions. Among them, the X-Y mode display is an excellent example. Teachers and students can use X-Y mode display to conduct Lissajou diagram teaching, which allows users to easily understand the relation between waveforms and frequency while measuring sine waveforms with different frequency by dual channels. For engineers working for the industries, the X-Y mode display can be used to conduct yield rate tests for basic components' electric conduction and non conduction. Therefore, the X-Y mode display plays an important role in basic oscilloscopes.

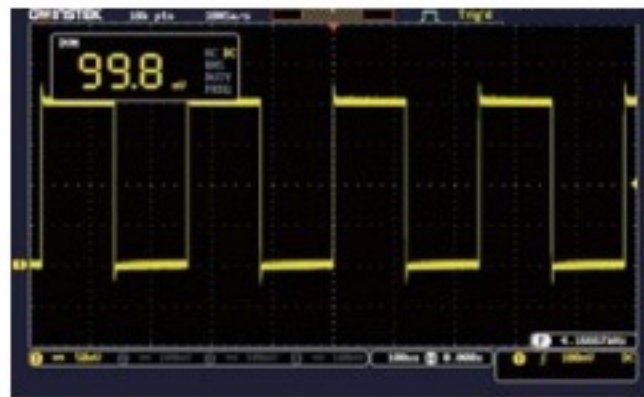
H. GO/NOGO FUNCTION



For the industries, the yield rate determination is very important to mass production. The GDS-1000B series oscilloscope provides the Go/NoGo analysis function to accelerate the yield rate analysis. From the right diagram, the Go/NoGo function provides a standard waveform template for examining DUT's waveforms. The function

can freely adjust the size of template. A defect message will be shown if the DUT's waveform is abnormal and touches the template. The function is not only very useful measurement tool for production lines but also a very convenient tool for engineers to observe waveforms in a long period of time.

I. DIGITAL VOLTAGE METER FUNCTION

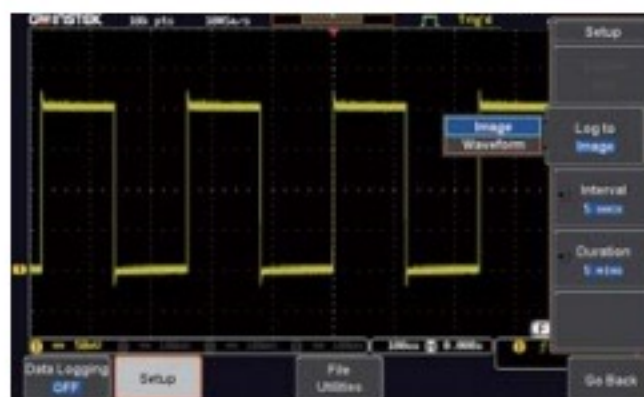


For electric circuit measurement and debugging, R&D engineers require oscilloscopes as well as basic voltage meters. The GDS-1000B series oscilloscope equips with a digital voltage meter with three-digit voltage value and five-digit frequency value. Engineers, by pressing the option key, can select the digital voltage meter function from the

menu to measure DC/AC voltage, duty cycle, and frequency. Engineers can not only measure waveforms but also monitor the electric parameters of each component on the circuit board. The function is a very convenient tool.

* Users need to download this application from GW Instek website

J. DATA LOG FUNCTION

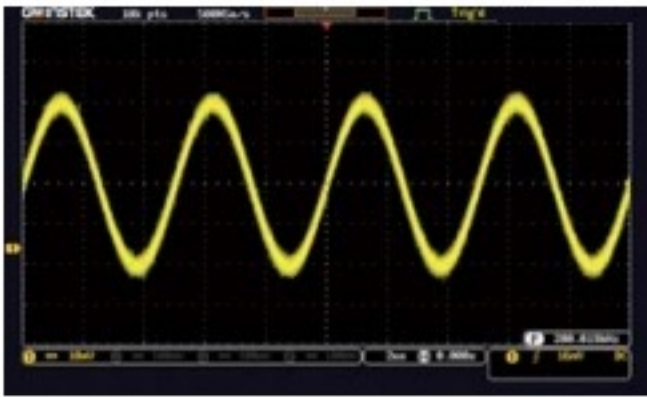


The GDS-1000B Series oscilloscope has the data log function option, which allows users to observe and record waveform changes in a long period of time to ensure product's reliability and stability. The data log function can set data storage time and interval based on the test requirements. Record time can be set from 5 minutes to 100 hours and the interval can be set as 5 seconds the shortest. Data log formats

include waveform and point data in CSV file. Data can be saved to USB, GDS-1000B or remote computer via LAN. It is very user-friendly and also an advanced measurement management tool.

* Users need to download this application from GW Instek website

K. DIGITAL FILTER FUNCTION



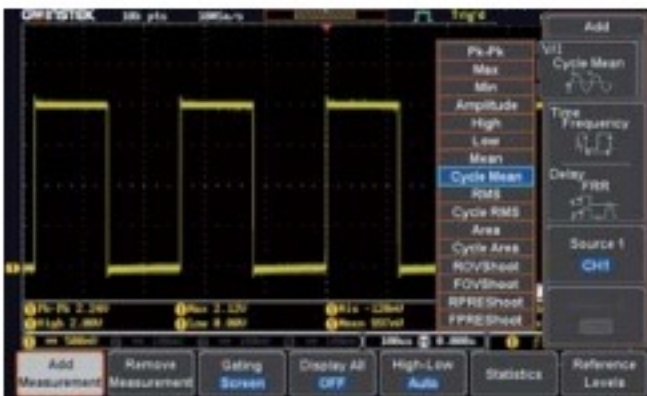
In electric circuit tests, engineers are often troubled by noise interference while measuring signals. The GDS-1000B series oscilloscope provides the digital filter function option, which can be set as high pass or low pass filter. The filter frequency can be



adjusted according to the requirements. The filter parameters of each channel can also be set. The tracking on function can be used to set same filter frequency for all channels.

* Users need to download this application from GW Instek website

L. 36 MEASUREMENT PARAMETER SELECTIONS

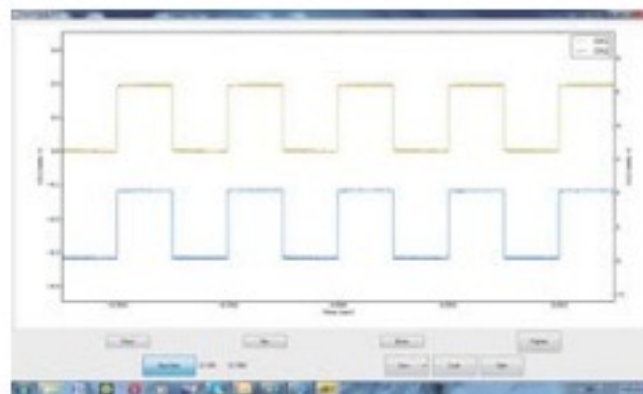


The GDS-1000B series oscilloscope is equipped with 36 different automatic measurement parameter functions. Users, after obtaining measured waveforms, can select different measurement parameters from Measure key according to different measurement requirements. The GDS-1000B Series shows simultaneously eight sets of different measurement parameters on the bottom of the



display screen. Users can also select to show all parameters if the preset eight sets are insufficient. Once the selection is made, all 36 measurement parameters will be shown on the center of the display screen. This is a very convenient measurement tool for students writing dissertations or engineers writing reports.

M. OPENWAVE CONNECTION SOFTWARE



The GDS-1000B Series oscilloscope, via the OpenWave connection software developed by GW Instek, can connect with the PC. Users, after installing USB driver under Windows interface, can connect GDS-1000B with the PC through USB cable and OpenWave software. Waveform interpretation and retrieval can be done from

the PC end. Data retrieval and storage can better facilitate users in processing analysis. OpenWave connection software is indeed a very powerful tool for engineers to compile reports or to integrate systems.

Oscilloscope Education And Training Kit



GDB-03

GDB-03

OSCILLOSCOPES



The GDB-03 training kit allows you to learn both the basic and the advanced functions of the GDS-3000 Series, GDS-2000A Series/GDS-2000E Series/MSO-2000 Series and GDS-1000B Series Digital Storage Oscilloscope (DSO). Following the training procedures of this training kit, you will quickly understand the basic operations of a DSO, and the unique features, which represents a typical hi-tech DSO today.

The training kit is a signal generator board capable of producing waveforms, which contain various real-life scenarios you might encounter. With the GDB-03 training kit and the included curriculums, you are able to acquire adequate knowledge in using a DSO with advanced features.

SPECIFICATIONS	
SIGNAL OUTPUT	
The GDB-03 provides 9 basic and 19 advanced oscilloscope training signals	
BASIC OSCILLOSCOPE TRAINING	
Lab 1	Connect and view a waveform
Lab 2	Compensate the probe (1kHz square wave)
Lab 3	Adjust waveform scale and position (square wave)
Lab 4	Measure the waveform by manual (square wave ; frequency counter, cursor measure)
Lab 5	Automatic measurement (GDB-03 including noise function ; auto measure, cursor getting measure)
Lab 6	VPO (VPO signal, color, gray mode)
Lab 7	Autoset function (Fit screen, AC priority)
Lab 8	Automatic range
Lab 9	Save data using hardcopy function
ADVANCE OSCILLOSCOPE TRAINING	
Lab 1	Automatic measurement (gating measurement)
Lab 2	Using peak detect mode
Lab 3	Low speed signal measurement
Lab 4	Noisy signal measurement
Lab 5	Using zoom timebase function
Lab 6	Transient signal measurement
Lab 7	Lissajous waveform & phase measurement
Lab 8	Runt trigger
Lab 9	Video trigger
Lab 10	Rise & Fall trigger
Lab 11	Pulse width trigger
Lab 12	Hold off function
Lab 13	Split window 1
Lab 14	Split window 2
Lab 15	UART signal
Lab 16	I ² C signal
Lab 17	SPI signal
Lab 18	CAN signal
Lab 19	LIN signal
POWER SUPPLY	
5V DC, USB or auxiliary power input	

ORDERING INFORMATION

GDB-03 Oscilloscope Education And Training Kit

ACCESSORIES :

CD x 1

Signal demo board with instructions

GTL-246 USB 2.0 A-B Type cable

ACCESSORIES

MODEL	DESCRIPTION	APPLICABLE DEVICE
DS2-08LA	8-Channel Logic Analyzer, Includes 8-channel Logic Analyzer Card (GLA-08) and 8 channel Logic Analyser Probe (GTL-08LA)	GDS-2000A Series
DS2-16LA	16-Channel Logic Analyzer, Includes 16-channel Logic Analyzer Card (GLA-16) and 16 channel Logic Analyser Probe (GTL-16LA)	GDS-2000A Series
DS2-FGN	DDS Function Generator, 5MHz, Sine/Square/Triangle/Pulse Function	GDS-2000A Series
DS2-GPIB	GPIB Interface	GDS-2000A Series
DS3A-GPIB	GPIB Interface	GDS-3000A Series
DS2-LAN	Ethernet & SVGA Output	GDS-2000A Series
DS3A-PWR	13 sets of Power Analysis Measurements	GDS-3000A Series
DS3A-GPIB	GPIB Interface	GDS-3000A Series
DS3A-16LA	16 Channel Logic Analyzer	GDS-3000A Series
DS3-PWR	Power Analysis Software: Power quality/Harmonic/Ripple/In-rush Current Measurement	GDS-3000 Series
DS3-SBD	Serial Bus Analysis Software I2C/SPI/UART (for 4 channel model only)	GDS-3000 Series
GAK-003	Adaptor, 50Ω Termination, BNC(P/M)	GDS-2000A Series, MDO-2000A Series, MDO-2000E Series, MSO-2000E Series, GDS-2000E Series, GDS-1000B Series, GSP-Series
GAP-001	AC-DC Adaptor	GDS-300/200 Series
GCL-001	Vertical Calibration Cable	GDS-300/200 Series
GCP-1030	Current Probe, DC ~ 100MHz, 30Arms	GDS-3000A Series, GDS-3000 Series, MSO-2000E Series, MDO-2000A Series, MDO-2000E Series, GDS-2000A Series, GDS-2000E Series, GDS-1000B Series
GCP-206P	Current Probe - Power Supply, 2 Channel Power Supply for GCP-530/1030	GDS-3000A Series, GDS-3000 Series, MSO-2000E Series, MDO-2000A Series, MDO-2000E Series, GDS-2000A Series, GDS-2000E Series, GDS-1000B Series
GCP-300	300kHz/200A Current probe	GDS-3000A Series, GDS-3000 Series, GDS-2000A Series, MDO-2000A Series, MDO-2000 Series, MSO-2000E Series, GDS-2000E Series, GDS-1000B Series
GCP-425P	Current Probe - Power Supply, 4 Channel Power Supply for GCP-530/1030	GDS-3000 Series, MSO-2000E Series, MDO-2000A Series, MDO-2000E Series, GDS-2000A Series, GDS-2000E Series, GDS-1000B Series
GCP-500	500kHz/150A Current probe	GDS-3000A Series, GDS-3000 Series, GDS-2000A Series, MDO-2000A Series, MDO-2000 Series, MSO-2000E Series, GDS-2000E Series, GDS-1000B Series
GCP-530	Current Probe, DC ~ 50MHz, 30Arms	GDS-3000A Series, GDS-3000 Series, MSO-2000E Series, MDO-2000A Series, MDO-2000E Series, GDS-2000A Series, GDS-2000E Series, GDS-1000B Series
GCP-1000	1MHz/70A Current probe	GDS-3000A Series, GDS-3000 Series, GDS-2000A Series, MDO-2000A Series, MDO-2000 Series, MSO-2000E Series, GDS-2000E Series, GDS-1000B Series
GCP-1030	100MHz/30A Current probe	GDS-3000A Series, GDS-3000 Series, GDS-2000A Series, MDO-2000A Series, MDO-2000 Series, MSO-2000E Series, GDS-2000E Series
GDB-03	Digital Storage Oscilloscope Demo Kit	GDS-3000A Series, GDS-3000 Series, MSO-2000E Series, MDO-2000A Series, MDO-2000E Series, GDS-2000A Series, GDS-2000E Series, GDS-1000B Series
GDP-025	25MHz High Voltage Differential Probe	GDS-3000A Series, GDS-3000 Series, MSO-2000E Series, MDO-2000A Series, MDO-2000E Series, GDS-2000A Series, GDS-2000E Series, GDS-1000B Series
GDP-040D	40MHz High Voltage Differential Probe	GDS-300/200 Series
GDP-050	50MHz High Voltage Differential Probe	GDS-3000A Series, GDS-3000 Series, MSO-2000E Series, MDO-2000A Series, MDO-2000E Series, GDS-2000A Series, GDS-2000E Series, GDS-1000B Series
GDP-100	100MHz High Voltage Differential Probe	GDS-3000A Series, GDS-3000 Series, MSO-2000E Series, MDO-2000A Series, MDO-2000E Series, GDS-2000A Series, GDS-2000E Series, GDS-1000B Series
GKT-100	Deskew Fixture	GDS-3000A Series, GDS-3000 Series
GLA-08	Logic Analyzer Card, 8-Channel Logic Analyzer Card for DS2-8LA	GDS-2000A Series
GLA-16	Logic Analyzer Card, 16-Channel Logic Analyzer Card for DS2-16LA	GDS-2000A Series
GPF-700	Protective Films	GDS-300/200 Series
GRA-411	Rack Mount Kit	GDS-3000 Series
GRA-420	Rack Mount Kit	GDS-2000A Series
GRA-426	Rack Mount Kit	MDO-2000A Series, MDO-2000E Series, MSO-2000E Series, GDS-2000E Series, GDS-1000B Series
GRA-443-E	Rack Mount Kit	GDS-3000A Series
GSC-008	Soft Carrying Case	GDS-3000 Series, MSO-2000E Series, MDO-2000A Series, MDO-2000E Series, GDS-2000A Series, GDS-2000E Series, GDS-1000B Series
GSC-010	Soft Carrying Case	GDS-300/200 Series
GSC-011	Soft Carrying Bag	GDS-300/200 Series
GTL-08LA	Logic Analyzer Probe, 8-Channel Logic Analyzer Probe for DS2-8LA	GDS-2000A Series
GTL-16E	16-Channel Logic Analyzer Probe	MSO-2000E Series
GTL-105A	Test Lead, Alligator to Banana Test Lead, Max. Current 3A, 1000mm	MDO-2000A Series, MDO-2000E Series
GTL-110	BNC Cable, BNC(P/M)-BNC(P/M), 1000mm	GDS-3000A Series, GDS-3000 Series, GDS-2000A Series, GDS-2000E Series, GDS-1000B Series
GTL-131	Test Clip, Suitable for GDP-040D	GDS-300/200 Series
GTL-16LA	Logic Analyzer Probe, 16-Channel Logic Analyzer Probe for DS2-16LA	GDS-2000A Series
GTL-205A	Temperature Probe Adaptor with Thermocouple (K type)	MDO-2000E Series
GTL-207A	Test Lead, Banana to Probe Test Lead, 800mm	GDS-300/200 Series, MDO-2000E Series.
GTL-232	RS-232C Cable, 9-pin, F-F Type, null modem, 2000mm	GDS-3000A Series, GDS-3000 Series, GDS-2000A Series,
GTL-246	USB 2.0 cable ,A-B type 4P, 1800mm	All DSO Series
GTL-248	GPIB Cable, Double Shielded, 2000mm	GDS-3000A Series, GDS-3000 Series, GDS-2000A Series
GTL-250	GPIB Cable, Double Shielded, 600mm	GDS-3000A Series, GDS-3000 Series, GDS-2000A Series
GTL-253	USB Cable, USB 2.0 A-mini B type, Approx. 1400mm	GDS-200/300 Series
GTP-033A	Oscilloscope Probe, 35MHz 1:1 Passive Probe	GDS-3000A Series, GDS-3000 Series, MSO-2000E Series, MDO-2000A Series, MDO-2000E Series, GDS-2000A Series, GDS-2000E Series, GDS-1000B Series
GTP-070B-4	Oscilloscope Probe, 70MHz (10:1/1:1) Switching Passive Probe, BNC(P/M)	MSO-2000E Series, MDO-2000A Series, MDO-2000E Series, GDS-2000A Series, GDS-2000E Series, GDS-1000B Series
GTP-100B-4	Oscilloscope Probe, 100MHz (10:1/1:1) Switching Passive Probe, BNC(P/M)	MSO-2000E Series, MDO-2000A Series, MDO-2000E Series, GDS-2000A Series, GDS-2000E Series, GDS-1000B Series
GTP-150A-2	Oscilloscope Probe, 150MHz (10:1/1:1) Switching Passive Probe, BNC(P/M)	GDS-2000A Series
GTP-150B-2	Oscilloscope Probe, 150MHz (10:1/1:1) Switching Passive Probe, BNC(P/M)	GDS-300/200 Series
GTP-151R	Oscilloscope Probe, 150MHz 10:1 Passive Probe, BNC(P/M)	GDS-3000 Series
GTP-200B-4	Oscilloscope Probe, 200MHz (10:1/1:1) Switching Passive Probe, BNC(P/M)	GDS-3000 Series, MSO-2000E Series, MDO-2000A Series, MDO-2000E Series, GDS-2000A Series, GDS-2000E Series, GDS-1000B Series
GTP-250A-2	Oscilloscope Probe, 250MHz (10:1/1:1) Switching Passive Probe, BNC(P/M)	GDS-2000A Series
GTP-250B-2	Oscilloscope Probe, 250MHz (10:1/1:1) Switching Passive Probe, BNC(P/M)	GDS-300/200 Series
GTP-251R	Oscilloscope Probe, 250MHz 10:1 Passive Probe, BNC(P/M)	GDS-3000 Series
GTP-300B-4	Oscilloscope Probe, 300MHz (10:1/1:1) Switching Passive Probe, BNC(P/M)	GDS-2000A Series, MDO-2000A Series
GTP-350A-2	Oscilloscope Probe, 350MHz (10:1/1:1) Switching Passive Probe, BNC(P/M)	GDS-2000A Series
GTP-351R	Oscilloscope Probe, 350MHz 10:1 Passive Probe, BNC(P/M)	GDS-3000A Series, GDS-3000 Series
GTP-352R	Oscilloscope Probe, 350MHz 20:1 Passive Probe, BNC(P/M)	GDS-3000A Series, GDS-3000 Series
GTP-501R	Oscilloscope Probe, 500MHz 10:1 Passive Probe, BNC(P/M)	GDS-3000A Series, GDS-3000 Series
GUG-001	GPIB-USB Adaptor, GPIB to USB Adaptor	GDS-3000 Series
CWS-001	Wrist Strap	GDS-300/200 Series

ACCESSORIES

GTP-070B-4

For: GDS-1052-U/1072-U/1072A-U,
GDS-2072A/2074A,
GDS-2072E/2074E



GTP-070B-4 is a x1, x10 attenuator modular probe. Designed for use with DC to 70MHz oscilloscope with input impedance of 1MΩ. The probe consists of following separate units;
1. BNC male connector and compensation box.
2. Probe body probe tip and R.C. assemblies.
3. Approx. 1.2M cable

Item	10:1	1:1
Bandwidth	DC~70MHz(±3dB)	DC~6MHz(±3dB)
Input R	~10MΩ	1MΩ (Oscilloscope)
Input C	14.5~17.5pF	85~115pF
Att. Ratio	1/10	1/1
Max. Input Voltage	≤600V DC+AC peak	≤200V DC+AC peak
Accessories	1.Pincher tip 2.Ground lead 3.Cable marker 4.Screw driver 5.IC tip 6.Adjusting tool 7.Earth tip	

GTP-100B-4

For: GDS-2102A/2104A,
GDS-2102E/2104E



The GTP-100B-4 is a passive high impedance oscilloscope probe designed and calibrated for use on instrument having an input impedance of 1MΩ shunted by 20pF. However, it may be compensated for use with instruments having an input capacitance of 5~30pF (10:1). The probe incorporates a two position slide switch in the head which selects attenuation of x1, x10 position.

Item	10:1	1:1
Bandwidth	DC~100MHz(±3dB)	DC~10MHz(±3dB)
Input R	~10MΩ	1MΩ (Oscilloscope)
Input C	14.5~17.5pF	85~115pF
Att. Ratio	1/10	1/1
Max. Input Voltage	≤600Vpk	≤200Vpk
Accessories	1.Channel identifier clip 2.Hook 3.Ground lead 4.Insulating tip 5.IC tip 6.Adjusting tool 7.Earth tip	

GTP-150A-2

For: GDS-2102A/2104A



The GTP-150A-2 is a passive high impedance oscilloscope probe designed and calibrated for use on instrument having an input impedance of 1MΩ shunted by 56pF. However, it may be compensated for use with instruments having an input capacitance of 10~30pF. The probe incorporates a two position slide switch in the head which selects attenuation of x1, x10 position.

Item	10:1	1:1
Bandwidth	DC~150MHz(±3dB)	DC~6MHz(±3dB)
Input R	~10MΩ	1MΩ (Oscilloscope)
Input C	13pF	56pF
Att. Ratio	1/10	1/1
Max. Input Voltage	500V CAT I, 300V CAT II (DC + peak AC)	300V CAT I, 150V CAT II (DC + peak AC)
Accessories	1.Channel identifier clip 2.hook 3.Ground lead 4.Insulating tip 5.IC tip 6.Adjusting tool 7.Earth tip	

GTP-150B-2

For: GDS-300/200 Series



The GTP-150B-2 is a passive high impedance oscilloscope probe designed and calibrated for use on instrument having an input impedance of 1MΩ shunted by 20pF. However, it may be compensated for use with instruments having an input capacitance of 10~30pF. The probe incorporates a two position slide switch in the head which selects attenuation of x1, x10 position.

Item	10:1	1:1
Bandwidth	DC~150MHz(±3dB)	DC~6MHz(±3dB)
Input R	~10MΩ	1MΩ (Oscilloscope)
Input C	13pF	65pF
Att. Ratio	1/10	1/1
Max. Input Voltage	500V CAT I, 400CAT II	150V CAT I, 150V CAT II
Accessories	1.Channel identifier clip 2.Hook 3.Ground lead 4.Insulating tip 5.IC tip 6.Adjusting tool 7.Earth tip	
Compensatim Range	—	10~30pF

GTP-200B-4

For: GDS-Series



The GTP-200B-4 is a passive high impedance oscilloscope probe designed and calibrated for use on instrument having an input impedance of 1MΩ shunted by 20pF. However, it may be compensated for use with instruments having an input capacitance of 5~30pF. The probe incorporates a two position slide switch in the head which selects attenuation of x1, x10 position.

Item	10:1	1:1
Bandwidth	DC~200MHz(±3dB)	DC~10MHz(±3dB)
Input R	~10MΩ	1MΩ (Oscilloscope)
Input C	10.5~17.5pF	65~105pF
Att. Ratio	1/10	1/1
Max. Input Voltage	600V peak	200V peak
Accessories	1.Channel identifier clip 2.hook 3.Ground lead 4.Insulating tip 5.IC tip 6.Adjusting tool 7.Earth tip	
Compensation Range	5~30pF	—

GTP-250A-2

For: GDS-2202A/2204A



The GTP-250A-2 is a passive high impedance oscilloscope probe designed and calibrated for use on instrument having an input impedance of 1MΩ shunted by 20pF. However, it may be compensated for use with instruments having an input capacitance of 10~35pF. Connect this sentence to the end of the previous sentence.

Item	10:1	1:1
Bandwidth	DC~250MHz(±3dB)	DC~6MHz(±3dB)
Input R	~10MΩ	1MΩ (Oscilloscope)
Input C	~17pF	~47pF
Att. Ratio	1/10	1/1
Max. Input Voltage	500V CAT I, 300CAT II	300V CAT I, 150V CAT II
Accessories	1.Channel identifier clip 2.Hook 3.Ground lead 4.Insulating tip 5.IC tip 6.Adjusting tool 7.Earth tip	

Ordering Guide

If an accessory is ordered separately from the main product, please indicate the nomenclature of the accessory when placing order.

Example : GSC-008 Soft Carrying Case for GDS-2000E Series

If an accessory is ordered along with the main product, please indicate the option number of the accessory when placing order.

Example : GDS-3502 500MHz, 2-Channel, Visual Persistence DSO , GSC-008 Soft Carrying Case

GTP-151R

For : GDS-3000 Series

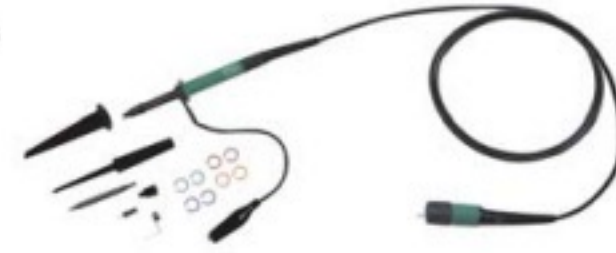


The GTP-151R is compatible with readout function oscilloscopes that automatically detect and display the attenuation factor of the probe.

Item	10:1
Bandwidth	DC~150MHz(±3dB)
Input R	~10MΩ
Input C	~12pF
Att. Ratio	1/10
Max. Input Voltage	< 500 Vpk
Accessories	1.Channel identifier clip 2.Sprung hook 3.Ground lead 4.Insulating tip 5.IC tip 6.Adjusting tool 7.Measuring tip 8. Sprung earth tip

GTP-251R

For: GDS-3000 Series

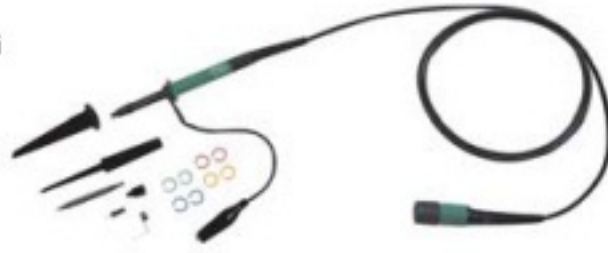


The GTP-251R is compatible with readout function oscilloscopes that automatically detect and display the attenuation factor of the probe.

Item	10:1
Bandwidth	DC~250MHz(±3dB)
Input R	~10MΩ
Input C	~12pF
Att. Ratio	1/10
Max. Input Voltage	DC 500V CAT I, 300V CAT II
Accessories	1.Channel identifier clip 2.Sprung hook 3.Ground lead 4.Insulating tip 5.IC tip 6.Adjusting tool 7.Measuring tip 8. Sprung earth tip

GTP-250B-2

For: GDS-300/200 Seri



The GTP-250B-2 is a passive high impedance oscilloscope probe designed and calibrated for use on instrument having an input impedance of 1MΩ shunted by 20pF. However, it may be compensated for use with instruments having an input capacitance of 10~35pF. Connect this sentence to the end of the previous sentence.

Item	10:1	1:1
Bandwidth	DC~250MHz(±3dB)	DC~6MHz(±3dB)
Input R	~10MΩ	1MΩ (Oscilloscope)
Input C	~13pF	~65pF
Att. Ratio	1/10	1/1
Max. Input Voltage	500V CAT I, 400V CAT II	150V CAT I, 150V CAT II
Accessories	1.Channel identifier clip 2.Hook 3.Ground lead 4.Insulating tip 5.IC tip 6.Adjusting tool 7.Earth tip	

GTP-300B-4

For: MDO-2000A Series



The GTP-300B-4 is a passive high impedance oscilloscope probe designed and calibrated for use on instrument having an input impedance of 1MΩ shunted by 20pF. However, it may be compensated for use with instruments having an input capacitance of 10~35pF. The probe incorporates a two position slide switch in the head which selects attenuation of x1, x10 position.

Item	10:1	1:1
Bandwidth	DC~300MHz(±3dB)	DC~10MHz(±3dB)
Input R	~10MΩ	1MΩ (Oscilloscope)
Input C	10.5~17.5pF	65~105pF
Att. Ratio	1/10	1/1
Max. Input Voltage	600V DC+AC pk	200V DC+AC pk
Accessories	1.Channel identifier clip 2.Hook 3.Ground lead 4.Insulating tip 5.IC tip 6.Adjusting tool 7.Earth tip	

GTP-351R/352R

For: GDS-3000A Series



Both GTP-351R and GTP-352R are passive high impedance oscilloscope probes designed and calibrated for use on instrument. GTP-351R has an input impedance of 1 MΩ shunted by 20pF while GTP-352R has an input impedance of 1 MΩ shunted by 15pF. However, GTP-351R may be compensated for use with instruments having an input capacitance of 10~35pF while GTP-352R has an input impedance of 10~30pF.

	GTP-351R	GTP-352R
Item	10:1	20:1
Bandwidth	DC~350MHz	DC~350MHz
Input R	~10MΩ	~10MΩ
Input C	~12pF	~7pF
Att. Ratio	1/10	1/20
Max. Input Voltage	500V CAT I, 300V CAT II	1kV CAT II
Accessories	1.Channel identifier clip 2.Sprung hook 3.Ground lead 4.Insulating tip 5.IC tip 6.Adjusting tool 7.Measuring tip 8. Sprung earth tip	

GTP-350A-2

For: GDS-2302A/2304A



The GTP-350A-2 is a passive high impedance oscilloscope probe designed and calibrated for use on instrument having an input impedance of 1MΩ shunted by 15pF. However, it may be compensated for use with instruments having an input capacitance of 10~30pF. Connect this sentence to the end of the previous sentence.

Item	10:1	1:1
Bandwidth	DC~350MHz	DC~6MHz
Input R	~10MΩ	~1MΩ
Input C	~13pF	~46pF
Att. Ratio	1/10	1/1
Max. Input Voltage	500V CAT I, 300V CAT II	300V CAT I, 150V CAT II
Accessories	1.Channel identifier clip 2.Sprung hook 3.Ground lead 4.Insulating tip 5.IC tip 6.Adjusting tool 7.Measuring tip 8. Sprung earth tip	

GKT-100 Deskew Fixture

The GKT-100 deskew fixture is used to compensate for the propagation delay between a passive voltage probe and current probe. It is used with the GDS-3000 Series, Required tools.

- 1.GDS-3000 x 1 or GDS-3000A x 1
- 2.GKT-100 x 1
- 3.USB type A-B cable x1 -used for deskew fixture
- 4.Standard passive probe x1
- 5.Current probe x1 (GCP-530 or GCP-1030)



ACCESSORIES

GTP-501R

For: GDS-3000A Series
GDS-3000 Series



The GTP-501R is a passive high impedance oscilloscope probe designed and calibrated for use on instrument having an input impedance of $1M\Omega$ shunted by 13pF. However, it may be compensated for use with instruments having an input capacitance of 8~20pF. Connect this sentence to the end of the previous sentence.

Item	10:1
Bandwidth	DC~500MHz
Input R	$\sim 10M\Omega$
Input C	$\sim 11.5pF$
Att. Ratio	1/10
Max. Input Voltage	500V CAT I, 300V CAT II
Accessories	1.Channel identifier clip 2.Sprung hook 3.Ground lead 4.Insulating tip 5.IC tip 6.Adjusting tool 7.Measuring tip 8. Sprung earth tip

GTP-033A

For: GDS-3000 Series



GTP-033A is a x 1, attenuator modular probe. Designed for use with DC to 35MHz oscilloscope with input impedance of $1M\Omega$ The probe consists of following separate units;
1. BNC male connector and compensation box.
2. Approx. 1.2M cable

Item	1:1
Bandwidth	DC~35MHz($\pm 3dB$)
Input R	$1M\Omega$ (Oscilloscope)
Input C	$\sim 83pF$
Att. Ratio	1/1
Max. Input Voltage	<300 CAT I
Accessories	1.Channel Identifier Clip 2.Sprung Hook 3.Ground Lead 4.Insulating Tip 5. IC Tip

GTL-101



GTL-110



GTL-207A



GTL-232



GTL-246



GTL-248



GTL-250



GTL-253

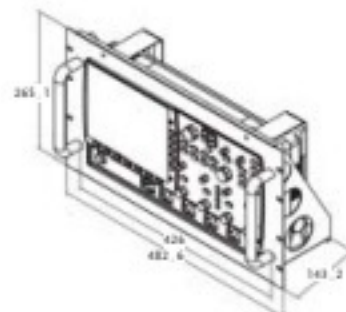


GTL-205A



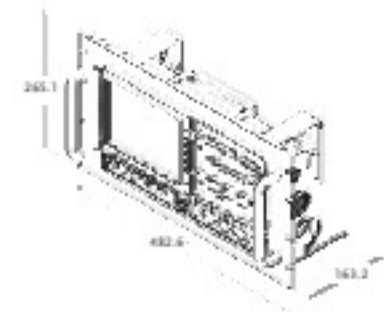
GRA-411 Rack Mount Kit

For : GDS-3000 Series



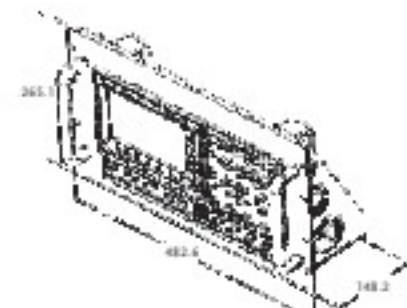
GRA-420 Rack Mount Kit

For : GDS-2000A Series



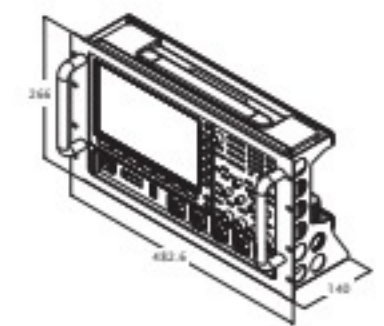
GRA-426 Rack Mount Kit

For : MDO-2000A Series, MDO-2000E Series, MSO-2000E Series, GDS-2000E Series, GDS-1000B Series



GRA-443 Rack Mount Kit

For : GDS-3000A Series



ACCESSORIES

Current Probe and Differential Probe Selections

Dual-channel Differential Probe



GCP-300/500/1000



GCP-530/1030, GCP-206P/425P



GDP-025



GDP-050/100



GDP-040D (for GDS-300/200 only)

In addition to the standard passive probes, the optional current or differential probes can be used to perform additional tests or power analysis.

The differential probes come in three bandwidths: 25MHz, 50MHz and 100MHz. The current probes come in a broad variety of bandwidth and current ranges (ranging from 50MHz/30A, 100MHz/30A, 300kHz/200A, 500kHz/150A, 1MHz/70A), to cover any number of power supply testing applications.

* The GCP-530/1030 must be used in conjunction with the GCP-206P/425P current probe power supply.

* The GCP-206P is capable of powering 2 units of GCP-530 or GCP-1030 and the GCP-425P is capable of powering 4 units.

CURRENT PROBE

	GCP-300	GCP-500	GCP-530	GCP-1000	GCP-1030
Probe Bandwidth	DC-300kHz	DC-500kHz	DC-50MHz	DC-1MHz	DC-100MHz
Rise Time	1.17µs(Typ.)	0.7µs(Typ.)	7ns or less	0.35µs (Typ.)	3.5ns or less
Maximum Continuous Input Range	200A(10mV/A) 20A(100mV/A)	150A(20mV/A) 15A(200mV/A)	30Apeak	7A(50mV/A) 70A(500mV/A)	30Apeak
Maximum Peak Current Value	DC : 200A AC : 140Arms	DC : 150A AC : 100Arms	50A	DC : 70A AC : 50Arms	50A
Output Voltage Rate	100mV/A ; 10mV/A	200mV/A; 20mV/A	0.1V/A	500mV/A; 50mV/A	0.1V/A
DC Amplitude Accuracy	±3% ±50 mA at 100 mV/A (50 mA – 20A peak range) ±4% ±50 mA at 10 mV/A (500 mA – 70A peak range) ±15% max at 10 mV/A (70A peak – 150A peak range) ±25% max at 10mV/A (150A peak – 200A peak range)	±3% ±30 mA at 200 mV/A (30 mA – 15 A peak range) ±4% ±300 mA at 20 mV/A (300 mA – 80 A peak range) ±15% max at 20 mV/A (80A peak – 150A peak range)	±1.0%rdg±1mV (0-30Arms/DC, 45-66Hz);±2.0%rdg (30Arms-50A peak /DC, 45-66Hz)	±3% ±20 mA at 500 mV/A (20 mA – 7A peak range) ±4% ±200 mA at 50 mV/A (200 mA – 50 A peak range) ±15% max at 50 mV/A (50A peak – 70A peak range)	±1.0%rdg±1mV (0-30Arms/DC, 45-66Hz);±2.0%rdg (30Arms-50A peak /DC, 45-66Hz)
Noise	-	-	2.5mArms or less	-	2.5mArms or less
Rate Supply Voltage	-	-	±12V± 0.5V	-	±12V± 0.5V
Maximum Rated Power	-	-	5.6VA	-	5.3VA
Maximum Rated Voltage	CAT III 300V/CAT II 600V	CAT III 600V	300V, CAT I	CAT III 600V	300V, CAT I

CURRENT PROBE POWER SUPPLY

	GCP-206P	GCP-425P
Compatible Current Probe	GCP-530/GCP-1030	GCP-530/GCP-1030
Number of Power Supply Connectors	2	4
Output Voltage	±12V± 0.5V	±12V± 0.5V
Rated Output Current	±600mA	±2.5A
Rated Supply Voltage(50/60Hz)	110V/120V, 220V/240V AC±10%	100V-240V AC±10%
Maximum Rated Power	20VA	170VA
Dimensions & Weight	73(W)x110(H)x186(D)mm ; Approx.1.1kg	80(W)x119(H)x200(D) mm ; Approx.1.1kg
Accessories	Power cord, fuse	Power cord, fuse

HIGH-VOLTAGE DIFFERENTIAL PROBE

	GDP-025	GDP-050	GDP-100
Probe Bandwidth	DC ~ 25MHz (attenuation x50, x200) ; DC ~ 15MHz(attenuation x20)	DC ~ 50MHz(attenuation x200, x500, x1000) ; DC ~ 25MHz(attenuation x100)	DC ~ 100MHz(attenuation x200, x500, x1000); DC ~ 50MHz(attenuation x100)
Attenuation	x20, x50, x200	x100, x200, x500, x1000	x100, x200, x500, x1000
Accuracy	±2%	±2%	±2%
Voltage Input Range (DC+AC peak to peak)	≤140Vp-p for x 20, ≤350Vp-p for x 50, ≤1400Vp-p for x 200	≤ 700Vp-p for x 100 ≤ 1400Vp-p for x 200 ≤ 3500Vp-p for x 500 ≤ 7000Vp-p for x 1000	≤ 700Vp-p for x 100 ≤ 1400Vp-p for x 200 ≤ 3500Vp-p for x 500 ≤ 7000Vp-p for x 1000
Permitted Max Input Voltage	Maximum differential voltage: Max voltage between input terminal and ground: 600Vrms	Maximum differential voltage: Max voltage between input terminal and ground: 6500Vrms	Maximum differential voltage: Max voltage between input terminal and ground: 6500Vrms
Input Impedance	Differential:4MΩ/1.2pF ; Between terminals and ground: 2MΩ/2.3pF	Differential:54MΩ/1.2pF ; Between terminals and ground:27MΩ/2.3pF	Differential: 54MΩ/1.2pF ; Between terminals and ground: 27MΩ/2.3pF
Output	≤ 7.0V	≤ 7.0V	≤ 7.0V
Output impedance	50Ω	50Ω	50Ω
Rise Time	14ns (x50, x200 attenuation) ; 23.4ns (x20 attenuation)	7ns (x200, x500, x1000 attenuation) ; 14ns (x100 attenuation)	3.5ns (x200, x500, x1000 attenuation) ; 7ns (x100 attenuation)
Rejection Rate on Common Mode(CMRR)	60Hz>80dB, 100Hz>60dB, 1MHz>50dB	60Hz>80dB, 100Hz>60dB, 1MHz>50dB	60Hz>80dB, 100Hz>60dB, 1MHz>50dB
Power Supply	External DC adapter	External DC adapter	External DC adapter
Consumption	Maximum 35mA (0.4Watt)	Maximum 35mA (0.4Watt)	Maximum 35mA (0.4Watt)

DUAL-CHANNEL DIFFERENTIAL PROBE

	GDP-040D
Channel	2
Bandwidth (-3dB)	DC ~ 40MHz (x200)
Attenuation	200 X
Voltage Input Range	600Vpp Max. CAT III
Output	≤ ±3V
Maximum Input Voltage to Earth	600Vpp for x200
Typical CMRR	80dB@60Hz ; 60dB@100Hz ; 50dB@1MHz
Input Impedance	Differential : 2MΩ//1.2pF, Ground 1MΩ//2.4pF
Output Impedance	50Ω
Rise Time	8.75ns for x200
Power Supply	5V DC from GDS-300/200 Series
Accuracy	±2%
Dimension	81.7(H) x 123.0(W) x 28.0(D) mm



SPECTRUM ANALYZERS

GW Instek's spectrum analyzer product line has three categories: application, basic and educational spectrum analyzers. These three categories are suitable for a wide range of test applications, ranging from R&D, service, maintenance, manufacturing, education and other RF-related fields.

The entire product line has five frequency ranges. The bandwidth ranges are 1.8GHz / 3GHz / 3.25GHz / 3.8GHz / 8.0GHz respectively to meet the measurement functions of various applications, including ASK/FSK/AM/FM demodulation analysis, ACPR/OCBW/CHPW, SEM measurement, TOI, Harmonic, CNR/CTB/CSO, frequency counter and USB, RS-232, Lan, MicroSD, GPIB are also provided for the communication interface.

There are two application spectrum analyzers, GSP-9330 and GSP-9300B. GSP-9330 has built-in unique EMI-specific functions and is equipped with special test accessories, allowing engineers to quickly and accurately identify EMI problems. In order to provide more stable measurement and further signal analysis, it has built-in Spectrogram and Topographic display modes. Through time accumulation and image stacking, the energy changes of the signal can be easily displayed. The built-in sequence function allows customers to create and execute the required test steps directly on the instrument without the need of a PC connection.

The GSP-8000 series is a basic spectrum analyzer, providing three bandwidth measurement ranges including 1.8GHz / 3.8GHz / 8.0GHz, and built-in basic measurement functions, such as AM/FM demodulation, channel power measurement, Time Spec display functions, etc., collocating with a 10.4-inch large display and easy-to-upgrade TG and EMI optional functions, which are suitable for general RF measurement applications.

GSP-730 is a spectrum analyzer developed for the education market and is equipped with a dedicated GRF1300/1300A communications module for teaching communications courses.

PRODUCTS

- 8.0 GHz Spectrum Analyzer
- 3.8 GHz Spectrum Analyzer
- 3.25 GHz Spectrum Analyzer
- 3.0 GHz Spectrum Analyzer
- 1.8 GHz Spectrum Analyzer
- RF Training System

SPECTRUM ANALYZER OVERVIEW

Spectrum analyzer is the most widely applied measuring instrument for wireless communications devices, components or systems. It measures and displays the frequency spectrum distribution of an RF signal. Spectrum analyzer can measure and read both frequency and amplitude information. Nowadays, digital communications dominate wireless communications systems. Despite the dominance of digital communications, measuring a frequency spectrum by a spectrum analyzer is still considered an important process.

To choose the right spectrum analyzer, several key specifications should be considered, which are explained below.

NOISE FLOOR

Noise floor is the bottom noise level when no signal is fed into spectrum analyzer. It represents the lowest signal level that spectrum analyzer can measure. The noise floor usually depends on Resolution Bandwidth (RBW).



Figure 2, Noise Floor

HARMONICS

Spectrum analyzer itself also generates harmonics from an input signal. Therefore if the harmonics generated by a spectrum analyzer are greater than the harmonics from an input signal, the harmonic measurement will result in an error as Figure 4 presents.

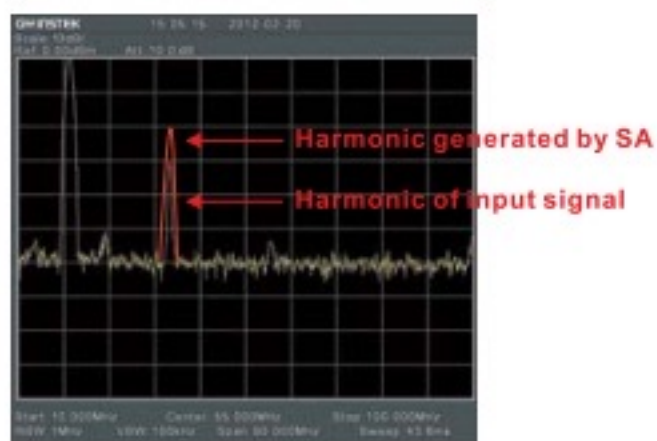


Figure 4, Harmonics

FREQUENCY RANGE

Selecting a spectrum analyzer for a measurement requires selecting its frequency range, like 1GHz, 2.4GHz, and so on. Therefore the frequency range is the first consideration for most applications.

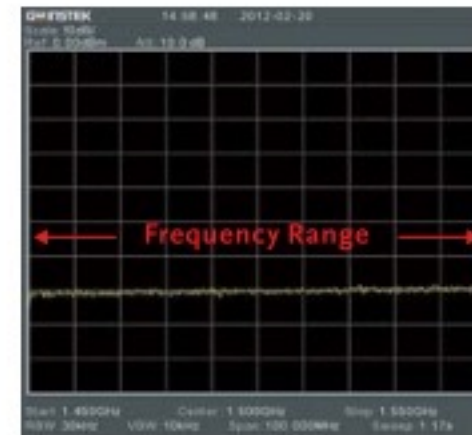


Figure 1, Frequency Range

SPURIOUS NOISE

Circuit noise or interference that looks like a signal occurs even without an input signal due to spurious noise of spectrum analyzer. Unlike noise floor, spurious noise presents itself like a signal with a specific frequency.

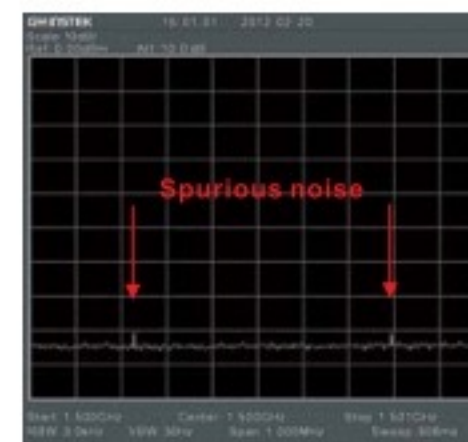


Figure 3, Spurious Noise

PHASE NOISE

Phase noise shows the purity of a signal. In Figure 5a, there are two signals with different levels of phase noise. The lower one is purer than the upper one, and therefore it has better phase noise performance.

a. Signals with different phase noises b. Definition of phase noise

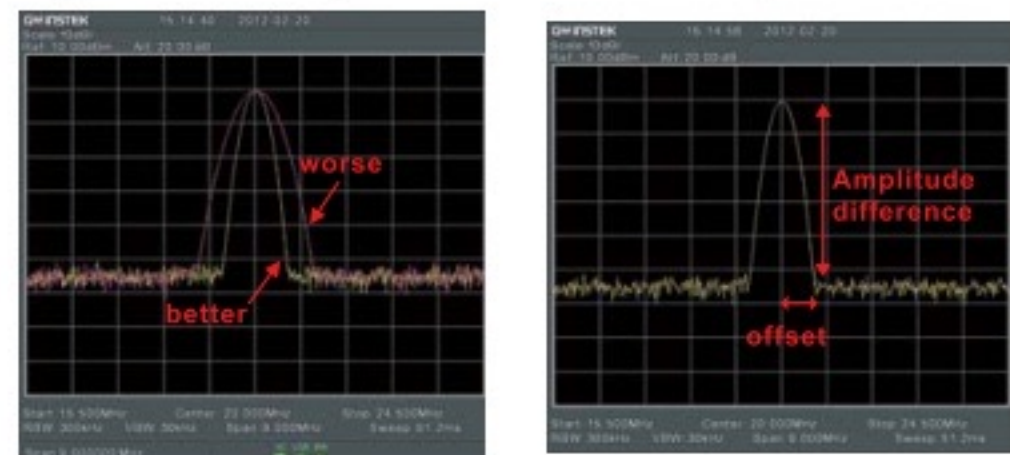


Figure 5 : Phase Noise

Figure 5b shows the definition of phase noise. It is usually defined as dBc with a frequency offset. For example, "-50dBc at 200kHz offset with 30kHz RBW".

SPECTRUM ANALYZERS

THIRD ORDER INTER-MODULATION

Third order inter-modulation occurs with a two-tone input signal, a signal with two frequencies or two signals with different frequencies that are fed into a spectrum analyzer at the same time. When the input signal frequencies are f_1 and f_2 , the harmonics are as follows.

Input	output	
f_1, f_2	fundamentals	f_1, f_2
	2nd order harmonics	$2f_1, 2f_2, f_1 \pm f_2,$
	3rd order harmonics	$3f_1, 3f_2, 2f_1 \pm f_2, 2f_2 \pm f_1$

The third order harmonics are the primary concerns in a system. If the frequencies of f_1 and f_2 are very close, then $2f_1-f_2$ and f_1-2f_2 will also be very close to the original signal. It will be difficult for the subsequent filters to filter out the harmonics accordingly. The concepts are illustrated in Figure 6.

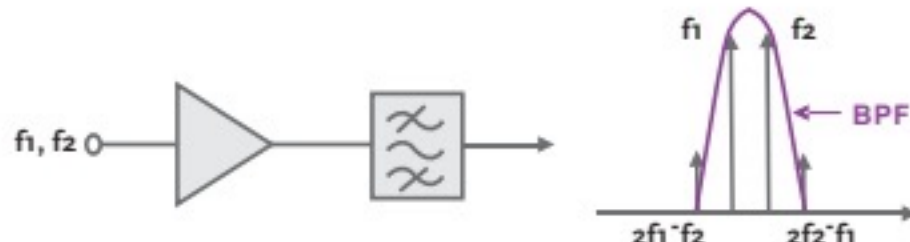


Figure 6: Third Order Harmonics of $2f_1-f_2$ and $2f_2-f_1$

An example is expressed in Table 1.

Input Frequency	Harmonics	1	2	3
100, 110		100, 110	...	300, 330, 310, 320, 90, 120
100, 101		100, 101	...	300, 303, 301, 302, 99, 102
100, 100.1		100, 100.1	...	300, 300.3, 300.1, 300.2, 99.9, 100.2

Table 1 : Two-Tone Signal Harmonics

In case the input signal frequencies are 100 and 100.1, their 3rd order harmonics will be 99.9 ($2f_1-f_2$) and 100.2 ($2f_2-f_1$). Using that example it is easy to see that the third order harmonics are close to the original signals, which will pose challenges for designing the subsequent filters. Therefore the inter-modulation distortion of spectrum analyzer itself might limit the ability of two-toned signal measurements.

DYNAMIC RANGE

Different companies use different definitions for dynamic range, but actually they all point to the same thing; the ability to accurately measure amplitude. Considering the specifications introduced above, the dynamic range might actually include more than one term. For example, if a two-tone signal is under measurement, the inter-modulation distortion needs to be considered. If the input signal frequency falls onto the spurious noise, it will limit the dynamic range. But generally speaking, dynamic range is defined as the level between noise floor and the maximum measurable level. Alternatively, sometimes the display range (80 or 100dB) is called dynamic range. It describes the range within the display without shifting the reference level. The entire concept is illustrated in Figure 7.

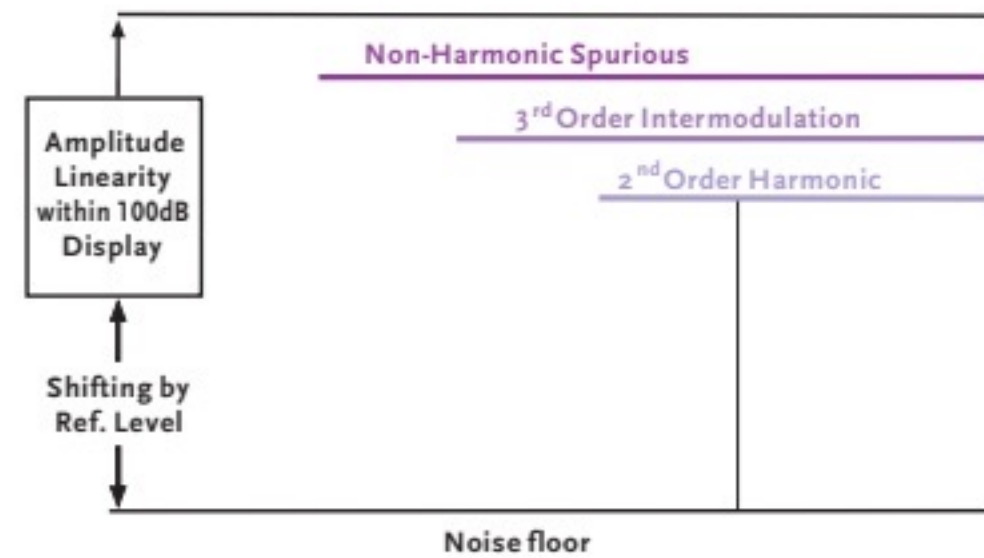
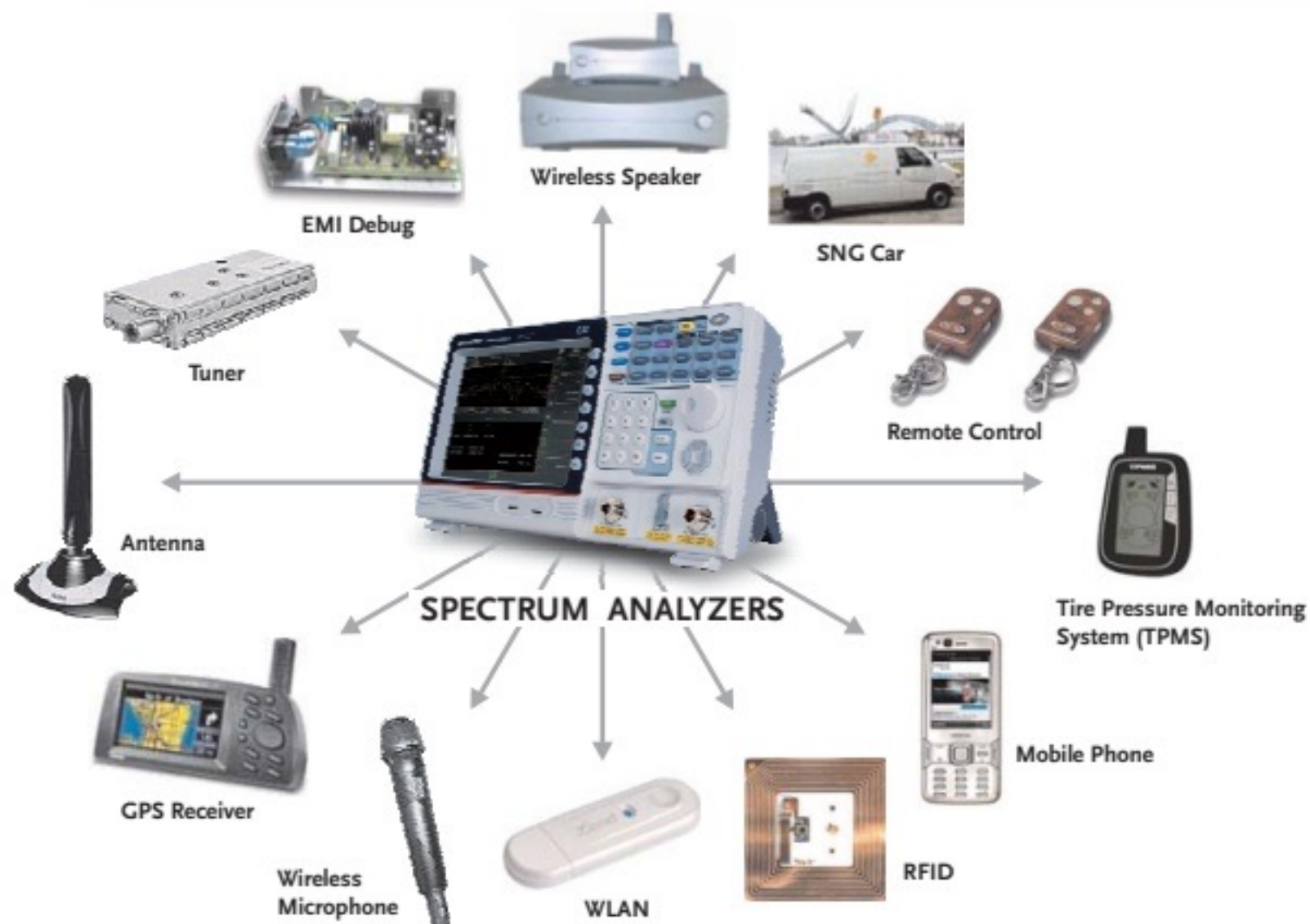


Figure 7 : Dynamic Range

APPLICATION



SPECTRUM ANALYZERS

MODEL	GSP-9330	GSP-9300B	GSP-8800/8380/8180	GSP-818	GSP-730
Frequency Range	9kHz ~ 3.25GHz	9kHz ~ 3GHz	9kHz ~ 8GHz / 3.8GHz / 1.8GHz	9kHz ~ 1.8GHz	150kHz ~ 3GHz
Frequency Stability	±1ppm max. (per year)	±1ppm max. (per year)	±1ppm max. (per year)	±1ppm max. (per year)	-
Over Temperature Frequency Stability	±0.025 ppm (0 ~ 50 °C)	±0.025 ppm (0 ~ 50 °C)	<1 ppm (15°C ~ 35 °C)	<2.5 ppm (15°C ~ 35 °C)	-
RBW Range	1Hz~1MHz in 1-3-10 sequence 200Hz, 9kHz, 120kHz, 1MHz for EMI Filter	1Hz~1MHz in 1-3-10 sequence 200Hz, 9kHz, 120kHz, 1MHz for EMI Filter	1Hz to 1MHz 1-3-5-10 steps EMI Filter(Opt): 200Hz, 9kHz, 120kHz, 1MHz	10Hz to 500Hz 1-10 steps, 1MHz, 3MHz EMI Filter (Opt): 200Hz, 9kHz, 120kHz, 1MHz	30kHz, 100kHz, 300kHz, 1MHz (30kHz Range is not adjustable)
VBW Range	1Hz~1MHz in 1-3-10 sequence	1Hz~1MHz in 1-3-10 sequence	10Hz~3MHz in 1-3-10 sequence	10Hz~3MHz in 1-3-10 sequence	-
Phase Noise	-88dBc/Hz @1GHz, 10kHz offset	-88dBc/Hz @1GHz, 10kHz offset	-104dBc/Hz @1GHz, 10kHz offset	-82dBc/Hz @1GHz, 10kHz offset	-85dBc/Hz @1GHz, 500kHz offset
Noise Floor	-139dBm @1GHz, 10Hz RBW, per-amp on	-139dBm @1GHz, 10Hz RBW, per-amp on	-150dBm @1GHz, 1Hz RBW, per-amp on	-140dBm @1GHz, 10Hz RBW, per-amp on	-100dBm @1GHz, 30kHz RBW
Overload Protection	+30dBm, ±50VDC	+30dBm, ±50VDC	+30dBm, ±50VDC	+30dBm, ±50VDC	+30dBm, ±25VDC
Reference Level Range	-110dBm ~ +30dBm	-110dBm ~ +30dBm	-80dBm ~ +30dBm	-80dBm ~ +30dBm	-40dBm ~ +20dBm
Input Attenuator	0 ~ 50dB, in 1 dB steps	0 ~ 50dB, in 1 dB steps	0 ~ 40dB, in 1 dB steps	0 ~ 40dB, in 1 dB steps	-
Pre-amplifier	Built-in 18dB internal	Built-in 18dB internal	Built-in 20dB internal	Built-in 20dB internal	-
Measurement Function	SEM, ACPR, OCBW, CHPW, N-dB BW, Phase Jitter, Demod. Analyzer, Harmonic, TOI, CNR, CSO, CTB, P1dB, TDP	SEM, ACPR, OCBW, CHPW, N-dB BW, Phase Jitter, Demod. Analyzer, Harmonic, TOI, CNR, CSO, CTB, P1dB, TDP	ACPR, OCBW, CHPW, N-dB BW, Demod. Analyzer	ACPR, OCBW, CHPW, N-dB BW, Demod. Analyzer	ACPR, OCBW, CHPW
Advantage Feature	Gated Sweep, Sequence, Correction Table, Split-Window, IF (886MHz) Output, Limit Line, RF Counter	Gated Sweep, Sequence, Correction Table, Split-Window, IF (886MHz) Output, Limit Line, RF Counter	Limit Line, RF Counter	Limit Line, RF Counter	Split-Window, Limit Line
Demodulator	AM, FM, ASK, FSK	AM, FM	AM, FM	AM, FM	-
Trace Number	4 Traces	4 Traces	5 Traces	5 Traces	3 Traces
Trace Detect Mode	Positive-peak, negative-peak, sample, normal, RMS(not Video), Quesi-Peak, Average	Positive-peak, negative-peak, sample, normal, RMS(not Video), Quesi-Peak, Average	Positive-peak, negative-peak, sample, normal, Volt Average, (Optional) Quesi-Peak, RMS Average	Positive-peak, negative-peak, sample, normal, RMS (not Video), (Optional) Quesi-Peak	-
Marker Number	6	6	8	5	5
Internal Memory	16MB nominal	16MB nominal	256MB nominal	256MB nominal	5 memories
Sweep Points	601	601	801	601	601
Display Modes	Spectrogram, Topographic, Spectrum	Spectrogram, Topographic, Spectrum	Time Spec, Demod Analyzer, Spectrum	Time Spec, Demod Analyzer, Spectrum	Spectrum mode
Tracking Generator	100kHz ~ 3.25GHz (Optional)	100kHz ~ 3GHz (Optional)	100kHz ~ 8GHz / 3.8GHz / 1.8GHz	100kHz ~ 1.8GHz (Optional)	-
Interface	USB Host/Device, RS-232, LAN(LXI), MicroSD, GPIB(Optional)	USB Host/Device, RS-232, LAN(LXI), MicroSD, GPIB(Optional)	USB Host/Device, LAN	USB Host/Device, LAN	USB Host/Device, RS-232
Screen Size	8.4 inches Color TFT LCD with SVGA (800 x 600)	8.4 inches Color TFT LCD with SVGA (800 x 600)	10.4 inches Color TFT LCD with XVGA (1024 x 768)	10.4 inches Color TFT LCD with SVGA (800 x 600)	5.6 inches Color TFT LCD with VGA (640 x 480)
Rack Adapter Panel	V, GRA-415	V, GRA-415	-	-	-
Power Operation	AC, Battery	AC, Battery	AC	AC	AC
Power Source	AC100 ~ 240V, 50 ~ 60Hz	AC100 ~ 240V, 50 ~ 60Hz	AC100 ~ 240V, 50 ~ 60Hz	AC100 ~ 240V, 50 ~ 60Hz	AC100 ~ 240V, 50 ~ 60Hz
Page	B5-12	B13-15	B16-18	B19-24	B19-24

RF & SPECTRUM ANALYZER TRAINING SYSTEM

MODEL	GRF-1300A	GRF-1300
Collocation Instrument	GSP-730	GSP-730
Necessary Option	USG-LF44	-
RF Cable	SMA Cable	SMA Cable
RF Connector	SMA Female	SMA Female
Interface	USB Device	USB Device
Power Source	AC100 ~ 240V, 50 ~ 60Hz	AC100 ~ 240V, 50 ~ 60Hz
Page	B20	B20

3.25GHz Spectrum Analyzer

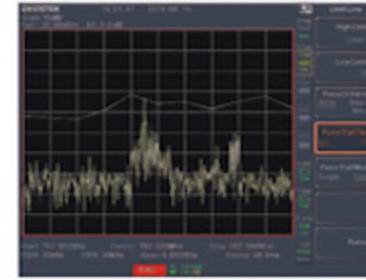
F. PRODUCTION LINE APPLICATIONS

Sequence Function



The sequence function allows users to edit a sequence formulated by a series of steps directly from the instrument. Pause and delay can be inserted in the sequence to observe the test results. There are five sets of sequence for selection. Each sequence allows editing of 20 steps. Different sequence can be interactive and support each other. This function provides automatic editing without using the PC that is very convenient for assembly lines in which execute routine test procedures.

Limit Line Function



The limit line function, based upon the preset criteria of passing the test, can be used to directly determine whether the DUT passes the test. Test result not only can be shown on the LCD screen, but also an alarm signal output indication from the rear panel which is done by connecting a speaker or light device to show the test result.

Shorten Warm-Up Time

GSP-9330 utilizes the patented design of high efficient heat dissipation and feedback temperature control. After the instrument is turned on, the internal instrument can rapidly maintain a stable temperature so as to provide accurate amplitude measurement and deliver the frequency measurement with 0.025 ppm frequency stability.

Wake-Up Clock

Users can set up automatic wake-up time for each day of the week. By so doing, the purpose of GSP-9330 pre wake-up can be achieved. Pre wake-up is ideal for the lower temperature environment to conduct tests in the preset time.

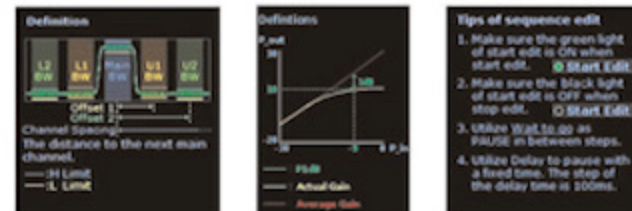
G. USER FRIENDLY DESIGN

Status Icons



Status Icons show the interface status, power status, alarm status and etc of GSP-9330. Users can easily understand the setting status and test results of the instrument.

Definition Help



The built-in Definition Help function allows users to immediately understand the parameters of Channel Power, OCBW, ACPR, SEM, Phase Jitter, N-dB Bandwidth & P1dB items so as to save time on reading user manual.

H. COMMUNICATIONS INTERFACE

Various Interface



Provide USB Host, RS-232, LXI C(LAN), and GPIB(option) instrument control interface. Supported programs comply with IEEE488.2.

USB Device/MicroSD



Provide USB Device, MicroSD interface for file storage. Quick Save function is also available for users to quickly retrieve display.



GSP-9330

SPECIFICATIONS		
DISPLAYED AVERAGE NOISE LEVEL (DANL)¹		
Preamp off	0 dB attenuation; RF Input is terminated with a 50Ω load. RBW 10 Hz; VBW 10 Hz; span 500 Hz; reference level = -60 dBm; trace average ≥40	
9 kHz ~ 100 kHz	< -93 dBm	Nominal
100 kHz ~ 1 MHz	< -90 dBm - 3 x (f/100 kHz) dB	Nominal
1 MHz ~ 10 MHz	< -122 dBm	Nominal
2.7 ~ 3.25 GHz	< -116 dBm	Nominal
Preamp on	0 dB attenuation; RF Input is terminated with a 50Ω load. RBW 10 Hz; VBW 10 Hz; span 500 Hz; reference level = -60 dBm; trace average ≥40	
100 kHz ~ 1 MHz	< -108 dBm - 3 x (f/100 kHz) dB	Nominal
1 MHz ~ 10 MHz	< -142 dBm	Nominal
10 MHz ~ 3.25 GHz	< -142 dBm + 3 x (f/1 GHz) dB	Nominal
<small>[1] DANL: spec. excludes spurious response.</small>		
LEVEL DISPLAY RANGE		
Scales	Log, Linear	
Units	dBm, dBmV, dBuV, V, W	
Marker Level Readout	0.01 dB	
Level Display Modes	0.01 % of reference level	Log scale
Number of Traces	Trace, Topographic, Spectrogram	Linear scale
Detector	Positive-peak, negative-peak, sample, normal, RMS(not Video), Quasi-Peak, Average	Single/Split Windows
Trace Functions	Clear & Write, Max/Min Hold, View, Blank, Average	Can be setup for each trace separately
ABSOLUTE AMPLITUDE ACCURACY		
Absolute Point	Center=160 MHz; RBW 10 kHz; VBW 1 kHz; span 100 kHz; log scale; 1 dB/div; peak detector; 23°C±5°C; Signal at Reference Level	
Preamp Off	± 0.5 dB	Ref Level 0 dBm; 10 dB RF attenuation
Preamp On	± 0.6 dB	Ref Level -30dBm; 0dB RF attenuation
FREQUENCY RESPONSE		
Preamp Off	Attenuation : 10 dB; Reference: 160 MHz; 20 ~ 30°C	
100 kHz ~ 2.0 GHz	± 0.5 dB	
2 GHz ~ 3.25 GHz	± 0.7 dB	
Preamp On	Attenuation: 0 dB; Reference: 160 MHz; 20 ~ 30°C	
1 MHz ~ 2 GHz	± 0.6 dB	
2 GHz ~ 3.25 GHz	± 0.8 dB	
ATTENUATION SWITCHING UNCERTAINTY		
Attenuator Setting	0 ~ 50 dB in 1 dB step	
Uncertainty	± 0.25 dB	Reference : 160 MHz, 10dB attenuation
RBW FILTER SWITCHING UNCERTAINTY		
1 Hz ~ 1 MHz	± 0.25 dB	Reference : 10 kHz RBW
LEVEL MEASUREMENT UNCERTAINTY		
Overall Amplitude Accuracy	± 1.5 dB	20 ~ 30°C; frequency > 1 MHz; Signal input 0 ~ -50 dBm; Reference level 0 ~ -50 dBm; Input attenuation 10 dB; RBW 1 kHz; VBW 1 kHz; after cal; Preamp Off Typical
± 0.5 dB		
SPIRIOUS RESPONSE		
Second Harmonic Intercept	+35 dBm +60 dBm	Preamp off; signal input -30dBm; 0 dB attenuation Typical; 10 MHz < f < 775 MHz Typical; 775 MHz < f < 1.625 GHz Preamp off; signal input -30dBm; 0 dB attenuation
Third-order Intercept	> 1dBm	300 MHz ~ 3.25 GHz Input signal level -30 dBm, Att. Mode, Att=0dB; 20 ~ 30°C Input terminated; 0 dB attenuation; Preamp off
Input Related Spurious	< -60 dBc	
Residual Response (Inherent)	< -90 dBm	

Rear Panel



GRA-415 Rack Adapter Panel

For : GSP-9330/9300B, Rack Mounting (19", 6U)



GKT-001 General Kit Set

Include :
ADP-002
ATN-100
CTL-303
CSC-002
For: GSP-Series



GKT-002 CATV Kit Set

Include :
ADP-001
ADP-101
GTL-304
CSC-003
For: GSP-Series



GKT-003 RLB Kit Set

Include :
GAK-001
GAK-002
CTL-302
CSC-004
For: GSP-Series



GKT-008 EMI Probe Kit Set

Include :
ADP-002
GTL-303
PR-01
PR-02
ANT-04
ANT-05
For: GSP-Series



3.25GHz Spectrum Analyzer

GSP-9330

SPECTRUM ANALYZERS & COMMUNICATION TESTERS

SPECIFICATIONS		
SWEEP		
SWEEP TIME		
Range	204 μ s – 1000 s 50 μ s – 1000 s	Span > 0 Hz Span = 0 Hz; Min resolution=10 μ s
Sweep Mode	Continuous; Single	
Trigger Source	Free run; Video; External	
Trigger Slope	Positive or negative edge	
RF PREAMPLIFIER		
Frequency Range	1 MHz – 3.25 GHz	
Gain	18 dB	Nominal (installed as standard)
FRONT PANEL INPUT/OUTPUT		
RF INPUT		
Connector Type	N-type female	
Impedance	50 Ω	Nominal
VSWR	<1.6 :1	300 kHz – 3.25 GHz ; Input attenuator \geq 10 dB
POWER FOR OPTION		
Connector Type	SMB male	
Voltage/Current	DC +7V/500 mA max	With short-circuit protection
USB HOST		
Connector Type	A plug	
Protocol	Version 2.0	Support Full/High/Low speed
MICRO SD SOCKET		
Protocol	SD 1.1	
Support Cards	Micro SD, Micro SDHC	Up to 32GB capacity
REAR PANEL INPUT/OUTPUT		
REFERENCE OUTPUT		
Connector Type	BNC female	
Output Frequency	10 MHz	Nominal
Output Amplitude	3.3V CMOS	
Output Impedance	50 Ω	
REFERENCE INPUT		
Connector Type	BNC female	
Input Reference Frequency	10 MHz	
Input Amplitude	-5 dBm – +10 dBm	
Frequency Lock Range	Within \pm 5 ppm of the input reference frequency	
ALARM OUTPUT		
Connector Type	BNC female	Open-collector
TRIGGER INPUT/GATED SWEEP INPUT		
Connector Type	BNC female	
Input Amplitude	3.3V CMOS	
Switch	Auto selection by function	
LAN TCP/IP INTERFACE		
Connector Type	RJ-45	
Base	10Base-T; 100Base-Tx; Auto-MDIX	
USB DEVICE		
Connector Type	B plug	
Protocol	Version 2.0	For remote control only; supports USB TMC Supports Full/High/Low speed
IF OUTPUT		
Connector Type	SMA female	
Impedance	50 Ω	Nominal
IF Frequency	886 MHz	Nominal
Output Level	-25 dBm	10 dB attenuation; RF input : 0 dBm @ 1 GHz
EARPHONE OUTPUT		
Connector Type	3.5mm stereo jack, wired for mono operation	
VIDEO OUTPUT		
Connector Type	DVI-I (integrated analog and digital), Single Link. Compatible with VGA or HDMI standard through adapter	
RS-232C INTERFACE		
Connector Type	D-sub 9-pin female	Tx , Rx , RTS , CTS
GPIB INTERFACE (OPTIONAL)		
Connector Type	IEEE-488 bus connector	
AC POWER INPUT		
Power Source	AC 100 V – 240 V, 50/60 Hz	Auto range selection
GENERAL		
Internal Data Storage	16 MB nominal	
Power Consumption	< 65 W	
Warm-up Time	< 45 minutes	
Temperature Range	+5 $^{\circ}$ C – + 45 $^{\circ}$ C -20 $^{\circ}$ C – + 70 $^{\circ}$ C	Operating Storage
Dimensions & Weight	350(W) x 210(H) x 100(D) mm, Approx. 4.5kg 13.8(W) x 8.3(H) x 3.9(D) inch, Approx. 9.9lb	Inc. all options (Basic + TG + GPIB + Battery)
Calibration Cycle	The recommended calibration cycle is one year; calibration services are available through GW Instek's authorized calibration services.	
TRACKING GENERATOR (OPTIONAL)⁵		
Frequency Range	100 kHz – 3.25 GHz	
Output Power	-50 dBm – 0 dBm in 0.5 dB steps	
Absolute Accuracy	\pm 0.5 dB	@160 MHz, -10 dBm, Source attenuation 10 dB, 20 – 30 $^{\circ}$ C
Output Flatness	Referenced – 160 MHz, -10 dBm 100 kHz – 2 GHz 2 GHz – 3.25 GHz	\pm 1.5 dB \pm 2 dB Referenced to -10 dBm Typical, output level = -10 dBm
Output Level Switching Uncertainty	\pm 0.8 dB	
Harmonics	< -30 dBc	
Reverse Power	+30 dBm max.	
Connector Type	N-type female	
Impedance	50 Ω	Nominal
Output VSWR	< 1.6:1	300 kHz – 3.25 GHz, source attenuation \geq 12 dB

[5] The minimum RBW filter is 10kHz when the TG output is ON.

Note : The specifications apply when the GSP-9330 is powered on for at least 45 minutes to warm-up to a temperature of 20 $^{\circ}$ C to 30 $^{\circ}$ C, unless specified otherwise.

ORDERING INFORMATION

GSP-9330 3.25 GHz Spectrum Analyzer

EMC Pretest Solution : **GKT-008** EMI Near Field Probe Set
GLN-5040A Line Impedance Stabilization Network
APS-7100E AC Power Source
GPL-5010 Transient Limiter

ACCESSORIES :

Power Cord, Certificate of Calibration, CD-ROM (with Quick Start Guide, User Manual, Programming Manual, SpectrumShot Software, SpectrumShot Guide & IVI Driver)

OPTION

GSP-93T1 Tracking Generator (Factory installed option)

Option 02 Battery Pack

GSP-93G1 GPIB Interface (Factory installed option)

OPTIONAL ACCESSORIES

GSC-009 Soft Carrying Case

GRA-415 Rack Adapter Panel

FREE DOWNLOAD

SpectrumShot PC Software for Windows System (available on GW Instek website)
 IVI Driver Supports LabVIEW/LabWindows/CVI Programming (available on NI website)

GLN-5040A LISN



GPL-5010 Transient Limiter

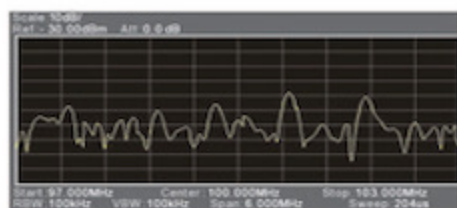


APS-7100E AC Power Source

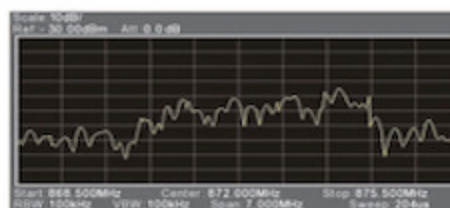


A. FAST SIGNAL SWEEP

FM Signal Monitoring



Taiwan Telecom Signals



For spectrum analyzer, speed is the most important specification. GSP-9330 provides sweep speed up to 204 μ s. Users, via high speed sweep time, can identify and analyze various fast or transient signals

such as frequency/amplitude modulation signals, Bluetooth frequency hopping signals, tuned oscillator or other interfering signals under ISM Band.

B. MODULATED SIGNAL ANALYSIS

2FSK Signal Analysis



2FSK

ASK/FSK Signal Demodulation & Analysis



FSK



ASK

AM/FM Signal Demodulation & Analysis



FM



AM

2FSK modulation, for its features of low design cost and low electricity consumption, is widely used by RF communications applications with low power and low data transmission speed characteristics. Nowadays, 2FSK modulation technology has been applied in various products and systems such as consumer electronics, automotive electronics, RFID, auto reading electricity meter, and industrial control devices, etc. 2FSK signal analysis measures parameters including carrier power, FSK frequency deviation, carrier frequency, and carrier frequency offset. Users can set the criterion in frequency deviation and carrier offset for fast test result determination.

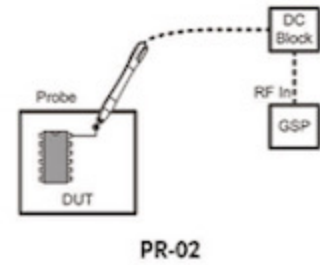
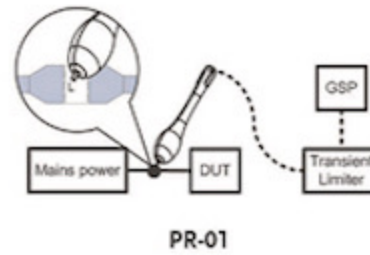
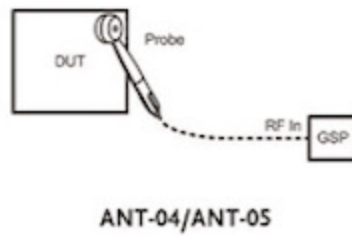
RFID and optical communications systems often use Amplitude Shift Keying (ASK). Applications such as wireless telephone, paging systems, and RFID, etc. utilize Frequency Shift Keying (FSK). ASK/FSK demodulation and

analysis measures parameters including ASK depth, frequency deviation, carrier power, carrier frequency offset, symbol, and waveform. Users can set ASK depth, frequency deviation, carrier power and carrier offset for Pass/Fail testing result. Data message is provided to determined preamble & sync function.

AM/FM Signal Analysis measures parameters including AM depth, frequency deviation, modulation rate, carrier power, carrier frequency offset and SINAD. Users can set the criterion in AM depth, frequency deviation, carrier power and carrier offset for fast test result determination. The GSP-9330 has a convenient AM/FM demodulation function to tune into AM or FM broadcast signals and listen to the demodulated signals.

3.25GHz Spectrum Analyzer

C. EMC PRETEST SOLUTION



GSP-9330 has the built-in EMI dedicated 200/9k/120k/1MHz filter, 20dB low noise amplifier and Quasi-Peak/Average detection mode to conduct radiation and conduction tests after collocating with the probe set.

GKT-008, the radiation test probe set, provides a complete near field test probe set to simplify the complex measurement procedures and to simulate 3m/10m far field tests from the labs. Using GKT-008 can greatly save engineers' debugging time and the money for going back and forth to the labs.

GKT-008 can collocate with the Tracking Generator function of GSP-9330 to conduct EMS tests.

For conduction tests, GSP-9330 can collocate with LISN and AC Power Source to conduct electromagnetic conduction tests. If users concern EUT's large voltage variation or complexity, applying a Transient Limiter will make test equipment safer.

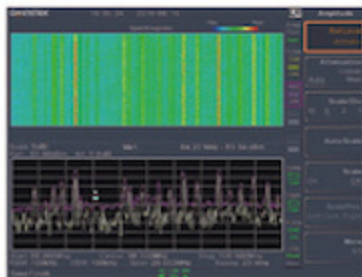
EMC Pretest Instruments Provided by GW Instek Are as Follows :

GSP-9330	Spectrum Analyzer	Built-in complete EMC pretest solution
GKT-008	EMI Near Field Probe Set	Provide probe set for near field signals, including, ANT-04/ANT-05 field sensor PR-01 AC high voltage probe PR-02 Source contact probe
GLN-5040A	LISN	LISN required by EMI conduction tests and it meets CISPR 16-1-2 regulations.
APS-7100E	AC Power Source	Different mains have different current leakages that will cause systems to have short circuit, AC Power Source Isolation transformer prevents short circuit by isolating current loop.
GPL-5010	Transient Limiter	Transient Limiter will make test equipment safer, if EUT has large voltage variation or complexity.

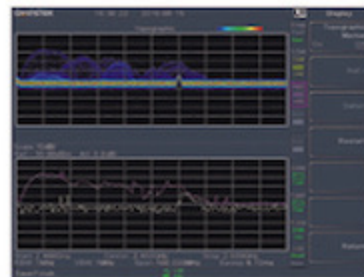
For more detailed information about EMC Pretest Solution, please visit "DETAILED EMC PRETEST SOLUTION" documents.

D. GRAPHIC PROCESSING OF SIGNAL MONITORING

Observe FM Signals by Spectrogram



Observe WiFi Signals by Topographic



Observe 4G LTE Signals by Split-Window Display



Spectrogram can simultaneously display power, frequency, and time. Frequency and power variation according to time changes can also be tracked. Especially, the intermittently appeared signals can be identified. Users, by using Spectrogram, can analyze the stability of signal versus time or identify the intermittently appeared interference signals in the communications system. Users can use two markers to find out the relation of power to frequency and time.

Topographic uses color shade to show the probability distribution of signal appearance. This function allows users to directly understand the

process of signal variation according to time changes that is beneficial to observe intermittent feeble signals or electromagnetic interference signals. Users can use two markers to find out the relation of power to frequency and percentage.

Split-Window allows two independent observations that are very convenient for monitoring two different frequency bandwidths.

Channel Power Measurement



ACPR

OCBW

Telecommunications and broadcasting service carriers will encounter distorted signals caused by adjacent channels' inter-modulation while transmitting modulated signals using communications channels. If the distorted signals are too large the communications quality of adjacent channels will be affected. The ACPR measurement can examine the leakage status that is conducive to identifying interference source.

The OCBW measurement can simultaneously display OCBW, channel power and PSD. OCBW's unit is shown by percentage. A measurement area containing bandwidth will be shown when OCBW is in use.

Spectrum Emission Mask

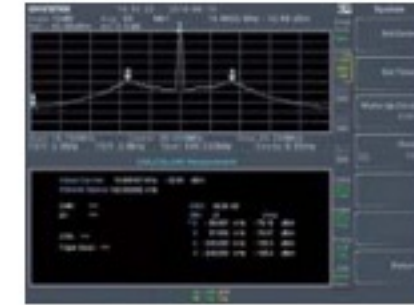


SEM

SEM measures out-of-channel emission which is defined by corresponding in-channel power. Users can set main channel's parameters, out-of-channel range, and limit line, etc.

GSP-9330 has the built-in SEM settings of 3 GPP, WLAN 802.11b/g/n, Wimax 802.16 and self-defined communications system. SEM supports the Pass/Fail test function and lists frequency range for surpassing each out-of-channel limit. An alarm signal will be triggered if any measurement results that are not matched with SEM.

CATV System Parameter Tests



CNR/CSO/CTB

The built-in CNR/CSO/CTB functions of GSP-9330 are ideal for measuring performance of CATV amplifier and system.

Note: General CATV is 75Ω. For GSP-9330, a 50 ~ 75 ohm adapter is needed.

TOI (Third Order Intercept)



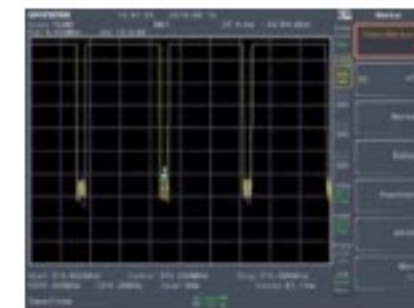
Users can measure the linearity of non-linear systems and components such as receiver, low-noise amplifier and mixer by TOI which automatically tests effective carrier and measures inter-modulation sidebands.

Harmonic



Harmonic can easily measure the amplitude of fundamental frequency and as high as ten orders of harmonic frequency. This function can also measure amplitude(dBc) which is the ratio of harmonic and corresponding fundamental carrier. Total harmonic distortion (THD) can also be calculated by this function. The best harmonic information can be obtained by adjusting RBW.

Time Domain Power



Users can go to zero span setting and open marker to observe burst signals when measuring burst signal in time domain is required.

Phase Jitter

The Phase Jitter function can rapidly measure phase noise produced by RF signal source's and oscillator's carrier deviation. This function can directly convert signal jitter to phase (rad) and time (ns).

Marker Noise

The marker noise function calculates the average noise level over a bandwidth of 1Hz, referenced from the marker position.

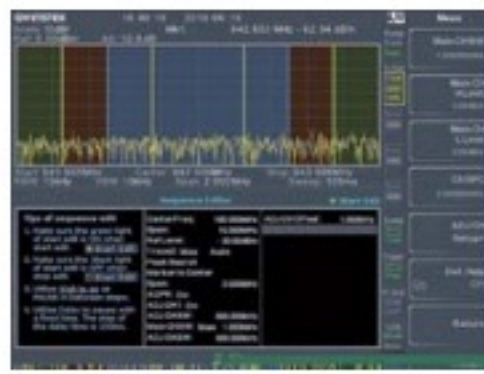
Gated Sweep

Radar or TDMA communications systems, via intermittently turning On/Off output power, control transmission signals. In order to monitor the power spectrum during the transmission process, the Gated Sweep function can initiate measurement only when signals appear. This function is ideal for measuring burst signals such as GSM or WLAN.

3.25GHz Spectrum Analyzer

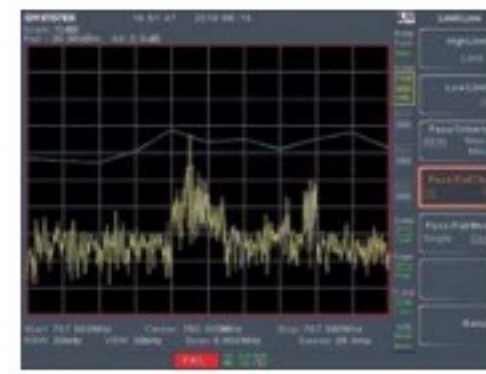
F. PRODUCTION LINE APPLICATIONS

Sequence Function



The sequence function allows users to edit a sequence formulated by a series of steps directly from the instrument. Pause and delay can be inserted in the sequence to observe the test results. There are five sets of sequence for selection. Each sequence allows editing of 20 steps. Different sequence can be interactive and support each other. This function provides automatic editing without using the PC that is very convenient for assembly lines in which execute routine test procedures.

Limit Line Function



The limit line function, based upon the preset criteria of passing the test, can be used to directly determine whether the DUT passes the test. Test result not only can be shown on the LCD screen, but also an alarm signal output indication from the rear panel which is done by connecting a speaker or light device to show the test result.

Shorten Warm-Up Time

GSP-9330 utilizes the patented design of high efficient heat dissipation and feedback temperature control. After the instrument is turned on, the internal instrument can rapidly maintain a stable temperature so as to provide accurate amplitude measurement and deliver the frequency measurement with 0.025 ppm frequency stability.

Wake-Up Clock

Users can set up automatic wake-up time for each day of the week. By so doing, the purpose of GSP-9330 pre wake-up can be achieved. Pre wake-up is ideal for the lower temperature environment to conduct tests in the preset time.

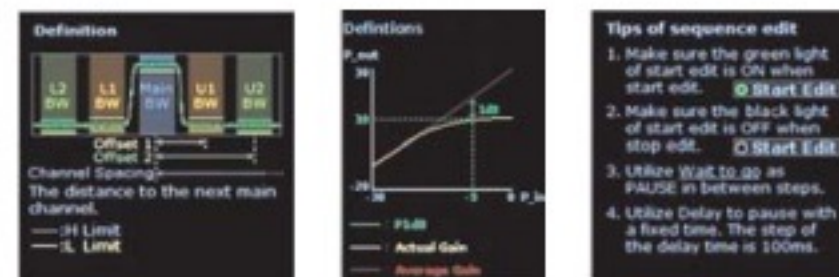
G. USER FRIENDLY DESIGN

Status Icons



Status Icons show the interface status, power status, alarm status and etc of GSP-9330. Users can easily understand the setting status and test results of the instrument.

Definition Help



The built-in Definition Help function allows users to immediately understand the parameters of Channel Power, OCBW, ACPR, SEM, Phase Jitter, N-dB Bandwidth & P1dB items so as to save time on reading user manual.

H. COMMUNICATIONS INTERFACE

Various Interface



Provide USB Host, RS-232, LXI C(LAN), and GPIB(option) instrument control interface. Supported programs comply with IEEE488.2.

File Storage and Video Output



DVI Interface



USB Device/MicroSD

Provide USB Device, MicroSD interface for file storage. Quick Save function is also available for users to quickly retrieve display. Support DVI with 800 x 600 resolutions.

I. SOFTWARE SUPPORT

PC Software - SpectrumShot



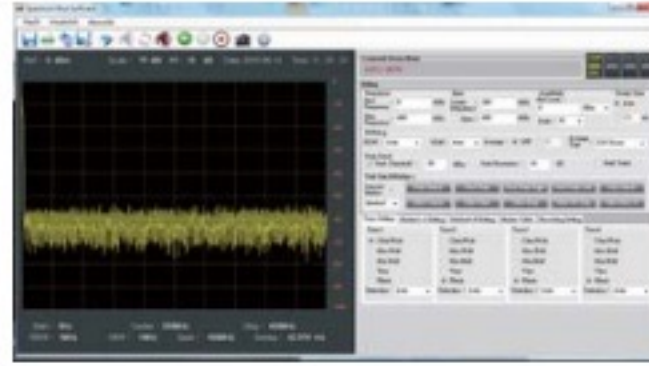
EMI Pretest Mode

Users can use the external software Spectrum Shot for EMI pretest report management and assessment, remote control and waveform data recording for long periods of time.

Under the EMI Pre-test Mode, users can select the required CISPR EMI regulation for conduction and radiation measurement.

IVI Driver & LabVIEW Support

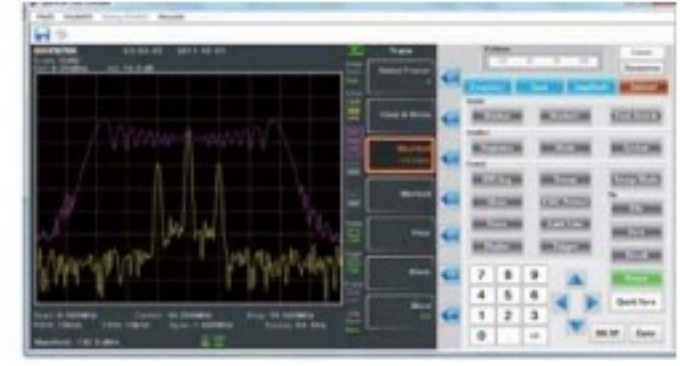
IVI Driver Supports LabView & LabWindows/CVI Programming. It is available on NI website.



Get Trace Mode

Under Get Trace mode, users can record the waveform data for long periods of time. It can be applied to spectrum monitoring for detecting any abnormal radio signals. The software will send out e-mail to inform users if any abnormal situation occurs.

Under the Remote Control mode, users can monitor wireless interference signals or observe signals for long periods of time.



Remote Control Mode

J. VARIOUS AUGMENTING OPTIONS

Tracking Generator



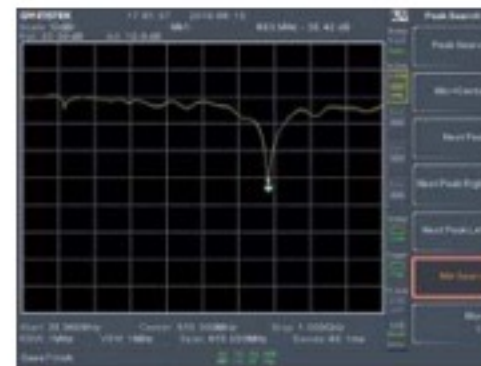
Scalar Network Analysis



3dB Frequency Bandwidth

TG option provides 0 to -50 dBm synchronized sweep output, conducts scalar network analysis (S11, S21) function as well as P1dB.

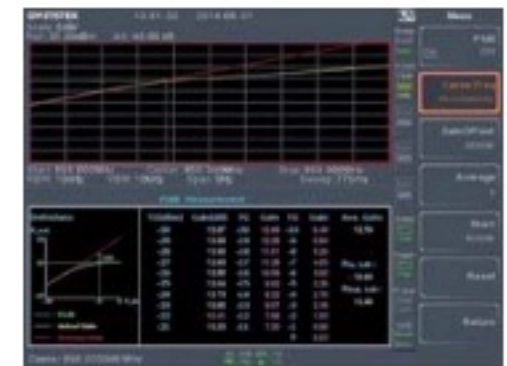
The built-in tracking generator can swiftly and easily measure frequency response of cable loss, filter bandwidth, amplifier gain, mixer conversion loss, etc. The N-dB Bandwidth function measures 3dB bandwidth of Bandpass filter. SWR bridge should be connected with tracking generator to measure the return loss of antenna or filter.



Reflection Loss

All active components have linear dynamic range for power output. Once output power reaches the maximum level, active component will enter the non-linear saturated area of P1dB point and cease amplifying signal intensity as well as produce harmonic distortion. It is very useful for P1dB point measurement in active components such as low noise amplifier, mixer and active filter.

P1dB Point Measurement



Soft Carrying Case



Optional soft carrying case(GSC-009) provides convenience and protection to the instrument. GSP-9330 is equipped with 8.4 inches 800 x 600 pixels LCD display which yields clearer display results for outdoor operations.

3GHz Spectrum Analyzer

Patent No. ZL201220347963.5



GSP-9300B (9kHz~3GHz)



FEATURES

- * Frequency Range : 9kHz ~ 3 GHz
- * 0.025ppm Frequency Stability and 1ppm Aging Rate
- * Built-in Preamplifier, 50dB Attenuator, and Sequence Function
- * RBW : 1Hz ~ 1MHz
- * Sensitivity : -149dBm/Hz (@PreAmp on)
- * Built-in AM/FM Demodulation & Analysis
- * Built-in P1dB point, Harmonic, Channel Power, N-dB Bandwidth, OCBW, ACPR, SEM, TOI, CNR, CTB, CSO, Noise Marker, Frequency Counter, Time Domain Power, Gated Sweep
- * Built-in Spectrogram, Topographic and Dual-View Display Modes
- * Remote Control Software : SpectrumShot
- * Remote Control Interface : LAN, USB, RS-232
- * Options : Tracking Generator, GPIB Interface

GSC-009 Soft Carrying Case

For: GSP-9330/9300B



GSP-9300B is a 3GHz spectrum analyzer, which meets general RF measurement requirements. It provides a frequency stability of 0.025ppm and collocates with a built-in preamplifier, which has a minimum noise floor of -149dBm / Hz. More than 20 measurement applications are also available, including AM/FM modulation analysis, ACPR /OCBW/CHPW, CATV parameters etc.

For signal monitoring and processing, GSP-9300B provides Topographic and Spectrogram display modes to analyze the signal through the change of color temperature. The split-window display mode can set parameters for both displays and measure two different frequency bands at the same time. Friendly user interface provides functions such as status icon display, online help, multi-language support, and sequence setting. The patented heat-conducting design can greatly shorten the time for the machine to power up. The preset power-on function can improve the efficiency when it is used in the production line. Communications interfaces include USB, RS-232, LXI, MicroSD, GPIB interface, and DVI output.

In summary, GSP-9300B is a stable, lightweight and suitable test equipment for various applications. It is very ideal for the education market, production line, general signal monitoring, and more importantly, its price is beyond your imagination. It is the preferred product for limited budgets.

SPECIFICATIONS		
FREQUENCY		
FREQUENCY		
Range	9 kHz – 3 GHz	
Resolution	1 Hz	
FREQUENCY REFERENCE		
Accuracy	±(period since last adjustment x aging rate) + stability over temperature + supply voltage stability	1 year after last adjustment 0 – 50 °C
Aging Rate	± 1 ppm max.	
Frequency Stability Over Temperature	± 0.025 ppm	
Supply Voltage Stability	± 0.02 ppm	
FREQUENCY READOUT ACCURACY		
Start, Stop, Center, Marker	±(marker frequency indication x frequency reference accuracy + 10% x RBW + frequency resolution)	
Trace Points	Max. 601 points, Min. 6 points	
MARKER FREQUENCY COUNTER		
Resolution	1 Hz, 10 Hz, 100 Hz, 1 kHz	RBW/Span >=0.02 ; Mkr level to DANL>30 dB
Accuracy	±(marker frequency indication X frequency reference accuracy + counter resolution)	
FREQUENCY SPAN		
Range	0 Hz (zero span), 100 Hz – 3 GHz	
Resolution	1 Hz	
Accuracy	± frequency resolution ¹	RBW : Auto
PHASE NOISE		
Offset from Carrier		Fc=1GHz;RBW=1kHz,VBW=10Hz Average≥40
10 kHz	< -88 dBc/Hz	Typical ²
100 kHz	< -95 dBc/Hz	Typical
1 MHz	< -113 dBc/Hz	Typical
RESOLUTION BANDWIDTH (RBW) FILTER		
Filter Bandwidth	1 Hz – 1 MHz in 1-3-10 sequence 200 Hz, 9 kHz, 120 kHz, 1MHz	-3dB bandwidth -6dB bandwidth Nominal ³
Accuracy	± 8%, RBW = 1MHz ; ± 5%, RBW<1MHz	Normal Bandwidth ratio: -60dB:-3dB
Shape Factor	<4.5 : 1	
VIDEO BANDWIDTH (VBW) FILTER		
Filter Bandwidth	1 Hz – 1 MHz in 1-3-10 sequence	-3dB bandwidth
[1] Frequency Resolution = Span/(Trace points - 1)		
[2] Typical specifications in this datasheet mean that the performance can be exhibited in 80% of the units with a 95% confidence level over the temperature range 20 to 30 °C. They are not covered by the product warranty.		
[3] Nominal values indicate expected performance. They are not covered by the product warranty.		
AMPLITUDE		
AMPLITUDE RANGE		
Measurement Range	100 kHz – 1 MHz	DANL 18 dBm
	1 MHz – 10 MHz	DANL to 21 dBm
	10 MHz – 3 GHz	DANL to 30 dBm
ATTENUATOR		
Input Attenuator Range	0 – 50 dB, in 1 dB steps	Auto or manual setup
MAXIMUM SAFE INPUT LEVEL		
Average Total Power	≤ +33 dBm	Input attenuator ≥ 10 dB
DC Voltage	± 50 V	
1 dB GAIN COMPRESSION		
Total Power at 1st Mixer	> 0 dBm	Typical ; Fc ≥ 50 MHz; preamp. off Typical ; Fc ≥ 50 MHz; preamp. on Mixer power level (dBm) = input power (dBm) - attenuation (dB)
Total Power at the Preamp	> -22 dBm	



GSP-9300B

SPECIFICATIONS

DISPLAYED AVERAGE NOISE LEVEL (DANL)¹

Preamp off	0 dB attenuation; RF Input is terminated with a 50Ω load. RBW 10 kHz; VBW 10 kHz; span 500 Hz; reference level = -60 dBm; trace average ≥40	
9 kHz–100 kHz	< -93 dBm	Nominal
100 kHz–1 MHz	< -90 dBm - 3 x (f/100 kHz) dB	Nominal
1 MHz–10 MHz	< -122 dBm	Nominal
2.7 – 3 GHz	< -116 dBm	Nominal
Preamp on	0 dB attenuation; RF Input is terminated with a 50Ω load. RBW 10 kHz; VBW 10 kHz; span 500 Hz; reference level = -60 dBm; trace average ≥40	
100 kHz–1 MHz	< -108 dBm - 3 x (f/100 kHz) dB	Nominal
1 MHz–10 MHz	< -142 dBm	Nominal
10 MHz–3 GHz	< -142 dBm + 3 x (f/1 GHz) dB	Nominal

[1] DANL spec. excludes spurious response.

LEVEL DISPLAY RANGE

Scales	Log, Linear	Log scale
Units	dBm, dBmV, dBuV, V, W	Linear scale
Marker Level Resout	0.01 dB 0.01 % of reference level	Single/Split Windows
Level Display Modes	Trace, Topographic, Spectrogram	
Number of Traces	4	
Detector	Positive-peak, negative-peak, sample, normal, RMS(not Video), Quasi-Peak, Average	
Trace Functions	Clear & Write, Max/Min Hold, View, Blank, Average	Can be setup for each trace separately

ABSOLUTE AMPLITUDE ACCURACY

Absolute Point	Center: 160 MHz ; RBW 10 kHz; VBW 1 kHz; span 100 kHz; log scale; 1 dB/div; peak detector; 23°C±5°C; Signal at Reference Level	
Preamp Off	± 0.5 dB	Ref level 0 dBm; 10 dB RF attenuation
Preamp On	± 0.6 dB	Ref level -30dBm; 0dB RF attenuation

FREQUENCY RESPONSE

Preamp Off	Attenuation: 10dB; Reference: 160MHz; 20–30°C	
100 kHz – 2.0 GHz	± 0.5 dB	
2GHz – 3 GHz	± 0.7 dB	
Preamp On	Attenuation: 0dB; Reference: 160MHz; 20–30°C	
1 MHz – 2 GHz	± 0.6 dB	
2 GHz – 3 GHz	± 0.6 dB	

ATTENUATION SWITCHING UNCERTAINTY

Attenuator Setting	0 – 50 dB in 1 dB step	Reference : 160 MHz, 10dB attenuation
Uncertainty	± 0.25 dB	

RBW FILTER SWITCHING UNCERTAINTY

1 Hz – 1 MHz	± 0.25 dB	Reference : 10 kHz RBW
---------------------	-----------	------------------------

LEVEL MEASUREMENT UNCERTAINTY

Overall Amplitude Accuracy	± 1.5 dB	20–30°C, frequency >1MHz; Signal input 0–30dBm; Reference level 0–30dBm; Input attenuation 10dB; RBW 1kHz; VBW 1kHz; after cal; Preamp Off Typical
	± 0.5 dB	

SPURIOUS RESPONSE

Second Harmonic Intercept	Preamp off; signal input -30dBm; 0dB attenuation	
	+35 dBm +60 dBm	Typical; 10MHz-cfc; 775MHz Typical; 775MHz-cfc; 625GHz
Third-order Intercept	Preamp off; signal input -30dBm; 0 dB attenuation	
	> 14dBm < -60 dBc	300 MHz – 3 GHz Input signal level -30 dBm, Att. Mode, Att = 0dB; 20 – 30°C Input terminated, 0dB attenuation, Preamp off
Input Related Spurious		
Residual Response(Inherent)	< -90 dBm	

SWEEP

SWEEP TIME		
Range	204 μs – 1000 s 50 μs – 1000 s	Span ≥ 0 Hz Span = 0 Hz; Min resolution – 10 μs
Sweep Mode	Continuous; Single	
Trigger Source	Free run; Video; External	
Trigger Slope	Positive or negative edge	

RF PREAMPLIFIER

SWEEP TIME		
Frequency Range	1 MHz – 3 GHz	Nominal (installed as standard)
Gain	18 dB	

Rear Panel



GRA-415 Rack Adapter Panel

For : GSP-9300/9300B, Rack Mounting (19", 6U)



GKT-001 General Kit Set

Include :
ADP-002
ATN-100
GTL-303
GSC-002
For: GSP-Series



GKT-002 CATV Kit Set

Include :
ADP-001
ADP-101
GTL-304
GSC-003
For: GSP-Series



GKT-003 RLB Kit Set

Include :
GAK-001
GAK-002
GTL-302
GSC-004
For: GSP-Series



GKT-008 EMI Probe Kit Set

Include :
ADP-002
GTL-303
PR-01
PR-02
ANT-04
ANT-05
For: GSP-Series



3GHz Spectrum Analyzer

SPECIFICATIONS

FRONT PANEL INPUT/OUTPUT		
RF INPUT		
Connector Type	N-type female	Nominal 300 kHz ~ 3 GHz ; Input attenuator ≥ 10 dB
Impedance	50Ω	
VSWR	<1.6 :1	
POWER FOR OPTION		
Connector Type	SMB male	With short-circuit protection
Voltage/Current	DC +7V/500 mA max	
USB HOST		
Connector Type	A plug	Support Full/High/Low speed
Protocol	Version 2.0	
MICRO SD SOCKET		
Protocol	SD 1.1	Up to 32GB capacity
Support Cards	Micro SD, Micro SDHC	
REAR PANEL INPUT/OUTPUT		
REFERENCE OUTPUT		
Connector Type	BNC female	Nominal
Output Frequency	10 MHz	
Output Amplitude	3.3V CMOS	
Output Impedance	50 Ω	
REFERENCE INPUT		
Connector Type	BNC female	
Input Reference Frequency	10 MHz	
Input Amplitude	-5 dBm ~ +10 dBm	
Frequency Lock Range	Within ± 5 ppm of the input reference frequency	
ALARM OUTPUT		
Connector Type	BNC female	Open-collector
TRIGGER INPUT/GATED SWEEP INPUT		
Connector Type	BNC female	
Input Amplitude	3.3V CMOS	
Switch	Auto selection by function	
LAN TCP/IP INTERFACE		
Connector Type	RJ-45	
Base	10Base-T; 100Base-Tx; Auto-MDIX	
USB DEVICE		
Connector Type	B plug	For remote control only; supports USB TMC Supports Full/High/Low speed
Protocol	Version 2.0	
IF OUTPUT		
Connector Type	SMA female	Nominal Nominal 10 dB attenuation; RF input : 0 dBm @ 1 GHz
Impedance	50 Ω	
IF Frequency	886 MHz	
Output Level	-25 dBm	
EARPHONE OUTPUT		
Connector Type	3.5mm stereo jack, wired for mono operation	
VIDEO OUTPUT		
Connector Type	DVI-I (integrated analog and digital), Single Link. Compatible with VGA or HDMI standard through adapter	
RS-232C INTERFACE		
Connector Type	D-sub 9-pin female	Tx , Rx , RTS , CTS
GPIB INTERFACE (OPTIONAL)		
Connector Type	IEEE-488 bus connector	
AC POWER INPUT		
Power Source	AC 100 V ~ 240 V, 50/60 Hz	Auto range selection
GENERAL		
Internal Data Storage	16 MB nominal	Operating Storage Inc. all options (Basic + TG + GPIB + Battery)
Power Consumption	< 65 W	
Warm-up Time	< 30 minutes	
Temperature Range	+5 °C ~ + 45 °C -20 °C ~ + 70 °C	
Dimensions & Weight	350(W) x 210(H) x 100(D) mm, Approx. 4.5kg 13.8(W) x 8.3(H) x 3.9(D) inch, Approx. 9.9lb	
Calibration Cycle	The recommended calibration cycle is one year; calibration services are available through GW Instek's authorized calibration services.	
TRACKING GENERATOR (OPTIONAL)⁵		
Frequency Range	100 kHz ~ 3 GHz	@160 MHz, -10 dBm, Source attenuation 10 dB, 20 ~ 30°C
Output Power	-50 dBm ~ 0 dBm in 0.5 dB steps	
Absolute Accuracy	± 0.5 dB	± 1.5 dB ± 2 dB Referenced to -10 dBm Typical, output level = -10 dBm
Output Flatness	Referenced ~ 160 MHz, -10 dBm 100 kHz ~ 2 GHz 2 GHz ~ 3 GHz	
Output Level Switching Uncertainty	± 0.8 dB	
Harmonics	< -30 dBc	
Reverse Power	+30 dBm max.	Nominal 300 kHz ~ 3 GHz, source attenuation ≥ 12 dB
Connector Type	N-type female	
Impedance	50 Ω	
Output VSWR	< 1.6:1	

[5] The minimum RBW filter is 10kHz when the TG output is ON.

Note : The specifications apply when the GSP-9300B is powered on for at least 30 minutes to warm-up to a temperature of 20 °C to 30 °C, unless specified otherwise.

ORDERING INFORMATION

GSP-9300B 3GHz Spectrum Analyzer

ACCESSORIES :

Power Cord, Certificate of Calibration, CD-ROM (with Quick Start Guide, User Manual, Programming Manual, SpectrumShot Software, SpectrumShot Guide & IVI Driver)

OPTION

Opt. 01 Tracking Generator Opt. 02 GPIB Interface

OPTIONAL ACCESSORIES

GSC-009 Soft Carrying Case **GRA-415** Rack Adapter Panel

FREE DOWNLOAD

SpectrumShot PC Software for Windows System (available on GW Instek website); IVI Driver Supports LabVIEW/LabWindows/CVI Programming (available on NI website)

8.0/3.8/1.8GHz Spectrum Analyzer



NEW

GSP-8000 Series

8.0GHz/3.8GHz/1.8GHz Spectrum Analyzer



FEATURES

- ✦ Frequency Range
 - GSP-8800 : 9kHz ~ 8.0GHz
 - GSP-8380 : 9kHz ~ 3.8GHz
 - GSP-8180 : 9kHz ~ 1.8GHz
- ✦ RBW: 1Hz ~ 1MHz in 1-3-5-10 steps
- ✦ VBW: 10Hz ~ 3MHz in 1-3-5-10 steps
- ✦ Phase Noise: -104 dBc/Hz
- ✦ Sensitivity : -160dBm/Hz Typical
 - @PreAmp On
- ✦ Built-in AM/FM Demodulation
- ✦ Built-in Time Spec Function
- ✦ Measurement Function : ACPR/OCBW/CHPW, NdB BW, Pass-Fail, Freq. Counter, Noise Marker
- ✦ Built-in 20dB Preamp
- ✦ Communication Interface: LAN, USB Host/Device
- ✦ Display : 10.4" XGA Output (1024*768)
- ✦ Options : EMI Filter

The GSP-8000 series, brand new general spectrum analyzers from GW Instek, features three frequency ranges, namely 8.0GHz, 3.8GHz and 1.8GHz. The series is suitable for teaching research, R&D verification, and the test requirements of radio frequency products during production and development stages. The series provides 1Hz ~ 1MHz resolution bandwidth (RBW), 10Hz ~ 3MHz video bandwidth (VBW), -104dBc/Hz phase noise, a 20dB preamplifier, and the lowest noise floor of -160dBm/Hz (typical).

With respect to measurement applications, GSP-8000 has built-in Time Spec function, AM/FM signal demodulation function, channel test (Channel Power Measurement) function, Pass-Mail function, etc. The Time Spec function can simultaneously observe and display the correlation between power, frequency and time. ACPR/OCBW/CHPW tests can be used to test adjacent channels, power occupation bandwidth ratio, and channel power. The Pass-Fail function can be used to determine whether the signal is within the set range. Users can use these functions to conduct a wide range of measurement applications.

GSP-8000 utilizes a 10.4-inch TFT LCD large-size screen with XGA (1024*768) resolution to allow an easy observation of test signals. For communication interface, GSP-8000 provides two interfaces: USB and LAN. Through the USB Host, users can quickly retrieve the files stored after measurements, while USB Device and LAN interface allow users to control the instrument through dedicated PC software, or use the corresponding command set to design the required program.

GSP-8000 provides EMI filter option. Customers can be activated through the corresponding software authorization (Soft-Key), which greatly improves usage efficiency.

ORDERING INFORMATION

GSP-8800	8.0GHz Spectrum Analyzer
GSP-8800(TG)	8.0GHz Spectrum Analyzer with TG
GSP-8380(TG)	3.8GHz Spectrum Analyzer with TG
GSP-8180(TG)	1.8GHz Spectrum Analyzer with TG

ACCESSORIES :
Power Cord, Safety Guide, USB Cable

OPTIONAL ACCESSORIES

GSP-8800E1	EMI Activation Option for GSP-8800
GSP-8380E1	EMI Activation Option for GSP-8380
GSP-8180E1	EMI Activation Option for GSP-8180
ADP-001	N(M)-BNC(F) Adapter
ADP-002	N(M)-SMA(F) Adapter
GTL-301	N(M)-N(M) RF Cable
GTL-303	SMA(M)-SMA(M) RF Cable
GSC-009	Soft Carrying Case
GRA-415	Rack Adapter Panel

FREE DOWNLOAD

SpectrumShot PC Software for Windows System (available on GW Instek website);
IVI Driver Supports LabVIEW/LabWindows/CVI Programming (available on NI website)

Rear Panel



GSP-8800

8.0/3.8/1.8GHz Spectrum Analyzer

SPECIFICATIONS						
Mode	GSP-8180		GSP-8380		GSP-8800	
FREQUENCY						
FREQUENCY RANGE						
Range	9 kHz – 1.8 GHz		9 kHz – 3.8 GHz		9 kHz – 8.0 GHz	
Resolution	1 Hz					
FREQUENCY SPAN						
Frequency Range	0 Hz, 100 Hz to max. frequency of instrument					
Span Uncertainty	±span / (sweep points-1)					
INTERNAL FREQUENCY REFERENCE						
Frequency Range	10.000000 MHz					
Reference Frequency Accuracy	±[(days from last calibrate × freq aging rate) + temperature stability + initial accuracy]					
Temperature Stability	<1ppm, 15°C – 35°C					
Aging Rate	<1ppm/year					
Initial Accuracy	<1ppm					
SSB PHASE NOISE						
Offset From Carrier	f _c = 1 GHz, RBW = 1 kHz, VBW = 1kHz, 20°C – 30°C, average ≥ 40					
	10 kHz	< -104 dBc/Hz				
	100 kHz	< -106 dBc/Hz, Typical				
	1 MHz	< -115 dBc/Hz, Typical				
BANDWIDTH						
Resolution Bandwidth	1Hz to 1MHz (1-3-5-10 steps by sequence) ; EMI Filter(6dB): 200Hz, 9kHz, 120kHz, 1MHz (Optional)					
RBW Uncertainty	< 5%, Typical, RBW ≤ 1 MHz					
Resolution Filter Shape Factor (60 dB: 3)	< 5: 1, Typical, digital and close to Gaussian shape					
Video Bandwidth (VBW)	10 Hz – 3 MHz					
AMPLITUDE						
AMPLITUDE AND LEVEL						
Amplitude Measurement Range	DANL – +10 dBm	100 kHz – 1 MHz, Preamp Off	DANL – +10 dBm	100 kHz – 1 MHz, Preamp Off	DANL – +10 dBm	100 kHz – 10 MHz, Preamp Off
	DANL – +20 dBm	1 MHz – 1.8 GHz, Preamp Off	DANL – +20 dBm	1 MHz – 3.8 GHz, Preamp Off	DANL – +20 dBm	10 MHz – 8 GHz, Preamp Off
Reference Level	-80 dBm – +30 dBm, 0.01dB by step					
Preamp	20 dB, 100 kHz – Max. Frequency Range					
Input Attenuation	0 – 40 dB, in 1 dB step					
Max Input DC Voltage	50 VDC					
Max Continuous Power	+30dBm, Average continuous power					
Displayed Average Noise Level (DANL)						
	Input Attenuation = 0 dB, ref. level ≥ -60dBm, trace average ≥ 40, RBW normalizes to 1Hz, DETECTOR = SAMPLE, RBW = 100Hz, VBW = 100Hz					
Preamp Off	9 kHz – 1MHz	<-95 dBm (typical), <-88dBm	9 kHz – 1MHz	<-95 dBm (typical), <-88dBm	9 kHz – 1MHz	-95dBm (typical), <-88 dBm
	1 MHz – 1 GHz	<-140dBm (typical), <-130 dBm	1 MHz – 1 GHz	<-140dBm (typical), <-130 dBm	1 MHz – 500MHz	-140dBm (typical), <-130 dBm
	1 GHz – 1.8 GHz	<-138dBm (typical), <-128 dBm	1 GHz – 3.8 GHz	<-138dBm (typical), <-128 dBm	500MHz – 3GHz	-138dBm (typical), <-128 dBm
					3GHz – 6GHz	-134dBm (typical), <-124 dBm
				6GHz – 8GHz	-129dBm (typical), <-119dBm	
Preamp On	100 kHz – 1MHz	<-135 dBm (typical), <-128dBm	100 kHz – 1MHz	<-135 dBm (typical), <-128dBm	100 kHz – 1MHz	-135dBm (typical), <-128 dBm
	1 MHz – 1 GHz	<-160dBm (typical), <-150 dBm	1 MHz – 1 GHz	<-160dBm (typical), <-150 dBm	1 MHz – 500MHz	-160dBm (typical), <-150 dBm
	1 GHz – 1.8 GHz	<-160dBm (typical), <-150 dBm	1 GHz – 3.8 GHz	<-160dBm (typical), <-150 dBm	500MHz – 3GHz	-160dBm (typical), <-150 dBm
					3GHz – 6GHz	-154dBm (typical), <-144 dBm
				6GHz – 8GHz	-149dBm (typical), <-139dBm	
FREQUENCY RESPONSE						
Filter Bandwidth	20°C to 30°C, 30% to 70% relative humidity, input attenuation = 10 dB, reference frequency = 50 MHz, SPAN = 200kHz, RBW = 10kHz, VBW = 10kHz					
Preamp Off, f _c ≥ 100 kHz	±0.8 dB, 100K – Max. Frequency Range					
Preamp On, f _c ≥ 1MHz	±0.9 dB, 100K – Max. Frequency Range					
UNCERTAINTY AND ACCURACY						
RBW Switch Uncertainty	Reference: 10 kHz RBW at Frequency Center is 50 MHz ; ±0.2 dB, Log resolution					
Input Attenuation Uncertainty	20°C – 30°C, f _c = 50 MHz, Preamp Off, 10 dB RF attenuation, RBW = 10K ; 1 – 40 dB ±0.5 dB					
Absolute Amplitude Uncertainty	20°C to 30°C, f _c = 50 MHz, Span = 200 kHz, RBW = 10 kHz, VBW = 10 kHz, peak detector, 10 dB RF attenuation, average ≥ 20, 2db/div, 95% confidence level					
Preamp Off	±0.4 dB, input signal level -20 dBm					
Preamp On	±0.5 dB, input signal level -40 dBm					
Uncertainty	20°C to 30°C, f _c ≥ 1MHz, signal input range 0 – -50dBm, Ref Level range 0 – -50dBm, 10 dB RF attenuation, RBW = 1kHz, VBW = 1kHz, Preamp Off					
	±1.5 dB (typical)					
VSWR	<1.5, Nominal, Input 10 dB RF attenuation, 1MHz – 1.8GHz / 3.8GHz					
	<1.8, Nominal, Input 20 dB RF attenuation, 1MHz – 8GHz					
DISTORTION AND SPURIOUS RESPONSE						
Second Harmonic Distortion	f _c ≥ 50 MHz, Preamp off, signal input -20 dBm, 0 dB RF attenuation, 20°C – 30°C ; -65 dBc					
Third-order Intermodulation	f _c ≥ 50 MHz, Input double tone level -20 dBm, frequency interval 100 kHz, input attenuation 0 dB, preamp off, 20°C – 30°C ; +10 dBm					
1 dB Gain Compression	Nominal, f _c ≥ 50 MHz, 0 dB RF attenuation, Preamp off, 20°C – 30°C ; > -2 dBm					
Residual Response	Connect 50 Ω load at input port, 0 dB input attenuation, 20°C to 30°C, average ≥ 40, RBW = 300Hz, VBW = 3kHz, SPAN = 2M					
	<-85 dBm, from 1 MHz – Max. Frequency Range					
Input Related Spurious	<-60 dBc, -30 dBm signal at input mixer, 20°C – 30°C					
SWEEP						
Sweep Time						
Range	10 ms – 3000 s, None-zero Span ; 1 ms – 3000 s, Zero Span					
Sweep Mode	Continuous; Single					
TRACKING GENERATOR (OPTION 01)						
Tracking Generator Output						
Frequency Range	100 kHz – Max. Frequency Range					
Output Power Level Range	-40 dBm – 0 dBm					
Output Power Level Resolution	1 dB					
Output Flatness	± 3 dB					
Maximum Safe Reverse Level	Average total power: +30 dBm, DC : ±50 VDC					
Impedance	50 Ω, Nominal					
Connector	N Type Female					
FREQUENCY COUNTER						
Frequency Counter						
Resolution	1Hz, 10Hz, 100Hz, 1kHz					
Accuracy	±(frequency indication × frequency reference accuracy) + counter resolution					
INPUTS AND OUTPUTS						
RF Input						
Impedance	50 Ω, Nominal					
Connector	N Type Female					
Reference Input						
Connector	BNC Female					
10MHz Reference Amplitude	0 dBm to +10 dBm					
Trigger Input						
Impedance	1 kΩ					
10MHz Reference Amplitude	BNC Female					
USB						
USB Host	Connector: A Plug, Protocol: USB 2.0 (Host End)					
USB Device	Connector: B Plug, Protocol: 2.0 Version					
GENERAL						
Display	10.4" TFT LCD, Resolution: 1024*768, Color: 65,536 colors					
Remote Control	USB Device: B Plug, supports USB TMC ; LAN TCP/IP Interface : RJ-45, supports 10Base-T/100Base-Tx					
Mass Memory	Internal Memory: 256M Bytes					
Temperature	Operating Temperature: 0°C to 40°C ; Storage Temperature: -20°C to 70°C					
Relative Humidity	0°C to 30°C : ≤ 95% ; 30°C to 40°C : ≤ 75%					
Power Consumption	28W					
Dimensions & Weight	421(W) × 221(H) × 115(D) mm; Approx. 5.0 kg (without package)					
AC Power Socket	100V – 240V, 50/60Hz					

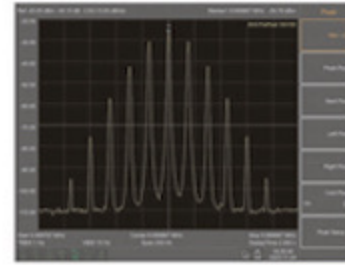
The specifications apply when the function generator is powered on for at least 30 minutes under +20°C~+30°C.

A. BROAD TEST AND MEASUREMENT RANGE

Model		Competitor	
GSP-8800	8.0GHz	Rigol DSA875	7.5GHz
		Siglent SSA3075X-Plus	7.5GHz
GSP-8380	3.8GHz	Rigol DSA832E	3.2GHz
		Siglent SSA3032X	3.2GHz
GSP-8180	1.8GHz	Rigol DSA815	1.5GHz
		Rigol RSA3015E	1.5GHz

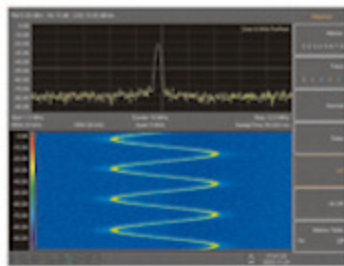
Whether it is a 1.8GHz, a 3.8GHz or an 8.0GHz model, the test and measurement bandwidth is wider than that of competitors at the same category.

B. RICH ANALYTICAL BANDWIDTH



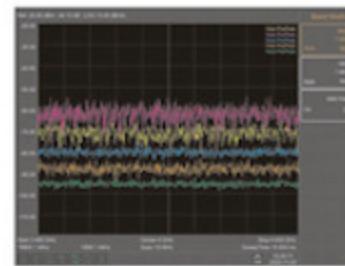
GSP-8000 provides RBW from 1Hz to 1MHz, and provides 1-3-5-10 Sequence stages, allowing users to observe the signal in more detail.

C. TIME SPEC



This function can simultaneously view and display the relationship between power, frequency and time, and can track changes in frequency and power over time.

D. TRACE & DETECTOR



GSP-8000 provides five traces of different colors, among which Trace1 is displayed in yellow, Trace 2 is fuchsia, Trace 3 is azure, Trace 4 is orange, and Trace 5 is green. Users can collocate the required Detector for test and measurement. The Detector function provides Pos Peak, Neg Peak, Sample, Normal, Voltage Avg, RMS Avg and Quasi-Peak functions. The Quasi-Peak function can only be used after the EMI option is turned on.

E. PEAK SEARCH & MARKER FUNCTION



In addition to the functions related to Max Peak, the Peak Search function provides a new settable search for Min Peak. Users can set whether to search for Max Peak or Min Peak.

GSP-8000 provides up to 8 Markers for simultaneous display, and Markers can be assigned to different Traces. It also provides three application functions: N-dB, Marker Noise and Frequency Counter. 1kHz, 100Hz, 10Hz and the most accurate resolution of 1Hz.

- * N-dB: N-dB: It can measure the bandwidth when the left and right sides of the Marker value decrease by N-dB respectively.
- * Marker Noise: Marker Noise: The current Marker frequency reading can be converted into the dBm/Hz absolute power reading at 1Hz RBW.
- * Frequency Counter: Frequency Counter: Users can set the counter to 1kHz, 100Hz, 10Hz and the most accurate resolution of 1Hz.

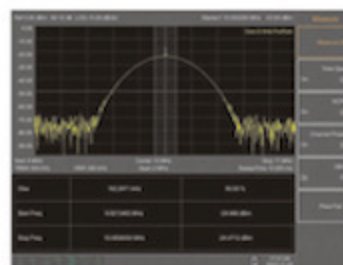
F. ACPR, OCBW, CHPW



ACPR

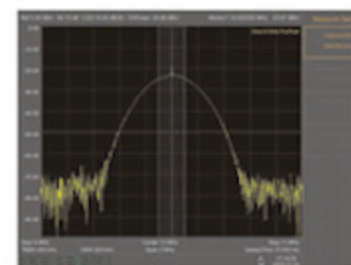
Adjacent Channel Power Ratio (ACPR) measurement can check the power of the signal and adjacent channels, which helps to understand the power value between channels. The ACPR function can set up to three groups of adjacent channel tests.

Occupied Bandwidth (OCBW) measurement can simultaneously display the occupied bandwidth, channel power and power spectrum density.



OCBW

Channel Power (OCBW) is used to measure the power strength of a signal in a user-defined channel.

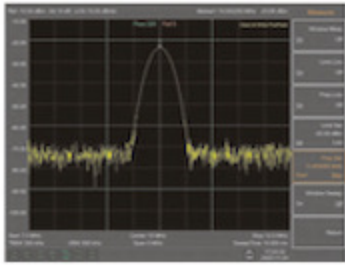


CHPW

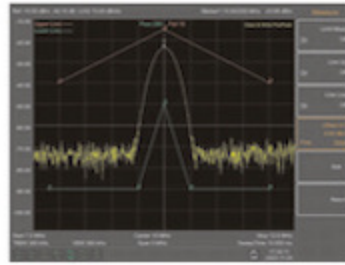
8.0/3.8/1.8GHz Spectrum Analyzer

GSP-8000 Series
SPECTRUM ANALYZERS

G. LIMIT LINE



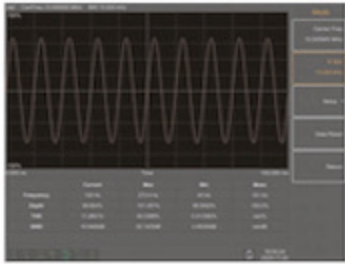
Windows Measure



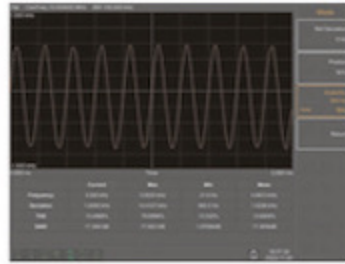
Limit Measure

Provides two Limit Line measurement functions, namely Windows Measure and Limit Measure. Determine whether the measured signal is qualified through the set conditions.

H. AM AND FM SIGNAL DEMODULATION



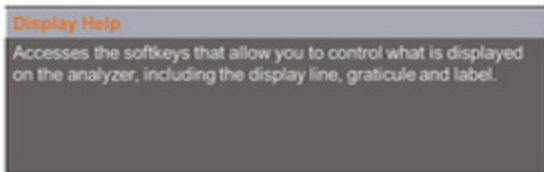
AM Analysis



FM Analysis

AM/FM signal analysis measurement parameters, such as amplitude modulation depth (Depth) or frequency deviation (Deviation), distortion (THD) and signal-to-noise and distortion ratio (SINAD), and supports demodulated audio source output.

I. HELP FUNCTION



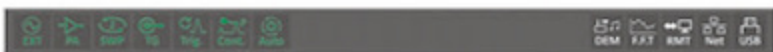
When the Help function is turned on, users can learn about the introduction or usage of each key or function, speeding up the user's understanding and familiarity with the functions.

J. LARGE SCREEN



Provides a large 10.4" TFT LCD with a resolution of 1024*768 (XGA), making it easier for users to observe the details of waveforms.

K. ICON STATUS



There are two areas in the icon status. The area in the lower left corner is mainly for the function settings of the instrument, while the area at the lower right corner is the usage of the communication interface, allowing users to easily understand the status and results of the instrument.

L. COMMUNICATION INTERFACE



Provides USB Host and LAN interfaces, and supports the command set that complies with the IEEE488.2 commands to facilitate users in the control of the instrument.

M. DEDICATED PC SOFTWARE

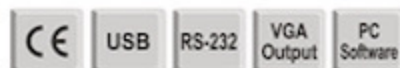


GSP-8000 has dedicated PC software that can be controlled directly through the computer's USB or LAN interface. In addition to basic Span, Amplitude, BW settings, the PC software also provides more commonly used functions such as Max/Min Trace, Detector and Peak On/Off.

3GHz Spectrum Analyzer & RF and Communications Trainer



GSP-730 3GHz Spectrum Analyzer



GRF-1300/1300A RF and Communication Trainer



GSP-730 FEATURES

- * Frequency Range : 150kHz ~ 3GHz
- * Autoset Function
- * Noise level : ≤ -100 dBm
- * RBW Range : 30kHz, 100kHz, 300kHz, 1MHz
- * ACPR/CHPW/OCBW Measurement
- * 3 Traces in Different Colors
- * Split Window Function
- * Limit Line Function
- * Remote Control Software
- * Presentation Material for Training Courses
- * Support Interface : USB Device/Host, RS-232C
- * 5.6" TFT LCD with VGA Output

GRF-1300/1300A FEATURES

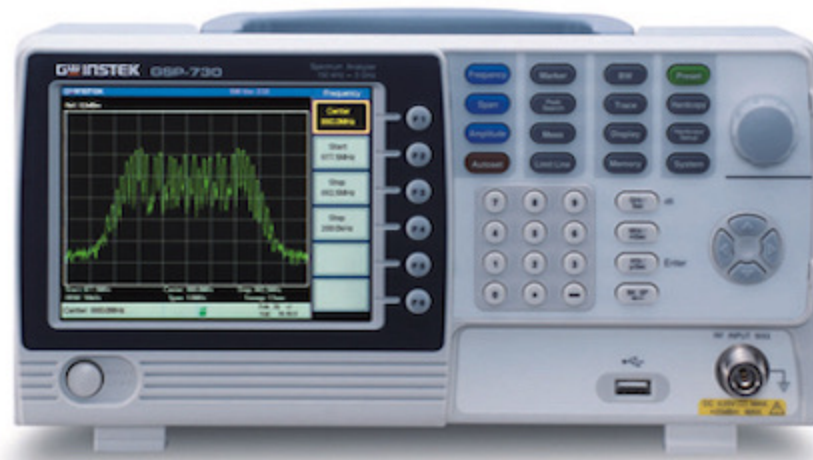
- * Waveform Support :
Sine Wave : 0.1 ~ 3MHz
Square Wave : 0.1 ~ 3MHz
Triangle Wave : 0.1 ~ 3MHz
- * RF Frequency : 870 ~ 920MHz
- * AM Modulation & FM Modulation
- * 5 On/Off Switches and 5 Test Points to Simulate 8 Failure Conditions for Learning Outcome Test
- * USB Interface to Provide Remote Control
- * Mixer & 2.4GHz Bandpass Filter (Only GRF-1300A)

GW Instek GSP-730 is a 3GHz Spectrum Analyzer developed mainly to fulfill the demands of RF Communication educations. Budget constraint and insufficient teaching tools are normally the two hurdles for schools to provide high-quality courses for RF communication experiments. GSP-730, featuring full functions, a moderate spectrum analyzer should provide, along with GRF-1300/1300A RF communication trainer possesses a unique position in the field as an economical turn-key solution for 3GHz RF Communication Experiment courses.

GSP-730 SPECIFICATIONS		
FREQUENCY		
Frequency Range		
Range	150kHz ~ 3GHz	
Center Frequency		
Setting Resolution Accuracy	0.1MHz ± 50 kHz	Frequency span : 0.3GHz ~ 2.6GHz, 20 $\pm 5^\circ$ C
Frequency Span		
Range Accuracy	0 Hz (Zero Span), 1MHz ~ 3GHz $\pm 3\%$	Frequency span : 0.3GHz ~ 2.6GHz, 20 $\pm 5^\circ$ C
Resolution Bandwidth (RBW)		
Offset from Carrier	30kHz, 100kHz, 300kHz, 1MHz	Nominal, -3dB bandwidth
SSB Phase Noise		
Offset from Carrier	< -85 dBc/Hz @500kHz offset	Typical, RBW : 30kHz, Span:1MHz@1GHz
Spurious Response & Harmonics		
	less than -50dBc	Reference at -40dBm input
AMPLITUDE		
Reference Level		
Input Range Accuracy Unit	+20 ~ -40dBm Within ± 2 dB dBm, dBV, dB μ V	Reference at 1GHz, SPAN:5MHz
Average Noise Level		
	≤ -100 dBm	Typical, center frequency:1GHz RBW:30kHz
Frequency Characteristics		
	@300MHz~2.6GHz @80~300MHz, 2.6~3GHz	± 3.0 dB ± 6.0 dB
SWEEP		
Sweep Time		
Range Accuracy	300ms ~ 8.4s, auto $\pm 2\%$	Not adjustable Frequency span : full span
RF INPUT		
Impedance VSWR Max Damage Level Connector	50 ohm less than 2.0@input att ≥ 10 dB +30dBm(CW average power), 25VDC N-type female	Nominal
INTERFACE		
RS-232C USB Connector VGA Output Display	Sub-D female-D 9 pins USB Host/Device full speed supported Sub-D female 15 pins 640 x 480 RGB color LCD	
GENERAL		
Temperature Range	Operating: 5 ~ 45°C Storage: -20 ~ 60°C	Guaranteed at 25 $\pm 5^\circ$ C, without soft carrying case Less than 60°C / 70%RH
Operating Humidity Dimensions & Weight	less than 45°C / 90%RH 296 (W) x 153 (H) x 105 (D) mm, Approx. 2.2kg	
Power Source	AC 100~240V, 50/60Hz	

3GHz Spectrum Analyzer

Rear Panel



GSP-730

GRF-1300 Front Panel



GRF-1300A Front Panel



GRF-1300/1300A SPECIFICATIONS

	GRF-1300A	GRF-1300
BASE BAND		
Waveforms	Sine, Square, Triangle	Sine, Square, Triangle
Frequency Range	0.1~3MHz, Step: 10kHz	0.1~3MHz, Step: 10kHz
Amplitude	≥1.5Vpp ≥0.75Vpp into 50 Ohm	≥1.5Vpp
Harmonic Distortion	≤-30dBc	≤-30dBc
RF/FM ANALYSIS		
Frequency Accuracy	±0.15MHz	±0.15MHz
Adjustable Range	≥45MHz (870M ~ 920MHz), Step: 1MHz	≥45MHz (870M ~ 920MHz), Step: 1MHz
Power Range	≥-15dBm	≥-15dBm
FM		
Max Frequency Deviation	>3MHz	>3MHz
AM		
Peak Difference	≥-18dBm	≥-18dBm
MIXER		
LO + IF	≥-35dBm	-
LO - IF	≥-35dBm	-
MIXER + MODULATION		
	≥-60dBm	-
BANDPASS FILTER		
Frequency Centre: 2.4GHz	Bandwidth: ±20MHz	-
INTERFACE		
USB Device	USB Type B	USB Type B
DIMENSIONS & WEIGHT		
165(W) x 155(H) x 90(D)mm/6.5(W) x 6.1(H) x 3.5(D)in, Approx. 1.2kg/2.6lb		

ORDERING INFORMATION

GSP-730 3GHz Spectrum Analyzer
GRF-1300/1300A RF and Communication System Trainer

ACCESSORIES :

GSP-730 : Quick start manual x 1, User manual CD x 1, Power cord x 1
GRF-1300/1300A : Experiment text book of student version, Power point file and remote control software CD,
GRF-1300 : RF cable x 3, Antenna x 1/GRF-1300A : RF cable x 6, Antenna x 2, N to SMA
adaptor connector x 1, Power cord x 1

OPTION

GBK-001 GRF-1300 Experiment text book of teacher version
GBK-002 GRF-1300A Experiment text book of teacher version

OPTIONAL ACCESSORIES

ADP-001 BNC to N-TYPE Adaptor
ADP-002 SMA to N-TYPE Adaptor
ATA-001 Antenna, General FM Antenna, BNC(M)
GTL-303 RF Cable, RG316 Assembly, 600mm, SMA(P/M)
GTL-246 USB Cable, USB 2.0, A-B Type, 1200mm

FREE DOWNLOAD

PC Software Training system remote control software

A TURN-KEY SOLUTION TO CLEAR AWAY TWO OBSTACLES

GSP-730, carrying 3GHz bandwidth and measurement functions including Autoset, Split Window, Limit Line, ACPR and OCBW etc., is regarded as the advanced educations of Mobile Communications (GSM, 3G, 4G/LTE...), Wi-Fi, Zigbee and RFID in the Electronic or the communications classes. The USB ports, the RS-232 interface and the VGA video output facilitate the teaching efficiency. The combination of GSP-730 and GRF-1300/1300A RF communications training is a turn-key system for both lecture and hands-on training purposes.

GRF-1300/1300A RF communications trainer, as the counterpart of GSP-730 for the basic RF communications experiment system, is capable of generating a baseband signal and a RF carrier signal for the built-in AM and FM communications operations. The baseband signal output contains the selections of Sine, Triangle, and Square waveforms in the frequency range of 100kHz ~ 3MHz, whereas the RF signal output is a frequency-variable Sine wave in the range of 870 ~ 920 MHz. Connecting the baseband signal output with AM or FM inputs on the panel, GRF-1300/1300A produces AM or FM signal output respectively by using the internal RF signal as the modulation carrier according to users' selected frequency.

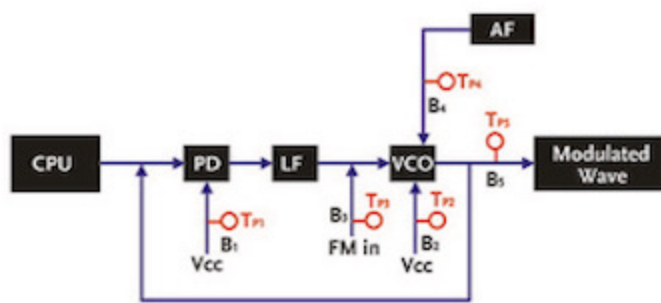
The GRF-1300A RF training kit features not only all functions of GRF-1300 RF training kit but also augments itself with Mixer and Bandpass Filter. Users can better understand the characteristics of Mixer and Bandpass Filter by operating scalar network analyzer measurement which is produced by combining GSP-730 spectrum analyzer, GRF-1300A RF Communications Trainer, and USG signal generator. The combination of USG signal generator and GRF-1300A Mixer function can produce 2.4GHz AM and FM modulation signals. GRF-1300A Bandpass Filter can purify the output signals by filtering out harmonic and spurious produced by Mixer output signals.

An Experiment Textbook (student's book) is available as the standard accessory of GRF-1300/1300A to provide experiment courses. The curriculum of the textbook includes the introduction of the frequency domain and the time domain concepts, the operation theories of a spectrum analyzer, and nine experiments to perform hands-on training for the learning of basic RF communications theories and the RF measurement techniques using a spectrum analyzer. A CD, containing power-point slides for course presentation and the remote-control software for experiment, is attainable with GRF-1300/1300A, allowing teachers to give lecture of experiment theories and perform experiment simultaneously.

Another Experiment Textbook (teacher's book) is accessible as an optional accessory of GRF-1300/1300A. In addition to the same contents in the student's book, this book provides the experiment results to the questions and as well as some advanced experiment theories. Thus, a section of test-for-learning outcomes can also be seen in the lecturers' material in order to guide the students from the faulty diagnosis to the correct one in a RF communication circuitry. On the GRF-1300/1300A panel, there are five test points set at different joints of circuit blocks. Through turning on or off the corresponding relays of the five test points enables the teachers to simulate the faults and teach students diagnosis technique.

The economical solution of GSP-730 and GRF-1300 greatly lowers the budget barriers for providing fundamental RF Communications Educations and facilitates the establishment of RF communication experiment labs with more training stations in schools.

TEST POINTS ON GRF-1300 FOR FAULT DIAGNOSIS



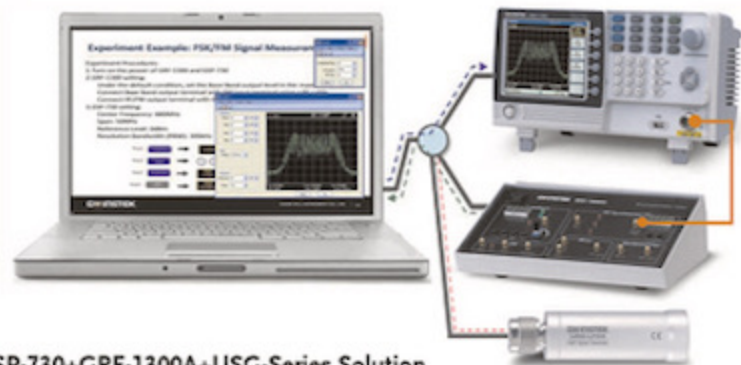
CURRICULUM CONTENTS

- Introductions of Frequency Domain , Time Domain , and Spectrum Analyzer Basics.
- 9 Experiments Include
 - Operations of Spectrum Analyzer
 - Base band and RF signal measurements
 - AM and FM signal measurements
 - Communication system and product measurements
- Learning Outcome Tests
- Auxiliary Tools
 - PPT files including all experiments contents
 - Remote control software to control GRF-1300, GSP-730 simultaneously
 - Experiment text books including the student version and the teacher(optional)

A. AN ECONOMIC TURN-KEY SOLUTION



GSP-730+GRF-1300 Solution



GSP-730+GRF-1300A+USG-Series Solution

FULLY-ELECTRONIC RF TRAINING SYSTEM

In class, teachers can connect GSP-730 and GRF-1300 with a PC via USB or RS-232 interface. First of all, all the contents of experiment has been converted into power-point slides and provided as the in-class materials. During lecturing the power-point slides, both GSP-730 and GRF-1300 can be remotely set by GRF Training System Control Software. Moreover, the signal shown on GSP-730 can be transferred to PC screen for further research. As a result, GSP-730 and GRF-1300 form an inclusive electronic-teaching-material package which efficiently simplifies lecturers' tasks before classes and shortens the process of the material preparation, and meanwhile, enhances the quality of the lecture. If the PC can only offer one USB interface, an extra purchase of USB hub* may solve the problem of insufficient USB interfaces. With proper installation, PC can manage the conjunction of GSP-730 and GRF-1300.

Properly connect Spectrum Analyzer, GRF-1300A RF and Communications Trainer, USG-LF44 RF Signal Generator and a PC to perform ongoing experiments while the lecture is being given. Using a PC, teacher can present teaching material with Power Point slides and simultaneously control GSP-730, GRF-1300A and USG-LF44 to perform experiments and get spectrum displays parameter readings on the PC screen. GSP-730, GRF-1300A and USG-LF44 easily transfer the current teaching materials including the PowerPoint slides, textbook and the remote control software into electronic-teaching system.

* USB hub is excluded from the product standard accessories.

3GHz Spectrum Analyzer

GSP-730 & GRF-1300/1300A

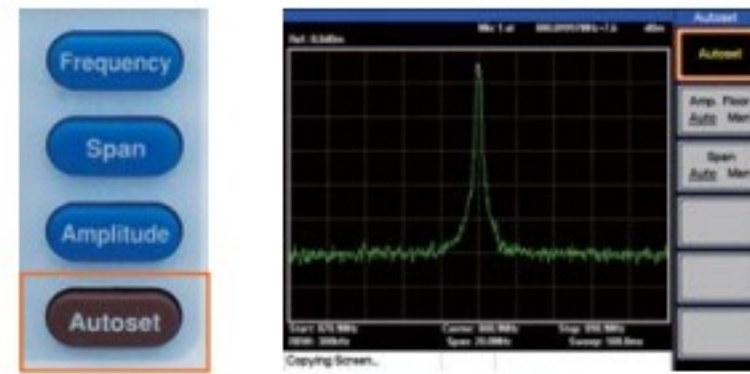
SPECTRUM ANALYZERS & COMMUNICATION TESTERS

B. PC SOFTWARE FOR GSP-730 and GRF-1300 REMOTE CONTROL



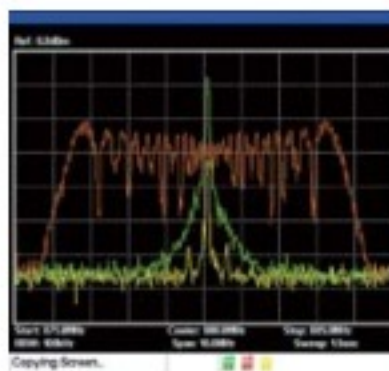
The dedicated PC software, Primary RF, is provided to support the remote control of GSP-730 and GRF-1300 simultaneously. The control includes base band signal waveform, frequency and RF signal frequency for GRF-1300 and Frequency, Span, Amplitude, RBW and spectrum transferring of GSP-730.

C. AUTOSET FUNCTION



The Autoset function automatically captures the signal and configures an appropriate setting for the optimum spectrum display at just one press of the button. With the Autoset function, using a spectrum analyzer like GSP-730 is no longer an annoying and complicated task.

D. THREE-TRACE DISPLAY WITH THREE-COLOR IDENTITY



GSP-730 can illustrate a signal with three colors simultaneously under various display modes, including Clear/Write, Max-Peak Hold, Min-Peak Hold, View, Blank and Average. Other useful trace functions such as trace math operations are also accomplishable.

E. MARKER FUNCTION



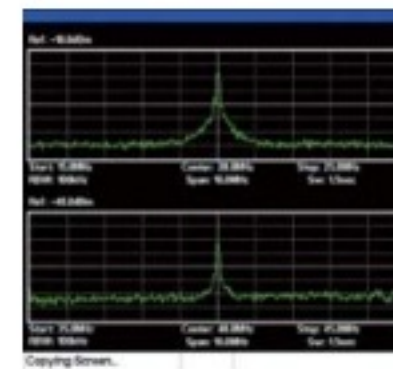
Five Markers can be used to obtain the measurement readings of specified points. Each marker has a counterpart Δ Marker, the amplitude difference can be measured and indicated by setting the frequency of marker and the interval frequency of Δ Marker between two signals. While several pairs of Markers are used for marking more than one pair of signals at the same time, the Marker Table can be turned on and it can process all the tests and demonstrate the reading figures.

F. SETTING STATUS PRESENTED BY ICONS



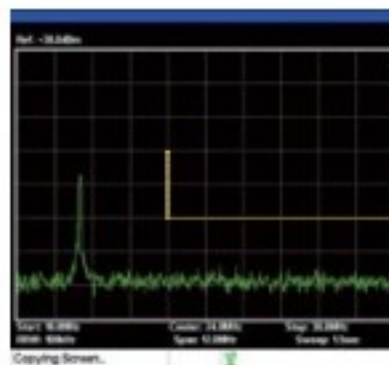
The intuitive icons help users grasp the current setting conditions all the time. As all status icons are clearly shown at the corner of the screen, there is no need to worry about the unknown settings, which may cause confusion and lead to measurement errors.

G. SPLIT-WINDOW DISPLAY IN LIVE MODE



Under Split-Window Display Mode, the monitor will display two independent screens, which can respectively have separated settings. For instance, if processing the test between fundamental and harmonic signals, the separated screens can respectively set at different frequencies at the same time in order to process the measurement.

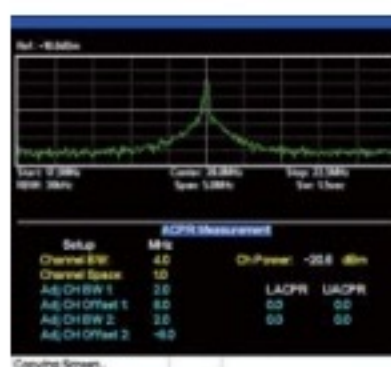
H. PASS/FAIL JUDGMENTS



This function may run the “Pass” and “Fail” inspection with efficiency. Firstly, a limit line or upper and lower limit lines should be edited as the judgment criterion, then the LCD will display

“Pass” or “Fail” according to whether the input signal meets the condition defined by the limit lines to indicate the examined outcome.

I. POWER MEASUREMENT FUNCTION



ACPR

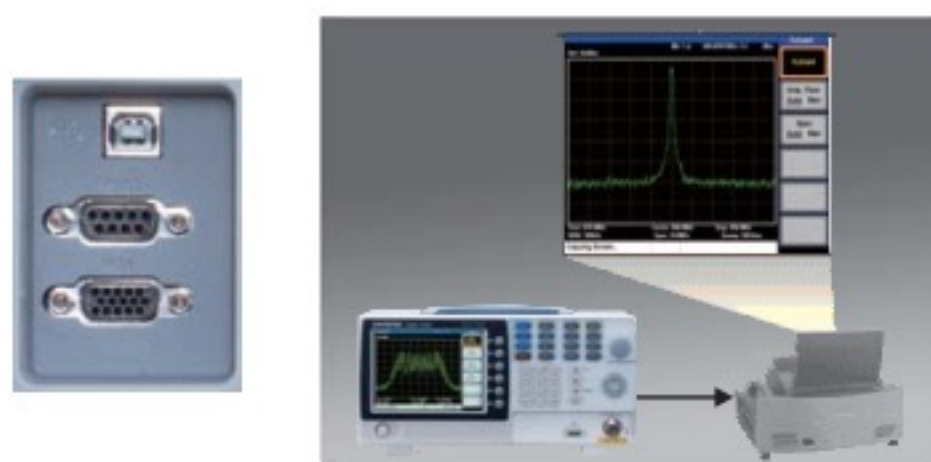


OCBW

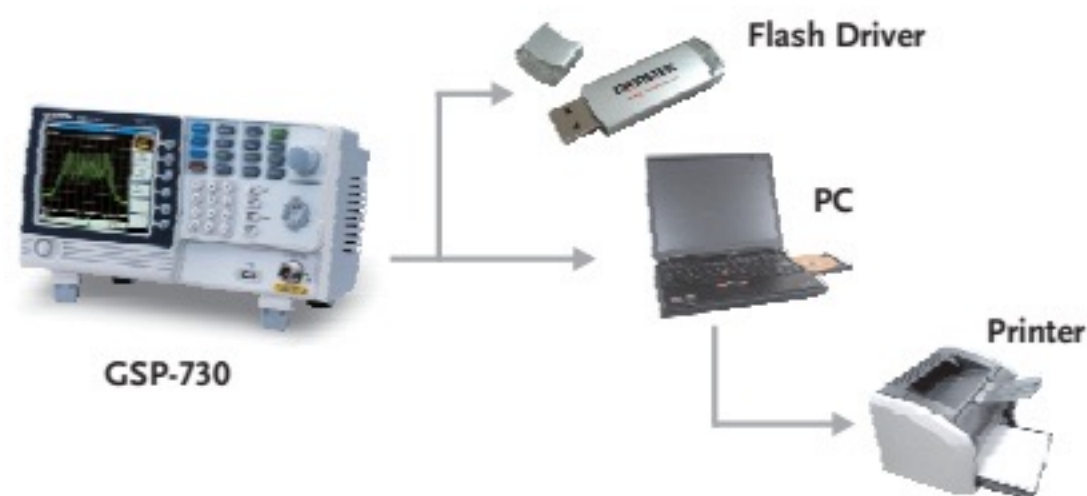
GSP-730 provides measurement functions such as ACPR, OCBW, and Channel Power. These items are regulated to be tested in recent communication systems, such as CDMA system. GSP-730

will illustrate channels by various colors so that the operation may become more precise and may minimize errors.

J. FLEXIBLE INTERFACE











The USB host interface on GSP-730 front panel allows the measuring diagrams to be saved in the memory stick. The USB Device and RS-232C interfaces on the rear panel are capable of connecting with a PC for remote control. VGA output can transfer



whatever demonstrated on the LCD display to other display device or projector, which will strengthen the impression while giving the lectures.

ACCESSORIES

MODEL	DESCRIPTION	CATEGORY	APPLICABLE DEVICE
ADP-001	Adaptor, 50Ω, BNC(J/F) - N(P/M)	Adaptor	GSP-Series
ADP-002	Adaptor, 50Ω, SMA(J/F) - N(P/M)	Adaptor	GSP-Series
ADP-101	Adaptor, 75Ω BNC(J/F) - 50Ω BNC(P/M)	Adaptor	GSP-Series
ATN-100	Adaptor, 10dB Attenuator, 50Ω, N(J/F)-N(P/M)	Adaptor	GSP-Series
GAK-001	Adaptor, 50Ω Termination, N(P/M)	Adaptor	GSP-Series
GAK-002	Adaptor, Cap with Chain, N(P/M)	Adaptor	GSP-Series
GSC-009	Soft Carrying Case	Bag	GSP-9330, GSP-9300B
GTL-246	USB Cable, USB 2.0, A-B Type, 1200mm	Communication Cable	GSP-Series
GTL-248	GPIB Cable, Double Shielded, 2000mm	Communication Cable	GSP-9330, GSP-9300B
GTL-250	GPIB Cable, Double Shielded, 600mm	Communication Cable	GSP-9330, GSP-9300B
GTL-110	BNC Cable, BNC(P/M)-BNC(P/M), 1000mm	General Lead	GSP-Series
GTL-301	RF Cable, RG223 Assembly, 1000mm, N(P/M)	General Lead	GSP-Series
GTL-302	RF Cable, RG223 Assembly, 300mm, N(P/M)	General Lead	GSP-Series
GTL-303	RF Cable, RG316 Assembly, 600mm, SMA(P/M)	General Lead	GSP-Series, GRF-1300/1300A
GTL-304	RF Cable, RG223 Assembly, 280mm, N(P/M) - N(J/F)	General Lead	GSP-Series
GRA-415	Rack Mount Kit, 19", 6U Size	Rack	GSP-9330, GSP-9300B
ADB-002	Adapter, DC Block, BNC(P/M)-BNC(J/K), 50W, 10MHz~2.2GHz	EMI Application	GSP-Series
ADB-006	Adapter, DC Block, N(P/M)-N(J/K), 50W, 10MHz~6GHz	EMI Application	GSP-Series
ADB-008	Adapter, DC Block SMA(P/M)-SMA(J/K), 50W, 0.1MHz~8GHz	EMI Application	GSP-Series
GKT-008	EMI Probe Kit Set, Including ANT-04, ANT-05, PR-01, PR-02, ADP-002, GTL-303	EMI Application	GSP-Series
GLN-5040A	Line Impedance Stabilization Network (LISN), AC Single Phase, 9kHz~30MHz	EMI Application	GSP-Series
GIT-5060	Isolated transformer, 900VA Capacity	EMI Application	GSP-Series
GPL-5010	Transient Limiter, Input: BNC(J/F), Output: M(P/M), 9kHz~200MHz	EMI Application	GSP-Series
ATA-001	Antenna, General FM Antenna, BNC(P/M)	Special Application	GSP-Series
GBK-001	GRF-1300 Experiment Text Book of Teacher Version	Special Application	GRF-1300
GBK-002	GRF-1300A Experiment Text Book of Teacher Version	Special Application	GRF-1300A
GKT-001	General Kit Set, Including ADP-002, ATN-100, GTL-303, GSC-002	Special Application	GSP-Series
GKT-002	CATV Kit Set, Including ADP-001, ADP-101, GTL-304, GSC-003	Special Application	GSP-Series
GKT-003	RLB Kit Set, Including GAK-001, GAK-002, GTL-302, GSC-004	Special Application	GSP-Series
RLB-001	Return Loss Bride, 10MHz - 1GHz, Source/Load: N(J/F), Coupling: N(P/M)	Special Application	GSP-Series

<p>GTL-110 BNC Cable, BNC(P/M)-BNC(P/M), 1000mm</p> 	<p>GTL-246 USB Cable, USB 2.0, A-B Type, 1200mm</p> 	<p>GRA-415 Rack Adapter Kit</p> 
<p>GTL-248 GPIB Cable, Double Shielded, 2000mm</p> 	<p>GTL-250 GPIB Cable, Double Shielded, 600mm</p> 	<p>GPL-5010 Transient Limiter, Input: BNC(J/F), Output: M(P/M), 9kHz~200MHz</p> 
<p>GLN-5040A Line Impedance Stabilization Network (LISN), AC Single Phase, 9kHz~30MHz</p> 	<p>GIT-5060 Isolated transformer, 900VA Capacity</p> 	

ACCESSORIES

MODEL	DESCRIPTION	CATEGORY	APPLICABLE DEVICE
ADP-001	Adaptor, 50Ω, BNC(J/F) - N(P/M)	Adaptor	GSP-Series
ADP-002	Adaptor, 50Ω, SMA(J/F) - N(P/M)	Adaptor	GSP-Series
ADP-101	Adaptor, 75Ω BNC(J/F) - 50Ω BNC(P/M)	Adaptor	GSP-Series
ATN-100	Adaptor, 10dB Attenuator, 50Ω, N(J/F)-N(P/M)	Adaptor	GSP-Series
GAK-001	Adaptor, 50Ω Termination, N(P/M)	Adaptor	GSP-Series
GAK-002	Adaptor, Cap with Chain, N(P/M)	Adaptor	GSP-Series
GSC-009	Soft Carrying Case	Bag	GSP-9330, GSP-9300B
GTL-246	USB Cable, USB 2.0, A-B Type, 1200mm	Communication Cable	GSP-Series
GTL-248	GPIB Cable, Double Shielded, 2000mm	Communication Cable	GSP-9330, GSP-9300B
GTL-250	GPIB Cable, Double Shielded, 600mm	Communication Cable	GSP-9330, GSP-9300B
GTL-110	BNC Cable, BNC(P/M)-BNC(P/M), 1000mm	General Lead	GSP-Series
GTL-301	RF Cable, RG223 Assembly, 1000mm, N(P/M)	General Lead	GSP-Series
GTL-302	RF Cable, RG223 Assembly, 300mm, N(P/M)	General Lead	GSP-Series
GTL-303	RF Cable, RG316 Assembly, 600mm, SMA(P/M)	General Lead	GSP-Series, GRF-1300/1300A
GTL-304	RF Cable, RG223 Assembly, 280mm, N(P/M) - N(J/F)	General Lead	GSP-Series
GRA-415	Rack Mount Kit, 19", 6U Size	Rack	GSP-9330, GSP-9300B
ADB-002	Adapter, DC Block, BNC(P/M)-BNC(J/K), 50W, 10MHz~2.2GHz	EMI Application	GSP-Series
ADB-006	Adapter, DC Block, N(P/M)-N(J/K), 50W, 10MHz~6GHz	EMI Application	GSP-Series
ADB-008	Adapter, DC Block SMA(P/M)-SMA(J/K), 50W, 0.1MHz~8GHz	EMI Application	GSP-Series
GKT-008	EMI Probe Kit Set, Including ANT-04, ANT-05, PR-01, PR-02, ADP-002, GTL-303	EMI Application	GSP-Series
GLN-5040A	Line Impedance Stabilization Network (LISN), AC Single Phase, 9kHz~30MHz	EMI Application	GSP-Series
GIT-5060	Isolated transformer, 900VA Capacity	EMI Application	GSP-Series
GPL-5010	Transient Limiter, Input: BNC(J/F), Output: M(P/M), 9kHz~200MHz	EMI Application	GSP-Series
ATA-001	Antenna, General FM Antenna, BNC(P/M)	Special Application	GSP-Series
GBK-001	GRF-1300 Experiment Text Book of Teacher Version	Special Application	GRF-1300
GBK-002	GRF-1300A Experiment Text Book of Teacher Version	Special Application	GRF-1300A
GKT-001	General Kit Set, Including ADP-002, ATN-100, GTL-303, GSC-002	Special Application	GSP-Series
GKT-002	CATV Kit Set, Including ADP-001, ADP-101, GTL-304, GSC-003	Special Application	GSP-Series
GKT-003	RLB Kit Set, Including GAK-001, GAK-002, GTL-302, GSC-004	Special Application	GSP-Series
RLB-001	Return Loss Bride, 10MHz - 1GHz, Source/Load: N(J/F), Coupling: N(P/M)	Special Application	GSP-Series

GTL-110 BNC Cable, BNC(P/M)-BNC(P/M), 1000mm



GTL-246 USB Cable, USB 2.0, A-B Type, 1200mm



GRA-415 Rack Adapter Kit



GTL-248 GPIB Cable, Double Shielded, 2000mm



GTL-250 GPIB Cable, Double Shielded, 600mm



GPL-5010 Transient Limiter, Input: BNC(J/F), Output: M(P/M), 9kHz~200MHz



GLN-5040A Line Impedance Stabilization Network (LISN), AC Single Phase, 9kHz~30MHz



GIT-5060 Isolated transformer, 900VA Capacity





SIGNAL SOURCES

GW Instek has been one of the major signal source suppliers for worldwide users by providing the advanced-featured products for decades. The wide product lines including MFG (Multi-Channel Function Generator), AFG (Arbitrary Function Generator), RF Signal Generator and DDS (Direct Digital Synthesized) Function Generators are well provided. The MFG-2000 Series is a mainstay function generator and its special feature is that you can output maximum five channels simultaneously. One of the five channels is RF Generator and its frequency is from 1 μ Hz to 160MHz/320MHz. The isolated channel design is an important feature of GW Instek function generators. Output Channels, synchronization and modulation input/output connector grounding are isolated from instrument chassis. The MFG-2000 Series is designed for scientific research and educational applications by the RF Generator and the isolated design. The AFG-3000 Series is designed for industrial, scientific research and educational applications by the high sample rate and the long waveform length. The AFG-2000 Series are designed to accommodate the educational and basic industrial requirements. The USG-Series is a pocket-sized, and USB interface compatible RF signal generator. The SFG-Series is a DDS based design for entry level engineering and educational applications. To fit versatile applications, each product line features different frequency ranges and/or specifications to meet the demands. Last but not least, Audio Generators are also provided for the specific fields.

PRODUCTS

- Arbitrary Function Generator
- Multi-Channel Function Generator
- DDS Function Generator
- Audio Generator
- RF Signal Generator

ARBITRARY FUNCTION GENERATOR OVERVIEW

Arbitrary function generator (ARB) is a digital-synthesized-technique based signal generator which generates both arbitrary and function waveforms. For the arbitrary waveform, the demanded waveform data can be edited by different means, saved into the memory, and sent out thru a digital to analog converter as a stimulus source. For the function waveform generation part in arbitrary function generator, the commonly used function waveforms like sine, square, triangle, ramp, pulse ... etc. are built into the memory for selection, which is referred to DDS (Direct Digital Synthesized) type function generator. The AM, FM, FSK, PWM and Sweep function, etc are usually optional features.

One major difference of the circuit structure between ARB and DDS function generator is that a low pass filter is used at the digital-to-analog converter (DAC) output to smooth out the quantization steps in DDS function generator. Therefore when a function waveform is demanded, in order to obtain low-distortion waveform, the signal generated from function section is suggested instead of ARB section.

The major specifications for arbitrary waveform generation are described as follows.

Sample Rate, Repetition Rate and True-Point-by-Point Arbitrary Waveform

The profile of arbitrary waveform is composed of a series of data. The frequency of arbitrary waveform is derived from sampling rate divided by the number of points constructing a complete waveform, i.e. $\text{frequency} = \text{sampling rate} / \text{number of points in waveform}$. Based on the equation, the higher the sampling rate, the higher the arbitrary waveform frequency can be available.

The ultimate case of composing an arbitrary waveform is the waveform made of two points. The frequency of the two-points-waveform is supposed to be half of the sample rate according to the above equation. But many ARB waveform generators do not follow this rule. The Repetition Rate is used to describe the limitation of highest frequency can be composed for the arbitrary waveform. It could be one third, one forth... etc of the sample rate. In case of the repetition is half of sample rate, it is true-point-by-point arbitrary waveform generator.

Vertical Resolution

The vertical resolution in arbitrary waveform represents the quantization distortion level, which the bit number of DAC plays the main role to decide it.

The higher bit DAC generates the output levels in finer steps, the output signal is less distorted and with less noise.

Memory Length

The waveform data is stored in the memory for sending out. More memory allows more waveform data to be stored, which is convenient for users to create a complex or lasting long waveform.

ARBITRARY FUNCTION GENERATOR

ARBITRARY FUNCTION GENERATOR SELECTION GUIDE OF AFG-3000 Series

MODEL		AFG-3032	AFG-3031	AFG-3022	AFG-3021	AFG-3081	AFG-3051
	Technology	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS
CHANNEL	Analog Channel	2	1	2	1	1	1
ISOLATED DESIGN	Isolated	V	V	V	V	-	-
RF	RF Generator Frequency	-	-	-	-	-	-
FREQUENCY	Frequency Range	1μHz – 30MHz	1μHz – 30MHz	1μHz – 20MHz	1μHz – 20MHz	1μHz – 80MHz	1μHz – 50MHz
	Frequency Resolution	1μHz	1μHz	1μHz	1μHz	1μHz	1μHz
ARB	Sample Rate	250MSa/s	250MSa/s	250MSa/s	250MSa/s	200MSa/s	200MSa/s
	Repetition Rate	125MHz	125MHz	125MHz	125MHz	100MHz	100MHz
	Memory Length	8M Points	8M Points	8M Points	8M Points	1M Points	1M Points
	Vertical Resolution	16-bit	16-bit	16-bit	16-bit	16-bit	16-bit
OUTPUT	Amplitude Range (@50Ω)	1mVpp ~ 10Vpp	1mVpp ~ 10Vpp	1mVpp ~ 10Vpp	1mVpp ~ 10Vpp	1mVpp ~ 10Vpp	1mVpp ~ 10Vpp
	DC Offset (@50Ω)	±5Vpk (AC+DC)	±5Vpk (AC+DC)	±5Vpk (AC+DC)	±5Vpk (AC+DC)	±5Vpk (AC+DC)	±5Vpk (AC+DC)
	Amplitude Unit	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm
	Impedance Switch	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z
FAN OUT	TTL Output/Sync Output	V	V	V	V	V	V
SQUARE CHARACTERISTIC	Square Rise/Fall Time	<8ns	<8ns	<8ns	<8ns	<8ns	<8ns
	Square Duty Cycle	20% – 80%	20% – 80%	20% – 80%	20% – 80%	20% – 80%	20% – 80%
PULSE CHARACTERISTIC	Pulse Width	20ns–999830s	20ns–999830s	20ns–999830s	20ns–999830s	8ns–1999.9s	8ns–1999.9s
	Duty Cycle	0.017%–99.983%	0.017%–99.983%	0.017%–99.983%	0.017%–99.983%	-	-
	Leading and Trailing Edge Time	9.32ns–799900s	9.32ns–799900s	9.32ns–799900s	9.32ns–799900s	<8ns	<8ns
BASIC WAVEFORM	Sine	V	V	V	V	V	V
	Square	V	V	V	V	V	V
	Triangle/Ramp	V	V	V	V	V	V
	Pulse	V	V	V	V	V	V
	Noise	V	V	V	V	V	V
	Harmonic	V	V	V	V	-	-
	Burst	V	V	V	V	V	V
	DC	V	V	V	V	V	V
SWEEP FUNCTION	Sweep	V	V	V	V	V	V
MODULATION	AM	V	V	V	V	V	V
	FM	V	V	V	V	V	V
	PM	V	V	V	V	-	-
	FSK	V	V	V	V	V	V
	ASK	-	-	-	-	-	-
	PSK	-	-	-	-	-	-
	PWM	V	V	V	V	V	V
	SUM	V	V	V	V	-	-
COUNTER FUNCTION	Counter	-	-	-	-	-	-
OTHERS	Ext. Trigger Input	V	V	V	V	V	V
	Ext. Modulation Input	V	V	V	V	V	V
	Trigger Output	-	-	-	-	V	V
	Modulation Output	-	-	-	-	V	V
	Marker Output	-	-	-	-	V	V
POWER AMPLIFIER	Power Amplifier, Inout, Output	-	-	-	-	-	-
INTERFACE	GPIO(Including option)	V	V	V	V	V	V
	USB Host	V	V	V	V	V	V
	USB Device	V	V	V	V	V	V
	LAN	V	V	V	V	-	-
	RS-232C	-	-	-	-	V	V
DISPLAY	Display	4.3" TFT LCD	4.3" TFT LCD	4.3" TFT LCD	4.3" TFT LCD	4.3" TFT LCD	4.3" TFT LCD
	Voltage Display	V	V	V	V	V	V
DSO LINK	DSO Link	V	V	V	V	V	V
STORAGE MEMORY	Internal Storage Memory	10 Groups	10 Groups	10 Groups	10 Groups	10 Groups	10 Groups
LABVIEW	LabView Driver	V	V	V	V	V	V
POWER	Power Source	AC100 – 240V	AC100 – 240V	AC100 – 240V	AC100 – 240V	AC100 – 240V	AC100 – 240V
	Power Consumption	85VA	50VA	85VA	50VA	65VA	65VA
Page		C6-13	C6-13	C6-13	C6-13	C14-15	C14-15

ARBITRARY FUNCTION GENERATOR

ARBITRARY FUNCTION GENERATOR SELECTION GUIDE OF MFG-2000 Series

MODEL		MFG-2220HM	MFG-2260MRA	MFG-2260MFA	MFG-2260M	MFG-2230M	MFG-2160MR	MFG-2160MF	MFG-2130M	MFG-2120MA	MFG-2120	MFG-2110
	Technology	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS
CHANNEL	Analog Channel	2	2	2	2	2	1	1	1	1	1	1
ISOLATED DESIGN	Isolated	-	V	V	V	V	V	V	V	V	V	V
RF	RF Generator Frequency	-	320MHz	160MHz	-	-	320MHz	160MHz	-	-	-	-
FREQUENCY	Frequency Range	200MHz	60MHz	60MHz	60MHz	30MHz	60MHz	60MHz	30MHz	20MHz	20MHz	10MHz
	Frequency Resolution	1μHz	1μHz	1μHz	1μHz	1μHz	1μHz	1μHz	1μHz	1μHz	1μHz	1μHz
ARB	Sample Rate	250MS/s	200MSa/s	200MSa/s	200MSa/s	200MSa/s	200MSa/s	200MSa/s	200MSa/s	200MSa/s	200MSa/s	200MSa/s
	Repetition Rate	125MHz	100MHz	100MHz	100MHz	100MHz	100MHz	100MHz	100MHz	100MHz	100MHz	100MHz
	Memory Length	16k Points	16k Points	16k Points	16k Points	16k Points	16k Points	16k Points	16k Points	16k Points	16k Points	16k Points
	Vertical Resolution	14-bit	14-bit	14-bit	14-bit	14-bit	14-bit	14-bit	14-bit	14-bit	14-bit	14-bit
OUTPUT	Amplitude Range (@50Ω)	1mVpp-10Vpp	1mVpp-10Vpp	1mVpp-10Vpp	1mVpp-10Vpp	1mVpp-10Vpp	1mVpp-10Vpp	1mVpp-10Vpp	1mVpp-10Vpp	1mVpp-10Vpp	1mVpp-10Vpp	1mVpp-10Vpp
	DC Offset (@50Ω)	±5Vpk (AC+DC)	±5Vpk (AC+DC)	±5Vpk (AC+DC)	±5Vpk (AC+DC)	±5Vpk (AC+DC)	±5Vpk (AC+DC)	±5Vpk (AC+DC)	±5Vpk (AC+DC)	±5Vpk (AC+DC)	±5Vpk (AC+DC)	±5Vpk (AC+DC)
	Amplitude Unit	Vpp,Vrms,dBm	Vpp,Vrms,dBm	Vpp,Vrms,dBm	Vpp,Vrms,dBm	Vpp,Vrms,dBm	Vpp,Vrms,dBm	Vpp,Vrms,dBm	Vpp,Vrms,dBm	Vpp,Vrms,dBm	Vpp,Vrms,dBm	Vpp,Vrms,dBm
	Impedance Switch	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z
FAN OUT	TTL Output/Sync Output	V	V	V	V	V	V	V	V	V	V	V
SQUARE CHARACTERISTIC	Square Rise/Fall Time	<15ns	<15ns	<15ns	<15ns	<15ns	<15ns	<15ns	<15ns	<15ns	<15ns	<15ns
	Square Duty Cycle	0.01%~99.99%	0.01%~99.99%	0.01%~99.99%	0.01%~99.99%	0.01%~99.99%	0.01%~99.99%	0.01%~99.99%	0.01%~99.99%	0.01%~99.99%	0.01%~99.99%	0.01%~99.99%
PULSE CHARACTERISTIC	Pulse Width	20ns-999.9ks	20ns-999.9ks	20ns-999.9ks	20ns-999.9ks	20ns-999.9ks	20ns-999.9ks	20ns-999.9ks	20ns-999.9ks	20ns-999.9ks	20ns-999.9ks	20ns-999.9ks
	Duty Cycle	0.01%~99.99%	0.01%~99.99%	0.01%~99.99%	0.01%~99.99%	0.01%~99.99%	0.01%~99.99%	0.01%~99.99%	0.01%~99.99%	0.01%~99.99%	0.01%~99.99%	0.01%~99.99%
	Leading and Trailing Edge Time	10ns-20s	10ns-20s	10ns-20s	10ns-20s	10ns-20s	10ns-20s	10ns-20s	10ns-20s	10ns-20s	10ns-20s	10ns-20s
BASIC WAVEFORM	Sine	V	V	V	V	V	V	V	V	V	V	V
	Square	V	V	V	V	V	V	V	V	V	V	V
	Triangle/Ramp	V	V	V	V	V	V	V	V	V	V	V
	Pulse	V	V	V	V	V	V	V	V	V	V	V
	Noise	V	V	V	V	V	V	V	V	V	V	V
	Harmonic	-	-	-	-	-	-	-	-	-	-	-
	Burst	V	V	V	V	V	V	V	V	V	-	-
	DC	-	-	-	-	-	-	-	-	-	-	-
SWEEP FUNCTION	Sweep	V	V	V	V	V	V	V	V	-	-	
MODULATION	AM	V	V	V	V	V	V	V	V	V	-	-
	FM	V	V	V	V	V	V	V	V	V	-	-
	PM	V	V	V	V	V	V	V	V	V	-	-
	FSK	V	V	V	V	V	V	V	V	V	-	-
	ASK(RF Channel)	V	V	V	-	-	V	V	-	-	-	-
	PSK(RF Channel)	V	V	V	-	-	V	V	-	-	-	-
	PWM	V	V	V	V	V	V	V	V	V	-	-
	SUM	V	V	V	V	V	V	V	V	V	-	-
COUNTER FUNCTION	Counter	V	V	V	V	V	V	V	V	-	-	
OTHERS	Ext. Trigger Input	V	V	V	V	V	V	V	V	V	-	-
	Ext. Modulation Input	V	V	V	V	V	V	V	V	V	-	-
	Trigger Output	V	V	V	V	V	V	V	V	V	-	-
	Modulation Output	-	-	-	-	-	-	-	-	-	-	-
	Marker Output	V	V	V	V	V	V	V	V	V	-	-
POWER AMPLIFIER	Power Amplifier,Inout,Output	V	V	V	-	-	-	-	-	V	-	-
INTERFACE	GPIB(Including option)	-	-	-	-	-	-	-	-	-	-	-
	USB Host	V	V	V	V	V	V	V	V	V	V	V
	USB Device	V	V	V	V	V	V	V	V	V	V	V
	LAN(By Model)	V	V	V	V	V	-	-	-	-	-	-
	RS232C	-	-	-	-	-	-	-	-	-	-	-
DISPLAY	Display	4.3" TFT LCD	4.3" TFT LCD	4.3" TFT LCD	4.3" TFT LCD	4.3" TFT LCD	4.3" TFT LCD	4.3" TFT LCD	4.3" TFT LCD	4.3" TFT LCD	4.3" TFT LCD	4.3" TFT LCD
	Voltage Display	V	V	V	V	V	V	V	V	V	V	V
DSO LINK	DSO Link	V	V	V	V	V	-	-	-	-	-	-
STORAGE MEMORY	Internal Storage Memory	10 Groups	10 Groups	10 Groups	10 Groups	10 Groups	10 Groups	10 Groups	10 Groups	10 Groups	10 Groups	10 Groups
LABVIEW	LabView Driver	V	V	V	V	V	V	V	V	V	V	V
POWER	Power Source	AC100 ~ 240V	AC100 ~ 240V	AC100 ~ 240V	AC100 ~ 240V	AC100 ~ 240V	AC100 ~ 240V	AC100 ~ 240V	AC100 ~ 240V	AC100 ~ 240V	AC100 ~ 240V	AC100 ~ 240V
	Power Consumption	30W~80W	30W~80W	30W~80W	30W~80W	30W~80W	30W~80W	30W~80W	30W~80W	30W~80W	30W~80W	30W~80W
Page		C16-22	C16-22	C16-22	C16-22	C16-22	C16-22	C16-22	C16-22	C16-22	C16-22	C16-22

ARBITRARY FUNCTION GENERATOR

ARBITRARY FUNCTION GENERATOR SELECTION GUIDE OF AFG-2000 Series

MODEL		AFG-2225	AFG-2125	AFG-2112	AFG-2105	AFG-2025	AFG-2012	AFG-2005
	Technology	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS	Arbitrary / DDS
CHANNEL	Analog Channel	2	1	1	1	1	1	1
RF	RF Generator Frequency	-	-	-	-	-	-	-
FREQUENCY	Frequency Range	1μHz – 25MHz	0.1Hz – 25MHz	0.1Hz – 12MHz	0.1Hz – 5MHz	0.1Hz – 25MHz	0.1Hz – 12MHz	0.1Hz – 5MHz
	Frequency Resolution	1μHz	0.1Hz	0.1Hz	0.1Hz	0.1Hz	0.1Hz	0.1Hz
ARB	Sample Rate	120MSa/s	20MSa/s	20MSa/s	20MSa/s	20MSa/s	20MSa/s	20MSa/s
	Repetition Rate	60MHz	10MHz	10MHz	10MHz	10MHz	10MHz	10MHz
	Memory Length	4k Points	4k Points	4k Points	4k Points	4k Points	4k Points	4k Points
	Vertical Resolution	10-bit	10-bit	10-bit	10-bit	10-bit	10-bit	10-bit
OUTPUT	Amplitude Range (@50Ω)	1mVpp – 10Vpp (≤ 20MHz) 1mVpp – 5Vpp (>20MHz)	1mVpp – 10Vpp (≤ 20MHz) 1mVpp – 5Vpp (>20MHz)	1mVpp – 10Vpp	1mVpp – 10Vpp	1mVpp – 10Vpp (≤ 20MHz) 1mVpp – 5Vpp (>20MHz)	1mVpp – 10Vpp	1mVpp – 10Vpp
	DC Offset (@50Ω)	±5Vpk (AC+DC) (≤ 20MHz) ±2.5Vpk (AC+DC) (>20MHz)	±5Vpk (AC+DC) (≤ 20MHz) ±2.5Vpk (AC+DC) (>20MHz)	±5Vpk (AC+DC)	±5Vpk (AC+DC)	±5Vpk (AC+DC) (≤ 20MHz) ±2.5Vpk (AC+DC) (>20MHz)	±5Vpk (AC+DC)	±5Vpk (AC+DC)
	Amplitude Unit	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm	Vpp, Vrms, dBm
	Impedance Switch	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z	50Ω / Hi-Z
FAN OUT	TTL Output/Sync Output	-	V	V	V	V	V	V
SQUARE CHARACTERISTIC	Square Rise/Fall Time	≤ 25ns	≤ 25ns	≤ 25ns	≤ 25ns	≤ 25ns	≤ 25ns	≤ 25ns
	Square Duty Cycle	1% – 99%	1% – 99%	1% – 99%	1% – 99%	1% – 99%	1% – 99%	1% – 99%
PULSE CHARACTERISTIC	Pulse Width	20ns~1999.9s	-	-	-	-	-	-
	Duty Cycle	-	-	-	-	-	-	-
	Leading and Trailing Edge Time	-	-	-	-	-	-	-
BASIC WAVEFORM	Sine	V	V	V	V	V	V	V
	Square	V	V	V	V	V	V	V
	Triangle/Ramp	V	V	V	V	V	V	V
	Pulse	V	V	V	V	V	V	V
	Noise	V	V	V	V	V	V	V
	Burst	V	-	-	-	-	-	-
SWEEP FUNCTION	Sweep	V	V	V	V	-	-	-
MODULATION	AM / Modulation	V	V	V	V	-	-	-
	FM	V	V	V	V	-	-	-
	PM	V	-	-	-	-	-	-
	FSK	V	V	V	V	-	-	-
	ASK	-	-	-	-	-	-	-
	PSK	-	-	-	-	-	-	-
	PWM	-	-	-	-	-	-	-
	SUM	V	-	-	-	-	-	-
COUNTER FUNCTION	Counter	V	V	V	V	-	-	-
OTHERS	Ext. Trigger Input	V	V	V	V	-	-	-
	Ext. Modulation Input	V	V	V	V	-	-	-
	Trigger Output	V	-	-	-	-	-	-
	Modulation Output	-	V	V	V	-	-	-
	Marker Output	-	-	-	-	-	-	-
INTERFACE	GPiB(Including option)	-	-	-	-	-	-	-
	USB Host	V	V	V	V	V	V	V
	USB Device	V	V	V	V	V	V	V
	LAN	-	-	-	-	-	-	-
	RS232C	-	-	-	-	-	-	-
DISPLAY	Display	3.5" TFT LCD	3.5" 3-Color LCD	3.5" 3-Color LCD	3.5" 3-Color LCD	3.5" 3-Color LCD	3.5" 3-Color LCD	3.5" 3-Color LCD
	Voltage Display	V	V	V	V	V	V	V
DSO LINK	DSO Link	V	X	X	X	X	X	X
STORAGE MEMORY	Internal Storage Memory	10 Groups	10 Groups	10 Groups	10 Groups	10 Groups	10 Groups	10 Groups
LABVIEW	LabView Driver	V	V	V	V	V	V	V
POWER	Power Source	AC100 – 240V	AC100 – 240V	AC100 – 240V	AC100 – 240V	AC100 – 240V	AC100 – 240V	AC100 – 240V
	Power Consumption	25W	25VA	25VA	25VA	25VA	25VA	25VA
Page		C23-25	C26-27	C26-27	C26-27	C26-27	C26-27	C26-27

SIGNAL SOURCES

30MHz/20MHz Arbitrary Function Generator



AFG-303X/302X Series



FEATURES

- * 1 μ Hz – 20 or 30MHz, 20Vpp, 1 or 2 Channel (s)
- * Arbitrary Waveform 250MSa/s, 16-bit Resolution, 8M Memory Depth
- * Isolation Channel Circuit Design
- * Synchronized Phase Operates up to 6 Units and 12 Channels
- * Harmonic Signal Generator
- * Dual Channel Models Support SUM Modulation, Coupling, Tracking, and Phase Functions
- * Pulse Waveform Parameters Can be Set Independently
- * Built-in AM/FM/PM/FSK/PWM/SUM Modulation, Sweep and Burst Functions
- * Built-in Medical and Automotive Electronic Waveforms
- * Built-in I/Q baseband Waveform on AFG-3032/3022
- * Provide USB/LAN/GPIB (Optional) Instrument Control Interface

GW Instek AFG-303X/302X arbitrary function generators include 20MHz/30MHz single isolated channel and 20/30 MHz dual isolated channel models, designed to meet industry, scientific research, and education applications. Not only output channel is earth ground isolation, dual channel models are also independently earth ground isolation, which is suitable for floating circuits (up to $\pm 42V$). Without taking grounding reference into consideration, each channel of dual channel models can be operated independently and multi ARB units can output simultaneously. Applications are, for instance, the ignition control or transmission device of automotive electronics. The series features sample rate of 250MSa/s, 16-bit resolution, and 8M point memory depth arbitrary waveform characteristics. Users can rebuild maximum 8M memory depth waveforms through using a GW Instek digital storage oscilloscope with the built-in DSOLink function of the AFG-303X/302X.

The series supports synchronized phase for multi channel operation and the maximum phase synchronization operation is up to 6 units and 12 channels. 10 MHz atomic clock frequency standard can be input via external signal source to elevate precision for frequency output. The series supports frequency sweep and amplitude sweep that can also integrate functions, including linear/logarithm, one-way (saw tooth)/two-way (triangle) waveforms, continuous/single trigger/gated trigger to meet various application requirements by applying different sweep methods. Frequency sweep tests the frequency response of electronic components such as filter and low frequency amplifier. Amplitude sweep simulates vibration tests (requires a vibration tester), and it also conducts aging tests of various materials and linearity tests of low frequency amplifier.

The main features of the AFG-303X/302X include output amplitude from 1mVpp to 10Vpp (connected with a 50 ohm load); frequency range from 1 μ Hz to 20MHz or 30MHz; 1 μ Hz frequency resolution; and built-in sine, square, pulse, triangle, ramp, DC voltage, harmonic and noise. The waveform width, rise edge time and fall edge time of pulse waveform can be adjusted flexibly. Pulse waveform, with duty cycle from 0.017% to 99.983%, can be applied as trigger signals. Users can conduct arbitrary editing via 65 built-in function waveforms. The series supports AM/FM/PM/FSK/PWM modulation, frequency sweep, amplitude sweep and burst to satisfy industrial application requirements. Dual channel models provide SUM modulation, coupling, tracking, and phase to meet the test requirements of differential signal, phase control and amplifier distortion. Built-in 8th harmonic signal generator simulates harmonic signal of switching power supplies and it also tests EMI power filter characteristics. The AFG-303X/302X provides free arbitrary waveform editing software (AWES) for users to quickly edit waveforms from the built-in diagrams so as to execute measurements.

SPECIFICATIONS				
	AFG-3031	AFG-3032	AFG-3021	AFG-3022
CHANNELS	1	2	1	2
FEATURES				
I/O Signal Ground for the Instrument Chassis	Connector shells for channel output(s), Sync output, 10MHz REF Input, Mod Input and Mod output are isolated from the instrument's chassis. Maximum allowable voltage on isolated connector shells is ± 42 Vpk. (DC + AC Peak)			
Each of the Signal Ground of CH1/CH2 Standard Waveforms	—	Isolated	—	Isolated
Arbitrary Waveforms	Sine, Square, Triangle, Ramp, Pulse, Noise, Harmonic, DC			
ARBITRARY WAVEFORMS				
Sample Rate	250 MSa/s			
Repetition Rate	125MHz			
Waveform Length	8M points			
Amplitude Resolution	16 bits			
Non-Volatile Memory	Ten 8M waveforms (1)			
User define Output Section	Any section from 2 – 8M points			
Trigger	Infinite/Manual/External			
Built-in Arbitrary Waveforms	Sine, Square, Ramp, Sinc, Exp Rise, Exp Fall, DC, Pulse, Abstan, Haversine, Sinever, Absin, Haversine, Stair_down, Absinehalf, N_pulse, Stair_UD, Ampalt, Negramp, Stair_up, Attalt, Rectpuls1, Stepresp, Diric_even, Roundhalf, Trapezia, Diric_odd, Sawtoot, Tripuls1, Gauspuls1, Sinetra, Dlorenz, Ln, Sqrt, Since, Lorentz, Xsquare, Gauss, Arccos, Arctan, Sech, Arccot, Arctanh, Sinh, Arccsc, Cosh, Tan, Arcsec, Cot, Tanh, Arcsin, Csc, Arcsinh, Sec, Barthannwin, Chebwin, Kaiser, Bartlett, Flattopwin, Triang, Blackman, Hamming, Tukeywin, Bohmanwin, Hann, Cardiac, EOG, EEG, EMG, PLETH, RESP, ECG1, ECG2, ECG3, ECG4, ECG5, ECG6, ECG7, ECG8, ECG9, ECG10, ECG11, ECG12, ECG13, ECG14, ECG15, LFPULSE, TENS1, TENS2, TENS3, IGNITION, SP, VR, TP1, TP2A, TP2B, TP3A, TP3B, TP4, TP5A, TP5B			
	<small>Note: It is required to update the ARB data first prior to enabling both Medical (Cardiac, EOG, EEG, EMG, PLETH, RESP, ECG1, ECG2, ECG3, ECG4, ECG5, ECG6, ECG7, ECG8, ECG9, ECG10, ECG11, ECG12, ECG13, ECG14, ECG15, LFPULSE, TENS1, TENS2, TENS3) and AutoElec (IGNITION, SP, VR, TP1, TP2A, TP2B, TP3A, TP3B, TP4, TP5A, TP5B) waveforms.</small>			
IQ WAVEFORMS				
Source Type	Random, Fixed Pattern			
	ASK, MSK, FSK, 2FSK, 4FSK, 8FSK, BPSK, QPSK, DQPSK, OQPSK, pi/4-QPSK, pi/4-DQPSK, 8PSK, 16APSK, 32APSK, 16QAM, 32QAM, 64QAM			
FREQUENCY CHARACTERISTICS				
Sine/Square Pulse	1 μ Hz – 30MHz 1 μ Hz – 25MHz	1 μ Hz – 30MHz 1 μ Hz – 25MHz	1 μ Hz – 20MHz 1 μ Hz – 20MHz	1 μ Hz – 20MHz 1 μ Hz – 20MHz
Triangle/Ramp Resolution	1 μ Hz – 1MHz 1 μ Hz			
Accuracy	± 1 ppm 0 – 50 $^{\circ}$ C ; ± 0.3 ppm 18 – 28 $^{\circ}$ C			
Stability Aging Tolerance	± 1 ppm, per 1 year ≤ 1 μ Hz			

30MHz/20MHz Arbitrary Function Generator



AFG-3032/3022

AFG-3000 Series

SIGNAL SOURCES

SPECIFICATIONS		AFG-3031	AFG-3032	AFG-3021	AFG-3022
OUTPUT CHARACTERISTICS (2)					
Amplitude	Range	1 mVpp – 10 Vpp (into 50Ω); 2 mVpp – 20 Vpp (into open-circuit)			
	Accuracy	± 1% of setting ±1 mVpp (at 1 kHz / into 50Ω without DC offset)			
	Resolution	0.1 mV or 4 digits			
	Flatness	0.1dB <10 MHz; 0.2 dB 10 MHz – 30 MHz (sinewave relative – 1 kHz/into 50Ω)			
	Units	Vpp, Vrms, dBm			
Offset	Range	±5 Vpk ac + dc (into 50Ω) ; ±10Vpk ac + dc (into open circuit)			
	Accuracy	1% of setting + 2 mV + 0.5% of amplitude			
Waveform Output	Impedance	50Ω typical (fixed); > 10MΩ (output disabled)			
SYNC Output	Protection	Short-circuit protected ; Overload relay automatically disables main output			
	Ground	42Vpk max.			
	Isolation				
	Level	TTL-compatible into>1kΩ			
	Impedance	50Ω nominal			
SINE WAVE CHARACTERISTICS					
Harmonic Distortion(5)		-60 dBc DC – 1 MHz, Ampl<3 Vpp; -55 dBc DC – 1 MHz, Ampl>3 Vpp			
Total Harmonic Distortion		-45 dBc 1MHz – 5 MHz, Ampl>3 Vpp; -30 dBc 5MHz – 30 MHz, Ampl>3 Vpp			
Spurious(non-harmonic)(5)		<0.2% + 0.1mVrms; DC – 20 kHz			
Phase Noise		-60 dBc DC – 1 MHz; -50 dBc 1MHz – 20MHz ; -50 dBc + 6 dBc/octave 1MHz – 30MHz(AFG-3031/3032only)			
		<-110dBc/Hz typical, 15 kHz offset, fc = 10MHz			
SQUARE WAVE CHARACTERISTICS					
Rise/Fall Time		<8 ns (3)			
Overshoot		< 5%			
Asymmetry(@50% duty)		1% of period+1 ns			
Variable Duty Cycle		20.0%–80.0%, ≤ 25 MHz; 40.0%–60.0% , 25–30MHz		20.0%–80.0% , ≤ 20 MHz	
Jitter		0.01%+525ps<2 MHz; 0.1%+75ps>2 MHz			
RAMP CHARACTERISTICS					
Linearity		< 0.1% of peak output			
Variable Symmetry		0% – 100% (0.1% resolution)			
PULSE CHARACTERISTICS					
Pulse Width		20ns – 999,830s(Extended mode 0.00ns–1,000ks ^{ns}); Width-0.625 x [(Rise Time-0.6ns)+(Fall Time-0.6ns)] ≥ 0 ; Period ≥ Width-0.625 x [(Rise Time-0.6ns)+(Fall Time-0.6ns)]			
Duty Setting Range		0.017% – 99.983%(Extended mode 0.0000%–100,0000% ^{ns})			
Period		40ns – 1,000,000s			
Rise Time and Fall Time ^{ns}		9.32ns – 799.89ks			
Resolution		0.0001%			
Overshoot		<5%			
Jitter		100 ppm + 50 ps			
Noise					
Noise Type		Gaussian			
Noise Bandwidth		100MHz equivalent bandwidth			
HARMONIC					
Harmonic Order		≤ 8			
Harmonic Type		Even, Odd, All, User ; Amplitude and Phase can be set for all harmonics			
AM and AM(DSB-SC)					
Carrier Waveforms		Sine, Square, Triangle, Ramp, Pulse, Noise, Arb			
Modulating Waveforms		Sine, Square, Triangle, Up/Dn Ramp			
Modulating Frequency		2 mHz – 20 kHz			
Depth		0% – 120.0%			
Source		Internal / External			



AFG-3031/3021

SPECIFICATIONS				
	AFG-3031	AFG-3032	AFG-3021	AFG-3022
FM				
Carrier Waveforms	Sine, Square, Triangle, Ramp			
Modulating Waveforms	Sine, Square, Triangle, Up/Dn Ramp			
Modulating Frequency	2 mHz – 20 kHz			
Peak Deviation	DC – 30 MHz (1μHz resolution)		DC – 20 MHz (1μHz resolution)	
Source	Internal / External			
PM				
Carrier Waveforms	Sine, Triangle, Ramp			
Modulating Waveforms	Sine, Square, Triangle, Up/Dn Ramp			
Phase Deviation	0° – 360°, 0.1° resolution			
Modulating Frequency	2 mHz – 20 kHz			
Source	Internal			
PWM				
Carrier Waveform	Square			
Modulating Waveforms	Sine, Square, Triangle, Up/Dn Ramp			
Modulating Frequency	2 mHz – 20 kHz			
Deviation	0% – 100.0% of pulse width, 0.1% resolution			
Source	Internal / External			
PSK				
Carrier Waveforms	Sine, Square, Triangle, Ramp			
Modulating Waveforms	50% duty cycle square			
Internal Rate	2 mHz to 1 MHz			
Frequency Range	DC – 30 MHz		DC – 20 MHz	
Source	Internal / External			
ADDITIVE MODULATION (SUM)				
Carrier Waveforms	Sine, Triangle, Ramp, Pulse, Noise			
Modulating Waveforms	Sine, Square, Triangle, Up/Dn Ramp			
Ratio	0% – 100% of carrier amplitude, 0.01% resolution			
Modulating Frequency	2 mHz – 20 kHz			
Source	Internal / External			
FSK				
Carrier Waveforms	Sine, Square, Triangle, Ramp			
Modulating Waveforms	50% duty cycle square			
Internal Rate	2 mHz – 1 MHz			
Frequency Range	DC – 30 MHz		DC – 20 MHz	
Source	Internal / External			
SWEEP				
Waveforms	Frequency Sweep : Sine, Square, Triangle, Ramp; Amplitude Sweep : Sine, Square, Triangle, Ramp, Pulse, Noise, ARB			
Type	Frequency, Amplitude			
Functions	Linear or Logarithmic			
Direction	Up or Down			
Start/Stop Frequency	Any frequency within the waveform's range			
Sweep Time	1 ms – 500 s (1 ms resolution)			
Trigger Mode	Single, External, Internal			
Trigger Source	Internal / External			
BURST				
Waveforms	Sine, Square, Triangle, Ramp, Pulse, Noise			
Frequency	1 μHz – 30 MHz (4)	1 μHz – 30 MHz (4)	1 μHz – 20 MHz	1 μHz – 20 MHz
Burst Count	1 – 1,000,000 cycles or Infinite			
Start / Stop Phase	-360.0° – +360.0° (0.1° resolution)			
Internal Period	1 μs – 500 s			
Gate Source	External Trigger (pulse waveforms can only be used in gate mode)			
Trigger Source	Single, External or Internal Rate			
Trigger Delay	N-Cycle, Infinite : 0 μs – 100s (1μs resolution)			

- Note :
1. A total of ten waveforms can be stored (Every waveform can composed of 8M points maximum)
 2. Add 1/10 th of output amplitude and offset specification per °C for operation outside of 0°C – 28°C range (1-year specification)
 3. Edge time decreased at higher frequency
 4. Sine and square waveforms above 25 MHz are allowed only with an "Infinite" count
 5. Harmonic distortion and Spurious noise at low amplitudes is limited by a -70 dBm floor
 6. Loss may occur if the pulse width is beyond the setting range of the normal mode. The pulse may vanish at times.
 7. Rise time and Fall time should be $\geq 0.01\%$ of period.

30MHz/20MHz Arbitrary Function Generator

AFG-3032/3022 Rear Panel



AFG-3031/3021 Rear Panel



AFG-3000 Series

SIGNAL SOURCES

SPECIFICATIONS				
	AFG-3031	AFG-3032	AFG-3021	AFG-3022
EXTERNAL MODULATION INPUT				
Type	AM, AM (DSB-SC), FM, PWM, Sum			
Voltage Range	± 5V full scale			
Input Impedance	10kΩ			
Frequency	DC – 20 kHz			
Modulation Output	Yes	—	Yes	—
Type	AM, AM (DSB-SC), FM, PM, PWM, Sum, Sweep			
Amplitude Range	≥ 1Vpp			
Impedance	> 10kΩ typical			
EXTERNAL TRIGGER INPUT				
Type	For FSK, Burst, Sweep, N Cycle ARB			
Input Level	TTL Compatibility			
Slope	Rising or Falling (Selectable)			
Pulse Width	> 100 ns			
Input Rate	DC – 1 MHz			
Input Impedance	10kΩ, DC coupled			
LATENCY				
Sweep	< 1 μs (typical); Burst : < 0.55 ns (typical); ARB : <(27.5/sample rate)+274ns			
JITTER				
Sweep	2.5 μs ; Burst : 1 ns , except pulse, 300 ps			
10MHz REFERENCE OUTPUT				
Output Voltage	1 Vp-p / 50 Ω square wave			
Output Impedance	50 Ω, AC coupled			
Output Frequency	10MHz			
10MHz REFERENCE INPUT				
Input Voltage	0.5Vpp – 5Vpp			
Input Impedance	1k Ω, unbalanced , AC coupled			
Input Frequency	10MHz ± 10Hz			
Waveform	Sine or Square (50±5% duty)			
Ground Isolation	42Vpk max.			
EXTERNAL-SYNC				
Phase Delay (max.)	Series Connection : 39 + (N-2) x 39 ±25ns ; Parallel connection : (N-1) x 6 ±25ns (where N=number of connected units)			
Maximum Number of Connected Units	Series Connection : 4 ; Parallel Connection : 6			
Applicable Functions	Sine, Square, Triangle, Pulse, Ramp, Harmonic, MOD, Sweep, Burst			
Store/Recall	10 Groups of Setting Memories			
Interface	GPIB (Optional), LAN, USB			
Display	4.3 inch TFT LCD, 480 x 3 (RGB) x 272			
GENERAL SPECIFICATIONS				
Power Source	AC100 – 240V , 50 – 60Hz			
Power Consumption	50VA	85VA	50VA	85VA
Operating Environment	Temperature to satisfy the specification : 18 – 28°C; Operating temperature : 0 – 40°C; Relative Humidity : ≤ 80%, 0 – 40°C ; ≤ 70%, 35 – 40°C ; Installation category : CAT II			
Operating Altitude	2000 meters			
Pollution Degree	IEC 61010 Degree 2, Indoor Use			
Storage Temperature	-10 – 70°C, Humidity: ≤ 70%			
Dimensions & Weight	265 (W) x 107 (H) x 374 (D)mm, Approx. 4kg			

Note : The specifications apply when the function generator is powered on for at least 30 minutes under +20°C~+30°C.

ORDERING INFORMATION

AFG-3031	30MHz Single channel Arbitrary Function Generator
AFG-3032	30MHz Dual channel Arbitrary Function Generator
AFG-3021	20MHz Single channel Arbitrary Function Generator
AFG-3022	20MHz Dual channel Arbitrary Function Generator

ACCESSORIES :

Quick Start Guide x 1, CD-ROM with AFG software and user manual x 1
GTL-110 BNC Cable, BNC(P/M)-BNC(P/M), 1000mm x 1 (only AFG-3031/3021)
GTL-110 BNC Cable, BNC(P/M)-BNC(P/M), 1000mm x 2 (only AFG-3032/3022)

OPTIONAL

AFG-3G1	GPIB Interface	GRA-432	Rack Adapter Kit
----------------	----------------	----------------	------------------

OPTIONAL ASSESSORIES

GTL-246 USB Type A to Type B cable

FREE DOWNLOAD

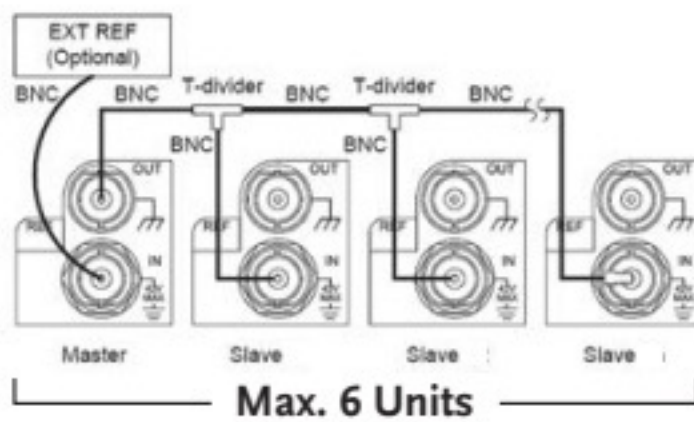
PC Software Arbitrary Waveform Editing Software

A. CIRCUIT DESIGN FOR GROUND ISOLATION AMONG OUTPUT/INPUT TERMINAL, INSTRUMENT CHASSIS, AND DUAL CHANNELS



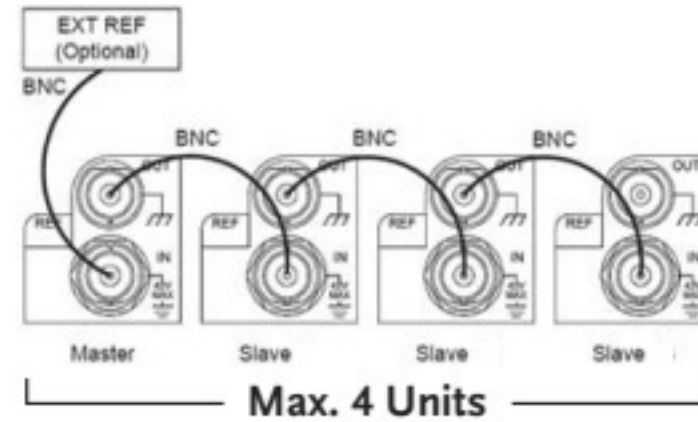
Channel 1, channel 2, reference 10 MHz input, synchronization and modulation input/output connector grounding are isolated from instrument chassis. The output channels of dual channel models are independently isolated. These connectors can sustain maximum isolation voltage up to $\pm 42\text{Vpk}$ (DC+ AC peak value) to earth ground that is ideal for floating circuit tests. Multi units output can be achieved without factoring in grounding reference issue. Applications include ignition controller or transmission devices of automotive electronics. The built-in DC bias voltage of the AFG-3000 Series can be applied on various waveforms. The DC bias voltage is $\pm 5\text{V}$ under 50Ω load. For automotive electronic applications require higher DC bias voltage such as ignition controller or transmission devices, the external power supplies can be used to bring up the DC bias voltage to $\pm 42\text{Vpk}$ (DC+ AC peak value).

B. MULTI CHANNEL SYNCHRONIZED PHASE OPERATION



Method one uses reference frequency output (REF OUT) and reference frequency input (REF IN), 50 ohm BNC cable (RG-58A/U) and T type BNC connector to connect up to 6 units to conduct synchronized phase operation.

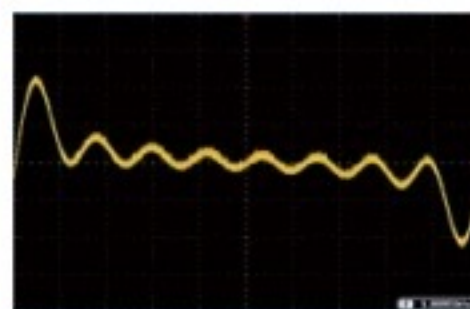
Users can implement multi channel synchronized phase operation up to 6 units and 12 channels (AFG-3032/3022). There are two methods to execute synchronized phase applications. Under different frequency, master unit can synchronize each channel and modulate individual phase.



Method two uses reference frequency output (REF OUT) and reference frequency input (REF IN), 50 ohm BNC cable (RG-58A/U) to connect up to 4 units to conduct synchronized phase operation.

At 10 MHz reference frequency input (REF IN) connector, users can input 10 MHz atomic clock frequency standard via external signal source to enhance precision for frequency output.

C. HARMONIC SIGNAL GENERATOR

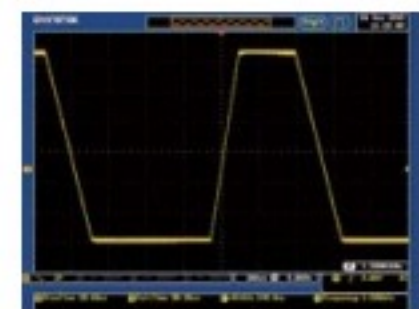
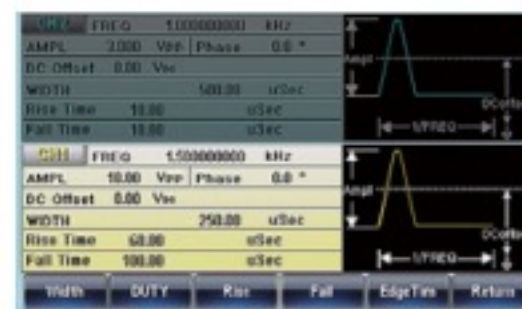


Harmonic Signal Generator

Harmonic Signal

Harmonic signal generator simulates the harmonic signal of switching power supplies and conducts characteristics tests on EMI power filter. Users can set order number and phase for harmonic signals to obtain desired signals. The above diagrams show 8th harmonic signal.

D. PULSE GENERATOR



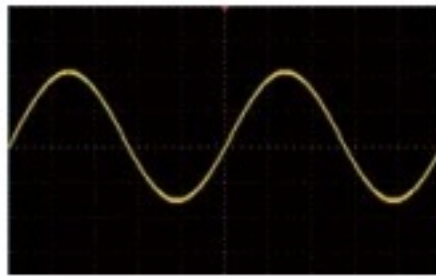
Pulse Generator

Pulse Signal

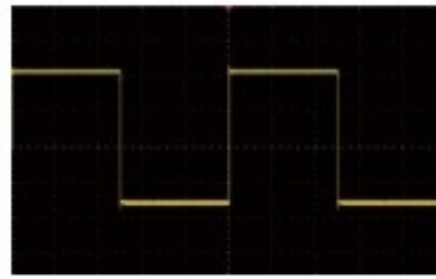
The output frequency for pulse reaches 25 MHz and its duty cycle is from 0.017% to 99.983%. Users can set pulse width, duty cycle, rise edge time, fall edge time and edge time to support trigger signal. The following diagrams show settings for pulse signal.

30MHz/20MHz Arbitrary Function Generator

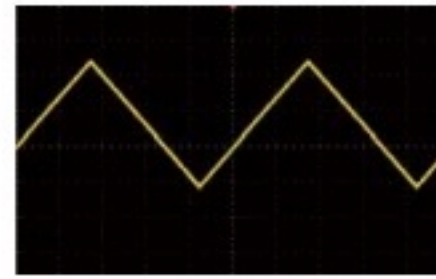
E. VERSATILE OUTPUT WAVEFORM SELECTIONS



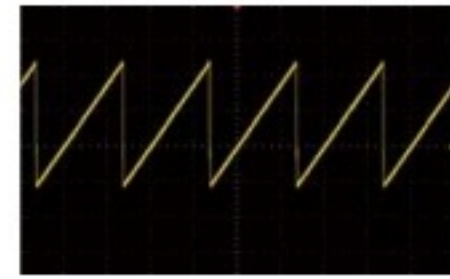
Sine



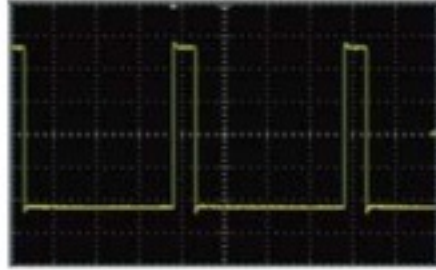
Square



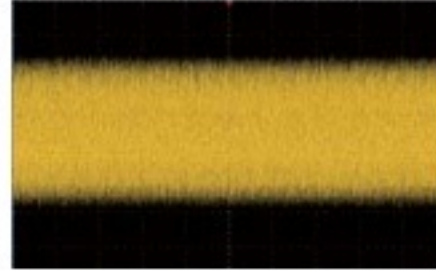
Triangle



Ramp



Pulse



Noise

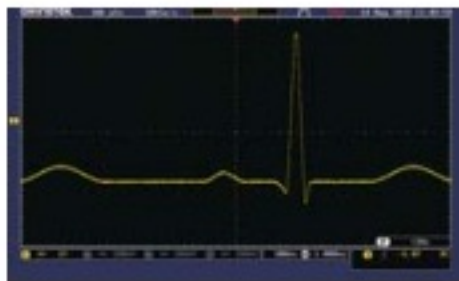


DC Voltage

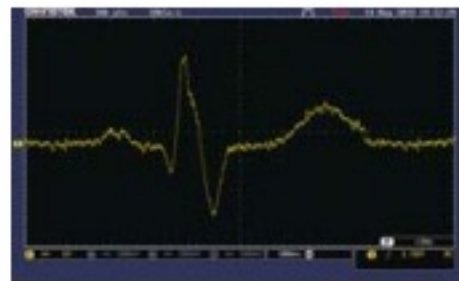


Arbitrary Waveform

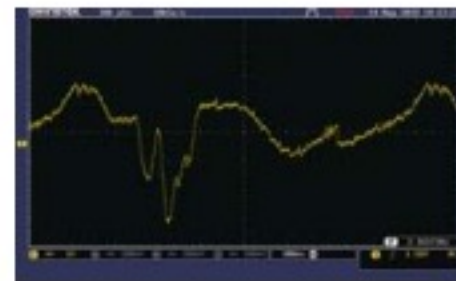
MEDICAL APPLICATION WAVEFORMS (MFG-2220HM excluded)



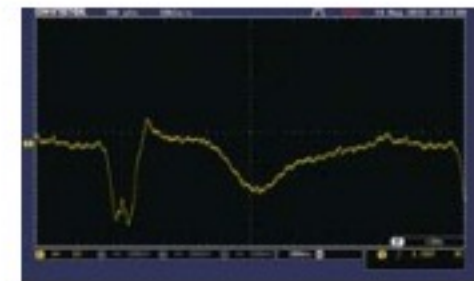
Cardiac



ECG1

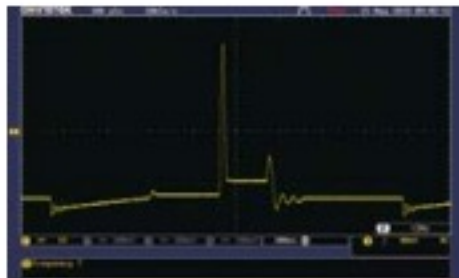


ECG2

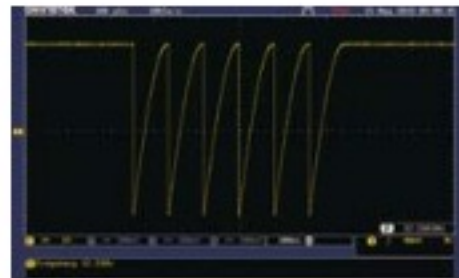


ECG3

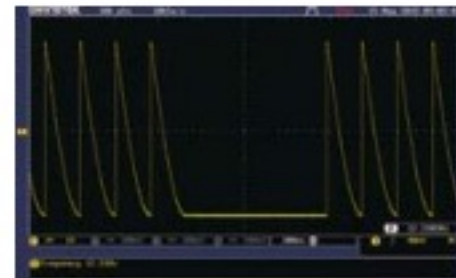
AUTOMOTIVE ELECTRONIC WAVEFORMS (MFG-2220HM excluded)



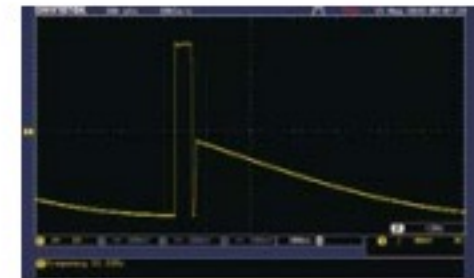
Ignition



ISO7637-2 TP3A



ISO7637-2 TP3B

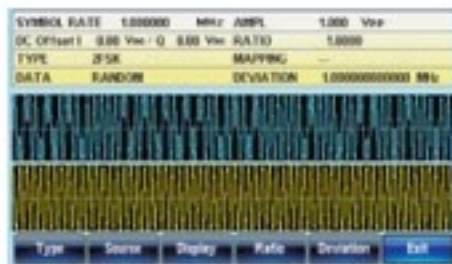


ISO7637-2 TP2B

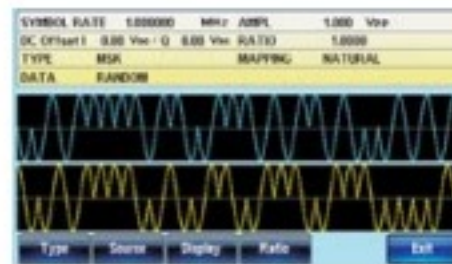
There are standard waveforms for the series such as sine, square, triangle, ramp, pulse, noise, DC voltage. In addition, 102 built-in waveforms, including medical application waveforms and

commonly used automotive electronic waveforms allow users to easily select desired waveforms.

F. IQ BASEBAND WAVEFORM OUTPUT FUNCTION FOR AFG-3032/3022



FSK



MSK



PSK

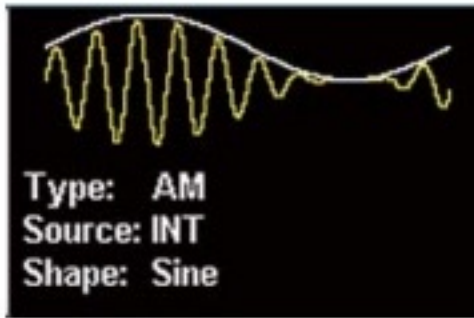


QAM

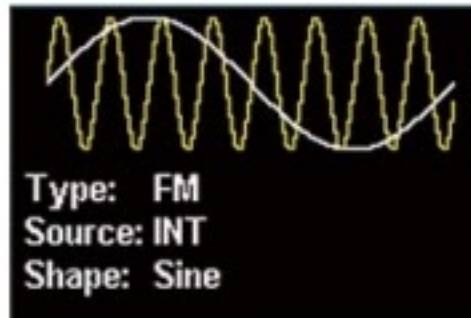
The CH1 and CH2 of AFG-3032/22 provide the IQ baseband waveform outputs, which include ASK, MSK, FSK(2FSK, 4FSK, 8FSK), PSK(BPSK,QPSK,DQPSK,QQPSK,pi/4 QPSK,pi/4DQPSK,

8PSK), APSK(16APSK, 32APSK), QAM(16QAM, 32QAM, 64QAM), etc. New IQ waveform commands are also available in the user manual.

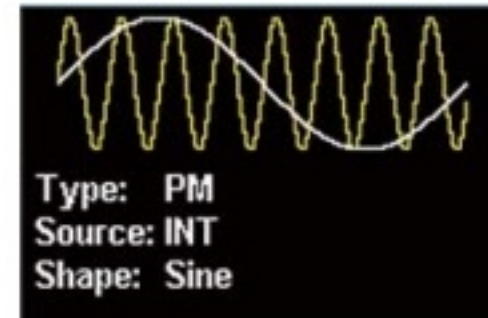
G. MODULATION FUNCTION



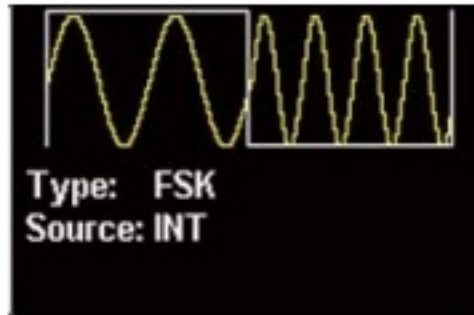
Amplitude Modulation



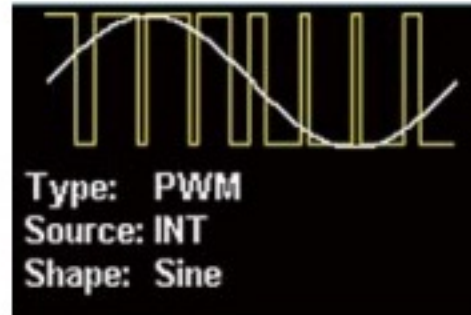
Frequency Modulation



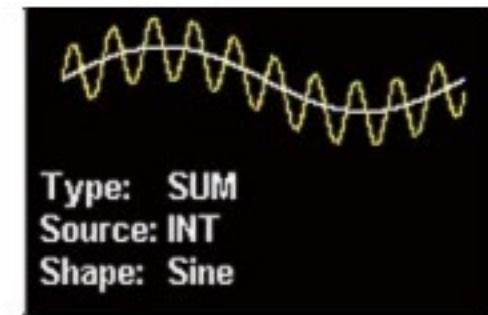
Phase Modulation



Frequency-shift Keying Modulation



Pulse Width Modulation



Sum Modulation

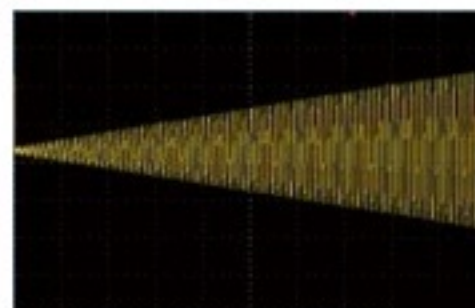
The series supports AM, FM, PM, FSK, PWM and SUM modulation. Modulation source can be from inside or outside.

Applications include the baseband of communications systems, motor control and light adjustment, etc.

H. SWEEP FUNCTION



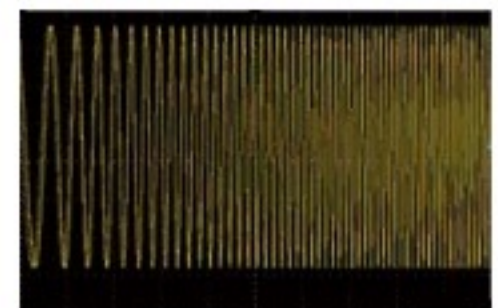
Amplitude Sweep Setting



Amplitude Sweep Signal



Frequency Sweep Setting



Frequency Sweep Signal

The series supports frequency sweep and amplitude sweep that can also integrate functions, including linear/logarithm, one-way (saw tooth)/two-way (triangle) waveforms, continuous/single trigger/gated trigger to meet various application requirements by different sweep methods. Frequency sweep carries out tests

on the frequency response of electronic components such as filter and low frequency amplifier. Amplitude sweep simulates vibration tests (requires a vibration tester), and it also conducts aging tests of various materials and linearity tests of low frequency amplifier.

I. BURST FUNCTION



Burst Setting



Burst Signal

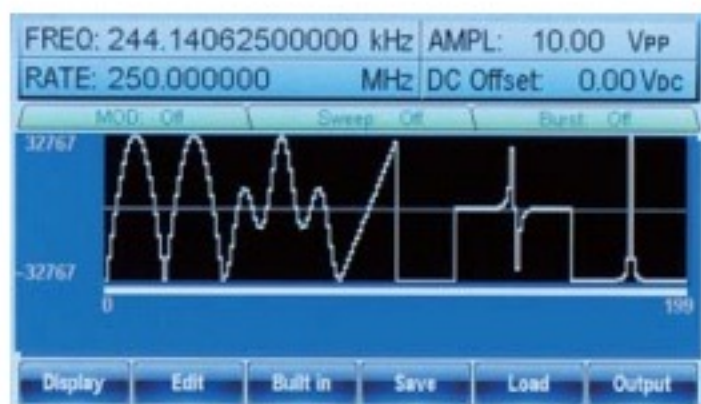
The series supports N-period or gated trigger. Phase angle, duration time, frequency, waveform infinite can be adjusted to meet non-continuous output applications.

30MHz/20MHz Arbitrary Function Generator

J. FLEXIBLE ARBITRARY WAVEFORM EDITING

Four methods to obtain arbitrary waveforms

- Front Panel Operation



Via single unit's panel, arbitrary waveforms can be selected, edited, stored, recalled, output, triggered from 65 built-in waveforms.

- Direct Waveform Reconstruction (DWR)



Direct Waveform Reconstruction from the DSO

Collocate with GDS series digital oscilloscopes to retrieve waveforms and upload them to arbitrary generator to achieve direct waveform reconstruction.

- CSV file Upload

	A	B	C
1	Start:	0	
2	Length:	629	
3	Sample Rate:	20000000	
4		0	
5		328	
6		655	
7		983	
8		1310	

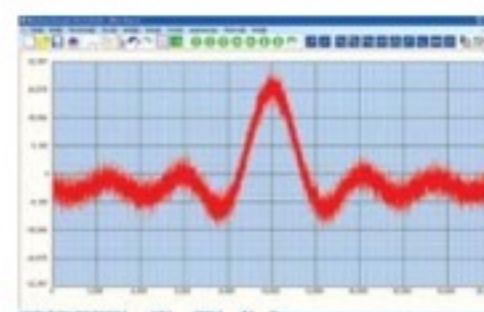
```
% sine wave generation program
result=round(2*15*sin(0.012*pi));
save gensin csv result /ascii;
% end

Start,0
Length,629
Sample Rate,20000000
0
328
655
983
1310
1638
```

Supports CSV file

Support CSV file upload produced by MATLAB and Excel.

- Arbitrary Waveform Editing PC Software



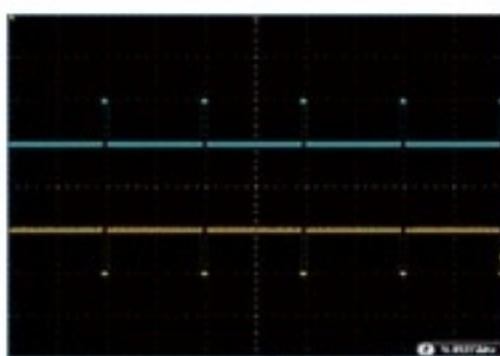
A Sinc Waveform with Gaussian Noise



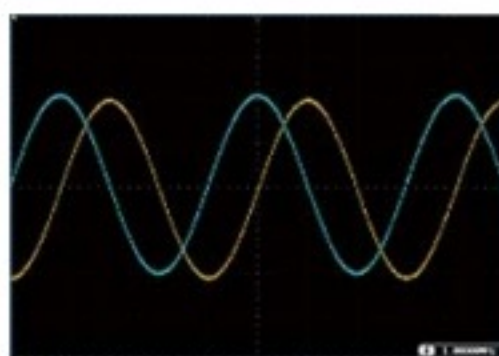
Digital Signal

Use AWES to edit complex waveforms. The software supports waveform mathematical operation. The waveform series includes Uniform Noise, Gaussian Noise, Rayleigh Noise, various digital codes such as non zero code, Manchester and RS-232, etc.

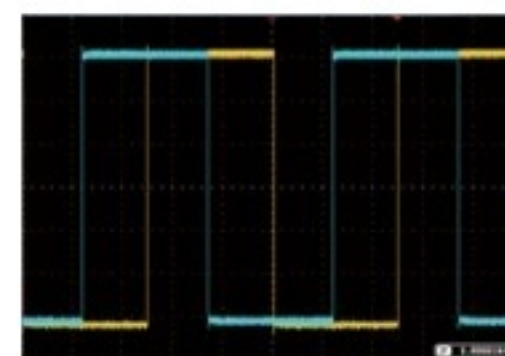
K. CORRELATED FUNCTIONS OF DUAL CHANNEL OUTPUTS



Differential Signal



Sine and Cosine Signal



Square Signal Phase Adjustment

AFG-3032/3022 models support independent channel or correlated channel applications. Four correlated functions are provided including SUM modulation, coupling, tracking, and phase.

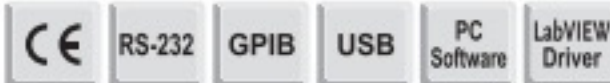
- * SUM modulation combines two signals and outputs the signal via one single channel. Combining noise and sine waveform to execute speaker's distortion test is one of the applications.
- * Coupling function arbitrarily sets ratio and difference for frequency and amplitude between two channels to realize a simultaneous effect for all parameters of dual channel. The example is amplifier using third order interpolation point(IP3) measurement to simulate signal output of two different frequency oscillators.

- * Tracking function produces differential signal with same frequency, same amplitude, and 180 degree phase difference.
- * Phase function arbitrarily sets phase parameters between two channels such as simulating sine/ cosine/square signal phase adjustment.

80MHz/50MHz Arbitrary Function Generator



AFG-3081/3051



FEATURES

- * Wide Frequency Range From 1 μ Hz~80/50MHz
- * 1 μ Hz Frequency Resolution Throughout Full Range
- * Standard Waveform : Sine, Square, Triangle, Ramp, Pulse, Noise
- * Built-In AM, FM, PWM, FSK, Sweep, Burst Functions
- * 16bit, 200MSa/s, 1M-Point Deep Arbitrary Waveform
- * DWR (Direct Waveform Reconstruction) Capability
- * Arbitrary Waveform Editing PC Software
- * 4.3" High Resolution LCD Display
- * GPIB, RS-232C, USB Host/Device Standard Interfaces

The AFG-3081/3051 is an Arbitrary Waveform and Digital-Synthesized Function Generator designed for industrial, scientific research and educational applications. The series comes with bandwidth of 80MHz for AFG-3081 and 50MHz for AFG-3051. The AFG-3081/3051, featuring 200MSa/s sample rate, 100MHz repetition rate by true point-by-point edit, 16-bit vertical resolution and 1M points waveform length, is a very useful and flexible signal source to meet diversified application needs in the market today.

The user-friendly operation, the On-Screen Help, and the multiple ways of arbitrary waveform editing make AFG-3081/3051 just a plug-and-play equipment. The point by point waveform data entry or standard waveform clip piling through front panel operation, the CSV file waveform data download, the direct waveform reconstruction through DSO waveform data import, and the PC software edited waveform download are the 4 methods available for arbitrary waveform editing.

A 4.3-inch high resolution TFT LCD in the AFG-3081/3051 front panel is used to display waveform and set parameters. The large and high-resolution screen is especially useful when the arbitrary waveform construction is done through front panel operation. The impedance of AFG-3081/3051 can be selected between 50 Ohm and Hi-Z to ensure right impedance compatibility between AFG and DUT.

SPECIFICATIONS		AFG-3081	AFG-3051
WAVEFORMS			
Standard Waveform	Sine, Square, Ramp, Pulse, Noise, DC, Sin(x)/x, Exponential Rise, Exponential Fall, Negative Ramp		
ARBITRARY WAVEFORMS			
ARB Function	Built in		
Sample Rate	200 MSa/s		
Repetition Rate	100MHz		
Waveform Length	1M points		
Amplitude Resolution	16 bits		
Non-Volatile Memory	Ten 1M waveforms *1		
User define Output Section	Any section from 2 to 1M points		
User define Mark Output	Any section from 2 to 1M points		
FREQUENCY CHARACTERISTICS			
Range	Sine, Square	80MHz	50MHz
	Triangle, Ramp	1MHz	
Resolution	1 μ Hz		
Accuracy	Stability	± 1 ppm 0 ~ 50 $^{\circ}$ C	
	Aging	± 1 ppm, per 1 year	
	Tolerance	$\leq 1\mu$ Hz	
OUTPUT CHARACTERISTICS *2			
Amplitude	Range	10 mVpp to 10 Vpp(into 50 Ω); 20 mVpp to 20 Vpp(open-circuit)	
	Accuracy	$\pm 1\%$ of setting ± 1 mVpp (at 1 kHz, >10 mVpp)(into 50 Ω)	
	Resolution	0.1 mV or 4 digits	
	Flatness	$\pm 1\%$ (0.1 dB)<10MHz; $\pm 2\%$ (0.2 dB)10MHz~50MHz; $\pm 10\%$ (0.9 dB)50MHz~70MHz; $\pm 20\%$ (1.9 dB)70MHz~80MHz (sinewave relative to 1kHz)	
Offset	Units	Vpp, Vrms, dBm	
Waveform Output	Range	± 5 Vpk ac + dc (into 50 Ω); ± 10 Vpk ac + dc (open circuit)	
	Accuracy	1% of setting + 2 mV+ 0.5% of amplitude	
SYNC Output	Impedance	50 Ω typical (fixed); >10M Ω (output disabled)	
	Protection	Short-circuit protected; overload relay auto-matically disables main output	
Level	Level	TTL-compatible into>1k Ω	
	Impedance	50 Ω nominal	
SINEWAVE CHARACTERISTICS			
Harmonic Distortion *5	-60dBc DC~1MHz, Ampl<3Vpp -55dBc DC~1MHz, Ampl>3Vpp -45dBc 1MHz~5MHz, Ampl>3Vpp -30dBc 5MHz~80MHz, Ampl>3Vpp		
Total Harmonic Distortion Spurious (non-harmonic)*5	<0.2%+0.1mVrms DC ~ 20 kHz		
Phase Noise	-60dBc DC~1MHz; -50dBc 1MHz~20MHz; -50dBc + 6dBc/octave 1MHz~80MHz < -65dBc typical 10MHz, 30kHz band; < -47dBc typical 80MHz, 30kHz band		
SQUARE WAVE CHARACTERISTICS			
Rise/Fall Time	<8ns *3		
Duty Cycle	20%~80%		
Overshoot	< 5%		
Asymmetry	1% of period+1ns		
Variable Duty Cycle	20.0%~80.0% \leq 25MHz; 40.0%~60.0%, 25~50MHz; 50.0%(Fixed), 50~80MHz		
Jitter	0.01% + 525ps < 2MHz; 0.1% + 75ps > 2MHz		
RAMP CHARACTERISTICS			
Linearity	< 0.1% of peak output		
Variable Symmetry	0%~100%		
PULSE CHARACTERISTICS			
Period	20ns ~ 2000s		
Pulse Width	8ns ~ 1999.9s		
Overshoot	Minimum Pulse Width: 8ns when FREQ \leq 50MHz; 5% of setting period when FREQ \leq 6.5MHz		
	Resolution: 1ns when FREQ \leq 50MHz; 1% of setting period when FREQ \leq 6.5MHz		
Jitter	<5%		
	100 ppm +50 ps		
AM MODULATION			
Carrier Waveforms	Sine, Square, Triangle, Ramp, Pulse, Arb		
Modulating Waveforms	Sine, Square, Triangle, Up/Dn Ramp		
Modulating Frequency	2mHz ~ 20kHz		
Depth	0% ~ 120.0%		
Source	Internal/External		
FM MODULATION			
Carrier Waveforms	Sine, Square, Triangle, Ramp		
Modulating Waveforms	Sine, Square, Triangle, Up/Dn Ramp		
Modulating Frequency	2mHz ~ 20kHz		
Peak Deviation	DC ~ 80MHz		DC ~ 50MHz
Source	Internal/External		
PWM			
Carrier Waveforms	Square		
Modulating Waveforms	Sine, Square, Triangle, Up/Dn Ramp		
Modulating Frequency	2mHz ~ 20kHz		
Deviation	0% ~ 100.0% of pulse width		
Source	Internal/External		

80MHz/50MHz Arbitrary Function Generator



AFG-3081/3051

Rear Panel



AFG-3000 Series

SIGNAL SOURCES

- *1. A total of ten waveforms can be stored (Every waveform can be composed of 1M points maximum)
- *2. Add 1/10th of output amplitude and offset specification per °C for operation outside of 0°C–28°C range (1year specification)
- *3. Edge time decreased at higher frequency
- *4. Sine and square waveforms above 25MHz are allowed only with an "Infinite" count
- *5. Harmonic distortion and Spurious noise at low amplitudes is limited by a -70 dBm floor
- *6. Arb Download Times :

Typical	Binary Code		ASC II Code
	GPIO/RS-232C (115 Kbps)	USB (Device)	USB (Host)
1M points	189 Sec	34 Sec	70 Sec
512K points	95 Sec	18Sec	35 Sec
256K points	49 Sec	9 Sec	18 Sec
64K points	16 Sec	3 Sec	6 Sec
16K points	7 Sec	830mS	1340 mS
8K points	6 Sec	490mS	780mS
4K points	6 Sec	365mS	520 mS
2K points	5 Sec	300mS	390 mS

SPECIFICATIONS		
	AFG-3081	AFG-3051
FSK		
Carrier Waveforms	Sine, Square, Triangle, Ramp, Pulse	
Modulating Waveforms	50% duty cycle square	
Internal Rate	2 mHz ~ 100 kHz	
Frequency Range	DC ~ 80MHz	DC ~ 50MHz
Source	Internal/External	
SWEEP		
Waveforms	Sine, Square, Triangle	
Type	Linear or Logarithmic	
Source	Internal/External	
Start/Stop FREQ	100µHz ~ 80 MHz	100µHz ~ 50MHz
Sweep Time	1ms ~ 500s	
Trigger	Single, External, Internal	
Marker	Falling edge of Mark signal (Programmable frequency)	
Source	Internal/External	
BURST		
Waveforms	Sine, Square, Triangle, Ramp	
Frequency	1µHz ~ 80MHz*4	1µHz ~ 50 MHz*4
Burst Count	1 ~ 1000000 cycles or Infinite	
Start/Stop Phase	-360.0 ~ +360.0*	
Internal Period	1ms ~ 500s	
Gate Source	External Trigger	
Trigger Source	Single, External or Internal Rate	
Trigger Delay	N-Cycle, Infinite : 0s ~ 85s	
EXTERNAL MODULATION INPUT		
Type	for AM, FM, Sweep, PWM	
Voltage Range	± 5V full scale	
Input Impedance	10kΩ	
Frequency	DC ~ 20 kHz	
EXTERNAL TRIGGER INPUT		
Type	for FSK, Burst, Sweep	
Input Level	TTL Compatible	
Slope	Rising or falling(selectable)	
Pulse Width	> 100 ns	
Input Impedance	10kΩ, DC coupled	
Latency	Sweep: <10us(typical); Burst: <100ns(typical)	
Jitter	Sweep: 2.5us; Burst: 1ns; except pulse, 300ps	
MODULATION OUTPUT		
Type	for AM, FM, Sweep, PWM	
Amplitude	Range: ≥1Vpp; Impedance: >10kΩ typical(fixed)	
TRIGGER OUTPUT		
Type	for Burst, Sweep	
Level	TTL Compatible into 50Ω	
Pulse Width	> 450 ns	
Maximum Rate	1 MHz	
Fan-out	≥ 4 TTL load	
Impedance	50Ω typical	
MARKER OUTPUT		
Type	for ARB, Sweep	
Level	TTL Compatible into 50Ω	
Fan-out	≥ 4 TTL load	
Impedance	50Ω typical	
Store/Recall		
	10 Groups of Setting Memories	
Interface		
	GPIO, RS-232C, USB Host/Device	
Display		
	4.3 inch TFT LCD; 480 × 3(RGB) × 272	
SYSTEM CHARACTERISTICS		
Configuration Times (typical)	Function Change: Standard>102ms,Pulse>660ms,Built-In Arb>240ms Frequency Change: 24ms; Amplitude Change: 50ms;Offset Change: 50ms Select User Arb: < 2s for 1M points; Modulation Change: < 200ms	
Arb Download Times (typical)	Binary Code: GPIO/RS-232C (115 Kbps), USB(Device) ASC II Code: USB(Host)*6	
GENERAL SPECIFICATIONS		
Power Consumption	65VA	
Operating Environment	Temperature to satisfy the specification: 18 ~ 28° C; Operating temperature: 0 ~ 40°C Relative Humidity: ≤80%, 0 ~ 40°C, ≤70%, 35 ~ 40°C; Installation category: CAT II	
Operating Altitude	2000 meters	
Pollution Degree	IEC 61010 Degree 2, Indoor Use	
Storage Temperature	-10 ~ 70°C, Humidity: ≤70%	
POWER SOURCE		
	AC100 ~ 240V , 50 ~ 60Hz	
POWER CONSUMPTION		
	65VA	
DIMENSIONS & WEIGHT		
	265 (W) x 107 (H) x 374 (D)mm, Approx. 4kg	

ORDERING INFORMATION

AFG-3081 80MHz Arbitrary Function Generator
AFG-3051 50MHz Arbitrary Function Generator

ACCESSORIES :

CD (User manual + Software) x 1 , Quick Start Guide x 1 , Power Cord x 1 , GTL-110 Test Lead x 1

OPTIONAL ASSESSORIES

GTL-232 RS-232C Cable
GTL-246 USB Cable, USB 2.0 A-B Type Cable, 4P
GTL-248 GPIO Cable (2.0m)
GTL-250 GPIO Cable, Double Shielded, 600mm
GRA-432 Rack Adapter Kit

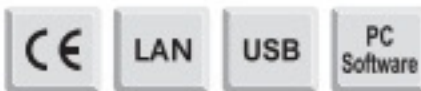
FREE DOWNLOAD

PC Software Arbitrary Waveform Editing Software

Multi-Channel Function Generator



MFG-2000 Series



FEATURES

- ✦ **Maximum Five Output Channels**
 - 2 Equivalent Performance Arbitrary Channels
Frequency : 1 μ Hz~10/20/30/60/200MHz
 - RF Channel Frequency (FG/ARB/MOD) : 160/320MHz
 - Pulse Generator Frequency : 25MHz
 - Power Amplifier : Low Frequency, 5Hz~100kHz,20dB /20W(limited by current setting)
- ✦ **True Point by Point Output Arbitrary Waveform Function: MFG-2220HM Sample Rate: 250MSa/s, Repetition Rate: 125MHz; Other models Sample Rate: 200MSa/s, Repetition Rate: 100MHz, 14-bit Resolution, 16k Points Memory Depth**
- ✦ **Earth Ground Isolation Design Among I/O Terminals and Instrument Chassis (MFG-2220HM Excluded)**
- ✦ **Frequency Counter : 150MHz, 8-bit Frequency Resolution**
- ✦ **AM/FM/PM/ASK/FSK/PSK/SUM/PWM Modulation**
- ✦ **Built-in Medical and Automotive Electronic Waveforms**
- ✦ **USB Host/USB Device/LAN(MFG-22XX only)**
- ✦ **4.3 Inch TFT Color Display**

MFG-2220HM Rear Panel



MFG-2260MRA Rear Panel



The MFG-2000 series is a multi-channel function generator, which has up to 5 simultaneous output channels, including CH1 and CH2 equivalent performance dual channel arbitrary function generator with the maximum 200MHz for both channels; RF signal generator, a standard AFG, which produces the maximum 320MHz sine wave and various modulation RF signals; pulse generator, whose frequency reaches 25MHz; power amplifier, which is ideal for audio range. The above-mentioned five different functionality channels are separately or totally allocated on 11 models, which extend from the basic single-channel AFG with pulse generator models to five-channel models so as to satisfy various educational and industrial applications.

The AFG channel of the MFG-2000 series outputs sine, square, and triangle, etc. The series features true point by point output arbitrary waveform characteristics of 200 MSa/s sample rate, 100MHz waveform repetition rate, 14-bit resolution, and 16k points memory depth. The MFG-2220HM offers up to 250MSa/s sample rate and 125MHz repetition rate. Some models provide various modulation methods such as AM/FM/PM/FSK/PWM. Sweep, Burst, Trigger, 150MHz Frequency Counter and 25MHz pulse generator are also available for some models. Synchronized dual channel models provide correlated functions, including synchronization, delay, sum, and coupling. RF signal generator, a complete AFG signal source (including ARB), features various modulations, Sweep, and digital modulations such as ASK and PSK and its sine wave frequency is up to 320MHz. A full-function pulse generator with 25 MHz is equipped to all models and its pulse width, rise edge time, fall edge time are adjustable that can be applied as trigger signals. Independent input/output power amplifier with 20W, 20dB, 5Hz~100kHz bandwidth, and distortion less than 0.1% can be applied to the audio application.

The overall design of the MFG-2000 series (MFG-2220HM excluded) is earth ground isolation among output/input terminals and instrument chassis that can only be found in high-level signal sources. The output channels can sustain maximum isolation voltage up to ± 42 Vpk (DC+ AC peak value) to earth ground that is ideal for floating circuit tests. Multi-unit outputs can be executed without factoring in grounding reference issue. There is no additional isolation requirement for experiments such as "full-wave rectification" and "voltage doubler" which are easy and safe. An external power supply can bring up the DC bias voltage to ± 42 Vpk to meet the requirements of higher DC bias voltage such as automotive and educational applications.

The AFG of the MFG-2000 series collocating with AWES (Arbitrary Waveform Editing Software) allows users to easily and quickly edit arbitrary waveforms. DWR (Direct Waveform Reconstruction) allows users to collocate with GDS series digital oscilloscopes to retrieve waveforms and upload them to arbitrary generator to achieve direct waveform reconstruction. 102 built-in waveforms allow users to edit arbitrary waveforms and to output the whole segment or divided segments.

With the multi-functionality channels, the MFG-2000 series provides different industrial sectors with special dual channel waveforms, IQ modulation signals, low-frequency vibration simulation, automotive sensors, medical applications (MFG-2220HM excluded), AM/FM broadcast signals, PWM motor or fan control signals, pulse synchronized signals, pulse noise, audio circuit or devices such as speaker tests. The series is ideal for various fields, including scientific research, education, research and development, production and quality control.

The MFG-2000 series can maximally and simultaneously output five functional channels. The functionalities of each channel are as follows:

Channel 1	1 μ Hz-200MHz max. FG With 250MSa/s ARB	AM,FM,PM,FSK,SUM PWM ,Sweep ,Burst , Trigger, Frequency Counter	ASK,PSK
Channel 2	1 μ Hz-320MHz max. FG With 200MSa/s ARB		
RF Channel	1 μ Hz-320MHz max. FG With 200MSa/s ARB		
Pulse Generator	25MHz Full Function pulse Generator (Frequency /Width/duty Cycle /Rise and Fall Edge adjustable)		
Power Amplifier	20W Power Amplifier (20W (RL=8 Ω)/20dB,5Hz~100kHz/<0.1% (Ampl >1Vpp 20Hz~20kHz)		

* ASK, PSK are standard equipped in MFG-2220HM

Multi-Channel Function Generator

SPECIFICATIONS

	CH1 (Function With ARB)	CH2 (Function With ARB)	25MHz Pulse Generator	RF Generator (Function With ARB)	Power Amplifier	Modulation/Sweep/ Burst/Frequency Counter
MFG-2110	• 10MHz		•			
MFG-2120	• 20MHz		•			
MFG-2120MA	• 20MHz		•		•	•
MFG-2130M	• 30MHz		•			•
MFG-2160MF	• 60MHz		•	• 160MHz		•
MFG-2160MR	• 60MHz		•	• 320MHz		•
MFG-2230M	• 30MHz	• 30MHz	•			•
MFG-2260M	• 60MHz	• 60MHz	•			•
MFG-2260MFA	• 60MHz	• 60MHz	•	• 160MHz	•	•
MFG-2260MRA	• 60MHz	• 60MHz	•	• 320MHz	•	•
MFG-2220HM	• 200MHz	• 200MHz	•			•

CH1/CH2

WAVEFORMS	Standard	Sine, Square, Triangle, Ramp, Pulse, Noise
ARBITRARY FUNCTIONS	Arb Function Sample Rate Repetition Rate Waveform Length Amplitude Resolution Non-volatile Memory User-defined Output Section	Built-in 200 MSa/s ; MFG-2220HM:250MSa/s 100MHz ; MFG-2220HM:125MHz 16k points 14 bits 10sets 16k points(1) From point 2 – 16384
FREQUENCY CHARACTERISTICS	Range Resolution Accuracy Stability Aging Tolerance	MFG-2220HM:Sine:200MHz(Max.);Square:60MHz(Max.);Triangle,Ramp:5MHz;Others:Sine:60MHz(Max.) Square:25MHz(Max.);Triangle,Ramp:1MHz 1μHz ±20 ppm ±1 ppm, per 1 year ≤1μHz
OUTPUT CHARACTERISTICS (2)	Amplitude Range Accuracy Resolution Flatness Units	1mVpp – 10 Vpp(into 50Ω) ; 2mVpp – 20 Vpp (open-circuit) MFG-2220HM : 1mVpp – 10Vpp ≤20MHz ; 1mVpp – 5Vpp ≤70MHz ; 1mVpp – 2Vpp ≤120MHz ; 1mVpp – 1Vpp ≤ 200MHz(into 50Ω) ±2% of setting ±1 mVpp (at 1 kHz/into 50Ω without DC offset) 0.1mV or 4 digits ± 1% (0.1dB) ≤ 1MHz ; ± 3% (0.3dB) ≤ 50 MHz ; ± 16% (1.5dB) ≤ 60MHz (sinewave relative to 1 kHz/into 50Ω), MFG-2220HM: ± 1% (0.1dB) ≤10MHz; ± 2% (0.2dB) ≤60 MHz ± 4% (0.4dB) ≤100MHz; ± 8% (0.8dB) ≤160MHz; ± 10% (1dB) ≤200MHz; (sinewave relative to 1 kHz/into 50Ω) Vpp, Vrms, dBm
OFFSET	Range Accuracy	±5 Vpk AC + DC (into 50Ω); ±10Vpk AC + DC (open circuit) ±(1% of setting + 5mV + 0.5% of amplitude)
WAVEFORM OUTPUT	Impedance Protection Ground Isolation	50Ω typical (fixed); > 10MΩ (output disabled) Short-circuit protected; Overload relay automatically disables main output 42Vpk max (MFG-2220HM excluded)
SYNC OUTPUT	Range Impedance Ground Isolation	TTL-compatible into>1kΩ 50Ω standard 42Vpk max (MFG-2220HM excluded)
SINE WAVE CHARACTERISTICS (3)	Harmonic Distortion Total Harmonic Distortion	-60 dBc DC – 200kHz, Ampl > 0.1 Vpp -55 dBc 200kHz – 1 MHz, Ampl > 0.1 Vpp ; -45 dBc 1MHz – 10 MHz, Ampl > 0.1Vpp ; -35 dBc 10MHz – 30MHz, Ampl > 0.1Vpp ; -27 dBc 30MHz – 60MHz, Ampl > 0.1Vpp MFG-2220HM:<-60 dBc <200kHz ; <-55 dBc 200kHz – 1 MHz ; <-45 dBc 1MHz – 10 MHz ; <-35 dBc 10MHz – 30MHz ; <-30 dBc 30MHz – 200MHz ; (at 1Vpp/into 50Ω without DC offset) < 0.1% (Ampl>1Vpp) DC–100 kHz
SQUARE WAVE CHARACTERISTICS	Rise/Fall Time Overshoot Asymmetry Variable duty Cycle Jitter	<15ns ; MFG-2220HM:<6ns <5% 1% of period +5 ns 0.01% to 99.99% (limited by the current frequency setting) 20ppm +500ps(4)
RAMP CHARACTERISTICS	Linearity Variable Symmetry	< 0.1% of peak output 0% – 100%
PULSE CHARACTERISTICS	Frequency Pulse Width Variable duty Cycle Overshoot Jitter	1μHz – 25MHz ≥ 20ns ; MFG-2220HM ≥ 10ns (limited by the current frequency setting) 0.01% – 99.99% (limited by the current frequency setting) <5% 20ppm + 500ps(4)
PULSE GENERATOR		
PULSE GENERATOR	Amplitude Offset Frequency Pulse Width Variable duty Cycle Leading and Trailing Edge Time(5) Overshoot Jitter	1mVpp – 2.5 Vpp (into 50Ω) ; 2mVpp – 5 Vpp (open-circuit) ±1 Vpk AC + DC (into 50Ω) ; ±2Vpk AC + DC (Open circuit) 1μHz – 25MHz 20ns – 999.7ks (limited by the current frequency setting) 0.1% – 99.9% (limited by the current frequency setting) 10ns – 20s(1ns resolution) (limited by the current frequency and pulse width settings) <5% 100ppm + 500ps(4)
RF GENERATOR		
ARBITRARY FUNCTIONS	ARB function Sample Rate Repetition Rate Waveform Length Amplitude Resolution User-defined output section Jitter	Built-in 200 MSa/s 100MHz 16k points 14 bits From point 2–16384 20ppm +5ns

SPECIFICATIONS		
FREQUENCY CHARACTERISTICS	Range Resolution Accuracy Stability Aging Tolerance	Sine: 1μHz–160MHz(DDS)/1μHz–60MHz(ARB) for MFG-2XXXMF ; 1μHz–320MHz(DDS)/1μHz–60MHz(ARB) for MFG-2XXXMR Square: 25MHz(max); Triangle, Ramp: 1MHz 1 μHz ±20 ppm ±1 ppm, per 1 year ≤ 1 μHz
OUTPUT CHARACTERISTICS(2)	Amplitude(into 50Ω) Accuracy Resolution Flatness	1mVpp to 2 Vpp (MFG-2XXXMF);1mVpp to 1 Vpp (MFG-2XXXMR) ±2% of setting ±1 mVpp(at 1 kHz/into 50Ω without DC offset) 1mV or 3 digits ±1%(0.1dB) ≤ 1MHz; ±3%(0.3dB) ≤ 50 MHz; ±10%(0.9dB) ≤ 160MHz; ±35%(3.5dB) ≤ 320MHz (sinewave relative to 1 kHz/into 50Ω)
OFFSET WAVEFORM OUTPUT SINE WAVE CHARACTERISTICS(3)	Impedance Harmonic Distortion Total Harmonic Distortion	±1 Vpk AC +DC (into 50Ω); ±2Vpk AC +DC (Open circuit) 50Ω typical(fixed); >10MΩ (output disabled) -60 dBc <200kHz; -55 dBc 200kHz–1 MHz; -45 dBc 1MHz–10 MHz; -30 dBc 10MHz–320MHz < 0.1% (Ampl>1Vpp) DC–100 kHz
SQUARE WAVE CHARACTERISTICS	Rise/Fall Time Overshoot Asymmetry Variable duty Cycle Jitter	<15ns <5% 1% of period +5 ns 0.01% to 99.99%(limited by the current frequency setting) 20ppm+500ps(4)
RAMP CHARACTERISTICS	Linearity Variable Symmetry	< 0.1% of peak output 0% to 100%
MODULATION/ SWEEP	Modulation Type Sweep type Source Modulating Frequency	AM,FM,PM,FSK,PWM (The detail same as CH1 modulation specification) Frequency INT/EXT (INT only for AM,FM,PM, PWM) Sine-DDS 5μs–327.68ms (Resolution:5μs); Sine-ARB 2mHz–20kHz(Resolution:1mHz)
PSK (MFG-2220HM also provided)	Carrier Waveforms Modulating Waveforms Internal Frequency Phase Range Source	Sine-DDS 50% duty cycle square 2 mHz to 1 MHz 0° – 360.0° Internal / External
ASK (MFG-2220HM also provided)	Carrier Waveforms Modulating Waveforms Internal Frequency Amplitude Range Source	Sine-DDS 50% duty cycle square 2 mHz to 1 MHz 1mVpp to 10Vpp Internal / External
POWER AMPLIFIER		
POWER AMPLIFIER	Input Impedance Input Voltage Working Mode Gain Output Power (RL=8Ω) Output Voltage Output Current Rise/Fall Time Full Power Bandwidth Overshoot Total Harmonic Distortion Ground Isolation	10kΩ 1.25Vpmax Constant Voltage 20dB 20W (Square) 12.5Vpmax 1.6Amax <2.5μs 5Hz – 100kHz 5% < 0.1% (Ampl >1Vpp); 20Hz ~ 20 kHz 42Vpk max
ADVANCED FUNCTIONS		
AM MODULATION	Carrier Waveforms Modulating Waveforms Modulating Frequency Depth Source	Sine, Square, Triangle, Ramp, Pulse, Arb Sine, Square, Triangle, Upramp, Dnramp 2mHz – 20kHz; MFG-2220HM : 2mHz – 50kHz(Int); DC – 20kHz; MFG-2220HM : DC – 50kHz (Ext) 0% – 120.0% Internal / External
FM MODULATION	Carrier Waveforms Modulating Waveforms Modulating Frequency Peak Deviation Source	Sine, Square, Triangle, Ramp Sine, Square, Triangle, Upramp, Dnramp 2mHz – 20kHz; MFG-2220HM : 2mHz – 50kHz(Int); DC – 20kHz; MFG-2220HM : DC – 50kHz (Ext) DC to max frequency; MFG-2220HM: DC – 0.5*max frequency Internal / External
PM	Carrier Waveforms Modulating Waveforms Modulation Frequency Phase Deviation Source	Sine, Square, Triangle, Ramp Sine, Square, Triangle, Upramp, Dnramp 2mHz – 20kHz; MFG-2220HM : 2mHz – 50kHz(Int); DC – 20kHz; MFG-2220HM : DC – 50kHz (Ext) 0° – 360.0° Internal / External
SUM	Carrier Waveforms Modulating Waveforms Modulation Frequency SUM Depth Source	Sine, Square, Triangle, Ramp; MFG-2220HM: Sine, Square, Triangle, Pulse ,Ramp ,Noise Sine, Square, Triangle, Upramp, Dnramp 2mHz – 20kHz; MFG-2220HM : 2mHz – 50kHz(Int); DC – 20kHz; MFG-2220HM : DC – 50kHz (Ext) 0% – 100.0% Internal / External
PWM	Carrier Waveforms Modulating Waveforms Modulation Frequency Phase Deviation Source	Square Sine, Square, Triangle,Upramp, Dnramp 2mHz – 20kHz; MFG-2220HM : 2mHz – 50kHz(Int); DC – 20kHz; MFG-2220HM : DC – 50kHz (Ext) 0% – 100.0% pulse width Internal / External
FSK	Carrier Waveforms Modulating Waveforms Internal Frequency Frequency Range Source	Sine, Square, Triangle, Ramp, Pulse 50% duty cycle square 2 mHz to 1 MHz 1μHz to max frequency Internal / External
SWEEP	Waveforms Type Sweep Direction Start/Stop Freq Sweep Time	Sine, Square, Triangle, Ramp Linear or Logarithmic Sweep up or sweep down 1μHz to max frequency 1ms to 500s

Multi-Channel Function Generator

SPECIFICATIONS

	Source Trigger Marker Source	Internal / External Single, External, Internal Marker signal on falling edge (programmable) Internal / External
BURST	Waveforms Frequency Pulse Count Start/Stop Phase Internal Frequency Gate Source Trigger Source	Sine, Square, Triangle, Ramp Max Frequency 25MHz (sine, square); 1MHz (triangle, ramp) 1-1000000 Cycles or infinite -360.0° - +360.0° 1 μs - 500 s External Trigger Single, External, Internal
TRIGGER DELAY	NCycle, Infinite	0s - 100 s
EXTERNAL TRIGGER INPUT	Type Input Level Slope Pulse Width Input Impedance	For FSK, Burst, Sweep TTL Compatibility Rising or Falling (selectable) >100ns 10kΩ, DC coupled
EXTERNAL MODULATION INPUT	Type Voltage Range Input Impedance Frequency Ground Isolation	For AM, FM, PM, SUM, PWM ±5V full scale 10kΩ DC - 20kHz(MFG-2220HM : DC - 50kHz) 42Vpk max(MFG-2220HM excluded)
TRIGGER OUTPUT	Type Level Pulse Width Maximum Rate Fan-out Impedance	For ARB, Burst, Sweep TTL Compatible into 50Ω >450ns ; MFG-2220HM : >100ns 1MHz ≥4 TTL Load 50Ω Typical
REFERENCE INPUT (MFG-2220HM only)	Input Voltage Output Impedance Input Frequency Waveform	0.5Vpp to 5Vpp 1kΩ, unbalanced, AC coupled 26.8436MHz±500Hz Sine or Square (50±5% duty)
REFERENCE OUTPUT (MFG-2220HM only)	Output Voltage Output Impedance Output Frequency	3.3Vpp square wave 50Ω, AC coupled 26.8436MHz
FREQUENCY COUNTER	Range Accuracy Time Base Resolution Input Impedance Sensitivity Ground Isolation	5Hz - 150MHz Time Base accuracy±1count ±20ppm (23°C ±5°C) The maximum resolution is : 100nHz for 1Hz, 0.1Hz for 100MHz 1kΩ/1pF 35mVrms - 30Vrms (5Hz - 150MHz) 42Vpk max(MFG-2220HM excluded)
Dual Channel Function (CH1/CH2)	Phase Track Coupling Dsolink	-180° -180° Synchronize phase CH2=CH1 Frequency (Ratio or Difference); Amplitude & DC Offset ✓
OTHER	Store/Recall Interface Display	10 Groups of Setting Memories LAN (MFG-22XX Series only), USB 4.3 inch TFT LCD, 480 x 3 (RGB) x 272
GENERAL SPECIFICATIONS	Power Source Power Amplifier Source Power Consumption Operating Environment Operating Altitude Pollution Degree Storage Temperature Dimensions & Weight	AC 100 - 240V, 50 - 60Hz DIP switch, AC 100-120V/AC 220-240V, 50-60Hz (MFG-2120MA, MFG-2260MFA, MFG-2260MRA only) 30W or 80W(with power amplifier) Temperature to satisfy the specification : 18 - 28°C ; Operating temperature : 0 - 40°C ; Relative humidity : < 80%, 0 - 40°C, < 70%, 35 - 40°C ; Installation category : CAT II 2000 Meters IEC 61010 degree 2, Indoor use -10 - 70°C, Humidity : < 70% 266(W) x 107(H) x 293(D) mm ; Approx. 2.5kg

The specifications apply when the function generator is powered on for at least 30 minutes under +20°C~+30°C
 Note : (1). A total of ten waveforms can be stored. (Every waveform can be composed of a maximum of 16k points)
 (2). Add 1/10th of output amplitude and offset specification per °C for operation outside of 0°C to 28°C range (1-year specification)
 (3). DC offset set to zero
 (4). Jitter specification for RF Generator: 20ppm +5ns
 (5). Only Pluse channel support

ORDERING INFORMATION

MFG-2110	10MHz Single Channel Arbitrary Function Generator with Pulse Generator
MFG-2120	20MHz Single Channel Arbitrary Function Generator with Pulse Generator
MFG-2120MA	20MHz Single Channel Arbitrary Function Generator with Pulse Generator, Modulation, Power Amplifier
MFG-2130M	30MHz Single Channel Arbitrary Function Generator with Pulse Generator, Modulation
MFG-2160MF	60MHz Single Channel Arbitrary Function Generator with Pulse Generator, Modulation, 160MHz RF Signal Generator
MFG-2160MR	60MHz Single Channel Arbitrary Function Generator with Pulse Generator, Modulation, 320MHz RF Signal Generator
MFG-2230M	30MHz Dual Channel Arbitrary Function Generator with Pulse Generator, Modulation
MFG-2260M	60MHz Dual Channel Arbitrary Function Generator with Pulse Generator, Modulation
MFG-2260MFA	60MHz Dual Channel Arbitrary Function Generator with Pulse Generator, Modulation, 160MHz RF Signal Generator, Power Amplifier
MFG-2260MRA	60MHz Dual Channel Arbitrary Function Generator with Pulse Generator, Modulation, 320MHz RF Signal Generator, Power Amplifier
MFG-2220HM	200MHz Dual Channel Arbitrary Function Generator with Pulse Generator, Modulation

ACCESSORIES :

Quick Start Guide x 1, CD-ROM with MFG Software and User Manual x 1
GTL-101 BNC-Alligator test lead x 1 (MFG-2110/2120/2120MA/2130M/2160MF/2160MR)
GTL-101 BNC-Alligator test lead x 2 (MFG-2230M/2260M/2260MFA/2260MRA)
GTL-110 BNC cable x 2 (MFG-2220HM)

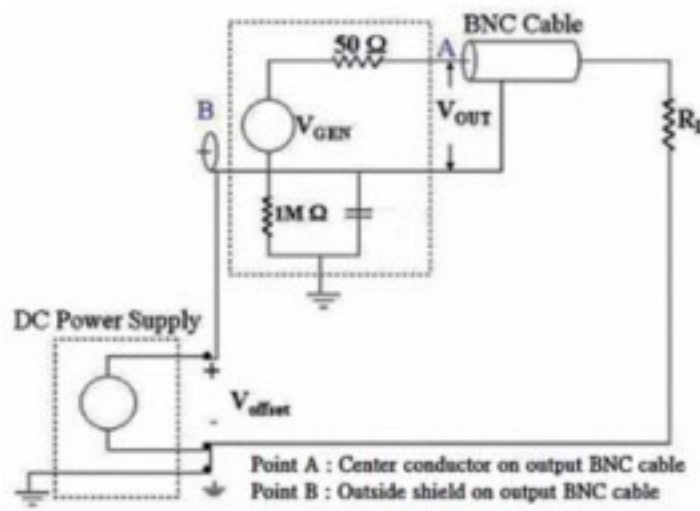
OPTIONAL ACCESSORIES

GTL-246	USB Type A to Type B cable
----------------	----------------------------

FREE DOWNLOAD

PC Software	Arbitrary Waveform Editing Software
--------------------	-------------------------------------

A. CIRCUIT DESIGN FOR GROUND ISOLATION AMONG OUTPUT/INPUT TERMINALS AND INSTRUMENT CHASSIS



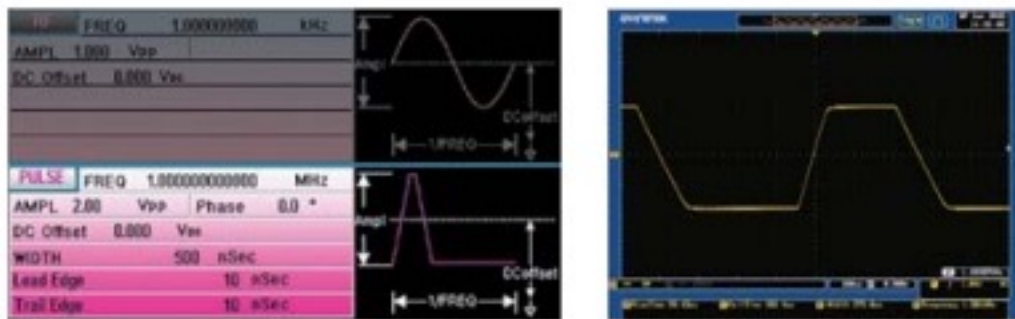
Connection diagram for MFG connecting with a power supply to increase D.C. bias voltage to $\pm 42V_{pk}$ (DC+ AC peak value).

Output channels, synchronization and modulation input/output connector grounding are isolated from instrument chassis. These connectors can sustain maximum isolation voltage up to $\pm 42V_{pk}$ (DC+ AC peak value) to earth ground that is ideal for floating circuit tests. Multi-unit outputs can be executed without factoring in grounding reference issue.

The built-in DC bias voltage of the MFG-2000 series can be applied on various waveforms. The DC bias voltage is $\pm 5V$ under 50 ohm load. An external power supply can be used to bring up the DC bias voltage to $\pm 42V_{pk}$ (DC+ AC peak value) for higher DC bias applications.

(* MFG-2220HM excluded)

B. PULSE GENERATOR



Each model of the series has a built-in pulse generator and its output frequency reaches 25 MHz. Users can set pulse width, duty cycle, rise edge time, and fall edge time to support trigger signal.

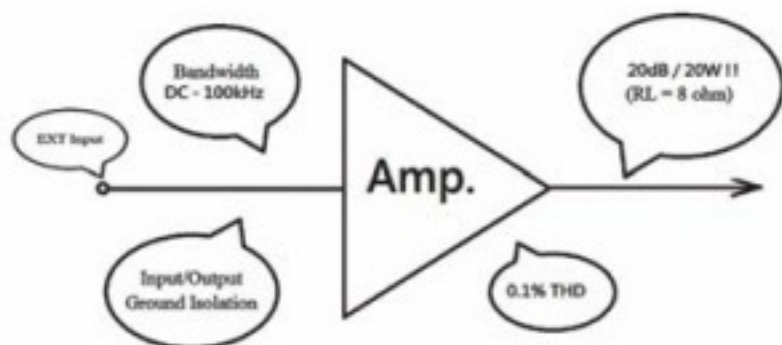
The pulse width can be fine-tuned to the minimum of 20ns and the leading/trailing edge times can be set independently to the minimum of 10ns.

C. RF SIGNAL GENERATOR

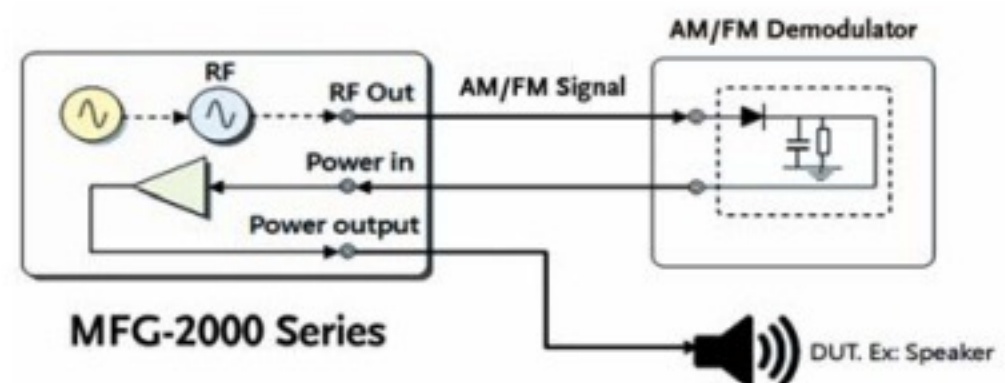


RF signal generator is a full function AFG signal source. Identical to CH1/CH2, it can output sine, square, ramp, pulse, noise, etc. Its sine wave frequency reaches 160MHz or 320MHz. And its true point by point output arbitrary waveform function supports 200 MHz sample rate, 100MHz waveform repetition rate, 14 bit resolution, 16k point memory depth, frequency sweep and various modulation methods such as AM/FM/PM/FSK/PWM/PSK/ASK. RF signal generator can be applied as a high frequency arbitrary waveform generator, simulated signals of analog or digital broadcast stations or carrier signals of local oscillator.

D. POWER AMPLIFIER



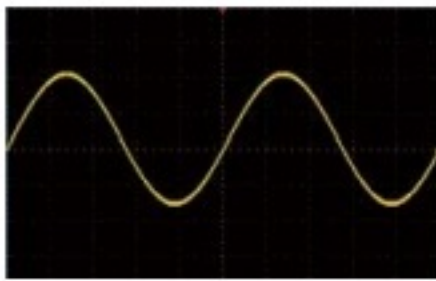
20W/20dB power amplifier, which has a bandwidth of DC~100kHz and less than 0.1% distortion. The low frequency power amplifier can be applied as an audio amplifier or a driver amplifier for piezoelectric components (collocating with an impedance transformer, 20W output) and conducts power component characteristics tests, magnetization characteristics tests(B-H curve) of magnetic materials such as ferrite and amorphous materials (collocating with an impedance transformer, 20W output)



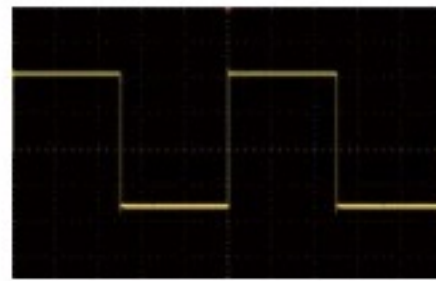
Users can connect a speaker with the low frequency power amplifier of the MFG-2000 series to realize various physics experiments.

Multi-Channel Function Generator

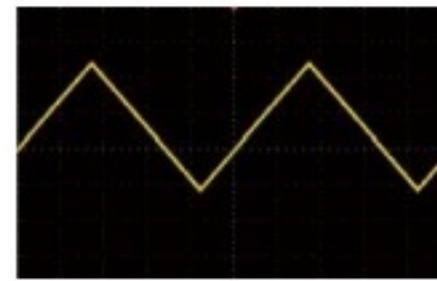
E. VERSATILE OUTPUT WAVEFORM SELECTIONS



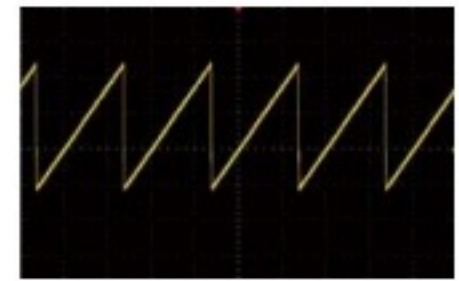
Sine



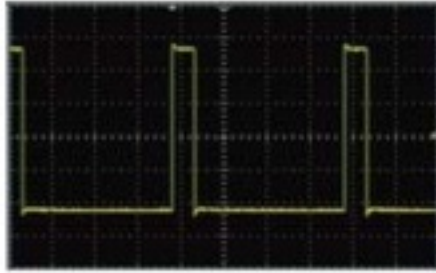
Square



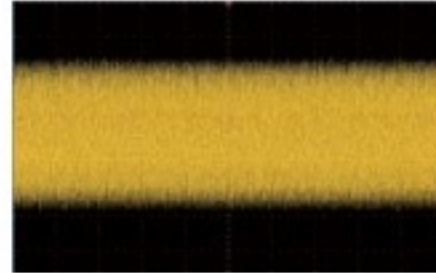
Triangle



Ramp



Pulse



Noise

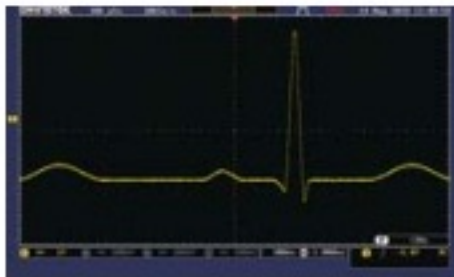


DC Voltage

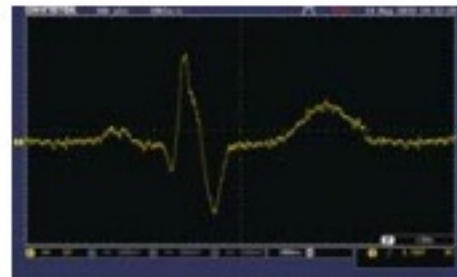


Arbitrary Waveform

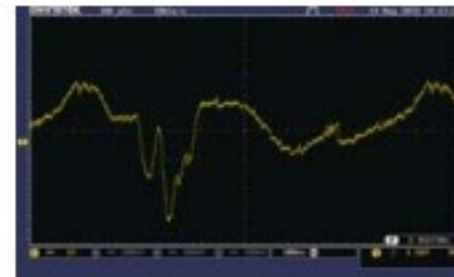
MEDICAL APPLICATION WAVEFORMS (MFG-2220HM Excluded)



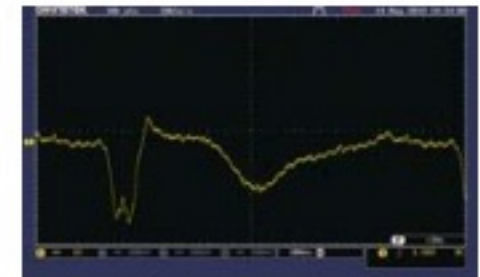
Cardiac



ECG1



ECG2

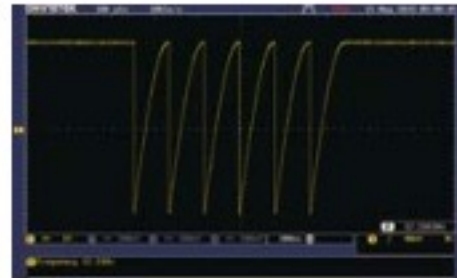


ECG3

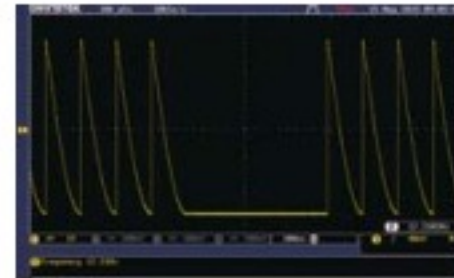
AUTOMOTIVE ELECTRONIC WAVEFORMS (MFG-2220HM Excluded)



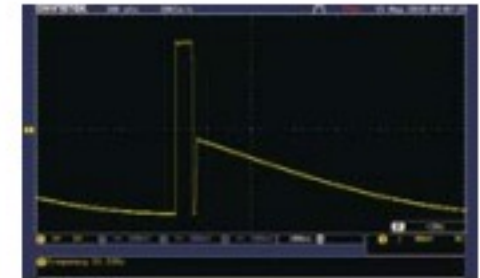
Ignition



ISO7637-2 TP3A



ISO7637-2 TP3B

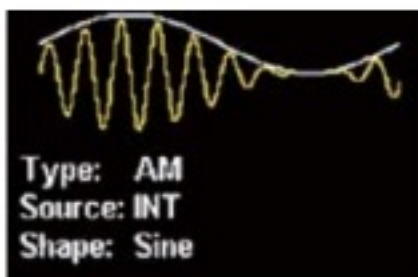


ISO7637-2 TP2B

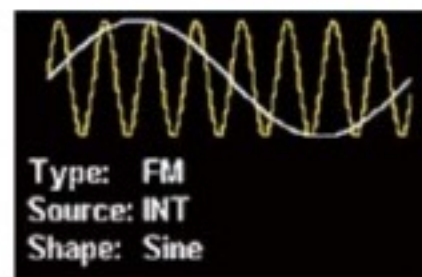
There are standard waveforms for the series such as sine, square, triangle, ramp, pulse, noise, DC voltage. In addition, 102 built-in waveforms, including medical application waveforms and

commonly used automotive electronic waveforms allow users to easily select desired waveforms.

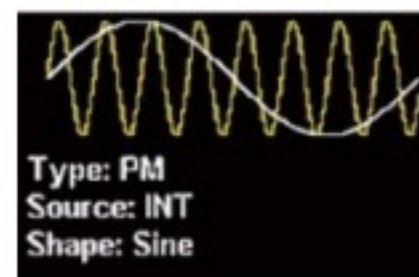
F. VARIOUS MODULATION FUNCTION



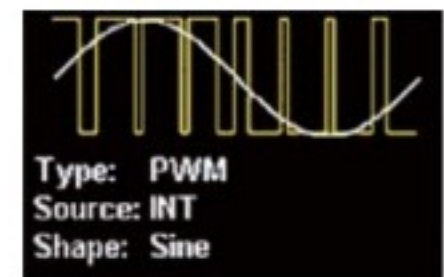
Amplitude Modulation



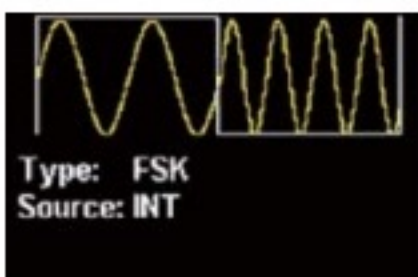
Frequency Modulation



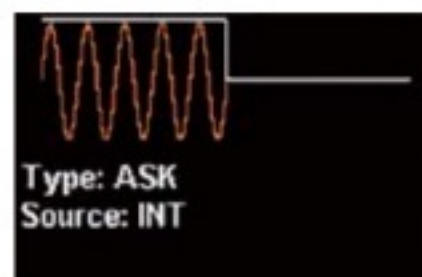
Phase Modulation



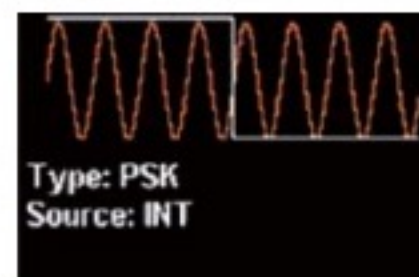
Pulse Width Modulation



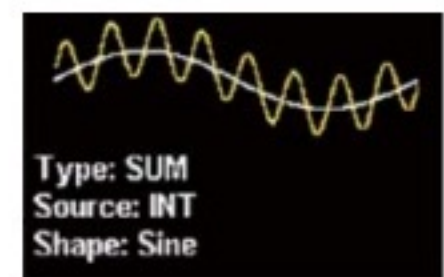
Frequency-shift Keying Modulation



Amplitude-shift Keying Modulation



Phase-Shift Keying Modulation

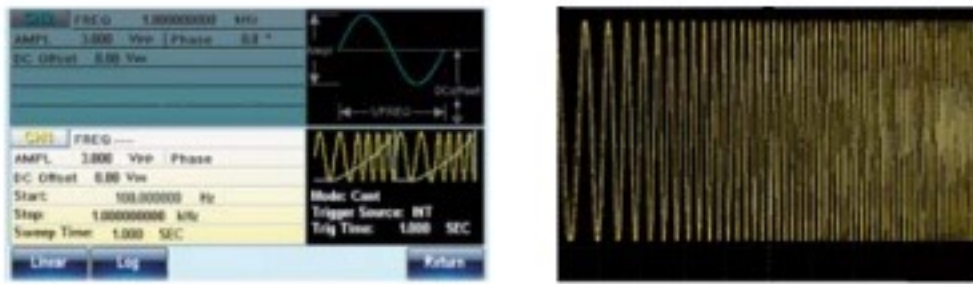


Sum Modulation

The series supports AM, FM, PM, FSK, PWM and SUM modulation. RF channel not only has the above-mentioned modulation capabilities but also supports advanced modulations such as ASK

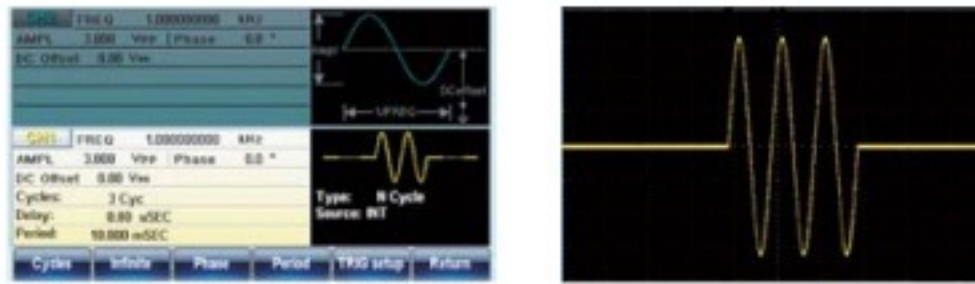
and PSK Modulation. The most modulation sources can be internal or external. Applications include communications systems' base band, motor control and light adjustment.

G. SWEEP FUNCTION



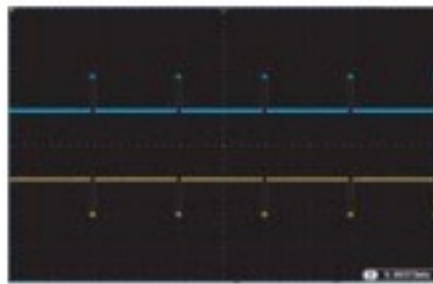
The series supports frequency sweep that can also integrate other functions, including linear/logarithm and INT/EXT/Manual trigger to meet various application requirements. Frequency sweep carries out tests on the frequency response of electronic components such as filter and low frequency amplifier.

H. BURST FUNCTION

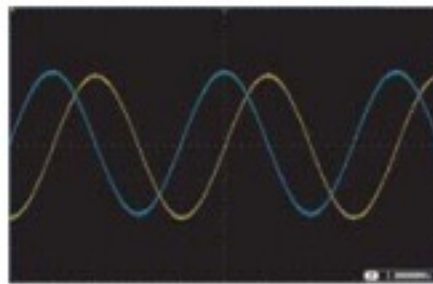


The series supports N-period or gated trigger. Phase angle, duration time, frequency, waveform infinite can be adjusted to meet non-continuous output applications.

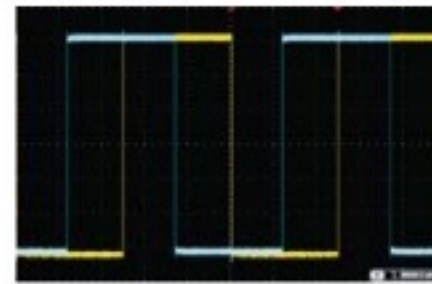
I. THE OUTPUT CORRELATED FUNCTIONS OF EQUIVALENT PERFORMANCE DUAL CHANNEL



Differential Signal



Sine and Cosine Signal



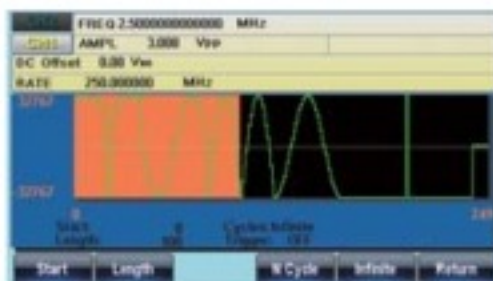
Square Wave Phase Setting

The CH1 and CH2 of MFG-2220HM/2230M/2260M/2260MFA/2260MRA can be applied separately. These two channels provide four correlated functions, including sum, coupling, tracking and phase.

* The coupling function allows users to freely set ratio and offset values for frequency and amplitude of both channels to realize that all parameters are simultaneously effective for both channels. The measurement of the Third-Order Intercept Point for an amplifier and the simulations of two different frequency oscillators outputting signals are two applied examples for coupling function.

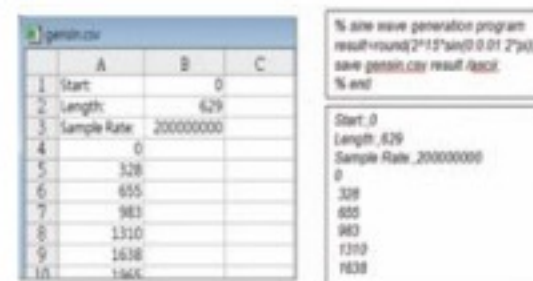
- * The tracking function can produce 180 degree phase offset differential signals with same frequency and amplitude.
- * The phase function allows users to freely set phase parameters for both channels such as sine wave, cosine wave, and square wave signals.
- * The sum modulation function can sum up two signals into one and output this signal via one channel. One of the related applications is to sum up sine waveform and noise to execute speaker distortion tests.

J. FOUR METHODS TO OBTAIN ARBITRARY WAVEFORMS



Front Panel Operation

Via single unit's panel, arbitrary waveforms can be selected, edited, stored, recalled, output, triggered from 102 built-in waveforms.



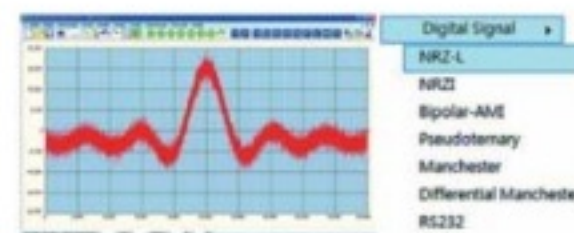
CSV File Upload

Support CSV file upload produced by MATLAB and Excel.



Direct Waveform Reconstruction

Collocate with GDS series digital oscilloscopes to retrieve waveforms and upload them to arbitrary generator to achieve direct waveform reconstruction. (DSO LINK is only for MFG-22XX Series)



Arbitrary Waveform Editing PC Software

Use AWES to edit complex waveforms. The software supports waveform mathematical operation. The waveform series includes Uniform Noise, Gaston Noise, Rayleigh Noise, various digital codes such as non zero code, Manchester and RS-232, etc.

K. MULTI-CHANNEL SYNCHRONIZED PHASE OPERATION



MFG-2220HM features reference input and reference output interfaces. Users can drive up to four MFG-2220HM units through the reference input and reference output interfaces to achieve eight-channels of phase synchronous outputs. (*MFG-2220HM only)

25MHz True Dual Channel Arbitrary Function Generator



AFG-2225



FEATURES

- ✦ Wide Frequency Ranges From 1 μ Hz ~ 25MHz (sine wave)
- ✦ 1 μ Hz Resolution in Full Range
- ✦ Built-in Standard 120MSa/s, 10bit, 4k Points Arbitrary Function for Both Channels
- ✦ True Dual-Channel Output, CH2 Provides the Same Characteristics as Ch1
- ✦ Dual-Channel Supports Couple, Tracking, Phase Operations
- ✦ 1% ~ 99% Adjustable Duty Cycle for Square Waveform
- ✦ User Friendly for Easy Parameter Setting and Parameters Display
- ✦ Multiple Editing Methods to Edit Arbitrary Waveform Easily
- ✦ Built-in Standard AM/FM/PM/FSK/SUM/ Sweep/Burst and Frequency Counter
- ✦ USB Host/Device Interface for Remote Control and Waveform Editing

AFG-2225 is the first basic level dual-channel arbitrary function generator, which provides superior features in its class. Both channels are equipped with same characteristics to adapt dual-signal applications such as differential signaling or IQ modulation. The outstanding cost-performance value makes the AFG-2225 a practical instrument to accelerate the development process.

The major features for both channels include 10Vpp output amplitude; 25MHz frequency bandwidth with 1 μ Hz resolution; built-in waveforms of Sine, Square, Ramp (Triangle) and Noise. As to the 1%~99% adjustable duty cycle of Square waveform can be used as pulse signal sources. For the arbitrary waveform, user can edit the 66 built-in waveforms or create a whole new one. Moreover, AFG-2225 carries features of AM/FM/PM/FSK/SUM Modulation, Sweep, Burst and Frequency Counter, which can be applied to various communication fields.

In addition to the intuitive and user friendly, the 3.5-inch color LCD displays the comprehensive operation information including the true waveform presented at the output. USB Host and Device interfaces are equipped to link the AFG-2225 with other devices, which provide the flexibility of waveform generation for more practical usages. With link to GW Instek GDS-series Digital Storage Oscilloscopes (DSOs), the waveforms of interest can be captured and reconstructed. User can also use the arbitrary waveform PC software to edit the waveform and then send to AFG-2225 directly, or save the waveform into flash drive and then transfer to AFG-2225.

SPECIFICATIONS		
	CH1	CH2
WAVEFORMS		
	Sine, Square, Ramp, Pulse, Noise, ARB	
ARBITRARY FUNCTION		
Sample Rate	120MSa/s	
Repetition Rate	60MHz	
Waveform Length	4k points	
Amplitude Resolution	10 bits	
Non-Volatile Memory	4k points	
FREQUENCY CHARACTERISTICS		
Range	Sine/Square Ramp	1 μ Hz ~ 25MHz
Resolution		1MHz
Accuracy	Stability	1 μ Hz
	Aging	± 20 ppm
	Tolerance	± 1 ppm, per 1 year
		≤ 1 MHz
OUTPUT CHARACTERISTICS		
Amplitude	Range	1mVpp~10Vpp(into 50 Ω), 2mVpp~20Vpp(open-circuit) 1mVpp~5Vpp(into 50 Ω)for 20MHz~25MHz 2mVpp~10 Vpp(open-circuit)for 20MHz~25MHz
	Accuracy	$\pm 2\%$ of setting ± 1 mVpp(at 1kHz/into 50 Ω without DC offset)
	Resolution	1mV or 3digits
	Flatness	$\pm 1\%$ (0.1dB) ≤ 100 kHz, $\pm 3\%$ (0.3 dB) ≤ 5 MHz, $\pm 5\%$ (0.4 dB) ≤ 12 MHz, $\pm 10\%$ (0.9dB) ≤ 25 MHz (sine wave relative to 1kHz/into 50 Ω)
	Units	Vpp, Vrms, dBm
Offset	Range	± 5 Vpk ac+dc(into 50 Ω); ± 10 Vpk ac+dc(open circuit) ± 2.5 Vpk ac+dc(into 50 Ω) for 20MHz~25MHz ± 5 Vpk ac+dc(open circuit) for 20MHz~25MHz
	Accuracy	2% of setting+20mV+0.5% of amplitude
Waveform Output	Impedance	50 Ω typical (fixed); >10M Ω (output disabled)
	Protection	Short-circuit protected; Overload relay automatically disables main output
SINE WAVE CHARACTERISTICS		
Harmonic Distortion		-55 dBc DC~200kHz, Ampl > 0.1Vpp; -50 dBc 200kHz~1MHz, Ampl > 0.1Vpp -35 dBc 1MHz~5MHz, Ampl > 0.1Vpp; -30 dBc 5MHz~25MHz, Ampl > 0.1Vpp
SQUARE WAVE CHARACTERISTICS		
Rise/Fall Time		≤ 25 ns at maximum output (into 50 Ω load)
Overshoot		5%
Asymmetry		1% of period + 5 ns
Variable Duty Cycle		1.0%~99% ≤ 100 kHz ; 10.0%~90.0% ≤ 1 MHz ; 50.0% ≤ 25 MHz
RAMP CHARACTERISTICS		
Linearity		< 0.1% of peak output
Variable Symmetry		0%~100%(0.1% Resolution)
PULSE CHARACTERISTICS		
Period		40ns ~ 2000s
Pulse Width		20ns ~ 1999.9s
Overshoot		<5%
Jitter		20ppm + 5ns
AM MODULATION		
Carrier Waveforms	Sine, Square, Ramp, Pulse, Arb	Sine, Square, Ramp, Pulse, Arb
Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp	Sine, Square, Triangle, Upramp, Dnramp
Modulating Frequency	2mHz ~ 20kHz (INT);	2mHz ~ 20kHz (INT);
Depth	DC ~ 20kHz (EXT) 0% ~ 120.0%	DC ~ 20kHz (EXT) 0% ~ 120.0%
Source	Internal / External	Internal / External



AFG-2225

SPECIFICATIONS		
	CH1	CH2
FM MODULATION		
Carrier Waveforms	Sine, Square, Ramp	Sine, Square, Ramp
Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp	Sine, Square, Triangle, Upramp, Dnramp
Modulating Frequency	2mHz – 20kHz (INT); DC – 20kHz (EXT)	2mHz – 20kHz (INT); DC – 20kHz (EXT)
Peak Deviation	DC – Max Frequency	DC – Max Frequency
Source	Internal / External	Internal / External
PM		
Carrier Waveforms	Sine, Square, Ramp	Sine, Square, Ramp
Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp	Sine, Square, Triangle, Upramp, Dnramp
Modulation Frequency	2mHz – 20kHz (INT); DC – 20kHz (EXT)	2mHz – 20kHz (INT); DC – 20kHz (EXT)
Phase Deviation	0° – 360°	0° – 360°
Source	Internal / External	Internal / External
FSK		
Carrier Waveforms	Sine, Square, Ramp, Pulse	Sine, Square, Ramp, Pulse
Modulating Waveforms	50% duty cycle square	50% duty cycle square
Modulation Frequency	2mHz – 100 kHz (INT); DC – 100 kHz(EXT)	2mHz – 100 kHz (INT); DC – 100 kHz(EXT)
Phase Deviation	1μHz – Max Frequency	1μHz – Max Frequency
Source	Internal / External	Internal / External
SUM		
Carrier Waveforms	Sine, Square, Ramp, Pulse, Noise	Sine, Square, Ramp, Pulse, Noise
Modulating Waveforms	Sine, Square, Triangle, Upramp, Dnramp	Sine, Square, Triangle, Upramp, Dnramp
Modulation Frequency	2mHz – 20kHz (INT); DC – 20kHz (EXT)	2mHz – 20kHz (INT); DC – 20kHz (EXT)
Phase Deviation	0% – 100.0%	0% – 100.0%
Source	Internal / External	Internal / External
SWEEP		
Waveforms	Sine, Square, Ramp	Sine, Square, Ramp
Type	Linear or Logarithmic	Linear or Logarithmic
Start/Stop Freq	1μHz to Max Frequency	1μHz to Max Frequency
Sweep Time	1ms – 500s	1ms – 500s
Source	Internal / External/Manual	Internal / External/Manual
BURST		
Waveforms	Sine, Square, Ramp	Sine, Square, Ramp
Frequency	1μHz – 15MHz(sine, square); 1μHz – 1MHz(ramp)	1μHz – 15MHz(sine, square); 1μHz – 1MHz(ramp)
Burst Count	1 – 65535 cycles or Infinite	1 – 65535 cycles or Infinite
Start/Stop Phase	-360 – +360	-360 – +360
Internal Period	1ms – 500s	1ms – 500s
Gate Source	External Trigger	External Trigger
Trigger Source	Single, External or Internal Rate	Single, External or Internal Rate
N-Cycle, Infinite	0s – 655350ns	0s – 655350ns
FREQUENCY COUNTER		
Range	5Hz – 150MHz	
Accuracy	Time Base accuracy±1count	
Time Base	±20ppm (23 °C ± 5 °C) after 30 minutes warm up	
Resolution	The maximum resolution is : 100nHz for 1Hz, 0.1Hz for 100MHz	
Input Impedance	1kΩ/1pF	
Sensitivity	35mVrms – 30Vrms (5Hz – 150MHz)	
DUAL CHANNEL FUNCTION		
Phase Tracking	-180° – 180°, Synchronize phase CH2=CH1	-180° – 180°, Synchronize phase CH1=CH2
Coupling	Frequency(Ratio or Difference)Amplitude & DC Offset	Frequency(Ratio or Difference)Amplitude & DC Offset
DSOLink	✓	✓

25MHz True Dual Channel Arbitrary Function Generator

Rear Panel



SPECIFICATIONS		
	CH1	CH2
EXTERNAL TRIGGER INPUT		
Type	For FSK, Burst, Sweep	
Input Level	TTL Compatibility	
Slope	Rising or Falling(Selectable)	
Pulse Width	>100ns	
Input Impedance	10kΩ, DC coupled	
EXTERNAL MODULATION INPUT		
Type	For AM, FM, PM, SUM	
Voltage Range	±5V full scale	
Input Impedance	10kΩ	
Frequency	DC – 20kHz	
TRIGGER OUTPUT		
Type	For Burst, Sweep, Arb	
Level	TTL Compatible into 50Ω	
Pulse Width	>450ns	
Maximum Rate	1MHz	
Fan-out	≥4 TTL Load	
Impedance	50Ω Typical	
SAVE/RECALL		
10 Groups of Setting Memories		
INTERFACE		
USB(Host & Device)		
DISPLAY		
3.5" TFT LCD		
POWER SOURCE		
AC100–240V , 50–60Hz		
POWER CONSUMPTION		
25W (Max.)		
OPERATING ENVIRONMENT		
Temperature to satisfy the specification: 18–28°C; Operating temperature: 0–40°C; Relative Humidity: ≤80%, 0–40°C; ≤70%, 35–40°C; Installation category: CAT II		
OPERATING ALTITUDE		
2000 meters		
STORAGE TEMPERATURE		
-10–70°C, Humidity: ≤70%		
DIMENSIONS & WEIGHT		
266(W)×107(H)×293(D) mm ; Approx. 2.5 kg		

* The specifications apply when the function generator is powered on for at least 30 minutes under +18°C–+28°C.

ORDERING INFORMATION

AFG-2225 25MHz True Dual Channel Arbitrary Function Generator

ACCESSORIES :

User Manual CD x 1, Quick Start Manual x 1, GTL-101 Test Lead x 2, Power Cord x 1

OPTIONAL ASSESSORIES

GTL-110 BNC Cable, BNC(P/M)-BNC(P/M), 1000mm

GTL-246 USB Cable, USB 2.0 Type A – Type B, 4P

FREE DOWNLOAD

PC Software Arbitrary Waveform Editing Software

25MHz/12MHz/5MHz Arbitrary Function Generator



AFG-2105/2112/2125



AFG-2005/2012/2025



FEATURES

- * 0.1Hz ~ 5/12/25 MHz with in 0.1Hz Resolution
- * Sine, Square, Ramp, Noise and Arbitrary Waveform
- * 20MSa/s Sampling Rate, 10 bit Vertical Resolution and 4k point Memory for Arbitrary Waveform
- * 1% ~ 99% Adjustable Duty Cycle for Square Waveform
- * Waveform Parameter Setting Through Numeric Keypad Entry & Knob Selection
- * Amplitude, DC Offset and Other Key Setting Information Shown on the 3.5" LCD Screen Simultaneously
- * AM/FM/FSK Modulation, Sweep, and Frequency Counter Functions (AFG-2100 only)
- * USB Device Interface for Remote Control and Waveform Editing
- * PC Arbitrary Waveform Editing Software

The AFG-2100/2000 Series Arbitrary Function Generator is a DDS (Direct Digital Synthesized) based signal generator designed to accommodate the educational and basic industrial requirements for an accurate and affordable signal source covering the output of Sine, Square (Pulse), Ramp (Triangle), Noise and Arbitrary waveforms. The 20MSa/s sampling rate, 10 bit vertical resolution and 4k point memory of the AFG-2100/2000 Series provide users with a flexible environment for creating the specific waveform output as needed. The 0.1Hz resolution of Sine, Square and Triangle waveforms and the 1% ~ 99% adjustable duty cycle of Square (Pulse) waveform are the remarkable features to greatly extend its application range in various fields. The AFG-2100/2000 Series includes 6 models in three frequency bands of 5MHz, 12MHz and 25MHz. Besides the basic features of the whole AFG-2100/2000 Series, AFG-2100 carries additional features of AM/FM/FSK Modulation, Sweep, and Frequency Counter. The friendly human interface of AFG-2100/2000 Series allows users to set waveform parameters, including waveform type, frequency, amplitude, DC offset, modulation type, and duty cycle, through keypad entry and/or the knob selection, and display the set parameters on the 3.5" LCD screen. The AFG-2100/2000 Series is equipped with a USB Device interface for remote control and waveform editing through a PC. A waveform editing software is provided to facilitate the waveform creation on the PC. After the waveform editing is done, the user is able to download the waveform data from PC to the AFG-2100/2000 Series for signal output.

SPECIFICATIONS							
Models	AFG-2105	AFG-2112	AFG-2125	AFG-2005	AFG-2012	AFG-2025	
WAVEFORMS							
	Sine, Square, Ramp, Noise, Arbitrary Waveform						
ARITRARY FUNCTION							
Sample Rate	20MSa/s						
Repetition Rate	10MHz						
Waveform Length	4k point						
Amplitude Resolution	10 bit						
FREQUENCY CHARACTERISTICS							
Range	Sine/Square	0.1Hz~5MHz	0.1Hz~12MHz	0.1Hz~25MHz	0.1Hz~5MHz	0.1Hz~12MHz	0.1Hz~25MHz
	Ramp	0.1Hz ~ 1MHz					
Resolution	Sine,Square,Ramp	0.1 Hz					
Accuracy	Stability	±20ppm					
	Aging	±1ppm, per 1 year					
	Tolerance	≤10mHz					
OUTPUT CHARACTERISTICS							
Amplitude	Range	≤ 20MHz : 1mVpp~10Vpp(50Ω); 2mVpp~20Vpp(open-circuit) ≤ 25MHz : 1mVpp~5Vpp(50Ω); 2mVpp~10Vpp(open-circuit)					
	Accuracy	±2% of setting ±1mVpp;(at 1kHz/into 50Ω without DC offset)					
	Resolution	1mV or 3digits					
	Flatness	±1%(0.1dB)≤ 100kHz; ±3%(0.3dB)≤ 5MHz; ±4%(0.4dB)≤ 12MHz; ±20%(2dB)≤ 20MHz; ±5%(0.4dB)≤ 25MHz; (sine wave relative to 1 kHz/into 50Ω)					
	Units	Vpp, Vrms, dBm					
Offset	Range	±5Vpk ac+dc(into 50Ω); ±10Vpk ac+dc(open circuit); ±2.5Vpk ac+dc(into 50Ω) for 20MHz~25MHz; ±5Vpk ac+dc(open circuit) for 20MHz~25MHz					
	Accuracy	2% of setting+10mV+0.5% of amplitude					
Waveform Output	Impedance	50Ω typical (fixed); >300kΩ (output disabled)					
	Protection(main output)	Short-circuit protected ; Overload relay auto matically disables main output					
SYNC Output	Level	TTL-compatible into >1kΩ					
	Impedance	50Ω nominal					
	Rise or Fall Time	≤ 25ns					
SINE WAVE CHARACTERISTICS							
Harmonic Distortion		-55 dBc DC - 200kHz, Ampl > 0.1Vpp; -50 dBc 200kHz - 1MHz, Ampl > 0.1Vpp -35 dBc 1MHz - 5MHz, Ampl > 0.1Vpp; -30 dBc 5MHz - 25MHz, Ampl > 0.1Vpp					
SQUAREWAVE CHARACTERISTICS							
Rise/Fall Time		≤ 25ns at maximum output (into 50Ωload)					
Overshoot		< 5%					
Asymmetry		1% of period+1 ns					
Variable Duty Cycle		1%~99%≤100kHz ; 20.0%~80.0%≤5MHz ; 40.0%~60.0%≤10MHz ; 50%≤25MHz (1% Resolution for full Frequency Range)					
RAMP CHARACTERISTICS							
Linearity		< 0.1% of peak output					
Variable Symmetry		0%~100%(0.1% Resolution)					
AM MODULATION							
Carrier Waveforms		Sine, Square, Triangle					
Modulating Waveforms		Sine, Square, Triangle					
Modulating Frequency		2 mHz~20 kHz (Int); DC~20kHz (Ext)			-		
Depth		0%~120.0%					
Source		Internal/External					
FM MODULATION							
Carrier Waveforms		Sine, Square, Triangle					
Modulating Waveforms		Sine, Square, Triangle					
Modulating Frequency		2 mHz~20 kHz (Int); DC~20kHz (Ext)			-		
Deviation		DC to Max Frequency					
Source		Internal/External					

25MHz/12MHz/5MHz Arbitrary Function Generator

AFG-2000 Series Rear Panel



AFG-2100 Series Rear Panel



AFG-2000 Series

SIGNAL SOURCES

SPECIFICATIONS						
Models	AFG-2105	AFG-2112	AFG-2125	AFG-2005	AFG-2012	AFG-2025
SWEEP						
Waveforms	Sine, Square, Triangle					
Type	Linear or Logarithmic					
Start/Stop Frequency	0.1Hz to Max Frequency					
Sweep Time	1ms-500s			-		
Source	Internal/External					
FSK						
Carrier Waveforms	Sine, Square, Triangle					
Modulating Waveforms	50% duty cycle square					
Modulation Rate	2mHz-100kHz(Int); DC-100kHz(Ext)			-		
Frequency Range	0.1Hz-Max Frequency					
Source	Internal/External					
FREQUENCY COUNTER						
Range	5Hz-150MHz					
Accuracy	Time Base accuracy ± 1 count					
Time base	± 20 ppm($23^{\circ}\text{C} \pm 5^{\circ}\text{C}$) after 30minutes warm up			-		
Resolution	100nHz for 1Hz, 0.1Hz for 100MHz					
Input Impedance	1k Ω /1pf					
Sensitivity	35mVrms-30Vrms (5Hz-150MHz)					
STORE/RECALL						
10 Groups of Setting Memories						
INTERFACE						
USB(Device)						
Display						
LCD						
POWER SOURCE						
AC100-240V, 50-60Hz						
POWER CONSUMPTION						
25 VA						
OPERATING ENVIRONMENT						
Temperature to satisfy the specification: 18-28°C; Operating temperature: 0-40°C Relative Humidity: $\leq 80\%$, 0-40°C; $\leq 70\%$, 35-40°C; Installation category: CAT II						
OPERATING ALTITUDE						
2000 meters						
STORAGE TEMPERATURE						
-10-70°C, Humidity: $\leq 70\%$						
DIMENSIONS & WEIGHT						
266(W) \times 107(H) \times 293(D) mm ; Approx. 2.5 kg						

ORDERING INFORMATION	
AFG-2005	5MHz Arbitrary Function Generator
AFG-2105	5MHz Arbitrary Function Generator
AFG-2012	12MHz Arbitrary Function Generator
AFG-2112	12MHz Arbitrary Function Generator
AFG-2025	25MHz Arbitrary Function Generator
AFG-2125	25MHz Arbitrary Function Generator
ACCESSORIES :	
CD (user manual + software) \times 1, Quick Start Guide \times 1, Power cord \times 1	
AFG-2100 Series - GTL-101 Test Lead \times 2, Instruction Manual \times 1, Power cord \times 1	
AFG-2000 Series - GTL-101 Test Lead \times 1, Instruction Manual \times 1, Power cord \times 1	
OPTIONAL ASSESSORIES	
GTL-246	USB Cable, USB 2.0 Type A - Type B, 4P
GTL-110	BNC Cable, BNC(P/M)-BNC(P/M), 1000mm
FREE DOWNLOAD	
PC Software	Arbitrary Waveform Editing Software
Driver	USB driver

SELECTION GUIDE

MODEL	AFG-2005	AFG-2105	AFG-2012	AFG-2112	AFG-2025	AFG-2125
FREQUENCY RANGE	5MHz	5MHz	12MHz	12MHz	25MHz	25MHz
ARBITRARY WAVEFORM	✓	✓	✓	✓	✓	✓
DUTY	✓	✓	✓	✓	✓	✓
TTL	✓	✓	✓	✓	✓	✓
DC OFFSET	✓	✓	✓	✓	✓	✓
USB INTERFACE	✓	✓	✓	✓	✓	✓
LIN/LOG SWEEP		✓		✓		✓
AM/FM/FSK MODULATION		✓		✓		✓
EXT COUNTER		✓		✓		✓

DDS FUNCTION GENERATORS

DIRECT DIGITAL SYNTHESIZED (DDS) FUNCTION GENERATOR OVERVIEW

DDS type Function Generator has become the main stream in signal generation. This technique brings the advantages of simplicity, stable frequency and low distortion. The basic principle of how DDS works is as follows.

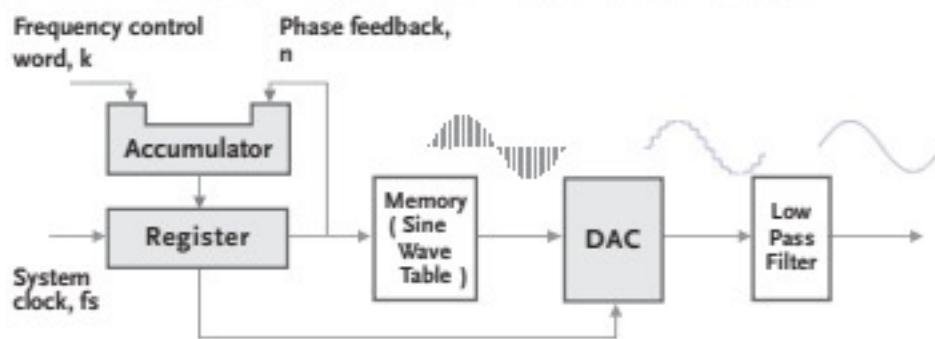


Figure 1 Block Diagram of DDS

The block diagram of DDS is illustrated in Figure 1 above. A digitized sine wave data is stored in a memory. The data is picked and sent out to a DAC, where step-shape sine wave is formed. A pure sine wave is then generated by a low pass filter.

The sine wave data is picked by accumulating the frequency control word, K . The whole sequence is as follows. At the very beginning, K is loaded into the accumulator. In a register, an address n in the memory selects the K^{th} data. Meanwhile the address n is fed back as part of the phase feedback to be added with K . Repeat the above steps, the $2K^{\text{th}}$, $3K^{\text{th}}$, and eventually a wave data is sent to construct a complete sine wave. The time base is the system clock f_s . Compared with the conventional function generator (introduced in the later section), there is no toggle between positive and negative current sources, therefore no spike noise occurs on the peak of the generated sine wave. Besides, the frequency stability follows the time base f_s . As a result, the frequency stability is much better than that of a conventional function generator.

The extended product of DDS function generators is the arbitrary waveform generator. In the DDS unit, a sine wave data is stored in the memory. If the waveform data is loaded into the memory as demanded, an arbitrary waveform generator is constructed accordingly.

DDS FUNCTION GENERATOR

MODEL	SFG-1003	SFG-1013
Technology	DDS	DDS
Analog Channel	1	1
Frequency Range	0.1Hz ~ 3MHz	0.1Hz ~ 3MHz
Frequency Resolution	0.1Hz	0.1Hz
Sample Rate	-	-
Repetition Rate	-	-
Vertical Resolution	-	-
Memory Length	-	-
Amplitude Range (@50Ω)	10Vpp	10Vpp
DC Offset (@50Ω)	±5Vpk (AC+DC)	±5Vpk (AC+DC)
Attenuator	-40dBx1	-40dBx1
Amplitude Unit	-	Vpp
Impedance Switch	50Ω	50Ω
Square Rise/Fall Time	25ns	25ns
Square Duty Cycle	25% ~ 75%	25% ~ 75%
Sine	✓	✓
Square	✓	✓
Triangle/Ramp	✓	✓
Pulse	-	-
Noise	-	-
Burst	-	-
CMOS Output	-	-
TTL Output/Sync Output	-	-
Sweep	-	-
AM/Modulation	-	-
FM	-	-
PM	-	-
FSK	-	-
PWM	-	-
SUM	-	-
GCV Function	-	-
VCF Function	-	-
Counter Function	-	-
Ext. Trigger Input	-	-
Ext. Modulation Input	-	-
Trigger Output	-	-
Modulation Output	-	-
Marker Output	-	-
GPIB	-	-
USB Host	-	-
USB Device	-	-
RS-232C	-	-
Display	6 digits LED	6 digits LED
Voltage Display	-	V
DSO Link	-	-
Internal Storage Memory	-	-
LabView Driver	-	-
Power Source	AC110/120/220/240V±10%	AC110/120/220/240V±10%
Power Consumption	-	-
Page	C29	C29

3 MHz DDS Function Generator



For educational institutions, the SFG-1003/1013 series direct digital synthesis (DDS) signal generator is the most affordable option for accurate waveform generation. It supports outputs of up to 3MHz and includes a voltage display. Using DDS technology embedded in an FPGA chip, the SFG-1003/1013 series generates waveforms with high precision and high stability for customers who need accurate signals.

SFG-1003/1013 (3MHz)



FEATURES

- * DDS Technology and FPGA Design
- * Frequency Range : 0.1Hz ~ 3MHz
- * High Frequency Accuracy : 20ppm
- * High Frequency Stability : 20ppm
- * Max. Frequency Resolution : 100 mHz
- * Low Distortion Sine Wave : -55dBc, 0.1Hz~200 kHz
- * Voltage Display (Only SFG-1013)

SELECTION GUIDE

MAIN FUNCTION	MODEL	SFG-1003	SFG-1013
Frequency		3 MHz	3 MHz
Offset		✓	✓
TTL Output		✓	✓
-40dB Attenuation		✓	✓
Voltage display		—	✓

SPECIFICATIONS	
MAIN	
Output Function	Sine, Square, Triangle, TTL
Frequency Range(For Sine, Square)	0.1Hz – 3MHz
Frequency Range(For Triangle)	0.1Hz – 1MHz
Frequency Resolution	0.1Hz maximum
Frequency Stability	±20ppm
Frequency Accuracy	±20ppm
Aging	±5ppm/year
Amplitude Range	2mVp-p – 10Vp-p (into 50Ω load)
Amplitude Accuracy	±20% at maximum position (only SFG-1013)
Impedance	50Ω±10%
Attenuator	-40dB±1dBx1
DC Offset	< -5V – > 5V (into 50Ω load)
Duty Control Range	25% – 75% below 1MHz (for square wave only)
Display	6 digits LED display
Output Control	ON/OFF selector
SINE WAVE	
Harmonics Distortion	Maximum Amplitude attenuation to 1/10 of any panel settings, TTL OFF ≥ -55dBc, 0.1Hz – 200kHz ≥ -40dBc, 0.2MHz – 2MHz ≥ -35dBc, 2MHz – 3MHz
Flatness (at maximum amplitude relative to 1kHz)	< ±0.3dB, 0.1Hz – 1MHz < ±0.5dB, 1MHz – 2MHz < ±1dB, 2MHz – 3MHz
TRIANGLE WAVE	
Linear	≥ 98%, 0.1Hz – 100kHz ; ≥ 95%, 100kHz – 1MHz
SQUARE WAVE	
Symmetry	5% of period+4ns, 0.1Hz – 100kHz
Rise or Fall Time	≤ 100ns at maximum output (into 50Ω load)
TTL OUTPUT	
Level	≥ 3Vp-p
Fan Out	20 TTL load
Rise or Fall Time	≤ 25ns
GENERAL	
Operation Environment	Indoor use, altitude < 2000m Ambient Temperature : 0°C – 40°C Relative Humidity: < 80% at 0°C – 40°C Up to 70% at 35°C – 40°C Installation category II Pollution Degree 2
POWER SOURCE	
	AC 100V/120V/220V/240V± 10%, 50/60Hz
STORAGE CONDITION	
Temperature	-10°C – 70°C
Humidity	70% (Maximum).
DIMENSION & WEIGHT	
	251(W) x 91(H) x 291(D) mm, Approx. 2.1kg

ORDERING INFORMATION

- SFG-1003 3 MHz DDS Function Generator
- SFG-1013 3 MHz DDS Function Generator with Voltage Display

ACCESSORIES :

User manualx1, Power cord x 1, Test lead GTL-101 x 1

OPTIONAL ACCESSORIES

- GTL-110 BNC Cable, BNC(P/M)-BNC(P/M), 1000mm

SPECIFIC APPLICATION SIGNAL SOURCES

SPECIFIC APPLICATION SIGNAL SOURCE OVERVIEW

GAG-810 provide a convenient solution for low frequency (< 1MHz) signal generation, specifically for audio bandwidth. Intuitive and simple panel interface provides quick frequency and amplitude adjustment, with dial/key shortcuts to different ranges. Square wave generation covers digital application in addition to the traditional analog using sine wave. Distortion is kept at minimum level, especially at the audible frequency range : 0.02% or less distortion factor for 500Hz~20kHz. The external synchronization signal input helps collaborate with other measurement devices.

The GWInstek USG-Series RF signal generator is a pocket-sized and USB interface compatible RF signal generator. It covers the frequency range from 35MHz ~ 4400MHz. The USG-Series provides continuous wave (CW) signal outputs without any signal modulation function.

The built-in electronic attenuator of the USG-Series allows an adjustable power range between -30dBm to 0dBm. The USG-Series has several operational modes including fixed frequency, frequency sweep, frequency hopping, and power sweep.

AUDIO GENERATOR

MODEL	GAG-810
Application	Audio Signal
Analog Channel	1
Frequency Range	10Hz ~ 1MHz
Output Range	5Vrms
Impedance	600Ω
Power Source	AC100/120/220/230V±10%
Page	C31

RF SIGNAL GENERATOR

MODEL	USG-LF44
Application	RF signal generator
Analog Channel	1
Frequency Range	34.5MHz ~ 4400MHz
Output Range	-30dBm ~ 0dBm
Impedance	50Ω
Modulation	Sine Wave
Display	-
Interface	USB
Power Source	DC 5V
Power Consumption	-
Page	C32-33

Audio Generator



GAG-810 provides a convenient solution for low frequency (< 1MHz) signal generation, specifically for audio bandwidth. Intuitive and simple panel interface provides quick frequency and amplitude adjustment, with dial/key shortcuts to different ranges. Square wave generation covers digital application in addition to the traditional analog using sine wave. Distortion is kept at minimum level, especially at the audible frequency range: 0.02% or less distortion factor for 500Hz~20kHz. The external synchronization signal input helps collaborate with other measurement devices.

GAG-810 (1MHz)



FEATURES

- * Frequency from 10Hz ~ 1MHz
- * 0.02% Low Sine wave Distortion
- * 6 Steps Output Attenuator
- * EXT SYNC Function

SPECIFICATIONS

SINE WAVE CHARACTERISTIC

Frequency Range	10Hz – 1MHz, 5 Ranges
Frequency Indicator	Dial Scale
Frequency Accuracy	$\pm 5\% + 1\text{Hz}$ (at x10, x100)
Output Voltage	5 Vrms (600Ω load)
Frequency Response	10Hz – 1MHz $\pm 0.5\text{dB}$ (at 600Ω load) Reference Frequency (1kHz)
Distortion Factor	500Hz – 20kHz : $\leq 0.02\%$ 100Hz – 100kHz : $\leq 0.05\%$ (x 10 range for 100Hz, x 1k range for 100kHz) 50Hz – 200kHz : $\leq 0.3\%$ 20Hz – 500kHz : $\leq 0.5\%$ 10Hz – 1MHz : $\leq 1.5\%$

SQUARE WAVE

Output Voltage	$\geq 10\text{Vpp}$ (no load)
Overshoot	$\leq 2\%$ (at 1kHz, max output)
Rise & Fall Time	$< 200\text{ns}$
Duty Ratio	50% $\pm 5\%$

EXT. SYNCHRONIZATION

Synchronizing Range	$\pm 1\%/V_{\text{rms}}$
Max. Allowable Input	15V (DC + AC peak)
Input Impedance	150k Ω

OUTPUT

Output Impedance	600Ω
Output Attenuator	0, -10, -20, -30, -40, -50dB 6 ranges (accuracy $\pm 1\text{dB}$ at 600Ω load)

POWER SOURCE

AC 100/120/220/230V $\pm 10\%$, 50/60Hz

DIMENSIONS & WEIGHT

130(W) x 210(H) x 292(D)mm, Approx 3 kg

ORDERING INFORMATION

GAG-810 1MHz Audio Generator with 0.02% Low Sine Wave Distortion

ACCESSORIES :

User Manual x 1, Power cord x 1, Test lead GTL-103 x 1

RF Signal Generator



USG-LF44



FEATURES

- * Frequency Range : 34.5MHz ~ 4400MHz
- * Output Power Range : -30dBm ~ 0dBm
- * Continuous Wave Signal Without any Modulation
- * Support Fixed Frequency, Frequency Sweep, Frequency Hopping & Power Sweep Mode
- * -107dBc/Hz Phase Noise@100kHz Offset
- * Frequency Resolution : 10kHz
- * PC USB Interface Powered and Controlled
- * External PC Software Support Different Operating System

The USG-LF44 RF signal generator is a pocket-sized and USB interface compatible RF signal generator. It covers the frequency range from 35MHz ~ 4400MHz. The USG-LF44 provides continuous wave (CW) signal outputs without any signal modulation function.

The built-in electronic attenuator of the USG-LF44 allows an adjustable power range between -30dBm to 0dBm. The USG-LF44 has several operational modes including fixed frequency, frequency sweep, frequency hopping, and power sweep.

A USG CD-ROM provides dedicated PC application programs, which were developed under JAVA software structure. This USG PC application program supports operating systems such as Windows 2000/XP/Vista/7/8, Linux & Mac OS X through the USB interface.

Users can download USG APP to smart phone or tablet with Android 4.0 or above. To operate USG, use USB-OTG connecting cable to connect tablet (or smart phone) and USG. The Android APP application software for the USG signal generator is available on Google Play Store.

The USG signal generator can be designated as the tracking generator for GSP-730 spectrum analyzer to conduct measurement functions of scalar network analyzer. A USG CD-ROM provides PC application programs for the GSP-730 Primary RF software. Users can, using a Windows OS computer, control USG and GSP-730 via the Primary RF software.

SPECIFICATIONS

FREQUENCY RANGE	34.5 MHz ~ 4.4 GHz
OUTPUT POWER	-30 dBm ~ 0 dBm, in 1 dB steps
INTERNAL REFERENCE FREQUENCY	25 MHz, aging ± 1 ppm at first year
FREQUENCY ACCURACY (0 dBm Output Level)	± 100 Hz at 100MHz
FREQUENCY RESOLUTION	10 kHz
OUTPUT ISOLATION	≤ -75 dBc, Output Control On/Off
MODE CONTROL	Fixed Frequency / Single Sweep / CW Sweep / Hopping / Power Sweep
STEP DWELL	≤ 1000 ms in 1 ms steps
FREQUENCY OFFSET	-50 kHz ~ 50 kHz in 10 kHz steps
OUTPUT FLATNESS (0 dBm Output Level)	-1 dBm ~ 3.5 dBm, typical
PHASE NOISE	
Carrier Frequency	$f_c = 1.0$ GHz
at 10kHz Offset Frequency	< -97 dBc/Hz, typical -100 dBc/Hz
at 100kHz Offset Frequency	< -107 dBc/Hz, typical -110 dBc/Hz
2ND HARMONICS (0 dB Attenuation)	
	≤ -15 dBc, typical
	34.5 MHz ~ 2.0 GHz
	≤ -10 dBc, typical
	2.0 GHz ~ 3.0 GHz
	≤ -25 dBc, typical
	3.0 GHz ~ 4.4 GHz
3rd HARMONICS (0 dB Attenuation)	
	≤ -5 dBc, typical
	34.5 MHz ~ 2 GHz
	≤ -20 dBc, typical
	2.0 GHz ~ 3.0 GHz
	≤ -40 dBc, typical
	3.0 GHz ~ 4.4 GHz
SPURIOUS RELATED TO RESOLUTION SETTINGS	
	≤ -30 dBc, typical, Resolution < 1 MHz
	≤ -65 dBc, typical, Resolution ≥ 1 MHz
SPURIOUS RELATED TO THE FUNDAMENTAL OUTPUT	
	≤ -60 dBc, typical

ORDERING INFORMATION

USG-LF44 RF Signal Generator

RF Signal Generator

ADP-003

50Ω N type (female) to SMA (female) Adapter
For: USG-Series



GTL-303

50Ω SMA RF cable (600mm)
For: USG-Series



SPECIFICATIONS

SUPPORTED OS	Windows/Linux/Mac/Android
INTERFACE	USB 2.0
USB CONNECTOR TYPE	Mini B
SUPPLY VOLTAGE	5V nominal
CURRENT CONSUMPTION	200 mA
RF CONNECTOR TYPE	N-type male
IMPEDANCE	50 Ω nominal
OUTPUT VSWR	< 1.5 : 1 , Output Level @ -30 dBm
MAXIMUM PERMISSIBLE DC VOLTAGE	±25V
MAXIMUM REVERSE POWER	+30dBm (1W)
ELECTROMAGNETIC COMPATIBILITY	EN 55011 class A, EN 61326-1 (industrial environment), EN 61326-2-1, EN 61000-4-2, EN 61000-4-3, EN 61000-4-11
DIMENSIONS & WEIGHT	30(W) x 103(H) x 30(D)mm; Approx. 100g

USG-LF44 35MHz ~ 4400MHz RF Signal Generator

ACCESSORIES

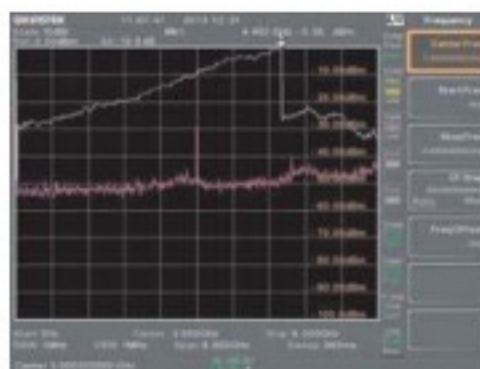
USB cable, CD-ROM with USG software, GSP-730 PrimaryRF software and User manual

GTL-253 USB Cable, USB 2.0, A-mini B Type, 1400mm

OPTIONAL ACCESSORIES

ADP-003 50Ω N type (female) to SMA (female) Adapter

GTL-303 50Ω SMA RF cable (600mm)



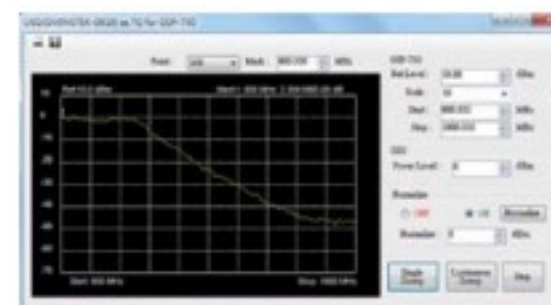
Test Result of Simultaneous Power Sweep and Frequency Sweep



Easy to Use Graphical Interface with Numeric Setting













USG Android APP



Test Result of Low Pass Filter with PrimaryRF Software

ACCESSORIES

MODEL	DESCRIPTION	APPLICABLE DEVICE
ADP-003	Adaptor, 50Ω, N(J/F) - SMA(J/F)	USG-Series
GRA-432	Rack Adapter Kit	AFG-3000 Series
GTL-101	Test Lead, BNC(P/M) to Alligator Test Lead, 1100mm	AFG-Series, SFG-Series, GFC-Series
GTL-110	BNC Cable, BNC(P/M)-BNC(P/M), 1000mm	AFG-Series, SFG-Series, GFC-Series
GTL-232	RS-232C Cable, 9-pin, F-F Type, null modem, 2000mm	AFG-3081/3051, GFG-3015
GTL-246	USB Cable, USB 2.0, A-B Type, 1200mm	MFG-2000 Series, AFG-Series
GTL-248	GPIB Cable, Double Shielded, 2000mm	AFG-3000 Series
GTL-250	GPIB Cable, Double Shielded, 600mm	AFG-3000 Series
GTL-253	USB Cable, USB 2.0, A-mini B Type, 1400mm	USG-Series
GTL-303	RF Cable, RG316 Assembly, 600mm, SMA(P/M)	USG-Series

<p>ADP-003</p> 	<p>GTL-303</p> 	<p>GTL-232</p> 
<p>GTL-101</p> 	<p>GTL-110</p> 	<p>GTL-246</p> 
<p>GTL-248</p> 	<p>GTL-250</p> 	<p>GTL-253</p> 
<p>GRA-432 Rack Mount Kit For : AFG-3000 Series</p> 		



DC POWER SUPPLIES

Stemming from the design and manufacture demands of electronic industries, GW Instek offers diverse power supply product lines to meet user's demand for a variety of applications. Based on different needs, the product lines can be divided into several categories including DC Power Supply, AC Power Source, DC Electronic Load and Source Measure Unit.

For DC Power Supply, the products can be briefly categorized by the following types, Technic, Programmable or Non-programmable, Single or Multiple Outputs, High Precision or Affordable Price, Dual Range and Wide Combinations of Voltage and Current, which can be selected to meet the application requirements.

Precision source meter is the latest product offering a four-quadrant power supply, which can accurately utilize voltage or current and measure voltage and/or current at the same time.

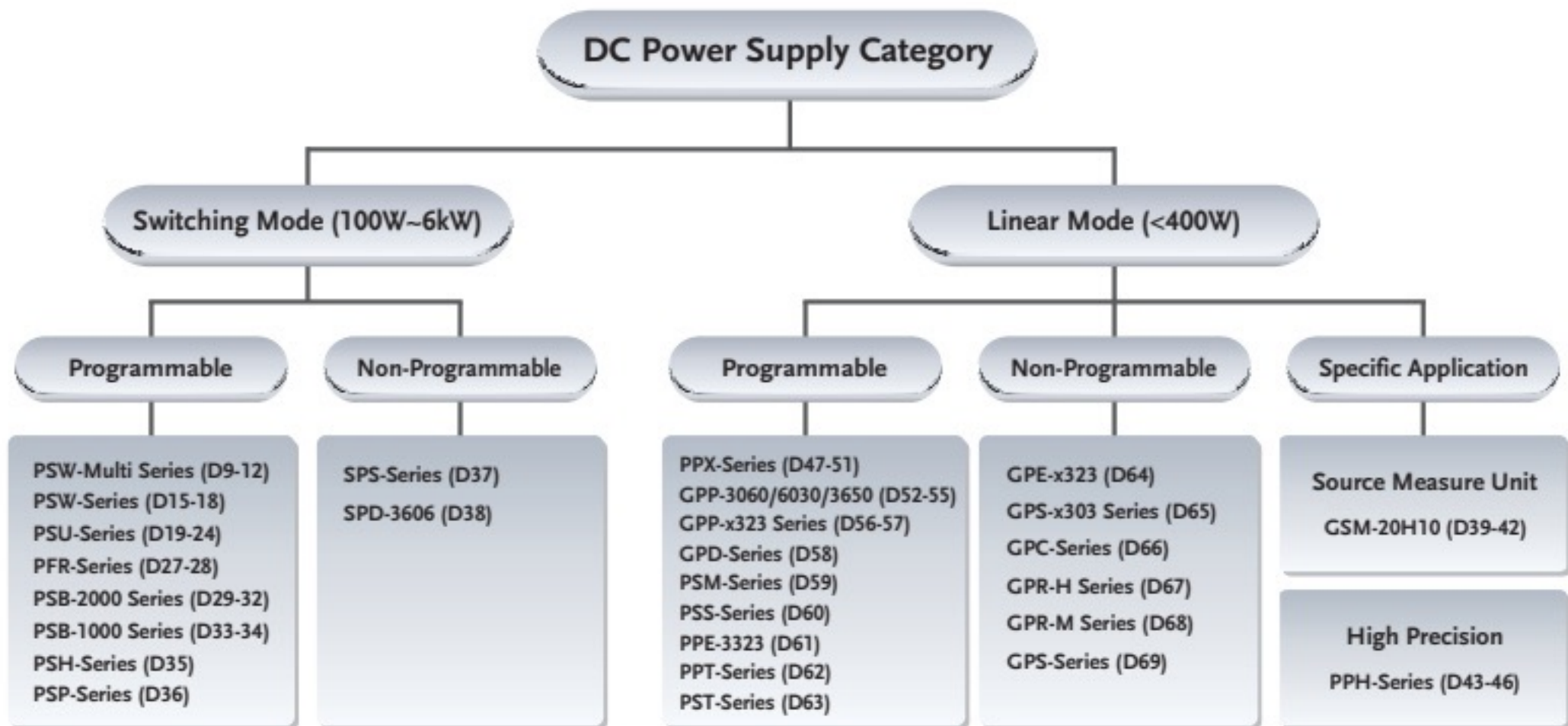
GW Instek offers more than 100 power supply products, Which are suitable for the requirements of Electronic Assembly Testing, Education, Component Testing, Wireless Product Testing, Burn-in, Battery-Power Product Testing Automotive, Aerospace industries and so on.

PRODUCTS

- Programmable & Single Channel DC Power Supply
- Non-Programmable & Single Channel DC Power Supply
- Programmable & Multiple Channel DC Power Supply
- Non-Programmable & Multiple Channel DC Power Supply
- Source Measure Unit

DC POWER SUPPLIES

GENERAL SELECTION GUIDE OF POWER SUPPLY BY APPLICATION



Series	Education	R&D/ Research Lab	Production Testing	ATE for Production	Burn-IN	Page
PSW-Multi Series		✓	✓	✓	✓	D9-12
PSW-Series		✓	✓	✓	✓	D15-18
PSU-Series		✓	✓	✓	✓	D19-24
PFR-Series		✓		✓		D27-28
PSB-2000 Series		✓	✓	✓	✓	D29-32
PSB-1000 Series		✓	✓	✓	✓	D33-34
PSH-Series		✓	✓	✓	✓	D35
PSP-Series	✓	✓		✓		D36
SPS-Series			✓	✓	✓	D37
SPD-3606	✓	✓	✓		✓	D38
GSM-20H10	✓	✓	✓	✓		D39-42
PPH-Series		✓	✓		✓	D43-46
PPX-Series		✓	✓		✓	D47-51
GPP-3060/6030/3650		✓	✓	✓	✓	D52-55
GPP-x323 Series	✓	✓	✓		✓	D56-57
GPD-Series	✓	✓	✓			D58
PSM-Series		✓	✓		✓	D59
PSS-Series		✓	✓	✓		D60
PPE-3323	✓	✓	✓	✓		D61
PPT-Series	✓	✓	✓	✓		D62
PST-Series	✓	✓	✓	✓		D63
GPE-x323	✓	✓	✓			D64
GPS-x303 Series	✓	✓	✓			D65
GPC-Series	✓	✓	✓			D66
GPR-H Series		✓	✓		✓	D67
GPR-M Series		✓	✓		✓	D68
GPS-Series	✓	✓	✓			D69

DC POWER SUPPLIES

GENERAL SELECTION GUIDE OF DC POWER SUPPLY BY TECHNIC

Technic	Channel	Programmability	Display	Model Series	Page	
Switching	2, 3	Programmable	LED	PSW-Multi Series	D9-12	
	1		LED	PSW-Series	D15-18	
	1		LED	PSU-Series	D19-24	
	1		LED	PFR-Series	D25-28	
	1		LED	PSB-2400L/PSB-2800L/PSB-2400H/PSB-2800H/PSB-2800LS	D29-32	
	1		LCD	PSB-1000 Series	D33-34	
	1		LCD	PSH-Series	D35	
	1		LCD	PSP-Series	D36	
	1		Non-Programmable	LED	SPS-Series	D37
	2	Programmable	LED	PSB-2400L2	D29-32	
	3	Non-Programmable	LED	SPD-3606	D38	
	Linear	1	Programmable	LCD	PPH-1503	D43-46
		1		LCD	GSM-20H10	D39-42
1		LED		GPP-1326	D56-57	
1		LCD		PPX-Series	D47-51	
1		VFD		PSM-Series	D59	
1		LCD		PSS-Series	D60	
1		Non-Programmable	LED	GPR-H Series	D67	
1			LED	GPR-M Series	D68	
1			LED	GPS-1830D/GPS-1850D/GPS-3030D/GPS-3030DD	D69	
1			LED	GPE-1326	D64	
2		Programmable	LCD	PPH-1503D/PPH-1506D/PPH-1510D	D43-46	
3			LCD	GPP-3060/GPP-6030	D52-55	
2			LCD	GPP-2323	D56-57	
3				GPP-3323		
4				GPP-4323		
2			LED	GPD-2303S	D58	
3				GPD-3303S		
4				GPD-4303S		
3				LED	PPE-3323	D64
3				LED	PPT-Series	D62
3				LED	PST-3201	D63
3			LED	PST-3202		
2			Non-Programmable	LED	GPE-2323	D64
3					GPE-3323	
4		GPE-4323				
2		LED		GPS-2303	D65	
3				GPS-3303		
4	GPS-4303					
3	LED			GPC-Series		D66

DC POWER SUPPLIES

GENERAL SELECTION GUIDE OF DC POWER SUPPLY BY CHANNEL

Channel	Programmability	Technic	Display	Model Series	Page
Single Channel	Programmable	Switching	LED	PSW-Series	D15-18
			LED	PSU-Series	D19-24
			LED	PFR-Series	D25-28
			LED	PSB-2400L/PSB-2800L/PSB-2400H/PSB-2800H/PSB-2800LS	D29-32
			LCD	PSB-1000 Series	D33-34
			LCD	PSH-Series	D35
		LCD	PSP-Series	D36	
		Linear	LCD	PPH-1503	D43-46
			LCD	GSM-20H10	D39-42
			LED	GPP-1326	D56-57
			LCD	PPX-Series	D47-51
			VFD	PSM-Series	D59
	LCD		PSS-Series	D60	
	Non-Programmable	Switching	LED	SPS-Series	D37
			LED	GPE-1326	D64
		Linear	LED	GPR-H Series	D67
LED			GPR-M Series	D68	
LED			GPS-1830D/GPS-1850D/GPS-3030D/GPS-3030DD	D69	
Multiple Channel	Programmable	Switching	LED	PSB-2400L2	D29-32
			LED	PSW-Multi Series	D9-12
		Linear	LCD	PPH-1503D/PPH-1506D/PPH-1510D	D43-46
			LCD	GPP-3060/GPP-6030	D52-55
			LCD	GPP-2323/GPP-3323/GPP-4323	D56-57
			LED	GPD-Series	D58
			LED	PPE-3323	D61
			LED	PPT-Series	D62
			LED	PST-3201	D63
			LED	PST-3202	D63
	Non-Programmable	Switching	LED	SPD-3606	D38
		Linear	LED	GPE-2323/GPE-3323/GPE-4323	D64
			LED	GPS-x303 Series	D65
			LED	GPC-Series	D66

DC POWER SUPPLIES

PROGRAMMABLE & SINGLE CHANNEL DC POWER SUPPLY

Voltage(V)	Current(A)	Total Power(W)	Model Name	Display	Technic	Interface	Page
6	200	1200	PSU 6-200	LED	Switching	RS-232, RS-485, USB, LAN, Analog Control, (Opt)GPIB	D19-24
8	180	1440	PSU 8-180	LED	Switching	RS-232, RS-485, USB, LAN, Analog Control, (Opt)GPIB	
15	100	1500	PSU 15-100	LED	Switching	RS-232, RS-485, USB, LAN, Analog Control, (Opt)GPIB	
30	50	1500	PSU 30-50	LED	Switching	RS-232, RS-485, USB, LAN, Analog Control, (Opt)GPIB	
50	30	1500	PSU 50-30	LED	Switching	RS-232, RS-485, USB, LAN, Analog Control, (Opt)GPIB	
80	19	1520	PSU 80-19	LED	Switching	RS-232, RS-485, USB, LAN, Analog Control, (Opt)GPIB	
8	20	200	PSM-2010	VFD	Linear	RS-232, (Opt)GPIB	D59
9	5	45	PPH-1503	LCD	Linear	USBCDC, LAN, GPIB	D43-46
10	5	50	PPX-1005	LCD	Linear	USBCDC, LAN, RS-232, RS-485, (Opt)GPIB	D47-51
12.5	120	1500	PSU 12.5-120	LED	Switching	RS-232, RS-485, USB, LAN, Analog Control, (Opt)GPIB	D19-24
15	3	45	PPH-1503	LCD	Linear	USBCDC, LAN, GPIB	D43-46
15	7	120	PSM-3004	VFD	Linear	RS-232, (Opt)GPIB	D59
20	1	20	GSM-20H10	LCD	Linear	RS-232, USBTMC, LAN, GPIB	D39-42
20	2	40	PPX-2002	LCD	Linear	USBCDC, LAN, RS-232, RS-485, (Opt)GPIB	D47-51
20	5	100	PPX-2005	LCD	Linear	USBCDC, LAN, RS-232, RS-485, (Opt)GPIB	
20	5	100	PSS-2005	LCD	Linear	RS-232, (Opt)GPIB	
20	10	200	PSP-2010	LCD	Switching	RS-232	D36
20	10	200	PSM-2010	VFD	Linear	RS-232, (Opt)GPIB	D59
20	18	360	PSH-2018A	LCD	Switching	RS-232, (Opt)GPIB	D35
20	76	1520	PSU 20-76	LED	Switching	RS-232, RS-485, USB, LAN, Analog Control, (Opt)GPIB	D19-24
30	4	120	PSM-3004	VFD	Linear	RS-232, (Opt)GPIB	D59
30	6	200	PSM-6003	VFD	Linear	RS-232, (Opt)GPIB	
30	36	360	PSW 30-36	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232	D15-18
30	72	720	PSW 30-72	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232	
30	108	1080	PSW 30-108	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232	
32	3	96	PSS-3203	LCD	Linear	RS-232, (Opt)GPIB	D60
32	6	192	GPP-1326	LCD	Linear	USBCDC, RS-232, (Opt)LAN, GPIB	D56-57
36	1	36	PPX-3601	LCD	Linear	USBCDC, LAN, RS-232, RS-485, (Opt)GPIB	D47-51
36	3	108	PPX-3603	LCD	Linear	USBCDC, LAN, RS-232, RS-485, (Opt)GPIB	
36	10	360	PSH-3610A	LCD	Switching	RS-232, (Opt)GPIB	D35
36	20	720	PSH-3620A	LCD	Switching	RS-232, (Opt)GPIB	
36	30	1080	PSH-3630A	LCD	Switching	RS-232, (Opt)GPIB	
40	27	360	PSW 40-27	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232	D15-18
40	54	720	PSW 40-54	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232	
40	81	1080	PSW 40-81	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232	
40	5	200	PSP-405	LCD	Switching	RS-232	D36
40	38	1520	PSU 40-38	LED	Switching	RS-232, RS-485, USB, LAN, Analog Control, (Opt)GPIB	D19-24
40	40	400	PSB-1400L	LCD	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB	D33-34
40	80	800	PSB-1800L	LCD	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB	
50	10	100	PFR-100L	LED	Switching	RS-232, RS-485, USB, LAN, (Opt)GPIB	D25-28
60	3.3	200	PSM-6003	VFD	Linear	RS-232, (Opt)GPIB	D59
60	3.5	200	PSP-603	LCD	Switching	RS-232	D36
60	25	1500	PSU 60-25	LED	Switching	RS-232, RS-485, USBCDC, LAN, Analog Control, (Opt)GPIB	D19-24
80	13.5	360	PSW 80-13.5	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, RS-232	D15-18
80	27	720	PSW 80-27	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, RS-232	
80	40	400	PSB-2400L	LED	Switching	USBCDC, Analog Control, (Opt)GPIB, RS-232	D29-32
80	40.5	1080	PSW 80-40.5	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB	D15-18
80	80	800	PSB-2800L	LED	Switching	RS-232, USBCDC, Analog Control, (Opt)GPIB	D29-32
80	80	800	PSB-2800LS	LED	Switching	RS-232, USBCDC, Analog Control, (Opt)GPIB	
100	1	100	PPX-10H01	LCD	Linear	USBCDC, LAN, RS-232, RS-485, (Opt)GPIB	D47-51
100	15	1500	PSU 100-15	LED	Switching	RS-232, RS-485, USBCDC, LAN, Analog Control, (Opt)GPIB	D19-24
150	10	1500	PSU 150-10	LED	Switching	RS-232, RS-485, USBCDC, LAN, Analog Control, (Opt)GPIB	
160	7.2	360	PSW 160-7.2	LED	Switching	LAN, USBCDC, Analog Control, (Opt)GPIB, RS-232	D15-18

DC POWER SUPPLIES

Voltage(V)	Current(A)	Total Power(W)	Model Name	Display	Technic	Interface	Page
160	10	400	PSB-1400M	LCD	Switching	LAN, USB CDC, Analog Control, (Opt) GPIB, RS-232	D33-34
160	14.4	720	PSW 160-14.4	LED	Switching	LAN, USB CDC, Analog Control, (Opt) GPIB, RS-232	D15-18
160	20	800	PSB-1800M	LCD	Switching	LAN, USB CDC, Analog Control, (Opt) GPIB	D33-34
160	21.6	1080	PSW 160-21.6	LED	Switching	LAN, USB CDC, Analog Control, (Opt) GPIB	D15-18
200	0.1	20	GSM-20H10	LCD	Linear	RS-232, USB TMC, LAN, GPIB	D39-42
250	2	100	PFR-100M	LED	Switching	RS-232, RS-485, USB CDC, LAN, (Opt) GPIB, RS-232	D25-28
250	4.5	360	PSW 250-4.5	LED	Switching	LAN, USB CDC, Analog Control, (Opt) GPIB, RS-232	D15-18
250	9	720	PSW 250-9	LED	Switching	LAN, USB CDC, Analog Control, (Opt) GPIB, RS-232	
250	13.5	1080	PSW 250-13.5	LED	Switching	LAN, USB CDC, Analog Control, (Opt) GPIB, RS-232	
300	5	1500	PSU 300-5	LED	Switching	RS-232, RS-485, USB CDC, LAN, Analog Control, (Opt) GPIB	D19-24
400	3.8	1520	PSU 400-3.8	LED	Switching	RS-232, RS-485, USB CDC, LAN, Analog Control, (Opt) GPIB	
600	2.6	1560	PSU 600-2.6	LED	Switching	RS-232, RS-485, USB CDC, LAN, Analog Control, (Opt) GPIB	
800	1.44	360	PSW 800-1.44	LED	Switching	LAN, USB CDC, Analog Control, (Opt) GPIB, RS-232	D15-18
800	2.88	720	PSW 800-2.88	LED	Switching	LAN, USB CDC, Analog Control, (Opt) GPIB, RS-232	
800	3	400	PSB-2400H	LED	Switching	RS-232, USB CDC, Analog Control, (Opt) GPIB	D29-32
800	4.32	1080	PSW 800-4.32	LED	Switching	LAN, USB CDC, Analog Control, (Opt) GPIB, RS-232	D15-18
800	6	800	PSB-2800H	LED	Switching	RS-232, USB CDC, Analog Control, (Opt) GPIB	D29-32

NON-PROGRAMMABLE & SINGLE CHANNEL DC POWER SUPPLY

Voltage(V)	Current(A)	Total Power(W)	Model Name	Display	Technic	Remark	Page
8	30	240	GPR-0830HD	LED	Linear	Rear-Panel Output	D67
12	30	360	SPS-1230	LED	Switching	Rear-Panel Output	D37
18	3	54	GPS-1830D	LED	Linear	Rear-Panel Output	D69
18	5	90	GPS-1850D	LED	Linear		
18	10	180	GPR-1810HD	LED	Linear	Rear-Panel Output	D68
18	20	360	SPS-1820	LED	Switching	Rear-Panel Output	D37
18	20	360	GPR-1820HD	LED	Linear	Rear-Panel Output	D67
24	15	360	SPS-2415	LED	Switching		D37
30	3	90	GPS-3030D	LED	Linear	Rear-Panel Output	D69
30	3	90	GPS-3030DD	LED	Linear		
30	6	180	GPR-3060D	LED	Linear	Rear-Panel Output	D68
32	6	192	GPE-1326	LED	Linear	Rear-Panel Output	D64
35	10	350	GPR-3510HD	LED	Linear	Rear-Panel Output	D67
36	10	360	SPS-3610	LED	Switching	Rear-Panel Output	D37
60	3	180	GPR-6030D	LED	Linear	Rear-Panel Output	D68
60	6	360	SPS-606	LED	Switching	Rear-Panel Output	D37
60	6	360	GPR-6060D	LED	Linear	Rear-Panel Output	D67
75	5	375	GPR-7550D	LED	Linear	Rear-Panel Output	
110	3	330	GPR-11H30D	LED	Linear	Rear-Panel Output	
300	1	300	GPR-30H10D	LED	Linear	Rear-Panel Output	

DC POWER SUPPLIES

PROGRAMMABLE & MULTIPLE CHANNEL DC POWER SUPPLY

	Voltage(V)	Current(A)	Power per. CH	Total Power(W)	Model Name	Channel	Display	Technic	Interface	Page
CH1	15	3	45	63	PPH-1503D	2	LCD	Linear	USBTMC, LAN, GPIB	D43-46
	9	5	45							
CH2	12	1.5	18	81	PPH-1506D	2	LCD	Linear	USBTMC, LAN, GPIB	
CH1	15	3	45							
CH2	12	3	36	81	PPH-1510D	2	LCD	Linear	USBTMC, LAN, GPIB	
CH1	9	5	45							
	4.5	10	45	138	PPT-1830	3	LED	Linear	GPIB	
CH2	12	3	36							
CH1	18	3	54	385	GPP-3060	3	LCD	Linear	USBCDC, RS-232, (Opt)LAN, GPIB	
CH2	18	3	54							
CH3	6	5	30	180	GPD-2303S	2	LED	Linear	USBCDC	
CH1	30	6	180							
CH2	30	6	180	195	GPD-3303S	3	LED	Linear	USBCDC	
CH3	1.8/2.5/3.3/5.0	5	25							
CH1	30	3	90	195	GPD-4303S	4	LED	Linear	USBCDC	
CH2	30	3	90							
CH1	30	3	90	195	GPD-3303D	3	LED	Linear	USBCDC	
CH2	30	3	90							
CH3	2.5/3.3/5.0	3	15	192	GPP-2323	2	LCD	Linear	USBCDC, RS-232, (Opt)LAN, GPIB	
CH1	30	3	90							
CH2	30	3	90	217	GPP-3323	3	LCD	Linear	USBCDC, RS-232, (Opt)LAN, GPIB	
CH3	1.8/2.5/3.3/5.0	5	25							
CH1	32	3	96	212	GPP-4323	4	LCD	Linear	USBCDC, RS-232, (Opt)LAN, GPIB	
CH2	32	3	96							
CH3	5	1	5	207	PPE-3323	3	LED	Linear	RS-232	
CH4	15	1	15							
CH1	32	3	96	126	PPT-3615	3	LED	Linear	GPIB	
CH2	32	3	96							
CH3	3.3 / 5	3	15	158	PST-3202	3	LED	Linear	RS-232(O), GPIB	
CH1	36	1.5	54							
CH2	36	1.5	54	96	PST-3201	3	LED	Linear	RS-232(O), GPIB	
CH3	6	5	30							
CH1	32	1	32	385	GPP-6030	3	LCD	Linear	USBCDC, RS-232, (Opt)LAN, GPIB	
CH2	32	1	32							
CH3	32	1	32	800	PSB-2400L2	2	LED	Switching	RS-232, USB, Analog Control,	
CH1	60	3	180							
CH2	60	3	180	720	PSW-720L11	2	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232	
CH3	1.8/2.5/3.3/5.0	5	25							
CH1	80	40	400	720	PSW-720L12	2	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232	
CH2	80	40	400							
CH1	30	36	360	720	PSW-720L14	2	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232	
CH2	30	36	360							
CH1	30	36	360	720	PSW-720L15	2	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232	
CH2	80	13.5	360							
CH1	30	36	360	720	PSW-720L22	2	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232	
CH2	160	7.2	360							
CH1	40	27	360	720	PSW-720L24	2	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232	
CH2	40	27	360							
CH1	40	27	360	720	PSW-720L25	2	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232	
CH2	80	13.5	360							
CH1	40	27	360	720	PSW-720L44	2	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232	
CH2	160	7.2	360							
CH1	80	13.5	360	720	PSW-720L45	2	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232	
CH2	80	13.5	360							
CH1	80	13.5	360	720	PSW-720L55	2	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232	
CH2	160	7.2	360							
CH1	160	7.2	360	720	PSW-720H66	2	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232	
CH2	160	7.2	360							
CH1	250	4.5	360	720	PSW-720H68	2	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232	
CH2	250	4.5	360							
CH1	250	4.5	360	720	PSW-720H88	2	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232	
CH2	800	1.44	360							
CH1	800	1.44	360	1080	PSW-1080L111	3	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232	
CH2	800	1.44	360							
CH3	160	7.2	360	1080	PSW-1080L112	3	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232	
CH1	30	36	360							
CH2	30	36	360	1080	PSW-1080L114	3	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232	
CH3	40	27	360							
CH1	30	36	360	1080	PSW-1080L115	3	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232	
CH2	30	36	360							
CH3	80	13.5	360	1080	PSW-1080L122	3	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232	
CH1	30	36	360							
CH2	30	36	360	1080	PSW-1080L115	3	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232	
CH3	160	7.2	360							
CH1	30	36	360	1080	PSW-1080L122	3	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232	
CH2	30	36	360							
CH3	40	27	360	1080	PSW-1080L122	3	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232	
CH1	30	36	360							

DC POWER SUPPLIES

	Voltage(V)	Current(A)	Power per. CH	Total Power(W)	Model Name	Channel	Display	Technic	Interface	Page										
CH1	30	36	360	1080	PSW-1080L124	3	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232	D9										
CH2	40	27	360																	
CH3	80	13.5	360																	
CH1	30	36	360	1080	PSW-1080L125	3	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232		D9									
CH2	40	27	360																	
CH3	160	7.2	360																	
CH1	30	36	360	1080	PSW-1080L144	3	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232			D9								
CH2	80	13.5	360																	
CH3	80	13.5	360																	
CH1	30	36	360	1080	PSW-1080L145	3	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232				D9							
CH2	80	13.5	360																	
CH3	160	7.2	360																	
CH1	30	36	360	1080	PSW-1080L155	3	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232					D9						
CH2	160	7.2	360																	
CH3	160	7.2	360																	
CH1	40	27	360	1080	PSW-1080L222	3	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232						D9					
CH2	40	27	360																	
CH3	40	27	360																	
CH1	40	27	360	1080	PSW-1080L224	3	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232							D9				
CH2	40	27	360																	
CH3	80	13.5	360																	
CH1	40	27	360	1080	PSW-1080L225	3	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232								D9			
CH2	40	27	360																	
CH3	160	7.2	360																	
CH1	40	27	360	1080	PSW-1080L244	3	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232									D9		
CH2	80	13.5	360																	
CH3	80	13.5	360																	
CH1	40	27	360	1080	PSW-1080L245	3	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232										D9	
CH2	80	13.5	360																	
CH3	160	7.2	360																	
CH1	40	27	360	1080	PSW-1080L255	3	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232											D9
CH2	160	7.2	360																	
CH3	160	7.2	360																	
CH1	80	13.5	360	1080	PSW-1080L444	3	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232	D9										
CH2	80	13.5	360																	
CH3	80	13.5	360																	
CH1	80	13.5	360	1080	PSW-1080L445	3	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232		D9									
CH2	80	13.5	360																	
CH3	160	7.2	360																	
CH1	80	13.5	360	1080	PSW-1080L455	3	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232			D9								
CH2	160	7.2	360																	
CH3	160	7.2	360																	
CH1	160	7.2	360	1080	PSW-1080L555	3	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232				D9							
CH2	160	7.2	360																	
CH3	160	7.2	360																	
CH1	250	4.5	360	1080	PSW-1080H666	3	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232					D9						
CH2	250	4.5	360																	
CH3	250	4.5	360																	
CH1	250	4.5	360	1080	PSW-1080H668	3	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232						D9					
CH2	250	4.5	360																	
CH3	800	1.44	360																	
CH1	250	4.5	360	1080	PSW-1080H688	3	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232							D9				
CH2	800	1.44	360																	
CH3	800	1.44	360																	
CH1	800	1.44	360	1080	PSW-1080H888	3	LED	Switching	LAN, USB, Analog Control, (Opt)GPIB, RS-232								D9			
CH2	800	1.44	360																	
CH3	800	1.44	360																	

POWER SUPPLIES

NON-PROGRAMMABLE & MULTIPLE CHANNEL DC POWER SUPPLY

	Voltage(V)	Current(A)	Power per. CH	Total Power(W)	Model Name	Channel	Display	Technic	Page			
CH1	30	6	180	375	SPD-3606	3	LED	Switching	D38			
CH2	30	6	180									
CH3	5	3	15									
CH1	32	3	96	192	GPE-2323	2	LED	Linear	D64			
CH2	32	3	96									
CH3	32	3	96									
CH1	32	3	96	217	GPE-3323	3	LED	Linear		D64		
CH2	32	3	96									
CH3	1.8/2.5/3.3/5.0	5	25									
CH1	32	3	96	212	GPE-4323	4	LED	Linear			D64	
CH2	32	3	96									
CH3	5	1	5									
CH4	15	1	15									
CH1	30	3	90	180	GPS-2303	2	LED	Linear				D65
CH2	30	3	90									
CH1	30	3	90	195	GPS-3303	3	LED	Linear	D65			
CH2	30	3	90									
CH3	5	3	15									
CH1	30	3	90	200	GPS-4303	4	LED	Linear		D65		
CH2	30	3	90									
CH3	2.2 ~ 5.2	1	5.2									
CH4	8 ~ 15	1	15									
CH1	30	6	180	375	GPC-3060D	3	LED	Linear			D66	
CH2	30	6	180									
CH3	5	3	15									
CH1	60	3	180	375	GPC-6030D	3	LED	Linear				D66
CH2	60	3	180									
CH3	5	3	15									

Dual-channel/Triple-channel Programmable Switching D.C. Power Supply



PSW-Multi Series

NEW



FEATURES

- * Multi-channel: Maximum 720W for Dual-channel Module and Maximum 1080W for Triple-channel Models; The PSW-Multi Series Also Features a New Built-in Function That Allows Individual Synchronizd Output Control of Each Voltage Module Output Latency Between Channels with the Same Voltage Module is Less Than 0.1ms
- * Multiple Voltage Combinations: Low Voltage Combinations Can be Selected From 30V/40V/80V/160V; High Voltage Combinations Can be Selected From 250V/800V
- * Advanced Web Server: Executes SCPI Commands; Web Controls Through Server; Data Log; Edit Sequence
- * CC/CV Priority Mode Selection is Ideal for Battery and LED Industries
- * Adjustable Rising and Falling Slew Rate
- * 720W/1080W Adopt 1/3, 1/2 Rack Mount Frame Designs (Standard EIA/JIS)
- * Standard Communications Interfaces: LAN, USB, External Analog Remote Control Terminal
- * Optional Communications Interfaces: GPIB-USB Adapter, RS232-USB Cable
- * Support LabVIEW Driver

GRA-410-J/E Rack Mount Kit (JIS/EIA)

For : PSW-Series



PSW-Multi Series is a dual-channel or triple-channel wide range output programmable switching DC power supply. The maximum output power can reach 1080W. There are 13 dual-channel models with a rated power of 720W, and 24 triple-channel models with a rated power of 1080W. The rated voltages of low voltage modules are 30V, 40V, 80V, 160V. The rated voltages of high voltage modules are 250V and 800V.

The CV/CC priority selection of the PSW-Multi Series is a very useful feature for DUT protection. The conventional power supply normally operates under CV mode when the power output is turned on. This could bring a high inrush current to the capacitive load or current-intensive load at the power output-on stage. Taking the I-V curve verification of LED as an example, it becomes a very challenging task to perform this measurement using a conventional power supply.

With LED connected to a power supply under CV mode as the initial setting, when the power output is turned on and the voltage rises to the LED forward voltage, the current will suddenly peak up and exceed the preset value of current limit. Upon detecting this high current, the power supply starts the transition from CV mode to CC mode. Though the current becomes stable after the CC mode being activated, the current spike occurred at the CV and CC crossover point may possibly damage the DUT. At the power output-on stage, the PSW-Multi Series is able to operate under CC priority to limit the current spike occurred at the threshold voltage and therefore protects DUT from the inrush current damage.

The adjustable slew rate of the PSW-Multi Series allows users to set for either output voltage or output current, a specific rise time from low to high level transition, and a specific fall time from high to low level transition. This facilitates the characteristic verification of a DUT during voltage or current level changes with controllable slew rates. Most manufacturing tests of lighting device or large capacitor during power output-on are associated with the occurrence of high surge current, which can greatly reduce the life time of the DUT. To prevent inrush current from damaging current-intensive devices, a smooth and slow voltage transition during power On-Off can significantly reduce the pike current and protect the device from high current damage.

The OVP and OCP are provided with the PSW-Multi Series. Both OVP and OCP levels can be selected, with default level set at 110%, of the rated voltage/current of the power supply. When any of the protection levels is tripped, the power output will be switched off to protect the DUT. The PSW-Multi Series provides USB Host/Device and LAN interfaces as standard, GPIB-USB adapter and RS232-USB cable as optional. The LabVIEW driver and the Data Logging PC software are supported on all the available interfaces. An analog control/monitoring connector is also available on the rear panel for external control of power On/Off and external monitoring of power output Voltage and Current.

DUAL-CHANNEL MODELS ARE AS FOLLOWS

MODEL	CH1	CH2	SIZE
PSW-720L11	30.00V	30.00V	1/3 Rack 3U
PSW-720L12	30.00V	40.00V	1/3 Rack 3U
PSW-720L14	30.00V	80.00V	1/3 Rack 3U
PSW-720L15	30.00V	160.0V	1/3 Rack 3U
PSW-720L22	40.00V	40.00V	1/3 Rack 3U
PSW-720L24	40.00V	80.00V	1/3 Rack 3U
PSW-720L25	40.00V	160.0V	1/3 Rack 3U
PSW-720L44	80.00V	80.00V	1/3 Rack 3U
PSW-720L45	80.00V	160.0V	1/3 Rack 3U
PSW-720L55	160.0V	160.0V	1/3 Rack 3U
PSW-720H66	250.0V	250.0V	1/3 Rack 3U
PSW-720H68	250.0V	800.0V	1/3 Rack 3U
PSW-720H88	800.0V	800.0V	1/3 Rack 3U

TRIPLE-CHANNEL MODELS ARE AS FOLLOWS

MODEL	CH1	CH2	CH3	SIZE
PSW-1080L111	30.00V	30.00V	30.00V	1/2 Rack 3U
PSW-1080L112	30.00V	30.00V	40.00V	1/2 Rack 3U
PSW-1080L114	30.00V	30.00V	80.00V	1/2 Rack 3U
PSW-1080L115	30.00V	30.00V	160.0V	1/2 Rack 3U
PSW-1080L122	30.00V	40.00V	40.00V	1/2 Rack 3U
PSW-1080L124	30.00V	40.00V	80.00V	1/2 Rack 3U
PSW-1080L125	30.00V	40.00V	160.0V	1/2 Rack 3U
PSW-1080L144	30.00V	80.00V	80.00V	1/2 Rack 3U
PSW-1080L145	30.00V	80.00V	160.0V	1/2 Rack 3U
PSW-1080L155	30.00V	160.0V	160.0V	1/2 Rack 3U
PSW-1080L222	40.00V	40.00V	40.00V	1/2 Rack 3U
PSW-1080L224	40.00V	40.00V	80.00V	1/2 Rack 3U
PSW-1080L225	40.00V	40.00V	160.0V	1/2 Rack 3U
PSW-1080L244	40.00V	80.00V	80.00V	1/2 Rack 3U
PSW-1080L245	40.00V	80.00V	160.0V	1/2 Rack 3U
PSW-1080L255	40.00V	160.0V	160.0V	1/2 Rack 3U
PSW-1080L444	80.00V	80.00V	80.0V	1/2 Rack 3U
PSW-1080L445	80.00V	80.00V	160.0V	1/2 Rack 3U
PSW-1080L455	80.00V	160.0V	160.0V	1/2 Rack 3U
PSW-1080L555	160.0V	160.0V	160.0V	1/2 Rack 3U
PSW-1080H666	250.0V	250.0V	250.0V	1/2 Rack 3U
PSW-1080H668	250.0V	250.0V	800.0V	1/2 Rack 3U
PSW-1080H688	250.0V	800.0V	800.0V	1/2 Rack 3U
PSW-1080H888	800.0V	800.0V	800.0V	1/2 Rack 3U

Notes :

- *1: At 85 ~ 132Vac or 170 ~ 265Vac, constant load.
- *2: From No-load to Full-load, constant input voltage. Measured at the sensing point in Remote Sense.
- *3: Measure with JEITA RC-9131B (1:1) probe
- *4: Measurement frequency bandwidth is 10Hz to 20MHz.
- *5: Measurement frequency bandwidth is 5Hz to 1MHz.
- *6: From 10% to 90% of rated output voltage, with rated resistive load.
- *7: From 90% to 10% of rated output voltage, with rated resistive load.
- *8: Time for output voltage to recover within 0.1% + 10mV of its rated output for a load change from 50 to 100% of its rated output current.
- *9: For load voltage change, equal to the unit voltage rating, constant input voltage.

SPECIFICATIONS

Module Type			1	2	4	5	6	8	
H/L Voltage Classification		—	L	L	L	L	H	H	
Rated output voltage		V	30	40	80	160	250	800	
Rated output current		A	36	27	13.5	7.2	4.5	1.44	
Rated output power		W	360	360	360	360	360	360	
Power ratio		—	3	3	3	3.2	3.125	3.2	
Constant Voltage Mode			30-36	40-27	80-13.5	160-7.2	250-4.5	800-1.44	
Line regulation (*1)		mV	18	23	43	83	128	403	
Load regulation (*2)		mV	20	25	45	85	130	405	
Ripple and noise (*3)	p-p (*4)	mV	60	60	60	60	80	150	
	r.m.s. (*5)	mV	7	7	7	12	15	30	
Temperature coefficient		ppm/°C	100ppm/°C of rated output voltage, after a 30 minute warm-up						
Remote sense compensation voltage (single wire)		V	0.6	0.6	0.6	0.6	1	1	
Rise time (*6)	Rated load	ms	50	50	50	100	100	150	
	No load	ms	50	50	50	100	100	150	
Fall time (*7)	Rated load	ms	50	50	50	100	150	300	
	No load	ms	500	500	500	1000	1200	2000	
Transient response time (*8)		ms	1	1	1	2	2	2	
Constant Current Mode			30-36	40-27	80-13.5	160-7.2	250-4.5	800-1.44	
Line regulation (*1)		mA	41	32	18.5	12.2	9.5	6.44	
Load regulation (*9)		mA	41	32	18.5	12.2	9.5	6.44	
Ripple and noise	r.m.s.	mA	72	54	27	15	10	5	
Temperature coefficient		ppm/°C	200ppm/°C of rated output current, after a 30 minute warm-up						
Protection Function			30-36	40-27	80-13.5	160-7.2	250-4.5	800-1.44	
Over voltage protection (OVP)	Setting range	V	3-33	4-44	8-88	16-176	20-275	20-880	
	Setting accuracy		± (2% of rated output voltage)						
Over current protection (OCP)	Setting range	A	3.6-39.6	2.7-29.7	1.35-14.85	0.72-7.92	0.45-4.95	0.144-1.584	
	Setting accuracy		± (2% of rated output current)						
Over temperature protection (OTP)	Operation		Turn the output off						
Low AC input protection (AC-FAIL)	Operation		Turn the output off						
Power limit (POWER LIMIT)	Operation		Over power limit.						
	Value (fixed)		Approx. 105% of rated output power						
Analog Programming and Monitoring			30-36	40-27	80-13.5	160-7.2	250-4.5	800-1.44	
External voltage control output voltage	at 23 °C ± 5 °C		Accuracy and linearity: ±0.5% of rated output voltage.						
External voltage control output current	at 23 °C ± 5 °C		Accuracy and linearity: ±1% of rated output current.						
External resistor control output voltage	at 23 °C ± 5 °C		Accuracy and linearity: ±1.5% of rated output voltage.						
External resistor control output current	at 23 °C ± 5 °C		Accuracy and linearity: ±1.5% of rated output current.						
Output voltage monitor	at 23 °C ± 5 °C		Accuracy: ±1%						
Output current monitor	at 23 °C ± 5 °C		Accuracy: ±1%						
Shutdown control			Turns the output off with a LOW (0V to 0.5V) or short-circuit						
Output on/off control			Possible logic selections: Turn the output on using a LOW (0V to 0.5V) or short-circuit, turn the output off using a HIGH (4.5V to 5V) or open-circuit. Turn the output on using a HIGH (4.5V to 5V) or open-circuit, turn the output off using a LOW (0V to 0.5V) or short-circuit.						
CV/CC/ALM/PWR ON/OUT ON indicator			Photocoupler open collector output; Maximum voltage 30V, maximum sink current 8mA.						
Front Panel			30-36	40-27	80-13.5	160-7.2	250-4.5	800-1.44	
Display, 4 digits	Voltage accuracy	at 23 °C ± 5 °C; ± (0.1% +	mV	20	20	20	100	200	400
	Current accuracy	at 23 °C ± 5 °C; ± (0.1% +	mA	40	30	20	5	5	2
Indications			GREEN LED's: CV, CC, VSR, ISR, DLY, RMT, 20, 40, 60, 80, 100, %W, W, V, A						
			RED LED's: ALM						
Buttons			Function, OVP/OCP, Set, Test, Lock/Local, PWR DSPL, Output						
Knobs			Voltage, Current						
USB port			Type A USB connector						
Programming and Measurement (USB, LAN, GPIB)			30-36	40-27	80-13.5	160-7.2	250-4.5	800-1.44	
Output voltage programming accuracy	at 23 °C ± 5 °C; ± (0.1% +	mV	10	10	10	100	200	400	
Output current programming accuracy	at 23 °C ± 5 °C; ± (0.1% +	mA	30	20	10	5	5	2	
Output voltage programming resolution		mV	1	1	2	3	5	14	
Output current programming resolution		mA	1	1	1	1	1	1	
Output voltage measurement accuracy	at 23 °C ± 5 °C; ± (0.1% +	mV	10	10	10	100	200	400	
Output current measurement accuracy	at 23 °C ± 5 °C; ± (0.1% +	mA	30	20	10	5	5	2	
Output voltage measurement resolution		mV	1	1	2	3	5	14	
Output current measurement resolution		mA	1	1	1	1	1	1	
Input Characteristics			30-36	40-27	80-13.5	160-7.2	250-4.5	800-1.44	
Efficiency	100Vac	%	77	78	78	79	79	80	
	200Vac	%	79	80	80	81	81	82	
Input Characteristics			Dual Channel			Triple Channel			
Nominal input rating			100Vac to 240Vac, 50Hz to 60Hz, single phase						
Input voltage range			85Vac ~ 265Vac						
Input frequency range			47Hz ~ 63Hz						
Maximum input current	100Vac	A	10			15			
	200Vac	A	5			7.5			
Inrush current			Less than 50A			Less than 75A			
Maximum input power		VA	1000			1500			
Power factor	100Vac		0.99						
	200Vac		0.97						
Hold-up time			20ms or greater						
Interface Capabilities			Dual Channel			Triple Channel			
USB			TypeA: Host, TypeB: Slave, Speed: 1.1/2.0, USB Class: CDC(Communications Device Class)						
LAN			MAC Address, DNS IP Address, User Password, Gateway IP Address, Instrument IP Address, Subnet Mask						
GPIB			Optional: GUC-001 (GPIB to USB Adapter)						
Environmental Conditions			Dual Channel			Triple Channel			
Operating temperature			0 °C to 50 °C						
Storage temperature			-25 °C to 70 °C						
Operating humidity			20% to 85% RH; No condensation						
Storage humidity			90% RH or less; No condensation						
Altitude			Maximum 2000m						
General Specifications			Dual Channel			Triple Channel			
Weight	main unit only	kg	Approx. 5.4kg			Approx. 7.7kg			
Dimensions	(WxHxD)	mm	142 x 124 x 350			214 x 124 x 350			
Cooling			Forced air cooling by internal fan						
EMC			Complies with the European EMC directive for Class A test and measurement products						
Safety			Complies with the European Low Voltage Directive and carries the CE-marking						
Withstand voltage	Between input and chassis		No abnormalities at 1500 Vac for 1 minute						
	Between input and output		No abnormalities at 3000 Vac for 1 minute						
	Between output and chassis		No abnormalities at 500 Vdc for 1 minute for 30V, 40V, 80V, 160V models No abnormalities at 1500 Vdc for 1 minute for 250V, 800V models						
Insulation resistance	Between input and chassis		500 Vdc, 100 MΩ or more						
	Between input and output		500 Vdc, 100 MΩ or more						
	Between output and chassis		500 Vdc, 100 MΩ or more for 30V, 40V, 80V, 160V and 250V models 1000 Vdc, 100 MΩ or more for 800V models						

Dual-channel/Triple-channel Programmable Switching D.C. Power Supply



PSW-Multi Series(Three-channel)



PSW-Multi Series(Two-channel)



PSW-Multi Series (LV)
Three-channel Models Rear Panel



PSW-Multi Series (HV)
Three-channel Models Rear Panel



PSW-Multi Series (LV)
Two-channel Models Rear Panel



PSW-Multi Series (HV)
Two-channel Models Rear Panel

ORDERING INFORMATION

Dual Channel Model

PSW-720L11	30V/36A*2	720W Multi-Range D.C. Power Supply
PSW-720L12	30V/36A*1 40V/27A*1	720W Multi-Range D.C. Power Supply
PSW-720L14	30V/36A*1 80V/13.5A*1	720W Multi-Range D.C. Power Supply
PSW-720L15	30V/36A*1 160V/7.2A*1	720W Multi-Range D.C. Power Supply
PSW-720L22	40V/27A*2	720W Multi-Range D.C. Power Supply
PSW-720L24	40V/27A*1 80V/13.5A*1	720W Multi-Range D.C. Power Supply
PSW-720L25	40V/27A*1 160V/7.2A*1	720W Multi-Range D.C. Power Supply
PSW-720L44	80V/13.5A*2	720W Multi-Range D.C. Power Supply
PSW-720L45	80V/13.5A*1 160V/7.2A*1	720W Multi-Range D.C. Power Supply
PSW-720L55	160V/7.2A*2	720W Multi-Range D.C. Power Supply
PSW-720H66	250V/4.5A*2	720W Multi-Range D.C. Power Supply
PSW-720H68	250V/4.5A*1 800V/1.44A*1	720W Multi-Range D.C. Power Supply
PSW-720H88	800V/1.44A*2	720W Multi-Range D.C. Power Supply

Triple Channel Model

PSW-1080L111	30V/36A*3	1080W Multi-Range D.C. Power Supply
PSW-1080L112	30V/36A*2 40V/27A*1	1080W Multi-Range D.C. Power Supply
PSW-1080L114	30V/36A*2 80V/13.5A*1	1080W Multi-Range D.C. Power Supply
PSW-1080L115	30V/36A*2 160V/7.2A*1	1080W Multi-Range D.C. Power Supply
PSW-1080L122	30V/36A*1 40V/27A*2	1080W Multi-Range D.C. Power Supply
PSW-1080L124	30V/36A*1 40V/27A*1 80V/13.5A*1	1080W Multi-Range D.C. Power Supply
PSW-1080L125	30V/36A*1 40V/27A*1 160V/7.2A	1080W Multi-Range D.C. Power Supply
PSW-1080L144	30V/36A*1 80V/13.5A*2	1080W Multi-Range D.C. Power Supply
PSW-1080L145	30V/36A*1 80V/13.5A*1 160V/7.2A*1	1080W Multi-Range D.C. Power Supply
PSW-1080L155	30V/36A*1 160V/7.2A*2	1080W Multi-Range D.C. Power Supply
PSW-1080L222	40V/27A*3	1080W Multi-Range D.C. Power Supply
PSW-1080L224	40V/27A*2 80V/13.5A*1	1080W Multi-Range D.C. Power Supply
PSW-1080L225	40V/27A*2 160V/7.2A*1	1080W Multi-Range D.C. Power Supply
PSW-1080L244	40V/27A*1 80V/13.5A*2	1080W Multi-Range D.C. Power Supply
PSW-1080L245	40V/27A*1 80V/13.5A*1 160V/7.2A*1	1080W Multi-Range D.C. Power Supply
PSW-1080L255	40V/27A*1 160V/7.2A*2	1080W Multi-Range D.C. Power Supply
PSW-1080L444	80V/13.5A*3	1080W Multi-Range D.C. Power Supply
PSW-1080L445	80V/13.5A*2 160V/7.2A*1	1080W Multi-Range D.C. Power Supply
PSW-1080L455	80V/13.5A*1 160V/7.2A*2	1080W Multi-Range D.C. Power Supply
PSW-1080L555	160V/7.2A*3	1080W Multi-Range D.C. Power Supply
PSW-1080H666	250V/4.5A*3	1080W Multi-Range D.C. Power Supply
PSW-1080H668	250V/4.5A*2 800V/1.44A*1	1080W Multi-Range D.C. Power Supply
PSW-1080H688	250V/4.5A*1 800V/1.44A*2	1080W Multi-Range D.C. Power Supply
PSW-1080H888	800V/1.44A*3	1080W Multi-Range D.C. Power Supply

Apart from the differences in output type, each unit differs at output channels and voltage.
The PSW-720 is dual channel output and PSW-1080 is triple channel output.

ACCESSORIES :

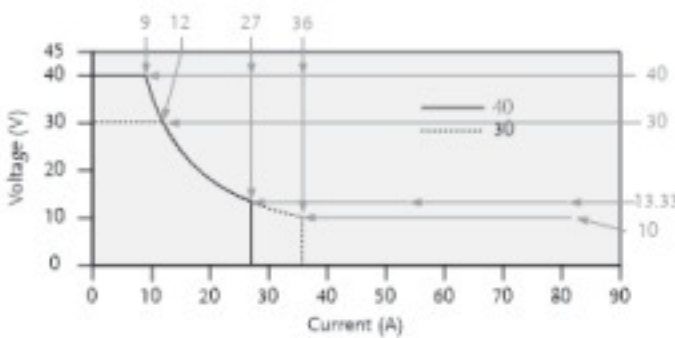
	Power Cord x1 (Region dependent)
GTL-123	Test Lead x 1 (30V/40V/80V/160V One low voltage module for each channel)
GTL-240	USB Cable "L" Type x1
PSW-004	Basic Accessories Kit x1 (30V/40V/80V/160V low voltage module)
PSW-008	Basic Accessories Kit x1 (250V/800V high voltage module)
PSW-009	Output terminal cover (30V/40V/80V/160V low voltage module)
PSW-011	Output terminal cover (250V/800V high voltage module)
PSW-012	High voltage output terminal (250V/800V high voltage module)

OPTIONAL ACCESSORIES

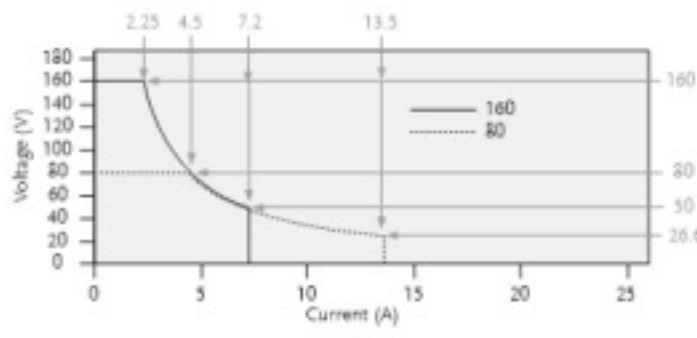
PSW-001	Accessory Kit
PSW-002	Simple IDC Tool
PSW-003	Contact Removal Tool
GUG-001	GPIB to USB Adaptor
GRA-410-J	Rack Mount Kit(JIS)
GRA-410-E	Rack Mount Kit(KIA)
GET-001	Extended Terminal with max. 30A (30V/40V/80V/160V low voltage module)
GET-002	Extended Terminal with max. 10A (250V/800V high voltage module)
GET-005	Extended European Terminal with max. 20A (30V/40V/80V/160V low voltage module)
GTL-130	Test Lead: 2x red, 2x black (250V/800V high voltage module)
GTL-248	GPIB Cable, 2000mm
GTL-250	GPIB Cable, 600mm
GUR-001A	USB to RS-232 Cable (M3), 3000mm
GUR-001B	USB to RS-232 Cable (#4-40 UNC), 3000mm



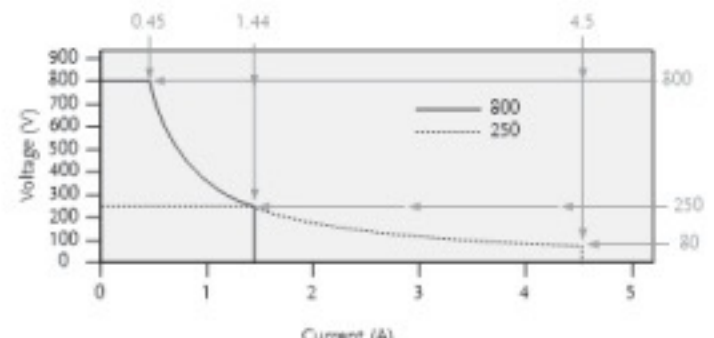
A. MULTI-RANGE OPERATION



PSW 30V/40V Series Operating Area



PSW 80V/160V Series Operating Area



PSW 250V/800V Series Operating Area

When the power supply is configured that the total output (Current x Voltage output) is less than the rated power output, it functions as a typical Constant Current (CC) and Constant Voltage (CV) power supply.

However, when the power supply is configured such that the total output power (Current x Voltage Output) exceeds the rated power output, the effective output is actually limited to the operation area of the unit.

B. MULTI-CHANNEL

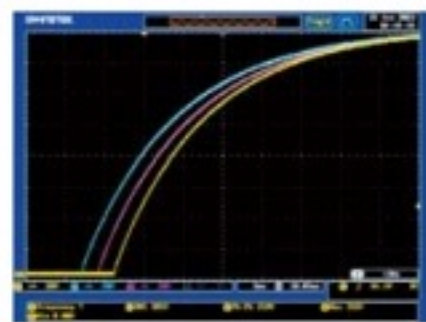


Figure 1

Multi-Channel, Dual-channel or triple-channel; the output latency between channels for same voltage module is less than 0.1ms.

When using a single-channel power supply for parallel multiple voltage output testing, there are different delays and slew rate settings, resulting in longer voltage output delay times and lack of control. The PSW-Multi Series features a built-in synchronous output control function (F130) that allow Dual-channel or triple-channel; the output latency between channels for same voltage module is less than 0.1ms.

It can fulfill diverse testing applications, for example: multi-channel digital device testing, electronic circuit verification, battery charging and discharging testing, and more.

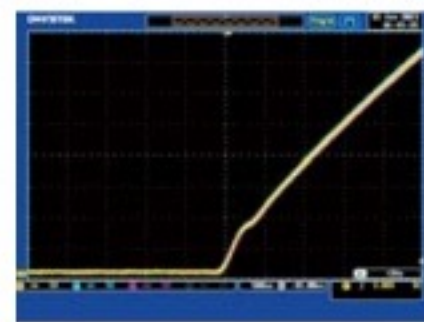


Figure 2

When using a single-channel power supply with three units connected in parallel through the backplane for synchronized output, each unit will experience a voltage output latency of approximately 5 to 10 ms. (Figure 1)

The waveform of PSW-Multi Series in triple-channel synchronized output mode exhibits voltage output latency times less than 0.1 ms for each channel (with the same voltage model) (Figure 2)

Dual-channel/Triple-channel Programmable Switching D.C. Power Supply

C. ADVANCED WEB SERVER



Figure 1



Figure 2



Figure 3



Figure 4

SCPI commands can be issued directly on the browser, examples are as follows: Direct control of PSW-Multi series power supplies on the browser. (Figure 1)

Data Log can be performed on the browser. For standard web server, the fastest data log time interval is 1 second. PSW-Multi series also provide paid version (active by option license key), the fastest data log time interval is 0.1 seconds and the data save to USB drive directly. (Figure 2)

Sequences can be edited on the browser. (Figure 3)

The above advanced web server functions are new functions of PSW-Multi. Currently, there is no plan to update the advanced web server in the existing PSW-Series (Single Channel). (Figure 4)

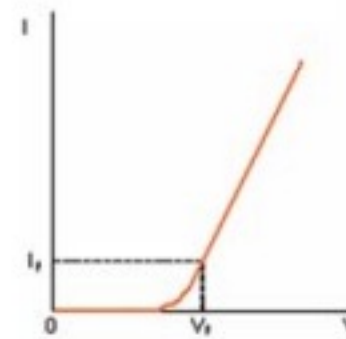
D. CV / CC PRIORITY SELECTION



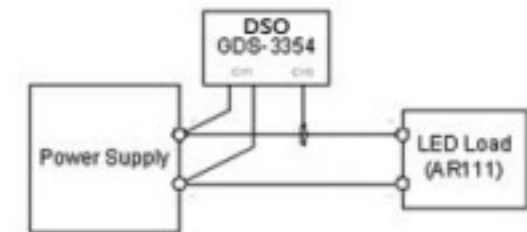
The Inrush Current and Surge Voltage occur at LED Forward Voltage (V_f) Under C.V Priority



The CC Priority Feature Effectively Limits the Occurrence of Inrush Current and Surge Voltage when the Supplied Voltage Rises to the LED Forward Voltage



V-I Characteristic of Diode

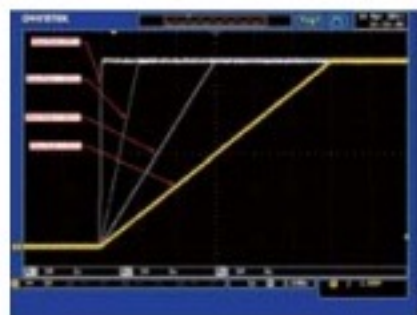


Using GDS-3354 DSO to Test LED Operation Under CV Priority and CC Priority Respectively

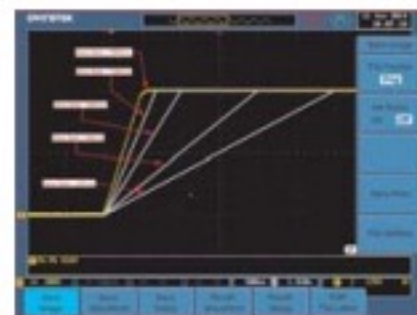
The PSW-Multi Series provides CC Mode and CV Mode to fit various applications in the general purpose market. To get into critical application niches, however, the power supply needs to provide advanced features

to meet the specific requirements. The CC and CV Priority Selection enable the power supply to run under CC priority, rather than normal CV priority, at the output-on stage.

E. ADJUSTABLE SLEW RATE



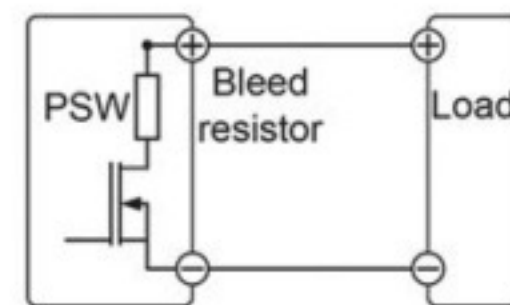
The Adjustable Rise Time of the PSW 30V Module



The Adjustable Rise Time of the PSW 800V Module

The PSW-Multi Series has adjustable slew rates for the level transition of both Current and Voltage. This gives the PSW-Multi Series power supply the ability to set specific rise time and fall time of the Voltage and Current drawn from the power supply to verify DUT performance during the Voltage/Current level transition. The feature also provides the benefit to slow down the voltage transition at the power output-on to protect DUT from inrush current damage. This is especially useful for the test of heavy-current-drawn devices like capacitors.

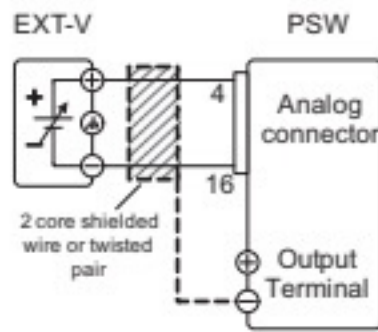
F. BLEEDER CONTROL



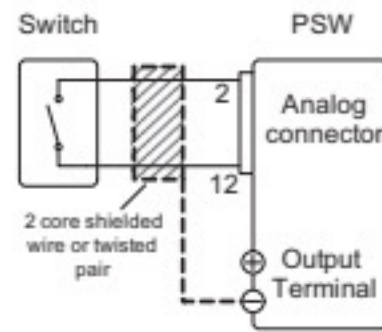
PSW-Multi Series Built-in Bleed Resistor

The PSW-Multi Series employs a bleed resistor in parallel with the output terminal. Bleed resistor is designed to dissipate the power from the power supply filter capacitors when power is turned off and the load is disconnected. Without a bleed resistor, power terminal may remain charged on the filter capacitors for some time and be potentially hazardous. In addition, bleed resistor also allows for smoother voltage regulation of the power supply as the bleed resistor acts as a minimum voltage load. The bleed resistance can be turned on or off using the configuration setting.

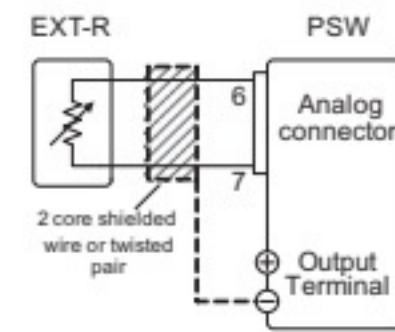
G. EXTERNAL ANALOG REMOTE CONTROL



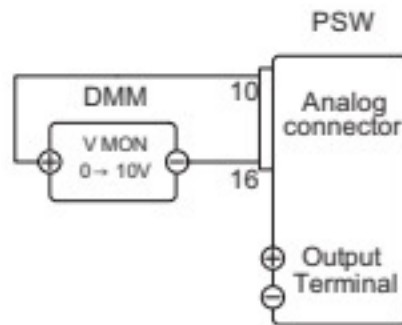
External Voltage Control of the Voltage Output



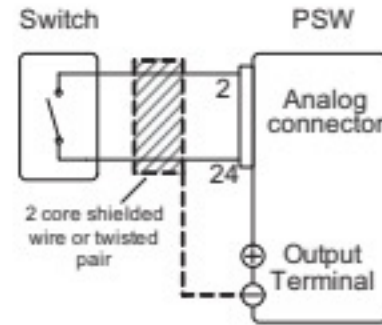
External Switch Control of the Main Power Shut-down



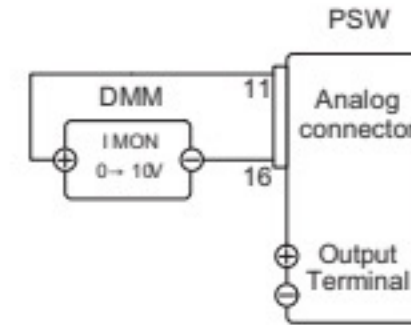
External Resistance control of the Voltage Output



External DMM Monitoring of the Output Voltage



External Switch Control of the Output On/Off



External DMM Monitoring of the Output Current

On the rear panel of the PSW-Multi Series power supply, a 26-pin Analog Control connector is available to perform lots of remote control and monitoring functions. The output voltage and current can be set using external voltage or resistance.

The power supply output on/off and main power shut-down can also be controlled using external switches. This Analog Control Connector is complied with the Mil 26 pin connector (OMRON XG4 IDC plug) standard.

H. VARIOUS INTERFACES SUPPORT & EXTENDED TERMINAL BOX



Rear Panel for PSW-Multi Series



The PSW-Multi Series provides USB Host port in the front panel for easy access of stored data, such as test script program. In the rear panel, a USB Device port is available for remote control or I & V data logging of power output through a PC controller. The LAN interface, which meets DHCP standard, is provided as a standard feature of the PSW-Multi Series for system communications and ATE applications.

An Extender Terminal box (P/N: GET-001/GET-002/GET-005) is provided as optional accessory to extend the power output form the rear panel to the front side. This extender terminal gives R&D or QC engineers convenience to do the jobs without frequently reaching the output terminal at the rear side of the PSW-Multi Series.

I. USING THE RACK MOUNT KIT



Rack Mount Kit GRA-410-J (JIS)



Rack Mount Kit GRA-410-E (EIA)

The PSW-Multi Series has an optional Rack Mount Kit (GW Instek part number: [JIS] GRA-410-J, [EIA] GRA-410-E[EIA]) that can be used to hold

6x PSW models, 3x PSW-720 models, 2x PSW-1080 models or a combination of all models (1x PSW, 1x PSW-720 and 1x PSW-1080).

Programmable Switching D.C. Power Supply (Multi-Range D.C. Power Supply)



PSW-Series



FEATURES

- * Voltage Rating : 30V/40V/80V/160V/250V/800V, Output Power Rating : 360W~1080W
- * Multi-range Voltage & Current Combinations in One Power Supply
- * C.V/C.C Priority ; Particularly Suitable for the Battery and LED Industry
- * Adjustable Slew Rate
- * Series Operation(2 units in Series)for(30V/40V/80V/160V), Parallel Operation(3 units in Parallel) for (30V/40V/80V/160V/250V/800V)
- * High Efficiency and High Power Density
- * 1/2, 1/3, 1/6 Rack Mount Size Design (EIA/JIS Standard) for 360W, 720W, 1080W
- * Standard Interface : LAN, USB, Analog Control Interface
- * Optional Interface : GPIB-USB Adaptor, RS232-USB Cable
- * LabVIEW Driver



PSW 80-40.5 (0-80V, 0-40.5A, 1080W)



PSW 80-27 (0-80V, 0-27A, 720W)



PSW 80-13.5 (0-80V, 0-13.5A, 360W)

The PSW-Series is a single-output multi-range programmable switching DC Power Supply covering a power range up to 1080W. This series of products include eighteen models with the combination of 30V, 40V, 80V, 160V, 250V and 800V rated voltages and 360W, 720W and 1080W maximum output powers. The multi-range feature allows the flexible and efficient configuration of voltage and current within the rated power range. As the PSW-Series can be connected in series for maximum 2 units or in parallel for maximum 3 units, the capability of connecting multiple PSW-Series units for higher voltage or higher current output provides a broad coverage of applications. With the flexibility of multi-range power utilization and series/parallel connection, the PSW-Series significantly reduces the users' cost for various power supply products to accommodate the projects with different power requirements.

The C.V/C.C priority selection of the PSW-Series is a very useful feature for DUT protection. The conventional power supply normally operates under C.V mode when the power output is turned on. This could bring a high inrush current to the capacitive load or current-intensive load at the power output-on stage. Taking the I-V curve verification of LED as an example, it becomes a very challenging task to perform this measurement using a conventional power supply. With LED connected to a power supply under C.V mode as the initial setting, when the power output is turned on and the voltage rises to the LED forward voltage, the current will suddenly peak up and exceed the preset value of current limit. Upon detecting this high current, the power supply starts the transition from C.V mode to C.C mode. Though the current becomes stable after the C.C mode being activated, the current spike occurred at the C.V and C.C crossover point may possibly damage the DUT. At the power output-on stage, the PSW-Series is able to operate under C.C priority to limit the current spike occurred at the threshold voltage and therefore protects DUT from the inrush current damage.

The adjustable slew rate of the PSW-Series allows users to set for either output voltage or output current, a specific rise time from low to high level transition, and a specific fall time from high to low level transition. This facilitates the characteristic verification of a DUT during voltage or current level changes with controllable slew rates. Most manufacturing tests of lighting device or large capacitor during power output-on are associated with the occurrence of high surge current, which can greatly reduce the life time of the DUT. To prevent inrush current from damaging current-intensive devices, a smooth and slow voltage transition during power On-Off can significantly reduce the spike current and protect the device from high current damage.

The OVP and OCP are provided with the PSW-Series. Both OVP and OCP levels can be selected, with default level set at 110%, of the rated voltage/current of the power supply. When any of the protection levels is tripped, the power output will be switched off to protect the DUT. The PSW-Series provides USB Host/Device and LAN interfaces as standard, GPIB-USB adaptor and RS232-USB cable as optional. The LabView driver and the Data Logging PC software are supported on all the available interfaces. An analog control/monitoring connector is also available on the rear panel for external control of power On/Off and external monitoring of power output Voltage and Current.

PARALLEL OPERATION (3 UNITS)

MODEL	SINGLE UNIT	2 UNITS	3 UNITS
PSW 30-36	30V/36A	30V/72A	30V/108A
PSW 30-72	30V/72A	30V/144A	30V/216A
PSW 30-108	30V/108A	30V/216A	30V/324A
PSW 40-27	40V/27A	40V/54A	40V/81A
PSW 40-54	40V/54A	40V/108A	40V/162A
PSW 40-81	40V/81A	40V/162A	40V/243A
PSW 80-13.5	80V/13.5A	80V/27A	80V/40.5A
PSW 80-27	80V/27A	80V/54A	80V/81A
PSW 80-40.5	80V/40.5A	80V/81A	80V/121.5A
PSW 160-7.2	160V/7.2A	160V/14.4A	160V/21.6A
PSW 160-14.4	160V/14.4A	160V/28.8A	160V/43.2A
PSW 160-21.6	160V/21.6A	160V/43.2A	160V/64.8A
PSW 250-4.5	250V/4.5A	250V/9A	250V/13.5A
PSW 250-9	250V/9A	250V/18A	250V/27A
PSW 250-13.5	250V/13.5A	250V/27A	250V/40.5A
PSW 800-1.44	800V/1.44A	800V/2.88A	800V/4.32A
PSW 800-2.88	800V/2.88A	800V/5.76A	800V/8.64A
PSW 800-4.32	800V/4.32A	800V/8.64A	800V/12.96A

SERIES OPERATION (2 UNITS)

MODEL	SINGLE UNIT	2 UNITS
PSW 30-36	30V/36A	60V/36A
PSW 30-72	30V/72A	60V/72A
PSW 30-108	30V/108A	60V/108A
PSW 40-27	40V/27A	80V/27A
PSW 40-54	40V/54A	80V/54A
PSW 40-81	40V/81A	80V/81A
PSW 80-13.5	80V/13.5A	160V/13.5A
PSW 80-27	80V/27A	160V/27A
PSW 80-40.5	80V/40.5A	160V/40.5A
PSW 160-7.2	160V/7.2A	320V/7.2A
PSW 160-14.4	160V/14.4A	320V/14.4A
PSW 160-21.6	160V/21.6A	320V/21.6A
PSW 250-4.5	N/A	N/A
PSW 250-9	N/A	N/A
PSW 250-13.5	N/A	N/A
PSW 800-1.44	N/A	N/A
PSW 800-2.88	N/A	N/A
PSW 800-4.32	N/A	N/A

SPECIFICATIONS									
	PSW 30-36	PSW 30-72	PSW 30-108	PSW 40-27	PSW 40-54	PSW 40-81	PSW 80-13.5	PSW 80-27	PSW 80-40.5
OUTPUT RATING									
Voltage	0 – 30V	0 – 30V	0 – 30V	0 – 40V	0 – 40V	0 – 40V	0 – 80V	0 – 80V	0 – 80V
Current	0 – 36A	0 – 72A	0 – 108A	0 – 27A	0 – 54A	0 – 81A	0 – 13.5A	0 – 27A	0 – 40.5A
Power	360W	720W	1080W	360W	720W	1080W	360W	720W	1080W
REGULATION(CV)									
Load	20mV	20mV	20mV	25mV	25mV	25mV	45mV	45mV	45mV
Line	18mV	18mV	18mV	23mV	23mV	23mV	43mV	43mV	43mV
REGULATION(CC)									
Load	41mA	77mA	113mA	32mA	59mA	86mA	18.5mA	32mA	45.5mA
Line	41mA	77mA	113mA	32mA	59mA	86mA	18.5mA	32mA	45.5mA
RIPPLE & NOISE (Noise Bandwidth 20MHz; Ripple Bandwidth=1MHz)									
CV p-p	60mV	80mV	100mV	60mV	80mV	100mV	60mV	80mV	100mV
CV rms	7mV	11mV	14mV	7mV	11mV	14mV	7mV	11mV	14mV
CC rms	72mA	144mA	216mA	54mA	108mA	162mA	27mA	54mA	81mA
PROGRAMMING ACCURACY									
Voltage	0.1% +10mV	0.1% +10mV	0.1% +10mV	0.1%+10mV	0.1%+10mV	0.1%+10mV	0.1% +10mV	0.1% +10mV	0.1% +10mV
Current	0.1% + 30mA	0.1% + 60mA	0.1% + 100mA	0.1%+20mA	0.1%+50mA	0.1%+80mA	0.1% + 10mA	0.1% + 30mA	0.1% + 40mA
MEASUREMENT ACCURACY									
Voltage	0.1% +10mV	0.1% +10mV	0.1% +10mV	0.1%+10mV	0.1%+10mV	0.1%+10mV	0.1% +10mV	0.1% +10mV	0.1% +10mV
Current	0.1% +30mA	0.1% +60mA	0.1% +100mA	0.1%+20mA	0.1%+50mA	0.1%+80mA	0.1% +10mA	0.1% +30mA	0.1% +40mA
RESPONSE TIME									
Raise Time	50ms	50ms	50ms	50ms	50ms	50ms	50ms	50ms	50ms
Fall Time(Full Load)	50ms	50ms	50ms	50ms	50ms	50ms	50ms	50ms	50ms
Fall Time(No Load)	500ms	500ms	500ms	500ms	500ms	500ms	500ms	500ms	500ms
Load Transient Recover Time (Load change from 50-100%)	1ms	1ms	1ms	1ms	1ms	1ms	1ms	1ms	1ms
PROGRAMMING RESOLUTION (By PC Remote Control Mode)									
Voltage	1mV	1mV	1mV	1mV	1mV	1mV	2mV	2mV	2mV
Current	1mA	2mA	3mA	1mA	2mA	3mA	1mA	2mA	3mA
MEASUREMENT RESOLUTION (By PC Remote Control Mode)									
Voltage	1mV	1mV	1mV	1mV	1mV	1mV	2mV	2mV	2mV
Current	1mA	2mA	3mA	1mA	2mA	3mA	1mA	2mA	3mA
SERIES AND PARALLEL CAPABILITY									
Parallel Operation	Up to 3 units including the master unit								
Series Operation	Up to 2 units including the master unit								
PROTECTION FUNCTION									
OVP	3-33V	3-33V	3-33V	4 – 44V	4 – 44V	4 – 44V	8-88V	8-88V	8-88V
OCP	3.6 –39.6A	5-79.2A	5-118.8A	2.7 – 29.7A	5 – 59.4A	5 – 89.1A	1.35-14.85A	2.7-29.7A	4.05-44.55A
OHP	Activated by elevated internal temperatures								
FRONT PANEL DISPLAY ACCURACY, 4 digits									
Voltage	0.1%±20mV	0.1%±20mV	0.1%±20mV	0.1%+20mV	0.1%+20mV	0.1%+20mV	0.1%±20mV	0.1%±20mV	0.1%±20mV
Current	0.1%±40mA	0.1%±70mA	0.1%±100mA	0.1%+30mA	0.1%+60mA	0.1%+80mA	0.1%±20mA	0.1%±40mA	0.1%±50mA
ENVIRONMENT CONDITION									
Operation Temp	0°C – 50°C								
Storage Temp	-25°C – 70°C								
Operating Humidity	20% – 85% RH; No condensation								
Storage Humidity	90% RH or Less; No condensation								
READ BACK TEMP COEFFICIENT									
Voltage	100ppm/°C of rated output voltage : after a 30 minute warm-up								
Current	200ppm/°C of rated output current : after a 30 minute warm-up								
OTHER									
Analog Control	Yes								
Interface	USB/LAN/GPIB-USB(Optional)/RS232-USB(Optional)								
Fan	With thermal sensing control								
POWER SOURCE	85VAC-265VAC, 47-63Hz, single phase								
DIMENSIONS & WEIGHT	71(W)x124(H) x350(D) mm ; Approx. 3kg	142(W)x124(H) x350(D)mm ; Approx. 5.3kg	214(W)x124(H) x350(D) mm ; Approx. 7.5kg	71(W)x124(H) x350(D) mm ; Approx. 3kg	142(W)x124(H) x350(D) mm ; Approx. 5.3kg	214(W)x124(H) x350(D) mm ; Approx. 7.5kg	71(W)x124(H) x350(D) mm ; Approx. 3kg	142(W)x124(H) x350(D) mm ; Approx. 5.3kg	214(W)x124(H) x350(D) mm ; Approx. 7.5kg

PSW-001



PSW-002



PSW-003



PSW-004



PSW-005



PSW-006



PSW-007



Programmable Switching D.C. Power Supply (Multi-Range D.C. Power Supply)

SPECIFICATIONS									
	PSW 160-7.2	PSW 160-14.4	PSW 160-21.6	PSW 250-4.5	PSW 250-9	PSW 250-13.5	PSW 800-1.44	PSW 800-2.88	PSW 800-4.32
OUTPUT RATING									
Voltage	0 – 160V	0 – 160V	0 – 160V	0 – 250V	0 – 250V	0 – 250V	0 – 800V	0 – 800V	0 – 800V
Current	0 – 7.2A	0 – 14.4A	0 – 21.6A	0 – 4.5A	0 – 9A	0 – 13.5A	0 – 1.44A	0 – 2.88A	0 – 4.32A
Power	360W	720W	1080W	360W	720W	1080W	360W	720W	1080W
REGULATION(CV)									
Load	85mV	85mV	85mV	130mV	130mV	130mV	405mV	405mV	405mV
Line	83mV	83mV	83mV	128mV	128mV	128mV	403mV	403mV	403mV
REGULATION(CC)									
Load	12.2mA	19.4mA	26.6mA	9.5mA	14mA	18.5mA	6.44mA	7.88mA	9.32mA
Line	12.2mA	19.4mA	26.6mA	9.5mA	14mA	18.5mA	6.44mA	7.88mA	9.32mA
RIPPLE & NOISE (Noise Bandwidth 20MHz; Ripple Bandwidth=1MHz)									
CV p-p	60mV	80mV	100mV	80mV	100mV	120mV	150mV	200mV	200mV
CV rms	12mV	15mV	20mV	15mV	15mV	15mV	30mV	30mV	30mV
CC rms	15mA	30mA	45mA	10mA	20mA	30mA	5mA	10mA	15mA
PROGRAMMING ACCURACY									
Voltage	0.1% +100mV	0.1% +100mV	0.1% +100mV	0.1%+200mV	0.1%+200mV	0.1%+200mV	0.1%+400mV	0.1%+400mV	0.1%+400mV
Current	0.1% + 5mA	0.1% +15mA	0.1% +20mA	0.1%+5mA	0.1%+10mA	0.1%+15mA	0.1%+2mA	0.1%+4mA	0.1%+6mA
MEASUREMENT ACCURACY									
Voltage	0.1% +100mV	0.1% +100mV	0.1% +100mV	0.1%+200mV	0.1%+200mV	0.1%+200mV	0.1%+400mV	0.1%+400mV	0.1%+400mV
Current	0.1% +5mA	0.1% +15mA	0.1% +20mA	0.1%+5mA	0.1%+10mA	0.1%+15mA	0.1%+2mA	0.1%+4mA	0.1%+6mA
RESPONSE TIME									
Raise Time	100ms	100ms	100ms	100ms	100ms	100ms	150ms	150ms	150ms
Fall Time(Full Load)	100ms	100ms	100ms	150ms	150ms	150ms	300ms	300ms	300ms
Fall Time(No Load)	1000ms	1000ms	1000ms	1200ms	1200ms	1200ms	2000ms	2000ms	2000ms
Load Transient Recover Time (Load change from 50~100%)	2ms	2ms	2ms	2ms	2ms	2ms	2ms	2ms	2ms
PROGRAMMING RESOLUTION (By PC Remote Control Mode)									
Voltage	3mV	3mV	3mV	5mV	5mV	5mV	14mV	14mV	14mV
Current	1mA	2mA	3mA	1mA	1mA	1mA	1mA	1mA	1mA
MEASUREMENT RESOLUTION (By PC Remote Control Mode)									
Voltage	3mV	3mV	3mV	5mV	5mV	5mV	14mV	14mV	14mV
Current	1mA	2mA	3mA	1mA	1mA	1mA	1mA	1mA	1mA
SERIES AND PARALLEL CAPABILITY									
Parallel Operation	Up to 3 units including the master unit			3	3	3	3	3	3
Series Operation	Up to 2 units including the master unit			N/A	N/A	N/A	N/A	N/A	N/A
PROTECTION FUNCTION									
OVP	16~176V	16~176V	16~176V	20~275V	20~275V	20~275V	20~880V	20~880V	20~880V
OCP	0.72~7.92A	1.44~15.84A	2.16~23.76A	0.45~4.95A	0.9~9.9A	1.35~14.85A	0.144~1.584A	0.288~3.168A	0.432~4.752
OHP	Activated by elevated internal temperatures								
FRONT PANEL DISPLAY ACCURACY, 4 digits									
Voltage	0.1%±100mV	0.1%±100mV	0.1%±100mV	0.1%±200mV	0.1%±200mV	0.1%±200mV	0.1%±400mV	0.1%±400mV	0.1%±400mV
Current	0.1%±5mA	0.1%±30mA	0.1%±30mA	0.1%±5mA	0.1%±10mA	0.1%±20mA	0.1%±2mA	0.1%±4mA	0.1%±6mA
ENVIRONMENT CONDITION									
Operation Temp	0°C – 50°C								
Storage Temp	-25°C – 70°C								
Operating Humidity	20% – 85% RH; No condensation								
Storage Humidity	90% RH or Less; No condensation								
READ BACK TEMP COEFFICIENT									
Voltage	100ppm/°C of rated output voltage : after a 30 minute warm-up								
Current	200ppm/°C of rated output current : after a 30 minute warm-up								
OTHER									
Analog Control Interface	Yes								
Interface	USB/LAN/GPIB-USB(Optional)/RS232-USB(Optional)								
Fan	With thermal sensing control								
POWER SOURCE	85VAC~265VAC, 47~63Hz, single phase								
DIMENSIONS & WEIGHT									
	71(W)x124(H) x350(D) mm ; Approx. 3kg	142(W)x124(H) x350(D) mm ; Approx. 5.3kg	214(W)x124(H) x350(D) mm ; Approx. 7.5kg	71(W)x124(H) x350(D) mm ; Approx. 3kg	142(W)x124(H) x350(D)mm ; Approx. 5.3kg	214(W)x124(H) x350(D) mm ; Approx. 7.5kg	71(W)x124(H) x350(D) mm ; Approx. 3kg	142(W)x124(H) x350(D) mm ; Approx. 5.3kg	214(W)x124(H) x350(D) mm ; Approx. 7.5kg

PSW-008



PSW-009



PSW-010



PSW-011



PSW-012





PSW-Series

ORDERING INFORMATION

PSW 30-36	(0-30V/0-36A/360W) Multi-Range DC Power Supply
PSW 30-72	(0-30V/0-72A/720W) Multi-Range DC Power Supply
PSW 30-108	(0-30V/0-108A/1080W) Multi-Range DC Power Supply
PSW 40-27	(0-40V/0-27A/360W) Multi-Range DC Power Supply
PSW 40-54	(0-40V/0-54A/720W) Multi-Range DC Power Supply
PSW 40-81	(0-40V/0-81A/1080W) Multi-Range DC Power Supply
PSW 80-13.5	(0-80V/0-13.5A/360W) Multi-Range DC Power Supply
PSW 80-27	(0-80V/0-27A/720W) Multi-Range DC Power Supply
PSW 80-40.5	(0-80V/0-40.5A/1080W) Multi-Range DC Power Supply
PSW 160-7.2	(0-160V/0-7.2A/360W) Multi-Range DC Power Supply
PSW 160-14.4	(0-160V/0-14.4A/720W) Multi-Range DC Power Supply
PSW 160-21.6	(0-160V/0-21.6A/1080W) Multi-Range DC Power Supply
PSW 250-4.5	(0-250V/0-4.5A/360W) Multi-Range DC Power Supply
PSW 250-9	(0-250V/0-9A/720W) Multi-Range DC Power Supply
PSW 250-13.5	(0-250V/0-13.5A/1080W) Multi-Range DC Power Supply
PSW 800-1.44	(0-800V/0-1.44A/360W) Multi-Range DC Power Supply
PSW 800-2.88	(0-800V/0-2.88A/720W) Multi-Range DC Power Supply
PSW 800-4.32	(0-800V/0-4.32A/1080W) Multi-Range DC Power Supply

ACCESSORIES :

CD-ROM x 1 (Programming Manual, User Manual), GTL-123 Test Lead x 1 (for PSW 30V/40V/80V/160V), Power Cord x 1 (Region dependent), GTL-240 USB Cable " L " Type x 1, PSW-004 Basic Accessories Kit x 1 (for PSW 30V/40V/80V/160V), Includes : M4 Terminal screws and washers x 2, Air Filter x 1, Analog control protection dummy x 1, Analog control lock lever x 1, M8 terminal bolts, nuts and washers x 2

PSW-008	Basic Accessories Kit for PSW 250V/800V models
PSW-009	Output Terminal Cover for 30V/40V/80V/160V models
PSW-011	Output Terminal Cover for 250V/800V models
PSW-012	High Voltage Output Terminal for 250V/800V model

OPTIONAL ACCESSORIES

PSW-001	Accessory Kit	PSW-010	Large filter (Type II/III)
PSW-002	Simple IDC Tool	GTL-248	GPIB Cable, Double Shielded, 2000mm
PSW-003	Contact Removal Tool	GTL-250	GPIB Cable, Double Shielded, 600mm
PSW-005	Cable for 2 Units of PSW-Series in Series Mode Connection (for PSW 30V/40V/80V/160V)	GUR-001A	USB to RS-232 Cable, 300mm (H3)
PSW-006	Cable for 2 Units of PSW-Series in Parallel Mode Connection	GUR-001B	RS-232 to USB Adapter with #4-40 UNC Rivet Nut
PSW-007	Cable for 3 Units of PSW-Series in Parallel Mode Connection	GUG-001	GPIB to USB Adaptor
GET-001	Extended Terminal with max. 30A (for PSW 30V/40V/80V/160V)	GRA-410-J	Rack Mount Kit (JIS)
GET-002	Extended Terminal with max. 10A (for PSW 250V/800V)	GRA-410-E	Rack Mount Kit (EIA)
GET-005	Extended European Terminal with max. 20A (for PSW 30V/40V/80V/160V)		
GTL-130	Test lead : 2 x red, 2 x black (for PSW 250V/800V)		

PSW-Series (LV) Rear Panel



PSW-Series (HV) Rear Panel



GRA-410-J/E Rack Mount Kit (JIS/EIA)

For : PSW-Series



GTL-130 Test lead, 1200mm, 18AWG, UL 3239 (for PSW 250V/800V)



GUR-001A USB to RS-232 Cable (for PSW-Series, 300mm)



GUG-001 GPIB to USB Adapter (for GDS-3000Series, PSW-Series)



GET-001 Extended Terminal (for PSW 30V/40V/80V/160V)



GET-002 Extended Terminal (for PSW 250V/800V)



GET-005 Extended European Terminal (for PSW 30V/40V/80V/160V)



Programmable Switching D.C. Power Supply



PSU-Series



FEATURES

- * Voltage Output : 6V/8V/12.5V/15V/20V/30V/40V/50V/60V/80V/100V/150V/300V/400V/600V
- * Power Output : 1200W ~ 1560W
- * C.V/C.C Priority Mode
- * Adjustable Voltage/Current Rise and Fall Time
- * Series/Parallel Connection : Max. 2 units (Models Under 300V)/4 units of The Same Model
- * High Efficiency and High Power Density
- * 1U Height and 19" Rack Mount Size
- * Three sets of Preset Function
- * Bleeder Control Function
- * Internal Resistance Function
- * Panel Lock Function
- * Protection : OVP, OCP, OHP, UVL, AC Fail, FAN Fail
- * Standard : USB, LAN, RS-232, RS-485, Analog Control
- * Option : GPIB, Isolated Analog Interface (Voltage Control/Current Control)

GW Instek PSU-Series, a DC power supply with high power density design, is 1U in height and compatible with 19" Rack Mount Size. The series is suitable for test system installation or system integration by flexibly selecting models for the integration into the existing test system. The PSU-Series, featuring superior voltage and current control functions, comprises fifteen models with output voltage/current ranging from 6V/200A to 600V/2.6A. The Series is suitable for different test conditions and DUTs, including electronic components testing, micro resistors, relays, shunt resistors, 12V/24V/48V battery simulation, and automotive electronic device testing.

The PSU-HV series is ideal for the primary input of DC/DC converter and servomotor production application. PSU is often integrated into component test systems such as aging test equipment for capacitors; 600V DC bias applications; aging test equipment for diode; semiconductor production equipment; automotive electronics; and ECU for V8 engine or V12 engine, etc.

Utilizing same model units of the PSU-Series to conduct series and parallel connections can increase total output power, total current or total voltage. The wide voltage and current output ranges of the PSU-Series can fully satisfy various voltage and current measurement requirements. The PSU-Series is a single power output DC programmable power supply, which outputs 1200W to 1560W. The PSU-Series provides maximum 2 units in series connection (models under 300V) to achieve maximum 600V or 4 units in parallel connection to obtain maximum 800A and the maximum output power of 6.24 kilowatts.

The PSU-Series allows settings for CC priority or CV priority. Under CC or CV mode, users can adjust slew rate for output voltage or current based upon test requirements. There are two kinds of slew rate settings: high speed priority and slew rate priority. High speed priority sets slew rate at the maximum speed to reach CC or CV mode. Slew rate priority allows users to set slew rate for CC or CV mode in order to control rise or fall slew rate. Slew rate priority mode is ideal for motor tests by adjusting the rise time of output voltage to protect DUT from being damaged by inrush current occurred at turn-on.

Comparing with other 1U power supplies available in the market, PSU supports a most complete array of interfaces, including USB, LAN, RS-232, RS-485, analog control interface, GPIB (option), isolated analog interface (voltage control), and isolated analog interface (current control). Via the multi-drop mode, PSU will not need any switch/hub and GPIB cable for remote control and slave unit augmentation when using LAN, USB or GPIB. This feature can help users save costs on augmentation equipment for connecting slave while using LAN or USB.

The PSU-Series provides users with flexible settings of High/Low Level or Trigger input/Trigger output signals with pulse width of 1 ~ 60ms. Trigger input controls PSU to output or upload preset voltage, current and memory parameters. While outputting or uploading preset voltage, current and memory parameters PSU can produce corresponding Trigger output signals.

PSU-Series Model Selection Table

1.5kW 1U High	6-200	8-180	12.5-120	15-100	20-76	30-50	40-38	50-30	60-25	80-19	100-15	150-10	300-5	400-3.8	600-2.6
Voltage	6,000 V	8,000 V	12,500 V	15,000 V	20,000 V	30,000 V	40,000 V	50,000 V	60,000 V	80,000 V	100,000 V	150,000 V	300,000 V	400,000 V	600,000 V
Current	200.0 A	180.0 A	120.0 A	100.0 A	76.00 A	50.00 A	38.00 A	30.0 A	25.00 A	19.00 A	15.00 A	10.00 A	5.000 A	3.800 A	2.600 A
Power	1200 W	1440 W	1500 W	1500 W	1520 W	1500 W	1520 W	1500 W	1500 W	1520 W	1500 W	1500 W	1500 W	1520 W	1560 W
3kW 2U High	6-400(B)	8-360(B)	12.5-240(B)	15-200(B)	20-152(B)	30-100(B)	40-76(B)	50-60(B)	60-50(B)	80-38(B)	100-30(B)	150-20(B)	300-10(B)	400-7.6(B)	600-5.2(B)
Voltage	6,000 V	8,000 V	12,500 V	15,000 V	20,000 V	30,000 V	40,000 V	50,000 V	60,000 V	80,000 V	100,000 V	150,000 V	300,000 V	400,000 V	600,000 V
Current	400.0 A	360.0 A	240.0 A	200.0 A	152.0 A	100.0 A	76.00 A	60.00 A	50.00 A	38.00 A	30.00 A	20.00 A	10.00 A	7.600 A	5.200 A
Power	2400 W	2880 W	3000 W	3000 W	3040 W	3000 W	3040 W	3000 W	3000 W	3040 W	3000 W	3000 W	3000 W	3040 W	3120 W
4.5kW 3U High	6-600(B)	8-540(B)	12.5-360(B)	15-300(B)	20-228(B)	30-150(B)	40-114(B)	50-90(B)	60-75(B)	80-57(B)	100-45(B)	150-30(B)	300-15(B)	400-11.4(B)	600-7.8(B)
	6-600(C)	8-540(C)	12.5-360(C)	15-300(C)	20-228(C)	30-150(C)	40-114(C)	50-90(C)	60-75(C)	80-57(C)	100-45(C)	150-30(C)	300-15(C)	400-11.4(C)	600-7.8(C)
	6-600(D)	8-540(D)	12.5-360(D)	15-300(D)	20-228(D)	30-150(D)	40-114(D)	50-90(D)	60-75(D)	80-57(D)	100-45(D)	150-30(D)	300-15(D)	400-11.4(D)	600-7.8(D)
Voltage	6,000 V	8,000 V	12,500 V	15,000 V	20,000 V	30,000 V	40,000 V	50,000 V	60,000 V	80,000 V	100,000 V	150,000 V	300,000 V	400,000 V	600,000 V
Current	600.0 A	540.0 A	360.0 A	300.0 A	228.0 A	150.0 A	114.0 A	90.0 A	75.00 A	57.00 A	45.00 A	30.00 A	15.00 A	11.40 A	7.800 A
Power	3600 W	4320 W	4500 W	4500 W	4560 W	4500 W	4560 W	4500 W	4500 W	4560 W	4500 W	4500 W	4500 W	4560 W	4680 W
6kW 4U High	6-800(B)	8-720(B)	12.5-480(B)	15-400(B)	20-304(B)	30-200(B)	40-152(B)	50-120(B)	60-100(B)	80-76(B)	100-60(B)	150-40(B)	300-20(B)	400-15.2(B)	600-10.4(B)
	6-800(C)	8-720(C)	12.5-480(C)	15-400(C)	20-304(C)	30-200(C)	40-152(C)	50-120(C)	60-100(C)	80-76(C)	100-60(C)	150-40(C)	300-20(C)	400-15.2(C)	600-10.4(C)
	6-800(D)	8-720(D)	12.5-480(D)	15-400(D)	20-304(D)	30-200(D)	40-152(D)	50-120(D)	60-100(D)	80-76(D)	100-60(D)	150-40(D)	300-20(D)	400-15.2(D)	600-10.4(D)
Voltage	6,000 V	8,000 V	12,500 V	15,000 V	20,000 V	30,000 V	40,000 V	50,000 V	60,000 V	80,000 V	100,000 V	150,000 V	300,000 V	400,000 V	600,000 V
Current	800.0 A	720.0 A	480.0 A	400.0 A	304.0 A	200.0 A	152.0 A	120.0 A	100.0 A	76.0 A	60.00 A	40.00 A	20.00 A	15.20 A	10.40 A
Power	4800 W	5760 W	6000 W	6000 W	6080 W	6000 W	6080 W	6000 W	6000 W	6080 W	6000 W	6000 W	6000 W	6080 W	6240 W

Note: B: Input voltage 170~265VAC, single phase; C: Input voltage 180~253VAC, three-phase three-wire; D: Input voltage 360~440VAC, three-phase four-wire; No CE certificate.

SPECIFICATIONS

Model	PSU	6-200	8-180	12.5-120	15-100	20-76	30-50	40-38	50-30	60-25	80-19	100-15	150-10	300-5	400-3.8	600-2.6	
Rated output voltage (*1)	V	6	8	12.5	15	20	30	40	50	60	80	100	150	300	400	600	
Rated output current (*2)	A	200	180	120	100	76	50	38	30	25	19	15	10	5	3.8	2.6	
Rated output power	W	1200	1440	1500	1500	1520	1500	1520	1500	1500	1520	1500	1500	1500	1520	1560	
Constant Voltage Mode	PSU	6-200	8-180	12.5-120	15-100	20-76	30-50	40-38	50-30	60-25	80-19	100-15	150-10	300-5	400-3.8	600-2.6	
Line regulation (*3)	mV	2.6	2.8	3.25	3.5	4	5	6	7	8	10	12	17	32	42	62	
Load regulation (*4)	mV	2.6	2.8	3.25	3.5	4	5	6	7	8	10	12	17	32	42	62	
Ripple and noise (*5)	p-p (*6)	mV	60	60	60	60	60	60	60	60	80	80	100	150	200	300	
	r.m.s. (*7)	mV	8	8	8	8	8	8	8	8	8	8	10	25	40	60	
Temperature coefficient	ppm/°C	100ppm/°C after a 30 minute warm-up															
Remote sense compensation voltage (single wire)	V	1	1	1	1	1	1.5	2	2	3	4	5	5	5	5	5	
Rise time (*8)	Rated load	ms	80	80	80	80	80	80	80	80	150	150	150	150	200	250	
	No load	ms	80	80	80	80	80	80	80	80	150	150	150	150	200	250	
Fall time (*9)	Rated load	ms	10	50	50	50	50	80	80	80	150	150	150	150	200	250	
	No load	ms	500	600	700	700	800	900	1000	1100	1200	1500	2000	2500	3000	4000	
Transient response time (*10)	ms	1.5	1.5	1	1	1	1	1	1	1	1	2	2	2	2	2	
Constant Current Mode	PSU	6-200	8-180	12.5-120	15-100	20-76	30-50	40-38	50-30	60-25	80-19	100-15	150-10	300-5	400-3.8	600-2.6	
Line regulation (*3)	mA	22	20	14	12	9.6	7	5.8	5	4.5	3.9	3.5	3	2.5	2.38	2.26	
Load regulation (*11)	mA	45	41	29	25	20.2	15	12.6	11	10	8.8	8	7	6	5.76	5.52	
Ripple and noise (*12)	r.m.s.	mA	400	360	240	200	152	125	95	85	75	57	45	35	25	17	12
Temperature coefficient	ppm/°C	100ppm/°C after a 30 minute warm-up															
Protection Function	PSU	6-200	8-180	12.5-120	15-100	20-76	30-50	40-38	50-30	60-25	80-19	100-15	150-10	300-5	400-3.8	600-2.6	
Over voltage protection (OVP)	Setting range	V	0.6 - 6.6	0.8-8.8	1.25 - 13.75	1.5 - 16.5	2 - 22	3 - 33	4 - 44	5 - 55	5 - 66	5 - 88	5 - 110	5 - 165	5 - 330	5 - 440	5 - 660
	Setting accuracy	mV	60	80	125	150	200	300	400	500	600	800	1000	1500	3000	4000	6000
Over current protection (OCP)	Setting range	A	5 - 220	5-198	5 - 132	5 - 110	5 - 83.6	5 - 55	3.8 - 41.8	3 - 33	2.5 - 27.5	1.9 - 20.9	1.5 - 16.5	1 - 11	0.5 - 5.5	0.38 - 4.18	0.26 - 2.86
	Setting accuracy	mA	4000	3600	2400	2000	1520	1000	760	600	500	380	300	200	100	76	52
Under voltage limit (UVL)	Setting range	V	0 - 6.3	0 - 8.4	0 - 13.12	0 - 15.75	0 - 21	0 - 31.5	0 - 42	0 - 52.5	0 - 63	0 - 84	0 - 105	0 - 157.5	0 - 315	0 - 420	0 - 630
Over temperature protection (OHP)	Operation	Turn the output off.															
Incorrect sensing connection protection (SENSE)	Operation	Turn the output off.															
Low AC input protection (AC-FAIL)	Operation	Turn the output off.															
Shutdown (SD)	Operation	Turn the output off.															
Power limit (POWER LIMIT)	Operation	Over power limit.															
Analog Programming and Monitoring	PSU	6-200	8-180	12.5-120	15-100	20-76	30-50	40-38	50-30	60-25	80-19	100-15	150-10	300-5	400-3.8	600-2.6	
External voltage control output voltage	Accuracy and linearity: ±0.5% of rated output voltage.																
External voltage control output current	Accuracy and linearity: ±1% of rated output current.																
External resistor control output voltage	Accuracy and linearity: ±1% of rated output voltage.																
External resistor control output current	Accuracy and linearity: ±1.5% of rated output current.																
Output voltage monitor	Accuracy: ±1%																
Output current monitor	Accuracy: ±1%																
Shutdown control	Turns the output off with a LOW (0V to 0.5V) or short-circuit.																
Output on/off control	Possible logic selections: Turn the output on using a LOW (0V to 0.5V) or short-circuit, turn the output off using a HIGH (4.5V to 5V) or open-circuit. Turn the output on using a HIGH (4.5V to 5V) or open-circuit, turn the output off using a LOW (0V to 0.5V) or short-circuit.																
Alarm clear control	Clear alarms with a LOW (0V to 0.5V) or short-circuit.																
CV/CC/ALM/PWR ON/OUT ON indicator	Photocoupler open collector output; Maximum voltage 30V, maximum sink current 8mA.																
Trigger out	Maximum low level output = 0.8V; minimum high level output = 2V; Maximum source current = 8mA.																
Trigger in	Maximum low level input voltage = 0.8V; minimum high level input voltage = 2V, Maximum sink current = 8mA.																
Front Panel	PSU	6-200	8-180	12.5-120	15-100	20-76	30-50	40-38	50-30	60-25	80-19	100-15	150-10	300-5	400-3.8	600-2.6	
Display, 4 digits	Voltage accuracy	0.1% +	mV	12	16	25	30	40	60	80	100	120	160	200	300	600	1200
		Current accuracy	0.2% +	mA	600	540	360	300	228	150	114	90	75	57	45	30	15
Indications	GREEN LED's: CV, CC, V, A, VSR, ISR, DLY, RMT, LAN, M1, M2, M3, RUN, Output ON; RED LED's: ALM, ERR																
Buttons	Lock/Local(Unlock), PROT(ALM_CLR), Function(M1), Test(M2), Set(M3), Shift, Output																
Knobs	Voltage, Current																
USB port	Type A USB connector																
Programming and Measurement (RS-232/485, USB, LAN, GPIB)	PSU	6-200	8-180	12.5-120	15-100	20-76	30-50	40-38	50-30	60-25	80-19	100-15	150-10	300-5	400-3.8	600-2.6	
Output voltage programming accuracy	0.05% +	mV	3	4	6.25	7.5	10	15	20	25	30	40	50	75	150	200	300
Output current programming accuracy	0.2% +	mA	200	180	120	100	76	50	38	30	25	19	15	10	5	3.8	2.6
Output voltage programming resolution		mV	0.2	0.27	0.4	0.5	0.7	1	1.3	1.7	2	2.7	3.4	5.2	10.2	13.6	20.4
Output current programming resolution		mA	6	6	4	3.3	2.5	1.7	1.2	1	0.8	0.65	0.5	0.34	0.19	0.13	0.09
Output voltage measurement accuracy	0.1% +	mV	6	8	12.5	15	20	30	40	50	60	80	100	150	300	400	600
Output current measurement accuracy	0.2% +	mA	400	360	240	200	152	100	76	60	50	38	30	20	10	7.6	5.2
Output voltage measurement resolution		mV	0.2	0.27	0.4	0.5	0.7	1	1.3	1.7	2	2.7	3.4	5.2	10.2	13.6	20.4
Output current measurement resolution		mA	6	6	4	3.3	2.5	1.7	1.2	1	0.8	0.65	0.5	0.34	0.19	0.13	0.09
Input Characteristics	PSU	6-200	8-180	12.5-120	15-100	20-76	30-50	40-38	50-30	60-25	80-19	100-15	150-10	300-5	400-3.8	600-2.6	
Normal input rating	100Vac ~ 240Vac, 50Hz ~ 60Hz, single phase																
Input voltage range	85Vac ~ 265Vac																
Input frequency range	47Hz ~ 63Hz																
Maximum input current	100Vac / 200Vac	A	21 / 11														
Inrush current	Less than 50A																
Maximum input power	VA	2000															
Power factor	100Vac / 200Vac	0.99 / 0.98															
Efficiency (*13)	100Vac / 200Vac	%	76.5 / 79	78/81	82 / 85	82 / 85	83 / 86	83 / 86	84 / 87	84 / 87	84 / 87	84 / 87	84 / 87	84 / 87	84 / 87	84 / 87	84 / 87
Hold-up time	20ms or greater																
Interface Capabilities	PSU	6-200	8-180	12.5-120	15-100	20-76	30-50	40-38	50-30	60-25	80-19	100-15	150-10	300-5	400-3.8	600-2.6	
USB	TypeA: Host, TypeB: Slave, Speed: 1.1/2.0, USB Class: CDC(Communications Device Class)																
LAN	MAC Address, DNS IP Address, User Password, Gateway IP Address, Instrument IP Address, Subnet Mask																
RS-232 / RS-485	Complies with the EIA232D / EIA485 Specifications																
GPIB (Factory Option)	SCPI - 1993, IEEE 488.2 compliant interface																
Isolated Analog Control Interface (Factory Option)	PSU	6-200	8-180	12.5-120	15-100	20-76	30-50	40-38	50-30	60-25	80-19	100-15	150-10	300-5	400-3.8	600-2.6	
Voltage Control	Using 0-5V or 0 - 10V signals for programming and measurement																
Current Control	Using 4 - 20mA current signals for programming and measurement																
Environmental Conditions	PSU	6-200	8-180	12.5-120	15-100	20-76	30-50	40-38	50-30	60-25	80-19	100-15	150-10	300-5	400-3.8	600-2.6	
Operating temperature	0 °C ~ 50 °C (*14)																
Storage temperature	-25 °C ~ 70 °C																
Operating humidity	20% ~ 85% RH; No condensation																
Storage humidity	90% RH or less; No condensation																
Altitude	Maximum 2000m																
General Specifications	PSU	6-200	8-180	12.5-120	15-100	20-76	30-50	40-38	50-30	60-25	80-19	100-15	150-10	300-5	400-3.8	600-2.6	
Weight	main unit only	kg	Less than 8.7kg														
Dimensions	(WxHxD)	mm	423 x 43.6 x 447.2														
Cooling	Forced air cooling by internal fan.																
EMC	Complies with the European EMC directive 89/336/EEC for Class A test and measurement products.																
Safety	Complies with the European Low Voltage Directive 73/23/EEC and carries the CE-marking.																
Withstand voltage	AC to Chassis : 1500Vac/1min; AC to Output terminal : 3000Vac/1min; Vout ≤ 150V; Output terminal to Chassis : 1000Vdc/1min; 150<Vout ≤ 600; Output terminal to Chassis : 1500Vdc/1min																
Insulation resistance	Chassis and output terminal; chassis and AC input; AC input and output terminal: 100MΩ or more (DC 1000V)																

Notes:

- (*1) Minimum voltage is guaranteed to maximum 0.2% of the rated output voltage.
- (*2) Minimum current is guaranteed to maximum 0.4% of the rated output current.
- (*3) At 85 ~ 132Vac or 170 ~ 265Vac, constant load.
- (*4) From No-load to Full-load, constant input voltage. Measured at the sensing point in Remote Sense.
- (*5) Measure with JEITA RC-9131B (1:1) probe
- (*6) Measurement frequency bandwidth is 10Hz ~ 20MHz.
- (*7) Measurement frequency bandwidth is 5Hz ~ 1MHz.
- (*8) From 10% ~ 90% of rated output voltage, with rated resistive load.
- (*9) From 90% ~ 10% of rated output voltage, with rated resistive load.
- (*10) Time for output voltage to recover within 0.5% of its rated output for a load change from 10 ~ 90% of its rated output current. Voltage set point from 10% ~ 100% of rated output.
- (*11) For load voltage change, equal to the unit voltage rating, constant input voltage.
- (*12) For 6V ~ 20V model the ripple is measured at 2V ~ rated output voltage and full output current. For other models, the ripple is measured at 10 ~ 100% output voltage and full output current.
- (*13) At rated output power.
- (*14) If install the front panel filter kit, the temperature is guaranteed to 40 °C.

Programmable Switching D.C. Power Supply

SPECIFICATIONS

Model		PSU	6-400	8-360	12.5-240	15-200	20-152	30-100	40-76	50-60	60-50	80-38	100-30	150-20	300-10	400-7.6	600-5.2		
Rated output voltage ^{(*)1}	V		6	8	12.5	15	20	30	40	50	60	80	100	150	300	400	600		
Rated output current ^{(*)2}	A		400	360	240	200	152	100	76	60	50	38	30	20	10	7.6	5.2		
Rated output power	W		2400	2880	3000	3000	3040	3000	3040	3000	3000	3040	3000	3000	3000	3040	3120		
Constant Voltage Mode	PSU		6-400	8-360	12.5-240	15-200	20-152	30-100	40-76	50-60	60-50	80-38	100-30	150-20	300-10	400-7.6	600-5.2		
Line regulation ^{(*)3}	mV		0.01% of rated output voltage +2mV																
Load regulation ^{(*)4}	mV		0.01% of rated output voltage +5mV																
Ripple and noise ^{(*)5}	p-p ^{(*)6}	mV	75	75	75	75	75	75	75	75	75	100	100	120	300	300	500		
	r.m.s. ^{(*)7}	mV	10	10	10	10	10	10	10	10	10	15	15	25	35	35	120		
Temperature coefficient	ppm/°C		100ppm/°C after a 30 minute warm-up																
Temperature stability			0.05% of rated output voltage over 8hrs interval following 30 minutes warm-up. Constant line, load & temp.																
Warm-up drift			Less than 0.05% of rated output voltage +2mV over 30 minutes following power on.																
Remote sense compensation voltage (single wire)	V		1	1	1	1	1	1.5	2	2	3	4	5	5	5	5	5		
Rise time ^{(*)8}	No load	ms	80	80	80	80	80	80	80	80	80	150	150	150	150	200	250		
Fall time ^{(*)9}	Rated load	ms	10	50	50	50	50	80	80	80	80	150	150	150	150	200	250		
	No load	ms	500	600	700	700	800	900	1000	1100	1100	1200	1500	2000	2500	3000	4000		
Transient response time ^{(*)10}	ms		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		
Constant Current Mode	PSU		6-400	8-360	12.5-240	15-200	20-152	30-100	40-76	50-60	60-50	80-38	100-30	150-20	300-10	400-7.6	600-5.2		
Line regulation ^{(*)3}	mA		0.05% of rated output current																
Load regulation ^{(*)11}	mA		0.5% of rated output current												1% of rated output current				
Load regulation thermal drift			Less than 0.1% of rated output current over 30 minutes following load change.																
Ripple and noise ^{(*)12}	r.m.s.	mA	850	800	650	590	520	290	185	137	107	85	69	58	30	20	15		
Temperature coefficient	ppm/°C		100ppm/°C after a 30 minute warm-up																
Temperature stability			0.05% of rated output current over 8hrs interval following 30 minutes warm-up. Constant line, load & temp.																
Warm-up drift			6-15V model : Less than 0.5% rated output current over 30 minutes following power on ; 20-600V model : Less than 0.25% rated output current over 30 minutes following power on.																
Protection Function	PSU		6-400	8-360	12.5-240	15-200	20-152	30-100	40-76	50-60	60-50	80-38	100-30	150-20	300-10	400-7.6	600-5.2		
Over voltage protection (OVP)	Setting range	V	0.6 - 6.6	0.8-8.8	1.25 - 13.75	1.5 - 16.5	2 - 22	3 - 33	4 - 44	5 - 55	5 - 66	5 - 88	5 - 110	5 - 165	5 - 330	5 - 440	5 - 660		
	Setting accuracy	mV	60	80	125	150	200	300	400	500	600	800	1000	1500	3000	4000	6000		
Over current protection (OCP)	Setting range	A	5 - 440	5-396	5 - 262	5 - 220	5 - 167.2	5 - 110	5 - 83.6	5 - 66	5 - 55	3.8 - 41.8	3 - 33	2 - 22	1 - 11	0.76 - 8.36	0.52 - 5.72		
	Setting accuracy	A	8	7.2	4.8	4	3.04	2	1.52	1.2	1	0.76	0.6	0.4	0.2	0.152	0.104		
Under voltage limit (UVL)	Setting range		0 - 6.3	0 - 8.4	0 - 13.12	0 - 15.75	0 - 21	0 - 31.5	0 - 42	0 - 52.5	0 - 63	0 - 84	0 - 105	0 - 157.5	0 - 315	0 - 420	0 - 630		
Over temperature protection (OHP)	Operation		Turn the output off.																
Incorrect sensing connection protection (SENSE)	Operation		Turn the output off.																
Low AC input protection (AC-FAIL)	Operation		Turn the output off.																
Shutdown (SD)	Operation		Turn the output off.																
Power limit (POWER LIMIT)	Operation		Over power limit.																
	Value (fixed)		Approx. 105% of rated output power																
Front Panel	PSU		6-400	8-360	12.5-240	15-200	20-152	30-100	40-76	50-60	60-50	80-38	100-30	150-20	300-10	400-7.6	600-5.2		
Display, 4 digits	Voltage accuracy	0.1% +	mV	12	16	25	30	40	60	80	100	120	160	200	300	600	800	1200	
	Current accuracy	0.2% +	mA	1200	1080	720	600	456	300	228	180	150	114	90	60	30	22.8	15.6	
Indications			GREEN LED's: CV, CC, V, A, VSR, ISR, DLY, RMT, LAN, M1, M2, M3, RUN, Output ON; RED LED's: ALM, ERR																
Buttons			Lock/Local(Unlock), PROT(ALM_CLR), Function(M1), Test(M2), Set(M3), Shift, Output																
Knobs			Voltage, Current																
USB port			Type A USB connector																
Programming and Measurement (RS-232/485, USB, LAN, GPIB)	PSU		6-400	8-360	12.5-240	15-200	20-152	30-100	40-76	50-60	60-50	80-38	100-30	150-20	300-10	400-7.6	600-5.2		
Output voltage programming accuracy	0.05% +	mV	3	4	6.25	7.5	10	15	20	25	30	40	50	75	150	200	300		
Output current programming accuracy	0.2% +	mA	400	360	240	200	152	100	76	60	50	38	30	20	10	7.6	5.2		
Output voltage programming resolution		mV	0.2	0.27	0.4	0.5	0.7	1	1.3	1.7	2	2.7	3.4	5.2	10.2	13.6	20.4		
Output current programming resolution		mA	12	12	8	6.6	5	3.4	2.4	2	1.6	1.3	1	0.68	0.38	0.26	0.18		
Output voltage measurement accuracy	0.1% +	mV	6	8	12.5	15	20	30	40	50	60	80	100	150	300	400	600		
Output current measurement accuracy	0.2% +	mA	800	720	480	400	304	200	152	120	100	76	60	40	20	15.2	10.4		
Output voltage measurement resolution		mV	0.2	0.27	0.4	0.5	0.7	1	1.3	1.7	2	2.7	3.4	5.2	10.2	13.6	20.4		
Output current measurement resolution		mA	12	12	8	6.6	5	3.4	2.4	2	1.6	1.3	1	0.68	0.38	0.26	0.18		
Input Characteristics	PSU		6-400	8-360	12.5-240	15-200	20-152	30-100	40-76	50-60	60-50	80-38	100-30	150-20	300-10	400-7.6	600-5.2		
Normal input rating			B type : 1P2W 200V models																
Input voltage range			B type : 1P2W 170 - 265Vac																
Input frequency range			47Hz - 63Hz																
Maximum input current	200Vac	A	B type : 22A																
Inrush current			B type : 1P2W 200V models Less than 100A.																
Power factor	200Vac		0.98 @1 Phase 200Vac																
Efficiency ^{(*)13}	%		78.5	81	85	85	86	86	87	87	87	87	87	87	87	87	87		
Hold-up time			20ms or greater																
Interface Capabilities	PSU		6-400	8-360	12.5-240	15-200	20-152	30-100	40-76	50-60	60-50	80-38	100-30	150-20	300-10	400-7.6	600-5.2		
USB			TypeA : Host, TypeB : Slave, Speed: 1.1/2.0, USB Class : CDC(Communications Device Class)																
LAN			MAC Address, DNS IP Address, User Password, Gateway IP Address, Instrument IP Address, Subnet Mask																
RS-232 / RS-485			Complies with the EIA232D / EIA485 Specifications																
GPIB (Factory Option)			SCPI - 1993, IEEE 488.2 compliant interface																
Environmental Conditions	PSU		6-400	8-360	12.5-240	15-200	20-152	30-100	40-76	50-60	60-50	80-38	100-30	150-20	300-10	400-7.6	600-5.2		
Operating temperature			0 °C - 50 °C ^{(*)14}																
Storage temperature			-25 °C - 70 °C																
Operating humidity			20% - 85% RH; No condensation																
Storage humidity			90% RH or less; No condensation																
Altitude			Maximum 2000m																
General Specifications	PSU		6-400	8-360	12.5-240	15-200	20-152	30-100	40-76	50-60	60-50	80-38	100-30	150-20	300-10	400-7.6	600-5.2		
Weight	main unit only	kg	Less than 20kg																
Dimensions	[WxHxD]	mm	423 x 87.2 x 447.2																
Cooling			Forced air cooling by internal fan.																
Withstand voltage			AC to Chassis:500Vac/1min; AC to Output terminal:3000Vac/1min; Vout ≤ 150V; Output terminal to Chassis:1000Vdc/1min; 150<Vout ≤ 600; Output terminal to Chassis: 1500Vdc/1min																
Insulation resistance			Chassis and output terminal, chassis and AC input; AC input and output terminal: 100MΩ or more (DC 1000V)																

Notes:

- ^{(*)1} Minimum voltage is guaranteed to maximum 0.2% of the rated output voltage.
- ^{(*)2} Minimum current is guaranteed to maximum 0.4% of the rated output current.
- ^{(*)3} Single phase 200V models : 170 - 265Vac.
- ^{(*)4} From No-load to Full-load, constant input voltage. Measured at the sensing point in Remote Sense.
- ^{(*)5} Measured at rated output voltage and current with JEITA RC-9131B probe.
- ^{(*)6} Measurement frequency bandwidth is 10Hz - 20MHz.
- ^{(*)7} Measurement frequency bandwidth is 5Hz - 1MHz.
- ^{(*)8} From 10% - 90% of rated output voltage, with rated resistive load.
- ^{(*)9} From 90% - 10% of rated output voltage, with rated resistive load.
- ^{(*)10} Time for output voltage to recover within 2% of its rated output for a load change from 50 to 100% of its rated output current. Voltage set point from 10% - 100% of rated output.
- ^{(*)11} For load voltage change, equal to the unit voltage rating, constant input voltage.
- ^{(*)12} For 6V - 20V model the ripple is measured at 2V - rated output voltage and full output current. For other models, the ripple is measured at 10 - 100% output voltage and full output current.
- ^{(*)13} At rated output power.
- ^{(*)14} If install the front panel filter kit, the temperature is guaranteed to 40 °C.

SPECIFICATIONS

Model		PSU	6-600	8-540	12.5-360	15-300	20-228	30-150	40-114	50-90	60-75	80-57	100-45	150-30	300-15	400-11.4	600-7.8
Rated output voltage (*)	V		6	8	12.5	15	20	30	40	50	60	80	100	150	300	400	600
Rated output current (*)	A		600	540	360	300	228	150	114	90	75	57	45	30	15	11.4	7.8
Rated output power	W		3600	4320	4500	4500	4560	4500	4560	4500	4500	4560	4500	4500	4500	4560	4680
Constant Voltage Mode	PSU		6-600	8-540	12.5-360	15-300	20-228	30-150	40-114	50-90	60-75	80-57	100-45	150-30	300-15	400-11.4	600-7.8
Line regulation (*)	mV		0.01% of rated output voltage +2mV														
Load regulation (*)	mV		0.01% of rated output voltage +5mV														
Ripple and noise (*)	p-p (*)	mV	75	75	75	75	75	75	75	75	75	100	100	120	300	300	500
	r.m.s. (*)	mV	10	10	10	10	10	10	10	10	10	15	15	25	35	35	120
Temperature coefficient	ppm/°C		100ppm/°C after a 30 minute warm-up														
Temperature stability			0.05% of rated output voltage over 8hrs interval following 30 minutes warm-up. Constant line, load & temp.														
Warm-up drift			Less than 0.05% of rated output voltage +2mV over 30 minutes following power on.														
Remote sense compensation voltage (single wire)	V		1	1	1	1	1	1.5	2	2	3	4	5	5	5	5	5
Rise time (*)	No load	ms	80	80	80	80	80	80	80	80	80	150	150	150	150	200	250
Fall time (*)	Rated load	ms	10	50	50	50	50	80	80	80	80	150	150	150	150	200	250
	No load	ms	500	600	700	700	800	900	1000	1100	1100	1200	1500	2000	2500	3000	4000
Transient response time (*)	ms		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Constant Current Mode	PSU		6-600	8-540	12.5-360	15-300	20-228	30-150	40-114	50-90	60-75	80-57	100-45	150-30	300-15	400-11.4	600-7.8
Line regulation (*)	mA		0.1% of rated output current / 0.05% of rated output current														
Load regulation (*)	mA		0.5% of rated output current / 1% of rated output current														
Load regulation thermal drift			Less than 0.1% of rated output current over 30 minutes following load change.														
Ripple and noise (*)	r.m.s.	mA	1400	1315	1060	987	900	472	275	191	138	110	92	81	30	20	15
Temperature coefficient	ppm/°C		100ppm/°C after a 30 minute warm-up														
Temperature stability			0.05% of rated output current over 8hrs interval following 30 minutes warm-up. Constant line, load & temp.														
Warm-up drift			6-15V model : Less than 0.5% rated output current over 30 minutes following power on. 20-600V model : Less than 0.25% rated output current over 30 minutes following power on.														
Protection Function	PSU		6-600	8-540	12.5-360	15-300	20-228	30-150	40-114	50-90	60-75	80-57	100-45	150-30	300-15	400-11.4	600-7.8
Over voltage protection (OVP)	Setting range	V	0.6 - 6.6	0.8-8.8	1.25 - 13.75	1.5 - 16.5	2 - 22	3 - 33	4 - 44	5 - 55	5 - 66	5 - 88	5 - 110	5 - 165	5 - 330	5 - 440	5 - 660
	Setting accuracy	mV	60	80	125	150	200	300	400	500	600	800	1000	1500	3000	4000	6000
Over current protection (OCP)	Setting range	A	5 - 660	5-594	5 - 396	5 - 330	5 - 250.8	5 - 165	5 - 125.4	5 - 99	5 - 82.5	5 - 62.7	4.5 - 49.5	3 - 33	1.5 - 16.5	1.14 - 12.54	0.78 - 8.58
	Setting accuracy	A	12	10.8	7.2	6	4.56	3	2.28	1.8	1.5	1.04	0.9	0.6	0.3	0.228	0.156
Under voltage limit (UVL)	Setting range		0 - 6.3	0 - 8.4	0 - 13.12	0 - 15.75	0 - 21	0 - 31.5	0 - 42	0 - 52.5	0 - 63	0 - 84	0 - 105	0 - 157.5	0 - 315	0 - 420	0 - 630
Over temperature protection (OHP)	Operation		Turn the output off.														
Incorrect sensing connection protection (SENSE)	Operation		Turn the output off.														
Low AC input protection (AC-FAIL)	Operation		Turn the output off.														
Shutdown (SD)	Operation		Turn the output off.														
Power limit (POWER LIMIT)	Operation		Over power limit.														
	Value (fixed)		Approx. 105% of rated output power														
Front Panel	PSU		6-600	8-540	12.5-360	15-300	20-228	30-150	40-114	50-90	60-75	80-57	100-45	150-30	300-15	400-11.4	600-7.8
Display, 4 digits	Voltage accuracy	0.1% +	mV	12	16	25	30	40	60	80	100	120	160	200	300	600	1200
	Current accuracy	0.2% +	mA	1800	1620	1080	900	684	450	342	270	225	171	135	90	45	34.2
Indications			GREEN LED's: CV, CC, V, A, VSR, ISR, DLY, RMT, LAN, M1, M2, M3, RUN, Output ON; RED LED's: ALM, ERR														
Buttons			Lock/Local(Unlock), PROT(ALM_CLR), Function(M1), Test(M2), Set(M3), Shift, Output														
Knobs			Voltage, Current														
USB port			Type A USB connector														
Programming and Measurement (RS-232/485, USB, LAN, GPIB)	PSU		6-600	8-540	12.5-360	15-300	20-228	30-150	40-114	50-90	60-75	80-57	100-45	150-30	300-15	400-11.4	600-7.8
Output voltage programming accuracy	0.05% +	mV	3	4	6.25	7.5	10	15	20	25	30	40	50	75	150	200	300
Output current programming accuracy	0.2% +	mA	600	540	360	300	228	150	114	90	75	57	45	30	15	11.4	7.8
Output voltage programming resolution		mV	0.2	0.27	0.4	0.5	0.7	1	1.3	1.7	2	2.7	3.4	5.2	10.2	13.6	20.4
Output current programming resolution		mA	18	18	12	9.9	7.5	5.1	3.6	3	2.4	1.95	1.5	1.02	0.57	0.39	0.27
Output voltage measurement accuracy	0.1% +	mV	6	8	12.5	15	20	30	40	50	60	80	100	150	300	400	600
Output current measurement accuracy	0.2% +	mA	1200	1080	720	600	456	300	228	180	150	114	90	60	30	22.8	15.6
Output voltage measurement resolution		mV	0.2	0.27	0.4	0.5	0.7	1	1.3	1.7	2	2.7	3.4	5.2	10.2	13.6	20.4
Output current measurement resolution		mA	18	18	12	9.9	7.5	5.1	3.6	3	2.4	1.95	1.5	1.02	0.57	0.39	0.27
Input Characteristics	PSU		6-600	8-540	12.5-360	15-300	20-228	30-150	40-114	50-90	60-75	80-57	100-45	150-30	300-15	400-11.4	600-7.8
Normal input rating			B type : 1P2W 200V models, C type : 3P3W 200V models, D type : 3P4W 400V models														
Input voltage range			B type : 1P2W 170 - 265Vac, C type : 3P3W 180 - 253Vac, D type : 3P4W 360 - 440Vac														
Input frequency range			47Hz - 63Hz														
Maximum input current	200Vac / 400Vac	A	B type : 33A - C type : 19A - D type 11A														
Inrush current			B type : 1P2W 200V models Less than 150A; C type : 3P3W 200V model Less than 100A; D type : 3P4W 400V model Less than 50A.														
Power factor	200Vac / 400Vac		0.98 @1 Phase 200Vac / 0.95 @ 3 Phase 200/400Vac														
Efficiency (*)	%		78.5	81	85	85	86	86	87	87	87	87	87	87	87	87	87
Hold-up time			20ms or greater														
Interface Capabilities	PSU		6-600	8-540	12.5-360	15-300	20-228	30-150	40-114	50-90	60-75	80-57	100-45	150-30	300-15	400-11.4	600-7.8
USB			TypeA: Host, TypeB: Slave, Speed: 1.1/2.0, USB Class: CDC(Communications Device Class)														
LAN			MAC Address, DNS IP Address, User Password, Gateway IP Address, Instrument IP Address, Subnet Mask														
RS-232 / RS-485			Complies with the EIA232D / EIA485 Specifications														
GPIB (Factory Option)			SCPI - 1993, IEEE 488.2 compliant interface														
Environmental Conditions	PSU		6-600	8-540	12.5-360	15-300	20-228	30-150	40-114	50-90	60-75	80-57	100-45	150-30	300-15	400-11.4	600-7.8
Operating temperature			0 °C - 50 °C (*)														
Storage temperature			-25 °C - 70 °C														
Operating humidity			20% - 85% RH; No condensation														
Storage humidity			90% RH or less; No condensation														
Altitude			Maximum 2000m														
General Specifications	PSU		6-600	8-540	12.5-360	15-300	20-228	30-150	40-114	50-90	60-75	80-57	100-45	150-30	300-15	400-11.4	600-7.8
Weight	main unit only	kg	Less than 28.7kg														
Dimensions	(WxHxD)	mm	423 x 130.8 x 447.2														
Cooling			Forced air cooling by internal fan.														
Withstand voltage			AC to Chassis : 1500Vac/1min; AC to Output terminal : 3000Vac/1min; Vout ≤ 150V; Output terminal to Chassis:1000Vdc/1min; 150<Vout ≤ 600; Output terminal to Chassis:1500Vdc/1min														
Insulation resistance			Chassis and output terminal; chassis and AC input; AC input and output terminal: 100MΩ or more (DC 1000V)														

Notes:
 (*) Minimum voltage is guaranteed to maximum 0.2% of the rated output voltage.
 (*) Minimum current is guaranteed to maximum 0.4% of the rated output current.
 (*) Single phase 200V models: 170-265Vac. Three phase 200V models: 180-253Vac. Three phase 400V models: 360-440Vac.
 (*) From No-load to Full-load, constant input voltage. Measured at the sensing point in Remote Sense.
 (*) Measured at rated output voltage and current with JEITA RC-9131B probe
 (*) Measurement frequency bandwidth is 10Hz - 20MHz.
 (*) Measurement frequency bandwidth is 5Hz - 1MHz.
 (*) From 10% - 90% of rated output voltage, with rated resistive load.
 (*) From 90% - 10% of rated output voltage, with rated resistive load.
 (*) Time for output voltage to recover within 2% of its rated output for a load change from 50 - 100% of its rated output current. Voltage set point from 10% - 100% of rated output.
 (*) For load voltage change, equal to the unit voltage rating, constant input voltage.
 (*) For 6V - 20V model the ripple is measured at 2V - rated output voltage and full output current. For other models, the ripple is measured at 10 - 100% output voltage and full output current.
 (*) Single phase and three phase 200V models : at 200Vac input voltage. Three phase 400V models : at 400Vac input voltage. At rated output power.
 (*) If install the front panel filter kit, the temperature is guaranteed to 40 °C.

Programmable Switching D.C. Power Supply

SPECIFICATIONS

Model	PSU	6-800	8-720	12.5-480	15-400	20-304	30-200	40-152	50-120	60-100	80-76	100-60	150-40	300-20	400-15.2	600-10.4	
Rated output voltage ^{(*)1}	V	6	8	12.5	15	20	30	40	50	60	80	100	150	300	400	600	
Rated output current ^{(*)2}	A	800	720	480	400	304	200	152	120	100	76	60	40	20	15.2	10.4	
Rated output power	W	4800	5760	6000	6000	6080	6000	6080	6000	6000	6080	6000	6000	6000	6080	6240	
Constant Voltage Mode	PSU	6-800	8-720	12.5-480	15-400	20-304	30-200	40-152	50-120	60-100	80-76	100-60	150-40	300-20	400-15.2	600-10.4	
Line regulation ^{(*)3}	mV	0.01% of rated output voltage +2mV															
Load regulation ^{(*)4}	mV	0.01% of rated output voltage +5mV															
Ripple and noise ^{(*)5}	p-p ^{(*)6} r.m.s. ^{(*)7}	mV	75	75	75	75	75	75	75	75	100	100	120	300	300	500	
Temperature coefficient	ppm/°C	100ppm/°C after a 30 minute warm-up															
Temperature stability		0.05% of rated output voltage over 8hrs interval following 30 minutes warm-up. Constant line, load & temp.															
Warm-up drift		Less than 0.05% of rated output voltage +2mV over 30 minutes following power on.															
Remote sense compensation voltage (single wire)	V	1	1	1	1	1	1.5	2	2	3	4	5	5	5	5	5	
Rise time ^{(*)8}	No load	ms	80	80	80	80	80	80	80	80	150	150	150	150	200	250	
Fall time ^{(*)9}	Rated load	ms	10	50	50	50	50	80	80	80	150	150	150	150	200	250	
	No load	ms	500	600	700	700	800	900	1000	1100	1100	1200	1500	2000	2500	3000	4000
Transient response time ^{(*)10}		ms	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
Constant Current Mode	PSU	6-800	8-720	12.5-480	15-400	20-304	30-200	40-152	50-120	60-100	80-76	100-60	150-40	300-20	400-15.2	600-10.4	
Line regulation ^{(*)3}	mA	0.1% of rated output current															
Load regulation ^{(*)11}	mA	0.5% of rated output current															
Load regulation thermal drift		Less than 0.1% of rated output current over 30 minutes following load change.															
Ripple and noise ^{(*)12}	r.m.s.	mA	2000	1900	1500	1390	1250	650	365	245	170	140	116	104	30	20	15
Temperature coefficient	ppm/°C	100ppm/°C after a 30 minute warm-up															
Temperature stability		0.05% of rated output current over 8hrs interval following 30 minutes warm-up. Constant line, load & temp.															
Warm-up drift		6-15V model : Less than 0.5% rated output current over 30 minutes following power on. 20-600V model : Less than 0.25% rated output current over 30 minutes following power on.															
Protection Function	PSU	6-800	8-720	12.5-480	15-400	20-304	30-200	40-152	50-120	60-100	80-76	100-60	150-40	300-20	400-15.2	600-10.4	
Over voltage protection (OVP)	Setting range	V	0.6 - 6.6	0.8 - 8.8	1.25 - 13.75	1.5 - 16.5	2 - 22	3 - 33	4 - 44	5 - 55	5 - 66	5 - 88	5 - 110	5 - 165	5 - 330	5 - 440	5 - 660
	Setting accuracy	mV	60	80	125	150	200	300	400	500	600	800	1000	1500	3000	4000	6000
Over current protection (OCP)	Setting range	A	5 - 880	5 - 792	5 - 528	5 - 440	5 - 334.4	5 - 220	5 - 167.2	5 - 132	5 - 110	5 - 83.6	5 - 66	4 - 44	2 - 22	1.52 - 16.72	1.04 - 11.44
	Setting accuracy	A	16	14.4	9.6	8	6.08	4	3.04	2.4	2	1.52	1.2	0.8	0.4	0.304	0.208
Under voltage limit (UVL)	Setting range		0 - 6.3	0 - 8.4	0 - 13.12	0 - 15.75	0 - 21	0 - 31.5	0 - 42	0 - 52.5	0 - 63	0 - 84	0 - 105	0 - 157.5	0 - 315	0 - 420	0 - 630
Over temperature protection (OHP)	Operation		Turn the output off.														
Incorrect sensing connection protection (SENSE)	Operation		Turn the output off.														
Low AC input protection (AC-FAIL)	Operation		Turn the output off.														
Shutdown (SD)	Operation		Turn the output off.														
Power limit (POWER LIMIT)	Operation		Over power limit.														
	Value (fixed)		Approx. 105% of rated output power														
Front Panel	PSU	6-800	8-720	12.5-480	15-400	20-304	30-200	40-152	50-120	60-100	80-76	100-60	150-40	300-20	400-15.2	600-10.4	
Display, 4 digits	Voltage accuracy	mV	12	16	25	30	40	60	80	100	120	160	200	300	600	800	1200
	Current accuracy	mA	2400	2160	1440	1200	912	600	456	360	300	228	180	120	60	45.6	31.2
Indications			GREEN LED's: CV, CC, V, A, VSR, ISR, DLY, RMT, LAN, M1, M2, M3, RUN, Output ON; RED LED's: ALM, ERR														
Buttons			Lock/Local(Unlock), PROT(ALM_CLR), Function(M1), Test(M2), Set(M3), Shift, Output														
Knobs			Voltage, Current														
USB port			Type A USB connector														
Programming and Measurement (RS-232/485, USB, LAN, GPIB)	PSU	6-800	8-720	12.5-480	15-400	20-304	30-200	40-152	50-120	60-100	80-76	100-60	150-40	300-20	400-15.2	600-10.4	
Output voltage programming accuracy	0.05% +	mV	3	4	6.25	7.5	10	15	20	25	30	40	50	75	150	200	300
Output current programming accuracy	0.2% +	mA	800	720	480	400	304	200	152	120	100	76	60	40	20	15.2	10.4
Output voltage programming resolution		mV	0.2	0.27	0.4	0.5	0.7	1	1.3	1.7	2	2.7	3.4	5.2	10.2	13.6	20.4
Output current programming resolution		mA	24	24	16	13.2	10	6.8	4.8	4	3.2	2.6	2	1.36	0.76	0.52	0.36
Output voltage measurement accuracy	0.1% +	mV	6	8	12.5	15	20	30	40	50	60	80	100	150	300	400	600
Output current measurement accuracy	0.2% +	mA	1600	1440	960	800	608	400	304	240	200	152	120	80	40	30.4	20.8
Output voltage measurement resolution		mV	0.2	0.27	0.4	0.5	0.7	1	1.3	1.7	2	2.7	3.4	5.2	10.2	13.6	20.4
Output current measurement resolution		mA	24	24	16	13.2	10	6.8	4.8	4	3.2	2.6	2	1.36	0.76	0.52	0.36
Input Characteristics	PSU	6-800	8-720	12.5-480	15-400	20-304	30-200	40-152	50-120	60-100	80-76	100-60	150-40	300-20	400-15.2	600-10.4	
Normal input rating			B type : 1P2W 200V models, C type : 3P3W 200V models, D type : 3P4W 400V models														
Input voltage range			B type : 1P2W 170 - 265Vac, C type : 3P3W 180 - 253Vac, D type : 3P4W 360 - 440Vac														
Input frequency range			47Hz - 63Hz														
Maximum input current	200Vac / 400Vac	A	B type : 44A, C type : 29A, D type 22A														
Inrush current			B type : 1P2W 200V models Less than 200A; C type : 3P3W 200V model Less than 100A; D type : 3P4W 400V model Less than 100A.														
Power factor	200Vac / 400Vac		0.98 @ 1 Phase 200Vac / 0.95 @ 3 Phase 200/400Vac														
Efficiency ^{(*)13}	%		78.5	81	85	85	86	86	87	87	87	87	87	87	87	87	87
Hold-up time			20ms or greater														
Interface Capabilities	PSU	6-800	8-720	12.5-480	15-400	20-304	30-200	40-152	50-120	60-100	80-76	100-60	150-40	300-20	400-15.2	600-10.4	
USB			TypeA: Host, TypeB: Slave, Speed: 1.1/2.0, USB Class: CDC(Communications Device Class)														
LAN			MAC Address, DNS IP Address, User Password, Gateway IP Address, Instrument IP Address, Subnet Mask														
RS-232 / RS-485			Complies with the EIA232D / EIA485 Specifications														
GPIB (Factory Option)			SCPI - 1993, IEEE 488.2 compliant interface														
Environmental Conditions	PSU	6-800	8-720	12.5-480	15-400	20-304	30-200	40-152	50-120	60-100	80-76	100-60	150-40	300-20	400-15.2	600-10.4	
Operating temperature			0 °C - 50 °C ^{(*)14}														
Storage temperature			-25 °C - 70 °C														
Operating humidity			20% - 85% RH; No condensation														
Storage humidity			90% RH or less; No condensation														
Altitude			Maximum 2000m														
General Specifications	PSU	6-800	8-720	12.5-480	15-400	20-304	30-200	40-152	50-120	60-100	80-76	100-60	150-40	300-20	400-15.2	600-10.4	
Weight	main unit only	kg	Less than 37.4kg														
Dimensions	(WxHxD)	mm	423 x 174.4 x 447.2														
Cooling			Forced air cooling by internal fan.														
Withstand voltage			AC to Chassis : 1500Vac/1min; AC to Output terminal : 3000Vac/1min; Vout ≤ 150V; Output terminal to Chassis:1000Vdc/1min; 150<Vout ≤ 600; Output terminal to Chassis:1500Vdc/1min														
Insulation resistance			Chassis and output terminal; chassis and AC input; AC input and output terminal: 100MΩ or more (DC 1000V)														

Notes:

- (*)1 Minimum voltage is guaranteed to maximum 0.2% of the rated output voltage.
- (*)2 Minimum current is guaranteed to maximum 0.4% of the rated output current.
- (*)3 Single phase 200V models: 170 - 265Vac. Three phase 200V models: 180 - 253Vac. Three phase 400V models: 360 - 440Vac.
- (*)4 From No-load to Full-load, constant input voltage. Measured at the sensing point in Remote Sense.
- (*)5 Measured at rated output voltage and current with JEITA RC-9131B probe
- (*)6 Measurement frequency bandwidth is 10Hz - 20MHz.
- (*)7 Measurement frequency bandwidth is 5Hz - 1MHz.
- (*)8 From 10% - 90% of rated output voltage, with rated resistive load.
- (*)9 From 90% - 10% of rated output voltage, with rated resistive load.
- (*)10 Time for output voltage to recover within 2% of its rated output for a load change from 50 - 100% of its rated output current. Voltage set point from 10% - 100% of rated output.
- (*)11 For load voltage change, equal to the unit voltage rating, constant input voltage.
- (*)12 For 6V - 20V model the ripple is measured at 2V - rated output voltage and full output current. For other models, the ripple is measured at 10 - 100% output voltage and full output current.
- (*)13 Single phase and three phase 200V models : at 200Vac input voltage. Three phase 400V models : at 400Vac input voltage. At rated output power.
- (*)14 If install the front panel filter kit, the temperature is guaranteed to 40 °C.

1U Handle & Bracket



**PSU-3kW****PSU-4.5kW****PSU-6kW****ORDERING INFORMATION**

PSU 6-200	1200W	Programmable Switching	DC Power Supply	PSU 60-25	1500W	Programmable Switching	DC Power Supply
PSU 8-180	1440W	Programmable Switching	DC Power Supply	PSU 80-19	1520W	Programmable Switching	DC Power Supply
PSU 12.5-120	1500W	Programmable Switching	DC Power Supply	PSU 100-15	1500W	Programmable Switching	DC Power Supply
PSU 15-100	1500W	Programmable Switching	DC Power Supply	PSU 150-10	1500W	Programmable Switching	DC Power Supply
PSU 20-76	1520W	Programmable Switching	DC Power Supply	PSU 300-5	1500W	Programmable Switching	DC Power Supply
PSU 30-50	1500W	Programmable Switching	DC Power Supply	PSU 400-3.8	1520W	Programmable Switching	DC Power Supply
PSU 40-38	1520W	Programmable Switching	DC Power Supply	PSU 600-2.6	1560W	Programmable Switching	DC Power Supply
PSU 50-30	1500W	Programmable Switching	DC Power Supply				

ACCESSORIES :

CD-ROM x 1 (User Manual, Programming Manual), Output terminal cover x 1, Analog connector plug kit x 1, Output terminal M8 bolt set(6V-60V model), Input terminal cover x 1, 1U Handle(RoHS), 1U Bracket(LEFT, RoHS), 1U Bracket (RIGHT,RoHS), Power Cord(10A) provided for certain regions only

OPTIONAL ACCESSORIES

PSU-01B	Bus Bar for 2 units in parallel operation (Applies to models ≤60 volts)	CTL-246	USB Cable, USB 2.0A-B Type Cable, 4P
PSU-01C	Cable for 2 units in parallel connection	CTL-258	GPB Cable, 2000mm
PSU-02B	Bus Bar for 3 units in parallel operation (Applies to models ≤60 volts)	CTL-259	RS-232 Cable with DB9 connector to RJ45
PSU-02C	Cable for 3 units in parallel connection	CTL-260	RS-485 Cable with DB9 connector to RJ45
PSU-03B	Bus Bar for 4 units in parallel operation (Applies to models ≤60 volts)	CTL-261	Serial Master Cable+Terminator, 0.5M
PSU-03C	Cable for 4 units in parallel connection	CTL-262	RS-485 Slave cable
PSU-232	RS232 Cable with DB9 connector kit	GRM-001	Slide bracket 2pcs/set ,PSU option
PSU-485	RS485 Cable with DB9 connector kit	PSU-GPIB	GPIB Interface card (factory option)
PSU-001	Front panel filter kit(factory installed)	GPW-001	UI_ICSA power cord 3m ,PSU option
PSU-01A	Joins a vertical stack of 2 PSU units together. 2U-sized handles x2, joining plates x2	GPW-002	VDE power cord 3m ,PSU option
PSU-02A	Joins a vertical stack of 3 PSU units together. 3U-sized handles x2, joining plates x2	GPW-003	PSE power cord 3m ,PSU option
PSU-03A	Joins a vertical stack of 4 PSU units together. 4U-sized handles x2, joining plates x2		
PSU-ISO-I	Isolate current remote control card(factory option)		
PSU-ISO-V	Isolate voltage remote control card(factory option)		

FREE DOWNLOAD

Driver LabView Driver

PSU-001**PSU-01C****PSU-02C****GPW-001****PSU-01A****PSU-01B****PSU-232****PSU-03B****GPW-002****PSU-02A****PSU-02B****PSU-485****PSU-03C****GPW-003****PSU-03A****GRM-001****GTL-259****GTL-260****GTL-261****GTL-262**

Programmable Switching D.C. Power Supply

PSU-Series

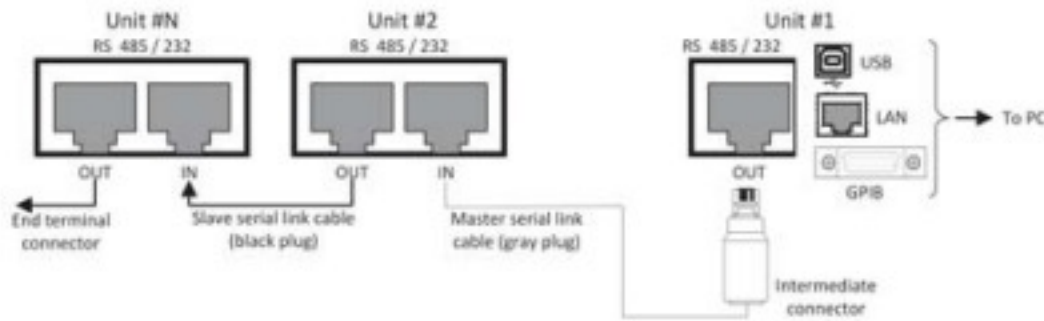
POWER SUPPLIES

A. SERIES/PARALLEL OPERATION AND HIGH POWER DENSITY

Series Connection	1 unit	2 units	Series Parallel	1 unit	2 units	3 units	4 units
Height of sets	1U	2U	Height of sets	1U	2U	3U	4U
PSU 6-200	6V 200A	12V 200A	PSU 6-200	6V 200A	6V 400A	6V 600A	6V 800A
PSU 8-180	8V 180A	16V 180A	PSU 8-180	8V 180A	8V 360A	8V 540A	8V 720A
PSU 12.5-120	12.5V 120A	25V 120A	PSU 12.5-120	12.5V 120A	12.5V 240A	12.5V 360A	12.5V 480A
PSU 15-100	15V 100A	30V 100A	PSU 15-100	15V 100A	15V 200A	15V 300A	15V 400A
PSU 20-76	20V 76A	40V 76A	PSU 20-76	20V 76A	20V 152A	20V 228A	20V 304A
PSU 30-50	30V 50A	60V 50A	PSU 30-50	30V 50A	30V 100A	30V 150A	30V 200A
PSU 40-38	40V 38A	80V 38A	PSU 40-38	40V 38A	40V 76A	40V 114A	40V 152A
PSU 50-30	50V 30A	100V 30A	PSU 50-30	50V 30A	50V 60A	50V 90A	50V 120A
PSU 60-25	60V 25A	120V 25A	PSU 60-25	60V 25A	60V 50A	60V 75A	60V 100A
PSU 80-19	80V 19A	160V 19A	PSU 80-19	80V 19A	80V 38A	80V 57A	80V 76A
PSU 100-15	100V 15A	200V 15A	PSU 100-15	100V 15A	100V 30A	100V 45A	100V 60A
PSU 150-10	150V 10A	300V 10A	PSU 150-10	150V 10A	150V 20A	150V 30A	150V 40A
PSU 300-5	300V 5A	600V 5A	PSU 300-5	300V 5A	300V 10A	300V 15A	300V 20A
PSU 400-3.8	400V 3.8A	NA	PSU 400-3.8	400V 3.8A	400V 7.6A	400V 11.4A	400V 15.2A
PSU 600-2.6	600V 2.6A	NA	PSU 600-2.6	600V 2.6A	600V 5.2A	600V 7.8A	600V 10.4A

To augment output power, the PSU-series can realize two-fold rated power (models under 300V) via 2 same model units in series connection; and four-fold rated power via 4 same model units in parallel connection so as to satisfy customers with large voltage and large current requirements. 2U height units in series connection can achieve maximum 600V output. 4U height units in parallel connection can output maximum 800A and 6240W.

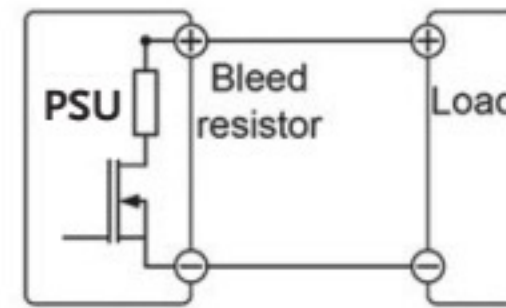
B. REMOTE PROGRAM CONTROL (UP TO 31 UNITS CONNECTION)



Provide RS-232, RS-485, USB, GPIB and LAN for PC to remote control Master PSU-Series. RJ-45 connector on the rear panel can connect up to 31 units. LAN or USB remote control and augmenting slave units by using PSU-Series multi-drop mode will no longer need any switch/hub that can help customers save equipment costs.

* For the detailed information please refer to User Manual

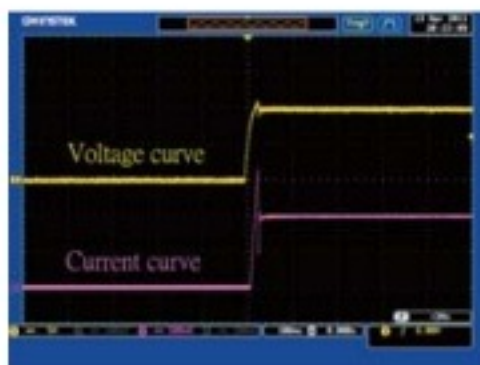
C. BLEEDER CONTROL



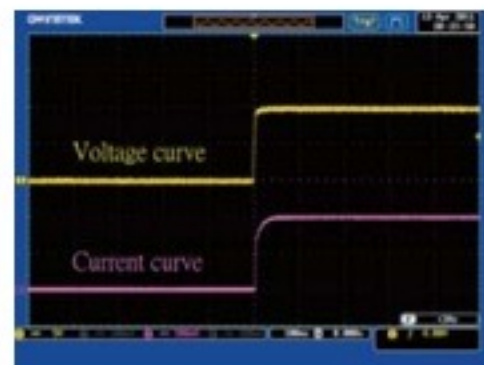
PSU-Series Built-in Bleed Resistor

The PSU-Series employs a bleed resistor in parallel with the output terminal. Bleed resistor is designed to dispatch the power from the power supply filter capacitors when power is turned off or the load is disconnected. Without a bleed resistor, power terminal may remain charged on the filter capacitors for some time and be potentially hazardous. In addition, bleed resistor also allows for smoother voltage regulation of the power supply as the bleed resistor acts as a minimum voltage load. The bleed resistance can be turned on or off using the configuration setting.

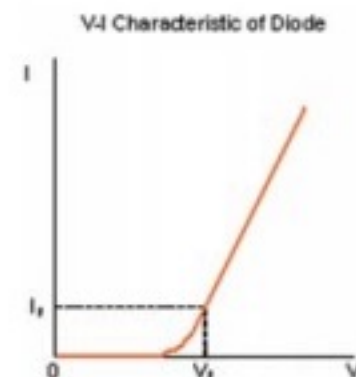
D. C.V/C.C PRIORITY MODE



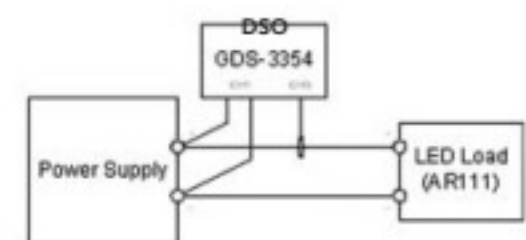
Under the conventional C.V mode, inrush current and surge voltage appeared at forward voltage (V_f) of LED.



Under C.C priority mode, inrush and surge voltage are effectively restrained.



V-I Characteristic of Diode



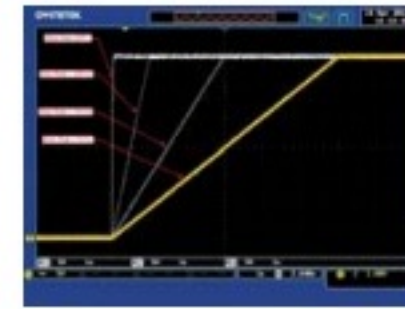
Using GDS-3354 DSO to Test LED Operation Under C.V Priority and C.C Priority Respectively

Conventional power supplies under the CV priority mode will produce inrush current and surge voltage at turn-on. The PSU-series has CV and CC priority modes.

The CC priority mode can prevent inrush current and surge voltage from occurring at turn-on to protect DUT.

E. ADJUSTABLE SLEW RATE

VOLTAGE SLEW RATE	CURRENT SLEW RATE
0.001V~0.060V/msec (PSU 6-200)	0.001A~2.000A / msec (PSU 6-200)
0.001V~0.080V/msec(PSU 8-180)	0.001A~1.800A / msec (PSU 8-180)
0.001V~0.125V/msec (PSU 12.5-120)	0.001A~1.200A / msec (PSU 12.5-120)
0.001V~0.150V/msec(PSU 15-100)	0.001A~1.000A / msec(PSU 15-100)
0.001V~0.200V/msec (PSU 20-76)	0.001A~0.760A / msec (PSU 20-76)
0.001V~0.300V/msec(PSU 30-50)	0.001A~0.500A / msec(PSU 30-50)
0.001V~0.400V/msec (PSU 40-38)	0.001A~0.380A / msec (PSU 40-38)
0.001V~0.500V/msec(PSU 50-30)	0.001A~0.300A / msec(PSU 50-30)
0.001V~0.600V/msec (PSU 60-25)	0.001A~0.250A / msec (PSU 60-25)
0.001V~0.800V/msec(PSU 80-19)	0.001A~0.190A / msec(PSU 80-19)
0.001V~1.000V/msec (PSU 100-15)	0.001A~0.150A / msec (PSU 100-15)
0.001V~1.500V/msec (PSU 150-10)	0.001A~0.100A / msec (PSU 150-10)
0.001V~1.500V/msec (PSU 300-5)	0.001A~0.025A / msec (PSU 300-5)
0.001V~2.000V/msec (PSU 400-3.8)	0.001A~0.008A / msec (PSU 400-3.8)
0.001V~2.400V/msec (PSU 600-2.6)	0.001A~0.006A / msec (PSU 600-2.6)



Adjustable Voltage Slew Rate

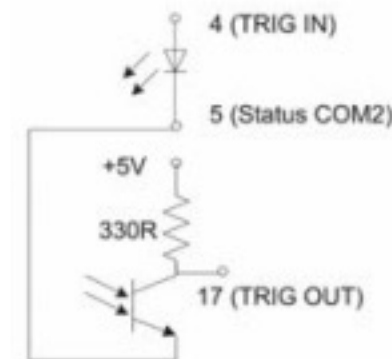
The PSU series can adjust slew rate for current and voltage. Via setting the rise and fall time of voltage and current, users can verify DUT's characteristics during voltage and current variation. Additionally, slew rate adjustment can mitigate voltage shift to effectively prevent DUT from being damaged by inrush current. This function is ideal for tests such as capacitive load and motor.

F. OVP, OCP AND UVL

MODEL	OCP	OVP	UVL
PSU 6-200	5 ~ 220A	0.6 ~ 6.6V	0 ~ 6.3V
PSU 8-180	5 ~ 198A	0.8 ~ 8.8V	0 ~ 8.4V
PSU 12.5-120	5 ~ 132A	1.25 ~ 13.75V	0 ~ 13.12V
PSU 15-100	5 ~ 110A	1.5 ~ 16.5V	0 ~ 15.75V
PSU 20-76	5 ~ 83.6A	2 ~ 22V	0 ~ 21V
PSU 30-50	5 ~ 55A	3 ~ 33V	0 ~ 31.5V
PSU 40-38	3.8 ~ 41.8A	4 ~ 44V	0 ~ 42V
PSU 50-30	3 ~ 33A	5 ~ 55V	0 ~ 52.5V
PSU 60-25	2.5 ~ 27.5A	5 ~ 66V	0 ~ 63V
PSU 80-19	1.9 ~ 20.9A	5 ~ 88V	0 ~ 84V
PSU 100-15	1.5 ~ 16.5A	5 ~ 110V	0 ~ 105V
PSU 150-10	1 ~ 11A	5 ~ 165V	0 ~ 157.5V
PSU 300-5	0.5 ~ 5.5A	5 ~ 330V	0 ~ 315V
PSU 400-3.8	0.38 ~ 4.18A	5 ~ 440V	0 ~ 420V
PSU 600-2.6	0.26 ~ 2.86A	5 ~ 660V	0 ~ 630V

Once the voltage or current output exceeds the preset level of OVP or OCP, PSU will shut down output to protect DUT. UVL is for users to set the minimum output voltage from the output terminal.

G. TRIGGER CONTROL (TRIGGER INPUT/TRIGGER OUTPUT)



PSU-series provides users with complete trigger input and trigger output functions so as to flexibly control PSU-series. Each function is elaborated as follows.

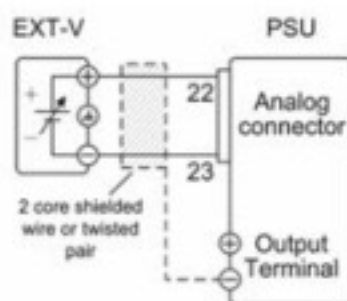
Trigger Input function :

1. Allow users to set the effective pulse width from 0~60ms for trigger input (0: the LOW or HIGH signal of DC level for trigger input)
2. Receive trigger input to control PSU-series output or to output preset voltage and current.
3. Receive trigger input to upload preset memory parameters.

Trigger Output function :

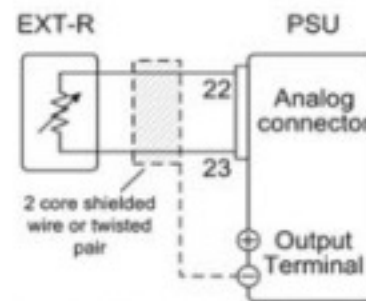
1. Allow users to set the effective pulse width from 0~60ms for trigger output (0: the LOW or HIGH signal of DC level for trigger output)
2. Set LOW or HIGH for output DC level
3. PSU produces trigger output signal when setting output or changing preset value or uploading preset memory parameters.

H. EXTERNAL ANALOG CONTROL FUNCTION



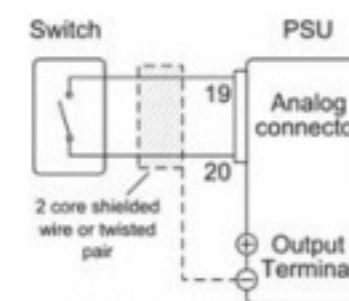
- Pin23 → EXT-V (-)
- Pin22 → EXT-V (+)
- Wire shield → negative (-) output terminal

External Voltage Controls Voltage Range



- Pin22 → EXT-R
- Pin23 → EXT-R
- Wire shield → negative (-) output terminal

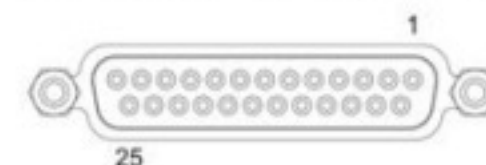
External Resistance Controls Voltage Range



- Pin19 → Switch
- Pin20 → Switch
- Wire shield → negative (-) output terminal

External On-off to Control Output, on or off

The rear panel of the PSU-series has an analog control terminal. The external analog control interface allows external voltage or resistance to control voltage and current output; and allows power supply to output or to be turned on and off. The diagram on the upper shows typical connection methods for external control applications. For more detailed connection information please refers to user manual.



Fanless Multi-Range D.C. Power Supply



PFR-100L



PFR-100M



FEATURES

- * Constant Power Output for Fivefold Multi-Range(V&I) Operation
- * Natural Convection Cooling Design (Fanless Structure)
- * Preset Memory Function
- * Output ON/OFF Delay Function
- * CV, CC Priority Mode
- * Adjustable Slew Rate For Voltage and Current
- * Bleeder Circuit Control
- * Protection : OVP, OCP, AC FAIL and OTP
- * Support Front Panel and Rear Panel Output
- * Interface: USB,LAN,RS-232/485(std.); GPIB(opt.)
- * Web Server Monitoring and Control
- * External Analog Control and Monitor Function
- * Remote Sensing Function

Model	PFR-100L	PFR-100M
Output Channel	1	1
Output Voltage	0~ 50V	0~ 250V
Output Current	0~ 10A	0~ 2A
Rated Power	100W	100W

The PFR-100 series, a small and high-performance programmable D.C. power supply, adopts natural convection design to dissipate heat. The fanless structure allows users to focus on their experiments and tests in a quiet environment. Fanless power supply will not suck in dust and foreign objects, therefore, PFR-100 series has a longer life cycle compared with that of power supplies with fan.

The PFR-100 series is a power supply with a five-fold rated power that allows users to self-define voltage and current under rated power conditions so as to satisfy them with wider voltage and current operational ranges. PFR-100 series, with rated 100W, provides two models: PFR-100L- maximum output voltage of 50V (at 2A) or maximum output current of 10A (at 10V); PFR-100M- maximum output voltage of 250V (at 0.4A) or maximum output current of 2A (at 50V).

The PFR-100 series provides front and rear panel output terminals. The front panel output terminal helps users shorten test lead replacement time while conducting adjustment on front panel's function keys. The rear panel output terminal facilitates an easy wiring operation for rackmount assembly. 3U height, 70mm width and 2.5KG in weight have greatly elevated PFR-100 series portability. Furthermore, the multi-drop mode allows users to control up to 31 PFR-100 series without using switch/Hub that help users save the equipment cost.

The LAN interface for PFR-100 is Ethernet port. PFR-100 also has a built-in web server and intuitive user interface. Users, via general browsers including Internet Explorer, Mozilla Firefox or Android cellular phones, can monitor PFR-100's test and measurement anywhere. Users not only can remotely monitor PFR-100 via internet, but also remotely observe and adjust their operating PFR-100s in the lab from your home. The outputs of PFR-100 series can be monitored including OVP, OCP, UVL; and the system information can be checked such as unit's serial number, firmware edition and internet setting. Users can remotely adjust PFR-100 settings, including output voltage/current, the slew rate for voltage/current, Bleeder circuit control, OCP, delayed time for output voltage and Buzzer settings.

The PFR-100 series provides special functionalities to meet test requirements for different load's characteristics. The CC priority mode can be applied for DUTs with diode characteristics to prevent DUT from being damaged by inrush current. A slow rise time for voltage can also protect DUT from inrush current, especially for tests on capacitive load. When power is off or load is disconnected, the activation of Bleeder circuit control will allow the bleeder resistor to consume filter capacitor's electricity. Without the bleed resistor, power supply's filter capacitor may still have electricity that is a potential hazard. For automatic testing equipment systems, the bleeder resistor allows PFR-100 series to rapidly discharge to prepare itself for the next operation.

SPECIFICATIONS			
Model		PFR-100L	PFR-100M
OUTPUT RATING			
Rated Output Voltage		50V	250V
Rated Output Current		10A	2A
Rated Output Power		100W	100W
REGULATION(CV)			
Load Regulation (*2)		10mV	33mV
Line Regulation (*1)		3mV	5mV
REGULATION(CC)			
Load Regulation (*9)		10mA	3.2mA
Line Regulation (*1)		8mA	1.2mA
RIPPLE & NOISE (*3)			
Vp-p (*4)		50mV	150mV
Vr.m.s.(*5)		4mV	15mV
A r.m.s.		10mA	2mA
PROGRAMMING ACCURACY			
Voltage	0.1% of setting +	40mV	200mV
Current	0.2% of setting +	20mA	2mA
MEASUREMENT ACCURACY			
Voltage	0.1% of reading +	40mV	200mV
Current	0.2% of reading +	20mA	2mA
RESPONSE TIME			
Rise Time (*6)	Rated load	50ms	100ms
Fall Time (*7)	Rated load	100ms	200ms
	No load	500ms	1000ms
Transient Response Time (*8)		1.5ms	2ms
PROGRAMMING RESOLUTION			
Voltage		2mV	10mV
Current		1mA	0.1mA
MEASUREMENT RESOLUTION			
Voltage		2mV	10mV
Current		1mA	0.1mA
PROTECTION FUNCTION			
Over Voltage Protection (OVP)	Setting range	5~55V	5~275V
Over Current Protection (OCP)	Setting range	1~11A	0.2~2.2A
Under Voltage Limit (UVL)	Setting range	0~52.5V	0~262.5V
Over Temperature Protection (OTP)	Operation	Turn the output off.	Turn the output off.
Low AC Input Protection (AC-Fail)	Operation	Turn the output off.	Turn the output off.
Power Limit (Power Limit)	Operation	Turn the output off.	Turn the output off.



PFR-Series

SPECIFICATIONS

Model	PFR-100L	PFR-100M
FRONT PANEL DISPLAY ACCURACY, 4 DIGITS		
Voltage	0.1% of reading + 40mV	200mV
Current	0.2% of reading + 20mA	2mA
ENVIRONMENT CONDITION		
Operating Temperature	0°C to 40°C	
Storage Temperature	-20°C to 70°C	
Operating Humidity	20% to 80% RH; No condensation	
Storage Humidity	20% to 85% RH; No condensation	
READBACK TEMP. COEFFICIENT(After A 30 Minute Warm-up)		
Voltage	100ppm/°C	
Current	200ppm/°C	
OTHER		
Analog Control	Yes	
Interface	USB, LAN, RS-232/485(std.); GPIB(opt.)	
AC Input	85-265VAC, 47-63Hz, single phase	
DIMENSIONS & WEIGHT		
	70(W)x124(H)x300(D)mm; Approx. 2.5kg	

Note: *1: At 85 ~ 132Vac or 170 ~ 265Vac, constant load.
 *2: From No-load to Full-load, constant input voltage. Measured at the sensing point in Remote Sense.
 *3: Measure with JEITA RC-9131B (1:1) probe
 *4: Measurement frequency bandwidth is 10Hz to 20MHz.
 *5: Measurement frequency bandwidth is 5Hz to 1MHz.
 *6: From 10%~90% of rated output voltage, with rated resistive load.
 *7: From 90%~10% of rated output voltage, with rated resistive load.
 *8: Time for output voltage to recover within 0.1% + 10mV of its rated output for a load change from 50 to 100% of its rated output current.
 *9: For load voltage change, equal to the unit voltage rating, constant input voltage.

ORDERING INFORMATION

PFR-100L Fanless Multi-Range D.C. Power Supply
PFR-100M Fanless Multi-Range D.C. Power Supply (European terminals provided only)

ACCESSORIES :
 CD(User Manual, Programming manual) x 1, Power cord, GTL-134 test lead, Accessory Packages
 GTL-104A test lead (for PFR-100L only), GTL-105A test lead (for PFR-100M only),
 GTL-204A test lead (for PFR-100L European Type Jack Terminal)

OPTIONAL ACCESSORIES

GTL-258	GPIB Cable, 2000mm	GTL-259	RS-232 Cable with DB9 connector to RJ45
PSU-232	RS-232 Cable with DB9 Connector Kit	GTL-260	RS-485 Cable with DB9 connector to RJ45
PSU-485	RS-485 Cable with DB9 Connector Kit	GTL-261	Serial Master Cable+Terminator, 0.5M
GTL-246	USB Cable (USB 2.0 Type A-TypeB Cable)	GTL-262	RS-485 Slave cable
GRA-431-J-100/200	Rack mount Kit(JIS)with AC 100V/200V		
GRA-431-E-100/200	Rack mount Kit(EIA)with AC 100V/200V		
PFR-GPIB	Optional GPIB Interface for PFR (Factory installed)		

GTL-259



GTL-260



GTL-261



GTL-262



Rear Panel



GRA-431-J/E Rack Mount Kit(JIS/EIA)



PSU-232 RS-232 Cable with DB9 Connector Kit



PSU-485 RS-485 Cable with DB9 Connector Kit



GTL-258 GPIB Cable, 2000mm



GTL-134 Test Lead



Programmable Switching D.C. Power Supply (Multi-range D.C. Power Supply)



PSB-2400L2



**PSB-2400L/PSB-2400H/
PSB-2800L/PSB-2800H**



PSB-2800LS



Note : PSB-2400H/PSB-2800H are not CE approved

FEATURES

- * Output Voltage Rating : 80V/800V, Output Power Rating : 400W ~ 800W
- * Constant Power Output for Multi-Range (V & I) Operation
- * Series and Parallel Operation (2 Units in Series or 4 Units in Parallel Maximum)
- * 90 Degree Angle Rotatable Control Panel
- * Sequence Function Edited by PC will be Controlled Through Power Supply Optional Interfaces
- * Standard Interface : RS-232C/USB/Analog Control Interface
- * Optional Interface : GPIB
- * Preset Function (3 Points)
- * LabVIEW Driver

The PSB-2000 Series is a high power density, programmable and multi-range output DC power supply. There are six models in the series including one power booster unit. The PSB-2000 Series has the output voltage of 0~80V and 0~800V, and the output power ranges of 0~400W and 0~800W. The multi-range output functionality facilitates flexible collocations of higher voltage and larger current under the rated power range. Both series and parallel connections can be applied to the PSB-2000 Series to fulfill the requirements of higher

The PSB-2000 Series provides three sets of preset function keys to memorize regularly used settings of voltage, current and power that users can recall rapidly. The sequence function, via RS232C, USB interface or optional GPIB interface, can connect with the computer to produce output power defined by sequence of a series of set voltage and current steps that are defined by the computer. This function is often used to establish a standard test procedure for the verification of the influence on DUTs done by the swiftly changing operating

The PSB-2000 Series protects over voltage and over current. The power supply output function will be shut down to protect DUTs while the protection mechanism is triggered to function. When conducting battery charging operation, the Hi-Ω mode of the PSB-2000 Series will prevent reverse current from damaging power supply.

The PSB-2000 Series provides analog control interfaces on the rear panel to control PSB-2000 Series output via the external voltage or to externally monitor voltage and current output status of power supply. The PSB-2000 Series panel can be rotated 90 degree angle suitable for vertical or horizontal position to accommodate the ideal space utilization.

SERIES OPERATION

MODEL NUMBER	SINGLE UNIT	TWO UNITS
PSB-2400L	80V/40A	160V/40A
PSB-2800L	80V/80A	160V/80A
PSB-2800LS (Booster Unit for PSB-2800L Only)	N/A	N/A
PSB-2400L2	N/A	N/A
PSB-2400H	N/A	N/A
PSB-2800H	N/A	N/A

PARALLEL OPERATION

MODEL NUMBER	SINGLE UNIT	TWO UNITS	THREE UNITS	FOUR UNITS
PSB-2400L	80V/40A	80V/80A	80V/120A	80V/160A
PSB-2800L	80V/80A	80V/160A	80V/240A	80V/320A
PSB-2800LS	N/A	80V/160A (PSB-2800L x 1+ PSB-2800LS x 1)	80V/240A (PSB-2800L x 1+ PSB-2800LS x 2)	N/A
PSB-2400L2	N/A	N/A	N/A	N/A
PSB-2400H	800V/3A	800V/6A	N/A	N/A
PSB-2800H	800V/6A	800V/12A	N/A	N/A

SPECIFICATIONS						
	PSB-2400L	PSB-2800L	PSB-2400L2	PSB-2400H	PSB-2800H	PSB-2800LS
OUTPUT RATING						
Voltage	0 – 80V	0 – 80V	0 – 80V x 2CH	0 – 800V	0 – 800V	80V
Current	0 – 40A	0 – 80A	0 – 40A x 2CH	0 – 3A	0 – 6A	80A
Power	400W	800W	800W	400W	800W	800W
REGULATION (CV)						
Load	0.01% ± 3mV of rated voltage			0.01% ± 30mV of rated voltage		N/A
Line	0.01% ± 2mV of rated voltage			0.01% ± 20mV of rated voltage		
REGULATION (CC)						
Load	0.02% ± 3mA of rated current			0.05% ± 15mA of rated current		N/A
Line	0.01% ± 2mA of rated current			0.05% ± 10mA of rated current		
RIPPLE & NOISE (Noise Bandwidth 20MHz ; Ripple Bandwidth=1MHz)						
CV p-p	90mV	150mV	90mV	250mV(only output voltage measures more than 1% of the rated voltage)	300mV(only output voltage measures more than 1% of the rated voltage)	N/A
CV rms	4mV	6mV	4mV	20mV(when current measures<2A) 35mV(when current measures>2A)	25mV(when current measures<2A) 40mV(when current measures>2A)	
CC rms	30mA	60mA	30mA	15mA	20mA	
PROGRAMMING ACCURACY						
Voltage	0.1% setting±2digits			0.1% setting±2digits		N/A
Current	0.2% setting±2digits			0.2% setting±2digits		
Power	± 10W			±10W (only output voltage measures more than 1% of rated voltage)		
READ BACK ACCURACY						
Voltage	0.2% reading±2digits			0.2% reading±2digits		N/A
Current	0.3% reading±2digits			0.3% reading±2digits		
Power	0.5% reading±5digits			0.5% reading±Vout x 40mA		
RESPONSE TIME						
Raise Time(Full load/No load)	50ms			200ms		N/A
Fall Time(Full load)	100ms			500ms		
Fall Time(No load)	500ms			1000ms		
Load Transient Recover Time (Load change from 50-100%)	1ms			7ms		
PROGRAMMING RESOLUTION						
Voltage	10mV			100mV		N/A
Current	10mA			10mA		
Power	10W			10W		
MEASUREMENT RESOLUTION						
Voltage	10mV			100mV		N/A
Current	10mA			10mA		
Power	10W			10W		
SERIES AND PARALLEL CAPABILITY						
Channel Number	1	1	2	1	1	
Series Operation	Up to 2 Units	Up to 2 Units	N/A	N/A	N/A	
Parallel Operation	Up to 4 Units	Up to 4 Units	N/A	Up to 2 Units	Up to 2 Units	For PSB-2800L Only
Parallel with booster PSB-2800LS	N/A	Up to 3 Units	N/A	N/A	N/A	
PROTECTION FUNCTION						
OVP (Fixed)	Output off when 110% of rated voltage			Output off when output voltage exceeds 110% of rated voltage		N/A
OVP (Variable)	Output off when operating; Setting range:1V-84V with front panel			Presetable in range from 10V – 840V om front panel		
OCP (Fixed)	Output off when 110% of rated current			Output off when output voltage exceed 110% of rated current		
OCP (Variable)	Output off when operating;Setting range:1A-42A(84A for model number)			Presetable in range from 0.1A – 6.30A om front panel		
OHP	Output off above heat sink setting temperature			Output off at the internal heat sink temperature over setting value		
ENVIRONMENT CONDITION						
Operation Temp	0°C – 40°C					N/A
Storage Temp	-20°C – 70°C					
Operating Humidity	30% – 80% RH (no dew condensation)					
Storage Humidity	30% – 80% RH (no dew condensation)					
OTHER						
Inrush Current	35A Max	70A Max	70A Mmax	35A Max	70A Max	70A Max
Power Consumption/Factor	560VA/0.99	1120VA/0.99	1120VA/0.99	560VA/0.99	1120VA/0.99	1120VA/0.99
Cooling Method	Forced air-cooling with fan motor					
Power Source	100VAC – 240VAC, 50/60Hz, Single phase					
Interface (Standard)	RS-232C/USB					
Interface (Optional)	GPIB					
Analog Control	Yes					
DIMENSIONS & WEIGHT						
	210(W) x 124(H) x 290(D)mm					
	Approx.5kg	Approx.7kg	Approx.7kg	Approx. 5kg	Approx. 6kg	Approx. 7kg

Programmable Switching D.C. Power Supply (Multi-range D.C. Power Supply)



PSB-2400L2



**PSB-2400L/PSB-2400H/
PSB-2800L/PSB-2800H**



PSB-2800LS

Rear Panel



PSB-2000 Series

POWER SUPPLIES

PSB-003 Parallel Connection Kit for Horizontal Installation



PSB-004 Parallel Connection Kit for Vertical Installation



ORDERING INFORMATION

PSB-2400L	0-80V/0-40A/400W Multi-Range DC Power Supply
PSB-2800L	0-80V/0-80A/800W Multi-Range DC Power Supply
PSB-2400L2	0-80V x 2/0-40A x 2/800W Multi-Range DC Power Supply
PSB-2400H	0-800V/0-3A/400W Multi-Range DC Power Supply
PSB-2800H	0-800V/0-6A/800W Multi-Range DC Power Supply
PSB-2800LS	800W Slave (Booster) Unit For Current Extension Only

ACCESSORIES :

User Manual (CD) x 1, AC Power Cord x 1, External Control Connector (26pin), Screws for output terminals on rear panel, Protection covers for output terminals on rear panel, Protection caps for output terminals on the front panel, GND Cable, USB Cable (For Model Number : PSB-2400L; PSB-2800L; PSB-2400L2; PSB-2400H; PSB-2800H) Local Bus (For Model Number : PSB-2400L; PSB-2800L; PSB-2400L2; PSB-2400H; PSB-2800H)

OPTIONAL ACCESSORIES

PSB-001	GPIB Card	GTL-246	USB Cable
PSB-003	Parallel Connection Kit for Horizontal Installation. Kit Includes : (PSB-007 Joint Kit, Horizontal bus bar x 2 , PSB-005 x1)	GTL-248	GPIB Cable
PSB-004	Parallel Connection Kit for Vertical Installation. Kit Includes : (PSB-007 Joint Kit, Vertical bus bar x 2, PSB-005 x 1)	GRJ-1101	Modular Cable
PSB-005	Parallel Connection Signal Cable	GRA-424	Rack Mount Kit
PSB-006	Series Connection Signal Cable		
PSB-007	Joint Kit : Includes 4 Joining Plates, (M3x6)screws x 4 ; (M3x8)screw x 2		
PSB-008	RS232C Cable (PSB-2000 Only)		

FREE DOWNLOAD

Driver Labview Driver

PSB-001 GPIB Control Board



GRJ-1101 Modular Cable



PSB-008 RS-232C Cable (PSB-2000 Only)



PSB-005 Parallel Connection Signal Cable



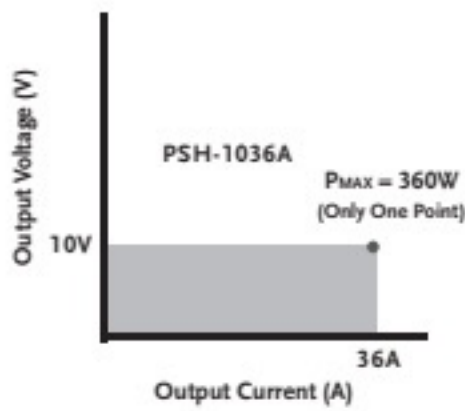
PSB-006 Series Connection Signal Cable



PSB-007 Joint Kit

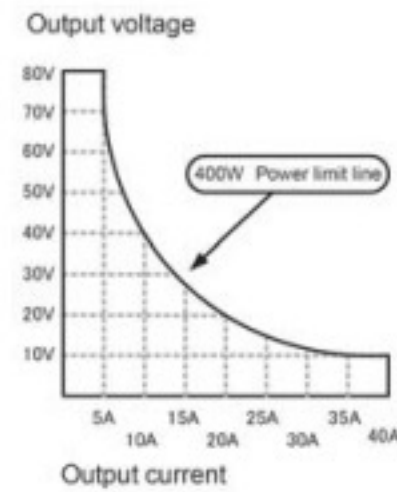


A. MULTI-RANGE OUTPUT OPERATION



The operation area of a Conventional Power Supply

Compared with the maximum power output of the conventional power supply that is calculated by the maximum output voltage multiplies by the maximum output current, the PSB-2000 series, defying the formula, has a unique characteristic of multi-range output (voltage and current). This distinguishing feature, under the same maximum power output range, can output a higher voltage with a smaller current and vice versa. For instance, for a conventional power supply with a maximum power output of 360W, the maximum voltage and current outputs are likely to be



The operation area of a Multi-Range Power Supply for PSB-2000 Series

10V and 36A respectively. Comparatively, PSB-2400L, with the maximum power output of 400W, provides voltage and current output ranges of 0~80V and 0~40A. The maximum current of 5A will be provided when the voltage reaches 80V and the maximum voltage of 10V for the maximum current of 40A. PSB-2400L, breaking the limitation of $P_{max}=V_{max} \times I_{max}$, broadens voltage and current application ranges. The following diagrams illustrate the voltage and current comparison between the multi-range output power supply and the conventional power supply.

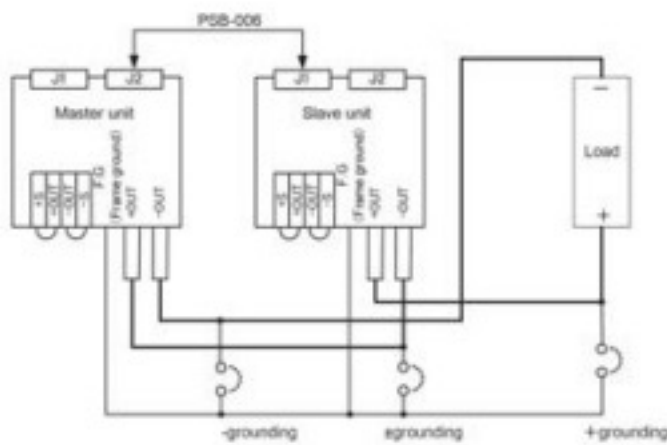
B. PRODUCTS IN THE SERIES

There are six models in the PSB-2000 Series. Model type, output voltage, output current and output power are as follows :

MODEL	PSB-2400L	PSB-2800L	PSB-2400L2	PSB-2400H	PSB-2800H	PSB-2800LS*
Channel Number	1	1	2	1	1	NA
Voltage Rating**	0 ~ 80V	0 ~ 80V	0 ~ 80V x 2CH	0 ~ 800V	0 ~ 800V	80V
Current Rating***	0 ~ 40A	0 ~ 80A	0 ~ 40A x 2CH	0 ~ 3A	0 ~ 6A	80A
Output Power (Max.)	400W	800W	800W	400W	800W	800W

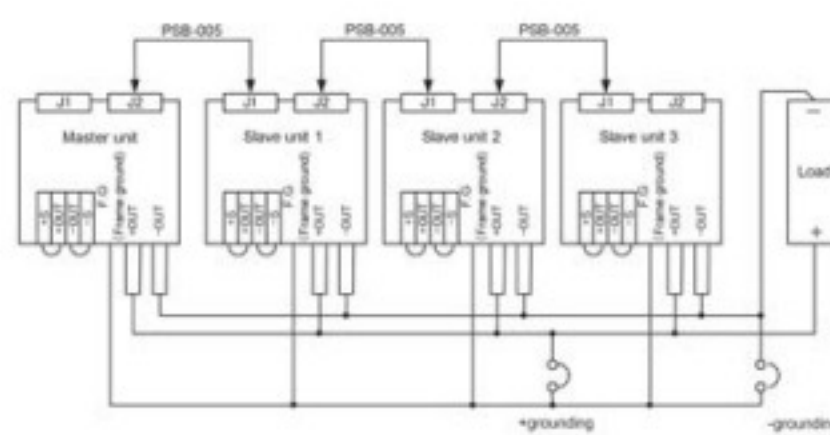
- * PSB-2800LS, a booster unit acting as slave to extend current, can not operate alone. It must operate with PSB-2800L master.
- ** The maximum current under the highest output voltage is power/voltage. For instance, when PSB-2400L outputs 80V the maximum current is $400W/80V = 5A$.
- *** Same as above. When PSB2400L outputs 40A the highest voltage is $400W/40A = 10V$.

C. SERIES AND PARALLEL CONNECTIONS



Series Connection

Hence, the PSB-2000 Series, with its multi-range output function and the power extension capability of series and parallel connections, is the high power density and high performance to cost ratio DC power supply, which provides



Parallel Connection

a wider range of power applications for any limited equipment space. The PSB-2000 Series is an ideal selection for testing DC power supply module, automobile lithium and lithium iron battery and electronic parts.

Programmable Multi-Range D.C. Power Supply



PSB-1000 Series



FEATURES

- * LCD Display and User-Friendly Menu-Typed Functional Interface
- * Voltage Rating : 40V/160V, Output Power Rating : 400W/800W
- * Constant Power Output for Multi-Range(V & I) Operation
- * The I/V Control Functions(Adjustable Slew Rate) are Suitable for Diode Characteristic Load & Surge Reducing
- * Sequence Function for Sequential D.C. Waveform Output
- * C.V/C.C Priority
- * Auto Run for Output or Sequence Function
- * Master-Slave Operation : 2 Units in Series/ 4 Units in Parallel
- * Synchronized Operation(Voltage Trigger, Trigger In/Trigger Out Signal)
- * Standard Interface : USB Host, LAN; Option : GPIB
- * Internal Sense Control(Disable/Front Panel/ Rear Panel)Function
- * LabVIEW Driver

PSB-106 Basic accessory kit :

M4 Terminal screws and washers x 2,
M8 Terminal bolts, Nuts and washers x 2,
Analog control protection dummy x 1,
Analog control lock level x 2, Short bar x 1



PSB-1000 is a series of Multi-Range DC Power Supply, whose maximum voltage output of 320V can be realized by placing 2 sets of 160V units in series connection. By connecting 4 sets of PSB-1800L units in parallel, the maximum current output of 320A can be achieved.

The PSB-1000 series is a bench-top power supply featuring user friendly interface, which can clearly display setting conditions and measurement results via LCD display and menu-typed functionality selection without referring to the user manual. All settings can be done by functionality keys, numerical keys, and speed dial keys. The 30A output capability from the front output terminal of the PSB-1000 series can better meet the requirements of laboratories and scientific R&D departments.

The PSB-1000 series features user friendly menu-typed functionality interface and its built-in functionalities can better meet industry's application requirements. Both front panel and rear panel output terminals of the PSB-1000 series facilitate researchers to access power output conveniently. The display panel adopts menu-typed functionality selection to help users quickly familiarize with settings and operation that is extremely suitable for on-site engineers and R&D engineers who deal with complicated functional setting requirements. Power On Configuration allows users to select previously set SEQ to carry out automatic execution as soon as power is turned on. For production lines demanding sequential power supply output application requirements, tremendous time can be saved by this function, which exempts users from resetting sequential power supply when power is turned on every single time.

Voltage Trigger allows users to set pulse signals for leading edge threshold and trailing edge threshold. VOLT TRIG can be applied to Automatic test system by providing output time for working voltage via BNC adapter. The Output Delay function facilitates users to respectively set action time for power output on and power output off for multiple sets of PSB-1000 so as to realize sequential power output applications.

The PSB-1000 series is equipped with multi range power output capability providing fourfold rated power output to meet customers' flexible application requirements.

SPECIFICATIONS

Model Name	PSB-1400L	PSB-1400M	PSB-1800L	PSB-1800M
OUTPUT RATING				
Output Voltage(V)	0~40	0~160	0~40	0~160
Output Current(A)	0~40	0~10	0~80	0~20
Output Power(W)	400W	400W	800W	800W
REGULATION (CV)				
Load Regulation (mV)	25	85	25	85
Line Regulation (mV)	23	83	23	83
REGULATION (CC)				
Load Regulation (mA)	45	15	85	25
Line Regulation (mA)	45	15	85	25
RIPPLE & NOISE (Noise Bandwidth 20MHz ; Ripple Bandwidth = 1MHz)				
CV p-p	60	60	80	80
CV rms	7	12	11	15
CC rms	80	20	160	40
PROGRAMMING ACCURACY				
Voltage (mV) 0.1% +	10	50	10	50
Current (mA) 0.1% +	20	10	40	20
MEASUREMENT ACCURACY				
Voltage (mV) 0.1% +	10	50	10	50
Current (mA) 0.1% +	20	10	40	20
RESPONSE TIME				
Raise Time (ms)	50	100	50	100
Fall Time(Full load) (ms)	50	150	50	150
Fall Time(No load) (ms)	500	1200	500	1200
Load Transient Recover Time(ms) (Load change from 50 to 100%)	1	1	1	1
PROGRAMMING RESOLUTION (By PC Remote Control Mode)				
Voltage (mV)	1	3	1	3
Current (mA)	1	1	2	1
MEASUREMENT RESOLUTION (By PC Remote Control Mode)				
Voltage (mV)	1	3	1	3
Current (mA)	1	1	2	1
SERIES AND PARALLEL CAPABILITY				
Parallel Operation	Up to 4 units including the master unit			
Series Operation	Up to 2 units including the master unit			
PROTECTION FUNCTION				
OVP (V)	4-44	5-176	4-44	5-176
OCP (A)	4-44	1-11	5-88	2-22
OHP	Turn the output off.	Turn the output off.	Turn the output off.	Turn the output off.



PSB-1000 Series

SPECIFICATIONS

Model Name	PSB-1400L	PSB-1400M	PSB-1800L	PSB-1800M
FRONT PANEL DISPLAY ACCURACY (4 Digits)				
Voltage (mV)	0.1% +	20	100	20
Current (mA)	0.1% +	20	10	40
ENVIRONMENT CONDITION				
Operation Temp	0°C ~ 40°C			
Storage Temp	-25°C ~ 70°C			
Operating Humidity	20% ~ 85% RH; No condensation			
Storage Humidity	90% RH or less; No condensation			
OTHER				
Analog Control	Yes			
Interface	USB/LAN/GPIB (Option)			
Power Source	100Vac ~ 240Vac, 50Hz ~ 60Hz, single phase			
Dimension	214(W)×124(H)×350(D) mm			
Weight				
	Approx. 5.2kg	Approx. 5.2kg	Approx. 6.8kg	Approx. 6.8kg

ORDERING INFORMATION

PSB-1400L	40V/40A/400W Programmable Multi-Range D.C. Power Supply
PSB-1400M	160V/10A/400W Programmable Multi-Range D.C. Power Supply
PSB-1800L	40V/80A/800W Programmable Multi-Range D.C. Power Supply
PSB-1800M	160V/20A/800W Programmable Multi-Range D.C. Power Supply

ACCESSORIES :

CD ROM (User Manual, Programming Manual) x 1, Power cord for UL/CSA or PSE (Region dependent), Output terminal cover, Type A-B USB cable, PSB-106 Basic accessory kit : M4 terminal screws and washers x 2, M8 Terminal bolts, Nuts and washers x 2, Analog control protection dummy x 1, Analog control lock level x 2, Short bar x 1

OPTIONAL ACCESSORIES

PSW-001	Analog remote control connector kit
PSW-002	Simple IDC tool
PSW-003	Contact removal tool
PSB-101	Cable for 2 units of PSB-1000 in parallel connection
PSB-102	Cable for 3 units of PSB-1000 in parallel connection
PSB-103	Cable for 4 units of PSB-1000 in parallel connection
PSB-104	Cable for 2 units of PSB-1000 in series connection
PSB-105	GPIB card
PSB-106	Basic accessory kit : M4 Terminal screws and washers x 2, M8 Terminal bolts, Nuts and washers x 2, Analog control protection dummy x 1, Analog control lock level x 2, Short bar x 1
GRA-418-J	Rack Mount Kit(JIS)
GRA-418-E	Rack Mount Kit(EIA)
GTL-123	Test leads: 1x red, 1x black

FREE DOWNLOAD

Driver	Labview Driver
---------------	----------------

Rear Panel



PSB-101 Cable for 2 units of PSB-1000 in parallel connection



PSB-102 Cable for 3 units of PSB-1000 in parallel connection



PSB-103 Cable for 4 units of PSB-1000 in parallel connection



PSB-104 Cable for 2 units of PSB-1000 in series connection



PSB-105 GPIB card



Programmable Switching D.C. Power Supply



PSH-Series



FEATURES

- * Wide Input Voltage Range and High Power Factor (P.F)
- * High Efficiency and High Power Density
- * Constant Voltage and Constant Current Operation
- * Over Voltage , Over Current and Over Temperature Protection
- * Self-Test and Software Calibration
- * Output ON/OFF Control
- * Low Ripple and Noise
- * LCD Display
- * Built-in Buzzer Alarm
- * Standard Interface : RS-232C
- * Optional Interface : GPIB (IEEE-488.2)
- * LabVIEW Driver

The PSH-Series is a single output from 360W to 1080W, programmable switching DC power supply. OVP, OCP and OTP protect the power supply and loads from unexpected conditions. Remote sensing adds an extra level of precision by compensating cable losses between loads. The bright LCD with simultaneous parameter outputs allows effortless operation. Self-test and software calibration features also reduce maintenance overhead. SCPI commands and LabVIEW driver access through the RS-232C or the optional GPIB interface allow remote control and ATE software development capability. Modular architecture, dedicated rear-panel output, and the 19 inch 4U rack mounting option ensure that the PSH-Series is optimized for large systems.

SPECIFICATIONS				
	PSH-2018A	PSH-3610A	PSH-3620A	PSH-3630A
OUTPUT				
Voltage	20V	36V	36V	36V
Current	18A	10A	20A	30A
REGULATION (C.V.)				
Load	≤ 0.1%+5mV	≤ 0.1%+5mV	≤ 0.1%+5mV	≤ 0.1%+5mV
Line	≤ 0.05%+5mV	≤ 0.05%+5mV	≤ 0.05%+5mV	≤ 0.05%+5mV
REGULATION (C.C.)				
Load	≤ 0.2%+5mA	≤ 0.2%+5mA	≤ 0.2%+10mA	≤ 0.2%+15mA
Line	≤ 0.2%+5mA	≤ 0.2%+5mA	≤ 0.2%+10mA	≤ 0.2%+15mA
RIPPLE & NOISE				
Voltage (mVrms)	≤ 10mVrms	≤ 10mVrms	≤ 10mVrms	≤ 10mVrms
Voltage (mVp-p)	≤ 100mVp-p	≤ 100mVp-p	≤ 100mVp-p	≤ 100mVp-p
	20Hz~20MHz	20Hz~20MHz	20Hz~20MHz	20Hz~20MHz
Current (mArms)	≤ 0.2%	≤ 0.2%	≤ 0.2%+20mA	≤ 0.2%+40mA
RESOLUTION				
Voltage	10mV	10mV	10mV	10mV
Current	10mA	10mA	10mA	10mA
PROGRAM ACCURACY				
Voltage	≤ 0.05%+25mV	≤ 0.05%+25mV	≤ 0.05%+25mV	≤ 0.05%+25mV
Current	≤ 0.2%+30mA	≤ 0.2%+30mA	≤ 0.2%+30mA	≤ 0.2%+30mA
READBACK RESOLUTION (Meter)				
Voltage	Same as Resolution	Same as Resolution	Same as Resolution	As Resolution
Current	Same as Resolution	Same as Resolution	Same as Resolution	As Resolution
READBACK ACCURACY (Meter)				
Voltage	Same as Program Accuracy	Same as Program Accuracy	Same as Program Accuracy	As Program Accuracy
Current	Same as Program Accuracy	Same as Program Accuracy	Same as Program Accuracy	As Program Accuracy
READBACK TEMP. COEFFICIENT				
Voltage (25 ±5°C)	≤ 100ppm/°C	≤ 100ppm/°C	≤ 100ppm/°C	≤ 100ppm/°C
RESPONSE (Rise/Fall) TIME				
Voltage Up (10%~90%)	≤ 150mS (≤95% rating load)	≤ 150mS (≤95% rating load)	≤ 150mS (≤95% rating load)	≤ 150mS (≤95% rating load)
Voltage Down (90%~10%)	≤ 150mS (≥10% rating load)	≤ 150mS (≥10% rating load)	≤ 150mS (≥10% rating load)	≤ 150mS (≥10% rating load)
RECOVERY TIME (50% Step Load Change From 25%~75%)				
CV Mode	≤ 2mS	≤ 2mS	≤ 2mS	≤ 2mS
PROTECTION				
OVP/OCP/OTP	✓	✓	✓	✓
Rush Current	✓	✓	✓	✓
OUTPUT ON/OFF CONTROL				
	✓	✓	✓	✓
INTERFACE				
Standard : RS-232C; Optional : GPIB				
POWER SOURCE				
AC90V~250V, 50/60Hz				
DIMENSIONS & WEIGHT				
	108(W)x142(H)x393(D) mm; Approx. 3.3kg	108(W)x142(H)x393(D) mm; Approx. 3.3kg	188(W)x142(H)x393(D) mm; Approx. 6.2kg	268(W)x142(H)x393(D) mm; Approx. 9.3kg

Rear Panel



ORDERING INFORMATION

- PSH-2018A 360W Programmable Switching D.C. Power Supply
- PSH-3610A 360W Programmable Switching D.C. Power Supply
- PSH-3620A 720W Programmable Switching D.C. Power Supply
- PSH-3630A 1080W Programmable Switching D.C. Power Supply

ACCESSORIES :
User manual x 1 , Power cord x 1

OPTION
Opt. 01: GPIB Interface (Factory Installed)

- OPTIONAL ACCESSORIES
- GRA-403 Rack Mount Kit
 - GTL-232 RS-232C Cable, 9-pin Female to 9-pin, null Modem for Computer
 - GTL-122 Test Lead, U-type to Alligator Test Lead, Max. Current 40A, 1200mm
 - GTL-248 GPIB Cable, Double Shielded, 2000mm

FREE DOWNLOAD
PC Software Driver PC Software including Data Log ; Remote Control Software
Labview Driver

Note : When Opt.01 GPIB interface is ordered, the standard interface RS-232C will be deleted.

Programmable Switching D.C. Power Supply



The PSP-Series is a single output, 200W, programmable switching DC power supply. OVL, OCL, OTP, and OPL protect the PSP-Series and its loads from unexpected conditions. The PSP-Series has a large LCD panel with output and parameter views and a key lock feature to prevent changing the settings. The PSP-Series is suitable for generic bench-top applications in laboratories and educational institutions.

PSP-603/405/2010



FEATURES

- * LCD Display
- * Output ON/OFF Control
- * 3 Step Fan Speed Control
- * Voltage/Current/Power Setting
- * Key Lock to Avoid Error Operation
- * Normal, +% & -% Output Operation Key
- * Standard Interface : RS-232C
- * Optional European Type Jack Terminal

European Type Jack Terminal



Rear Panel



SPECIFICATIONS			
OUTPUT			
Model	PSP-603	PSP-405	PSP-2010
Voltage	0 – 60V	0 – 40V	0 – 20V
Current	0 – 3.5A	0 – 5A	0 – 10A
VOLTAGE REGULATION			
Load	≤ 10mV	≤ 10mV	≤ 10mV
Line	≤ 0.05%	≤ 0.05%	≤ 0.05%
CURRENT REGULATION			
Load	≤ 5mA	≤ 5mA	≤ 5mA
Line	≤ 0.05%	≤ 0.05%	≤ 0.05%
RIPPLE			
Voltage (mVrms)	≤ 20mV	≤ 20mV	≤ 20mV
Current (mA rms)	≤ 10mA	≤ 10mA	≤ 10mA
RESOLUTION			
Voltage	20mV	10mV	10mV
Current	10mA	10mA	10mA
PROGRAM ACCURACY			
Voltage	± 0.05%rdg ± 4digits	± 0.05%rdg ± 3digits	± 0.05%rdg ± 3digits
Current	± 0.1%rdg + 5digits	± 0.1%rdg + 5digits	± 0.3%rdg + 10digits
READBACK (METER) RESOLUTION			
Voltage	Same as Resolution	Same as Resolution	Same as Resolution
Current	Same as Resolution	Same as Resolution	Same as Resolution
READBACK (METER) ACCURACY			
Voltage	Same as Program Accuracy	Same as Program Accuracy	Same as Program Accuracy
Current	Same as Program Accuracy	Same as Program Accuracy	Same as Program Accuracy
PROTECTION			
OVL/OCL/OPL/OTP	✓	✓	✓
OUTPUT ON/OFF CONTROL			
	✓	✓	✓
DISPLAY			
LCD			
INTERFACE (STANDARD)			
RS-232C			
POWER SOURCE			
AC 115V/230V ± 15% , 50/60Hz			
DIMENSIONS & WEIGHT			
225(W) x 100(H) x 305(D) mm ; Approx. 4kg			

ORDERING INFORMATION

PSP-603 200W Programmable Switching DC Power Supply
 PSP-405 200W Programmable Switching DC Power Supply
 PSP-2010 200W Programmable Switching DC Power Supply

ACCESSORIES :

User manual x 1, Power cord x 1, Test lead GTL-104A x 1 , European test lead GTL-204A x 1

OPTIONAL ACCESSORIES

GTL-232A RS-232C Cable
 GRA-428 Rack Mount Kit, 19", 3U Size

FREE DOWNLOAD

PC Software RS-232C Remote Control Software

Switching D.C. Power Supply



The SPS-Series is a single output, 360W, switching DC power supply. OVP protects the SPS-Series and their loads from unexpected conditions. High regulation is maintained at 0.01%. Remote sensing adds an extra level of precision by compensating cable losses between loads. Turning the output On/Off from external device is available through Remote control terminals. The GPS-Series is an ideal solution for power-efficient bench-top or portable applications requiring high regulation.

SPS-1230/1820/2415/3610/606



FEATURES

- * Dual Measurement Display
- * 0.01 % High Regulation
- * Constant Voltage and Constant Current Operation
- * High Efficiency
- * High Power Density
- * Over Voltage Protection
- * Remote Output ON/OFF Control

SPECIFICATIONS					
OUTPUT					
	SPS-1230	SPS-1820	SPS-2415	SPS-3610	SPS-606
Voltage	0 ~ 12V	0 ~ 18V	0 ~ 24V	0 ~ 36V	0 ~ 60V
Current	0 ~ 30A	0 ~ 20A	0 ~ 15A	0 ~ 10A	0 ~ 6A
CONSTANT VOLTAGE OPERATION					
Regulation	Line regulation $\leq 5\text{mV}$ Load regulation $\leq 5\text{mV}$				
Ripple & Noise	$\leq 5\text{mVrms}$, 100mVp-p 20Hz ~ 20MHz				
Recovery Time	$\leq 500\mu\text{S}$ (50% Load change, Minimum load 0.5A)				
Temp. Coefficient	$\leq 100\text{ppm}/^\circ\text{C}$				
Output Range	0 to rating voltage continuously adjustable				
CONSTANT CURRENT OPERATION					
Regulation	Line regulation $\leq 3\text{mA}$ Load regulation $\leq 3\text{mA}$				
Ripple Current	$\leq 3\text{mA}$ (SPS-606) $\leq 5\text{mA}$ (SPS-3610) $\leq 10\text{mA}$ (SPS-2415) $\leq 10\text{mA}$ (SPS-1820) $\leq 30\text{mA}$ (SPS-1230)				
Output Range	0 to rating current continuously adjustable (HI/LO range switchable)				
METER					
Type	3 1/2 digit, 0.39" LED display				
Accuracy	$\pm (0.5\% \text{ of rdg} + 2\text{digits})$				
INSULATION					
Chassis and Terminal	20M Ω or above (DC 500V)				
Chassis and AC Cord	30M Ω or above (DC 500V)				
POWER SOURCE					
AC 115V/ 230V $\pm 15\%$, 50/60Hz					
DIMENSIONS & WEIGHT					
128(W) x 151(H) x 295(D) mm, Approx. 3.2kg					

Rear Panel



ORDERING INFORMATION

- SPS-1230** 360W Switching D.C. Power Supply
- SPS-1820** 360W Switching D.C. Power Supply
- SPS-2415** 360W Switching D.C. Power Supply
- SPS-3610** 360W Switching D.C. Power Supply
- SPS-606** 360W Switching D.C. Power Supply

ACCESSORIES :

User manual x 1 , Power cord x 1 , Test lead GTL-203A x 1

Multiple Output Dual Range D.C. Power Supply



SPD-3606



FEATURES

- * Three Independent, Isolated Output
- * CH1/CH2 : Dual Output Range of 30V/6A or 60V/3A
- * CH3 Adjustable Output : 0.1~5V/3A
- * High Efficiency Power Conversion (Up to 25% Than Traditional Power Supply)
- * Remote Output On/Off Control
- * OVP to Protect the DUT
- * OTP to Protect SPD-3606 for Reducing the Repair Rate
- * Automatically Switches AC 115V/230V Source
- * Full Safety Design: Reverse Polarity, CH3 Overload Protection, Safe Output Setting , C.C./C.V. Mode
- * Compact Size, Light Weight
- * Low Fan Acoustic Noise with Fan Speed Control Circuit
- * Voltage/Current Protection Knob(Optional)
- * Optional European Jack Type Terminal

European Type Jack Terminal



Rear Panel



GPS-001

Voltage/Current protection Knob



The SPD-3606 DC power supply provides 375W output capacity, three isolated outputs with dual-range for CH1 & CH2, highly efficient power conversion, low noise, high reliability, thorough protection, excellent value and a compact size. SPD-3606 creates a new bench mark for satisfying mainstream power supply demands. CH1 & CH2 offer dual-range output either at 30V/6A or 60V/3A per channel to accommodate a wide range of applications. SPD-3606 supports series and parallel tracking, allowing the CH1 and CH2 to be internally connected in series or parallel providing flexible output (30V/12A, 60V/6A, or 120V/3A). High power density and high power conversion efficiency lets SPD-3606 consume less energy making for a greener power supply. In addition, the high power density makes SPD-3606 weigh less than half and occupy much less space compared to linear power supplies. To avoid damage caused by improper operation, it also has OVP and OTP. The dual range AC input accepts both 115V and 230V inputs. When the instrument is on, devices can be connected and voltage/current levels can be adjusted safely from the front panel by turning off the output using the Output on/off key. The optional voltage/current protection knobs can be used to prevent accidentally changing the output levels. These knobs are useful for automated testing at fixed output levels, such as in assembly lines or product inspections.

SPECIFICATIONS	
OUTPUT RATINGS	
CH1/CH2 Independent	0 ~ 30V / 0 ~ 6A ; 0 ~ 60V / 0 ~ 3A
CH1/CH2 Series	0 ~ 60V / 0 ~ 6A ; 0 ~ 120V / 0 ~ 3A
CH1/CH2 Parallel	0 ~ 30V / 0 ~ 12A ; 0 ~ 60V / 0 ~ 6A
CH3	0.1 ~ 5V / 3A
VOLTAGE REGULATION	
Line	≤ 0.01% + 3mV
Load	≤ 0.01% + 5mV (rating current ≤ 6A) ≤ 0.01% + 8mV (rating current ≤ 12A)
Ripple & Noise	≤ 5mVrms (5Hz ~ 1MHz) ; ≤ 50mVpp (20Hz ~ 20MHz)
Recovery Time	≤ 100 μs (50% load change, minimum load 0.5A)
CURRENT REGULATION	
Line	≤ 0.2% + 3mA
Load	≤ 0.2% + 3mA
Ripple & Noise	≤ 3mA rms
TRACKING OPERATION	
Tracking Error	≤ 0.5% + 10mV of master
Series Regulation	≤ 300mV
Ripple & Noise	≤ 10mVrms (5Hz ~ 1MHz) ; ≤ 100mVpp (20Hz ~ 20MHz)
OUTPUT ON/OFF RESPONSE TIME	
Voltage Up (10% ~ 90%)	≤ 100ms (≤ 95% rating load)
Voltage Down (90% ~ 10%)	≤ 100ms (≥ 10% rating load)
OVP	
Accuracy	± (0.5% of reading + 0.5V)
METER	
Type	3 1/2 digit 0.5" LED display
Accuracy	± (0.5% of reading + 2 digits)
Resolution	100mV/10mA
INSULATION	
Chassis & Terminal	100MΩ or above (DC 1000V)
Chassis & AC code	100MΩ or above (DC 1000V)
TEMPERATURE COEFFICIENT	
Voltage	≤ 100ppm/°C + 3mV
Current	≤ 150ppm/°C + 3mA
REMOTE CONTROL	
Output On/Off	
FAN NOISE	
	≤ 50dB
OPERATION ENVIRONMENT	
Ambient temperature	0 ~ 40 °C ; Relative humidity ≤ 80%
STORAGE ENVIRONMENT	
Ambient temperature	-10 ~ 70 °C ; Relative humidity ≤ 70%
POWER SOURCE	
	AC 115V/230V ± 15%, 50/60Hz
DIMENSIONS & WEIGHT	
	255 (W) x 145 (H) x 265 (D) mm ; Approx. 6kg

ORDERING INFORMATION

SPD-3606 Multiple Output Dual Range D.C. Power Supply

ACCESSORIES :

User manual x 1, Power cord x 1, Test lead GTL-104A x 2, GTL-105A x 1
European Test Lead GTL-201A x 1, GTL-203A x 1, GTL-204A x 2

OPTIONAL ACCESSORIES

GPS-001 Voltage/Current protection Knob

Source Measure Unit



GSM-20H10

NEW



FEATURES

- Maximum Output $\pm 210V \pm 1.05A/22W$
- Built-in 4 Sequence Output Modes (Stair, Log, SRC-MEM, Custom), up to 2500 Points
- OVP /OTP Protection Function
- 0.012% Basic Measure Accuracy with 6½-digit Resolution
- Variable Sampling Speed
- SDM (Source Delay Measure) Cycle
- 2-, 4-, and 6-wire Remote V-source and Measure Sensing
- Variable Display Digits
- Built-in Limit Function
- Built-in 5 Calculation Functions
- 4.3" TFT LCD, Digital Number Keyboard
- Built-in RTC Clock
- Interface: RS-232, USBTMC, LAN, GPIB (Opt.)

GW Instek GSM-20H10 is a Source Measure Unit that provides highly stable DC power and instrument-grade 6½-digit multimeter measurements. While operating, it can be used as a voltage source, current source, voltmeter, ammeter, and ohmmeter, which is uniquely ideal for the evaluation of component characteristics and the test applications of production, including nanomaterials and components, semiconductor architecture, organic materials, high-efficiency illumination, passive components and material characteristics analysis, etc.

GSM-20H10 provides four-quadrant operation of $\pm 210V \pm 1.05A/22W$. The first and third quadrants operate as power supplies to supply power to the load. The second and fourth quadrants function as loads to consume power internally. Voltage value, current value and resistance value can be measured while operating the power supply or load function with an accuracy of 0.012% and a resolution of $1\mu V/10pA/10\mu\Omega$.

With respect to sampling rate, GSM-20H10 supports a sampling rate of up to 50k points/second, which can accurately analyze the characteristics of the DUT. With the large 4.3-inch screen, all measurement settings, parameters and results can be completely displayed on the screen. The SDM (Source Delay Measure) function is provided to delay sampling when the signal changes so as to prevent the unstable signal from being captured and cause misjudgment. There are four built-in sequence output modes (Stair, Log, SRC-MEM, Custom), which can support up to 2500 points of sequence variation output.

Pertaining to protection, GSM-20H10 provides OVP/OTP modes. The design of OVP allows users to self-define the range of OVP. OTP can effectively prevent errors caused by temperature drift during the test process. For interfaces, this product supports standard SCPI commands and provides RS-232, USBTMC, LAN, GPIB (optional) interfaces to meet users' different interface needs.



GSM-20H10

Rear Panel



SM-01/SM-02 Digital I/O Adapter



ORDERING INFORMATION

GSM-20H10 with GPIB	Source Measure Unit
GSM-20H10	Source Measure Unit

ACCESSORIES :

CD User manual x 1, Quick Start manual x 1, Test Lead GTL-207A x 1, Alligator Clip x 2

OPTIONAL ACCESSORIES

SM-01	Digital I/O Adapter, Convert DB15 to DB9 + 8-pin micro-DIN	GRA-450-J	Rack Mount kit
SM-02	Digital I/O Adapter, Convert DB15 to DB37 + 8-pin micro-DIN	GRA-450-E	Rack Mount kit
GTL-246	USB Cable (USB 2.0 A-B Type, approx. 1200mm)		
GTL-248	GPIB Cable, 2000mm		

- NOTE :**
- Speed = Normal (1 NPLC). For 0.1 PLC, add 0.005% of range to offset specifications, except 200mV, 1A ranges, add 0.05%. For 0.01 PLC, add 0.05% of range to offset specifications, except 200mV, 1A ranges, add 0.5%.
 - Required to reach 0.1% of final value after Command is processed. Resistive load, 10pA to 100mA range.
 - Overshoot into a fully resistive 100kΩ load, 10Hz to 1MHz BW, adjacent ranges: 100mV typical, except 20V/200V.
 - Maximum time required for the output to begin to change following the receipt of SOURCE:VOLTage[CURRent <ref> Command.
 - Heating rates applicable for voltage or current measurements, autorange off, filter off, display off, trigger delay = 0, and binary reading forms.
 - Purely resistive load, 1pA and 10pA ranges <0mΩ.
 - 1000 point sweep was characterized with the source on a feed ramp.
 - Pass/Fail test performed using one high limit and one low math limit.
 - Includes time to re-program source to a new level before making measurement.
 - Time from falling edge of START OF TEST signal to falling edge of END OF TEST signal.
 - Command processing time of SOURCE:VOLTage[CURRent: TRIGged<ref> Command not included.

SPECIFICATIONS

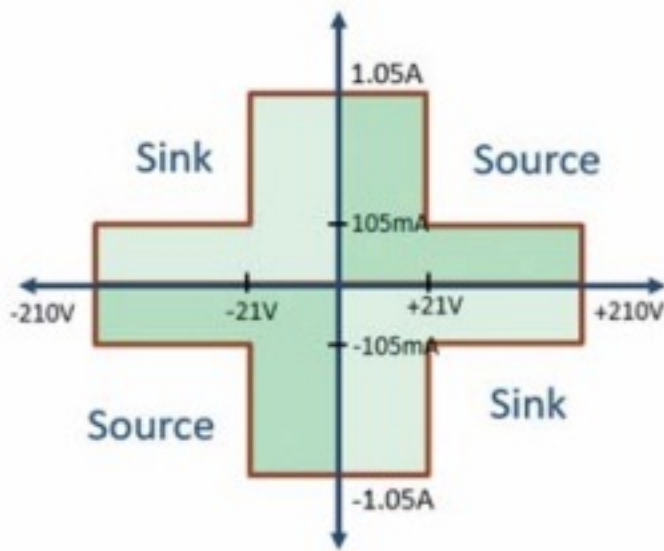
MAXIMUM RANGE	Voltage	±210V									
	Current	±1.05A									
SOURCE	Power	22W									
	Voltage Resolution	1µV									
DC Voltage	Current Resolution	10pA									
	Output Voltage	±21V / ±1.05A, ±210V / ±105 mA									
	Current Limit	Min. 0.1% of range									
	Programming Resolution & Accuracy *1	Range	±200.000mV	±2.00000V	±20.0000V	±200.000V					
		Resolution	1µV	10µV	100µV	1mV					
		Accuracy	±(0.02%+600µV)	±(0.02%+600µV)	±(0.02%+2.4mV)	±(0.02%+24mV)					
	Load Regulation	0.01% of range + 100µV									
	Line Regulation	0.01% of range									
	Overshoot	<0.1% typical (full scale step, resistive load, 10mA range)									
	Recovery Time (1000% Load Change)	<250µs (within 0.1% plus load regulation errors, 1A and 100mA compliance.)									
	Ripple and Noise	4mVrms(20Hz~1MHz) / 10mVpp(20Hz~1MHz)									
	Temperature Coefficient	±(0.15 x accuracy specification)/°C (0°~18°C & 28°~50°C)									
	DC Current	Output Current	±1.05A / ±21V, ±105 mA / ±210V								
		Voltage Limit	Min. 0.1% of range								
		Programmed Source Resolution & Accuracy *1	Range	±1.00000µA	±10.0000µA	±100.000µA	±1.00000mA	±10.00000mA	±100.000mA	±1.00000A	
Resolution			10pA	100pA	1nA	10nA	100nA	1µA	10µA		
Accuracy			±(0.035%+600pA)	±(0.033%+2nA)	±(0.031%+20nA)	±(0.034%+200nA)	±(0.045%+2µA)	±(0.066%+20µA)	±(0.27%+900µA)		
Load Regulation		0.01% of range + 100pA									
Line Regulation		0.01% of range									
Overshoot		<0.1% typical (1mA step, RL = 10kΩ, 20V range)									
Temperature Coefficient		±(0.15 x accuracy specification)/°C (0°~18°C & 28°~50°C)									
Output Settling Time *2		100µs typical time									
Output Rise Time (±30%)		300µs, 200V range, 100mA compliance ; 150µs, 20V range, 100mA compliance									
DC Floating Voltage		Output can be floated up to ±250VDC									
Remote Sense		Up to 1V drop per load lead									
Compliance Accuracy		Add 0.3% of range and ±0.02% of reading to base specification									
Range Change Overshoot *3		Adjacent range changes between 200mV, 2V and 20V ranges, 100mV typical									
Minimum Compliance Value	0.1% of range										
Command Processing Time *4	Autorange On:10ms, Autorange Off: 7ms										
MEASUREMENT	Voltage	Input Resistance	>10 GΩ								
		Measurement Resolution & Accuracy	Range	±200.000mV	±2.00000V	±20.0000V	±200.000V				
			Resolution	1µV	10µV	100µV	1mV				
	Accuracy		±(0.012%+300µV)	±(0.012%+300µV)	±(0.015%+1.5mV)	±(0.015%+10mV)					
	Temperature Coefficient	±(0.15 x accuracy specification)/°C (0°~18°C & 28°~50°C)									
	Current	Voltage Burden (4-wire mode)	< 1mV								
		Programmed Source Resolution & Accuracy *1	Range	±1.00000µA	±10.0000µA	±100.000µA	±1.00000mA	±10.00000mA	±100.000mA	±1.00000A	
			Resolution	10pA	100pA	1nA	10nA	100nA	1µA	10µA	
	Accuracy		±(0.029%+300pA)	±(0.027%+700pA)	±(0.025%+6nA)	±(0.027%+60nA)	±(0.035%+600nA)	±(0.055%+6µA)	±(0.22%+570µA)		
	Temperature Coefficient	±(0.1 x accuracy specification) / °C (0°~18°C & 28°~50°C)									
	Resistance	Range	Resolution	<2.00000Ω	2.00000Ω	20.0000Ω	200.000Ω	2.00000kΩ	20.0000kΩ		
			Test current	---	---	100mA	10mA	1mA	100µA		
			Accuracy	Source IACC+Meas.VACC	Source IACC+Meas.VACC	±(0.1%+0.003Ω), Normal ±(0.07%+0.001Ω), Enhanced	±(0.08%+0.03Ω), Normal ±(0.05%+0.01Ω), Enhanced	±(0.07%+0.3Ω), Normal ±(0.05%+0.1Ω), Enhanced	±(0.06%+3Ω), Normal ±(0.04%+1Ω), Enhanced		
			Resolution	200.000kΩ	2.00000MΩ	20.0000MΩ	200.000MΩ	>200.000MΩ			
			Test current	10µA	5µA	0.5µA	100nA				
Accuracy			±(0.07%+30Ω), Normal ±(0.05%+10Ω), Enhanced	±(0.11%+300Ω), Normal ±(0.05%+100Ω), Enhanced	±(0.11%+1kΩ), Normal ±(0.05%+500Ω), Enhanced	±(0.66%+10kΩ), Normal ±(0.35%+5kΩ), Enhanced	Source IACC+Meas.VACC				
Temperature Coefficient		±(0.15 x accuracy specification)/°C (0°~18°C & 28°~50°C)									
Source I mode, Manual OHMS		Total uncertainty = I source accuracy + V measure accuracy (4-wire remote sense)									
Source V mode, Manual OHMS		Total uncertainty = V source accuracy + I measure accuracy (4-wire remote sense)									
6-wire OHMS Mode		Available using active ohms guard and guard sense. Max. Guard Output Current: 50mA (except 1A range). Accuracy is load dependent									
Guard Output Impedance	<0.1Ω in ohms mode										
SYSTEM SPEED *5	Maximum Range Change Rate	75/second									
	Maximum Measure Auto Range Time	40ms (fixed source) *6									
	Sequence Reading Rates *7 (rdg./second) for 60Hz (50Hz)	Speed	NPLC / Trig Origin	Measure		Source-Measure *8		Source-Measure Pass/Fail test *8, *9		Measure Memory *9	
				TO MEMORY	TO GPIB	TO MEMORY	TO GPIB	TO MEMORY	TO GPIB	TO MEMORY	TO GPIB
		Fast	0.01 / internal	2081 (2030)	1198 (1210)	1551 (1515)	1000 (900)	902 (900)	809 (840)	165 (162)	164 (162)
		488.2	0.01 / external	1239 (1200)	1079 (1050)	1018 (990)	916 (835)	830 (830)	756 (780)	163 (160)	162 (160)
		Medium	0.1 / internal	510 (433)	509 (433)	470 (405)	470 (410)	389 (343)	388 (343)	133 (126)	132 (126)
		488.2	0.1 / external	438 (380)	438 (380)	409 (360)	409 (365)	374 (333)	374 (333)	131 (125)	131 (125)
	Normal	1 / internal	59 (49)	59 (49)	58 (48)	58 (48)	56 (47)	56 (47)	44 (38)	44 (38)	
	488.2	1 / external	57 (48)	57 (48)	57 (48)	57 (47)	56 (47)	56 (47)	44 (38)	44 (38)	
	Single Reading Operation Rates (rdg./second) for 60Hz (50Hz)	Speed	NPLC / Trig Origin	Measure		Source-Measure *9		Source-Measure Pass/Fail test *8, *9			
				TO GPIB	TO GPIB	TO GPIB	TO GPIB	TO GPIB	TO GPIB		
				Fast(488.2)	0.01 / internal	256 (256)	79 (83)	79 (83)	79 (83)	79 (83)	
				Medium(488.2)	0.1 / internal	167 (166)	72 (70)	72 (70)	69 (70)	69 (70)	
	Normal(488.2)	1 / internal	49 (42)	34 (31)	34 (31)	35 (30)	35 (30)				
Component Interface Handler Time for 60Hz (50Hz) *8, *9	Speed	NPLC / Trig Origin	Measure		Source Pass/Fail test		Source-Measure Pass/Fail test *9, *11				
			TO GPIB	TO GPIB	TO GPIB	TO GPIB	TO GPIB				
			Fast	0.01 / internal	1.04 ms (1.08 ms)	0.5 ms (0.5 ms)	4.82 ms (5.3 ms)	4.82 ms (5.3 ms)			
			Medium	0.1 / internal	2.55 ms (2.9 ms)	0.5 ms (0.5 ms)	6.27 ms (7.1 ms)	6.27 ms (7.1 ms)			
Normal	1 / internal	17.53 ms (20.9 ms)	0.5 ms (0.5 ms)	21.31 ms (25.0 ms)	21.31 ms (25.0 ms)						
SYSTEM GENERAL	Load Impedance	Stable into 20,000pF typical									
	Differential Mode Voltage	250Vpk									
	Common Mode Voltage	250VDC									
	Common Mode Isolation	>10GΩ, <1000pF									
	Over Range	105% of range, source and measure									
	Max. Voltage Drop	5V									
	Max. Sense lead Resistance	1MΩ									
	Sense Input Impedance	>100GΩ									
	Guard Offset Voltage	<150µV, typical									
	Source Output Modes	Fixed DC level, Memory List (mixed function), Stair (linear and log)									
	Source Memory List	100 points max.									
	Memory Buffer	5,000 readings @ 5 digits (two 2,500 point buffers). Includes selected measured value(s) and time stamp. Lithium battery backup(3 yr + battery life)									
	Programmability	IEEE-488.2 (SCPI), RS-232 ; 5 user-definable power-up states plus factory default and *RST.									
	Digital I/O Connector	Active low input. Start of test, end of test, 3 category bits ; +5V@ 300mA supply ; 1 trigger input, 4 TTL/Relay Drive outputs (33V@500mA, diode)									
	Remote Interface	USB/GPIB/LAN/RS-232									
Insulation	Chassis and terminal : 20MΩ or above (DC 500V) ; Chassis and AC cord : 30MΩ or above (DC 500V)										
Operation Environment	Indoor use, Altitude : ≤ 2000m Ambient temperature : 0 – 40°C Relative humidity : ≤ 80% ; Installation category: II, Pollution degree: 2										
Storage Environment	Temperature: -20°C – 70°C; Humidity: < 80%										
Input Power	100-240VAC, 50-60Hz										
Power Consumption	80W										
Dimensions & Weight	214 (W) x 86 (H) x 356.5 (D) mm, Approx. 4.8kg										

Source Measure Unit

GSM-20H10

POWER SUPPLIES

A. MAXIMUM OUTPUT: $\pm 210V/\pm 1.05A/22W$

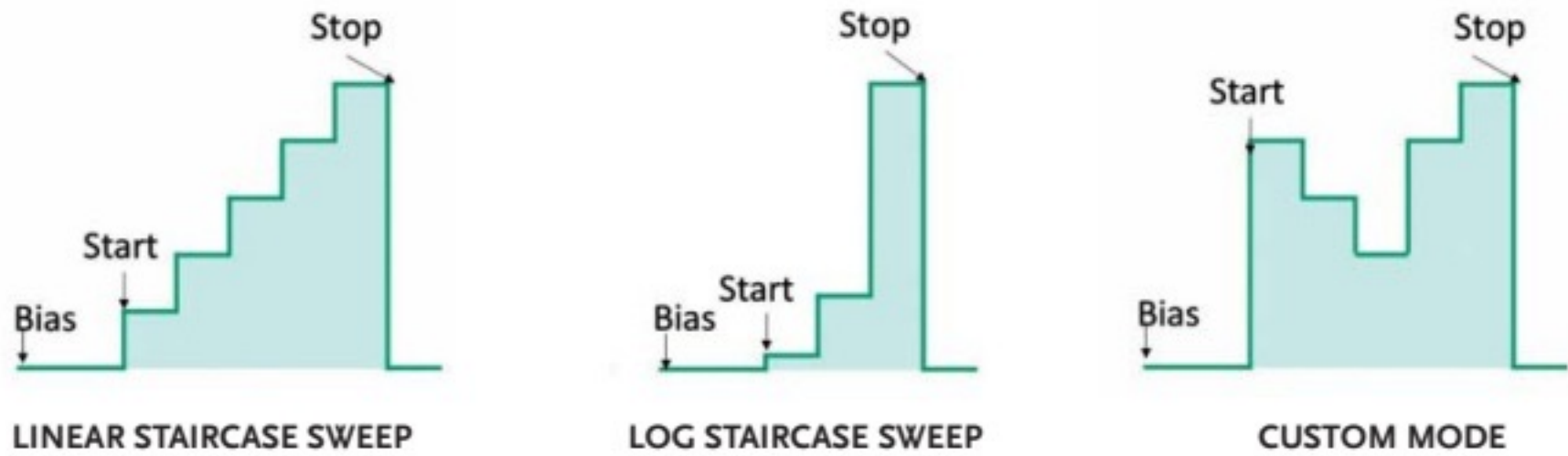


The power source output of the GSM-20H10 has two ranges.

The voltage range is ± 21 volts, and the current is $\pm 1.05A$.
The voltage range is ± 210 volts, and the current range is $\pm 105mA$.
The power capacity is 22W.

Provide a full range of four-quadrant measurement without duty cycle limit.

B. BUILT-IN 4 SEQUENCE OUTPUT MODES, UP TO 2500 POINTS



GSM-20H10 Source Measure Unit provides four sequence output modes: linear staircase, log staircase, SRC-MEM (source memory) and Custom (self-defined).

With these output modes, users can quickly generate output as needed. The total number of sequence points is 2,500.

C. OVP/OTP PROTECTION FUNCTION



In terms of protection, GSM-20H10 provides OVP/OTP protection modes; in the design of OVP, users can define the range of OVP, and the protection of OTP can effectively prevent errors caused by temperature drift during the test process.

D. 0.012% BASIC MEASURE ACCURACY WITH 6½DIGIT RESOLUTION



GSM-20H10 provides a measurement accuracy of up to 0.012%, and provides a meter display function of up to 6½ digits, allowing users to have more accurate results when measuring small signals...

E. VARIABLE SAMPLING SPEED

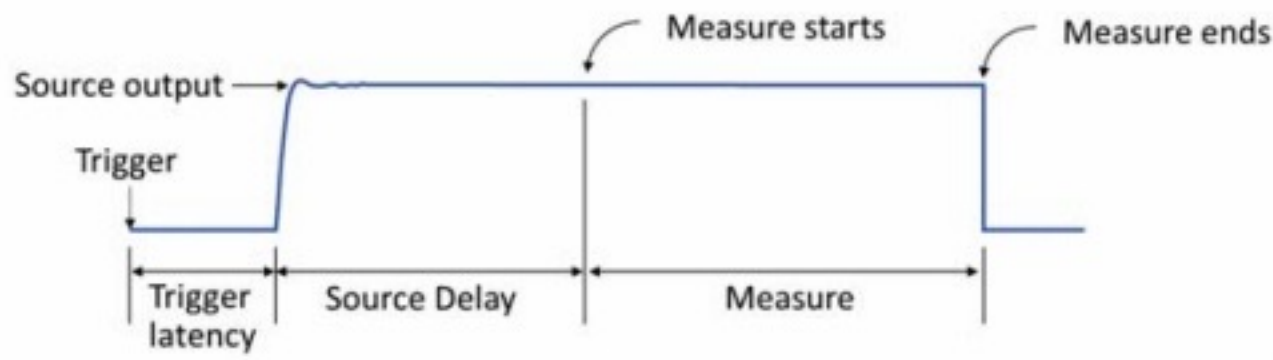


The sampling rate of GSM-20H10 is variable. Therefore, users can choose the sampling rate from 0.01 PLC to 10 PLC according to their needs.

SAMPLING MODE	FAST	MEDIUM	NORMAL	HIGH	OTHER
Speed, NPLC	0.01	0.1	1	10	User defined
Digit	3½	4½	5½	6½	Selectable

Where NPLC represents the number of power line cycles, for example, AC power frequency is 50Hz, 1 PLC means 20ms, 2 PLC means 40ms, and so on.

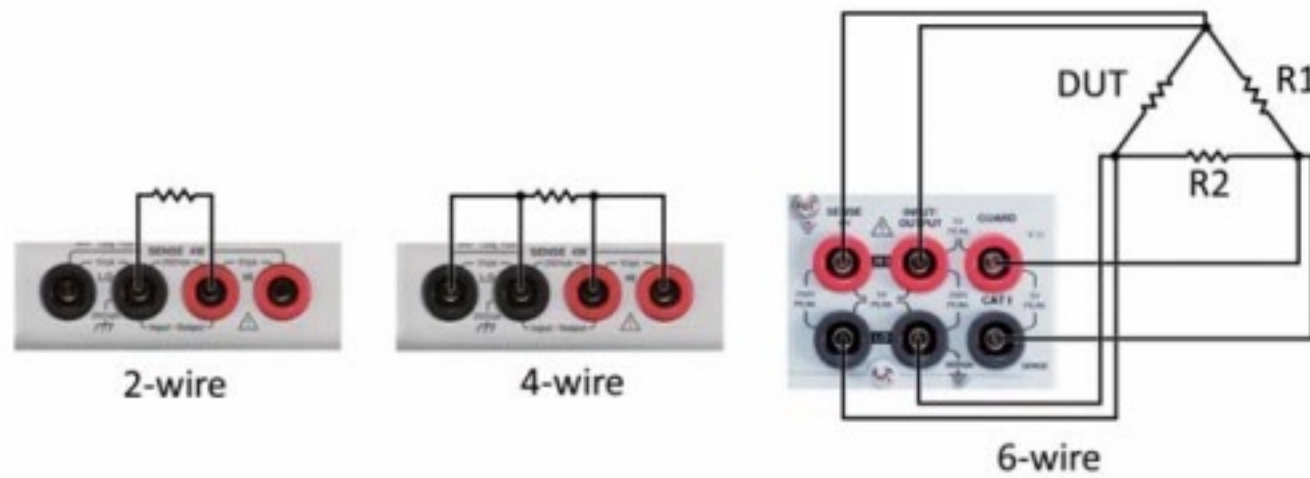
F. SDM (SOURCE DELAY MEASURE) CYCLE



The initial state of the source output may be unstable. If the meter starts measuring after the source is output, users can set the source delay to start the meter measurement after passing the unstable period so as to obtain stable measurement results.

GSM-20H10 Source Measure Unit delay range is 0 to 9999.999 seconds.

G. 2-, 4-, AND 6-WIRE REMOTE V-SOURCE AND MEASURE SENSING



Other than 2-wire, GSM-20H10 also provides 4-wire and 6-wire resistance measurements.

4-wire measurement eliminates the effect of lead resistance, realizing accurate measurement of small resistances below 100ohm at high currents.

6-wire combining 4-wire connection and the protection of ohm characteristics eliminates the effects of internal parallel resistance, realizing the resistance measurement of a tiny wire.

H. VARIABLE DISPLAY DIGITS



The display bits of GSM-20H10 are variable. Therefore, users can choose the number of display bits among 3.5, 4.5, 5.5, and 6.5 bits according to their needs.

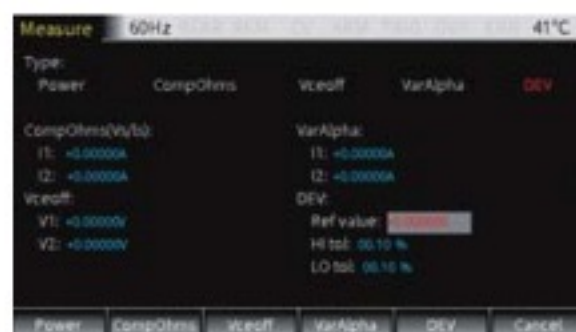
I. BUILT-IN LIMIT FUNCTION



GSM-20H10 has three built-in Pass/Fail limit line tests with a total of 11 sets.

J. BUILT-IN 5 CALCULATION FUNCTIONS

- Power = V•I
- CompOhms = $\frac{(V2-V1)}{(I2-I1)}$
- Vceoff(%) = $\left[\frac{\Delta R}{(R2+\Delta V)} \right] * 100\%$
- VarAlpha, $\alpha = \frac{\log(I2+I1)}{\log(V2+V1)}$
- Dev = $\left[\frac{(X-Y)}{Y} \right] * 100\%$



GSM-20H10 provides five built-in calculation functions: Power, Offset Compensation Ohms, Voltage Coefficient, Varistor Alpha, and Percent Deviation.

Programmable High Precision D.C. Power Supply



PPH-1503



PPH-1503D/1506D/1510D



FEATURES

- 3.5" TFT LCD Display
- High Measurement Resolution: 1mV/0.1µA for 5mA range.
- Transient Recovery Time: $\leq 40\mu\text{s}$ within 100mV; $< 80\mu\text{s}$ within 20mV
- Current Sink Function
- Pulse Current Measurement (Pulse width min.: 33µs)
- Long Integration Current Measurement
- Built-in DVM Measurement Function
- Sequence Function (Sequence power output)
- Built-in Battery Simulation Function (CH1 of PPH-15xxD)
- OVP, OCP, OTP & Temperature Display for Heat Sink
- Support USB (Device & Host)/GPIB/LAN
- Five Groups of Save/Recall Setting
- External Relay Control

PPH-1503 Rear Panel



PPH-1503D/1506D/1510D Rear Panel



PPH-Series high precision measurement capability achieves the maximum resolution of 1mV/0.1µA and the smallest pulse current width of 33µs that satisfy customers' measurement application requirements of high resolution and pulse current. Fast load current variation will result in voltage sag for general power supplies that will have an impact on DUT's internal circuit operation. PPH-Series is equipped with the excellent transient recovery time, which can, in less than 40µs, recover the output voltage to within 100mV of the previous output when the current level changes from 10% to 100% of the full scale. Furthermore, conventional power supplies do not have sufficient response speed to promptly respond to set voltage value once the set voltage is changed. PPH-15xxD has a rise time of 0.2ms and a fall time of 0.3ms, which are 100 times faster than that of conventional power supplies. Therefore, PPH-15xxD can provide DUT with a stable output voltage even when DUT is operating under large transient current output. The internal high-speed sampling circuit design of PPH-15xxD, with the sample rate of 64K, can conduct pulse current measurement without using a current probe and oscilloscope. The current read back accuracy is 0.2%+1µA (equals to 11µA) at 5mA range, and the read back resolution is 0.1µA that allow DUT to be measured with a high accuracy level. Unlike battery, general power supplies, which do not have the characteristics of fast transient recovery time, can not maintain a stable power supply for cellular phone, wireless device, and wearable device which produce large transient pulse current load for hundreds of µs to dozens of ms when in use. PPH-15xxD, different from general power supplies, has the characteristics of fast transient recovery time. While simulating battery to output pulse current, PPH-15xxD can quickly compensate the voltage drop caused by pulse current. PPH-15xxD's CH1 has the built-in battery simulation function, which can define output impedance settings so as to accurately simulate battery's impedance characteristics during battery discharge. Fast transient recovery time and built-in battery simulation function together facilitate PPH-15xxD to accurately simulate battery's real behavior pattern so as to conduct product tests.

PPH-15xxD is not only suitable for simulating battery, charger and supplying power to DUT, but also ideal for simulating an electronic load to conduct discharge tests with its sink current capability. The sink current function allows PPH-15xxD to simulate a voltage source with the sink current capability. The maximum sink current of PPH-15xxD's CH1 is 3.5A and for CH2 is 3A. Long integration current measurement can be utilized to conduct average current measurement for periodical pulse current in a long period of time that is applied to analyze power consumption for a period of time. One of the applications is to measure the average power consumption of a cellular phone in use so as to conduct the internal RF module parameter analysis. The maximum pulse current measurement range of CH1 is 5A and for CH2 is 3A. The built-in sequence function of CH1 provides users with 1000 steps to edit sequential outputs, including voltage, current and execution time. The built-in DVM function of CH2 has a voltage range from 0 to +20VDC that saves users the cost of purchasing an additional voltage meter.

PPH-15xxD provides OTP function and shows heat sink temperature on the upper right corner of the display screen. Other than that, features such as five sets of system setting values for the SAVE/RECALL function, 10 sets of Power On Setup Settings, Key-Lock function to prevent unauthorized inputs, temperature-controlled fan to reduce noise, hardcopy to save screen information, and external relay control device together augment PPH-15xxD's usability. PPH-Series supports test requirements of Profile1, Profile2 and Profile3 from USB Power Delivery (PD) constructed by USB-IF association.

SELECTION GUIDE

Model	PPH-1503	PPH-1503D	PPH-1506D	PPH-1510D
Channel	1	2	2	2
Dual Range Output	Channel 1 0-15V/0-3A or 0-9V/0-5A	0-15V/0-3A or 0-9V/0-5A	0-15V/0-3A or 0-9V/0-5A	0-15V/0-3A or 0-9V/0-5A Rear Terminal: 0-10A/0-4.5V 0-12V/0-3.0A
Display	3.5 Inch TFT LCD	3.5 Inch TFT LCD	3.5 Inch TFT LCD	3.5 Inch TFT LCD
Current Measurement Range	5A/5mA	5A/500mA/ 5mA(CH1)	5A/500mA/ 5mA(CH1)	10A/500mA/ 5mA(CH1)
CV&CC	✓	✓	✓	✓
Built-in DVM Measurement Function	✓	✓ (CH2)	✓ (CH2)	✓ (CH2)
Pulse Current Measurement	✓	✓	✓	✓
Long integration Current Measurement	✓	✓	✓	✓
Battery Simulation	NA	✓ (CH1)	✓ (CH1)	✓ (CH1)
Automated Sequential Output	✓	✓ (CH1)	✓ (CH1)	✓ (CH1)
High Measurement Resolution	✓ (1mV/0.1µA)	✓ (1mV/0.1µA)	✓ (1mV/0.1µA)	✓ (1mV/0.1µA)
Sink Current Capability	✓ (Max: 2A)	✓ (Max: 3.5A)	✓ (Max: 3.5A)	✓ (Max: 3.5A)
Selectable Output from Front or Rear Panel	✓	✓	✓	✓
Relay Output Control	✓	✓	✓	✓
Memory	5 Sets	5 Sets	5 Sets	5 Sets
Sample Rate	60K	64K	64K	64K
Lock Function	✓	✓	✓	✓
Protection Function	OVP/OTP/OCP	OVP/OTP/OCP	OVP/OTP/OCP	OVP/OTP/OCP
Four Wire Output Open Circuit Protection	NA	✓	✓	✓
Temperature Display for Heat Sink	NA	✓	✓	✓
Standard Interface:	GPIB	✓	✓	✓
LAN, USB, Analog Control	✓	✓ (TMC)	✓ (TMC)	✓ (TMC)
Interface	✓ (CDC)	✓	✓	✓

ORDERING INFORMATION

PPH-1503	0-15V/0-3A or 0-9V/0-5A	High Precision DC Power Supply
PPH-1503D	CH1:0-15V/0-3A or 0-9V/0-5A;CH2:0-12V/0-1.5A	High Precision Dual Channel Output DC Power Supply
PPH-1506D	CH1:0-15V/0-3A or 0-9V/0-5A;CH2:0-12V/0-3A	High Precision Dual Channel Output DC Power Supply
PPH-1510D	CH1:0-15V/0-3A or 0-9V/0-5A;0-4.5V/0-10A(Rear terminal);CH2:0-12V/0-3A	High Precision Dual Channel Output DC Power Supply

ACCESSORIES:

CD (User manual x1, Quick start manual x1), Power cord (Region dependent), Test lead GTL-207A x1, GTL-203A x1, GTL-204A x1

OPTIONAL ACCESSORIES

GTL-246 USB Cable (USB 2.0, A-B Type) GRA-450-J Rack Mount kit GRA-450-E Rack Mount kit

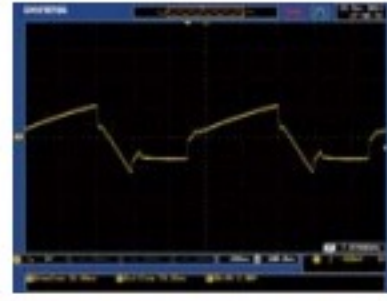
SPECIFICATIONS								
Model	PPH-1503		PPH-1503D		PPH-1506D		PPH-1510D	
OUTPUT RATING								
Number of Output Channel	1		2		2		2	
Channel No.	Ch 1		Ch 1 Ch 2		Ch 1 Ch 2		Ch 1 Ch 2	
Power	45W		45W 18W		45W 36W		45W 36W	
Voltage	0 ~ 15V or 0 ~ 9V		0 ~ 15V or 0 ~ 9V 0 ~ 12V		0 ~ 15V or 0 ~ 9V 0 ~ 12V		0 ~ 15V or 0 ~ 9V 0 ~ 12V	
Current	0 ~ 3A or 0 ~ 5A		0 ~ 3A or 0 ~ 5A 0 ~ 1.5A		0 ~ 3A or 0 ~ 5A 0 ~ 3.0A		0 ~ 3A or 0 ~ 5A 0 ~ 3.0A	
Output Voltage Rising Time	0.15ms (10% ~ 90%)		0.20ms (10% ~ 90%)		0.20ms (10% ~ 90%)		0.20ms (10% ~ 90%)	
Output Voltage Falling Time	0.65ms (90% ~ 10%)		0.30ms (90% ~ 10%)		0.30ms (90% ~ 10%)		0.30ms (90% ~ 10%)	
STABILITY								
Voltage	0.01%+0.5mV		0.01%+3.0mV		0.01%+3.0mV		0.01%+3.0mV	
Current	0.01%+50 μ A		—		—		—	
REGULATION (CV)								
Load	0.01%+2mV		0.01%+2mV		0.01%+2mV		0.01%+2mV	
Line	0.5mV		0.5mV		0.5mV		0.5mV	
REGULATION (CC)								
Load	0.01%+1mA		0.01%+1mA		0.01%+1mA		0.01%+1mA	
Line	0.5mA		0.5mA		0.5mA		0.5mA	
RIPPLE & NOISE (20Hz~20MHz)								
CV p-p	8mV		\leq 5A : 8mVp-p(20Hz~ 20MHz)		\leq 5A : 8mVp-p(20Hz~ 20MHz)		\leq 5A : 8mVp-p(20Hz~ 20MHz)	
CV rms	1mV		3mV(0~1MHz)		3mV(0~1MHz)		3mV(0~1MHz)	
CC rms	—		—		—		—	
PROGRAMMING ACCURACY								
Voltage	0.05%+10mV		0.05%+10mV		0.05%+10mV		0.05%+10mV	
Current(Ch1:5A,10A/CH2:1.5A,3A)	0.16%+5mA		0.16%+5mA(5A/1.5A)		0.16%+5mA(5A/3A)		0.16%+5mA(5A/3A)	
Current (500mA)	—		0.16%+0.5mA		0.16%+0.5mA		0.16%+0.5mA	
Current (5mA)	—		0.16%+5 μ A		0.16%+5 μ A		0.16%+5 μ A	
READBCK ACCURACY								
Voltage	0.05%+3mV		0.05%+3mV		0.05%+3mV		0.05%+3mV	
Current(Ch1:5A,10A/CH2:1.5A,3A)	0.2%+400 μ A(5A)		0.2%+400 μ A(5A)		0.2%+400 μ A(5A)		0.2%+400 μ A(5A)	
Current (500mA)	—		0.2%+100 μ A		0.2%+100 μ A		0.2%+100 μ A	
Current (5mA)	0.2%+1 μ A		0.2%+1 μ A		0.2%+1 μ A		0.2%+1 μ A	
RESPONSE TIME								
Transient Recovery Time (Response to 100% Load Change)	<40 μ S(within 100mV) <80 μ S(within 20mV)		<40 μ S(within 100mV, Rear) <50 μ S(within 100mV,Front) <80 μ S(within 20mV)		<40 μ S(within 100mV, Rear) <50 μ S(within 100mV,Front) <80 μ S(within 20mV)		<40 μ S(within 100mV, Rear) <50 μ S(within 100mV,Front) <80 μ S(within 20mV)	
PROGRAMMING RESOLUTION								
Voltage	2.5mV		2.5mV		2.5mV		2.5mV	
Current (5A range)	1.25mA		1.25mA(5A)		1.25mA(5A)		1.25mA(5A)	
Current (500mA range)	—		0.125mA		0.125mA		0.125mA	
Current (5mA range)	—		1.25 μ A		1.25 μ A		1.25 μ A	
READBCK RESOLUTION								
Voltage	1mV		1mV		1mV		1mV	
Current (5A range)	0.1mA		0.1mA(5A)		0.1mA(5A)		0.1mA(5A)	
Current (500mA range)	—		0.01mA		0.01mA		0.01mA	
Current (5mA range)	0.1 μ A		0.1 μ A		0.1 μ A		0.1 μ A	
PROTECTION FUNCTION								
OVP Accuracy	50mV		Ch1: 0.8V		Ch2: 50mV		Ch1: 0.8V	
OVP Resolution	10mV		10mV		10mV		10mV	
DVM								
DC Readback Accuracy(23 \pm 5 $^{\circ}$ C)	\pm 0.05%+3mV		\pm 0.05%+3mV		\pm 0.05%+3mV		\pm 0.05%+3mV	
Readback Resolution	1mV		1mV		1mV		1mV	
Input Voltage Range	0 ~ 20VDC		0 ~ 20VDC		0 ~ 20VDC		0 ~ 20VDC	
Maximum Input Voltage	—		-3V, +22V		-3V, +22V		-3V, +22V	
Input Resistance and Capacitance	100000M Ω		20M Ω		20M Ω		20M Ω	
PROGRAMMABLE OUTPUT RESISTANCE								
Range	0.001 Ω ~ 1.000 Ω		—		0.001 Ω ~ 1.000 Ω		0.001 Ω ~ 1.000 Ω	
Programming Accuracy	—		0.5% + 10 m Ω		—		0.5% + 10 m Ω	
Resolution	1m Ω		—		1m Ω		1m Ω	
PULSE CURRENT MEASUREMENT								
Trigger Level	5mA ~ 5A, 5mA/Step		5mA ~ 5A, 5mA/Step		5mA ~ 5A, 5mA/Step		5mA ~ 5A, 5mA/Step	
High Time/low Time/Average Time	33.3 μ s ~ 833ms, 33.3 μ s/Step		33.3 μ s ~ 833ms, 33.3 μ s/Step		33.3 μ s ~ 833ms, 33.3 μ s/Step		33.3 μ s ~ 833ms, 33.3 μ s/Step	
Trigger Delay	0 ~ 100ms, 10 μ s/Steps		0 ~ 100ms, 10 μ s/Steps		0 ~ 100ms, 10 μ s/Steps		0 ~ 100ms, 10 μ s/Steps	
Average Readings	1 ~ 100		1 ~ 100		1 ~ 100		1 ~ 100	
Long Integration Pulse Time	1S ~ 63S		1S ~ 63S		1S ~ 63S		1S ~ 63S	
Long Integration Measurement Time	850ms(60Hz)/840ms(50Hz)~60s, or Auto time 16.7ms/Steps(60Hz), 20ms/Steps(50Hz)		850ms(60Hz)/840ms(50Hz)~60s, or Auto time 16.7ms/Steps(60Hz), 20ms/Steps(50Hz)		850ms(60Hz)/840ms(50Hz)~60s, or Auto time 16.7ms/Steps(60Hz), 20ms/Steps(50Hz)		850ms(60Hz)/840ms(50Hz)~60s, or Auto time 16.7ms/Steps(60Hz), 20ms/Steps(50Hz)	
Long Integration Trigger Mode	Rising, Falling, Neither		Rising, Falling, Neither		Rising, Falling, Neither		Rising, Falling, Neither	
OTHERS								
Output Terminal	Front/Rear Panel		Front/Rear Panel		Front/Rear Panel		Front/Rear Panel	
DVM Input	Front/Rear Panel		—		Front Panel		—	
Relay Control Connector	150mA/15V, 5V output, 100mA		150mA/15V, 5V output, 100mA		150mA/15V, 5V output, 100mA		150mA/15V, 5V output, 100mA	
Operation Temperature	0 ~ 40 $^{\circ}$ C		0 ~ 40 $^{\circ}$ C		0 ~ 40 $^{\circ}$ C		0 ~ 40 $^{\circ}$ C	
Operation Humidity	< 80%		< 80%		< 80%		< 80%	
Storage Temperature	-20 $^{\circ}$ C ~ 70 $^{\circ}$ C		-20 $^{\circ}$ C ~ 70 $^{\circ}$ C		-20 $^{\circ}$ C ~ 70 $^{\circ}$ C		-20 $^{\circ}$ C ~ 70 $^{\circ}$ C	
Storage Humidity	< 80%		< 80%		< 80%		< 80%	
PC REMOTE INTERFACES								
Standard	GPIB/USB/LAN		GPIB/USB/LAN		GPIB/USB/LAN		GPIB/USB/LAN	
CURRENT SINK CAPACITY								
Sink Current Rating	2A (Vout \leq 5V); 2A-0.1*(Vout-5) (Vout>5V)		Ch1:0~4V:3.5A; 4~15V:3.5A-(0.25A/V) *(Vset-4V)		Ch2: 0~5V:2A; 5~12V:2A-(0.1A/V) *(Vset-5V)		Ch1:0~4V:3.5A; 4~15V:3.5A-(0.25A/V) *(Vset-4V)	
MEMORY								
Save/Recall	5 Sets		5 Sets		5 Sets		5 Sets	
POWER								
Input Power	90 ~ 264VAC ; 50/60Hz		90 ~ 264VAC ; 50/60Hz		90 ~ 264VAC ; 50/60Hz		90 ~ 264VAC ; 50/60Hz	
Power Consumption	150W		160W		160W		160W	
DIMENSIONS & WEIGHT								
	222(W)x86(H)x363(D)mm; Approx 4.2kg		222(W)x86(H)x363(D)mm; Approx 4.5kg		222(W)x86(H)x363(D)mm; Approx 4.5kg		222(W)x86(H)x363(D)mm; Approx 4.5kg	

Programmable High Precision D.C. Power Supply

A. FAST RESPONSE TO LOAD AND VOLTAGE CHANGES



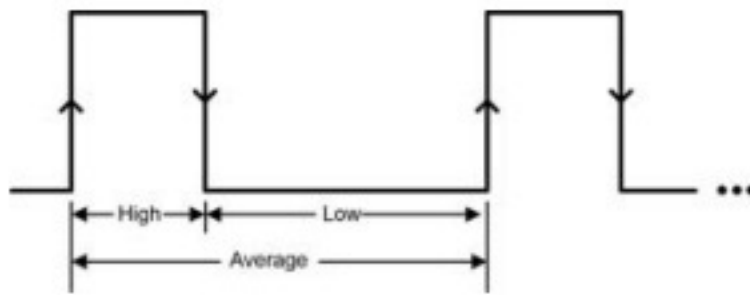
PPH-Series



Conventional Power Supply

When DUT such as cellular phone switches to idling, receiving or transmitting mode, the current drawn from power supply changes over tenfold. The sudden current change will cause the supplied voltage to drop as well. The conventional power supply is considered a dull device since it will take several milliseconds for the dropped voltage to return to the original level. PPH-Series is designed to simulate battery response when a significant voltage drop occurs. Recovery time of 40 μ s or less is guaranteed when the maximum voltage drop is within 100mV.

C. PULSE CURRENT MEASUREMENTS



Pulse Current Measurement

PPH-Series DC power supply can perform current measurements for pulsing loads. To avoid false pulse detection, users can use a trigger level of up to 5A. All pulses, noise or other transients that are less than set trigger level will be ignored. The manual integration time range setting is 33 μ s to 833,333 μ s. Pulse current measurement can measure transient current consumption to provide the information for the allocation of power supply system for products' preliminary design, i.e. power supply circuits, battery selections for clients' product analyses. Portable communications products, i.e. RF modules and designs based upon blue tooth system can better use pulse current measurement function.

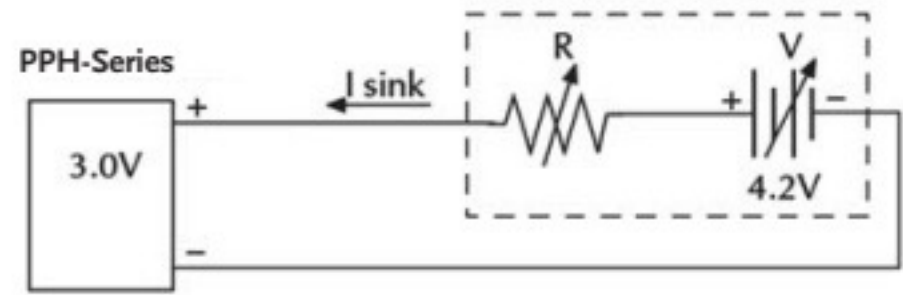
E. BUILT-IN DIGITAL VOLTMETER



DVM Input for PPH-Series

The built-in Digital Volt-Meter (DVM) of PPH-Series has a dedicated input terminal located on the front panel. With the DC voltage measurement range from 0 to +20VDC, PPH-Series not only provides power supply for DUT but also measures the voltage on DUT. The read back accuracy reaches $\pm(0.05\%+3mV)$ and read back resolution is 1mV. Users are able to save the cost of purchasing an extra voltage meter. Furthermore, DVM measurements can be remotely controlled by SCPI commands via a PC.

B. SINK CURRENT FUNCTION



PPH-Series and an Electrical Potential Circuit

When connecting with an electric potential circuit and the output voltage of the tested electric potential circuit is greater than that of PPH-Series by approximately 0.3V to 2.5V, PPH-Series will automatically convert its power supply role to the sink current role acting as a load of voltage source. At this time, the voltage setting of PPH-Series can be regarded as the CV setting of an electronic load. A single PPH-Series can be used to charge battery and to simulate battery's load to consume power without extra instruments. PPH-Series is ideal for tests on battery and portable charger.

D. LONG INTEGRATION CURRENT MEASUREMENT



Long Integration Current Measurement

Long integration current measurement is to measure the average current of periodical pulse current in a long period of time. The measured pulse current must be a complete periodical waveform or multiple complete periodical waveforms. The total measurement time is up to 60 seconds. Measurements can be taken from pulse's positive edge trigger or negative edge trigger. Users can also take measurements from the beginning of power output. Long integration current measurement is to analyze power consumption for a period of time. For instance, users can measure the average power consumption of a cellular phone in use to analyze its internal RF module parameters.

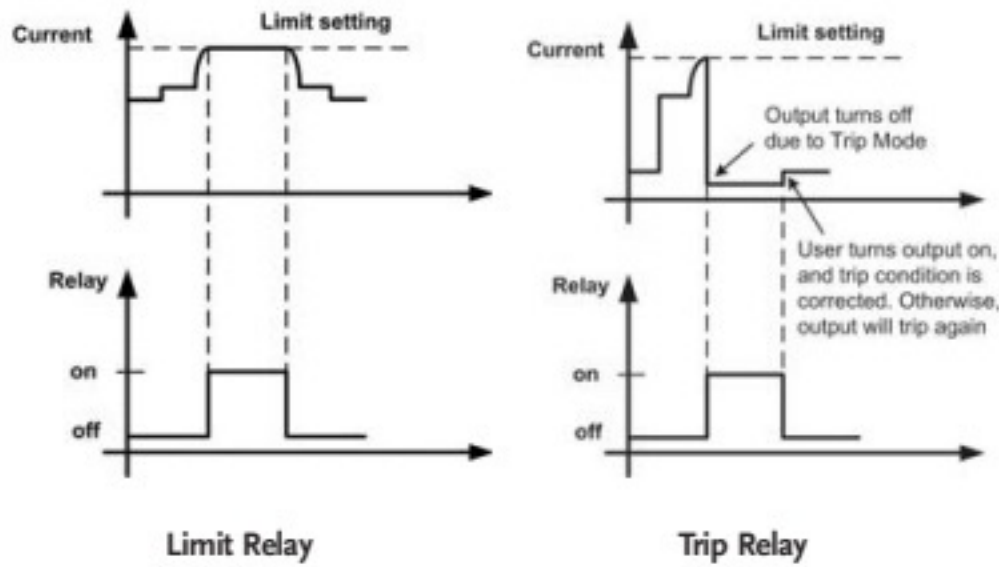
F. MEASUREMENTS FOR POWER CONSUMPTION ANALYSIS



Voltage and Current Waveforms of the Receiving Signals of a Cellular Phone

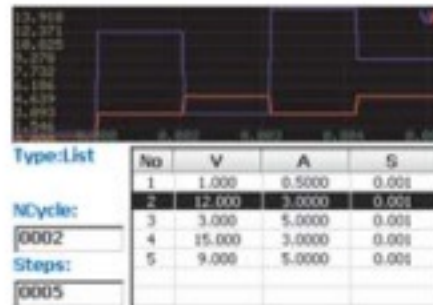
One particular requirement of power consumption for portable wireless communications devices is Pulse Current. Portable devices such as cellular phones must transmit and receive (detect) signal periodically by drawing pulse current instead of constant current from battery to ensure devices' sound connection in network. To analyze the transient power consumption of a DUT, the peak of short pulse current and average current measurements over a long period of time are crucial. PPH-Series provides pulse current and long integration functions, the former can measure the peak value of a pulse, the latter can measure the average value of pulses. PPH-Series provides DUT with pulse current measurement and analyzes the transient power consumption to qualify the device for specified power consumption requirements.

G. EXTERNAL RELAY CONTROL



PPH-Series provides Limit relay and Trip relay modes and is equipped with corresponding output ports, in which output signals control external relay. Under Limit relay mode and the current limit is reached, PPH-Series will switch from Constant Voltage to Constant Current automatically. Under "Trip relay" mode and the current limit is reached, PPH-Series will turn output off. Furthermore, External Relay control can be used if users simultaneously use other devices for test system. When "Limit Relay" mode is selected and the current limit is reached, External

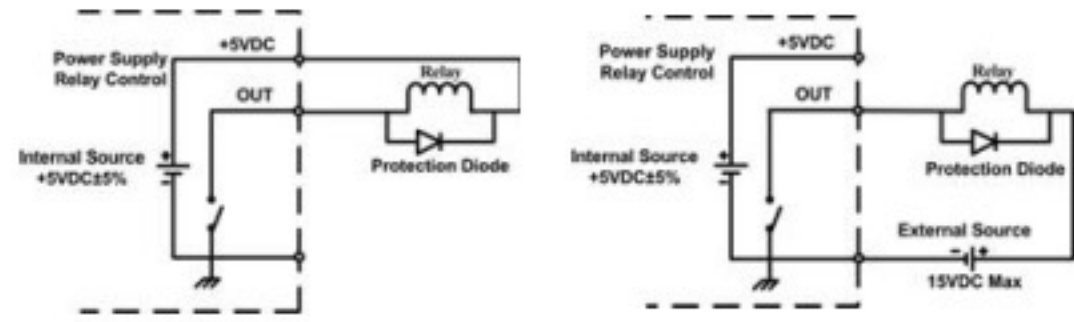
H. SEQUENCE FUNCTION



Functional Setting Page for Sequence Function

For the practical usage, PPH-15xxD can be programmed to output a sequential voltage variation according to the requirements. There are 1000 steps for users to edit output voltage, current and execution time. Programmable execution time range is from 0.001 second to 3600 seconds and the resolution is 0.001 second. Programmable recurring frequency is from 1 to 9999 or it can be set to infinite execution (set recurring frequency to 0).

Relay Can be Driven by Using Internal +5V or External Power Source :



+5VDC Relay Output

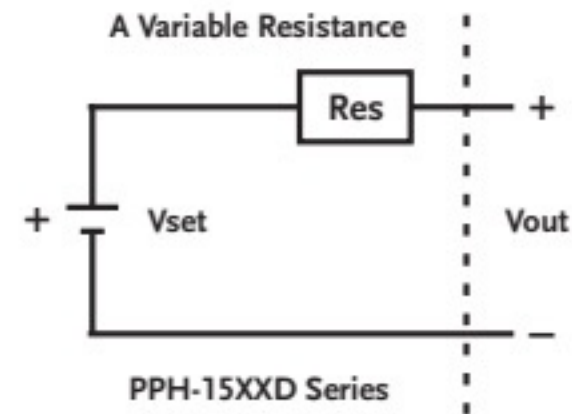
Using the +5VDC relay output to drive an external relay. Ensure the current does not exceed 150mA.

External Power Source

Using an external power source to drive the external relay. The voltage of the source can not exceed 15V and the current can not exceed 150mA.

Relay control signal will go high and will return back to the low level when the current level goes back below the constant current setting. When "Trip Relay" mode is selected and the current limit is reached, the relay control signal will go high and the output is disabled. When the output goes back on and the current is less than the current setting, the relay control signal will back to the low level. Users can use relay control signal to control other devices for test system.

I. BATTERY SIMULATION FUNCTION



Battery Equivalent Model

PPH-15xxD's battery simulation function is equivalent to a variable resistance circuit internally connected in series to simulate battery's output impedance. The function can also be regarded as a power supply with a variable internal resistor. The variable internal resistance range is from 0.000Ω to 1.000Ω and the resolution is 1mΩ. PPH-15xxD can be utilized as a battery or an ideal voltage source Vset to be connected with variable resistance Res in series. The following diagram shows battery simulation to produce output voltage Vout.

Programmable High-precision D.C. Power Supply



NEW

PPX-Series



FEATURES

- * CV, CC Priority Start Function
- * Four Levels of Current Measurement Resolution (min. 0.1μA)/Two Levels of Voltage Measurement Resolution (min. 0.1mV)
- * Power Output ON/OFF Delay Function
- * Adjustable Voltage and Current Slew Rate
- * Bleeder Circuit Control
- * Delayed Over-current Protection(OCP Delay)
- * Sequential Power Output Function
- * Remote Sensing Function & Data Logger
- * 10 Sets of Memory Function
- * Over Voltage Protection, Under Voltage Limit, Over Current Protection, Over Temperature Protection, AC Alarm Function
- * Supports K-Type Thermocouple Temperature Measurement
- * Interfaces: USB, LAN, RS-232, RS-485, Analog Control; Opt: GPIB

The PPX-Series programmable high-precision DC power supplies include six models; PPX-1005(10V/5A/50W), PPX-2002(20V/2A/40W), PPX-2005(20V/5A/100W), PPX-3601(36V/1A/36W), PPX-3603(36V/3A/108W), and PPX-10H01(100V/1A/100W). This series has the output low noise (0.35mVrms) and fast transient response characteristics (<50μs) of conventional linear power supplies. It also provides constant voltage and constant current priority output modes, and the series can also set the voltage and current rising/falling slew rates separately, and the delay time for the output to be turned on and off.

The PPX-Series has four current levels and two voltage levels to provide users with high-precision measurements, and via the Data Logger function, the measurement records can be stored in the USB for long-term measurement and recording of IoT devices, portable devices, wearable devices, and sensor components.

In order to extend the use time of portable devices and wearable devices, manufacturers are not only committed to improving the operating efficiency of the circuit, but also reducing standby power consumption as much as possible. In order to satisfy users' low-power measurement applications, GW Instek has launched the PPX-Series with current measurement resolutions (0.1μA, 1μA, 10μA, 0.1mA) and voltage measurement resolutions (0.1mV, 1mV) to provide power for portable devices and wearable devices. When the device enters the sleep mode or the standby mode, the PPX series can still measure the subtle current changes of the DUT.

The PPX-Series provides the Test Sequence function, which allows users to arbitrarily define output waveforms. The voltage rising or falling time and the voltage maintenance time of each step can be set. For the operation, users can directly edit parameters on the front panel of the PPX-Series, or the CSV file can be edited via computer and imported into the PPX-Series, and the PPX-Series can be remotely edited. In addition, the OCP Delay function of the PPX-Series allows users to flexibly adjust the time to enable the over-current protection according to the characteristics of the DUT to protect the DUT and at the same time to test the current change of the DUT within a certain period of time.

Other than voltage, current, and power measurement, the PPX-Series also supports temperature measurement. While collocating with a K Type Thermocouple, the temperature range can be measured from -200°C ~ +1372°C. Supported standard communication interfaces include USB, LAN, RS-232, RS-485 and optional GPIB interface.



PPX-Series

GTL-205A



GTL-259



GTL-260



GTL-261



GTL-262



SPECIFICATIONS

Model	PPX-1005	PPX-2002	PPX-2005	PPX-3601	PPX-3603	PPX-10H01
DC Output Mode						
Output Voltage	10.000V	20.000V	20.000V	36.000V	36.000V	100.00V
Output Current	5.0000A	2.0000A	5.0000A	1.0000A	3.0000A	1.0000A
Output Power	50W	40W	100W	36W	108W	100W
CONSTANT VOLTAGE OPERATION						
Line Regulation	±(0.01% of setting+1mV)	±(0.01% of setting+1mV)	±(0.01% of setting+1mV)	±(0.01% of setting+3mV)	±(0.01% of setting+3mV)	±(0.01% of setting+7mV)
Load Regulation	±(0.01% of setting+2mV)	±(0.01% of setting+2mV)	±(0.01% of setting+3mV)	±(0.01% of setting+3mV)	±(0.01% of setting+4mV)	±(0.01% of setting+7mV)
Transient Response ¹	<50µs	<50µs	<50µs	<50µs	<50µs	<100µs
Ripple Noise(Vrms ² /Vpp ³)	0.35mVrms/<6mVpp	0.5mVrms/<8mVpp	0.5mVrms/<8mVpp	0.8mVrms/<10mVpp	0.8mVrms/<10mVpp	1.2mVrms/<15mVpp
Rise Time ⁴	Rated load 20ms	50ms	50ms	50ms	50ms	100ms
	No load 20ms	50ms	50ms	50ms	50ms	100ms
Fall Time ⁵	Rated load 10ms	20ms	20ms	20ms	20ms	50ms
	No load 100ms	150ms	150ms	150ms	150ms	250ms
Setting Range (105%)	0V ~ 10.5V	0V ~ 21.0V	0V ~ 21.0V	0V ~ 37.8V	0V ~ 37.8V	0V ~ 105.0V
Setting Resolution	1mV	1mV	1mV	1mV	1mV	10mV
Setting Accuracy (23°C±5°C)	±(0.03% of setting+3mV)	±(0.03% of setting+5mV)	±(0.03% of setting+5mV)	±(0.03% of setting+8mV)	±(0.03% of setting+8mV)	±(0.03% of setting+20mV)
Remote Sensing Compensation Voltage(single line)	1V	1V	1V	1V	1V	3V
Temperature Coefficient (TYP.)	100 ppm/°C	100 ppm/°C	100 ppm/°C	100 ppm/°C	100 ppm/°C	100 ppm/°C
CONSTANT CURRENT OPERATION						
Line Regulation	±(0.02% of setting+250µA)	±(0.02% of setting+100µA)	±(0.02% of setting+250µA)	±(0.02% of setting+50µA)	±(0.02% of setting+150µA)	±(0.02% of setting+50µA)
Load Regulation	±(0.02% of setting+250µA)	±(0.02% of setting+100µA)	±(0.02% of setting+250µA)	±(0.02% of setting+50µA)	±(0.02% of setting+150µA)	±(0.02% of setting+50µA)
Ripple Noise(Arms ²)	2mA	1mA	2mA	400µA	1mA	1mA
Setting Range (105%)	0A ~ 5.25A	0A ~ 2.1A	0A ~ 5.25A	0A ~ 1.05A	0A ~ 3.15A	0A ~ 1.05A
Setting Resolution	0.1mA	0.1mA	0.1mA	0.1mA	0.1mA	0.1mA
Setting Accuracy (23°C±5°C)	±(0.05% of setting+3.0mA)	±(0.05% of setting+1.0mA)	±(0.05% of setting+3.0mA)	±(0.05% of setting+0.5mA)	±(0.05% of setting+1.5mA)	±(0.05% of setting+1.0mA)
Temperature Coefficient (TYP.)	200 ppm/°C	200 ppm/°C	200 ppm/°C	200 ppm/°C	200 ppm/°C	200 ppm/°C
MEASUREMENT AND DISPLAY						
Voltage Range	H 10.000V	20.000V	20.000V	36.000V	36.000V	100.00V
	L 1.0000V	2.0000V	2.0000V	3.6000V	3.6000V	10.000V
Current Range	H 5.0000A	2.0000A	5.0000A	1.0000A	3.0000A	1.0000A
	M 500.00mA	200.00mA	500.00mA	100.00mA	300.00mA	100.00mA
	L 50.000mA	20.000mA	50.000mA	10.000mA	30.000mA	10.000mA
	LL 5.0000mA	2.0000mA	5.0000mA	1.0000mA	3.0000mA	1.0000mA
Measurement Resolution	Voltage(H) 1mV	1mV	1mV	1mV	1mV	10mV
	Voltage(L) 0.1mV	0.1mV	0.1mV	0.1mV	0.1mV	1mV
	Current(H) 0.1mA	0.1mA	0.1mA	0.1mA	0.1mA	0.1mA
	Current(M) 0.01mA	0.01mA	0.01mA	0.01mA	0.01mA	0.01mA
	Current(L) 0.001mA	0.001mA	0.001mA	0.001mA	0.001mA	0.001mA
	Current(LL) 0.0001mA	0.0001mA	0.0001mA	0.0001mA	0.0001mA	0.0001mA
Measurement Accuracy	Voltage(H/L) ±(0.03% of rdg + 2mV)	±(0.03% of rdg + 4mV)	±(0.03% of rdg + 5mV)	±(0.03% of rdg + 6mV)	±(0.03% of rdg + 8mV)	±(0.03% of rdg + 15mV)
	Temperature Coefficient ⁶ (TYP.) 100 ppm/°C	100 ppm/°C	100 ppm/°C	100 ppm/°C	100 ppm/°C	100 ppm/°C
	Current(H/M) ±(0.05% of rdg + 2.5mA)	±(0.05% of rdg + 1.0mA)	±(0.05% of rdg + 2.5mA)	±(0.05% of rdg + 0.4mA)	±(0.05% of rdg + 1.2mA)	±(0.05% of rdg + 1.0mA)
	Current(L/LL) ±(0.1% of rdg + 40µA)	±(0.1% of rdg + 24µA)	±(0.1% of rdg + 40µA)	±(0.1% of rdg + 16µA)	±(0.1% of rdg + 28µA)	±(0.1% of rdg + 24µA)
	Temperature Coefficient ⁶ (TYP.) 200 ppm/°C	200 ppm/°C	200 ppm/°C	200 ppm/°C	200 ppm/°C	200 ppm/°C
TEMPERATURE MEASURED						
Temperature (K-Type Thermocouple)	Range -200°C~+1372°C					
	Resolution 0.25°C					
	Accuracy ±(0.5% + 2°C)					
PROTECTION						
Over Voltage Protection(OVP)	Operation Turns the output off, displays OVP and lights ALARM					
	Setting Range 0.5V ~ 11.0V	1.0V ~ 22.0V	1.0V ~ 22.0V	1.8V ~ 39.6V	1.8V ~ 39.6V	5.0V ~ 110.0V
	(5% to 110% of the rated output voltage)					
	Setting Accuracy ±(1% of rating)					
Over Current Protection(OCP)	Operation Turns the output off, displays OCP and lights ALARM					
	Setting Range 0.25A ~ 5.5A	0.1A ~ 2.2A	0.25A ~ 5.5A	0.05A ~ 1.1A	0.15A ~ 3.3A	0.05A ~ 1.1A
	(5% to 110% of the rated output current)					
	Setting Accuracy ±(1% of rating)					
Over Temperature Protection(OTP)	Operation Turns the output off, displays OTP and lights ALARM					
OTHER						
Interface Capabilities	LAN USB RS-232/RS-485	MAC Address, DNS IP Address, User Password, Gateway IP Address, Instrument IP Address, Subnet Mask				
Nominal Input Voltage ⁷	100Vac / 120Vac / 220Vac / 240Vac(±10%), 50Hz / 60Hz, single phase					
Input Frequency Range	47Hz ~ 63Hz					
Max. Inrush Current	25Amax 200VA	20Amax 150VA	30Amax 300VA	35Amax 150VA	40Amax 300VA	30Amax 300VA
Max. Power Consumption	0°C ~ 40°C					
Operating Temperature	-20°C ~ 70°C					
Storage Temperature	20% ~ 80% RH; No condensation					
Operating Humidity	20% ~ 85% RH; No condensation					
Storage Humidity	107(W) × 124(H) × 313(D) mm (not including protrusions); Approx. 5.5kg					
Dimensions & Weight						

NOTE: *1. Time for output voltage to recover within ±(0.1% + 10mV) of its rated output for a load change from 50% to 100% of its rated output current
 *2. Measurement frequency bandwidth is 5 Hz to 1 MHz
 *3. Measurement frequency bandwidth is 10 Hz to 20 MHz
 *4. From 10%~90% of rated output voltage, with rated resistive load
 *5. From 90%~10% of rated output voltage, with rated resistive load
 *6. Temperature coefficient: after a 30 minute warm-up
 *7. Before connecting the power plug to an AC line outlet, make sure the voltage selector switches of the bottom panel in the correct position. It might be damaged the instrument by connecting to the wrong AC line voltage

Programmable High-precision D.C. Power Supply

Rear Panel



GRA-441-J/E Rack Mount Kit(JIS/EIA)



ORDERING INFORMATION

PPX-1005	10V/5A/50W Programmable High-precision DC Power Supply
PPX-2002	20V/2A/40W Programmable High-precision DC Power Supply
PPX-2005	20V/5A/100W Programmable High-precision DC Power Supply
PPX-3601	36V/1A/36W Programmable High-precision DC Power Supply
PPX-3603	36V/3A/108W Programmable High-precision DC Power Supply
PPX-10H01	100V/1A/100W Programmable High-precision DC Power Supply

ACCESSORIES :

CD (User Manual), Power Cord, Test Lead(GTL-104A for PPX-1005/PPX-2005/PPX-3603, 1m, 10A)(GTL-105A for PPX-2002/PPX-3601, 1m, 3A)(GTL-204A for PPX-1005/PPX-2005/PPX-3603<European Type Jack Terminal>, 1m, 10A) (GTL-203A for PPX-2002/PPX-3601/PPX-10H01<European Type Jack Terminal>, 1m, 3A) (GTL-201A, Ground lead for European Type Jack Terminal)

OPTIONAL ACCESSORIES

GTL-246	USB Cable(USB 2.0 Type A-Type B Cable,4P)
GTL-205A	Temperature probe adapter(thermal coupling, K-Type), about 1000mm
GTL-258	GPIB Cable, 2000mm
GTL-259	RS-232 Cable with DB9 connector to RJ45
GTL-260	RS-485 Cable with DB9 connector to RJ45
GTL-261	Serial Master Cable+Terminator, 0.5M
GTL-262	RS-485 Slave cable
GRA-441-J	Rack for PPX-Series(JIS)
GRA-441-E	Rack for PPX-Series(EIA)
PPX-G	GPIB Interface(factory installed)

A. DISPLAY MODE



Voltage and Current



Voltage, Current and Wattage



Voltage, Current and Sequence Test

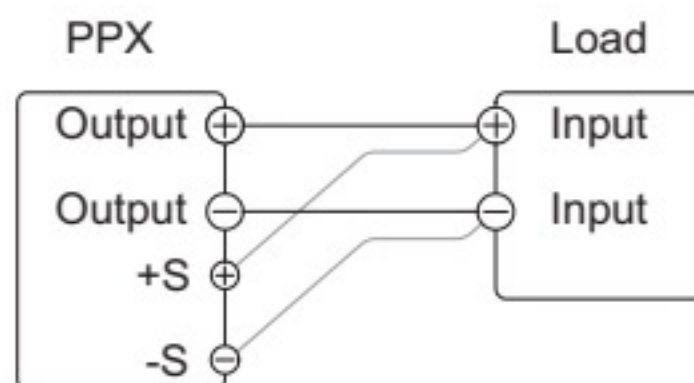


Voltage, Current and Temperature Measurement

The PPX-Series has four display modes, namely 1) voltage and current 2) voltage, current and wattage 3) voltage, current and Sequence Test 4) voltage, current and temperature measurement,

which are convenient for users to switch to different display modes according to test requirements.

B. REMOTE SENSING



REMOTE SENSING CONNECTION DIAGRAM

The Remote Sensing function can be used to compensate for the voltage drop caused by the resistance on the test connection lead from the power output to the load. PPX-1005/2002/2005/3601/3603 compensates for voltages up to 1 volt, and PPX-10H01 compensates

for voltages up to 3 volts. When testing, choose a test connection lead with a voltage drop less than the compensation voltage of the PPX series as much as possible.

C. TEMPERATURE MEASUREMENT



Blue: Temperature Control on with no GTL-205A Connected



Green: Output Safe is Activated and Output is on with GTL-205A Connected



White: Temperature Control on with GTL-205A Connected



Red: The Alarm of Short Circuit Occurs From Temperature Measurement

The PPX-Series can measure DUT temperature while outputting power. Before measuring the temperature, please use the optional accessory GTL-205A (temperature probe adapter with K-type thermocouple) to connect the DUT and TC input terminals on the front panel of the PPX-Series respectively. During the measurement process, users can set the monitoring

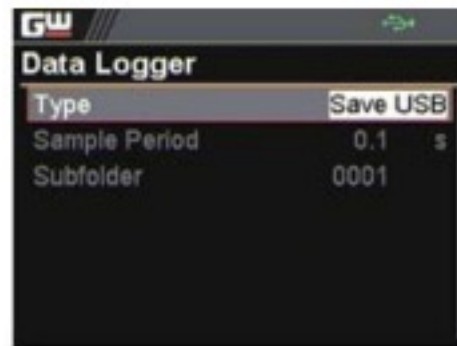
temperature for the DUT. Once the measurement temperature reaches the monitoring temperature value, the PPX-Series will stop the output. The PPX-Series can measure the temperature range of -200.0°C ~ 1372.0°C (-328.0°F ~ 2501.6°F). Users can choose the display unit as $^{\circ}\text{C}$ or $^{\circ}\text{F}$ according to the requirement.

D. DATA LOGGER



Data Logger Function

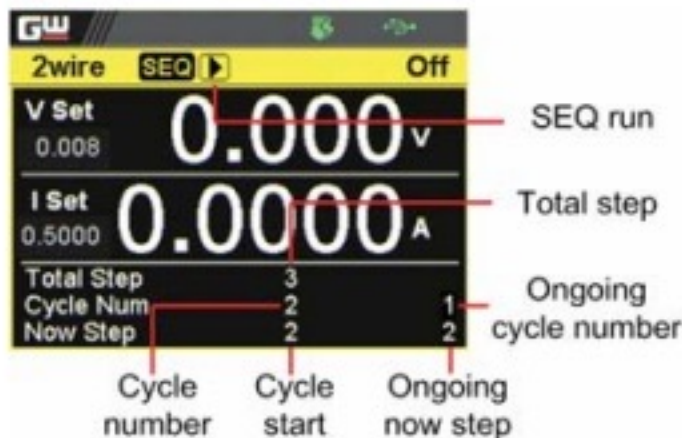
Dlog Icon Appears



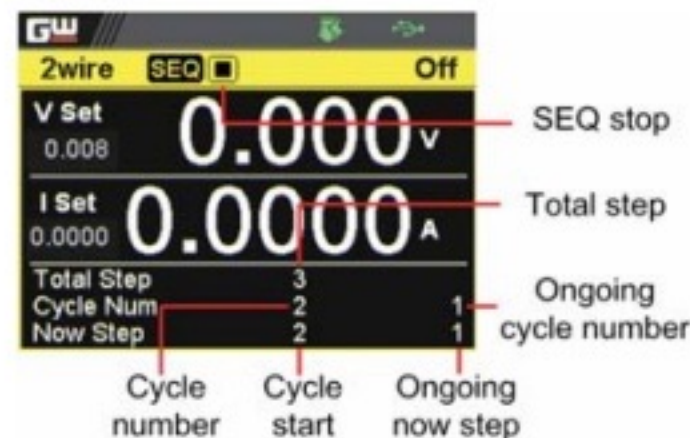
Save Data Log Into USB Disk

The PPX-Series can record the measured voltage, current and temperature data to a USB flash drive or can be remotely controlled to read the data. Data sampling interval is 0.1~999.9 seconds.

E. SEQUENCE TEST



SEQ Run in Cycle Mode



SEQ Stop in Cycle Mode

The Sequence Test function allows users to plan the PPX-Series to execute a sequential power output. The PPX-Series will automatically execute the planned power output to the DUT to realize automated measurement. The PPX-Series can store

Programmable High-precision D.C. Power Supply

F. V/I SLEW RATE

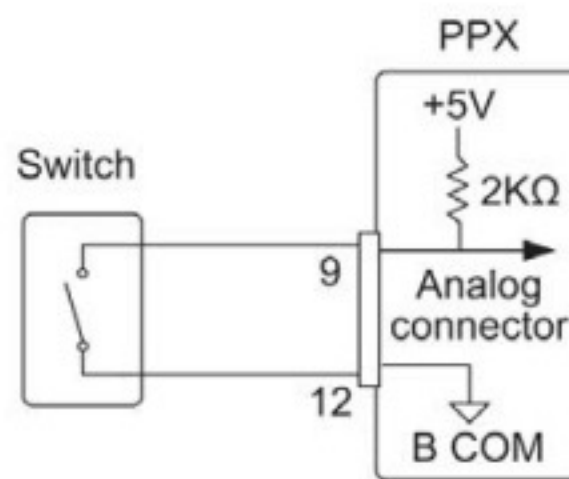
Model	R_V Slew Rate/ F_V Slew Rate Setting Range
PPX-1005	0.0001V/ms ~ 0.1V/ms
PPX-2002	0.0001V/ms ~ 0.2V/ms
PPX-2005	0.0001V/ms ~ 0.2V/ms
PPX-3601	0.0001V/ms ~ 0.36V/ms
PPX-3603	0.0001V/ms ~ 0.36V/ms
PPX-10H01	0.001V/ms ~ 0.5V/ms

Voltage Rising/Falling Slew Rate

The PPX-Series can adjust the slew rate of current and voltage. Via setting the rising and falling time of voltage and current, users can verify the performance of the DUT during the voltage/current changes. In addition, the adjustment of the slew

rate slows down the voltage transfer, which can effectively avoid the damage of the inrush current to the DUT, therefore, the series is especially suitable for the testing of capacitive loads and motors.

G. ANALOG REMOTE CONTROL

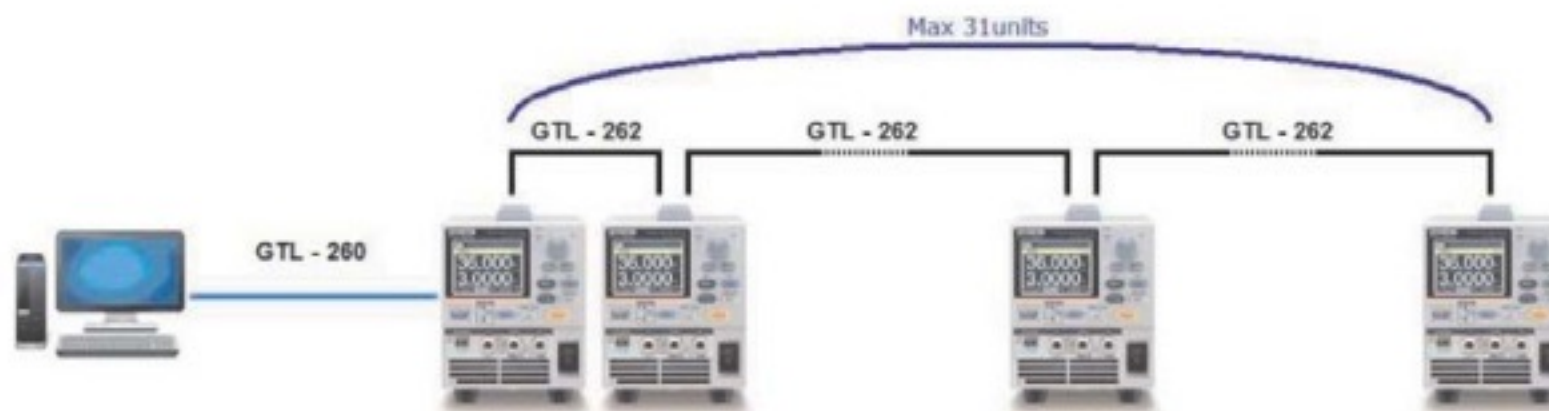


External Control of Output

The PPX-Series supports the analog control function, including external voltage to control voltage output/current output, external resistance to control voltage output/current output, external

control of power output, trigger input/trigger output, and voltage/current monitoring.

H. MULTIPLE UNIT CONNECTION



Multiple Unit Connection

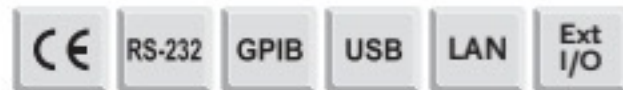
The PPX series can connect up to 31 units. The PC is connected to the first unit of PPX through GTL-260, and the remaining PPX units are connected in a daisy-chained method via GTL-262. When using PPX-Series Multiple Unit Connection for remote program

control and slave expansion, there is no need to use other remote control equipment (E.g. switch/Hub), which can help users save equipment purchase costs.

Triple-channel Programmable DC Power Supply



GPP-3060/6030/3650 NEW



FEATURES

- ✦ 4.3" TFT LCD Display
- ✦ Setting Resolution: 1mV/0.1mA;
Read Back Resolution: 0.1mV/0.1mA
- ✦ Low Ripple Noise: $\leq 1\text{mVrms}/\leq 2\text{mArms}$
- ✦ Transient Response Time: $\leq 100\mu\text{s}$
- ✦ Load Function (CC, CV, CR mode)
- ✦ Tracking Series and Parallel Function without Additional External Wiring
- ✦ Utilizing Hardware to Realize Over Voltage Protection/Over Current Protection/Over Temperature Protection
- ✦ Delay Function/Output Monitoring Function/Output Recorder Function
- ✦ Supports Setting Value, Measurement Value and Output Waveform Display
- ✦ Sequential Output Function and Built-in 8 Template Waveforms
- ✦ The Output Recorder Function Records the Output Voltage & Current Parameters with a Minimum Recording Interval of 1 Second
- ✦ Provides 10 Sets of Memory for Each Sequence/Delay/Recorder/Panel Setting Condition
- ✦ GPP-3060/6030 Supports a USB (Type A) Output Terminal
- ✦ Intelligent Temperature Control Fan Effectively Reduces Noise
- ✦ Standard: RS-232, USB, Ext I/O
Optional (manufacturer installed only): LAN, LAN+GPIB

GRA-449-J Rack Mount Kit (JIS)



GRA-449-E Rack Mount Kit (EIA)



GPP-3060 and GPP-6030 triple-channel programmable DC power supplies are extension models of the GPP-X323 series. The maximum output power of these three models is 385W. GPP-3650 supports CH1/CH2: 0 ~ 36V / 0 ~ 5A output; CH3 supports 1.8V, 2.5V, 3.3V, 5.0V / 5A. GPP-3060 supports CH1/CH2: 0 ~ 30V / 0 ~ 6A output; GPP-6030 supports CH1/CH2: 0 ~ 60V / 0 ~ 3A output; CH3 of both models supports 1.8V, 2.5V, 3.3V, 5.0V/5A.

GPP-3650, GPP-3060 and GPP-6030 inherit the high program resolution (1mV/0.1mA) and read back resolution (0.1mV/0.1mA) of the GPP series with low-ripple noise characteristics $\leq 1\text{mVrms}/\leq 2\text{mArms}$ and $\leq 100\mu\text{s}$ output transient recovery ability. An independent output on-off switch is provided for each channel.

For series and parallel applications of CH1 and CH2, the tracking function can automatically switch to series or parallel output without additional external wiring. Multiple display modes including single channel or multi-channel setting value, measurement value and waveform display to collocate with the built-in output monitoring function allow users to set the monitoring conditions according to their needs so as to generate an alarm or stop the output during the measurement process in order to stop the measurement and protect the customer's DUT. The output recorder function can record the voltage/current of the output process in the internal memory, and save the result as a (*.REC) or (*.CSV) file, and then save it to a USB flash drive. The unique load function of the GPP series can arbitrarily set CH1/CH2 as power supply or load function. For example, one channel is set as power output, and the other channel is set as load function to consume the power of the DUT to satisfy simple battery charging and discharging or load characteristic test by a single power supply. The sequence output function allows users to edit the power output waveforms by themselves, and also allows users to set the sequential constant voltage (CV) or constant current (CC) load waveforms such as serial power output or dynamic load simulation test. Channel 3 (CH3) incorporates 3A USB (Type A) output terminal, which can be used for USB charging test.

Pertaining to measurement protections, OVP/OCP/OPP/OTP protection functions are provided. The protection mechanism of OVP/OCP/OTP is implemented by hardware circuits, which has a faster response time to protect equipment or DUT while comparing with competitors who use software for protection. The OVP and OCP functions allow users to set the protection action point according to the conditions of the DUT. OPP only provides protection during the operation of the load function.

In addition, GPP-3650, GPP-3060 and GPP-6030 incorporate terminal output on the rear panel, and include a voltage remote sensing terminal. Users can choose front panel or rear panel terminal output, which is convenient for stand-alone or rack operation. Output value setting and Sequence/ The Delay/Recorder functions provide 10 sets of internal memory, which can be uploaded/stored by a USB flash drive.



GPP-3650

Rear Panel



European Type Jack Terminal



Triple-channel Programmable DC Power Supply

SPECIFICATIONS

		GPP-3060			GPP-6030			GPP-3650		
Output Mode										
Number of Channel		CH1	CH2	CH3	CH1	CH2	CH3	CH1	CH2	CH3
Voltage		0 ~ 30.000V	0 ~ 30.000V	1.8V/2.5V/3.3V/5.0V,±5%	0 ~ 60.000V	0 ~ 60.000V	1.8V/2.5V/3.3V/5.0V,±5%	0 ~ 36.000V	0 ~ 36.000V	1.8V/2.5V/3.3V/5.0V,±5%
Current		0 ~ 6.0000A	0 ~ 6.0000A	5A (USB Port 3A)	0 ~ 3.0000A	0 ~ 3.0000A	5A (USB Port 3A)	0 ~ 5.0000A	0 ~ 5.0000A	5A (USB Port 3A)
Tracking Series Voltage / Current		0 ~ 60.000V / 0 ~ 6.0000A	-	-	0 ~ 120.000V / 0 ~ 3.0000A	-	-	0 ~ 72.000V / 0 ~ 5.0000A	-	-
Tracking Parallel Voltage / Current		0 ~ 30.000V / 0 ~ 12.0000A	-	-	0 ~ 60.000V / 0 ~ 6.0000A	-	-	0 ~ 36.000V / 0 ~ 10.0000A	-	-
Warning		The CH3 output current from the 2 terminals should Not exceed 5A.								
Constant Voltage Operation										
Line Regulation		≤ 0.01% + 3mV	≤ 3mV		≤ 0.01% + 3mV	≤ 3mV		≤ 0.01% + 3mV	≤ 3mV	
Load regulation		≤ 0.01% + 5mV (rating current ≤ 10A)	≤ 5mV		≤ 0.01% + 5mV (rating current ≤ 10A)	≤ 5mV		≤ 0.01% + 5mV (rating current ≤ 10A)	≤ 5mV	
Ripple & noise (5Hz-1MHz)		≤ 1mVrms	≤ 2mVrms		≤ 1mVrms	≤ 2mVrms		≤ 1mVrms	≤ 2mVrms	
Transient recovery time		≤ 100µs (50% load change - minimum load 0.5A)								
Temperature coefficient		≤ 300ppm/°C								
Constant Current Operation										
Line Regulation		≤ 0.01% + 3mA								
Load regulation		≤ 0.01% + 3mA								
Ripple & noise		≤ 2mArms								
Resolution										
Programming	Voltage	1mV			2mV			2mV		
	Current	0.2mA			0.1mA			0.1mA		
Reedback	Voltage	0.1mV			0.1mV			0.1mV		
	Current	0.1mA			0.1mA			0.1mA		
Tracking Operation(CH1/CH2)										
Tracking error		≤ 0.1% + 10mV of Master (No Load, with load add load regulation ≤ 200mV)			≤ 0.2% + 20mV of Master (No Load, with load add load regulation ≤ 200mV)			≤ 0.1% + 10mV of Master (No Load, with load add load regulation ≤ 200mV)		
Parallel regulation	Line	≤ 0.01% + 3mV			≤ 0.01% + 3mV			≤ 0.01% + 3mV		
	Load	≤ 0.01% + 5mV (rating current ≤ 10A) ≤ 0.02% + 5mV (rating current > 10A)			≤ 0.01% + 5mV (rating current ≤ 10A) ≤ 0.02% + 5mV (rating current > 10A)			≤ 0.01% + 5mV (rating current ≤ 10A) ≤ 0.02% + 5mV (rating current > 10A)		
Series regulation	Line	≤ 0.01% + 5mV			≤ 0.01% + 5mV			≤ 0.01% + 5mV		
	Load	≤ 200mV			≤ 200mV			≤ 200mV		
Ripple & noise		≤ 2mVrms(5Hz-1MHz)			≤ 2mVrms(5Hz-1MHz)			≤ 2mVrms(5Hz-1MHz)		
Note		Tracking is not supported in LOAD mode.								
Meter										
Full Scale	Voltage	32.0000V	1.8V/2.5V/3.3V/5.0V		62.0000V	1.8V/2.5V/3.3V/5.0V		36.0000V	1.8V/2.5V/3.3V/5.0V	
	Current	6.2000A			3.2000A			5.2000A		
Programming	Voltage	5 digits			5 digits			5 digits		
	Current	5 digits			5 digits			5 digits		
Reedback	Voltage	6 digits			6 digits			6 digits		
	Current	5 digits			5 digits			5 digits		
Setting accuracy	Voltage	± (0.03% of reading + 10mV)			± (0.03% of reading + 10mV)			± (0.03% of reading + 10mV)		
	Current	± (0.3% of reading + 10mA)			± (0.3% of reading + 10mA)			± (0.3% of reading + 10mA)		
Reedback accuracy	Voltage	± (0.03% of reading + 10mV)			± (0.03% of reading + 10mV)			± (0.03% of reading + 10mV)		
	Current	± (0.3% of reading + 10mA)			± (0.3% of reading + 10mA)			± (0.3% of reading + 10mA)		
DC Load Mode										
Display	Voltage	1 ~ 32.00V			1 ~ 62.00V			1 ~ 36.5.00V		
	Current	0 ~ 6.200A			0 ~ 3.200A			0 ~ 5.200A		
CV Mode	Power	0 ~ 50.00W			0 ~ 50.00W			0 ~ 50.00W		
	CH1/CH2	1.500V - 32.00V			1.500V - 62.00V			1.500V - 36.50V		
	Setting Accuracy	≤ ±(0.1% + 30mV)			≤ ±(0.1% + 30mV)			≤ ±(0.1% + 30mV)		
	Reedback Accuracy	≤ ±(0.1% + 30mV)			≤ ±(0.1% + 30mV)			≤ ±(0.1% + 30mV)		
	Resolution	10mV			10mV			10mV		
CC Mode	CH1/CH2	0 ~ 6.200A			0 ~ 3.200A			0 ~ 5.200A		
	Setting Accuracy	≤ ±(0.3% + 10mA)			≤ ±(0.3% + 10mA)			≤ ±(0.3% + 10mA)		
	Reedback Accuracy	≤ ±(0.3% + 10mA)			≤ ±(0.3% + 10mA)			≤ ±(0.3% + 10mA)		
CR Mode	Resolution	1mA			1mA			1mA		
	CH1/CH2	1Ω- 1kΩ			1Ω- 1kΩ			1Ω- 1kΩ		
	Setting Accuracy	≤ ±(3% + 1Ω)			≤ ±(3% + 1Ω)			≤ ±(3% + 1Ω)		
	Reedback Accuracy	(voltage≥0.1V, and current≥0.1A) ≤ ±(3% + 1Ω)			(voltage≥0.1V, and current≥0.1A) ≤ ±(3% + 1Ω)			(voltage≥0.1V, and current≥0.1A) ≤ ±(3% + 1Ω)		
	Resolution	1Ω			1Ω			1Ω		
Protection										
OVP	Power Mode	OFF,ON(0.5V-35.0V)		Fixed 5.5V	OFF,ON(0.5V-65.0V)		Fixed 5.5V	OFF,ON(0.5V-38.0V)		Fixed 5.5V
	Load Mode	OFF,ON(1.5V-35.0V)		-	OFF,ON(1.5V-65.0V)		-	OFF,ON(1.5V-38.0V)		-
	Setting Accuracy				±100mV			±100mV		
OCP	Power Mode	OFF,ON(0.05A-6.50A)		3.1A(USB port)	OFF,ON(0.05A-3.50A)		3.1A(USB port)	OFF,ON(0.05A-5.50A)		3.1A(USB port)
	Load Mode	OFF,ON(0.05A-6.50A)		-	OFF,ON(0.05A-3.50A)		-	OFF,ON(0.05A-5.50A)		-
	Setting Accuracy				±20mA			±20mA		
Insulation resistance	Between chassis and terminal	20MΩ or above (DC 500V)								
	Between chassis and DC power cord	30MΩ or above (DC 500V)								
General										
Operation Environment		Indoor use, Altitude: ≤ 2000m								
		Ambient temperature: 0 ~ 40°C								
		Relative humidity: ≤ 80%								
Storage Environment		Installation category: II / Pollution degree: 2								
		TEMPERATURE: -10°C ~ 70°C								
Power Input		HUMIDITY: ≤ 70%								
Power Consumption		AC 100V/120V/220V/230V±10%, 50/60Hz								
Accessories		900VA, 680W								
		CD User manual x1, Quick Start manual x1, Power Code x1								
		Test lead: GTL-104A x 3 (Europe) Test lead: GTL-204A x 3, GTL-201A x 1								
Dimensions		213 (W) x 145 (H) x 362 (D) mm								
Weight		Approx. 10kg								

ORDERING INFORMATION

GPP-3060 385W Triple-channel Programmable DC Power Supply

GPP-3650 385W Triple-channel Programmable DC Power Supply

GPP-6030 385W Triple-channel Programmable DC Power Supply

ACCESSORIES :

CD (User manual), Quick start manual, Power cord, test lead: GTL-104A x 3, European test leads: GTL-204A x 3, GTL-201A x 1

OPTIONAL ACCESSORIES

GTL-246 USB Cable

GRA-449-E Rack Mount Kit (EIA)

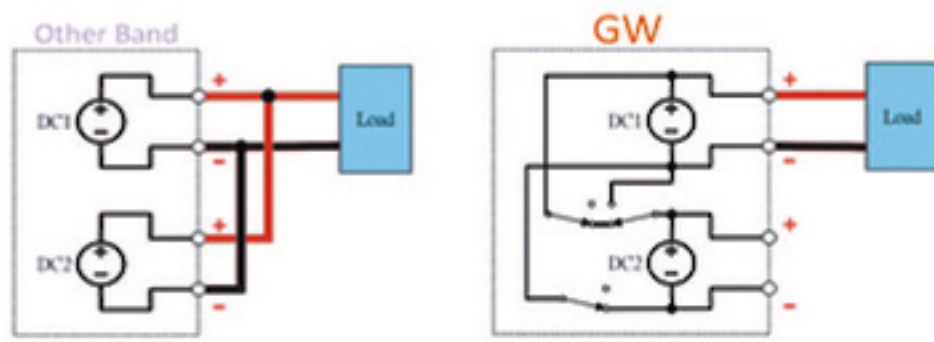
GRA-449-J Rack Mount Kit (JIS)

INTERFACE

Standard: RS-232, USB, Ext I/O, Optional(manufacturer installed only): LAN, GPIB+LAN

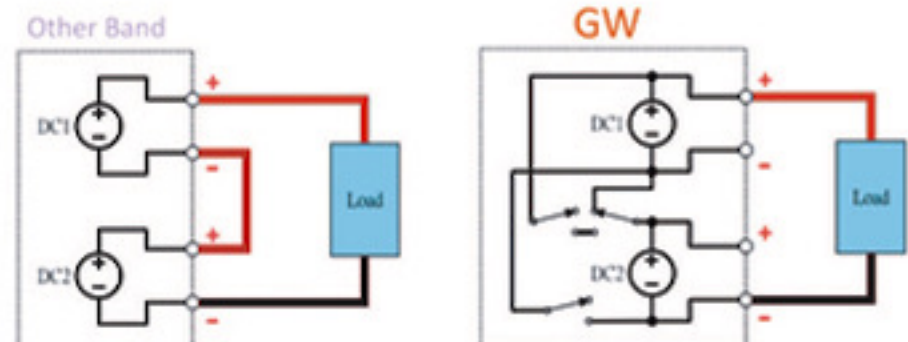
NOTE: Contact local sales if you have issues with Interface purchase.

A. TRACKING SERIES AND PARALLEL FUNCTION



Output in Parallel Connections

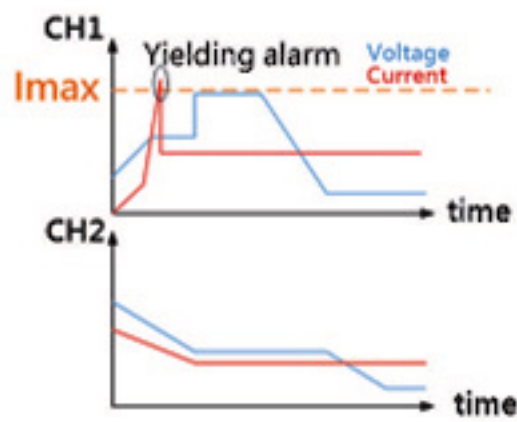
For series and parallel applications of CH1 and CH2, the tracking function of the GPP-Series utilizes the internal circuit to automatically switch the output to serial or parallel output without additional external wiring, providing users with convenience not only in operating procedures but also a more stable output.



Output in Series Connections

The tracking function design of other brands requires additional external wiring connections for the output in series or parallel. However, excessively long, thin or inconsistent external wiring may cause inaccurate voltage or current output.

B. OUTPUT MONITORING FUNCTION



Output Monitoring

The output monitoring function allows users to set the monitoring conditions according to the requirements, including the voltage, current, and power greater than or less than the setting and the logical relationship of AND, OR. It also allows users to sound



Monitoring Function Setting

alarms or stop the output during the measurement process, stop the measurement, and protect the customer's DUT. Both Channel could be monitored simultaneously as well.

* Channel 3 does not support the output monitoring function.

C. SEQUENCE OUTPUT FUNCTION

Output Waveform of the GPP-6030/3060

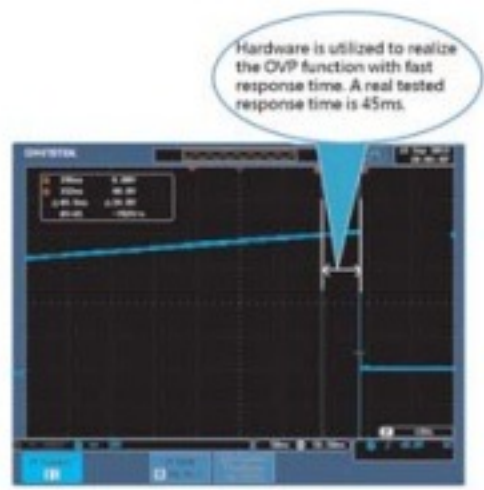
The GPP-Series provides a sequential output function on Channel 1 and Channel 2. This function not only allows users to edit the power output waveform, but also allows users to set the sequential constant voltage (CV) or constant current (CC) load waveform, i.e. a serial power output or a simulation test of a dynamic load. The maximum settable points for sequence function are 2048, and interval range of each point can be set from 1 to 300 seconds. In order to simplify the setting of waveform editing, the GPP-Series has 8 built-in Templet waveforms in sequence output function for

users to directly apply for output, including Sine, Pulse, Ramp, Stair Up, Stair Dn, Stair UpDn, Exp Rise, and Exp Fall waveforms.

The editing data of the sequence output can be stored in the internal 10 sets of the memory, or to be saved by USB flash drive (Save/Recall) and saved as *.SEQ or *.CSV file; The stored *.CSV can be exported into Excel for editing and analysis. The final edited file can be imported to (Save/Recall) of the power supply using a USB flash drive.

Triple-channel Programmable DC Power Supply

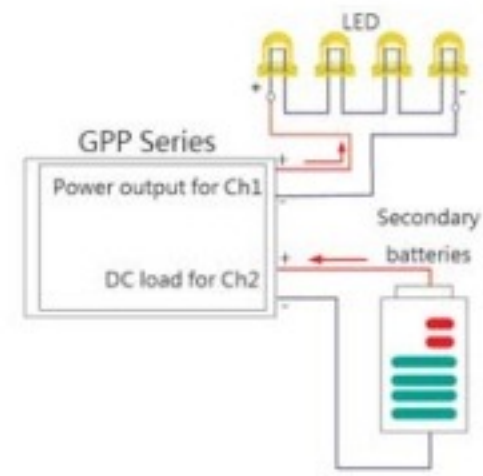
D. HARDWARE PROTECTION FUNCTION(OVP/OCP/OTP)



OVP Trigger

The protection mechanism of OVP/OCP/OTP is implemented by hardware circuit, which has the advantage of faster response time than competitors who use software to achieve protection. When it is detected that the voltage of the DUT exceeds the setting value of the OVP, the output of the power supply can be stopped in a short time to achieve the purpose of protecting the DUT.

E. LOAD FUNCTION



GPP-Series Application

The CH1/CH2 of the GPP series is designed with the load function. A single power supply can meet the basic battery charging and discharging test requirements. It can provide power output in channel 1 and channel 2. The rated constant voltage load (CV), rated constant current load (CC) and maximum 1kΩ constant resistance load (CR) function are built-in to allow users to conduct discharging test without using an electronic load. In application, users can also set either that one channel of the single GPP series as the power output, one channel as the load function to consume the power of the DUT, or that both channels as load functions to consume the power of different loads simultaneously.

F. OUTPUT DELAY FUNCTION

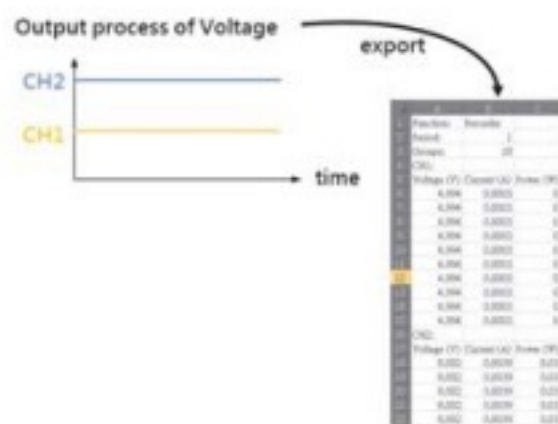


GPP-Series Delayed Waveform

Output delay function allows users to edit the timing waveform of the power output on/off when the front panel voltage and current settings are unchanged. In order to simplify the setting of waveform editing, the GPP-Series has three built-in timing modes in the delay output function, including Fixtime, Increase, Decline for users to apply directly. The editing data of the output delay can be stored in

the internal 10 sets of memory, or to be saved by USB flash drive (Save/Recall) and saved as *.DLY or *.CSV file. The stored *.CSV can be exported into Excel for editing and analysis. The final edited file can be exported to (Save/Recall) of the power supply using a USB flash drive.

G. OUTPUT RECORDER FUNCTION



Schematic Diagram for Recorder Function

The output recorder function records the voltage & current parameters of the output process. The recording interval of each point can be set according to user's requirements, and the shortest interval is 1 second and the longest is 300 seconds. The results can be stored in *.REC or *.CSV format to the power supply or directly



Recorder Function Setting



Save as *.REC

saved in the USB flash drive. The stored *.CSV can be exported into Excel to conduct the future analysis. (*.REC can be saved to 2048 records, *.CSV can be saved to 614400 records)

* Channel 3 does not support the output recorder function

Multi-output Programmable D.C. Power Supply



GPP-Series



FEATURES

- ✦ 4.3" TFT LCD Display
- ✦ Supports Setting Value, Measurement Value and Output Waveform Display
- ✦ Load Function (CC, CV, CR Mode)
- ✦ Setting Resolution: 1mV/0.1mA ; Read Back Resolution: 0.1mV/0.1mA
- ✦ Low Ripple Noise: $\leq 350\mu\text{Vrms}/\leq 2\text{mArms}$
- ✦ Transient Response Time: $\leq 50\mu\text{s}$
- ✦ Tracking Series and Parallel Function without Additional External Wiring
- ✦ Utilizing Hardware to Realize Over Voltage Protection/Over Current Protection/Over Temperature Protection
- ✦ Delay Function/Output Monitoring Function/Output Recorder Function
- ✦ Intelligent Temperature Control Fan Effectively Reduces Noise
- ✦ Sequential Output Function and Built-in 8 Template Waveforms
- ✦ The Output Recorder Function Records The Output Voltage & Current Parameters with A Minimum Recording Interval of 1 Second
- ✦ Provides 10 Sets of Memory for Each Sequence /Delay/Recorder/Panel Setting Condition
- ✦ GPP-3323 Supports A USB(Type A) Output Terminal
- ✦ Standard: RS-232, USB, Ext I/O; Optional (Manufacturer Installed Only) : LAN, GPIB+LAN
- ✦ Compatible with Commands of GPD-X303S Series

With the maximum output power of 217W, the GPP-Series, the multi-channel programmable DC power supply, includes four models: GPP-1326 (0–32V/0–6A) for single-channel output and GPP-2323 for dual-channel output (CH1:0–32V/0–3A, CH2:0–32V/0–3A), GPP-3323 for three-channel output (CH1: 0–32V/0–3A, CH2:0–32V/0–3A, CH3: 1.8V, 2.5V, 3.3V, 5.0V/5A) and GPP-4323 for four-channel output (CH1:0–32V/0–3A, CH2:0–32V/0–3A, CH3:0–5V/0–1A, CH4: 0–15V/0–1A). This series not only provides high program resolution (1mV/0.1mA) and read back resolution (0.1mV/0.1mA), but also features optimal low-ripple noise characteristics $\leq 350\mu\text{Vrms}/\leq 2\text{mArms}$ and output transient recovery capability $\leq 50\mu\text{s}$. Independent output on-off switch is provided for each channel.

For series and parallel applications of CH1 and CH2, the tracking function of the GPP-Series utilizes the internal circuit to automatically switch the output to serial or parallel output without additional external wiring, providing users with convenience not only in operating procedures but also a more stable output. The tracking function design of other brands requires additional external wiring connections for the output in series or parallel. However, excessively long, thin or inconsistent external wiring may cause inaccurate voltage or current output.

The GPP-Series offers a variety of display modes, including single or multi-channel setting values, measurement values, and waveform displays. The Monitor function of the GPP-Series allows users to set monitoring conditions according to requirements, sound alarms or stop output during the measurement process, and stop measurement and protect the customer's DUT. The GPP-Series provides output recorder function, which records the voltage/current of the output process to the internal memory, and the result can be stored as a (*.REC) or (*.CSV) file, which can then be transferred to the USB flash drive. The stored *.CSV can be exported to the Excel to conduct the future analysis.

The CH1/CH2 of the GPP-Series are designed with the load function. A single power supply can set one channel as the power output, and one channel for the load function to consume the power of the DUT so as to meet the basic charging and discharging test requirements for battery. Channel 1 and channel 2 not only provide 32V/3A power output, but also feature built-in maximum 32V constant voltage load (CV), maximum 3.2A constant current load (CC) and maximum 1k Ω constant resistance load (CR) function.

The GPP-Series provides the sequential output function on Channel 1 and Channel 2. This function not only allows users to edit the power output waveform, but also allows users to set the sequential constant voltage (CV) or constant current (CC) load waveform, i.e. a serial power output or a simulation test of a dynamic load. In order to simplify the setting of waveform editing, the GPP-Series has 8 built-in Template waveforms in the sequence output function for users to directly apply for output, including Sine, Pulse, Ramp, Stair Up, Stair Dn, Stair UpDn, Exp Rise, Exp Fall waveforms.

The sound protection functions include OVP/OCP/OPP/OTP, in which the protection mechanism for OVP/OCP/OTP is implemented by hardware circuit that has the advantage of faster response time compared with competitors who adopt software to achieve protections. The OVP/OCP functions allow users to set the protection action point (except CH3 of GPP-3323) according to the conditions of the DUT. The OPP is only activated during the operation of the load function. The Delay Function sets the length of time during channel 1 or channel 2 power output on or during power output off.

In addition, the Trigger In/Trigger Out functions synchronize external devices. The GPP-3323 channel 3 adds a 3A USB (Type A) output terminal for USB charging test. The intelligent temperature-controlled fan can adjust the speed according to the temperature of the power transistor so as to reduce unnecessary noise. The output value setting and the Sequence/Delay/Recorder functions provide 10 sets of internal memory for use, and can be loaded/stored using a USB flash drive. In addition to the standard RS-232 and USB remote interfaces, the GPP-Series also has an optional LAN or LAN+GPIB interface to facilitate different requirements. The commands of the GPP-Series conform to SCPI requirements and are compatible with the commands of the GPD-X303S Series.

European Type Jack Terminal



Rear Panel (LAN+GPIB)



Rear Panel (LAN)



Rear Panel



OUTPUT FUNCTION LIST

Model Number	GPP-4323			
	GPP-3323			
	GPP-2323			
	GPP-1326			
Number of Outputs	CH1	CH2	CH3	CH4
Sequence Output Function	✓	✓		
Load Functions (CC, CV, CR mode)	✓	✓		
Output Delay Function	✓	✓		
Output Monitoring Monitor(10 sets)	✓	✓	(GPIB not supported)	✓
Output Recorder Function	✓	✓	(GPIB not supported)	✓
Panel Save/Recall	✓	✓	✓	✓

Multi-output Programmable D.C. Power Supply

SPECIFICATIONS

		GPP-1326	GPP-2323	GPP-3323		GPP-4323					
OUTPUT MODE											
Number of Channel		CH1	CH1	CH2	CH1	CH2	CH3	CH1	CH2	CH3	CH4
Voltage		0 - 32.000V	0 - 32.000V	0 - 32.000V	0 - 32.000V	0 - 32.000V	1.8V/2.5V/3.3V/5.0V, ±5%	0 - 32.000V	0 - 32.000V	0 - 5.000V	0 - 15.000V
Current		0 - 6.0000A	0 - 3.0000A	0 - 3.0000A	0 - 3.0000A	0 - 3.0000A	5A (USB Port 3A)	0 - 3.0000A	0 - 3.0000A	0 - 1.0000A	0 - 1.0000A
Tracking Series Voltage/Current		-	0 - 64.000V / 0 - 3.0000A	0 - 64.000V / 0 - 3.0000A	-	-	-	0 - 64.000V / 0 - 3.0000A	-	-	-
Tracking Parallel Voltage/Current		-	0 - 32.000V / 0 - 6.0000A	0 - 32.000V / 0 - 6.0000A	-	-	-	0 - 32.000V / 0 - 6.0000A	-	-	-
Warning: The CH3 of GPP-3323 output current from the 2 terminals should Not exceed 5A.											
CONSTANT VOLTAGE OPERATION											
Line Regulation		≤ 0.01% + 3mV	≤ 0.01% + 3mV	≤ 0.01% + 3mV	≤ 0.01% + 3mV	≤ 3mV	-	≤ 0.01% + 3mV	-	-	-
Load Regulation		≤ 0.01%+3mV(rating current≤3A) ≤ 0.02%+5mV(rating current>3A)	≤ 0.01%+3mV(rating current≤3A) ≤ 0.02%+5mV(rating current>3A)	≤ 0.01%+3mV(rating current≤3A) ≤ 0.02%+5mV(rating current>3A)	≤ 0.01%+3mV(rating current≤3A) ≤ 0.02%+5mV(rating current>3A)	≤ 5mV	-	≤ 0.01%+3mV(rating current≤3A) ≤ 0.02%+5mV(rating current>3A)	-	-	-
Ripple & Noise (5Hz-1MHz)		≤0.5mVrms	≤0.35mVrms	≤0.35mVrms	≤0.35mVrms	≤2mVrms	-	≤0.35mVrms	-	≤1mVrms	-
Transient Recovery Time		≤100μs	≤50μs	≤50μs	≤50μs	≤100μs	-	≤50μs	-	-	-
Temperature Coefficient		≤ 300ppm/°C	-	-	-	-	-	-	-	-	-
CONSTANT CURRENT OPERATION											
Line Regulation		≤ 0.2% + 3mA	-	-	-	-	-	-	-	-	-
Load Regulation		≤ 0.2% + 3mA	-	-	-	-	-	-	-	-	-
Ripple & Noise		≤4mArms	≤ 2mArms	≤ 2mArms	≤ 2mArms	-	-	≤ 2mArms	-	-	-
Resolution		-	-	-	-	-	-	-	-	-	-
Programming	Voltage/Current	1mV / 0.2mA	1mV / 0.1mA	1mV / 0.1mA	1mV / 0.1mA	-	-	1mV / 0.1mA	-	-	-
Reedback	Voltage/Current	1mV / 0.2mA	0.1mV / 0.1mA	0.1mV / 0.1mA	0.1mV / 0.1mA	-	-	0.1mV / 0.1mA	-	-	-
TRACKING OPERATION(CH1/CH2)											
Tracking Error		-	≤±(0.1%+10mV of Master(0-32V)) (No Load, with load add load regulation≤100mV)	≤±(0.1%+10mV of Master(0-32V)) (No Load, with load add load regulation≤100mV)	-	-	-	≤±(0.1%+10mV of Master(0-32V)) (No Load, with load add load regulation≤100mV)	-	-	-
Parallel Regulation	Line	-	≤ 0.01% + 3mV	≤ 0.01% + 3mV	-	-	-	≤ 0.01% + 3mV	-	-	-
	Load	-	≤ 0.01%+3mV(rating current≤3A) ≤ 0.02%+5mV(rating current>3A)	≤ 0.01%+3mV(rating current≤3A) ≤ 0.02%+5mV(rating current>3A)	-	-	-	≤ 0.01%+3mV(rating current≤3A) ≤ 0.02%+5mV(rating current>3A)	-	-	-
Series Regulation	Line	-	≤ 0.01% + 5mV	≤ 0.01% + 5mV	-	-	-	≤ 0.01% + 5mV	-	-	-
	Load	-	≤ 100mV	≤ 100mV	-	-	-	≤ 100mV	-	-	-
Ripple & Noise		-	≤1mVrms(5Hz-1MHz)	≤1mVrms(5Hz-1MHz)	-	-	-	≤1mVrms(5Hz-1MHz)	-	-	-
Note: GPP-1326 does not have Tracking function,and Tracking is not supported in LOAD mode.											
METER											
Full Scale	Voltage/Current	33.0000V / 6.2000A	33.0000V / 3.2000A	33.0000V / 3.2000A	33.0000V / 3.2000A	1.8V/2.5V/3.3V/5.0V	-	33.0000V / 3.2000A	-	-	-
Programming Resolution	Voltage/Current	5 digits / 5 digits	5 digits / 5 digits	5 digits / 5 digits	5 digits / 5 digits	-	-	5 digits / 5 digits	-	-	-
Reedback Resolution	Voltage/Current	6 digits / 5 digits	6 digits / 5 digits	6 digits / 5 digits	6 digits / 5 digits	-	-	5 digits / 6 digits	-	-	-
Setting Accuracy	Voltage	± (0.03% of reading + 10mV)	± (0.03% of reading + 10mV)	± (0.03% of reading + 10mV)	± (0.03% of reading + 10mV)	-	-	± (0.03% of reading + 10mV)	-	-	-
	Current	± (0.3% of reading + 10mA)	± (0.3% of reading + 10mA)	± (0.3% of reading + 10mA)	± (0.3% of reading + 10mA)	-	-	± (0.3% of reading + 10mA)	-	-	-
Reedback Accuracy	Voltage	± (0.03% of reading + 10mV)	± (0.03% of reading + 10mV)	± (0.03% of reading + 10mV)	± (0.03% of reading + 10mV)	-	-	± (0.03% of reading + 10mV)	-	-	-
	Current	± (0.3% of reading + 10mA)	± (0.3% of reading + 10mA)	± (0.3% of reading + 10mA)	± (0.3% of reading + 10mA)	-	-	± (0.3% of reading + 10mA)	-	-	-
DC LOAD MODE											
Display	Voltage	1 - 33.00V	1 - 33.00V	1 - 33.00V	1 - 33.00V	-	-	1 - 33.00V	-	-	-
	Current	0 - 6.200A	0 - 3.200A	0 - 3.200A	0 - 3.200A	-	-	0 - 3.200A	-	-	-
	Power	0 - 100.00W	0 - 50.00W	0 - 50.00W	0 - 50.00W	-	-	0 - 50.00W	-	-	-
CV Mode	CH1/CH2	1.500V - 33.00V	1.500V - 33.00V	1.500V - 33.00V	1.500V - 33.00V	-	-	1.500V - 33.00V	-	-	-
	Setting/Reedback Accuracy	≤±(0.1% + 30mV)	≤±(0.1% + 30mV)	≤±(0.1% + 30mV)	≤±(0.1% + 30mV)	-	-	≤±(0.1% + 30mV)	-	-	-
	Resolution	10mV	10mV	10mV	10mV	-	-	10mV	-	-	-
CC Mode	CH1/CH2	0 - 3.200A	0 - 3.200A	0 - 3.200A	0 - 3.200A	-	-	0 - 3.200A	-	-	-
	Setting/Reedback Accuracy	≤±(0.3% + 10mA)	≤±(0.3% + 10mA)	≤±(0.3% + 10mA)	≤±(0.3% + 10mA)	-	-	≤±(0.3% + 10mA)	-	-	-
	Resolution	1mA	1mA	1mA	1mA	-	-	1mA	-	-	-
CR Mode	CH1/CH2	10- 1kΩ	10- 1kΩ	10- 1kΩ	10- 1kΩ	-	-	10- 1kΩ	-	-	-
	Setting/Reedback Accuracy	≤±(3% + 1Ω) (voltage≥0.1V, and current≥0.1A)	≤±(3% + 1Ω) (voltage≥0.1V, and current≥0.1A)	≤±(3% + 1Ω) (voltage≥0.1V, and current≥0.1A)	≤±(3% + 1Ω) (voltage≥0.1V, and current≥0.1A)	-	-	≤±(3% + 1Ω) (voltage≥0.1V, and current≥0.1A)	-	-	-
	Resolution	1Ω	1Ω	1Ω	1Ω	-	-	1Ω	-	-	-
PROTECTION											
OVP	Power Mode	OFF,ON(0.5V - 35.0V)	OFF,ON(0.5V - 35.0V)	OFF,ON(0.5V - 35.0V)	OFF,ON(0.5V - 35.0V)	Fixed 5.5V	-	OFF,ON(0.5V - 35.0V)	OFF,ON(0.5V-6.0V)	OFF,ON(0.5V-16.5V)	-
	Load Mode	OFF,ON(1.5V - 35.0V)	OFF,ON(1.5V - 35.0V)	OFF,ON(1.5V - 35.0V)	OFF,ON(1.5V - 35.0V)	-	-	OFF,ON(1.5V - 35.0V)	-	-	-
	Setting Accuracy	±100mV	-	-	-	-	-	-	-	-	-
	Resolution	100mV	-	-	-	-	-	-	-	-	-
OCP	Power Mode	OFF,ON(0.05A - 7.00A)	OFF,ON(0.05A - 3.50A)	OFF,ON(0.05A - 3.50A)	OFF,ON(0.05A - 3.50A)	3.1A(USB port)	-	OFF,ON(0.05A - 3.50A)	OFF,ON(0.05A - 1.20A)	-	-
	Load Mode	OFF,ON(0.05A - 7.00A)	OFF,ON(0.05A - 3.50A)	OFF,ON(0.05A - 3.50A)	OFF,ON(0.05A - 3.50A)	-	-	OFF,ON(0.05A - 3.50A)	-	-	-
	Setting Accuracy	±20mA	-	-	-	-	-	-	-	-	-
	Resolution	10mA	-	-	-	-	-	-	-	-	-
Insulation Resistance		Between chassis and terminal : 20MΩ or above (DC 500V) Between chassis and DC power cord : 30MΩ or above (DC 500V)									
GENERAL											
Operation Environment		Indoor use, Altitude: ≤ 2000m ; Ambient temperature: 0 - 40°C / Relative humidity: ≤ 80% ; Installation category: II / Pollution degree: 2									
Storage Environment		TEMPERATURE: -10°C - 70°C / HUMIDITY: ≤70%									
Power Input		AC 100V/120V/220V/230V±10%, 50/60Hz									
Power Consumption		360W	360W	420W	420W	-	-	420W	-	-	-
Dimensions & Weight		213 (W) x 145 (H) x 312 (D) mm ; Approx. 7.5kg									

ORDERING INFORMATION

- GPP-1326** (32V/6A) Single-Output Programmable DC Power Supply
- GPP-2323** (32V/3A*2) Dual-Output Programmable DC Power Supply
- GPP-3323** (32V/3A*2; 1.8V or 2.5V or 3.3V or 5V/5A*1) Three-Output Programmable DC Power Supply
- GPP-4323** (32V/3A*2; 5V/1A; 15V/1A) Four-Output Programmable DC Power Supply

ACCESSORIES :

User Manual x 1 , Power cord x 1

European Test Leads :

- GPP-1326** Test Lead GTL-104A x 1, GTL-105A x 1
- GPP-2323** Test Lead GTL-104A x 2
- GPP-1326** GTL-203A x 1, GTL-204A x 1, GTL-201A x 1
- GPP-2323** GTL-204A x 2, GTL-201A x 1
- GPP-4323** Test Lead GTL-104A x 2, GTL-105A x 2
- GPP-3323** Test Lead GTL-104A x 3
- GPP-4323** GTL-203A x 2, GTL-204A x 2, GTL-201A x 1
- GPP-3323** GTL-204A x 3, GTL-201A x 1

OPTIONAL ACCESSORIES

GTL-246 USB Cable **GRA-449-J** Rack Mount Kit (JIS) **GRA-449-E** Rack Mount Kit (EIA)

OPTIONS (Manufacturer Installed Only)

LAN Interface; GPIB+LAN Interface

Multiple Output Programmable Linear D.C. Power Supply



GPD-2303S/3303S/ 4303S/3303D



FEATURES

- * 2, 3 and 4 Independent Isolated Output
- * 4 LED Display Sets : 3 Digits After Decimal Point (GPD-2303S/3303S/4303S)
- * Minimum Resolution :
GPD-2303S/3303S/4303S (1mV/1mA)
GPD-3303D (100mV/10mA)
- * Digital Panel Control (Rotary Encoder Switch, Rubber Key With Indicator)
- * User-Friendly Operation, Coarse / Fine Volume Control
- * 4 Sets Save / Recall
- * Key-Lock
- * Output ON/OFF
- * Tracking Series and Parallel Mode
- * Smart Cooling Fan Achieving Low Noise
- * Compact Design
- * PC Software & USB Driver
- * USB Standard Interface
- * Optional European Jack Type Terminal

Rear Panel



European Type Jack Terminal



The GPD-Series is a cutting edge, economical, high resolution programmable power supply, Which is equipped with 2, 3 and 4 independent output channels and support a maximum output from 180Watt to 195Watt. The power supplies include four sets of memory for voltage and current setting, a USB remote interface, high resolution (GPD-2303S / GPD-3303S / GPD-4303S) and intelligent fan control to reduce noise. The durable features along with the free output monitoring software make the GPD-Series suitable for any lab as well as the LED industry.

SPECIFICATIONS												
	GPD-2303S		GPD-3303S			GPD-4303S			GPD-3303D			
OUTPUT												
Channel Voltage	CH1	CH2	CH1	CH2	CH3	CH1	CH2	CH3	CH4	CH1	CH2	CH3
	0-30V	0-30V	0-30V	0-30V	2.5/3.3/5.0V	0-30V	0-30V	0-5V or 5.001V-10V	0-5V	0-30V	0-30V	2.5/3.3/5.0V
Current	0-3A	0-3A	0-3A	0-3A	3A	0-3A	0-3A	0-3A or 0-1A	0-1A	0-3A	0-3A	3A
CONSTANT VOLTAGE OPERATION												
Regulation	Line regulation $\leq 0.01\%+3mV$ Load regulation $\leq 0.01\%+3mV$ (rating current $\leq 3A$); $\leq 0.02\%+5mV$ (rating current $>3A$)											
Ripple & Noise	$\leq 1mV_{rms}$ (5Hz-1MHz)											
Recovery Time	$\leq 100\mu s$ (50%Load change, Minimum load 0.5A)											
Temp.Coefficient	$\leq 300ppm / ^\circ C$											
CONSTANT CURRENT OPERATION												
Regulation	Line regulation $\leq 0.2\%+3mA$; Load regulation $\leq 0.2\%+3mA$											
Ripple Current	$\leq 3mA_{rms}$											
TRACKING OPERATION												
Regulation of PAR.	Line regulation $\leq 0.01\%+3mV$ Load regulation $\leq 0.01\%+3mV$ (rating current $\leq 3A$); $\leq 0.02\%+5mV$ (rating current $>3A$)											
Regulation of SER.	Line regulation $\leq 0.01\%+5mV$ Load regulation $\leq 100mV$											
Tracking Error	$\leq 0.1\%\pm 10mV$ (10 - 30V) no load, with load added load regulation $\leq 100mV$											
METER												
Display	Voltage: 5 digits 0.4" LED Display (full scale:32V) Current: 4 digits 0.4" LED Display (full scale:3.2A)						Voltage:3 digits 0.4"LED Display Current:3 digits 0.4"LED Display					
Resolution	Voltage: 1mV Current: 1mA						Voltage:100mV Current:10mA					
Program	Voltage: $\pm(0.03\%$ of RDG +10 digits)						Voltage: $\pm(0.5\%$ of RDG+2 digits)					
Accuracy(25 $\pm 5^\circ C$)	Current: $\pm(0.3\%$ of RDG +10 digits)						Current: $\pm(0.5\%$ of RDG+2 digits)					
Readback	Voltage: $\pm(0.03\%$ of RDG +10 digits)						Voltage: $\pm(0.5\%$ of RDG+2 digits)					
Aaccuracy(25 $\pm 5^\circ C$)	Current: $\pm(0.3\%$ of RDG +10 digits)						Current: $\pm(0.5\%$ of RDG+2 digits)					
CH3 SPECIFICATIONS												
Output Voltage			(2.5V/3.3V/5V) $\pm 8\%$			0-5V / 5-10V			(2.5V/3.3V/5V) $\pm 8\%$			
Output Current			3A			0-3A / 0-1A			3A			
Regulation			Line regulation $\leq 0.01\%+3mV$			Line regulation $\leq 0.01\%+3mV$			Line regulation $\leq 0.01\%+3mV$			
(25 $\pm 5^\circ C$)			Load regulation $\leq 0.01\%+3mV$			Load regulation $\leq 0.01\%+3mV$			Load regulation $\leq 0.01\%+3mV$			
Repple & Noise			$\leq 1mV_{rms}$ (5Hz-1MHz)			$\leq 2mV_{rms}$ (5Hz-1MHz)			$\leq 1mV_{rms}$ (5Hz-1MHz)			
KEY LOCK												
Yes												
MEMERY SAVE/RECALL												
4 sets												
POWER SOURCE												
AC100V/120V/220V/230V $\pm 10\%$, 50/60Hz; Power consumption : 490VA max.												
DIMENSION & WEIGHT												
210(W) x 130 (H) x 265(D) mm ; Approx. 7kg												

ORDERING INFORMATION

- GPD-2303S** GPD-2303S 2 Channels, 180W Programmable Linear DC Power Supply
- GPD-3303S** GPD-3303S 3 Channels, 195W Programmable Linear DC Power Supply
- GPD-4303S** GPD-4303S 4 Channels, 195W Programmable Linear DC Power Supply
- GPD-3303D** GPD-3303D 3 Channels, 195W Programmable Linear DC Power Supply

ACCESSORIES :

- User Manual x 1, Power cord x 1
- GPD-2303S** Test Lead GTL-104A x 2, European Test Lead GTL-204Ax2, GTL-201A x 1
- GPD-3303S** Test Lead GTL-104A x 2, GTL-105A x 1; European Test Lead GTL-203A x 1, GTL-204A x 2, GTL-201A x 1
- GPD-4303S** Test Lead GTL-104A x 2, GTL-105A x 2; European Test Lead GTL-203A x 2, GTL-204A x 2, GTL-201A x 1
- GPD-3303D** Test Lead GTL-104A x 2, GTL-105A x 1; European Test Lead GTL-203A x 1, GTL-204A x 2, GTL-201A x 1

OPTIONAL ACCESSORIES

- GTL-246 USB Cable

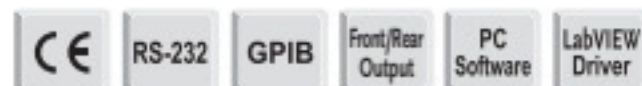
FREE DOWNLOAD

- PC Software PC Software including Data Log
- Driver Labview Driver

Programmable Dual-range Linear D.C. Power Supply



PSM-2010/3004/6003



FEATURES

- * Single Output Dual Range Max. 200W
- * High Resolution: 1mV/1mA
- * Stable & Clear Power: 0.01% Load/Line Regulation, 350µVrms Ripple
- * 100 Sets Memory
- * Auto Step Running With Timer Setting
- * Safety Design: OVP, OCP & OTP ; Output ON/OFF Control(OCP Provides Delay Setting to Prevent Trip of High Start-Up Current)
- * Self-Test and Software Calibration
- * Highly Visible Vacuum-Fluorescent Display
- * Front and Rear Output Terminal
- * Standard Interface : RS-232C, GPIB
- * Optional European Jack Type Terminal

European Type Jack Terminal



Rear Panel



The PSM-Series is a single output / dual range, 120W or 200W, programmable linear DC power supply. OVP, OCP, OTP, and output On/Off control protect the PSM-Series and their loads from unexpected conditions. High resolution, high regulation, and low ripple are maintained at 1mV/1mA, 0.01%, and <math><350\mu\text{Vrms}</math>, respectively. Operation and configuration is simplified with a digital interface and a clear LCD display. Standard features include; store/recall output memories, automatic stepping with timers for continuous testing and self-testing and software calibration features to reduce maintenance overhead. SCPI programming, LabVIEW drivers, RS-232C and GPIB interfaces enable easy automated test system integration and remote control. The PSM-Series is an ideal choice for high precision applications such as QA verification and product development.

SPECIFICATIONS			
	PSM-2010	PSM-3004	PSM-6003
DC OUTPUT			
Low Range	0 – 8V/20A	0 – 15V/7A	0 – 30V/6A
High Range	0 – 20V/10A	0 – 30V/4A	0 – 60V/3.3A
CONSTANT VOLTAGE OPERATION			
Regulation (% of output + offset)	Load regulation $\leq 0.01\% + 2\text{mV}$; Line regulation $\leq 0.01\% + 2\text{mV}$		
Ripple & Noise	$< 350\mu\text{Vrms}/3\text{mVpp}$	$< 350\mu\text{Vrms}/2\text{mVpp}$	$\leq 50\text{V}: < 500\mu\text{Vrms}/3\text{mVpp}$ $> 50\text{V}: < 1\text{mVrms}/3\text{mVpp}$
CONSTANT CURRENT OPERATION			
Regulation (% of output + offset)	Load regulation $\leq 0.01\% + 250\mu\text{A}$; Line regulation $\leq 0.01\% + 250\mu\text{A}$		
Ripple & Noise	$< 2\text{mArms}$		
RESOLUTION			
Programming	Voltage Current	1mV 1mA	1mV 0.5mA
Readback	Voltage Current	0.5mV 1mA	0.5mV 0.1mA
Front Panel	Voltage Current	1mV 1mA($<10\text{A}$), 10mA($\geq 10\text{A}$)	
OVP/OCP	Voltage Current	10mV 10mA	
ACCURACY			
Programming	Voltage Current	0.05% + 10mV 0.2% + 10mA	
Readback	Voltage Current	0.05% + 5mV 0.15% + 5mA	
OVP/OCP	Voltage Current	0.1% + 10mV 0.4% + 10mA	
TRANSIENT RESPONSE			
	$< 50\mu\text{sec}$ (for output to recover within 15mV following a change in output current from full load to half load)		
COMMAND PROCESSING TIME			
	100 ms		
VOLTAGE PROGRAMMING RESPONSE TIME (for resistive load)(10% – 90%)			
Voltage Up	Full Load No Load	95 ms 45 ms	50 ms 20 ms
Voltage Down	Full Load No Load	30 ms 450 ms	45 ms 400 ms
STABILITY (% of output + offset)			
Voltage	0.02% + 1mV		
Current	0.1% + 1mA		
MEMORY			
Store/Recall	100 sets		
TEMPERATURE COEFFICIENT PER °C \pm (% of Output + Offset)			
Voltage	0.01% + 3mV		
Current	0.02% + 3mA		
POWER SOURCE			
AC 100V/120V/220V $\pm 10\%$, 230V (- 6% – + 10%), 50/60Hz			
INTERFACE			
Standard RS-232C , GPIB			
DIMENSIONS & WEIGHT			
230(W) x 140(H) x 380(D) ; Approx. 10kg			

ORDERING INFORMATION

- PSM-2010 200W Single Output, Programmable Power Supply
- PSM-6003 200W Single Output, Programmable Power Supply
- PSM-3004 120W Single Output, Programmable Power Supply

ACCESSORIES :

User manual x 1, Power cord x 1, Test lead GTL-104A x 1, European test lead GTL-204A x 1, Ground lead GTL-201A x 1 (European terminal), Sense lead GTL-202 x 1 (European Terminal)

OPTION

Opt. 01 GRA-407 Rack Mount Kit

OPTIONAL ACCESSORIES

- GTL-232 RS-232C Cable, 9-pin Female to 9-pin, Null Modem for PC Computer
- GTL-248 GPIB Cable, Double Shielded, 2000mm
- GRA-407 Rack Mount Kit

FREE DOWNLOAD

- PC Software PC Software including Data Log ; Remote Control Software
- Driver Labview Driver ; PSM VB Example ; PSM VC++ Example

Programmable Linear D.C. Power Supply



PSS-2005/3203



FEATURES

- * Digitized Programmable Interface
- * High Resolution 10mV, 1mA
- * High Stability, Low Drift
- * Over-Voltage, Over-Current, Over Temperature Protection
- * Intelligent Fan Control (Change by Output Power)
- * Built-in Buzzer Alarm
- * LabVIEW Driver
- * Standard Interface : RS-232C
- * Optional Interface : GPIB (IEEE-488.2)
- * Optional European Jack Type Terminal

European Type Jack Terminal



Rear Panel



The PSS-Series is a single output, 96W or 100W, programmable linear DC power supply. OVP, OCP, and OTP protect the PSS series and their loads from unexpected conditions. The LCD panel simultaneously displays output and other parameters and the regulated cooling fan ensures low noise for comfortable operation. RS232C and GPIB interfaces, SCPI command sets and LABVIEW drivers make remote control and ATE software development easier. (Note: only RS-232C or GPIB can be installed at one time) The compact PSS series is suitable for any high resolution bench-top or rack mount application.

SPECIFICATIONS		
	PSS-2005	PSS-3203
OUTPUT		
Voltage	0 – 20V	0 – 32V
Current	0 – 5A	0 – 3A
OVP	0 – 21V	0 – 33V
LOAD REGULATION		
Voltage	≤ 3mV (≤ 5mV, rating current > 3.0A)	
Current	≤ 3mA (≤ 5mA, rating current > 3.0A)	
LINE REGULATION		
Voltage	≤ 3mV	
Current	≤ 3mA	
RESOLUTION		
Voltage	10mV	
Current	1mA (2mA, rating current > 3.0A)	
OVP	10mV	
PROGRAM ACCURACY (25 ± 5°C)		
Voltage	≤ 0.05%+20mV	
Current	≤ 0.1%+5mA (+10mA, rating current > 3.0A)	
OVP	≤ 0.05%+20mV	
RIPPLE & NOISE (20Hz – 20MHz)		
Voltage	Ripple ≤ 1mVrms/3mVp-p ; Noise ≤ 2mVrms/30mVp-p	
Current	≤ 3mA _{rms} (≤ 5mA _{rms} , rating current > 3.0A)	
TEMPERATURE COEFFICIENT (0 – 40°C)		
Voltage	≤ 100ppm+3mV	
Current	≤ 100ppm+3mA	
READBACK RESOLUTION		
Voltage	10mV	
Current	1mA (2mA, rating current > 3.0A)	
READBACK ACCURACY(25 ± 5°C)		
Voltage	≤ 0.05%+10mV	
Current	≤ 0.1%+5mA (10mA rating current > 3.0A)	
READBACK TEMPERATURE COEFFICIENT		
Voltage	≤ 100ppm+10mV	
Current	≤ 100ppm+5mA (10mA rating current > 3.0A)	
RESPONSE TIME		
Voltage Up (10%~90%)	≤ 100mS	
Voltage Down (90%~10%)	≤ 100mS (≥10% rating load)	
DRIFT		
Voltage	≤ 100ppm+10mV	
Current	≤ 150ppm+10mA	
INTERFACE		
Standard : RS-232C; Option : GPIB		
POWER SOURCE		
AC 100V/120V/220V ±10%, 230V (+10%/-6%), 50/60Hz		
DIMENSIONS & WEIGHT		
108(W) x 142(H) x 318(D) mm, Approx. 4.8kg		

ORDERING INFORMATION

PSS-2005 100W Single Output Programmable D.C. Power Supply

PSS-3203 96W Single Output Programmable D.C. Power Supply

ACCESSORIES :

User manual x 1, Power cord x 1 Test lead GTL-104A x 1 (PSS-2005) or GTL-105A x 1 (PSS-3203)
European Test Lead GTL-204A x 1 (PSS-2005) or GTL-203A x 1 (PSS-3203)

OPTION

Opt.01 : GPIB Interface (factory installed)

OPTIONAL ACCESSORIES

GTL-232 RS-232C Cable, 9-pin Female to 9-pin, null Modem for Computer

GRA-408 Rack Adapter Panel (19" 4U)

GTL-248 GPIB Cable, Double Shielded, 2000mm

FREE DOWNLOAD

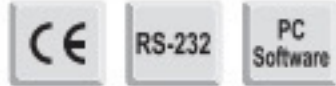
PC Software PC Software including Data Log ; Remote Control Software
Driver LabView Driver

Note : When Opt.01 GPIB interface is ordered, the standard interface RS-232C will be deleted.

Multiple Output Programmable Linear D.C. Power Supply



PPE-3323



FEATURES

- * Easy Operation with UP/DOWN Key
- * High Resolution: 10mV, 1mA
- * Over Voltage Protection (by Software)
- * 50 Sets Memory
- * Self Test and Software Calibration
- * Auto Step Running With Timer Setting
- * Triple Output
- * Auto Tracking
- * RS-232C Communication
- * High Stability, Low Drift
- * 4 Digit Display
- * IEC Safety Regulation

Rear Panel



The PPE-Series is a 3-channel, programmable linear DC power supply with 207W output. The PPE-Series features OVP and OCP and is compliant with all major safety standards (UL, CSA, and IEC) for safe, reliable operation. The digital interface and smart features simplify operation and configuration with output limit store/recall functions, tracking, serial operation, and auto stepping for continuous testing. The series has PC software and SCPI commands as standard for remote control and PC interfacing via RS-232C. The versatile PPE-Series is ideal for high-level applications requiring high resolution, multiple outputs, and an extra level of safety.

OUTPUT	
Voltage	0~+32V, 0~-32V, 3.3V/5V FIXED
Current	0~+3A, 0~-3A, 3A FIXED
OVP	0~+33V, 0~-33V
LOAD REGULATION	
Voltage	≤ 6mV
Current	≤ 3mA
LINE REGULATION	
Voltage	≤ 3mV
Current	≤ 3mA
RESOLUTION	
Voltage	10mV (20mV rating voltage > 36V)
Current	1mA (2mA rating current > 3.5A)
OVP	10mV (20mV rating voltage > 36V)
PROGRAM ACCURACY (25 ± 5°C)	
Voltage	≤ 0.05% + 25mV (+ 50mV rating voltage > 36V)
Current	≤ 0.2% + 10mA
OVP	≤ 2% + 0.6V
RIPPLE & NOISE (20Hz ~ 20MHz)	
Voltage	Ripple 1mVrms / 3mVp-p Noise 2mVrms / 30mVp-p
Current	≤ 3mA rms (≤ 5mA rms rating current > 3.5A)
TEMPERATURE COEFFICIENT (0~40°C)	
Voltage	≤ 100ppm + 3mV
Current	≤ 150ppm + 3mA
REARBACK RESOLUTION/ACCURACY (25 ± 5°C)	
Voltage	10mV (20mV rating voltage > 36V)
Current	1mA (2mA rating current > 3.5A)
Voltage	≤ 0.05% + 25mV (+ 50mV rating voltage > 36V)
Current	≤ 0.2% + 10mA
RESPONSE TIME	
VOLTAGE UP 10% ~ 90%	≤ 100mS
VOLTAGE DOWN 90% ~ 10%	≤ 100mS (≥ rating load)
REARBACK TEMPERATURE COEFFICIENT	
Voltage	≤ 100ppm + 10mV (+ 20mV rating voltage > 36V)
Current	≤ 150ppm + 10mA
DRIFT	
Voltage	≤ 100ppm + 10mV
Current	≤ 150ppm + 10mA
TRACK OPERATION	
Tracking Error	≤ 0.1% + 50mV
Series Regulation	≤ 50mV
PARALLEL OPERATION (PPT-Series only)	
Program Accuracy (25 ± 5°C)	Voltage ≤ 0.05% + 25mV (+ 50mV rating voltage > 36V) Current ≤ 0.2% + 20mA OVP ≤ 2% + 0.6V
Load Effect	Voltage ≤ 3mV rear output (≤ 6mV front output) Current ≤ 6mA (≤ 12mA rating current > 3.5A)
Source Effect	Voltage ≤ 3mV; Current ≤ 6mA
MEMORY	
Store/Recall	50 sets
TIMER	
Setting Time	1 second ~ 99 minutes (Max. 99 minutes x 50 sets)
Resolution Function	1 second for output working loop (Auto Step running)
STANDARD INTERFACE	
RS-232C	
POWER SOURCE	
AC 100V/120V/ 220V/240V ±10%, 50/60Hz	
DIMENSIONS & WEIGHT	
255(W) x 145(H) x 346(D) mm; Approx. 10kg	

PPE-3323 207W Triple Output Programmable D.C. Power Supply

Model	Independent	Series	Parallel	Display Type	Weight (kg)
PPE-3323	(0~32V/0~3A)x2, (5V/3A)FIXED	64V/3A	32V/6A	LED	10

ACCESSORIES :

User manual x 1, Power cord x 1, Test lead GTL-105A x 3

GRA-401 Rack Mount Kit

FREE DOWNLOAD

PC Software Remote Control Software

Multiple Output Programmable Linear D.C. Power Supply



PPT-1830/PPT-3615



FEATURES

- * Easy Operation with UP/DOWN Key
- * High Resolution: 10mV, 1mA
- * Over Voltage Protection, Over Current Protection (PPT-Series by Hardware)
- * 50 Sets Memory
- * Self Test and Software Calibration
- * Auto Step Running With Timer Setting
- * FRONT/REAR Output and Sense Switch Selectable
- * Triple Output
- * Auto Series and Parallel Operation
- * Auto Tracking
- * IEEE-488.2 and SCPI Compatible Command set
- * GPIB Standard Interface
- * LabVIEW Driver
- * High Stability, Low Drift
- * 4 Digit Display
- * IEC Safety Regulation

Rear Panel



The PPT-Series is a 3-channel, programmable linear DC power supply with 138W or 126W outputs. The PPT-Series features OVP and OCP and is compliant with all major safety standards (UL, CSA, and IEC) for safe, reliable operation. For extra precision, the PPT-Series includes remote sensing that adds an extra level of precision by compensating cable losses between loads. The digital interface and smart features simplify operation and configuration with output limit store/recall functions, automatic tracking, automatic serial or parallel operation, and auto stepping for continuous testing. The series has Labview drivers and SCPI commands as standard for remote control and PC interfacing via GPIB. The versatile PPT-Series is ideal for high-level applications requiring high resolution, multiple outputs, and an extra level of safety.

SPECIFICATIONS		
MODEL	PPT-1830	PPT-3615
OUTPUT		
Voltage	0-18Vx2, 0-6Vx1	0-36Vx2, 0-6Vx1
Current	0-3Ax2, 0-5Ax1	0-1.5Ax2, 0-3Ax1
OVP	0-20Vx2, 0-7Vx1	0-38.5Vx2, 0-7Vx1
LOAD REGULATION		
Voltage	≤ 3mV rear output (≤ 6mV front output)	
Current	≤ 3mA (≤ 6mA rating current > 3.5A)	
LINE REGULATION		
Voltage	≤ 3mV	
Current	≤ 3mA	
RESOLUTION		
Voltage	10mV (20mV rating voltage > 36V)	
Current	1mA (2mA rating current > 3.5A)	
OVP	10mV (20mV rating voltage > 36V)	
PROGRAM ACCURACY (25 ± 5°C)		
Voltage	≤ 0.05% + 25mV (+ 50mV rating voltage > 36V)	
Current	≤ 0.2% + 10mA	
OVP	≤ 2% + 0.6V	
RIPPLE & NOISE (20Hz ~ 20MHz)		
Voltage	Ripple 1mVrms / 3mVp-p Noise 2mVrms / 30mVp-p	
Current	≤ 3mA rms (≤ 5mA rms rating current > 3.5A)	
TEMPERATURE COEFFICIENT (0-40°C)		
Voltage	≤ 100ppm + 3mV	
Current	≤ 150ppm + 3mA	
REARBACK RESOLUTION/ACCURACY (25 ± 5°C)		
Voltage	10mV (20mV rating voltage > 36V)	
Current	1mA (2mA rating current > 3.5A)	
Voltage	≤ 0.05% + 25mV (+ 50mV rating voltage > 36V)	
Current	≤ 0.2% + 10mA	
RESPONSE TIME		
VOLTAGE UP 10% ~ 90%	≤ 100mS	
VOLTAGE DOWN 90% ~ 10%	≤ 100mS (≥ rating load)	
REARBACK TEMPERATURE COEFFICIENT		
Voltage	≤ 100ppm + 10mV (+ 20mV rating voltage > 36V)	
Current	≤ 150ppm + 10mA	
DRIFT		
Voltage	≤ 0.03% + 6mV	
Current	≤ 0.1% + 6mA	
TRACK OPERATION		
Tracking Error	≤ 0.1% + 50mV	
Series Regulation	≤ 50mV	
PARALLEL OPERATION		
Program Accuracy (25 ± 5°C)	Voltage ≤ 0.05% + 25mV (+ 50mV rating voltage > 36V) Current ≤ 0.2% + 20mA OVP ≤ 2% + 0.6V	
Load Effect	Voltage ≤ 3mV rear output (≤ 6mV front output) Current ≤ 6mA (≤ 12mA rating current > 3.5A)	
Source Effect	Voltage ≤ 3mV; Current ≤ 6mA	
MEMORY		
Store/Recall	50 sets	
TIMER		
Setting Time	1 second ~ 255 minutes (Max. 255 minutes x 50 sets)	
Resolution	1 second	
Function	for output working loop (Auto Step running)	
STANDARD INTERFACE		
GPIB		
POWER SOURCE		
AC 100V/120V/220V/240V ± 10%, 50/60Hz		
DIMENSIONS & WEIGHT		
255(W) x 145(H) x 346(D) mm; Approx. 10kg		

ORDERING INFORMATION

Model	Independent	Series	Parallel	Display Type	Weight (kg)
PPT-1830	(0-18V/0-3A)x2, (0-6V/0-5A)x1	36V/3A	18V/6A	LED	10
PPT-3615	(0-36V/0-1.5A)x2, (0-6V/0-3A)x1	72V/1.5A	36V/3A	LED	10

ACCESSORIES :
User manual x 1, Power cord x 1, Test lead GTL-105A x 3, GTL-104A x 3

OPTIONAL ACCESSORIES

GRA-401 Rack Mount Kit
GTL-248 GPIB Cable, Double Shielded, 2000mm
GTL-204A European test lead x 3

FREE DOWNLOAD

Driver LabView Driver

Multiple Output Programmable Linear D.C. Power Supply



PST-3201/3202



FEATURES

- * Digitized Programmable Interface
- * High Resolution 10mV, 1mA
- * 192 x 128 LCD Display, Simultaneously Shows Settings and Measuring Result
- * Over-Voltage, Over-Current, Over Temperature Protection
- * Intelligent Fan Control (Changes by Output Power)
- * 100 Sets Memory
- * Auto Step Running With Timer Setting
- * Auto Series and Parallel Function
- * LabVIEW Driver
- * Standard Interface : RS-232C
- * Optional Interface : GPIB (IEEE-488.2)
- * Optional European Jack Type Terminal

European Type Jack Terminal



Rear Panel



PST-Series is a 3-channel, 96W or 158W, programmable linear DC power supply. High resolution is maintained at 10mV, 1mA (3A). OVP, OCP, and OTP protect the PST-Series and its loads from unexpected conditions. PST-Series is capable of independent, series or parallel operation for increased flexibility. The large LCD display conveniently displays all outputs and configurations simultaneously to simplify operation. The programmable interface allows automatic stepping, 100 sets of memory and comprehensive timing operations. GPIB and RS232C interfaces, Labview drivers and SCPI compatibility allow easy ATE software development and remote control. The versatile PST-Series is ideal for high resolution, multiple output, automated operations such as production testing and rack mounting systems.

SPECIFICATIONS		
	PST-3202	PST-3201
OUTPUT		
Voltage	0-32Vx2, 0-6Vx1	0-32Vx3
Current	0-2Ax2, 0-5Ax1	0-1Ax3
OVP	0-33Vx2, 0-7Vx1	0-33Vx3
LOAD REGULATION		
Voltage	≤ 3mV (≤ 5mV rating current >3.0A)	
Current	≤ 3mA (≤ 5mA rating current >3.0A)	
LINE REGULATION		
Voltage	≤ 3mV	
Current	≤ 3mA	
RESOLUTION		
Voltage	10mV	
Current	1mA (2mA, rating current >3.0A)	
OVP	10mV	
PROGRAM ACCURACY(25 ± 5°C)		
Voltage	≤ 0.05%+20mV	
Current	≤ 0.1%+5mA (+10mA, rating current>3.0A)	
OVP	≤ 0.05%+20mV	
RIPPLE & NOISE(20Hz~20MHz)		
Voltage	Ripple: ≤ 1mVrms/3mVp-p ; Noise: ≤ 2mVrms/30mVp-p	
Current	≤ 3mArms (≤ 5mArms, rating current >3.0A)	
TEMPERATURE COEFFICIENT (0 ~ 40 °C)		
Voltage	≤ 100ppm+3mV	
Current	≤ 100ppm+3mA	
REARBACK RESOLUTION		
Voltage	10mV(20mV, rating voltage >36V)	
Current	1mA(2mA, rating current >3.0A)	
REARBACK ACCURACY(25 ± 5°C)		
Voltage	≤ 0.05%+10mV(+20mV, rating voltage >36V)	
Current	≤ 0.1%+5mA(+10mA, rating current>3.0A)	
REARBACK TEMPERATURE COEFFICIENT		
Voltage	≤ 100ppm+10mV(+20mV, rating voltage >36V)	
Current	≤ 150ppm+10mA(+20mA, rating current >3.0A)	
RESPONSE TIME		
Voltage Up (10%~90%)	≤ 100mS	
Voltage Down (90%~10%)	≤ 100mS (≥ 10% rating load)	
DRIFT		
Voltage	≤ 100ppm+10mV(+20mV, rating voltage >36V)	
Current	≤ 150ppm+10mA	
TRACK OPERATION		
Tracking Error	≤ 0.1%+20mV	
Series(Load Effect)	≤ 20mV	
PARALLEL OPERATION		
Program Accuracy(25 ± 5°C)	Voltage ≤ 0.05%+20mV, Current ≤ 0.1%+10mA, OVP ≤ 0.05%+20mV	
Load Effect	Voltage ≤ 3mV(≤ 5mV, rating current>3.0A); Current ≤ 6mA	
Source Effect	Voltage ≤ 3mV; Current ≤ 6mA	
MEMORY		
Store/Recall	100 Sets	
TIMER		
Setting Time	0.1 second~99 Minutes 59 second (Max. 99 Minutes 59 second x 100)	
Resolution	0.1 second	
Function	Auto step running (for output working loop)	
INTERFACE		
Standard	: RS-232C ; Option: GPIB (IEEE488.2)	
POWER SOURCE		
AC	100V/120V/220V ± 10%, 230V(+10%/-6%), 50/60Hz	
DIMENSIONS & WEIGHT		
230(W) x 140(H) x 380(D) mm	, Approx.10kg	

ORDERING INFORMATION

PST-3202 158W Triple Output Programmable D.C. Power Supply
 PST-3201 96W Triple Output Programmable D.C. Power Supply

Model	Independent	Series	Parallel	Display Type	Weight (kg)
PST-3201	(0-32V/0-1A)x3	64V/1A	32V/2A	LCD	10
PST-3202	(0-32V/0-2A)x2,(0-6V/0-5A)x1	64V/2A	32V/4A	LCD	10

ACCESSORIES :

User manual x 1, Power cord x 1, Test lead: GTL-104A x 3 (PST-3202) or GTL-105A x 3 (PST-3201)
 European test lead: GTL-204A x 3 (PST-3202) or GTL-203A x 3 (PST-3201)

OPTION

Opt.01 GPIB Interface (factory installed)

OPTIONAL ACCESSORIES

GRA-407 Rack Mount Kit
 GTL-248 GPIB Cable, Double Shielded, 2000mm
 GTL-232 RS-232C Cable, 9-pin Female to 9-pin, null Modem for Computer

FREE DOWNLOAD

PC Software PC Software including Data Log ; Remote Control Software
 Driver LabView Driver

Multiple Output Linear D.C. Power Supply



GPE-X323 Series



FEATURES

- * 1/2/3/4 Independent Isolated Output
- * 4.3 Inch LCD Display
- * Setting & Read Back Resolution 100mV/10mA (*1)
- * Output ON/OFF Switch
- * Analog Control (Remote I/O) for Output ON/OFF
- * Set View Function for Checking an Original V/I Setting During Output On
- * Key Lock Function
- * Tracking Series and Parallel Operation
- * Optional European Jack Type Terminal

European Type Jack Terminal



Rear Panel



The GPE-X323 series is a cutting edge, economical linear DC Power supply. The GPE-X323 series features output power from 192 to 217 watts, three independent isolated output channels (for GPE-3323), high resolution, low noise, high reliability, and compact size. The GPE-X323 series has a built-in digital panel control design to replace conventional control method. This unique design allows the GPE-X323 series linear DC power supply to provide users with more efficient functionalities, including set view and key lock so as to expedite the operation process. The key lock function protects DUTs by preventing others from changing voltage and current parameters. Additionally, output key light facilitates users in clearly reading the operational status of power supply.

SPECIFICATIONS										
	GPE-4323				GPE-3323			GPE-2323		GPE-1326
OUTPUT MODE										
Number of Channel	CH1	CH2	CH3	CH4	CH1	CH2	CH3	CH1	CH2	CH1
Voltage	0~32V	0~32V	0~5V	0~15V	0~32V	0~32V	5V	0~32V	0~32V	0~32V
Current	0~3A	0~3A	0~1A	0~1A	0~3A	0~3A	5A	0~3A	0~3A	0~6A
Tracking Series Voltage	0~64V				0~64V			0~64V		-
Tracking Parallel Current	0~6A				0~6A			0~6A		-
CONSTANT VOLTAGE OPERATION										
Line Regulation	$\leq 0.01\%+3mV$									
Load Regulation	$\leq 0.01\%+3mV$ (rating current $\leq 3A$)									
	$\leq 0.02\%+5mV$ (rating current $> 3A$)									
Ripple & Noise	$\leq 1mV_{rms}$ (5Hz~1MHz)									
Recovery Time	$\leq 100\mu s$ (50% Load Change, minimum load 0.5A)									
CONSTANT CURRENT OPERATION										
Line Regulation	$\leq 0.2\%+3mA$									
Load Regulation	$\leq 0.2\%+3mA$									
Ripple & Noise	$\leq 3mArms$									
TRACKING OPERATION (CH1,CH2)										
Tracking Error	$\leq 0.1\%+10mV$ of Master(0~32V) No Load, with Load add load regulation $\leq 100mV$									
Parallel Regulation	Line: $\leq 0.01\%+3mV$									
	Load: $\leq 0.01\%+3mV$ (rating current $\leq 3A$)									
	$\leq 0.02\%+5mV$ (rating current $> 3A$)									
Series Regulation	Line: $\leq 0.01\%+5mV$; Load: $\leq 100mV$									
Ripple & Noise	$\leq 2mV_{rms}$, 5Hz ~ 1MHz									
CH3 OPERATION FOR (GPE-3323)										
Output Voltage	5.0V, $\pm 5\%$									
Output Current	5A									
Line Regulation	$\leq 3mV$									
Load Regulation	$\leq 5mV$									
Ripple & Noise	1mVrms(5Hz~1MHz)									
METER										
Voltage Resolution	100mV (*1)									
Current Resolution	10mA (*1)									
Setting Accuracy	Voltage $\pm(0.1\%$ of reading +30mV); Current $\pm(0.3\%$ of reading +6mA)									
Readback Accuracy	Voltage $\pm(0.1\%$ of reading +30mV); Current $\pm(0.3\%$ of reading +6mA)									
INSULATION										
Chassis and Terminal	20M Ω or above (DC 500V)									
Chassis and AC Cord	30M Ω or above (DC 500V)									
ENVIRONMENT CONDITION										
Operation Temp	0~40 $^{\circ}C$									
Storage Temp	-10~70 $^{\circ}C$									
Operating Humidity	$\leq 80\%$ RH									
Storage Humidity	$\leq 70\%$ RH									
OTHER										
Power Source	AC100V/120V/220V $\pm 10\%$; 230V(+10%~-6%); 50/60Hz									
Dimensions & Weight	210(W)x 155(H) x 306(D) mm ; Approx. 7kg									

ORDERING INFORMATION

- GPE-1326 Single Channel, 192W Linear DC Power Supply
- GPE-2323 2 Channels, 192W Linear DC Power Supply
- GPE-3323 3 Channels, 217W Linear DC Power Supply
- GPE-4323 4 Channels, 212W Linear DC Power Supply

ACCESSORIES :

User Manual (CD) x 1 ; Power Cord x 1

GPE-1326 Test Lead GTL-104A x 1 ; GTL-105A x 1 ; or European GTL-204A x 1, GTL-203A x 1

GPE-2323 Test Lead GTL-104A x 2 ; or European GTL-204A x 2

GPE-3323 Test Lead GTL-104A x 3 ; or European GTL-204A x 3

GPE-4323 Test Lead GTL-104A x 2 ; GTL-105A x 2 or European GTL-204A x 2, GTL-203A x 2

Note : (*1) For a higher resolution (10mV/1mA), please follow the setting procedure of the user manual on p35.

When using a higher resolution, the current or voltage adjustment may be limited by the knob sensibility.

Multiple Output Linear D.C. Power Supply



GPS-2303/3303/4303



FEATURES

- * 2, 3 and 4 Independent Isolated Output
- * Four "3 Digits" LED Displays
- * 0.01% Load and Line Regulation
- * Low Ripple and Noise
- * Tracking Operation and Auto Series/Parallel Operation
- * Output ON/OFF Switch
- * Output Voltage and Current Setting When Output Disable (Except for GPS-2303)
- * Fan Speed Control Circuit to Minimize Fan Noise
- * Over Load and Reverse Polarity Protection
- * Optional European Jack Type Terminal

European Type Jack Terminal



GPS-001

Voltage/Current protection Knob



Rear Panel



GPS-3303

The GPS Series linear power supplies have 2-4 independent output channels, 180W to 200W output, overload and reverse polarity protection as well as an output ON/OFF switch for safety. The tracking mode switches allow voltage/current to be output in parallel or series and the intelligent fan reduces noise. The GPS-Series is an entry level general purpose power supply recognized for their affordability in education, laboratories and industry.

SPECIFICATIONS									
	GPS-4303				GPS-3303			GPS-2303	
OUTPUT MODE									
	CH1	CH2	CH3	CH4	CH1	CH2	CH3	CH1	CH2
Voltage	0 – 30V	2.2 – 5.2V	8 – 15V		0 – 30V	5V Fixed		0 – 30V	
Current	0 – 3A	1A Max.	1A Max.		0 – 3A	3A Max.		0 – 3A	
Tracking Series Voltage	0 – 60V			0 – 60V		0 – 60V	
Tracking Parallel Current	0 – 6A				0 – 6A			0 – 6A	
CONSTANT VOLTAGE OPERATION (CH1, CH2)									
Line Regulation	≤ 0.01% + 3mV								
Load Regulation	≤ 0.01% + 3mV (rating current ≤ 3A) ≤ 0.02% + 5mV (rating current > 3A)								
Ripple & Noise	≤ 1mVrms, 5Hz – 1MHz								
Recovery Time	≤ 100 μS (50% Load change, Minimum load 0.5A)								
CONSTANT CURRENT OPERATION (CH1, CH2)									
Line Regulation	≤ 0.2% + 3mA								
Load Regulation	≤ 0.2% + 3mA								
Ripple & Noise	≤ 3mArms								
TRACKING OPERATION (CH1, CH2)									
Tracking Error	≤ 0.5% + 10mV of CH1								
Series Regulation	≤ 0.01% + 5mV								
Load Regulation	≤ 300mV								
Ripple & Noise	≤ 2mVrms, 5Hz – 1MHz								
CH3 OPERATION (for GPS-3303/4303)									
CH3 Voltage	GPS-4303 : 2.2V – 5.2V, GPS-3303 : 5V Fix								
Line Regulation	≤ 5mV								
Load Regulation	≤ 15mV								
Ripple & Noise	≤ 2mVrms, 5Hz – 1MHz								
Current Output	GPS-4303 : 1A, GPS-3303 : 3A								
CH4 OPERATION (for GPS-4303)									
CH4 VOLTAGE	8V – 15V								
Line Regulation	≤ 5mV								
Load Regulation	≤ 10mV								
Ripple & Noise	≤ 2mVrms, 5Hz – 1MHz								
Current Output	1A								
METER									
Digital	3 digits 0.5" LED display GPS-4303/3303 Out ON Accuracy ± (0.5% of rdg + 2 digits) GPS-4303/3303 Out OFF Accuracy ± (0.5% of rdg + 8 digits) GPS-2303 Accuracy ± (0.5% of rdg + 2 digits)								
INSULATION									
Chassis and Terminal	≥ DC 500V / 20MΩ								
Chassis and AC Cord	≥ DC 500V / 30MΩ								
POWER SOURCE									
AC 100V/120V/220V±10%, 230V(+10%–6%), 50/60Hz									
DIMENSIONS & WEIGHT									
255(W) x 145(H) x 265(D) mm, Approx. 7 kg									

ORDERING INFORMATION

- GPS-4303 4-channels, 200W Multiple Output Linear DC Power Supply
- GPS-3303 3-channels, 195W Multiple Output Linear DC Power Supply
- GPS-2303 2-channels, 180W Multiple Output Linear DC Power Supply

ACCESSORIES :

- User manual x 1, Power cord x 1,
- GPS-4303 : Test lead GTL-104A x 2, GTL-105A x 2 ; European test lead GTL-203A x 2, GTL-204A x 2, GTL-201 x 1
- GPS-3303 : Test lead GTL-104A x 2, GTL-105A x 1 ; European test lead GTL-203A x 1, GTL-204A x 2, GTL-201 x 1
- GPS-2303 : Test lead GTL-104A x 2 ; European test lead GTL-204A x 2, GTL-201A x 1

OPTIONAL ACCESSORIES

- GPS-001 Voltage/Current Protection Knob

Triple Output Linear D.C. Power Supply



GPC-3060D/6030D

The GPC-Series is a triple output, 375W, linear DC power supply. Channel 1 and 2 are fully adjustable (model dependant) and channel 3 is fixed at 5V/3A with ripple and noise at less than 2mVrms. Overload and reverse polarity protection keep GPC-Series and its loads safe from unexpected conditions. GPC features continuous or dynamic internal load selection and series or parallel tracking for application flexibility. The GPC-Series is an ideal solution for inexpensive bench-top applications requiring low noise and multiple outputs.

FEATURES

- * Triple Output
- * Auto Tracking
- * Auto Series and Parallel Operation
- * Constant Voltage and Constant Current Operation
- * Low Ripple and Noise
- * Internal Select for Continuous or Dynamic Load
- * Overload and Reverse Polarity Protection
- * 3 1/2 Digits 0.5" LED Display
- * 5V, 3A Fixed Output

SPECIFICATIONS	
OPERATION MODE	
Independent	Two independent outputs and 5V fixed output Output from 0 to rating volts and 0 to rating amperes
Series	Output from 0 to \pm rating volts at rating amperes each
Parallel	Output from 0 to double rating volts at rating amperes Output from 0 to double rating amperes at rating volts
CONSTANT VOLTAGE OPERATION	
Regulation	Line regulation $\leq 0.01\% + 3mV$ Load regulation $\leq 0.01\% + 3mV$ (rating current $\leq 3A$) $\leq 0.01\% + 5mV$ (rating current $\leq 10A$) $\leq 0.02\% + 5mV$ (rating current $\geq 10A$)
Ripple & Noise	$\leq 1mVrms$ 5Hz – 1MHz
Recovery Time	$\leq 100\mu S$ (50% Load change, Minimum load 0.5A)
CONSTANT CURRENT OPERATION	
Regulation	Line regulation $\leq 0.2\% + 3mA$ Load regulation $\leq 0.2\% + 5mA$
Ripple Current	$\leq 3mA_{rms}$
5V FIXED OUTPUT	
Regulation	Line regulation $\leq 5mV$ Load regulation $\leq 10mV$
Ripple & Noise	$\leq 2mVrms$
Voltage Accuracy	$5V \pm 0.25V$
Output Current	3A
TRACKING OPERATION	
Tracking Error	$\leq 0.5\% + 10mV$ of the master
Series Regulation	$\leq 300mV$
METER	
Digital	3 1/2 digits 0.5" LED display Accuracy $\pm(0.5\%$ of rdg + 2 digits)
INSULATION	
Chassis and Terminal	100M Ω or above (DC 1000V)
Chassis and AC Cord	100M Ω or above (DC 1000V)
POWER SOURCE	
AC 100V/120V/220V/240V $\pm 10\%$, 50/60Hz	
DIMENSIONS	
255(W) x 145(H) x 420(D) mm	

ORDERING INFORMATION

Model	Independent	Series	Parallel	Weight (kg)
GPC-6030D	375W D.C. Power Supply (0 – 60V/0 – 3A) x 2 , (5V/3A MAX) x 1	120V 3A	60V 6A	18.5
GPC-3060D	375W D.C. Power Supply (0 – 30V/0 – 6A) x 2 , (5V/3A MAX) x 1	60V 6A	30V 12A	18.5
ACCESSORIES :				
User manual x 1 , Power cord x 1				
Test lead GTL-105A x 1 ($\leq 3A$) or GTL-104A x 2 ($\leq 10A$)				
OPTIONAL ACCESSORIES				
GRA-401	Rack Mount Kit			

Linear D.C. Power Supply



The GPR-H Series consists of single output linear DC power supplies with voltage outputs rating from 8V to 300V. The series includes overload and reversed polarity protection to protect devices under test from being damaged due to inappropriate operation. The internal select for dynamic loads is often used for amplifier testing. It can support high pulse current derived from dynamic processes as well as support low noise and noise, which make it suitable for high-end bench-top applications requiring precision. Its rear panel supports output wiring. These features combined into one assembly allow the GPR-H Series to predominate in applications requiring high voltage or high current.

GPR-H Series



FEATURES

- * 0.01% High Regulation
- * Constant Voltage and Constant Current Operation
- * Internal Select for Continuous or Dynamic Load
- * Low Ripple and Noise
- * Overload and Reverse Polarity Protection
- * 3 1/2 Digit 0.5" LED Display
- * Internal Select for Continuous or Dynamic Load (for GPR-3510HD/GPR-6060D/GPR-7550D)

SPECIFICATIONS	
CONSTANT VOLTAGE OPERATION	
Regulation	Line regulation $\leq 0.01\% + 3\text{mV}$ Load regulation $\leq 0.01\% + 5\text{mV} (<10\text{A})$ $\leq 0.02\% + 5\text{mV} (\geq 10\text{A})$
Ripple & Noise	$\leq 1\text{mVrms}$ 5Hz – 1MHz
Recovery Time	$\leq 100\mu\text{S}$ (50% load change, minimum load 0.5A)
Output Range	0 to rating voltage continuously adjustable
CONSTANT CURRENT OPERATION	
Regulation	Line regulation $\leq 0.2\% + 3\text{mA}$ Load regulation $\leq 0.2\% + 5\text{mA}$
Ripple Current	$\leq 5\text{mA}_{\text{rms}}$ ($\leq 20\text{A}$), $\leq 10\text{mA}_{\text{rms}}$ ($\leq 30\text{A}$) $\leq 20\text{mA}_{\text{rms}}$ ($\leq 50\text{A}$)
Output Range	0 to rating current continuously adjustable
METER	
Type	3 1/2 Digit 0.5" LED display
Accuracy	$\pm (0.5\% \text{ of rdg} + 2 \text{ digits})$
INSULATION	
Chassis and Terminal	100M Ω or above (DC 1000V)
Chassis and AC Cord	100M Ω or above (DC 1000V)
POWER SOURCE	
AC 100V/120V/220V/240V $\pm 10\%$, 50/60Hz	
DIMENSIONS	
254(W) x 152(H) x 456(D) mm	

Rear Panel



ORDERING INFORMATION

Model	Output Volts (V)	Output Amps (A)	Weight (kg)	
GPR-0830HD	240W D.C. Power Supply	0 – 8	0 – 30	18.5
GPR-1820HD	360W D.C. Power Supply	0 – 18	0 – 20	18.5
GPR-3510HD	350W D.C. Power Supply	0 – 35	0 – 10	18.5
GPR-6060D	360W D.C. Power Supply	0 – 60	0 – 6	18.5
GPR-7550D	375W D.C. Power Supply	0 – 75	0 – 5	18.5
GPR-11H30D	330W D.C. Power Supply	0 – 110	0 – 3	13.5
GPR-30H10D	300W D.C. Power Supply	0 – 300	0 – 1	13.5

ACCESSORIES :

User manual x 1, Power cord x 1
Test lead GTL-105A x 1 ($\leq 3\text{A}$) or GTL-104A x 1 ($\leq 10\text{A}$) or Not Available ($>10\text{A}$)

OPTIONAL ACCESSORIES

GTL-122 Test Lead, U-type to Alligator Test Lead, Max. Current 40A, 1200mm

Note: CE Approved Only for GPR-1820HD, GPR-3510HD, GPR-7550D, GPR-11H30D
Rear-Panel Output Only for GPR-0830HD, GPR-1820HD

Linear D.C. Power Supply



The GPR-M Series is a single output, 180W, linear DC power supply which featuring all the same functions as the GPR-H Series but for lower power demands. Like the GPR-H Series, the GPR-M Series is suitable for high-end precision bench top applications. Low load and line regulation for both constant voltage and constant current mode ensure reliable, predictable output. Overload and reverse polarity protection as well as internal selection for dynamic or constant load are standard.

GPR-M Series



FEATURES

- * 0.01% High Regulation
- * Constant Voltage and Constant Current Operation
- * Internal Select for Continuous or Dynamic Load
- * Low Ripple and Noise
- * Overload and Reverse Polarity protection
- * 3 1/2 Digit 0.5" LED Display

SPECIFICATIONS	
CONSTANT VOLTAGE OPERATION	
Regulation	Line regulation $\leq 0.01\% + 3\text{mV}$ Load regulation $\leq 0.01\% + 5\text{mV}$ (<10A) Load regulation $\leq 0.02\% + 5\text{mV}$ ($\geq 10\text{A}$)
Ripple & Noise	$\leq 1\text{mVrms}$ 5Hz – 1MHz
Recovery Time	$\leq 100\mu\text{S}$ (50% load change, minimum load 0.5A)
Output Range	0 to rating voltage continuously adjustable
CONSTANT CURRENT OPERATION	
Regulation	Line regulation $\leq 0.2\% + 3\text{mA}$ Load regulation $\leq 0.2\% + 3\text{mA}$
Ripple Current	$\leq 3\text{mA}_{\text{rms}}$
Output Range	0 to rating current continuously adjustable
METER	
Digital	3 1/2 Digits 0.5" LED display Accuracy $\pm (0.5\% \text{ of rdg} + 2 \text{ digits})$
INSULATION	
Chassis and Terminal	$20\text{M}\Omega$ or above (DC 500V)
Chassis and AC Cord	$30\text{M}\Omega$ or above (DC 500V)
POWER SOURCE	
AC 100V/120V/220V/240V $\pm 10\%$, 50/60Hz	
DIMENSIONS	
254(W) x 152(H) x 349(D) mm	

ORDERING INFORMATION				
Model		Output Volts (V)	Output Amps (A)	Weight (kg)
GPR-1810HD	180W D.C. Power Supply	0 – 18	0 – 10	11.5
GPR-3060D	180W D.C. Power Supply	0 – 30	0 – 6	11.5
GPR-6030D	180W D.C. Power Supply	0 – 60	0 – 3	11.5
ACCESSORIES :				
User manual x 1 , Power cord x 1				
Test lead GTL-105A x 1 (GPR-6030D)				
GTL-104A x 1 (GPR-1810HD/3060D)				
OPTIONAL ACCESSORIES				
GRA-401 Rack Adapter Panel (19" , 4U)				

Linear D.C. Power Supply



GPS-1830D/1850D/3030D



GPS-3030DD



FEATURES

- * Light and Compact Design
- * 0.01% High Regulation
- * Constant Voltage and Constant Current Operation
- * Remote Control for External Programmability
- * Internal Select for Continuous or Dynamic Load
- * Low Ripple and Noise
- * Overload and Reverse Polarity Protection
- * Series or Parallel Operation
- * Optional European Type Jack Terminal for GPS-3030D/GPS-3030DD

European Type Jack Terminal



The GPS-Series is a single output, 54W to 90W, linear DC power supply. The GPS-Series has digital display meters with varying power outputs. The GPS-Series features overload and reverse polarity protection as well as high regulation and low ripple/noise that are maintained at 0.01% and < 1mVrms, respectively. Continuous or dynamic internal load selection accommodates applications such as pulsed current. Remote control terminals offer programming and operation from an external device.

SPECIFICATIONS	
CONSTANT VOLTAGE OPERATION	
Regulation	Line regulation $\leq 0.01\% + 3mV$ Load regulation $\leq 0.01\% + 3mV$ (rating current $\leq 3A$) $\leq 0.01\% + 5mV$ (rating current $> 3A$)
Ripple & Noise	$\leq 0.5mVrms$ 5Hz ~ 1MHz (rating current $\leq 3A$) $\leq 1mVrms$ 5Hz ~ 1MHz (rating current $> 3A$)
Recovery Time	$\leq 100\mu S$ (50% load change, minimum load 0.5A)
Temp. Coefficient	$\leq 300 ppm / ^\circ C$
Output Range	0 to rating voltage continuously adjustable
CONSTANT CURRENT OPERATION	
Regulation	Line regulation $\leq 0.2\% + 3mA$ Load regulation $\leq 0.2\% + 3mA$
Ripple Current	$\leq 3mA_{rms}$
Output Range	0 to rating current continuously adjustable (Hi/Lo range switchable)
METER	
Digital	3½ digits 0.5" LED display (GPS-1830D/1850D/3030D) 3½ digits 0.39" LED display (GPS-3030DD) Accuracy $\pm(0.5\%$ of rdg + 2 digits)
INSULATION	
Chassis and Terminal	$20M\Omega$ or above (DC 500V)
Chassis and AC Cord	$30M\Omega$ or above (DC 500V)
POWER SOURCE	
AC 100V/120V/220V/240V $\pm 10\%$, 50/60Hz	
DIMENSIONS	
128(W) x 145(H) x 285(D) mm	

ORDERING INFORMATION

Model	Output Volts(V)	Output Amps(A)	Weight (kg)
GPS-1830D	0 – 18	0 – 3	4
GPS-1850D	0 – 18	0 – 5	5
GPS-3030D	0 – 30	0 – 3	5
GPS-3030DD	0 – 30	0 – 3	5

ACCESSORIES :

- User manual x 1 , Power cord x 1
- Test lead GTL-105A x 1 ($\leq 3A$) or GTL-104A x 1 ($\leq 10A$)
- European test lead GTL-203A x 1 ($\leq 3A$) or GTL-204A x 1 ($\leq 10A$)

NOTE



AC POWER SOURCES

GW Instek AC Power Sources currently can be divided into three categories. Programmable AC/DC Power Source, Programmable AC Power Source, AC Power Source.

AC Power Source ASR-3000/ASR-2000 Series not only plays the role as a precision AC/DC power source but also a powerful analyzer. It contains abundant features for the testing and characteristic analysis of power supplies, electronic devices, components and modules.

The APS-7000 Series is programmable linear AC Power Source, with the height of 2U and output frequency range is 45~500Hz. The maximum rated output for APS-7050 is 500VA, 310Vrms, 4.2Arms and APS-7100 is 1000VA, 310Vrms, 8.4Arms. The APS-7000 Series comprises nine measurement and test functions and provides user interface similar to that of AC Power Meter.

PRODUCTS

- Programmable AC/DC Power Source
 - Programmable AC Power Source
 - AC Power Source
-

AC POWER SOURCES

AC POWER SOURCES

Programmable Switching AC/DC Power Source

GW Instek not only provides compact and lightweight switching AC/DC power sources but also features AC, DC and AC+DC power outputs and the real time measurements of Vrms, Vavg, Vpeak, Irms, IpkH, Iavg, Ipeak, P, S, Q, PF, CF, 40 th-order Voltage Harmonic and Current Harmonic. Four signal sources are collocated as Internal (INT), External (EXT), Internal+ External (ADD), and External Synchronization (SYNC) to flexibly output power so as to meet customers' demands. The powerful sequence function is very suitable for producing arbitrary waveforms. 16 sets of arbitrary waveform storage space and 10 sets of panel setting memory space are provided for data storage and setting input.

Linear AC Power Source

GW Instek recommends linear AC power source for AC power with the requirements of high accuracy, high stability and low ripple/noise. Programmable AC Power Source APS-7000 is suitable for simulating AC power outputs and it has 9 measurement functions (Vrms, Irms, F, Ipk, W, VA, PF, Ipk hold, CF), 7 waveform modes, Sequence mode, Simulate mode, and Surge/Dip Control Mode etc. Purpose AC power source applications, non-programmable AC source APS-7000E Series, with high precision and THD of less than 0.5%, is the ideal selection.

2K~4KVA PROGRAMMABLE SWITCHING AC/DC POWER SOURCE

Model	Output Capacity	Output Freq.	Output Voltage	Max. Current	Display Type	Weight(kg)	Page
ASR-3200	2KVA	1~999.9Hz	AC 100V Range 0.0V~200.0V AC 200V Range 0.0V~400.0V DC 100V Range -285V~+285V DC 200V Range -570V~+570V	AC 100V Range 20A AC 200V Range 10A DC 100V Range 20A DC 200V Range 10A	LCD	25	D73-78
ASR-3300	3KVA	1~999.9Hz	AC 100V Range 0.0V~200.0V AC 200V Range 0.0V~400.0V DC 100V Range -285V~+285V DC 200V Range -570V~+570V	AC 100V Range 30A AC 200V Range 15A DC 100V Range 30A DC 200V Range 15A	LCD	25	
ASR-3400	4KVA	1~999.9Hz	AC 100V Range 0.0V~200.0V AC 200V Range 0.0V~400.0V DC 100V Range -285V~+285V DC 200V Range -570V~+570V	AC 100V Range 40A AC 200V Range 20A DC 100V Range 40A DC 200V Range 20A	LCD	25	
ASR-3400HF	4KVA	1~5000Hz	AC 100V Range 0.0V~200.0V AC 200V Range 0.0V~400.0V DC 100V Range -285V~+285V DC 200V Range -570V~+570V	AC 100V Range 40A AC 200V Range 20A DC 100V Range 40A DC 200V Range 20A	LCD	25	

PROGRAMMABLE SWITCHING AC/DC POWER SOURCE

Model	Output Capacity	Output Freq.	Output Voltage	Max. Current	Display Type	Weight(kg)	Page
ASR-2050/ ASR-2050R	500VA	1~999.9Hz	AC 100V Range 0.0V~175.0V AC 200V Range 0.0V~350.0V DC 100V Range -250.0V~+250.0V DC 200V Range -500.0V~+500.0V	AC 100V Range 5A AC 200V Range 2.5A DC 100V Range 5A DC 200V Range 2.5A	LCD	11.5 ASR-2000 Series 10.5 ASR-2000R Series	D79-82
ASR-2100/ ASR-2100R	1000VA	1~999.9Hz	AC 100V Range 0.0V~175.0V AC 200V Range 0.0V~350.0V DC 100V Range -250.0V~+250.0V DC 200V Range -500.0V~+500.0V	AC 100V Range 10A AC 200V Range 5A DC 100V Range 10A DC 200V Range 5A	LCD	11.5 ASR-2000 Series 10.5 ASR-2000R Series	

PROGRAMMABLE LINEAR AC POWER SOURCE

Model	Output Capacity	Output Freq.	Output Voltage	Max. Current	Display Type	Weight(kg)	Page
APS-7050	500 VA	45~500Hz Option: 45~999.9Hz	0~310V, 0~155V Option: 0~600V	2.1A, 4.2A	LCD	24	D83-86
APS-7100	1000 VA	45~500Hz Option: 45~999.9Hz	0~310V, 0~155V Option: 0~600V	4.2A, 8.4A	LCD	38	
APS-7200	2000 VA	45~500Hz Option: 45~999.9Hz	0~310V, 0~155V Option: 0~600V	8.4A, 16.8A	LCD	90	
APS-7300	3000 VA	45~500Hz Option: 45~999.9Hz	0~310V, 0~155V Option: 0~600V	12.6A, 25.2A	LCD	128	

LINEAR AC POWER SOURCE

Model	Output Capacity	Output Freq.	Output Voltage	Max. Current	Display Type	Weight(kg)	Page
APS-7050E	500 VA	45~500Hz	0~310V, 0~155V	2.1A, 4.2A	LCD	24	D87-88
APS-7100E	1K VA	45~500Hz	0~310V, 0~155V	4.2A, 8.4A	LCD	38	

Programmable AC/DC Power Source



ASR-3000 Series

NEW



FEATURES

- ❖ Output Rating: AC 0 ~ 400 Wrms, DC 0 ~ ± 570 V
- ❖ Output Frequency up to 999.9 Hz (5kHz for ASR-3400HF only)
- ❖ DC Output (100% of Rated Power)
- ❖ Measurement Items: Wrms, Vavg, Vpeak, Irms, IpkH, Iavg, Ipeak, P, S, Q, PF, CF
- ❖ Voltage and Current Harmonic Analysis (THDv, THDi)
- ❖ Remote Sensing Capability
- ❖ OCP, OPP, OTP, AC Fail Detection and Fan Fail Alarm
- ❖ Support Arbitrary Waveform Function
- ❖ Output Capacity: 2kVA/3kVA/4kVA
- ❖ Customized Phase Angle for Output On/Off
- ❖ Sequence and Simulation Function (up to 10 sets)
- ❖ Interface(std): USB, LAN, RS-232, GPIB
- ❖ Built-in External Control I/O and External Signal Input
- ❖ Built-in Output Relay Control
- ❖ Memory Function (up to 10 sets)
- ❖ Built-in Web Server

The ASR-3000 Series is an AC+DC power source, featuring high-speed DC voltage rising and falling time ($\leq 100\mu s$). There are four models of the series: ASR-3200(2kVA), ASR-3300(3kVA) and ASR-3400/3400HF (4kVA). The series can provide rated power output during AC output and DC output. Ten ASR-3000 Series output modes are available, including 1) AC power output mode (AC-INT Mode), 2) DC power output mode (DC-INT Mode), 3) AC/DC power output mode (AC+DC-INT Mode), 4) External AC signal source mode (AC-EXT Mode), 5) External AC/DC signal source mode (AC+DC-EXT Mode), 6) External AC signal superimposition mode (AC-ADD Mode), 7) External AC/DC signal superimposition mode (AC+DC-ADD Mode), 8) External AC signal synchronization mode (AC-SYNC Mode), 9) External AC/DC signal synchronization mode (AC+DC-SYNC Mode) 10) External DC voltage control of AC output mode(AC-VCA).

ASR-3000 Series is ideal for the development of On-board Chargers, Server Powers, LED modules, AC Motors, AC Fans, UPS and various electronic components, as well as for testing applications of automotive electrical equipment and home appliances.

The ASR-3000 Series provides users with waveform output capabilities including 1) Sequence mode generates waveform fallings, surges, sags, changes and other abnormal power line conditions; 2) Arbitrary waveform function allows users to store/upload user-defined waveforms; and 3) Simulate mode simulates power outage, voltage rise, voltage fall, and frequency variations. When the ASR-3000 Series power source outputs, it can also measure Wrms, Vavg, Vpeak, Irms, Iavg, Ipeak, IpkH, P, S, Q, PF, CF, 100th-order Voltage Harmonic and Current Harmonic. In addition, the remote sensing function ensures accurate voltage output, and the Customized Phase Angle for Output On/Off function can set the start and end angles of the voltage output according to the test requirements. The protection limits of V-Limit, Ipeak-Limit and F-Limit can be set according to user requirements. Over voltage limit, OCP, OPP will protect the DUT during the output process. The Fan Fail Alarm function and the AC fail alarm function are also designed in the ASR-3000 Series.

The front panel of the ASR-3000 Series provides a universal socket or a European socket, which allows users to plug and use so as to save wiring time. Since the power socket specification has a maximum current of 15A, the rear panel of ASR-3000 Series is designed with a current circuit breaker. When the socket current is greater than 15A, it will automatically open the circuit to protect users. The ASR-3000 Series supports I/O interface and is standardly equipped with USB, LAN, External I/O, RS-232C and GPIB.

ASR-002 External three phase control unit



- * Basis Requirement of ASR-002 to ASR-Series
- 1. Must be the three same models of ASR-Series
- 2. To ASR-2000 Series, the Opt1: RS-232+GPIB interface is required
- * Functions of ASR-Series are limited when conducts to ASR-002
- 1. No DC Output
- 2. Measurement Items: only current(A), power(W)and PF for each phase
- 3. No Voltage and Current Harmonic Analysis
- 4. No Remote Sensing Capability
- 5. No Arbitrary Waveforms Function
- 6. No Sequence and Simulation Function
- 7. Not supported External Control I/O
- 8. No memory Function
- 9. Only support USB, no LAN port for communication

GRA-442-J Rack Mount Adapter(JIS)



GRA-442-E Rack Mount Adapter(EIA)



GTL-137 Output power wire



APS-008 Air inlet filter



GET-006 Universal extension (AC signal phase 250V/13Amps)



GPW-005 Power cord



GPW-006 Power cord



GPW-007 Power cord



SPECIFICATIONS

		ASR-3200	ASR-3300	ASR-3400	ASR-3400HF
INPUT RATING (AC)					
NOMINAL INPUT VOLTAGE		200 Vac to 240 Vac			
INPUT VOLTAGE RANGE		180 Vac to 264 Vac			
PHASE		Single phase, Two-wire			
NOMINAL INPUT FREQUENCY		50 Hz to 60 Hz			
INPUT FREQUENCY RANGE		47 Hz to 63 Hz			
MAX. POWER CONSUMPTION		2500 VA or less	3750 VA or less	5000 VA or less	5000 VA or less
POWER FACTOR^{†1}	200Vac	0.95 (TYP)			
MAX. INPUT CURRENT	200Vac	15 A	22.5 A	30 A	30 A
†1. For an output voltage of 100 V / 200 V (100V / 200V range), maximum current, and a load power factor of 1.					
AC MODE OUTPUT RATINGS (AC rms)					
VOLTAGE	Setting Range^{†1}	0.0 V to 200.0 V / 0.0 V to 400.0 V			
	Setting Resolution	0.1 V			
	Accuracy^{†2}	±(1 % of set + 1 V / 2 V)			
OUTPUT PHASE		Single phase, Two-wire			
MAXIMUM CURRENT^{†3}	100 V	20 A	30 A	40 A	40 A
	200 V	10 A	15 A	20 A	20 A
MAXIMUM PEAK CURRENT^{†4}	100 V	120 A	180 A	240 A	160 A
	200 V	60 A	90 A	120 A	80 A
LOAD POWER FACTOR		0 to 1 (leading phase or lagging phase)			
POWER CAPACITY		2000 VA	3000 VA	4000 VA	4000 VA
FREQUENCY	Setting Range	AC Mode: 40.0 Hz to 999.9 Hz, AC+DC Mode: 1 Hz to 999.9 Hz			AC Mode: 40.0 Hz to 5000 Hz, AC+DC Mode: 1 Hz to 5000 Hz
	Setting Resolution	0.01 Hz (1.00 to 99.99 Hz), 0.1 Hz (100.0 to 999.9 Hz)			0.01 Hz (1.00 to 99.99 Hz), 0.1 Hz (100.0 to 999.9 Hz) 1 Hz (1000 to 5000 Hz)
	Accuracy	0.02% of set (23 °C ± 5 °C)			
	Stability^{†5}	± 0.005%			
OUTPUT ON PHASE		0° to 359° variable (setting resolution 1°)			
DC OFFSET^{†6}		Within ± 20 mV (TYP)			
†1. 100 V / 200 V range.					
†2. For an output voltage of 20 V to 200 V / 40 V to 400 V, an output frequency of 45 Hz to 65 Hz, no load, and 23 °C ± 5 °C.					
†3. For an output voltage of 1 V to 100 V / 2 V to 200 V. Limited by the power capacity when the output voltage is 100 V to 200 V / 200 V to 400 V. If there is the DC superimposition, the current of AC+DC mode satisfies the maximum current. In the case of lower than 40 Hz, and the power rating temperature, the maximum current will be decrease.					
†4. With respect to the capacitor-input rectifying load. Limited by the maximum current.					
†5. For 45 Hz to 65 Hz, the rated output voltage, no load and the resistance load for the maximum current, and the operating temperature.					
†6. In the case of the AC mode and 23 °C ± 5 °C.					
OUTPUT RATING FOR DC MODE					
VOLTAGE	Setting Range^{†1}	-285 V to +285 V / -570 V to +570 V			
	Setting Resolution	0.1 V			
	Accuracy^{†2}	±(1 % of set + 1 V / 2 V)			
MAXIMUM CURRENT^{†3}	100 V	20 A	30 A	40 A	40 A
	200 V	10 A	15 A	20 A	20 A
MAXIMUM PEAK CURRENT^{†4}	100 V	120 A	180 A	240 A	160 A
	200 V	60 A	90 A	120 A	80 A
POWER CAPACITY		2000 W	3000 W	4000 W	4000 W
†1. 100 V / 200 V range.					
†2. For an output voltage of -285 V to -28.5 V, +28.5 V to +285 V / -570 V to -57 V, +57 V to +570 V, no load, and 23 °C ± 5 °C.					
†3. For an output voltage of 1.4 V to 100 V / 2.8 V to 200 V. Limited by the power capacity when the output voltage is 100 V to 250 V / 200 V to 500 V.					
†4. Limited by the maximum current.					
OUTPUT VOLTAGE STABILITY					
LINE REGULATION^{†1}		0.2% or less			
LOAD REGULATION^{†2}		0.5% or less (0 to 100%, via output terminal)			
RIPPLE NOISE^{†3}		1 Vrms / 2 Vrms (TYP)			
†1. Power source input voltage is 200 V, 220 V, or 240 V, no load, rated output.					
†2. For an output voltage of 100 V to 200 V / 200 V to 400 V, a load power factor of 1, stepwise change from an output current of 0 A to maximum current (or its reverse), using the output terminal on the rear panel.					
†3. For 5 Hz to 1 MHz components in DC mode using the output terminal on the rear panel.					
OUTPUT VOLTAGE WAVEFORM DISTORTION RATIO, OUTPUT VOLTAGE RESPONSE TIME, EFFICIENCY					
TOTAL HARMONIC DISTORTION (THD)^{†1}		< 0.2% @50/60Hz < 0.3% @<500Hz < 0.5% @500.1Hz~999.9Hz			< 0.2% @50/60Hz < 0.5% @<500Hz < 1.0% @500.1Hz~2000Hz < 2.0% @2100Hz~5000Hz
OUTPUT VOLTAGE RESPONSE TIME^{†2}		100 μs (TYP)			
EFFICIENCY^{†3}		80 % or more			
†1. At an output voltage of 50 V to 200 V / 100 V to 400 V, a load power factor of 1, and in AC mode.					
†2. For an output voltage of 100 V / 200 V, a load power factor of 1, with respect to stepwise change from an output current of 0 A to the maximum current (or its reverse).					
†3. For AC mode, at an output voltage of 100 V / 200 V, maximum current, and load power factor of 1.					
MEASURED VALUE DISPLAY					
VOLTAGE	RMS, AVG Value^{†1}	Resolution	0.1 V		
		Accuracy^{†2}	For 45 Hz to 65 Hz and DC: ±(0.5 % of reading + 0.5 V / 1 V) For all other frequencies: ±(0.7 % of reading + 1 V / 2 V)		
	PEAK Value	Resolution	0.1 V		
		Accuracy	For 45 Hz to 65 Hz and DC: ±(2 % of reading) + 1 V / 2 V		
CURRENT	RMS, AVG Value	Resolution	0.01 A		
		Accuracy^{†3}	For 45 Hz to 65 Hz and DC: ±(0.5 % of reading+0.1 A/0.05 A) For all other frequencies: ±(0.7 % of reading+0.2 A/0.1 A)	For 45 Hz to 65 Hz and DC: ±(0.5 % of reading+0.15 A/0.08 A) For all other frequencies: ±(0.7 % of reading+0.3 A/0.15 A)	For 45 Hz to 65 Hz and DC: ±(0.5 % of reading+0.2 A/0.1 A) For all other frequencies: ±(0.7 % of reading+0.4 A/0.2 A)
	PEAK Value	Resolution	0.1 A		
		Accuracy^{†4}	For 45 Hz to 65 Hz and DC: ±(2 % of reading) + 0.5 A/0.25 A	For 45 Hz to 65 Hz and DC: ±(2 % of reading) + 0.8 A/0.4 A	For 45 Hz to 65 Hz and DC: ±(2 % of reading) + 1 A/0.5 A
POWER	Active (W)	Resolution	1 W		
		Accuracy^{†5}	±(2 % of reading + 2 W)	±(2 % of reading + 3 W)	±(2 % of reading + 4 W)
	Apparent (VA)	Resolution	1 VA		
		Accuracy^{†6}	±(2 % of reading + 2 VA)	±(2 % of reading + 3 VA)	±(2 % of reading + 4 VA)
	Reactive (VAR)	Resolution	1 VAR		
		Accuracy^{†7}	±(2 % of reading + 2 VAR)	±(2 % of reading + 3 VAR)	±(2 % of reading + 4 VAR)
LOAD POWER FACTOR		Range	0.000 to 1.000		
		Resolution	0.001		
LOAD CREST FACTOR		Range	0.00 to 50.00		
		Resolution	0.01		
HARMONIC VOLTAGE EFFECTIVE VALUE (RMS) PERCENT (%) (AC-INT and 50/60 Hz only)		Range	Up to 100th order of the fundamental wave		
		Full Scale	200 V / 400 V, 100%		
		Resolution	0.1 V, 0.1%		
		Accuracy^{†8}	Up to 20th : ±(0.2 % of reading + 0.5 V / 1 V) 20th to 100th : ±(0.3 % of reading + 0.5 V / 1 V)		

Programmable AC/DC Power Source



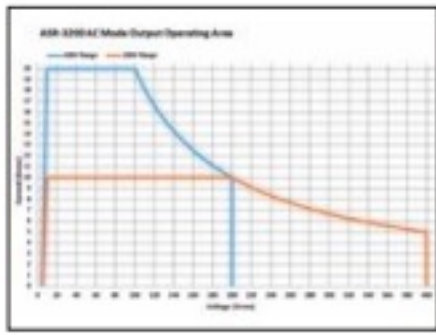
Rear Panel



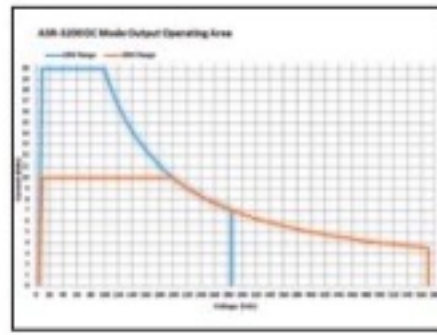
ASR-3000 Series

SPECIFICATIONS		ASR-3200	ASR-3300	ASR-3400	ASR-3400HF
HARMONIC CURRENT EFFECTIVE VALUE (RMS) PERCENT (%) (AC-INT and 50/60 Hz only)	Range	Up to 1000th order of the fundamental wave			
	Full Scale	20 A / 30 A, 100%	30 A / 15 A, 100%	40 A / 20 A, 100%	
	Resolution	0.01 A, 0.1%			
	Accuracy ^{†1}	Up to 20th ±1% of reading+0.4 A(0.2 A)	Up to 20th ±1% of reading+0.6 A(0.3 A) 20th to 100th ±1.5% of reading+0.6 A(0.3 A)	Up to 20th ±1% of reading+0.8 A(0.4 A) 20th to 100th ±1.5% of reading+0.8 A(0.4 A)	
^{†1} The voltage display is set to RMS in AC/AC-DC mode and AVG in DC mode. ^{†2} AC mode: For an output voltage of 20 V to 200 V / 40 V to 400 V and 23 °C ± 3 °C, DC mode: For an output voltage of 28.5 V to 280 V / 37 V to 570 V and 23 °C ± 3 °C. ^{†3} An output current in the range of 5% to 100% of the maximum current, and 23 °C ± 3 °C. ^{†4} An output current in the range of 5% to 100% of the maximum peak current in AC mode, an output current in the range of 5% to 100% of the maximum instantaneous current in DC mode, and 23 °C ± 3 °C. ^{†5} For an output voltage of 30 V or greater, an output current in the range of 10% to 100% of the maximum current, DC or an output frequency of 40 Hz to 60 Hz, and 23 °C ± 3 °C. ^{†6} The apparent and reactive power are not displayed in the DC mode. ^{†7} The reactive power is for the load with the power factor 0.5 or lower. ^{†8} An output voltage in the range of 20 V to 200 V / 40 V to 400 V and 23 °C ± 3 °C.					
OTHERS					
PROTECTIONS		UVF, OCP, OTP, OPP, Fan Fail			
DISPLAY		FT-LCD, 4.3 inch			
MEMORY FUNCTION		Store and recall settings, Basic settings: 16 (0-9 numeric keys)			
ARBITRARY WAVE	Number of Memories	16 (nonvolatile)			
	Waveform Length	4096 words			
INTERFACE	Standard	USB			
	LAN	Type A: Host, Type B: Slave, Speed: 1.1/2.0, USB-CDC, USB-TMC			
	RS-232C	MAC Address, DNS IP Address, User Password, Gateway IP Address, Instrument IP Address, Subnet Mask			
	EXT Control	Complies with the EIA-532 specifications			
INSULATION RESISTANCE		External Signal Input, External Control I/O			
		SCPI-1993, IEEE 488.2 compliant interface			
WITHSTAND VOLTAGE		300 Vdc, 30 MΩ or more			
WITHSTAND VOLTAGE		1500 Vac, 1 minute			
EMC		Between input and chassis, output and chassis, input and output			
EMC		Between input and chassis, output and chassis, input and output			
SAFETY		EN 61326-1, EN 61326-2-1, EN 61000-3-2, EN 61000-3-3, EN 61000-3-11, EN 61000-3-12 EN 61000-4-2/4-3/4-4/4-5/4-6/4-8/4-11/4-34, EN 55011 (Class A), EN 55012			
ENVIRONMENT		EN 61010-1			
Operating Environment		Indoor use, Overvoltage Category II			
Operating Temperature Range		0 °C to 40 °C			
Storage Temperature Range		-10 °C to 70 °C			
Operating Humidity Range		20% to 80% RH (no condensation)			
Storage Humidity Range		30% RH or less (no condensation)			
Altitude		Up to 2000 m			
DIMENSIONS & WEIGHT		430(8)×176(H)×330(D) mm (not including protrusions); Approx. 25kg			
ORDERING INFORMATION					
ASR-3200	2kVA Programmable AC/DC Power Source				
ASR-3300	3kVA Programmable AC/DC Power Source				
ASR-3400	4kVA Programmable AC/DC Power Source				
ASR-3400HF	4kVA Programmable AC/DC Power Source				
ACCESSORIES :					
CD (User manual/Programming manual), Safety guide, Input Terminal Cover, Output terminal cover include remote sensing, GRA-442-E Rack mount adapter(EIA), GTL-246 USB Cable					
OPTIONAL ACCESSORIES					
GPW-005	Power cord, 3m, 105°C, UL/CSA type	GTL-232	RS232C Cable, approx. 2m		
GPW-006	Power cord, 3m, 105°C, VDE type	GTL-248	GPIB Cable, approx. 2m		
GPW-007	Power cord, 3m, 105°C, PSE type	ASR-002	External three phase control unit for IP2W, IP3W, 3P4W output		
GRA-442-J	Rack mount adapter(JIS)	APS-008	Air inlet filter		
GRA-442-E	Rack mount adapter(EIA)	GET-006	Universal Extension		
GTL-137	Output power wire(load wire_10AWG:50A, 600V/sense wire_16AWG:20A, 600V)	* European output outlet(factory installed)			

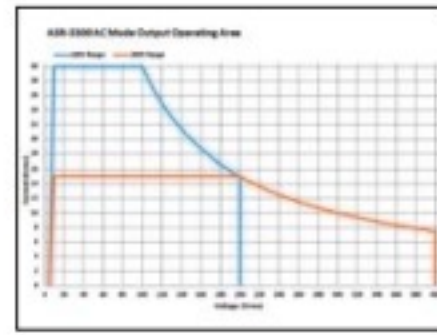
A. OPERATING AREA FOR ASR-3000 SERIES



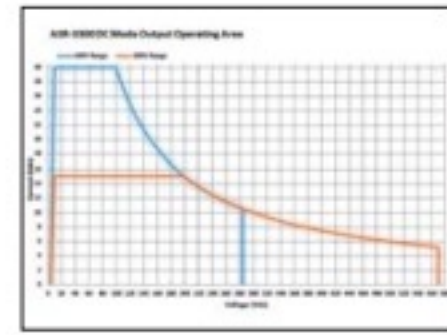
AC Output for ASR-3200



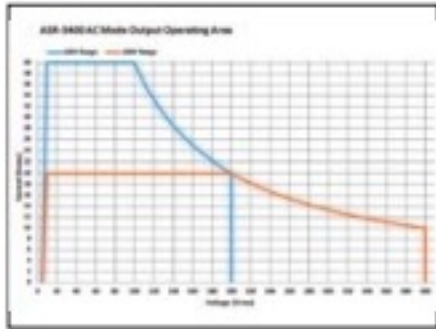
DC Output for ASR-3200



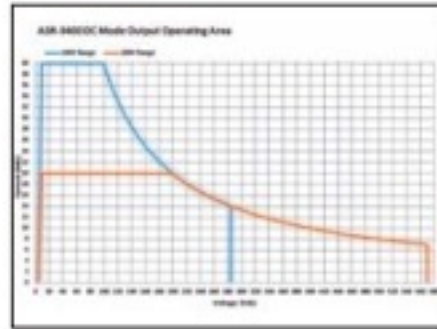
AC Output for ASR-3300



DC Output for ASR-3300



AC Output for ASR-3400



DC Output for ASR-3400

Model Name	Power Rating	Max. Output Current	Max. Output Voltage
ASR-3200	2k VA	20 / 10 A	400 Vrms / ± 570 Vdc
ASR-3300	3k VA	30 / 15 A	400 Vrms / ± 570 Vdc
ASR-3400	4k VA	40 / 20 A	400 Vrms / ± 570 Vdc

The ASR-3000 series is an AC + DC power source that provides not only rated power output for AC output, but also rated power output for DC output.

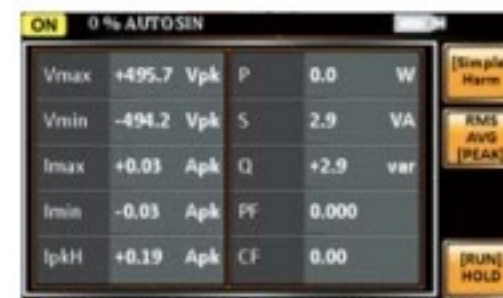
B. MEASUREMENT ITEMS FOR ASR-3000 SERIES



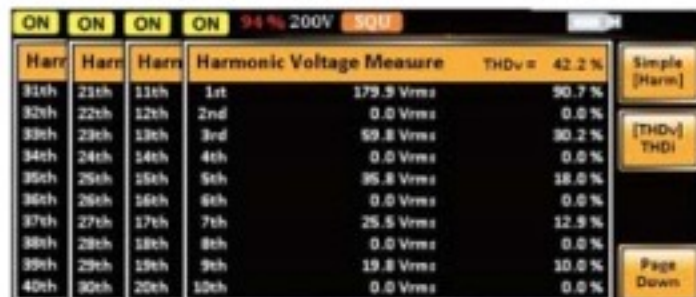
RMS Meas Display



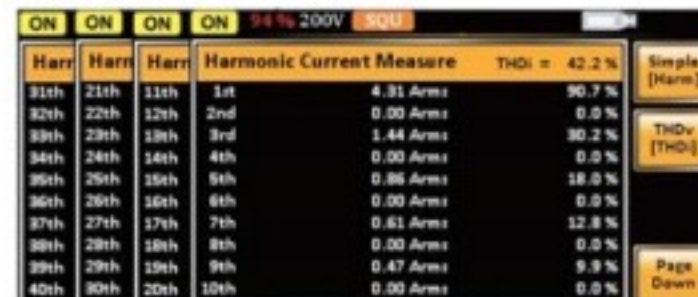
AVG Meas Display



Peak Meas Display



Voltage Harmonic



Current Harmonic

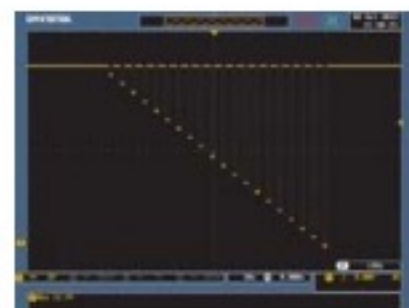
The ASR-3000 Series provides users with measurement capabilities including Vrms, Vavg, Vpeak, Irms, Iavg, Ipeak, IpH, P, S, Q, PF, CF, 100th-order Voltage Harmonic and Current Harmonic. During the power output, the measurement

parameters including Vrms/Irms, Vavg/Iavg and Vmax/Vmin/Imax/Imin can be switched by users at any time to display the instantaneous calculation reading.

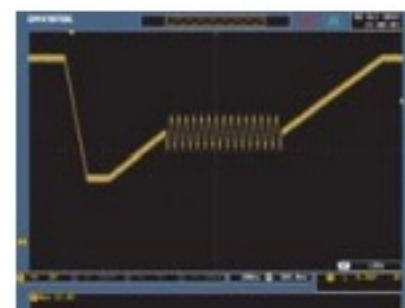
C. SEQUENCE MODE AND BUILT-IN ISO-16750-2 WAVEFORMS



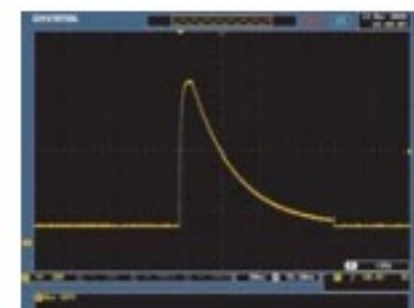
SEQ6: Momentary Drop in Supply Voltage



SEQ7: Reset Behavior at Voltage Drop with 12V System



SEQ8: Starting Profile Waveform



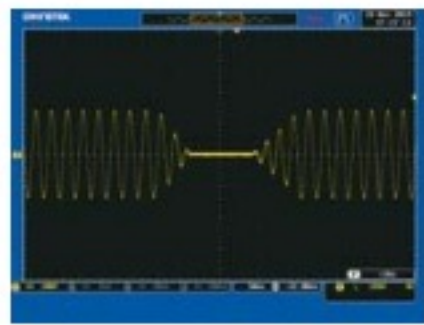
SEQ9: Load Dump with Tr_10ms, Td_40ms

The sequence mode provides editable 10 sets of SEQ0~SEQ9, each set has 0~999 steps, each step time setting range is 0.0001~999.9999 seconds. Users can combine multiple sets of steps to generate the required waveforms, including waveform falling, surges, sags and other abnormal power line conditions to meet the needs of the test applications.

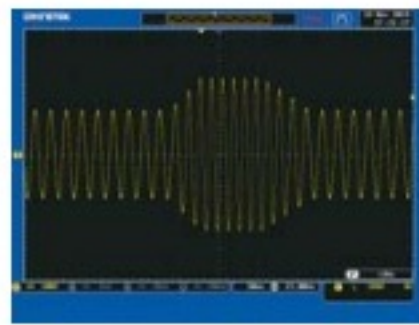
In addition, ASR-3000 Series also built in common ISO-16750-2 test waveforms in the Sequence Mode preset waveforms, including Momentary Drop in Supply Voltage built in at SEQ6, Reset Behavior at Voltage Drop with 12V system built in at SEQ7, Starting Profile Waveform built in at SEQ8 and Load Dump with Tr_10ms, and Td_40ms built in at SEQ9.

Programmable AC/DC Power Source

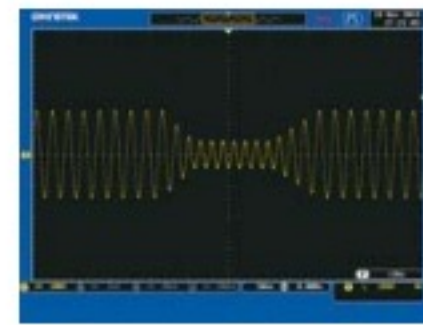
D. SIMULATE MODE



Power Outage



Voltage Rise



Voltage Fall

Simulate Mode can quickly simulate different transient waveforms, such as power outage, voltage rise, voltage fall, etc.,

for engineers to evaluate the impact of transient phenomena on the DUT. Ex: Capacitance durability test.

E. FUNCTION WAVEFORM (ARBITRARY EDIT) MODE



TRI Waveform



STAIR Waveform



CLIP Waveform



SURGE Waveform



Fourier Series Synthesized Waveform

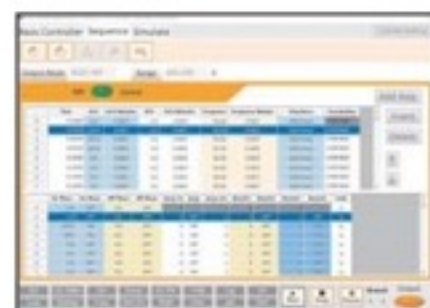
ASR-3000 Series provides more than 20,000 waveform combinations in seven categories, allowing users to quickly simulate different AC voltage waveforms. Adjust the desired waveform type directly through the panel (displayed synchronously on the screen),

then the waveform is loaded into the ARB 1~16 waveform register through the access procedures, and return to the main menu output mode to perform ARB Waveform output.

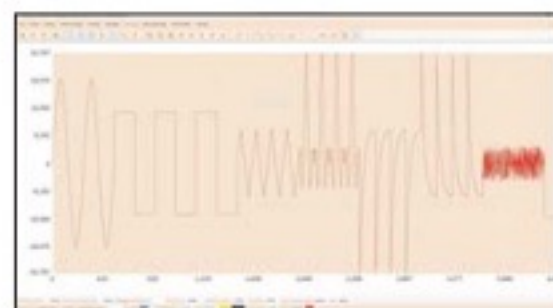
F. PC SOFTWARE



Basic Controller



Sequence Mode



ARB Waveform Edit



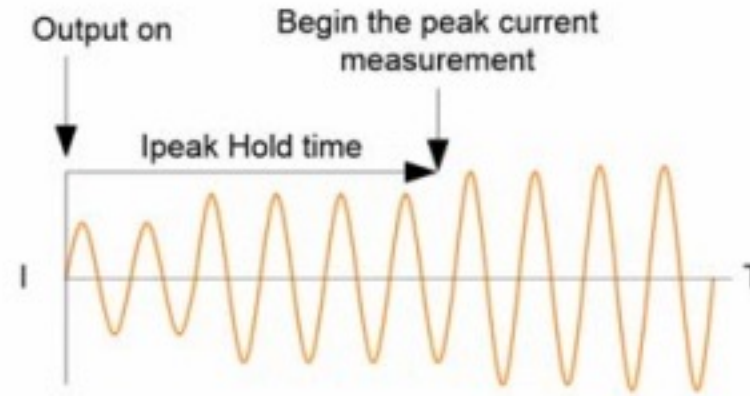
The Waveform is Observed with DSO

The ASR-3000 Series software includes basic settings, the Simulate Mode, the Sequence Mode, Data Log and the arbitrary waveform editing function. Users can directly set output voltage, frequency, start/stop phase on ASR-3000 Series through the software. The Simulate Mode can quickly simulate different transient waveforms such as power outage, voltage rise, voltage fall... etc.

The Sequence Mode can edit the editing parameters read back from ASR-3000 Series, or directly edit the parameters and control ASR-3000 Series to output waveforms according to the set sequence.

The arbitrary waveform editing function not only combines various waveforms, including sine waves, square waves, triangle waves, and noise waveforms, but also allows users to draw arbitrary waveforms and output them.

G. T, IPK HOLD & IPK, HOLD FUNCTIONS



T, Ipk Measurement

T, Ipk Hold is used to set the delay time after the output (1ms ~ 60,000ms) to capture the Ipeak value and keep the maximum value. The update only functions when the measurement value is greater than the original value. The T, Ipk Hold delay time setting can be used to measure surge current at the power on process of the DUT.

Ipk Hold can be used to measure the transient surge current of the DUT at power on without using an oscilloscope and a current probe.

H. SLEW RATE MODE



The ASR-3000 Series can set the Slew Rate Mode to determine the rise time of the voltage according to the test requirements of the DUT. Slew Rate Mode provides "Time" and "Slope" modes. When setting "Time" mode, ASR-3000 Series can increase output to 10~90% of the set voltage within 100 μ s; and when selecting "Slope" mode, ASR-3000 Series increases output voltage by a fixed rising slope of 1.5V/ μ s until reaching the set voltage value.

In addition, if users decide to self-define the rise time of the output voltage, users can flexibly set the rise time of the ASR-3000 Series voltage by editing the Sequence mode.

Compact Programmable A.C./D.C. Power Source



ASR-2050/2100 Series



ASR-2050R/2100R Series



FEATURES

- Output Rating: AC 0 ~ 350 Vrms, DC 0 ~ 50 V
- Output Frequency up to 999.9 Hz
- DC Output (100% of Rated Power)
- Output Capacity: 500VA/1000VA
- Measurement Items: Vrms, Vavg, Vpeak, Irms, IpkH, Iavg, Ipeak, P, S, Q, PF, CF
- Voltage and Current Harmonic Analysis (THDv, THDi)
- Customized Phase Angle for Output On/Off
- Remote Sensing Capability
- OVP, OCP, OPP, OTP, AC Fail Detection and Fan Fail Alarm
- Interface: USB, LAN, RS-232[std.]; GPIB(opt.)
- Built-in External Control I/O and External Signal Input
- Built-in Output Relay Control
- Memory Function (up to 10 sets)
- Sequence and Simulation Function (up to 10 sets)
- Support Arbitrary Waveform Function
- Built-in Web Server

GET-003 Euro Extended Terminal Box

GET-004 Universal Extended Terminal Box (ASR-2000R only)



GET-006 Universal extension

(AC signal phase 250V/13Amps)



The ASR-2000 series, an AC+DC power source aiming for system integration or desktop applications, provides both rated power output for AC output and rated power output for DC output. Ten ASR-2000 output modes are available, including 1) AC power output mode (AC-INT Mode), 2) DC power output mode (DC-INT Mode), 3) AC/DC power output mode (AC+DC-INT Mode), 4) External AC signal source mode (AC-EXT Mode), 5) External AC/DC signal source mode (AC+DC-EXT Mode), 6) External AC signal superposition mode (AC-ADD Mode), 7) External AC/DC signal superposition mode (AC+DC-ADD Mode), 8) External AC signal synchronization mode (AC-SYNC Mode), 9) External AC/DC signal synchronization mode (AC+DC-SYNC Mode), 10) External DC voltage control of AC output mode (AC-VCA).

The ASR-2000 series provides users with waveform output capabilities to meet the test requirements of different electronic component development, automotive electrical devices and home appliance, including 1) Sequence mode generates waveform fallings, surges, sags, changes and other abnormal power line conditions; 2) Arbitrary waveform function allows users to store/load user-defined waveforms; and 3) Simulate mode simulates power outage, voltage rise, voltage fall, and frequency variations. When the ASR-2000 series power source outputs, it can also measure Vrms, Vavg, Vpeak, Irms, Iavg, IpkH, P, S, Q, PF, CF, 100th-order Voltage Harmonic and Current Harmonic. In addition, the Remote sense function ensures accurate voltage output. The Customized Phase Angle for Output On/Off function can set the starting angle and ending angle of the voltage output according to the test requirements. V-Limit, Ipeak-Limit, F-Limit, OVP, OCP, OPP function settings can protect the DUT during the measurement process. In addition to OTP, OCP, and OPP protection, the ASR-2000 series also incorporates the Fan fail alarm function and AC fail alarm function.

The front panel of the ASR-2050/2100 provides a universal socket or a European socket, which allows users to plug and use the set to save wiring time. The ASR-2050R/2100R is 3U height and 1/2 Rack width design, which is compatible with ATS assembly. The ASR-2000 series supports I/O interface and is equipped with USB, LAN, PS-232C External I/O and optional GPIB.

SPECIFICATIONS		ASR-2050/ASR-2050R	ASR-2100/ASR-2100R
INPUT RATING [AC]			
NOMINAL INPUT VOLTAGE		100 Vac to 240 Vac	100 Vac to 240 Vac
INPUT VOLTAGE RANGE		90 Vac to 264 Vac	90 Vac to 264 Vac
PHASE		Single phase, Two-wire	Single phase, Two-wire
INPUT FREQUENCY RANGE		47 Hz to 63 Hz	47 Hz to 63 Hz
MAX. POWER CONSUMPTION		3000 VA or less	1500 VA or less
POWER FACTOR*	100%ac	0.95 (typ.)	0.95 (typ.)
	200%ac	0.8 (typ.)	0.90 (typ.)
MAX. INPUT CURRENT	100Vac	4 A	15 A
	200Vac		7.5 A
*1. For an output voltage of 100V/200V/100V(200V range), maximum current, and a load power factor of 1.			
AC MODE OUTPUT RATINGS [AC rms]			
VOLTAGE	Setting Range Setting Resolution Accuracy	0.0 V to 175.0 V / 0.0 V to 350.0 V 0.1 V ±(0.5 % of set + 0.6 V / 1.2 V)	0.0 V to 175.0 V / 0.0 V to 350.0 V 0.1 V ±(0.5 % of set + 0.6 V / 1.2 V)
OUTPUT PHASE		Single phase, Two-wire	Single phase, Two-wire
MAXIMUM CURRENT*	100 V	5 A	10 A
	200 V	2.5 A	5 A
MAXIMUM PEAK CURRENT**	100 V	20 A	40 A
	200 V	10 A	20 A
POWER CAPACITY		500 VA 1000 VA	1000 VA
FREQUENCY	Setting Range Setting Resolution Accuracy Stability*	AC Mode: 40.00 Hz to 999.9 Hz, AC+DC Mode: 1.00 Hz to 999.9 Hz 0.01 Hz (1.00 to 99.99 Hz), 0.1 Hz (100.0 to 999.9 Hz) 40 Hz to 65 Hz: 0.01% of set, For 40 Hz to 999.9 Hz: 0.02% of set ±0.005%	AC Mode: 40.00 Hz to 999.9 Hz, AC+DC Mode: 1.00 Hz to 999.9 Hz 0.01 Hz (1.00 to 99.99 Hz), 0.1 Hz (100.0 to 999.9 Hz) 40 Hz to 65 Hz: 0.01% of set, For 40 Hz to 999.9 Hz: 0.02% of set ±0.005%
OUTPUT ON PHASE DC OFFSET**		0.0° to 359.9° (Typ) Within ±20 mV (Vary)	0.0° to 359.9° (Typ) Within ±20 mV (Vary)
*1. 100 V, 200 V range *2. For an output voltage of 175 V to 175 V / 35 V to 350 V, user, an output frequency of 40 Hz to 63 Hz, no load, DC voltage setting 0V (AC+DC mode) and 27C, ± 5°C *3. For an output voltage of 1 V to 100 V / 2 V to 200 V, limited by the power capacity when the output voltage is 100 V to 175 V / 200 V to 350 V. *4. With 5 nts, limited by the maximum current. *5. For 45 Hz to 65 Hz, the rated output voltage, no load and the resistance load for the maximum current, and the operating temperature. *6. In the case of the AC mode and output voltage setting to 0 V.			
OUTPUT RATING FOR DC MODE			
VOLTAGE	Setting Range* Setting Resolution Accuracy	-250 V to +250 V / -500 V to +500 V 0.1 V ±(0.5 % of set) + 0.6 V / 1.2 V	-250 V to +250 V / -500 V to +500 V 0.1 V ±(0.5 % of set) + 0.6 V / 1.2 V
MAXIMUM CURRENT*	100 V	5 A	10 A
	200 V	2.5 A	5 A
MAXIMUM PEAK CURRENT**	100 V	20 A	40 A
	200 V	10 A	20 A
POWER CAPACITY		100 W 200 W	1000 W
*1. 100 V, 200 V range *2. For an output voltage of 250 V to 25 V, ±25 V to +250 V / 500 V to 50 V, ±50 V to +500 V, no load, AC voltage setting 0V (AC+DC mode) and 27C, ± 5°C *3. For an output voltage of 1.4 V to 100 V / 2.8 V to 200 V, limited by the power capacity when the output voltage is 100 V to 150 V / 200 V to 500 V. *4. With 5 nts, limited by the maximum current.			
OUTPUT VOLTAGE STABILITY			
LINE REGULATION*		±0.2% or less	±0.2% or less
LOAD REGULATION*		±0.15% @45-65Hz; ±0.5% @DC all other frequencies (0-100%, via output terminal)	±0.15% @45-65Hz; ±0.5% @DC all other frequencies (0-100%, via output terminal)
RIPPLE NOISE*		0.7 Vrms / 1.4 Vrms (TYP)	0.7 Vrms / 1.4 Vrms (TYP)
*1. Under source input voltage is 100 V, 120 V or 230 V, no load, stand-by mode *2. For an output voltage of 75 V to 170V/150V to 350V, a load power factor of 1, stepwise change from an output current of 0 A to maximum current (or its reverse), using the output terminal on the rear panel. *3. For 5 Hz to 1.5 kHz components in DC mode using the output terminal on the rear panel.			
OUTPUT VOLTAGE WAVEFORM DISTORTION RATIO, OUTPUT VOLTAGE RESPONSE TIME, EFFICIENCY			
TOTAL HARMONIC DISTORTION(THD) [†]		≤ 0.2% @50/60Hz, ≤ 0.3% @-500Hz, ≤ 0.5% @500-1100-999.9Hz	≤ 0.2% @50/60Hz, ≤ 0.3% @-500Hz, ≤ 0.5% @500-1100-999.9Hz
OUTPUT VOLTAGE RESPONSE TIME [‡]		100 μs (TYP)	70 μs (TYP)
EFFICIENCY [§]		70 % or more	70 % or more
*1. At an output voltage of 50 V to 175 V / 100 V to 150 V, a load power factor of 1, and in AC and AC+DC mode. *2. For an output voltage of 100 V / 200 V, a load power factor of 1, with respect to stepwise change from an output current of 0 A to the maximum current (or its reverse), 100% - 90% of output voltage. *3. For AC mode, at an output voltage of 100 V / 200 V, maximum current, and load power factor of 1 and size wave only. †. Total Harmonic Distortion (THD) is the ratio of the sum of the squares of the amplitudes of the harmonics to the square of the amplitude of the fundamental component. ‡. Output voltage response time is the time from the start of the output voltage change to the time when the output voltage reaches the specified value. §. Efficiency is the ratio of the output power to the input power.			
MEASURED VALUE DISPLAY			
VOLTAGE	RMS, AVG Value	Resolution Accuracy	0.1 V For 45 Hz to 65 Hz and DC: ±(0.5 % of reading + 0.3 V/0.6 V) For 40 Hz to 999.9 Hz: ±(0.7 % of reading + 0.9 V/1.8 V)
	PEAK Value	Resolution Accuracy	0.1 V For 45 Hz to 65 Hz and DC: ±(2 % of reading) + 1 V / 2 V
CURRENT	RMS, AVG Value	Resolution Accuracy	0.01 A For 45 Hz to 65 Hz and DC: ±(0.5 % of reading + 0.02 A/0.02 A); For 40 Hz to 999.9 Hz: ±(0.7 % of reading + 0.04 A / 0.04 A)
	PEAK Value	Resolution Accuracy	0.01 A For 45 Hz to 65 Hz and DC: ±(0.5 % of reading + 0.04 A/0.04 A); For 40 Hz to 999.9 Hz: ±(0.7 % of reading + 0.08 A / 0.04 A)



ASR-2000 Series

SPECIFICATIONS		ASR-2050/ASR-2050R	ASR-2100/ASR-2100R
PEAK Value	Resolution Accuracy ¹	0.01 A For 45 Hz to 65 Hz and DC: ±(2 % of reading)+0.2(A/0.1 A)	0.01 A For 45 Hz to 65 Hz and DC: ±(2 % of reading)+0.2(A/0.1 A)
POWER	Active (W)	Resolution Accuracy ¹	±(2 % of reading + 0.5 W)
	Apparent (VA)	Resolution Accuracy ¹	0.1 / 1 VA ±(2 % of reading + 0.5 VA)
LOAD POWER FACTOR	Reactive (VAR)	Resolution Accuracy ¹	0.1 / 1 VAR ±(2 % of reading + 1 VAR)
	Accuracy ¹ **	Range	0.000 to 1.000
LOAD CREST FACTOR	Resolution	Resolution	0.001
	Range	Range	0.00 to 50.00
HARMONIC VOLTAGE	EFFECTIVE VALUE (RMS)	Resolution	0.01
	PERCENT (%) (AC-INT and 50/60 Hz only)	Range	Up to 100th order of the fundamental wave
HARMONIC CURRENT	EFFECTIVE VALUE (RMS)	Full Scale	175 V / 350 V, 100%
	PERCENT (%) (AC-INT and 50/60 Hz only)	Resolution Accuracy ¹	0.1 V, 0.1%
OTHERS	PROTECTIONS	OCF, OTP, OPP, FAN Fail	
	DISPLAY	TFT-LCD, 4.3 inch	
MEMORY FUNCTION	ARBITRARY WAVE	Number of Memories	16 (nonvolatile)
	Waveform Lengths		4096 words
INTERFACE	Standard	USB	Type A: Host, Type B: Slave, Speed: 1.1/2.0, USB-CDC
	EXT Control	LAN	MAC Address, DNS IP Address, User Password, Gateway IP Address, Instrument IP Address, Subnet Mask
INSULATION RESISTANCE	Between input and chassis, output and chassis, input and output	RS-232C	Complies with the EIA-825-232 specifications
	WITHSTAND VOLTAGE	Optional GPIB	External Signal Input; External Control I/O
Safety	Environment	Operating Environment	SCPI-1993, IEEE 488.2 compliant interface
	Operating Temperature Range	Storage Temperature Range	500 Vdc, 30 MΩ or more
DIMENSIONS & WEIGHT	Operating Humidity Range	Storage Humidity Range	1500 Vac, 1 minute
	Storage Humidity Range	Altitude	EN 61326-1 (Class A), EN 61326-2-1/-2-2 (Class A), EN 61000-3-2 (Class A, Group 1), EN 61000-3-3 (Class A, Group 1), EN 61000-4-2/-4-3/-4-4/-4-5/-4-6/-4-8/-4-11 (Class A, Group 1), EN 55011 (Class A, Group 1), EN 61010-1
ACCESSORIES	CD ROM (User Manual, Programming manual), Safety Guide, Power Cord, Mains Terminal Cover Set, Remote Sense Terminal Cover Set, GTL-123 Test Lead, GTL-246 USB Cable	ASR-2000	285 (W) × 124 (H) × 480 (D) (not including protrusions), Approx. 11.5 kg
	ASR-2000R	213 (W) × 124 (H) × 480 (D) (not including protrusions), Approx. 10.5 kg	

ORDERING INFORMATION

- ASR-2050 500VA Programmable AC/DC Power Source
- ASR-2100 1000VA Programmable AC/DC Power Source
- ASR-2050R 500VA Programmable AC/DC Power Source for 3U 1/2 Rack Mount
- ASR-2100R 1000VA Programmable AC/DC Power Source for 3U 1/2 Rack Mount

ACCESSORIES

- CD ROM (User Manual, Programming manual), Safety Guide, Power Cord, Mains Terminal Cover Set, Remote Sense Terminal Cover Set, GTL-123 Test Lead, GTL-246 USB Cable

OPTIONAL ACCESSORIES

- ASR-GPIB-2K Optional GPIB Interface for ASR-2000 (Factory installed)
- ASR-EU-2K European Output Outlet only for ASR-2000 (Factory installed)
- GET-003 Extended Universal Power Socket (ASR-2000R only)
- GET-004 Extended European Power Socket (ASR-2000R only)
- ASR-001 Air Inlet Filter
- ASR-002 External three phase control unit for IP2W, IP3W, 3P4W output
- GRA-439-E Rack Mount Kit (EIA)
- GRA-439-I Rack Mount Kit (IIS)
- GTL-232 RS-232C Cable, approx. 2M
- GTL-255 GPIB Cable, approx. 2M, including 25 pins Micro-D connector
- GET-006 Universal Extension

FREE DOWNLOAD

- USB Driver

Note: GET-003/GET-004 are not CE approved.

ASR-2050/2100 Rear Panel



ASR-2050R/2100R Rear Panel



GRA-439-I/E Rack Mount Kit (IIS/EIA)

For: ASR-2000 Series



GTL-258 GPIB Cable, 2000mm



ASR-001 Air Inlet Filter



ASR-002 External three phase control unit

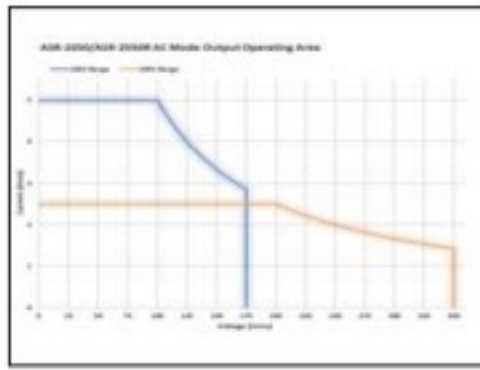
- * Basic Requirement of ASR-002 to ASR-Series
1. Must be the three same models of ASR-Series
2. To ASR-2000 Series, the ASR-GPIB-2K GPIB Interface is required
- * Functions of ASR-Series are limited when conducts to ASR-002
1. No DC Output
2. Measurement items: only current(A), power(W) and PF for each phase
3. No Voltage and Current Harmonic Analysis
4. No Remote Sensing Capability
5. No Arbitrary Waveform Function
6. No Sequence and Simulation Function
7. Not supported External Control I/O
8. No memory Function
9. Only supported USB, no LAN port for communication



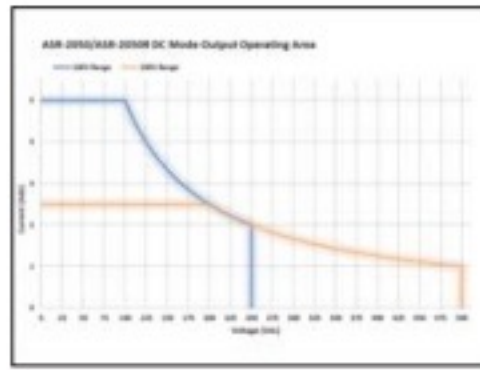
Simply Reliable | Good Will Instrument Co., Ltd.

Compact Programmable A.C./D.C. Power Source

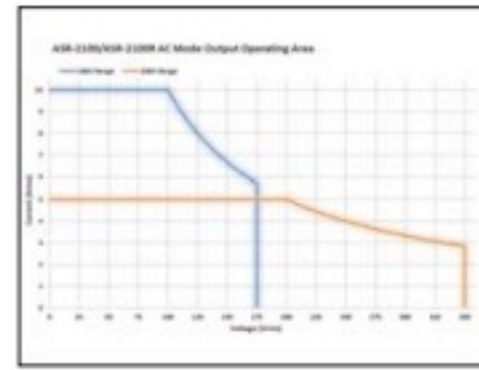
A. OPERATING AREA FOR ASR-2000 SERIES



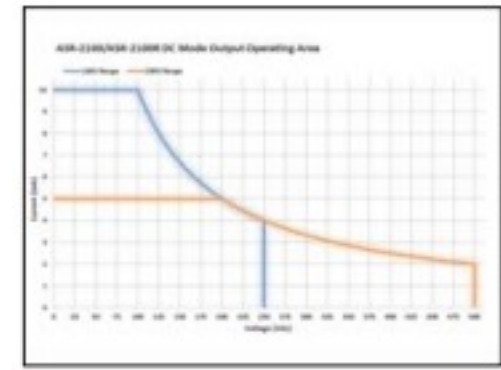
AC Output for
ASR-2050/ASR-2050R



DC Output for
ASR-2050/ASR-2050R



AC Output for
ASR-2100/ASR-2100R



DC Output for
ASR-2100/ASR-2100R

The ASR-2000 series is an AC+DC power source that provides rated power output not only at the AC output, but also at the DC output. The operation areas are shown in diagrams.

Model Name	Power Rating	Max. Output Current	Max. Output Voltage
ASR-2050	500 VA	5 / 2.5 A	350 Vrms / 500 Vdc
ASR-2100	1000 VA	10 / 5 A	350 Vrms / 500 Vdc
ASR-2050R	500 VA	5 / 2.5 A	350 Vrms / 500 Vdc
ASR-2100R	1000 VA	10 / 5 A	350 Vrms / 500 Vdc

B. MEASUREMENT ITEMS FOR ASR-2000 SERIES



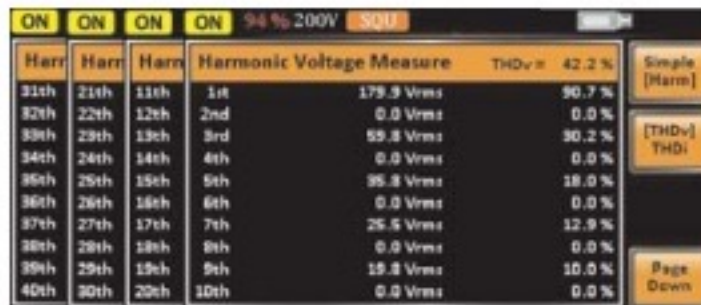
RMS Meas Display



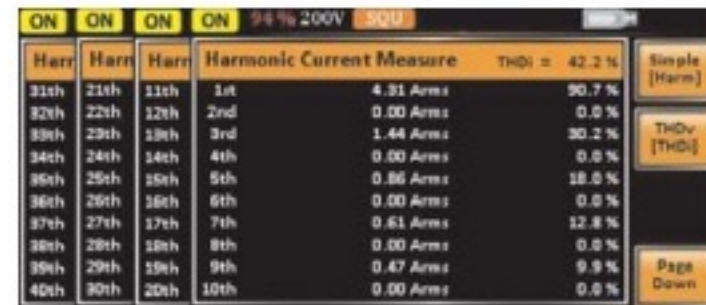
AVG Meas Display



Peak Meas Display



Voltage Harmonic

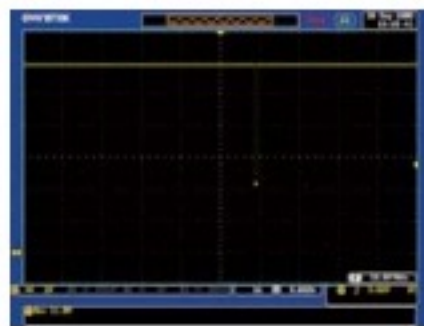


Current Harmonic

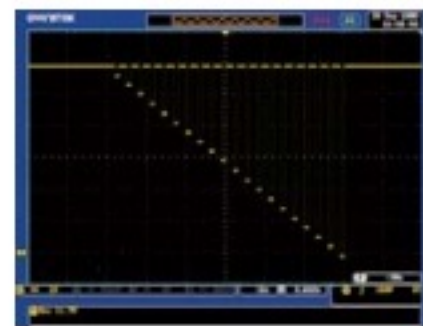
The ASR-2000 series provides users with measurement capabilities including Vrms, Vavg, Vpeak, Irms, Iavg, Ipeak, IpkH, P, S, Q, PF, CF, 40th-order Voltage Harmonic and Current Harmonic. During the power output, the measurement

parameters including Vrms/Irms, Vavg/Iavg and Vmax/Vmin/Imax/Imin can be switched by users at any time to display the instantaneous calculation reading.

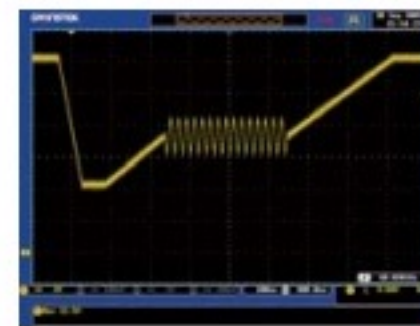
C. SEQUENCE MODE AND APPLICATIONS



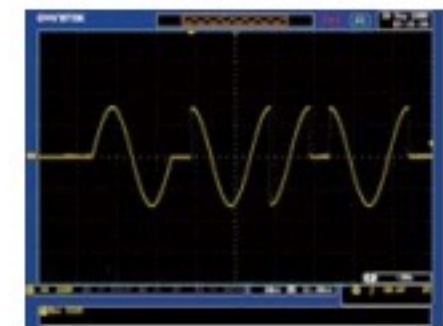
Momentary Drop in Supply Voltage



Reset Behavior at Voltage Drop



Starting Profile Waveform

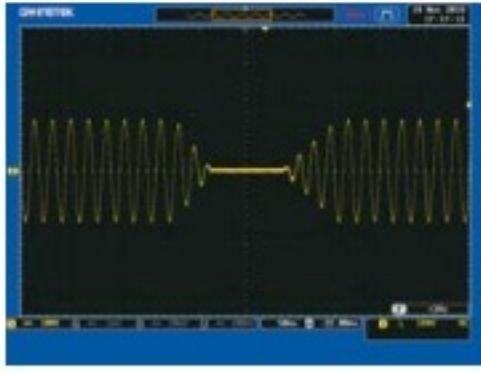


Instantaneous Power Failure

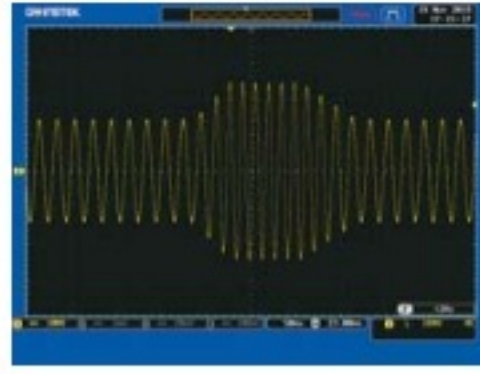
There are 10 sets of Sequence mode and each set has 0~999 steps. The time setting range of each step is 0.0001 ~ 999.9999 seconds. Users can combine multiple sets of steps to generate

the desired waveforms, including waveform fallings, surges, sags, changes and other abnormal power line conditions to meet the needs of the test application.

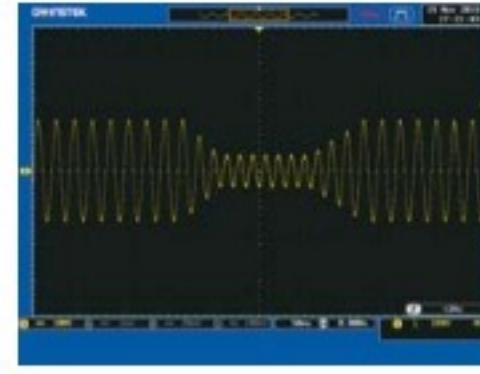
D. SIMULATE MODE



Power Outage



Voltage Rise

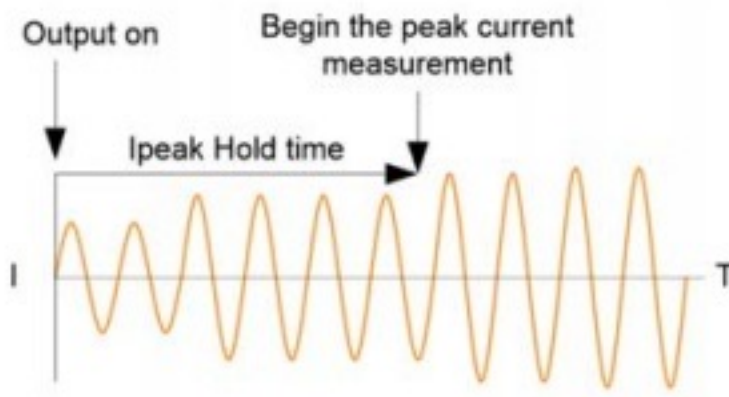


Voltage Fall

Simulate Mode can quickly simulate different transient waveforms, such as power outage, voltage rise, voltage fall, etc.,

for engineers to evaluate the impact of transient phenomena on the DUT. Ex: Capacitance durability test.

E. T, IPK HOLD & IPK, HOLD FUNCTIONS



T, Ipk Measurement

T, Ipk Hold is used to set the delay time after the output (1ms ~ 60,000ms) to capture the Ipeak value and keep the maximum value. The update only functions when the measurement value is greater than the original value. The T, Ipk Hold delay time setting can be used to measure surge current at the power on process of the DUT.

Ipk Hold can be used to measure the transient surge current of the DUT at power on without using an oscilloscope and a current probe.

F. SLEW RATE MODE



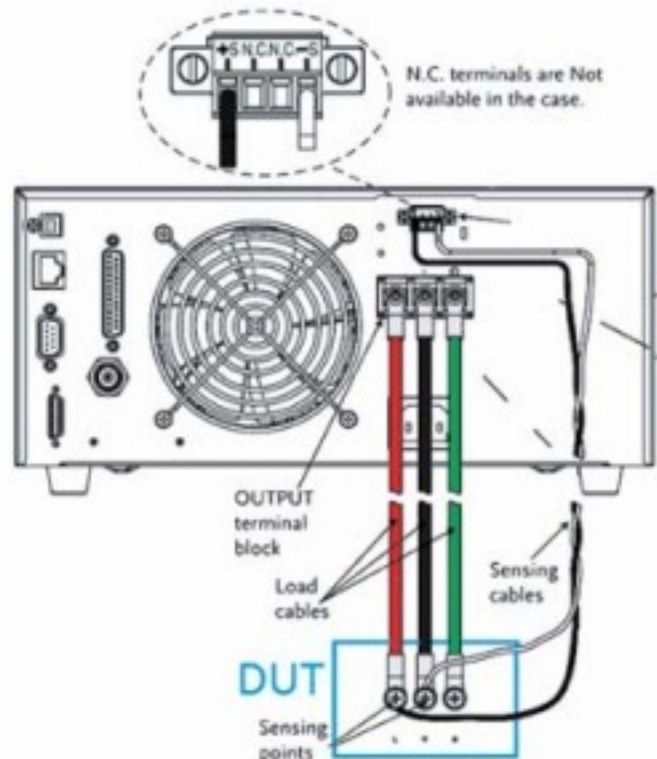
Time Mode

Slope Mode

The ASR-2000 series can set the Slew Rate Mode to determine the rise time of the voltage according to the test requirements of the DUT. Slew Rate Mode provides "Time" and "Slope" modes. When setting "Time" mode, ASR-2000 can increase output to 10~90% of the set voltage within 100 μ s; and when selecting "Slope" mode, ASR-2000 increases output voltage by a fixed rising slope of 1.5V/ μ s until reaching the set voltage value.

In addition, if users decide to self-define the rise time of the output voltage, users can flexibly set the rise time of the ASR-2000 series voltage by editing the Sequence mode.

G. REMOTE SENSE FUNCTION



For high current output applications, the voltage drop caused by large current passing through the load cables will affect the measurement results. The ASR-2000 series provides the remote sense function that can sense the voltage drop of the DUT to the ASR-2000 series and the DUT will be compensated by the ASR-2000 series. The maximum voltage that the remote sense function can compensate is 5% of the output voltage.

500/1000/2000/3000 VA Programmable Linear AC Power Source



APS-7050



APS-7100



FEATURES

- * 4.3-inch TFT-LCD
- * Output Capacity: APS-7050(500VA,310Vrms,4.2Arms); APS-7100(1000VA,310Vrms,8.4Arms); APS-7200(2000VA,310Vrms,16.8Arms); APS-7300(3000VA,310Vrms,25.2Arms)
- * Output Augmentation by Options(0-600Vrms/45-999.9Hz)
- * Low Ripple & Noise
- * Measurement and Test Functions Include VOLT, CURR, PWR, SVA, IPK, IPKH, FREQ, PF, CF
- * Support a Small AC Current Measurement 2mA -35A, Min. Resolution 0.01mA(APS-7050&APS-7100)
- * Reverse Current Alarm Function
- * 10 sets of Sequence Function to Edit Output Waveforms/10 sets of Simulate Mode to Rapidly Simulate Transient Power Supply/10 sets of Program Mode to Define Measurement Sequence/10 sets of Panel Memory Function
- * Automatic Execution of Sequence, Simulate, Program mode and Output Function when the Power is on
- * Standard Interfaces:USB Host,USB Device,LAN
- * Optional Interfaces:GPIB(APS-001);RS-232/USB CDC(APS-002 for APS-7050&APS-7100 only)RS-232 (APS-007 for APS-7200& APS-7300 only)

APS-001/APS-002 Interface Card



APS-003

Output Voltage Capacity

APS-004

Output Frequency Capacity



APS-007 RS-232 Interface Card

For: APS-7200 Series, APS-7300 Series



GWInstek introduces APS-7000 series programmable AC power sources, which consists of 500VA of APS-7050, 1000VA of APS-7100, 2000VA of APS-7200 and 3000VA of APS-7300. APS-7000 series features power characteristics from its linear structure design including low noise, low THD, and highly stabilized power output that are ideal for the product development and verification of input power with low noise requirement or stereo, video and audio device applications, etc. The maximum rated voltage is 0-310Vrms, 25.2Arms, 100.8A peak current and the output frequency range is 45-500.0Hz. Users can conveniently augment the output voltage from 0Vrms to 600Vrms and output frequency from 45Hz to 999.9Hz by purchasing options without sending equipment back to GW Instek.

One of the popular alternative energy solutions in the market is to utilize inverter to convert DC to AC and the converted AC is then sent to power grid or products require electricity. For instance, AC produced by PV inverter is sent to power grid or equipment requires electricity. While simulating power grid to verify inverter connecting with power grid, general AC power sources cannot withstand DUT's feedback energy, hence, additional power consumption resistors are needed to prevent AC power source from being damaged. On the contrary, APS-7000 series has the characteristic of absorbing reverse current so that additional power consumption resistors are not required. The input terminal of APS-7000 series is designed to isolate from the simulated AC power grid output terminal, therefore, users do not need an additional isolation device to protect DUT. APS-7000 series is suitable for simulating power grid and conducting inverter output characteristic tests, including synchronized phase and frequency. Reverse current and power detected by APS-7000 series will be displayed in red readings to facilitate user's test observation. APS-7000 series utilizes Simulate mode and Sequence mode to provide a single step or consecutive power changes; and to simulate power grid's Voltage Abnormality Test and Frequency Abnormality Test.

APS-7000 series comprises nine measurement and test functions (Vrms, Irms, F, Ipk, W, VA, PF, Ipk hold, CF), and provides user interface similar to that of AC Power Meter. APS-7000 series is ideal for the LED industry and standby mode power consumption test. Under the ARB mode, APS-7000 series provides waveforms in seven categories including Sine waveform, Triangle waveform, Staircase waveform (Square wave), Clipped Sinewave, Crest factor waveform, Surge waveform, and Fourier series and 20,000 waveform combinations so as to meet the requirements of simulating abnormal input power waveform test of various industries. Ten Preset settings allow users to store ten sets of data; Power ON Output setting allows Sequence, Simulate, and Program to automatically execute output after the equipment power is on.

To meet the test criteria of line voltage fluctuation often seen in consumer electronics, APS-7000 series features five methods to cope with special purpose or abnormal voltage, frequency, and phase; ten sets of the Simulate mode simulate power outage, voltage rise, and voltage fall; ten sets of the Sequence mode allow users to define parameters and produce sine wave by editing steps; ten sets of the Program mode can edit AC waveform output and define the ceiling and floor level of measurement items for different DUTs; Ramp Control allows users to set the variation speed for output voltage rise and fall; Surge/Dip Control simulates DUT's input power producing a Surge or Dip voltage overlapping with output voltage waveform at a specific time. For larger current output applications, voltage drop across the output cables should be avoided. APS-7200/7300 also provide the remote sense function, which senses DUT's voltage and sends the information back to APS-7200/7300 for program controlled voltage compensation. Therefore, APS-7200/7300 can avoid the voltage drop of the cable to affect output voltage.

Ethernet Port, on the rear panel, can be used for remote program control; Sync Output Socket provides external 10V sync output; Signal Output Connector provides monitor of Program execution results. APS-7000 series also provides users with Trigger In/Out and Output on/off remote control functions from J1 connector on the rear panel.

SPECIFICATIONS				
Model	APS-7050	APS-7100	APS-7200	APS-7300
AC OUTPUT				
Power Rating	500VA	1000VA	2000VA	3000VA
Output Voltage	0 - 155Vrms, 0 - 310Vrms	0 - 155Vrms, 0 - 310Vrms	0 - 155Vrms, 0 - 310Vrms	0 - 155Vrms, 0 - 310Vrms
Output Frequency	45.00 - 500.0 Hz	45.00 - 500.0 Hz	45.00 - 500.0 Hz	45.00 - 500.0 Hz
Maximum Current(r.m.s) *1	0-155Vrms 4.2A	0-310Vrms 8.4A	0-155Vrms 16.8A	0-310Vrms 25.2A
Maximum Current(peak)	0-155Vrms 16.8A	0-310Vrms 33.6A	0-155Vrms 67.2A	0-310Vrms 100.8A
OPT. APS-003(rms)	0-600Vrms 1.05A	0-600Vrms 2.1A	0-600Vrms 4.2A	0-600Vrms 6.3A
OPT. APS-003(peak)	0-600Vrms 4.2A	0-600Vrms 8.4A	0-600Vrms 16.8A	0-600Vrms 25.2A
Total Harmonic Distortion (THD)*2	≤ 0.5% at 45 - 500Hz (Resistive Load)			
Crest Factor	≤ 4			
Line Regulation	0.1% (% of full scale)			
Load Regulation	0.3% (% of full scale)			
Response Time	<100μs			
Reverse Current	30% of Maximum Output RMS Current (Continue); 100% of Maximum Output RMS Current (Within 3 minutes)			
SETTING				
Voltage	Range	0-155Vrms, 0-310Vrms, Auto		
	Resolution	0.01V at 0.00 - 99.99Vrms; 0.1V at 100.0 - 310.0Vrms		
	Accuracy	±(0.5% of setting+2 counts)		
Frequency	Range	45 - 500Hz		
	Resolution	0.01Hz at 45.00 - 99.99Hz; 0.1Hz at 100.0 - 500.0Hz		
	Accuracy	±0.02% of setting		
OPT. APS-004	Range	45-999.9Hz		
	Resolution	0.01Hz at 45.00 - 99.99Hz; 0.1Hz at 100.0 - 999.9Hz		
Power On/Off	Range	0 - 359°		
Phase Angle	Resolution	1°		
	Accuracy	±1°(45 - 65Hz)		
MEASUREMENT*3				
Voltage(RMS)	Range	0.20-38.75Vrms;38.76-77.50Vrms; 77.51-155.0Vrms;155.1-310.0Vrms		0.20-38.75Vrms;38.76-77.50Vrms; 77.51-155.0Vrms;155.1-310.0Vrms
	Resolution	0.01V at 0.00 - 99.99Vrms; 0.1V at 100.0 - 310.0Vrms		0.01V at 0.00 - 99.99Vrms; 0.1V at 100.0 - 310.0Vrms
Frequency	Accuracy*4	±(0.5% of reading + 2 counts)		±(0.5% of reading + 2 counts)
	Range	45 - 500Hz		45 - 500Hz
	Resolution	0.01Hz at 45Hz-99.99Hz; 0.1Hz at 100Hz-500.0Hz		0.01Hz at 45Hz-99.99Hz; 0.1Hz at 100Hz-500.0Hz
Current(RMS)	Accuracy	±0.1Hz		±0.1Hz
	Range	2.00 - 70.00mA;60.0 - 350.0mA; 0.300 - 3.500A;3.00 - 17.5A		0.200 - 3.500A;3.00-35.00A
	Resolution	0.01mA, 0.1mA, 0.001A, 0.01A		0.001A;0.01A
	Accuracy	±(0.6% of reading+5 counts),2.00-350.0mA; ±(0.5% of reading+5 counts),0.300-3.500A; ±(0.5% of reading+3 counts),3.000-17.50A		±(0.5% of reading+5 counts),0.200-3.500A ±(0.5% of reading+3 counts),3.00-35.00A



APS-7200

APS-7300

SPECIFICATIONS

Model		APS-7050	APS-7100	APS-7200	APS-7300
Current(Peak)	Range	0.0 – 70.0A		0.0 – 140.0A	
	Resolution	0.1A		0.1A	
	Accuracy	±(1% of reading+1 count)		± 1% of reading+1 count)	
Power(W)	Resolution	0.01W, 0.1W, 1W		0.1W, 1W	
	Accuracy	±(0.6% of reading+5 counts),0.20–99.99W; ±(0.6% of reading+5 counts),100.0–999.9W; ±(0.6% of reading+2 counts),1000–9999W		±(0.6% of reading+5counts),0.2–999.9W; ±(0.6% of reading+2counts),1000–9999W	
	Resolution	0.01VA, 0.1VA, 1VA		0.1VA, 1VA	
Apparent(VA)	Accuracy	±(1% of reading+7 counts),0.20–99.99VA; ±(1% of reading+7 counts),100.0–999.9VA; ±(1% of reading+5 counts),1000–9999VA		±(1% of reading+7 counts),0.2–999.9VA; ±(1% of reading+5 counts),1000–9999VA	
	Resolution	0.001		0.001	
	Accuracy	±(2% of reading + 2 counts)		±(2% of reading+2 counts)	
GENERAL					
Remote output signal	Pass, Fail, Test-in Process, Trigger in, Trigger out, OUT ON/OFF				
Sync output signal	Output Signal 10 V, BNC Type				
Number of Preset	10 (0–9 numeric keys)				
Protection	OCP, OPP, OTP and Alarm				
Trigger Out	Maximum low level output = 0.8V ; Minimum high level output = 2V ; Maximum source current = 8mA				
Trigger In	Maximum low level input voltage = 0.8V ; Minimum high level input voltage = 2.0V; Maximum sink current = 8mA				
SEQUENCE/SIMULATION FUNCTION					
Number of Memories	10 (0 – 9 Numeric keys)				
Number of Steps	255 max. (For 1 sequence)				
Step Time Setting Range	0.01 – 999.99s				
Operation Within Step Parameters	Constant, Keep, Linear Sweep Output Range, Frequency, Waveform (sine wave only); On Phase, Off Phase, Term Jump Count (0 – 255) jump-to, Branch 1, Branch 2, Trigger Output				
Sequence Control	Start, Stop, Hold, Continue, Branch 1, Branch 2				
AC INPUT					
Phase	Single Phase	Single Phase	Single Phase	Single Phase	Single Phase
Input Voltage	115/230Vac±15%	115/230Vac±15%	230Vac±15%	230Vac±15%	230Vac±15%
Input Frequency	50/60Hz	50/60Hz	50/60Hz	50/60Hz	50/60Hz
Max. Current	16A/8A	32A/16A	32A	50A	50A
Power Factor	0.7Typ.	0.7Typ.	0.7Typ.	0.7Typ.	0.7Typ.
Power Consumption	1.8kVA or less	3.6kVA or less	7.2kVA or less	10.8kVA or less	10.8kVA or less
ENVIRONMENT CONDITIONS					
Operating Temperature Range	0 – +40°C				
Storage Temperature Range	-10 – +70°C				
Operating Humidity Range	20 – 80% RH (No Condensation)				
Storage Humidity Range	80% RH or less(No Condensation)				
INTERFACE					
Standard	USB Host, LAN		USB Host, USB CDC, LAN		
Optional	GPIB (APS-001) RS232 / USB CDC (APS-002)		GPIB (APS-001) RS232 (APS-007)		
DIMENSIONS & WEIGHT					
	430(W) x 88(H) x 400(D) mm; Approx. 24kg	430(W) x 88(H) x 560(D) mm; Approx. 38kg	430(W) x 312(H) x 650(D) mm; Approx. 90kg	430(W) x 400(H) x 650(D) mm; Approx. 128kg	

ORDERING INFORMATION

APS-7050 500VA Programmable AC Power Source APS-7200 2000VA Programmable AC Power Source
 APS-7100 1000VA Programmable AC Power Source APS-7300 3000VA Programmable AC Power Source

ACCESSORIES :
 CD ROM(User Manual, Programming Manual for APS-7000) x 1, Power Cord(Region Dependent), GTL-123 Test Lead

OPTIONAL ASSESSORIES

APS-001 GPIB interface card APS-004 Output Frequency Capacity(45–999.9Hz)
 APS-002 RS-232/USB interface card(APS-7050, APS-7100) GRA-423 APS-7050, APS-7100 rack mount kit
 APS-007 RS-232 interface card(APS-7200, APS-7300) GRA-429 Rack mount kit (APS-7200)
 APS-003 Output Voltage Capacity(0–600Vrms) GRA-430 Rack mount kit (APS-7300)

Note : 1. APS-7200/APS-7300 are not CE approved.
 2. The minimum time settings of sequence mode or simulate mode must be greater than 1 cycle of the waveform itself.

APS-7300 Rear Panel



APS-7200 Rear Panel



APS-7100 Rear Panel



APS-7050 Rear Panel



APS-7000 Series
Europe Type Output Outlet



Note :
 The Specifications are not suit for ARB mode.
 *1. Maximum output current at working voltage 120Vrms, 240Vrms
 *2. 45–500Hz, 10% or higher of the rated output voltage, the maximum current or lower
 *3. All of measurement accuracy is at 23±5°C
 *4. In the case of 15–155V, 30–310V, sine wave, no load

Mains Terminal Cover Set



500/1000/2000/3000 VA Programmable Linear AC Power Source

APS-7000 Series

POWER SOURCES

A. CONTROL PANEL CHARACTERISTICS



Standard Mode

Simple Mode

There are two control panel modes: Standard mode and Simple mode. Both modes are shown on the above. Standard mode combines settings and AC Power Meter measurement window display. Users apply Function key (F1~F3) to select required measurement items. There are nine items for selection. Simple mode shows all measurement items on the display.

B. REVERSE CURRENT DISPLAY

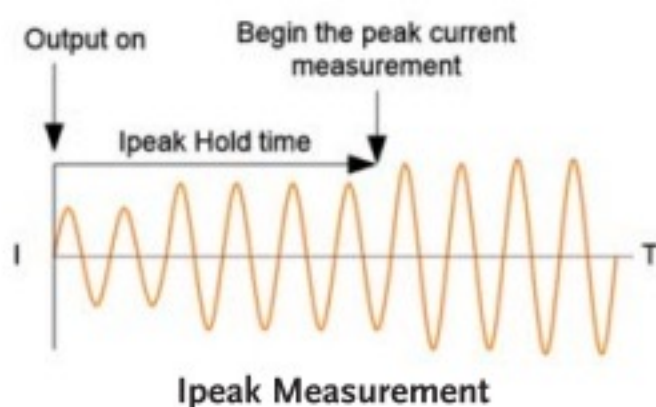


Standard Mode

Simple Mode

When output terminal detects 180 degree phase difference between voltage and current (reverse current), the front panel of APS-7000 Series will remind users the power and power factor measurement results in red numerical display. This feature can be applied to show the power and power factor measurement while testing inverter for feedback power grid. As shown on the above : APS-7000 Series can withstand reverse current: 30% of the maximum effective current or maximum current output within three minutes.

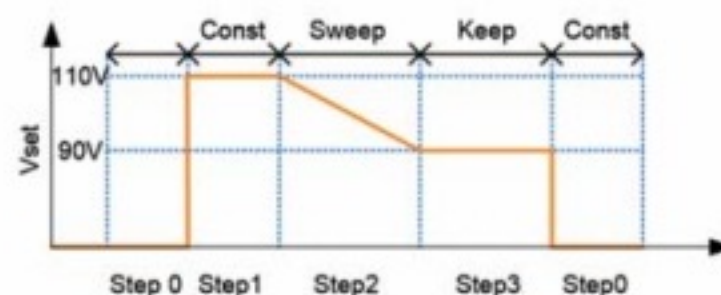
C. T IPEAK, HOLD FUNCTION



Ipeak Measurement

T, Ipk Hold sets delay time (1ms~60 seconds) for measurement after the output of Ipeak value and the maximum value will be retrieved. Update will be proceeded only if measured value is greater than the original value. Ipk Hold is for measuring transient inrush current as soon as the equipment power is on that is usually done by oscilloscope and current probe. T, Ipk Hold delay time setting can be applied to measure inrush current of sequentially activated DUT.

D. SEQUENCE MODE



Sequence Mode

There are ten sets of Sequence mode and each set has 0~255 steps. The time setting range for each step is 0.01 ~ 999.99 seconds. Combining many sets of steps to edit required waveforms can satisfy users' requirement of highly complicated waveforms.

E. SIMULATE MODE



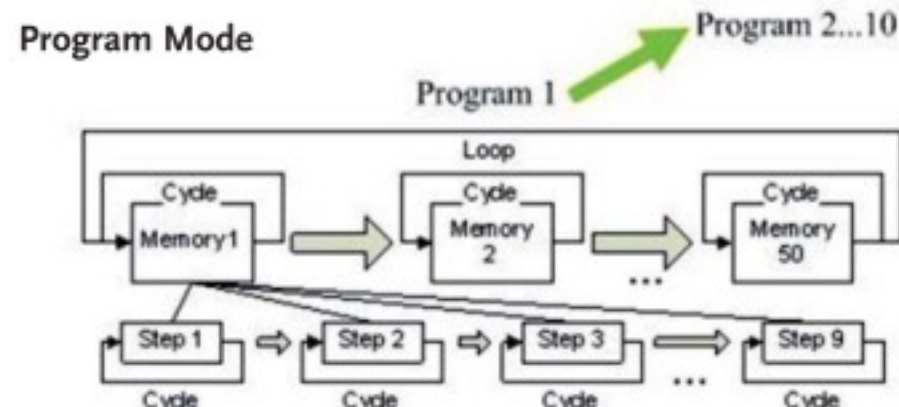
Power Outage

Voltage Rise

Voltage Fall

This mode can rapidly produce different simulated input transient waveforms such as power outage; voltage rise and voltage fall etc. for engineers to evaluate the impact on DUT posed by the transient phenomena. For instance, capacitor endurance test.

F. PROGRAM MODE



This mode allows users to set ceiling and floor specifications to produce PASS/FAIL result after the measurement is done. It can also show test results for each test procedure or only show the last result.

There are ten sets of Program mode and each set has 50 sets of memory. Each memory comprises 9 steps. Each Program will operate according to memory sequence, self-defined loops or designated steps to stop.

G SURGE/DIP CONTROL



Surge

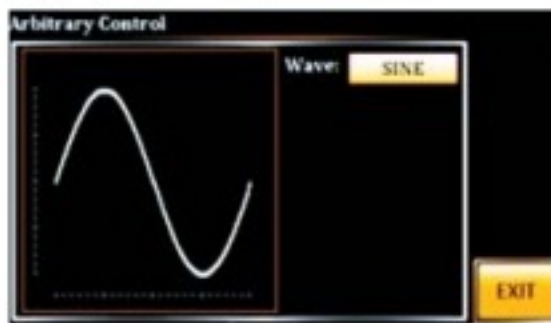


Dip

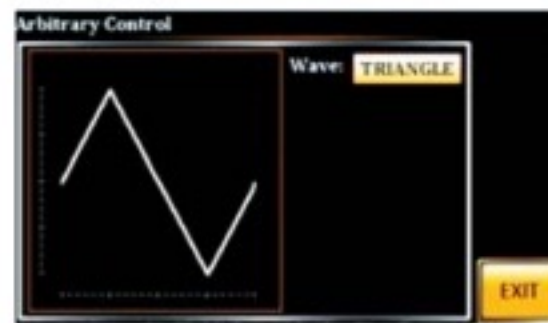
Overlapping a Surge/Dip voltage on a normal voltage as the input power for DUT allows users to simulate Surge/Dip situation and evaluate DUT characteristics.

H. FUNCTION WAVEFORM (ARB) MODE

Provide waveforms in seven categories and 20,000 waveform combinations so as to rapidly simulate distorted AC voltage waveforms.



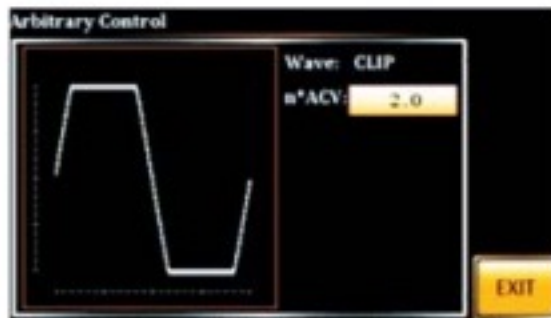
Sine Waveform
Standard AC Waveform



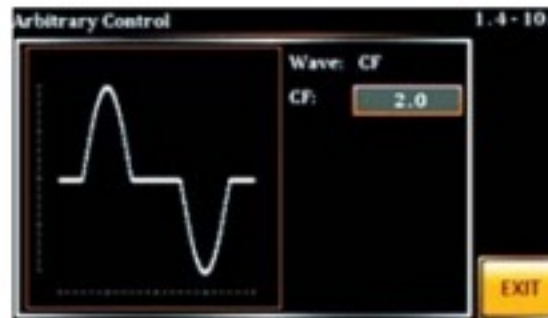
Triangle Waveform
Power Harmonic Output Simulation
Is Triangle Waveform



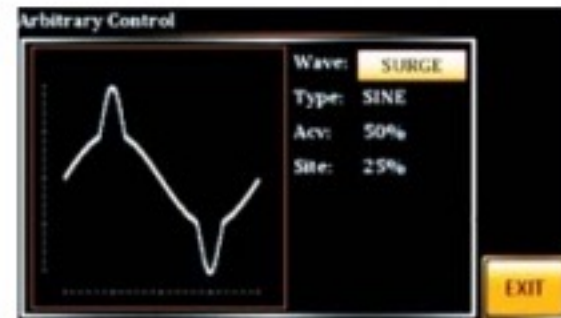
Staircase Waveform
Simulate Square Waveform And Staircase
Waveform For Commercial Ups



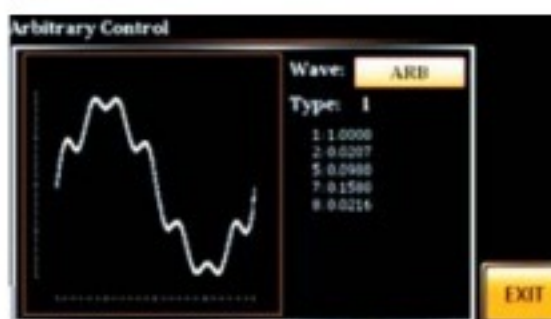
Clipped Sinewave
Simulate Grid Power Supply Heavy
Load Waveform



Crest Factor Waveform
Simulate Rectified Filter Current
Waveform By Capacitor Input



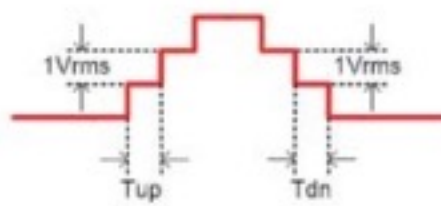
Surge Waveform
Simulate Grid Power Supply's
Peak Over-voltage



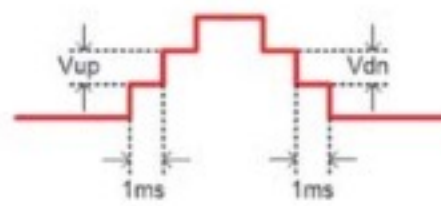
Fourier Series Synthesized Waveform

Simulate real output power waveform. Distorted power waveform is produced due to output impedance and non-linear effect such as inductance, capacitance, and parasitic capacitance effect. For example: motors.

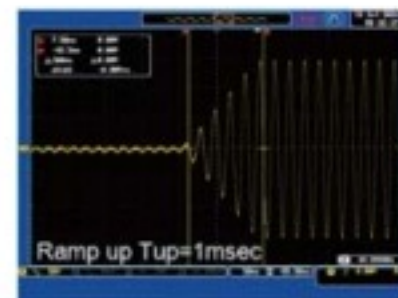
I. RAMP CONTROL



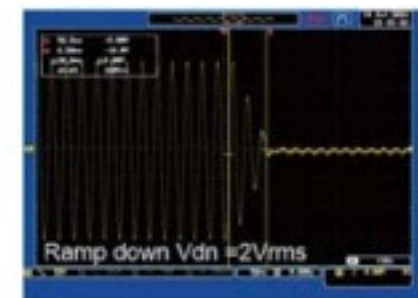
$T_{up} \rightarrow 0.1 \sim 999.9\text{ms}$
 $T_{dn} \rightarrow 0.1 \sim 999.9\text{ms}$



$V_{up} \rightarrow 0.01 \sim 99.99\text{Vrms}$
 $V_{dn} \rightarrow 0.01 \sim 99.99\text{Vrms}$



Mode=Time, $T_{up}=1\text{msec}$,
 $V_{AC}=100\text{V}$, Freq=50Hz,
Ramp output=on.



Mode=Voltage, $V_{dn}=2\text{Vrms}$,
 $V_{AC}=100\text{V}$, Freq=50Hz,
Ramp output=off.

Ramp control allows users to set output voltage rise or fall speed which is based on time (1ms) or voltage (1Vrms) unit.

500/1000 VA AC Power Source



APS-7050E



APS-7100E



FEATURES

- * 4.3" large LCD Display
- * Output Capacity:
APS-7050E (500VA, 310Vrms, 4.2/2.1Arms)
APS-7100E (1000VA, 310Vrms, 8.4/4.2Arms)
- * Measurement Function :
Voltage, Current, Power, Frequency, Power Factor, Ipeak
- * Reverse Current Alarm Function
- * 10 Sets of The Test Mode Simulate Power Transient Output
- * 10 Sets of Preset Allow Users to Store Ten Settings
- * OCP/OPP/OTP Protection
- * Variable Voltage, Frequency and Current Limiter
- * Universal Power Inlet

GW Instek launches the APS-7000E series the economy version of the APS-7000 programmable AC power source. With the height of 2U, the maximum rated output for APS-7050E is 500VA, 310Vrms, 4.2Arms and APS-7100E is 1000VA, 310Vrms, 8.4Arms. The output frequency range of the series is 45~500Hz. The series is ideal for the test and development of DC power supply devices, consumer electronics, automotive electronics and electronic components.

The APS-7000E series comprises six measurement and test functions (Vrms, Irms, F, Ipk, W, PF), and provides user interface similar to that of AC Power Meter. The APS-7000E series, via switching many sets of current levels to increase small current measurement resolution, is ideal for the LED industry and standby mode power consumption test. Ten sets of Preset allow users to store ten settings.

To meet the test criteria of line voltage fluctuation often seen in consumer electronics, the APS-7000E series not only provides a stable AC power source but also features the Test mode to satisfy special or abnormal voltage and frequency variation demands. Ten sets of the Test mode simulate power outage, voltage rise, and voltage fall. The APS-7000E series that simulates waveforms of city power grid's transient changes is suitable for verifying electronics products operated under abnormal power source.

The APS-7000E series is the economy version of the APS-7000 series. If communications interface and larger voltage/frequency are required, please refer to the APS-7000 series.

SPECIFICATIONS

Model	APS-7050E	APS-7100E
Power Rating	500VA	1000VA
Output Voltage	0 – 155Vrms/0 – 310.0 Vrms	0 – 155Vrms/0 – 310.0 Vrms
Output Frequency	45.00 – 500.0 Hz	45.00 – 500.0 Hz
Maximum Current (r.m.s)	0–155Vrms 0–310Vrms	8.4A 4.2A
Maximum Current (peak)	0–155Vrms 0–310Vrms	16.8A 33.6A
Total Harmonic Distortion (THD)	≤ 0.5% at 45 – 500Hz (Resistive Load)	
Crest Factor	≤ 4	
Line Regulation	0.1% (% of full scale)	
Load Regulation	0.3% (% of full scale)	
Response Time	<100μs	
Reverse Current	30% of Maximum Output RMS Current (Continue); 100% of Maximum Output RMS Current (Within 3 minutes)	
SETTING		
Voltage	Range	0 – 155Vrms/0 – 310Vrms/Auto
	Resolution	0.01V at 0.00 – 99.99Vrms; 0.1V at 100.0 – 310.0Vrms
	Accuracy	±(0.5% of setting+2 counts)
Frequency	Range	45 – 500Hz
	Resolution	0.01Hz at 45.00 – 99.99Hz/0.1Hz at 100.0 – 500.0Hz
	Accuracy	±0.02% of setting
MEASUREMENT		
Voltage(RMS)	Range	0.20–38.75Vrms/38.76–77.50 Vrms/77.51–155.0Vrms/155.1–310.0Vrms
	Resolution	0.01V at 0.00 – 99.99Vrms; 0.1V at 100.0 – 310.0Vrms
	Accuracy	±(0.5% of reading + 2 counts)
Frequency	Range	45 – 500Hz
	Resolution	0.01Hz (at 45Hz–99.99Hz)/0.1Hz (at 100Hz–500.0Hz)
	Accuracy	±0.1Hz
Current(RMS)	Range	2.00 – 70.00mA/60.0 – 350.0mA/0.300 – 3.500A/3.00 – 17.5A
	Resolution	0.01mA, 0.1mA, 0.001A, 0.01A
	Accuracy	±(0.6% of reading+5 counts); 2.00–350.0mA/±(0.5% of reading+5 counts); 0.350–3.500A/±(0.5% of reading+3 counts);3.500–17.50A
Current(Peak)	Range	0.0 – 70.0A
	Resolution	0.1A
	Accuracy	±(1% of reading+1 count)
Power(W)	Resolution	0.01W, 0.1W, 1W
	Accuracy	±(0.6% of reading+5 counts); 0.20–99.99W; ±(0.6% of reading+5 counts); 100.0–999.9W ±(0.6% of reading+2 counts); 1000–9999W
Power Factor	Resolution	0.001
	Accuracy	±(2% of reading + 2 counts)
GENERAL		
Number of Preset	10(0–9 Numeric keys)	
Protection	OCP, OPP, OTP and Alarm	



APS-7050E



APS-7100E

APS-7050E Rear Panel



APS-7100E Rear Panel



SPECIFICATIONS		
Model	APS-7050E	APS-7100E
ENVIRONMENT CONDITIONS		
Operation Temperature	0 – +40°C	
Storage Temperature	-10 – +70°C	
Operating Humidity	20 – 80% RH (No Condensation)	
Storage Humidity	80% RH or less (No Condensation)	
AC INPUT		
Input Power Source	1φ AC 115/230Vac ±15%	
DIMENSIONS & WEIGHT		
	430(W) x 88(H) x 400(D) mm; Approx. 24kg	430(W) x 88(H) x 560(D) mm; Approx. 38kg

ORDERING INFORMATION	
APS-7050E	500VA AC Power Source
APS-7100E	1000VA AC Power Source
ACCESSORIES :	
CD ROM (User Manual) x 1, Power Cord (Region Dependent), Mains Terminal Cover Set, GTL-123 Test Lead	
OPTIONAL ASSESSORIES	
GRA-423	Rack Mount Kit (APS-7000E Series)

Mains Terminal Cover Set

For: APS-7100/7100E Series



For: APS-7050/7050E Series



**APS-7000E Series
Europe Type Output Outlet**





ELECTRONIC LOADS

GW Instek provides DC electronic loads, AC/DC electronic loads, which allow users to flexibly test various batteries, energy storage systems, and power supply devices. DC electronic load can simulate load characteristics, including static, dynamic, constant current, constant resistance, constant voltage, constant power and short circuit. AC/DC electronic load can simulate sine wave current load in the CC mode, non-sine wave current load in the linear CC mode, and AC rectified load in the rectifier mode.

Electronic loads can be simply divided into multi-channel electronic loads and single-channel electronic loads according to application requirements. The multi-channel electronic load can test and measure multiple sets of low-power and different specifications of power output devices at the same time; and the single-channel electronic load can, based on the characteristics of a single load, choose high power, high voltage, high precision, high resolution or fast dynamic response to conduct test and measurement.

Electric vehicles, solar energy, energy storage systems, server power supplies, and power electronics, etc., can use the built-in dedicated test modes of GW Instek electronic loads to simplify user's operating procedures and shorten the test time. For example: using the CC+CV, CP+CV, CC+UVP, CP+UVP battery discharge modes to discharge electric vehicle battery can avoid over-discharge and protect the battery at the same time. The MPPT mode can quickly obtain the maximum power point of the solar panel.

PRODUCTS

- Multi-channel Electronic Loads
- High Power DC Electronic Load
- DC Electronic Load
- AC & DC Electronic Load

DC ELECTRONIC LOADS

MULTI-CHANNEL DC ELECTRONIC LOAD MODULES

Model	Operation Voltage	Operation Current	Power	Channel	Weight(kg)	Page
PEL-2020A(B)	0 ~ 80V	20A	100/100W	2	3.8	D105-108
PEL-2030A(B)	0 ~ 80V	5/40A	30/250W	2	3.8	
PEL-2040A(B)	0 ~ 80V	70A	350W	1	3.8	
PEL-2041A(B)	0 ~ 500V	10A	350W	1	3.8	

DC ELECTRONIC LOADS

Model	Operation Voltage	Operation Current	Power	Channel	Weight(kg)	Page	
PEL-503-80-50	0 ~ 80V	50A	250W	1	5.3	D117-118	
PEL-504-80-70	0 ~ 80V	70A	350W	1	5.3		
PEL-507-80-140	0 ~ 80V	140A	700W	1	10.3		
PEL-3021	0 ~ 150V	35A	175W	1	6	D93-98	
PEL-3031E	0 ~ 150V	60A	300W	1	7.5	D99-104	
PEL-3041	0 ~ 150V	70A	350W	1	7	D93-98	
PEL-3111	0 ~ 150V	210A	1050W	1	17		
PEL-3211	0 ~ 150V	420A	2100W	1	23		
PEL-3212	0 ~ 150V	420A	2100W	1	67.5		
PEL-3322	0 ~ 150V	630A	3150W	1	73		
PEL-3323	0 ~ 150V	630A	3150W	1	85.5		
PEL-3424	0 ~ 150V	840A	4200W	1	110		
PEL-3533	0 ~ 150V	1050A	5250W	1	96.5		
PEL-3535	0 ~ 150V	1050A	5250W	1	127.5		
PEL-3744	0 ~ 150V	1470A	7350W	1	125		
PEL-3955	0 ~ 150V	1890A	9450W	1	149		
PEL-3032E	0 ~ 500V	15A	300W	1	7.5		D99-104
PEL-504-500-15	0 ~ 500V	15A	350W	1	5.3		D117-118
PEL-507-500-30	0 ~ 500V	30A	700W	1	10.3		
PEL-3021H	0 ~ 800V	8.75A	175W	1	6	D93-98	
PEL-3041H	0 ~ 800V	17.5A	350W	1	7		
PEL-3111H	0 ~ 800V	52.5A	1050W	1	17		
PEL-3211H	0 ~ 800V	105A	2100W	1	23		
PEL-3212H	0 ~ 800V	105A	2100W	1	67.5		
PEL-3322H	0 ~ 800V	157.5A	3150W	1	73		
PEL-3323H	0 ~ 800V	157.5A	3150W	1	85.5		
PEL3424H	0 ~ 800V	210A	4200W	1	110		
PEL-3533H	0 ~ 800V	262.5A	5250W	1	96.5		
PEL-3535H	0 ~ 800V	262.5A	5250W	1	127.5		
PEL-3744H	0 ~ 800V	367.5A	7350W	1	125		
PEL-3955H	0 ~ 800V	472.5A	9450W	1	149		

DC ELECTRONIC LOADS

HIGH POWER DC ELECTRONIC LOADS

Model	Operation Voltage	Operation Current	Power	Channel	Weight(kg)	Page
PEL-5006C-150-600	150V	600A	6kW	1	62	D109-116
PEL-5008C-150-800	150V	800A	8kW	1	77.5	
PEL-5010C-150-1000	150V	1000A	10kW	1	84.8	
PEL-5012C-150-1200	150V	1200A	12kW	1	92	
PEL-5015C-150-1500	150V	1500A	15kW	1	116.5	
PEL-5018C-150-1800	150V	1800A	18kW	1	124	
PEL-5020C-150-2000	150V	2000A	20kW	1	140.5	
PEL-5024C-150-2000	150V	2000A	24kW	1	155	
PEL-5006C-600-420	600V	420A	6kW	1	62	
PEL-5008C-600-560	600V	560A	8kW	1	77.5	
PEL-5010C-600-700	600V	700A	10kW	1	84.8	
PEL-5012C-600-840	600V	840A	12kW	1	92	
PEL-5015C-600-1050	600V	1050A	15kW	1	116.5	
PEL-5018C-600-1260	600V	1260A	18kW	1	124	
PEL-5020C-600-1400	600V	1400A	20kW	1	140.5	
PEL-5024C-600-1680	600V	1680A	24kW	1	155	
PEL-5006C-1200-240	1200V	240A	6kW	1	62	
PEL-5008C-1200-320	1200V	320A	8kW	1	77.5	
PEL-5010C-1200-400	1200V	400A	10kW	1	84.8	
PEL-5012C-1200-480	1200V	480A	12kW	1	92	
PEL-5015C-1200-600	1200V	600A	15kW	1	116.5	
PEL-5018C-1200-720	1200V	720A	18kW	1	124	
PEL-5020C-1200-800	1200V	800A	20kW	1	140.5	
PEL-5024C-1200-960	1200V	960A	24kW	1	155	
PEL-5004G-150-400	150V	400A	4kW	1	28	D125-128
PEL-5005G-150-500	150V	500A	5kW	1	28	
PEL-5006G-150-600	150V	600A	6kW	1	28	
PEL-5004G-600-280	600V	280A	4kW	1	29	
PEL-5005G-600-350	600V	350A	5kW	1	29	
PEL-5006G-600-420	600V	420A	6kW	1	29	
PEL-5004G-1200-160	1200V	160A	4kW	1	29	
PEL-5005G-1200-200	1200V	200A	5kW	1	29	
PEL-5006G-1200-240	1200V	240A	6kW	1	29	

DC ELECTRONIC LOADS

AC/DC ELECTRONIC LOADS

Model	Operation Voltage	Operation Current	Power	Channel	Weight(kg)	Page
AEL-5002-350-18.75	350V	18.75A	1875W	1	21.5	D119-124
AEL-5003-350-28	350V	28A	2800W	1	27.5	
AEL-5004-350-37.5	350V	37.5A	3750W	1	33.5	
AEL-5006-350-56	350V	56A	5600W	1	58	
AEL-5008-350-75	350V	75A	7500W	1	70	
AEL-5012-350-112.5	350V	112.5A	11250W	1	105	
AEL-5015-350-112.5	350V	112.5A	15000W	1	140	
AEL-5019-350-112.5	350V	112.5A	18750W	1	260	
AEL-5023-350-112.5	350V	112.5A	22500W	1	295	
AEL-5002-425-18.75	425V	18.75A	1875W	1	21.5	
AEL-5003-425-28	425V	28A	2800W	1	27.5	
AEL-5004-425-37.5	425V	37.5A	3750W	1	33.5	
AEL-5006-425-56	425V	56A	5600W	1	58	
AEL-5008-425-75	425V	75A	7500W	1	70	
AEL-5012-425-112.5	425V	112.5A	11250W	1	105	
AEL-5015-425-112.5	425V	112.5A	15000W	1	140	
AEL-5019-425-112.5	425V	112.5A	18750W	1	260	
AEL-5023-425-112.5	425V	112.5A	22500W	1	295	
AEL-5003-480-18.75	480V	18.75A	2800W	1	27.5	
AEL-5004-480-28	480V	28A	3750W	1	33.5	

Programmable D.C. Electronic Load



PEL-3111/3111H



PEL-3041/3041H/3021/3021H



FEATURES

- * Operating Voltage (DC) : 0~150V(PEL-3000)/ 0~800V(PEL-3000H)
- * Operating Mode : C.C/C.V/C.R/C.P/C.C+C.V/ C.R+C.V/C.P+C.V
- * Parallel Connection of Inputs for Higher Capacity (Max : 9,450W)
- * Support of High Slew Rate : Max 16A/ μ s (PEL-3000)/0.84A/ μ s (PEL-3000H)
- * Run Program Function (Go/NoGo Test)
- * Sequence Function for High Efficient Load Simulations
- * Dynamic (Switching) Function : 0.0166Hz~20kHz
- * Soft Start Function : Off/On (1~200ms, Res. 1ms)
- * Adjustable OCP/OVP/OPP/UVP Setting
- * Short Circuit Function
- * Timer Function : Elapsed Time of Load on
- * Cut Off Time (Auto Load Off Timer) : 1s to 999h 59min 59s or Off
- * External Channel Control/Monitoring Via Analog Control Connector
- * Setup Memories : 100 sets
- * 3.5 Inch TFT LCD Display
- * Multi Interface : USB, RS-232 (Std.)/ GPIB, LAN (Opt.)

Rear Panel



The PEL-3000 Series, a single-channel, programmable D.C. electronic load with 0.01mA current resolution and 16A/ μ s current Slew Rate, is very ideal for testing server power supply and SPS(Switching Power Supply) for commercial and industrial computers. For a heavy-duty device like cloud ecosystem running 24-hour nonstop operations, a stable and high-power power supply, ranging from 350W to 1500W, is required to maintain the normal operation of server, Hub, and the equipment of data storage and internet communications. Owing to the increasing demand of data transmission and large scale data storage of telecommunications systems, the infrastructure of internet communications is in the pace of rapid expansion. This has greatly boosted the market demand of telecommunications equipment powered by power supply of 2000W and above. The flexible power combination of PEL-3000 Series meets the test requirements of present high-power power supply. The PEL-3000H Series programmable DC Electronic load, which not only inherited functions and features from the PEL-3000 Series but providing three current ranges for all PEL-3000H Series and adding voltage monitor BNC terminals on the front panel. The PEL-3000H Series, a single-channel, programmable D.C. electronic load with 800V and 0.84A/ μ s current Slew Rate, is ideal for the test of the high voltage devices such as the EV & HEV in-vehicle chargers, DC/DC converters or high-voltage batteries. With respect to battery testing applications such as rechargeable battery for electrical tools, battery module and automobile battery, PEL-3000(H) Series has three stand-alone models to offer including 175W, 350W, 1050W and Booster. By connecting Booster 2100W units with master units, the maximum load capacity of the whole system can reach 9,450W. Hence, the PEL-3000(H) Series fulfills various power testing requirements including medium to low power or high-power power supply.

The PEL-3000(H) Series has seven operating modes and three operating functions. Among the seven operating modes, four of them are basic operating modes, including constant current, constant voltage, constant resistance, and constant power, and the other three are advanced operating modes including constant current + constant voltage, constant resistance + constant voltage, and constant power + constant voltage. Users must first select operating mode and then operating function based upon the test requirements. Static, Dynamic and Sequence operating functions can be applied to different testing conditions including a fixed load level, switching between two levels or switching among more than two levels. Sequence function is divided into Fast Sequence and Normal Sequence according to the test time of each step. Both Dynamic and Sequence are to assist users to simulate the genuine load change. For instance, PEL-3000(H) Series can simulate HEV current consumption to make sure that automobile battery can supply HEV with sufficient power need on the road. By so doing, manufacturers can elevate product quality and reliability.

The Soft Start function of the PEL-3000(H) Series can set current rise time for the moment PEL-3000(H) Series is turned on to reduce the abnormal situation of the voltage drop of power supply under test. The adjustable Under Voltage Protection(UVP), GO/NO GO voltage input monitoring function, current monitoring function and Timer Function to control load activation time can be jointly applied to the characteristic tests of battery bleeding to avoid battery damage during bleeding operation. Based upon the functionalities described above, the PEL-3000(H) Series can test a vast variety of power supply ranging from the fundamental static sink current to complex dynamic load simulations so as to enhance product quality and reliability.

The single unit D.C Electronic Load of PEL-3000(H) Series

The PEL-3000(H) Series is a high speed, single channel and programmable D.C. electronic load and its power, functionality, parallel combination and size are listed on the following chart :

MODEL	PEL-3021/3021H	PEL-3041/3041H	PEL-3111/3111H	PEL-3211/3211H
Power	175W	350W	1,050W	2,100W Booster
Function	Full-function Single Unit	Full-function Single Unit	Full-function Single Unit	No control panel, can not be operated alone
Parallel Combination	Parallel with same model, 5 units the maximum	Parallel with same model, 5 units the maximum	Parallel with same model, 5 units the maximum Parallel with the maximum of four PEL-3211(H)s	Parallel with PEL-3111(H)
Size	Half Rack	Half Rack	Full Rack	Full Rack

Note:

- *1. Full scale of H range
- *2. Vin: input terminal voltage of electronic load
- *3. M range applies to the full scale of H range
- *4. Siemens[S] = Input current[A] / Input voltage[V] = 1/resistance[Ω]
- *5. Converted value at the input current. At the input current. It is not applied for the condition of the parallel operation.
- *6. set = Vin/Rset
- *7. At the sensing point during remote sensing under the operating range of the input voltage. It is also applied for the condition of the parallel operation.
- *8. It is not applied for the condition of the parallel operation.
- *9. Time to reach from 10 % to 90 % when the current is varied from 2 % to 100 % (20 % to 100 % in M range) of the rated current.
- *10. N = Number of units in parallel (same model)
- *11. N = Number of units in parallel (same model) or N = 1 + 2 x (Number of units in parallel [PEL-3211])

SPECIFICATIONS													
Model	PEL-3021			PEL-3041			PEL-3111			PEL-3211			
Voltage	0V-150V			0V-150V			0V-150V			0V-150V			
Current	35A			70A			210A			420A			
Power	175W			350W			1050W			2100W			
Input Resistance	500 kΩ			500 kΩ			500 kΩ			500 kΩ			
Min. Operating Voltage(DC)(Typ.)	0.75V@17.5A 1.5V@35A			0.75V@35A 1.5V@70A			0.75V@105A 1.5V@210A			0.75V@210A 1.5V@420A			
CONSTANT CURRENT MODE													
Operating Range	H, M, L	0-35A	0-3.5A	0-0.35A	0-70A	0-7A	0-0.7A	0-210A	0-21A	0-2.1A	420A		
Accuracy of Setting	H, M	$\pm(0.2\% \text{ of set} + 0.1\% \text{ of f.s.}^{(1)}) + V_{in}^{(2)}/500 \text{ k}\Omega$									$\pm(1.2\% \text{ of set} + 1.1\% \text{ of f.s.})$		
Accuracy of Setting	L	$\pm(0.2\% \text{ of set} + 0.1\% \text{ of f.s.}^{(1)}) + V_{in}^{(2)}/500 \text{ k}\Omega$									N/A		
Accuracy of Setting(Parallel)		$\pm(1.2\% \text{ of set} + 1.1\% \text{ of f.s.}^{(1)})$									$\pm(1.2\% \text{ of set} + 1.1\% \text{ of f.s.})$		
Resolution	H, M, L	1mA	0.1mA	0.01mA	2mA	0.2mA	0.02mA	10mA	1mA	0.1mA	N/A		
CR MODE													
Operating Range	Range	H	23.3336S-400μS (42.857mΩ-2.5kΩ)			46.6672S-800μS (21.428mΩ-1.25kΩ)			140.0016S-2.4mS (7.1427mΩ-416.6667Ω)			280.0032S-4.8mS (3.5714mΩ-208.3334Ω)	
		M	2.33336S-40μS (428.566mΩ-25kΩ)			4.6667S-80μS (214.28mΩ-12.5kΩ)			14.0001S-242.4μS (71.427mΩ-4.16667kΩ)			28.0032S-484.8μS (35.7135mΩ-2.083334Ω)	
		L	0.233336S-4μS (4.28566Ω-250kΩ)			0.46667S-8μS (2.1428Ω-125kΩ)			1.40001S-24.24μS (714.27mΩ-41.6667kΩ)			N/A	
Accuracy of Setting	H, M	$\pm(0.5\% \text{ of set}^{(3)} + 0.5\% \text{ of f.s.}^{(1)}) + V_{in}^{(2)}/500\text{k}\Omega$									$\pm(1.2\% \text{ of set}^{(3)} + 1.1\% \text{ of f.s.}^{(1)})$		
Accuracy of Setting	L	$\pm(0.5\% \text{ of set}^{(3)} + 0.5\% \text{ of f.s.}^{(1)}) + V_{in}^{(2)}/500\text{k}\Omega$									N/A		
Parallel		$\pm(1.2\% \text{ of set} + 1.1\% \text{ of f.s.}^{(1)})$									$\pm(1.2\% \text{ of set} + 1.1\% \text{ of f.s.}^{(1)})$		
Resolution	H, M, L	400μS	40μS	4μS	800μS	80μS	8μS	2.4mS	240μS	24μS	N/A		
CONSTANT VOLTAGE MODE													
Operating Range	Range	H	1.5V-150V									1.5V-150V	
		L	1.5V-15V									1.5V-15V	
Accuracy of Setting	H, L	$\pm(0.1\% \text{ of set} + 0.1\% \text{ of f.s.})$									N/A		
Resolution	H, L	10mV/1mV									N/A		
CONSTANT POWER MODE													
Operating Range	Range	H	17.5W-175W			35W-350W			105W-1050W			210W-2100W	
		M	1.75W-17.5W			3.5W-35W			10.5W-105W			21W-210W	
		L	0.175W-1.75W			0.35W-3.5W			1.05W-10.5W			N/A	
Accuracy of Setting	H, M, L	$\pm(0.6\% \text{ of set}^{(3)} + 1.4\% \text{ of f.s.}^{(1)}) + V_{in}^{(2)}/500\text{k}\Omega$									N/A		
Resolution	H, M, L	10mW	1mW	0.1mW	10mW	1mW	0.1mW	100mW	10mW	1mW	N/A		
PARALLEL Mode													
Capacity		875W			1750W			5250W			PEL-3111 with 4 booster units : Max 9.45kW		
SLEW RATE													
Operation Mode		CC, CR			CC, CR			CC, CR			N/A		
Setting Range (CC mode)	Range	H	2.5 x N ¹⁰ mA/μs-2.5A/μs			5 x N ¹⁰ mA/μs-5A/μs			16 x N ¹¹ mA/μs-16A/μs			N/A	
		M	250 x N ¹⁰ μA/μs-250mA/μs			500 x N ¹⁰ μA/μs-500mA/μs			1.6 x N ¹¹ mA/μs-1.6A/μs			N/A	
		L	25 x N ¹⁰ μA/μs-25mA/μs			50 x N ¹⁰ μA/μs-50mA/μs			160 x N ¹¹ μA/μs-160mA/μs			N/A	
Setting Range (CR Mode)	Range	H	250 x N ¹⁰ μA/μs-250mA/μs			500 x N ¹⁰ μA/μs-500mA/μs			1.6 x N ¹¹ mA/μs-1.6A/μs			N/A	
		M	25 x N ¹⁰ μA/μs-25mA/μs			50 x N ¹⁰ μA/μs-50mA/μs			160 x N ¹¹ μA/μs-160mA/μs			N/A	
		L	2.5 x N ¹⁰ μA/μs-2.5mA/μs			5 x N ¹⁰ μA/μs-5mA/μs			16 x N ¹¹ μA/μs-16mA/μs			N/A	
Accuracy of Setting	H, M, L	$\pm(10\% \text{ of set}^{(3)} + 5\mu\text{s})$									N/A		
Resolution (Setting Range)		1 x N ¹⁰ mA 250 x N ¹⁰ mA/μs-2.5A/μs 100 x N ¹⁰ μA 25 x N ¹⁰ mA/μs-250 mA/μs 10 x N ¹⁰ μA 2.5 x N ¹⁰ mA/μs-25 mA/μs 1 x N ¹⁰ μA 250 x N ¹⁰ μA/μs-2.5 x N ¹⁰ mA/μs 100 x N ¹⁰ nA 25 x N ¹⁰ μA/μs-250 x N ¹⁰ μA/μs 10 x N ¹⁰ nA 2.5 x N ¹⁰ μA/μs-25 x N ¹⁰ μA/μs			2 x N ¹⁰ mA 500 x N ¹⁰ mA/μs-5A/μs 200 x N ¹⁰ μA 50 x N ¹⁰ mA/μs-500 x N ¹⁰ mA/μs 20 x N ¹⁰ μA 5 x N ¹⁰ mA/μs-50 x N ¹⁰ mA/μs 2 x N ¹⁰ μA 500 x N ¹⁰ μA/μs-5 x N ¹⁰ mA/μs 200 x N ¹⁰ nA 50 x N ¹⁰ μA/μs-500 x N ¹⁰ μA/μs 20 x N ¹⁰ nA 5 x N ¹⁰ μA/μs-50 x N ¹⁰ μA/μs			6 x N ¹¹ mA 1.6 x N ¹¹ A/μs-16A/μs 600 x N ¹¹ μA 160 x N ¹¹ mA/μs-1.6 x N ¹¹ A/μs 60 x N ¹¹ μA 16 x N ¹¹ mA/μs-160 x N ¹¹ mA/μs 6 x N ¹¹ μA 1.6 x N ¹¹ mA/μs-16 x N ¹¹ mA/μs 600 x N ¹¹ nA 160 x N ¹¹ μA/μs-1.6 x N ¹¹ μA/μs 60 x N ¹¹ nA 16 x N ¹¹ μA/μs-160 x N ¹¹ μA/μs			N/A		
METER													
Voltmeter	Accuracy	$\pm(0.1\% \text{ of rdg} + 0.1\% \text{ of f.s.})$									N/A		
Ammeter	Accuracy	$\pm(0.2\% \text{ of rdg} + 0.3\% \text{ of f.s.})$									N/A		
Ammeter(Parallel Operation)	Accuracy	$\pm(1.2\% \text{ of rdg} + 1.1\% \text{ of f.s.})$									N/A		
DYNAMIC MODE													
Operation Mode		CC, CR and CP											
T1 & T2 Accuracy		0.025ms-10ms/Res : 1μs ; 1ms-60s/Res : 1ms ±100ppm of setting											
Slew Rate (CC Mode)	Range	H	2.5mA/μs-2.5A/μs			5mA/μs-5A/μs			16mA/μs-16A/μs			N/A	
		M	250μA/μs-250mA/μs			500μA/μs-500mA/μs			1.6mA/μs-1.6A/μs			N/A	
		L	25μA/μs-25mA/μs			50μA/μs-50mA/μs			160μA/μs-160mA/μs			N/A	
Slew Rate (CR Mode)	Range	H	250μA/μs-250mA/μs			500μA/μs-500mA/μs			1.6mA/μs-1.6A/μs			N/A	
		M	25μA/μs-25mA/μs			50μA/μs-50mA/μs			160μA/μs-160mA/μs			N/A	
		L	2.5μA/μs-2.5mA/μs			5μA/μs-5mA/μs			16μA/μs-16mA/μs			N/A	
Current Accuracy		±0.4%F.S.			±0.4%F.S.			±0.4%F.S.			$\pm(1.2\% \text{ of set} + 1.1\% \text{ of F.S.})$		
PROTECTION FUNCTION													
Functions		Overvoltage protection(OVP), Overcurrent protection(OCP), Overpower protection(OPP), Overheat protection(OHP), Undervoltage protection(UVP), Reverse connection protection(REV)											
GENERAL													
Input Range		90VAC-132VAC/180VAC-250VAC Single-phase; 47Hz-63Hz											
Power(Max.)		90VA			110VA			190VA			230VA		
Interface		USB/RS232/Analog Control (Standard) ; GPIB/LAN (Option)											
Dimensions & Weight		214.5(W)x124(H)x400(D)mm; Approx. 6kg			214.5(W)x124(H)x400(D)mm; Approx. 7kg			429.5(W)x128(H)x400(D)mm; Approx. 17kg			427.7(W)x128(H)x592.5(D)mm; Approx. 23kg		

Programmable D.C. Electronic Load

SPECIFICATIONS

Model	PEL-3212	PEL-3323	PEL-3424	PEL-3535	PEL-3322	PEL-3533	PEL-3744	PEL-3955		
Voltage	0V-150V	0V-150V	0V-150V	0V-150V	0V-150V	0V-150V	0V-150V	0V-150V		
Current	0-420A	0-630A	0-840A	0-1050A	0-630A	0-1050A	0-1470A	0-1890A		
Power	2100W	3150W	4200W	5250W	3150W	5250W	7350W	9450W		
Input Resistance	250 kΩ	166.7 kΩ	125 kΩ	100 kΩ	500 kΩ	500 kΩ	500 kΩ	500 kΩ		
Min. Operating Voltage(DC)(Typ.)	0.75V@210A 1.5V@420A	0.75V@315A 1.5V@630A	0.75V@420A 1.5V@840A	0.75V@525A 1.5V@1050A	0.75V@315A 1.5V@630A	0.75V@525A 1.5V@1050A	0.75V@735A 1.5V@1470A	0.75V@945A 1.5V@1890A		
CONSTANT CURRENT MODE										
Operating Range	H, M, L	0-420A 0-42A 0-4.2A	0-630A 0-63A 0-6.3A	0-840A 0-84A 0-8.4A	0-1050A 0-105A 0-10.5A	0-630A 0-63A N/A	0-1050A 0-105A N/A	0-1470A 0-147A N/A	0-1890A 0-189A N/A	
Accuracy of Setting	H, M, L	±(0.2 % of set + 0.1 % of f.s.) + Vin ² / (500/N ¹⁸ kΩ)								
Resolution	H, M, L	20mA 2mA 0.2mA	30mA 3mA 0.3mA	40mA 4mA 0.4mA	50mA 5mA 0.5mA	30mA 3mA N/A	50mA 5mA N/A	70mA 7mA N/A	90mA 9mA N/A	
CR MODE										
Operating Range	Range	H	280.0032S-4.8mS (3.57138mΩ-208.333Ω)	420.0048S-7.2mS (2.38092mΩ-138.888Ω)	560.0064S-9.6mS (1.78569mΩ-104.166Ω)	700.008S-12mS (1.42855mΩ-83.3333Ω)	420.0048S-7.2mS (2.38092mΩ-138.888Ω)	700.008S-12mS (1.42855mΩ-83.3333Ω)	980.0112S-16.8mS (1.02039mΩ-59.5238Ω)	1260.0144S-21.6mS (793.641uΩ-46.2963Ω)
		M	28.00032S-480μS (35.7138mΩ-2083.33Ω)	42.00048S-720μS (23.8092mΩ-1388.88Ω)	56.00064S-960μS (17.8569mΩ-1041.66Ω)	70.0008S-1.2mS (14.2855mΩ-833.333Ω)	42.00048S-720μS (23.8092mΩ-1388.88Ω)	70.0008S-1.2mS (14.2855mΩ-833.333Ω)	98.00112S-1.68mS (10.2039mΩ-595.238Ω)	126.00144S-2.16mS (7.93641mΩ-462.963Ω)
		L	2.800032S-48μS (357.138mΩ-20.8333kΩ)	4.200048S-72μS (238.092mΩ-13.8888kΩ)	5.600064S-96μS (178.569mΩ-10.4166kΩ)	7.00008S-120μS (142.855mΩ-8.33333kΩ)	N/A	N/A	N/A	N/A
Accuracy of Setting	H, M, L	±(0.5 % of set ² + 0.5 % of f.s.) + Vin ² / (500/N ¹⁸ kΩ)								
Resolution	H, M, L	4.8mS 480μS 48μS	7.2mS 720μS 72μS	9.6mS 960μS 96μS	12mS 1.2mS 120μS	7.2mS 720μS -	12mS 1.2mS -	16.8mS 1.68mS -	21.6mS 2.16mS -	
CONSTANT VOLTAGE MODE										
Operating Range	Range	H	1.5V-150V							
		L	1.5V-15V							
Accuracy of Setting	H, L	±(0.1 % of set + 0.1 % of f.s.)								
Resolution	H, L	10mV/1mV								
CONSTANT POWER MODE										
Operating Range	Range	H	210W-2100W	315W-3150W	420W-4200W	525W-5250W	315W-3150W	525W-5250W	735W-7350W	945W-9450W
		M	21W-210W	31.5W-315W	42W-420W	52.5W-525W	31.5W-315W	52.5W-525W	73.5W-735W	94.5W-945W
		L	2.1W-21W	3.15W-31.5W	4.2W-42W	5.25W-52.5W	N/A	N/A	N/A	N/A
Accuracy of Setting	H, M, L	±(0.6 % of set + 1.4 % of f.s.) + Vin x Vin / (500/N ¹⁰ MΩ): alone operation specifications								
Resolution	H, M, L	200mW 20mW 2mW	300mW 30mW 3mW	400mW 40mW 4mW	500mW 50mW 5mW	300mW 30mW -	500mW 50mW -	700mW 70mW -	900mW 90mW -	
PARALLEL Mode										
Capacity		-								
SLEW RATE										
Operation Mode		CC, CR								
Setting Range (CC mode)	Range	H	32mA/μs-16A/μs	48mA/μs-16A/μs	64mA/μs-16A/μs	80mA/μs-16A/μs	48mA/μs-16A/μs	80mA/μs-16A/μs	112mA/μs-16A/μs	144mA/μs-16A/μs
		M	3.2mA/μs-1.6A/μs	4.8mA/μs-1.6A/μs	6.4mA/μs-1.6A/μs	8mA/μs-1.6A/μs	4.8mA/μs-1.6A/μs	8mA/μs-1.6A/μs	11.2mA/μs-1.6A/μs	14.4mA/μs-1.6A/μs
		L	320μA/μs-160mA/μs	480μA/μs-160mA/μs	640μA/μs-160mA/μs	800μA/μs-160mA/μs	N/A	N/A	N/A	N/A
Setting Range (CR Mode)	Range	H	3.2mA/μs-1.6A/μs	4.8mA/μs-1.6A/μs	6.4mA/μs-1.6A/μs	8mA/μs-1.6A/μs	4.8mA/μs-1.6A/μs	8mA/μs-1.6A/μs	11.2mA/μs-1.6A/μs	14.4mA/μs-1.6A/μs
		M	320μA/μs-160mA/μs	480μA/μs-160mA/μs	640μA/μs-160mA/μs	800μA/μs-160mA/μs	480μA/μs-160mA/μs	800μA/μs-160mA/μs	1.12mA/μs-160mA/μs	1.44mA/μs-160mA/μs
		L	32μA/μs-16mA/μs	48μA/μs-16mA/μs	64μA/μs-16mA/μs	80μA/μs-16mA/μs	N/A	N/A	N/A	N/A
Accuracy of Setting	H, M, L	±10 % of set ² + 5μs)								
Resolution (Setting Range)		12mA	18mA	24mA	30mA	18mA	30mA	42mA	54mA	
		1.6A/μs-16A/μs	1.6A/μs-16A/μs	1.6A/μs-16A/μs	1.6A/μs-16A/μs	1.6A/μs-16A/μs	1.6A/μs-16A/μs	1.6A/μs-16A/μs	1.6A/μs-16A/μs	
		1.2mA	1.8mA	2.4mA	3mA	1.8mA	3mA	4.2mA	5.4mA	
		160mA/μs-1.6A/μs	160mA/μs-1.6A/μs	160mA/μs-1.6A/μs	160mA/μs-1.6A/μs	160mA/μs-1.6A/μs	160mA/μs-1.6A/μs	160mA/μs-1.6A/μs	160mA/μs-1.6A/μs	
		120μA	180μA	240μA	300μA	180μA	300μA	420μA	540μA	
		16mA/μs-160mA/μs	16mA/μs-160mA/μs	16mA/μs-160mA/μs	16mA/μs-160mA/μs	16mA/μs-160mA/μs	16mA/μs-160mA/μs	16mA/μs-160mA/μs	16mA/μs-160mA/μs	
		12μA	18μA	24μA	30μA	18μA	30μA	42μA	54μA	
		1.6mA/μs-16mA/μs	1.6mA/μs-16mA/μs	1.6mA/μs-16mA/μs	1.6mA/μs-16mA/μs	1.6mA/μs-16mA/μs	1.6mA/μs-16mA/μs	1.6mA/μs-16mA/μs	1.6mA/μs-16mA/μs	
		1.2μA	1.8μA	2.4μA	3μA	1.8μA	3μA	4.2μA	5.4μA	
		160μA/μs-1.6mA/μs	160μA/μs-1.6mA/μs	160μA/μs-1.6mA/μs	160μA/μs-1.6mA/μs	160μA/μs-1.6mA/μs	160μA/μs-1.6mA/μs	160μA/μs-1.6mA/μs	160μA/μs-1.6mA/μs	
	120nA	180nA	240nA	300nA	180nA	300nA	N/A	N/A		
	16μA/μs-160μA/μs	16μA/μs-160μA/μs	16μA/μs-160μA/μs	16μA/μs-160μA/μs	N/A	N/A	N/A	N/A		
METER										
Voltmeter	Accuracy	±(0.1 % of rdg + 0.1 % of f.s.)								
Ammeter	Accuracy	±(0.2 % of rdg + 0.3 % of f.s.)								
DYNAMIC MODE										
Operation Mode		CC and CR								
T1 & T2 Accuracy		0.025ms-10ms/Res : 1μs ; 1ms-30s/Res : 1ms 1μs/1ms ± 100ppm								
Slew Rate (CC Mode)	Range	H	32mA/μs-16A/μs	48mA/μs-16A/μs	64mA/μs-16A/μs	80mA/μs-16A/μs	48mA/μs-16A/μs	80mA/μs-16A/μs	112mA/μs-16A/μs	144mA/μs-16A/μs
		M	3.2mA/μs-1.6A/μs	4.8mA/μs-1.6A/μs	6.4mA/μs-1.6A/μs	8mA/μs-1.6A/μs	4.8mA/μs-1.6A/μs	8mA/μs-1.6A/μs	11.2mA/μs-1.6A/μs	14.4mA/μs-1.6A/μs
		L	320μA/μs-160mA/μs	480μA/μs-160mA/μs	640μA/μs-160mA/μs	800μA/μs-160mA/μs	N/A	N/A	N/A	N/A
Slew Rate (CR Mode)	Range	H	3.2mA/μs-1.6A/μs	4.8mA/μs-1.6A/μs	6.4mA/μs-1.6A/μs	8mA/μs-1.6A/μs	4.8mA/μs-1.6A/μs	8mA/μs-1.6A/μs	11.2mA/μs-1.6A/μs	14.4mA/μs-1.6A/μs
		M	320μA/μs-160mA/μs	480μA/μs-160mA/μs	640μA/μs-160mA/μs	800μA/μs-160mA/μs	480μA/μs-160mA/μs	800μA/μs-160mA/μs	1.12mA/μs-160mA/μs	1.44mA/μs-160mA/μs
		L	32μA/μs-16mA/μs	48μA/μs-16mA/μs	64μA/μs-16mA/μs	80μA/μs-16mA/μs	N/A	N/A	N/A	N/A
Current Accuracy		±0.4%F.S.								
PROTECTION FUNCTION										
Functions		Overvoltage protection(OVP), Overcurrent protection(OCP), Overpower protection(OPP), Overheat protection(OHP), Undervoltage protection(UVP), Reverse connection protection(REV)								
GENERAL										
Input Range		90VAC-132VAC/180VAC-250VAC Single-phase; 47Hz-63Hz								
Power(Max.)		380VA	570VA	760VA	950VA	420VA	650VA	880VA	1110VA	
Interface		USB/RS232/Analog Control (Standard) ; GPIB/LAN (Option)								
Dimensions & Weight		598(W)x877(H)x706(D)mm; Approx. 67.5kg	598(W)x877(H)x706(D)mm; Approx. 85.5kg	598(W)x877(H)x706(D)mm; Approx. 110kg	598(W)x877(H)x706(D)mm; Approx. 127.5kg	598(W)x877(H)x706(D)mm; Approx. 73kg	598(W)x877(H)x706(D)mm; Approx. 96.5kg	598(W)x877(H)x706(D)mm; Approx. 125kg	598(W)x877(H)x706(D)mm; Approx. 149kg	

PEL-3000/3000(H) Series

DC ELECTRONIC LOADS

SPECIFICATIONS																											
Model		PEL-3021H				PEL-3041H				PEL-3111H				PEL-3211H													
Voltage		0V-800V				0V-800V				0V-800V				0V-800V													
Current		8.75A				17.5A				52.5A				105A													
Power		175W				350W				1050W				2100W													
Input Resistance		3.24MΩ				3.24MΩ				3.24MΩ				3.24MΩ													
Min. Operating Voltage(DC)(Typ.)		5V@8.75A 2.5V@4.375A				5V@17.5A 2.5V@8.75A				5V@52.5A 2.5V@26.25A				5V@105A 2.5V@52.5A													
CONSTANT CURRENT MODE																											
Operating Range		H, M, L		0-8.75A	0-8.75mA	0-87.5mA	0-17.5A	0-1.75A	0-175mA	0-52.5A	0-5.25A	0-525mA	0-105A	0-10.5A	0-1.05A												
Accuracy of Setting		H, M		$\pm(0.2\% \text{ of set} + 0.1\% \text{ of f.s.}) + V_{in}^2/3.24M\Omega$								$\pm(1.2\% \text{ of set} + 1.1\% \text{ of f.s.})$															
Accuracy of Setting		L		$\pm(0.2\% \text{ of set} + 0.1\% \text{ of f.s.}) + V_{in}^2/3.24M\Omega$								N/A															
Accuracy of Setting(Parallel)				$\pm(1.2\% \text{ of set} + 1.1\% \text{ of f.s.})$								N/A															
Resolution		H, M, L		300μA	30μA	3μA	0.6mA	60μA	6μA	2mA	200μA	20μA	4mA	400μA	40μA												
CR MODE																											
Operating Range		Range		H		M		L		H		M		L													
				1.75S-30μS (571mΩ-33.3kΩ)		3.5S-60μS (285mΩ-16.6kΩ)		10.5S-180μS (95.2mΩ-5.55kΩ)		21S-360μS (47.6mΩ-2.777kΩ)		1.75S-30μS (5.71Ω-333kΩ)		3.5S-60μS (2.85Ω-166kΩ)		10.5S-180μS (952mΩ-55.5kΩ)		21S-360μS (476mΩ-27.77kΩ)									
				17.5mS-0.3μS (57.1Ω-3.33MΩ)		35mS-0.6μS (28.5Ω-1.66MΩ)		105mS-1.8μS (9.52Ω-555kΩ)		210mS-3.6μS (4.762Ω-277.7kΩ)																	
Accuracy of Setting		H, M		$\pm(0.5\% \text{ set} + 0.5\% \text{ f.s.}) + V_{in}^2/3.24M\Omega$								$\pm(1.2\% \text{ of set} + 1.1\% \text{ of f.s.})TYP$															
Accuracy of Setting		L		$\pm(0.5\% \text{ set} + 0.5\% \text{ f.s.}) + V_{in}^2/3.24M\Omega$								N/A															
Parallel				$\pm(1.2\% \text{ of set} + 1.1\% \text{ of f.s.})$								N/A															
Resolution		H, M, L		30μS	3μS	0.3μS	60μS	6μS	0.6μS	180μS	18μS	1.8μS	N/A														
CONSTANT VOLTAGE MODE																											
Operating Range		Range		H		L		H		L		H		L													
				5V-800V		5V-80V		5V-800V		5V-80V		5V-800V		5V-80V													
Accuracy of Setting		Range		H, L		$\pm(0.2\% \text{ of set} + 0.2\% \text{ of f.s.})$								$\pm(0.2\% \text{ of set} + 0.2\% \text{ of f.s.})$													
		Parallel		TYP		$\pm(0.2\% \text{ of set} + 0.2\% \text{ of f.s.})$								$\pm(0.2\% \text{ of set} + 0.2\% \text{ of f.s.})$													
Resolution		Range		H, L		20mV/2mV								N/A													
CONSTANT POWER MODE																											
Operating Range		Range		H		M		L		H		M		L													
				17.5W-175W		1.75W-17.5W		0.175W-1.75W		35W-350W		3.5W-35W		0.35W-3.5W		105W-1050W		10.5W-105W		1.05W-10.5W		210W-2100W		21W-210W		2.1W-21W	
Accuracy of Setting		H, M		$\pm(0.6\% \text{ of set} + 1.4\% \text{ of f.s.}) + V_{in}/3.24M\Omega$								$\pm(5\% \text{ of f.s.})TYP$															
Resolution		H, M, L		10mW	1mW	0.1mW	10mW	1mW	0.1mW	100mW	10mW	1mW	N/A														
PARALLEL Mode																											
Capacity		875W				1750W				5250W				PEL-3111H with 4 booster units : Max 9.45kW													
SLEW RATE																											
Operation Mode				CC, CR				CC, CR				CC, CR				N/A											
Setting Range (CC mode)		Range		H		M		L		H		M		L		N/A											
				0.14 x N ¹⁰⁰ mA/μs-140mA/μs		0.014 x N ¹⁰⁰ mA/μs-14mA/μs		1.4 x N ¹⁰⁰ μA/μs-1400μA/μs		0.014 x N ¹⁰⁰ mA/μs-14mA/μs		0.0014 x N ¹⁰⁰ mA/μs-1.4mA/μs		0.14 x N ¹⁰⁰ μA/μs-140μA/μs		N/A											
Setting Range (CR Mode)		Range		H		M		L		H		M		L		N/A											
				0.014 x N ¹⁰⁰ mA/μs-14mA/μs		0.0014 x N ¹⁰⁰ mA/μs-1.4mA/μs		0.14 x N ¹⁰⁰ μA/μs-140μA/μs		0.0280 x N ¹⁰⁰ mA/μs-280mA/μs		0.00280 x N ¹⁰⁰ mA/μs-2.800mA/μs		0.280 x N ¹⁰⁰ μA/μs-280.0μA/μs		N/A											
Accuracy of Setting		H, M, L		$\pm(10\% \text{ of set} + 25\mu\text{s})$								N/A															
Resolution (Setting Range)				50 x N ¹⁰⁰ μA		14 x N ¹⁰⁰ mA/μs-140mA/μs		5 x N ¹⁰⁰ μA		1.4 x N ¹⁰⁰ mA/μs-14 x N ¹⁰⁰ mA/μs		0.5 x N ¹⁰⁰ μA		140 x N ¹⁰⁰ μA/μs-1.4 x N ¹⁰⁰ mA/μs		50 x N ¹⁰⁰ nA		14 x N ¹⁰⁰ μA/μs-140 x N ¹⁰⁰ μA/μs		5 x N ¹⁰⁰ nA		1.4 x N ¹⁰⁰ μA/μs-14 x N ¹⁰⁰ μA/μs		0.5 x N ¹⁰⁰ nA		0.14 x N ¹⁰⁰ μA/μs-1.4 x N ¹⁰⁰ μA/μs	
				100 x N ¹⁰⁰ μA		28 x N ¹⁰⁰ mA/μs-280mA/μs		10 x N ¹⁰⁰ μA		2.8 x N ¹⁰⁰ mA/μs-28 x N ¹⁰⁰ mA/μs		1 x N ¹⁰⁰ μA		280 x N ¹⁰⁰ μA/μs-2.8 x N ¹⁰⁰ mA/μs		0.1 x N ¹⁰⁰ μA		28 x N ¹⁰⁰ μA/μs-280 x N ¹⁰⁰ μA/μs		10 x N ¹⁰⁰ nA		2.8 x N ¹⁰⁰ μA/μs-28 x N ¹⁰⁰ μA/μs		1 x N ¹⁰⁰ nA		0.28 x N ¹⁰⁰ μA/μs-2.8 x N ¹⁰⁰ μA/μs	
				300 x N ¹⁰⁰ μA		84 x N ¹⁰⁰ mA/μs-840mA/μs		30 x N ¹⁰⁰ μA		8.4 x N ¹⁰⁰ mA/μs-84 x N ¹⁰⁰ mA/μs		3 x N ¹⁰⁰ μA		840 x N ¹⁰⁰ μA/μs-8.4 x N ¹⁰⁰ mA/μs		0.3 x N ¹⁰⁰ μA		84 x N ¹⁰⁰ μA/μs-840 x N ¹⁰⁰ μA/μs		30 x N ¹⁰⁰ nA		8.4 x N ¹⁰⁰ μA/μs-84 x N ¹⁰⁰ μA/μs		3 x N ¹⁰⁰ nA		0.84 x N ¹⁰⁰ μA/μs-8.4 x N ¹⁰⁰ μA/μs	
METER																											
Voltmeter		Accuracy		$\pm(0.1\% \text{ of rdg} + 0.1\% \text{ of f.s.})$								$\pm(0.1\% \text{ of rdg} + 0.1\% \text{ of f.s.})TYP$															
Ammeter		Accuracy		$\pm(0.2\% \text{ of rdg} + 0.3\% \text{ of f.s.})$								N/A															
Ammeter(Parallel Operation)		Accuracy		$\pm(1.2\% \text{ of rdg} + 1.1\% \text{ of f.s.})$								$\pm(1.2\% \text{ of rdg} + 1.1\% \text{ of f.s.})TYP$															
DYNAMIC MODE																											
Operation Mode				CC, CR, CP								N/A															
T1 & T2 Accuracy				0.025ms-10ms/Res : 1μs ; 10ms-30s/Res : 1ms								N/A															
Slew Rate (CC Mode)		Range		H		M		L		H		M		L		N/A											
				0.140mA/μs-140.0mA/μs		0.014mA/μs-14.00mA/μs		1.400μA/μs-1400.0μA/μs		0.014mA/μs-14.000mA/μs		0.0014mA/μs-1.4000mA/μs		0.1400μA/μs-140.00μA/μs		N/A											
Slew Rate (CR Mode)		Range		H		M		L		H		M		L		N/A											
				0.014mA/μs-14.000mA/μs		0.0014mA/μs-1.4000mA/μs		0.1400μA/μs-140.00μA/μs		0.028mA/μs-28.00mA/μs		2.8μA/μs-2.800mA/μs		0.0084mA/μs-0.8400mA/μs		N/A											
Current Accuracy				$\pm 0.4\%F.S.$								$\pm 0.4\%F.S.$															
PROTECTION FUNCTION																											
Functions		Overvoltage protection(OVP), Overcurrent protection(OCP), Overpower protection(OPP), Overheat protection(OHP), Undervoltage protection(UVP), Reverse connection protection(REV)																									
GENERAL																											
Input Range		90VAC-132VAC/180VAC-250VAC Single-phase; 47Hz-63Hz																									
Power(Max.)		90VA				110VA				190VA				230VA													
Interface		Std : USB/RS232/Analog Control ; Opt : GPIB/LAN																									
Dimensions & Weight		213.8(W)x124(H)x400.5(D)mm; Approx. 6kg				213.8(W)x124(H)x400.5(D)mm; Approx. 7kg				427.8(W)x124(H)x400.5(D)mm; Approx. 17kg				427.7(W)x127.8(H)x553.5(D)mm; Approx. 23kg													

Programmable D.C. Electronic Load

SPECIFICATIONS

Model	PEL-3212H	PEL-3323H	PEL-3424H	PEL-3535H	PEL-3322H	PEL-3533H	PEL-3744H	PEL-3955H		
Voltage	0V-800V	0V-800V	0V-800V	0V-800V	0V-800V	0V-800V	0V-800V	0V-800V		
Current	0-105A	0-157.5A	0-210A	0-262.5A	0-157.5A	0-262.5A	0-367.5A	0-472.5A		
Power	2100W	3150W	4200W	5250W	3150W	5250W	7350W	9450W		
Input Resistance	1.62MΩ	1.08MΩ	0.81MΩ	0.648MΩ	3.24MΩ	3.24MΩ	3.24MΩ	3.24MΩ		
Min. Operating Voltage(DC)(Typ.)	5V@105A 2.5V@52.5A	5V@157.5A 2.5V@78.75A	5V@210A 2.5V@105A	5V@262.5A 2.5V@131.25A	5V@157.5A 2.5V@78.75A	5V@262.5A 2.5V@131.25A	5V@367.5A 2.5V@183.75A	5V@472.5A 2.5V@236.25A		
CONSTANT CURRENT MODE										
Operating Range	H,M,L	0-105A 0-10.5A 0-1.05A	0-157.5A 0-15.75A 0-1.575A	0-210A 0-21A 0-2.1A	0-262.5A 0-26.25A 0-2.625A	0-157.5A 0-15.75A 0-1.575A	0-262.5A 0-26.25A 0-2.625A	0-367.5A 0-36.75A 0-3.675A	0-472.5A 0-47.25A 0-4.725A	
Accuracy of Setting	H,M,L	$\pm(0.2\% \text{ of set} + 0.1\% \text{ of f.s.}) + V_{in} / (3.24/N^{10}) \text{ M}\Omega$								
Resolution	H,M,L	4mA 0.4mA 0.04mA	6mA 0.6mA 0.06mA	8mA 0.8mA 0.08mA	10mA 1mA 0.1mA	6mA 0.6mA 0.06mA	10mA 1mA 0.1mA	14mA 1.4mA 0.14mA	18mA 1.8mA 0.18mA	
CR MODE										
Operating Range ¹⁴	Range	H	21S-360μS (47.619mΩ- 2.778kΩ)	31.5S-540μS (31.746mΩ- 1.85185kΩ)	42S-72μS (23.8095mΩ- 1.3889kΩ)	52.5S-90μS (19.0476mΩ- 1.1111kΩ)	31.5S-540μS (31.746mΩ- 1.85185kΩ)	52.5S-90μS (19.0476mΩ- 1.1111kΩ)	73.5S-1.26mS (13.6054mΩ- 793.651Ω)	94.5S-1.62mS (10.582mΩ- 617.284Ω)
		M	2.1S-36μS (476.19mΩ- 27.778kΩ)	3.15S-54μS (317.46mΩ- 18.5185kΩ)	4.2S-72μS (238.095mΩ- 13.8889kΩ)	5.25S-90μS (190.476mΩ- 11.1111kΩ)	3.15S-54μS (317.46mΩ- 18.5185kΩ)	5.25S-90μS (190.476mΩ- 11.1111kΩ)	7.35S-126μS (136.054mΩ- 793.651kΩ)	9.45S-162μS (105.82mΩ- 6.17284kΩ)
		L	210mS-3.6μS (4.7619Ω- 277.78kΩ)	315mS-5.4μS (3.1746Ω- 185.185kΩ)	420mS-7.2μS (2.38095Ω- 138.888kΩ)	525mS-9μS (1.90476Ω- 111.111kΩ)	315mS-5.4μS (3.1746Ω- 185.185kΩ)	525mS-9μS (1.90476Ω- 111.111kΩ)	735mS-12.6μS (1.36054Ω- 79.365kΩ)	945mS-16.2μS (1.0582Ω- 61.7284kΩ)
Accuracy of Setting ¹⁵	H,M,L	$\pm(0.5\% \text{ of set} + 0.5\% \text{ of f.s.}) + V_{in} / (3.24/N^{10}) \text{ M}\Omega$: Alone operation specifications								
Resolution		360μS 36μS 3.6μS	540μS 54μS 5.4μS	720μS 72μS 7.2μS	900μS 90μS 9μS	540μS 54μS 5.4μS	900μS 90μS 9μS	1.26mS 126μS 12.6μS	1.62mS 162μS 16.2μS	
CONSTANT VOLTAGE MODE										
Operating Range	Range	H	5V-800V							
		L	5V-80V							
Accuracy of Setting ¹⁷	Range	H,L	$\pm(0.2\% \text{ of set} + 0.2\% \text{ of f.s.})$							
Resolution	Range	H,L	20mV/2mV							
CONSTANT POWER MODE										
Operating Range	Range	H	210W-2100W	315W-3150W	420W-4200W	525W-5250W	315W-3150W	525W-5250W	735W-7350W	945W-9450W
		M	21W-210W	31.5W-315W	42W-420W	52.5W-525W	31.5W-315W	52.5W-525W	73.5W-735W	94.5W-945W
		L	2.1W-21W	3.15W-31.5W	4.2W-42W	5.25W-52.5W	3.15W-31.5W	5.25W-52.5W	7.35W-73.5W	9.45W-94.5W
Accuracy of Setting ¹⁸	H,M,L	$\pm(0.6\% \text{ of set} + 1.4\% \text{ of f.s.}) + V_{in} \times V_{in} / (3.24/N^{10}) \text{ M}\Omega$: Alone operation specifications								
Resolution		200mW 20mW 2mW	300mW 30mW 3mW	400mW 40mW 4mW	500mW 50mW 5mW	300mW 30mW 3mW	500mW 50mW 5mW	700mW 70mW 7mW	900mW 90mW 9mW	
PARALLEL Mode										
Capacity		-								
SLEW RATE										
Operation Mode		CC, CR		CC, CR		CC, CR		CC, CR		
Setting Range (CC mode)	Range	H	1.68mA/μs-840mA/μs	2.52mA/μs-839.7mA/μs	3.36mA/μs-840mA/μs	4.2mA/μs-840mA/μs	2.52mA/μs-839.7mA/μs	4.2mA/μs-840mA/μs	5.88mA/μs-840mA/μs	7.56mA/μs-839.7mA/μs
		M	168μA/μs-84mA/μs	252μA/μs-83.97mA/μs	336μA/μs-84mA/μs	420μA/μs-84mA/μs	252μA/μs-83.97mA/μs	420μA/μs-84mA/μs	588μA/μs-84mA/μs	756μA/μs-83.97mA/μs
		L	16.8μA/μs-8.4mA/μs	25.2μA/μs-8.397mA/μs	33.6μA/μs-8.4mA/μs	42μA/μs-8.4mA/μs	25.2μA/μs-8.397mA/μs	42μA/μs-8.4mA/μs	58.8μA/μs-8.4mA/μs	75.6μA/μs-8.397mA/μs
Setting Range (CR Mode)	Range	H	168μA/μs-84mA/μs	252μA/μs-83.97mA/μs	336μA/μs-84mA/μs	420μA/μs-84mA/μs	252μA/μs-83.97mA/μs	420μA/μs-84mA/μs	588μA/μs-84mA/μs	756μA/μs-83.97mA/μs
		M	16.8μA/μs-8.4mA/μs	25.2μA/μs-8.397mA/μs	33.6μA/μs-8.4mA/μs	42μA/μs-8.4mA/μs	25.2μA/μs-8.397mA/μs	42μA/μs-8.4mA/μs	58.8μA/μs-8.4mA/μs	75.6μA/μs-8.397mA/μs
		L	1.68μA/μs-840μA/μs	2.52μA/μs-839.7μA/μs	3.36μA/μs-840μA/μs	4.2μA/μs-840μA/μs	2.52μA/μs-839.7μA/μs	4.2μA/μs-840μA/μs	5.88μA/μs-840μA/μs	7.56μA/μs-839.7μA/μs
Accuracy of Setting ¹⁹	H,M,L	$\pm(10\% \text{ of set} + 25\mu\text{s})$								
Resolution (Setting Range)		600μA	900μA	1.2mA	1.5mA	900μA	1.5mA	2.1mA	2.7mA	
		168mA/μs-840mA/μs	252mA/μs-842.4mA/μs	336mA/μs-840mA/μs	420mA/μs-840mA/μs	252mA/μs-842.4mA/μs	420mA/μs-840mA/μs	588mA/μs-840mA/μs	756mA/μs-842.4mA/μs	
		60μA	90μA	120μA	150μA	90μA	150μA	210μA	270μA	
		16.8mA/μs-168mA/μs	25.2mA/μs-252mA/μs	33.6mA/μs-336mA/μs	42mA/μs-420mA/μs	25.2mA/μs-252mA/μs	42mA/μs-420mA/μs	58.8mA/μs-588mA/μs	75.6mA/μs-756mA/μs	
		6μA	9μA	12μA	15μA	9μA	15μA	21μA	27μA	
		1.68mA/μs-16.8mA/μs	2.52mA/μs-25.2mA/μs	3.36mA/μs-33.6mA/μs	4.2mA/μs-42mA/μs	2.52mA/μs-25.2mA/μs	4.2mA/μs-42mA/μs	5.88mA/μs-58.8mA/μs	7.56mA/μs-75.6mA/μs	
		600nA	900nA	1.2μA	1.5μA	900nA	1.5μA	2.1μA	2.7μA	
		0.168mA/μs-1.68mA/μs	0.252mA/μs-2.52mA/μs	0.336mA/μs-3.36mA/μs	0.42mA/μs-4.2mA/μs	0.252mA/μs-2.52mA/μs	0.42mA/μs-4.2mA/μs	0.588mA/μs-5.88mA/μs	0.756mA/μs-7.56mA/μs	
		60nA	90nA	120nA	150nA	90nA	150nA	210nA	270nA	
		0.0168mA/μs-0.168mA/μs	0.0252mA/μs-0.252mA/μs	0.0336mA/μs-0.336mA/μs	0.042mA/μs-0.42mA/μs	0.0252mA/μs-0.252mA/μs	0.042mA/μs-0.42mA/μs	0.0588mA/μs-0.588mA/μs	0.0756mA/μs-0.756mA/μs	
	6nA	9nA	12nA	15nA	9nA	15nA	21nA	27nA		
	0.00168mA/μs-0.0168mA/μs	0.00252mA/μs-0.0252mA/μs	0.00336mA/μs-0.0336mA/μs	0.0042mA/μs-0.042mA/μs	0.00252mA/μs-0.0252mA/μs	0.0042mA/μs-0.042mA/μs	0.00588mA/μs-0.0588mA/μs	0.00756mA/μs-0.0756mA/μs		
METER										
Voltmeter Accuracy		$\pm(0.1\% \text{ of rdg} + 0.1\% \text{ of f.s.})$								
Ammeter Accuracy		$\pm(1.2\% \text{ of rdg} + 1.1\% \text{ of f.s.})$								
DYNAMIC MODE										
Operation Mode		CC and CR								
T1 & T2 Accuracy		0.025ms-10ms/Res : 1μs ; 10ms-30s/Res : 1ms								
Slew Rate (CC Mode)	Range	H	1.68mA/μs-840mA/μs	2.52mA/μs-839.7mA/μs	3.36mA/μs-840mA/μs	4.2mA/μs-840mA/μs	2.52mA/μs-839.7mA/μs	4.2mA/μs-840mA/μs	5.88mA/μs-840mA/μs	7.56mA/μs-839.7mA/μs
		M	168μA/μs-84mA/μs	252μA/μs-83.97mA/μs	336μA/μs-84mA/μs	420μA/μs-84mA/μs	252μA/μs-83.97mA/μs	420μA/μs-84mA/μs	588μA/μs-84mA/μs	756μA/μs-83.97mA/μs
		L	16.8μA/μs-8.4mA/μs	25.2μA/μs-8.397mA/μs	33.6μA/μs-8.4mA/μs	42μA/μs-8.4mA/μs	25.2μA/μs-8.397mA/μs	42μA/μs-8.4mA/μs	58.8μA/μs-8.4mA/μs	75.6μA/μs-8.397mA/μs
Slew Rate (CR Mode)	Range	H	168μA/μs-84mA/μs	252μA/μs-83.97mA/μs	336μA/μs-84mA/μs	420μA/μs-84mA/μs	252μA/μs-83.97mA/μs	420μA/μs-84mA/μs	588μA/μs-84mA/μs	756μA/μs-83.97mA/μs
		M	16.8μA/μs-8.4mA/μs	25.2μA/μs-8.397mA/μs	33.6μA/μs-8.4mA/μs	42μA/μs-8.4mA/μs	25.2μA/μs-8.397mA/μs	42μA/μs-8.4mA/μs	58.8μA/μs-8.4mA/μs	75.6μA/μs-8.397mA/μs
		L	1.68μA/μs-840μA/μs	2.52μA/μs-839.7μA/μs	3.36μA/μs-840μA/μs	4.2μA/μs-840μA/μs	2.52μA/μs-839.7μA/μs	4.2μA/μs-840μA/μs	5.88μA/μs-840μA/μs	7.56μA/μs-839.7μA/μs
Current Accuracy		$\pm 0.4\% \text{ F.S.}$								
PROTECTION FUNCTION										
Functions		Overvoltage protection(OVP), Overcurrent protection(OCP), Overpower protection(OPP), Overheat protection(OHP), Undervoltage protection(UVP), Reverse connection protection(REV)								
GENERAL										
Input Range		90VAC-132VAC/180VAC-250VAC Single-phase; 47Hz-63Hz								
Power(Max.)		380VA	570VA	760VA	950VA	420VA	650VA	880VA	1110VA	
Interface		Std : USB/RS232/Analog Control ; Opt. : GPIB/LAN								
Dimensions & Weight		598(W)x877(H)x706(D)mm; Approx. 67.5kg	598(W)x877(H)x706(D)mm; Approx. 85.5kg	598(W)x877(H)x706(D)mm; Approx. 110kg	598(W)x877(H)x706(D)mm; Approx. 127.5kg	598(W)x877(H)x706(D)mm; Approx. 73kg	598(W)x877(H)x706(D)mm; Approx. 96.5kg	598(W)x877(H)x706(D)mm; Approx. 125kg	598(W)x877(H)x706(D)mm; Approx. 149kg	

ORDERING INFORMATION

PEL-3021 (150V/35A/175W) Single-Channel Programmable D.C. Electronic Load
PEL-3041 (150V/70A/350W) Single-Channel Programmable D.C. Electronic Load
PEL-3111 (150V/210A/1050W) Single-Channel Programmable D.C. Electronic Load
PEL-3211 (150V/420A/2100W) 2100W Booster for PEL-3111 only
PEL-3212 (150V/420A/2100W) Single-Channel Programmable D.C. Electronic Load
PEL-3322 (150V/630A/3150W) Single-Channel Programmable D.C. Electronic Load
PEL-3323 (150V/630A/3150W) Single-Channel Programmable D.C. Electronic Load
PEL-3424 (150V/840A/4200W) Single-Channel Programmable D.C. Electronic Load
PEL-3533 (150V/1050A/5250W) Single-Channel Programmable D.C. Electronic Load
PEL-3535 (150V/1050A/5250W) Single-Channel Programmable D.C. Electronic Load
PEL-3744 (150V/1470A/7350W) Single-Channel Programmable D.C. Electronic Load
PEL-3955 (150V/1890A/9450W) Single-Channel Programmable D.C. Electronic Load

PEL-3021H (800V/8.75A/175W) Single-Channel Programmable D.C. Electronic Load
PEL-3041H (800V/17.5A/350W) Single-Channel Programmable D.C. Electronic Load
PEL-3111H (800V/52.5A/1050W) Single-Channel Programmable D.C. Electronic Load
PEL-3211H (800V/105A/2100W) 2100W Booster for PEL-3111H only
PEL-3212H (800V/105A/2100W) Single-Channel Programmable D.C. Electronic Load
PEL-3322H (800V/157.5A/3150W) Single-Channel Programmable D.C. Electronic Load
PEL-3323H (800V/157.5A/3150W) Single-Channel Programmable D.C. Electronic Load
PEL-3424H (800V/210A/4200W) Single-Channel Programmable D.C. Electronic Load
PEL-3533H (800V/262.5A/5250W) Single-Channel Programmable D.C. Electronic Load
PEL-3535H (800V/262.5A/5250W) Single-Channel Programmable D.C. Electronic Load
PEL-3744H (800V/367.5A/7350W) Single-Channel Programmable D.C. Electronic Load
PEL-3955H (800V/472.5A/9450W) Single-Channel Programmable D.C. Electronic Load

ACCESSORIES :

Quick Start Guide, CD(User Manual/Programming Manual), Power Cord
PEL-011 Load Input Terminal Cover **PEL-012** Terminal Fittings Kits

GTL-255 Frame Link Cable 300mm
PEL-013 Flexible Terminal Cover

Front Terminal Washers
PEL-014 J1/J2 Protection Plug

OPTIONAL ACCESSORIES

CR123A 3V Lithium Battery for Clock.
GRA-413 Rack Mount Bracket for Booster PEL-3211(H) (EIA+JIS)
GRA-414-E Rack Mount Frame for PEL-3021(H), PEL-3041(H), PEL-3111(H)/EIA
GRA-414-J Rack Mount Frame for PEL-3021(H), PEL-3041(H), PEL-3111(H)/JIS

GTL-120 Test Lead (Max. 40A)
GTL-248 GPIB Cable, 2.0m
GTL-246 USB Cable Type A- Type B
PEL-010 Dust Filter

PEL-004 GPIB Option **PEL-008** Connect Cu Plate
PEL-005 Connect Cu Plate **PEL-009** Connect Cu Plate
PEL-006 Connect Cu Plate **PEL-018** LAN Card
PEL-007 Connect Cu Plate

FREE DOWNLOAD

Driver LabView Driver



GRA-413 Rack Mount Kit (EIA+JIS)

For : PEL-3211(H)



GRA-414-J Rack Mount Kit (JIS)

For : PEL-3021/3021H/3041/3041H/3111/3111H



GRA-414-E Rack Mount Kit (EIA)

For : PEL-3021/3021H/3041/3041H/3111/3111H



Programmable D.C. Electronic Load



PEL-3031AE

NEW



PEL-3032AE

NEW



FEATURES

- 0-150V(PEL-3031AE)Min. Operating Voltage(dc) : 1V at 60A, 0.5V at 30A
- 0-500V(PEL-3032AE)Min. Operating Voltage(dc) : 2.5V at 15A, 1.25V at 7.5A
- 7 Operating Modes : CC, CV, CR, CP, CC+CV, CR+CV, CP+CV
- Normal Sequence Function: Max Steps: 1000 steps/Step Time:1ms-999h 59min 59s(3599940 sec)Fast Sequence Function: Max Steps:1000 steps/Step Time:25us-600ms
- Soft Start
- BATT Test Automation:Max Test Time:999h:59min 59s(3599940 sec):Max Test AH:9999.99Ah
- OCP, OPP Test Automation
- Max. Slew Rate : 2.5A/μs
- Dynamic Mode
- Protection : OVP, OCP, OPP, OTP, RVP, UVF
- Remote Sense
- Integrate Voltage, Current and Power Measurement Functions
- External Voltage or Resistance Control
- Rear Panel BNC, Trigger IN/OUT
- Analog External Control
- Interfaces : LAN/USB/RS-232 & RS-485(Std.), GPIB(Opt.)

GW Instek launches new PEL-3000AE Series programmable single-channel electronic load. In the series, PEL-3031AE provides 300W (1V-150V/60A) and PEL-3032AE provides 300W(2.5V-500V/15A) current sink capability. Inherited from the PEL-3000A Series, PEL-3000AE has an easy-to-read LCD panel and user-friendly interface. This model features high speed and accurate measurement capability for electronic component, battery, portable charger and power products that require low to medium power consumption.

The PEL-3000AE Series is designed for current sink operation starting from 60mA and aims at measurement applications, including charger, adapter, various power supply equipment, and portable charger.

The PEL-3000AE Series has seven operating modes. Among them, four basic operating modes are constant current, constant voltage, constant resistance, and constant power. Three other combined operating modes are constant current + constant voltage, constant resistance + constant voltage, constant power + constant voltage. Users can select operating modes based upon products' test requirements. For C.C. mode, electronic load will sink a constant current according to the set current value; for C.V. mode, electronic load will attempt to sink sufficient current to control the source voltage to the programmed value; for C.R. mode, electronic load will sink a current linearly proportional to the input voltage according to the set resistance value; for C.P. mode, electronic load will initiate load power sinking operation (load voltage x load current) in accordance with the programmed power setting.

To meet the requirements of different test conditions, the Static function is to sink a constant current; the Dynamic function is to periodically switch between two sink conditions, and the Sequence function is to provide tests for more than two sink conditions. The sequence function can be divided into Normal Sequence and Fast Sequence. Normal Sequence is the most flexible mean of generating complex sequences that can facilitate users to establish a set of changing current sink conditions based upon different sinking conditions (CC, CR, CV or CP mode) and time(adjustable range: 1ms to 999h 59min 59s). Fast sequence allows time resolution of 25us to be set for the smallest step. Setting parameters for multiple steps can simulate consecutive current changes of various real load conditions. For instance, while using an electronic load to test a power-driven tool's power supply, we can first obtain waveforms by an oscilloscope and a current probe from the tool, and subsequently, use the obtained waveforms to edit simulated current waveforms, via electronic load's sequence function, to test the power-driven tool and to analyze its operational status. The Soft Start function allows users to determine the rise time of current sink that is to decide the required time to reach electronic load's set current, resistance or power value. Setting a proper rise time for Soft Start is effective to counter output voltage fluctuation caused

by DUT's (power supply) transient output current. It is worth noting, General DC loads do not have the soft start function. When conducting high speed current sink operation, the inductance effect on the cable connecting electronic load and DUT will lead to transient voltage drop on electronic load's input terminal, therefore, that will result in Voltage Non-monotonic increase. PEL-3000AE's soft start function not only allows output voltage to be Monotonic increase, but also prevents inrush current and surge voltage from happening on DUT. For instance, testing using a power supply, LED and a DC load (activate the soft start function) can prevent inrush current and surge voltage from causing damages on LED.

The built-in BATT Test Automation of PEL-3000AE Series provides battery discharge applications with more flexible discharge stop setting as well as rise and fall Slew Rate for discharge current settings. OCP, OPP Test Automation for DUT (ex. Power Supply), provides users with high resolution measurement values to verify DUT's activation point. Provide users with measurement results so as to help them determine whether DUT's actual over protection activation point meets the regulations. Other than that, PEL-3000AE provides users with analog control terminal to control PEL-3000AE Series from external voltage, external resistance and switch. Analog control terminal can also monitor electronic load's status and display protective alarms.

SPECIFICATIONS				
Model	PEL-3031AE		PEL-3032AE	
Power	300W	300W	300W	300W
Range	Low	High	Low	High
Voltage	0 - 150V	0 - 150V	0 - 500V	0 - 500V
Current	0 - 6A	0 - 60A	0 - 1.5A	0 - 15A
Min. Operating Voltage(dc)	1V - 6A	1V - 60A	2.5V - 1.5A	2.5V - 15A
STATIC MODE				
Constant Current Mode				
Range	0 - 6A	0 - 60A	0 - 1.5A	0 - 15A
Setting Range	0 - 61.2A	0 - 61.2A	0 - 1.53A	0 - 15.3A
Resolution	0.2mA	2mA	0.05mA	0.5mA
Accuracy	(T ¹)±(0.1% of set +0.1% of FS)+ Vin/5000K (Full scale of High range)	(T ¹)±(0.1% of set +0.2% of FS)+ Vin/5000K (Full scale of High range)	(T ¹)±(0.1% of set +0.1% of FS)+ Vin/5000K (Full scale of High range)	(T ¹)±(0.1% of set +0.2% of FS)+ Vin/5000K (Full scale of High range)
Constant Resistance Mode				
Range	60S-0.002S(0.0166667-500K)(300W/15V)	60S-0.002S(0.166667-5K)(300W/150V)	6S-0.0002S(0.166667-5K)(300W/50V)	6S-0.0002S(0.166667-5K)(300W/500V)
Setting Range	60S-0.002S(0.0166667-500K)(300W/15V)	60S-0.002S(0.166667-5K)(300W/150V)	6S-0.0002S(0.166667-5K)(300W/50V)	6S-0.0002S(0.166667-5K)(300W/500V)
Resolution(30000 Steps)	0.002S(150V)	0.002S(150V)	0.0002S(50V)	0.0002S(500V)
Accuracy	(T ¹)±(0.3% of set + 0.6S) + 0.002mS	(T ¹)±(0.3% of set + 0.6S) + 0.002mS	(T ¹)±(0.3% of set + 0.6S) + 0.002mS	(T ¹)±(0.3% of set + 0.6S) + 0.002mS
Constant Voltage Mode				
Range	1 - 15V	1 - 150V	2.5 - 50V	2.5 - 500V
Setting Range	0 - 15.3V	0 - 153V	0 - 51V	0 - 510V
Resolution	0.5mV	5mV	1mV	10mV
Accuracy	(T ¹)±(0.1% of set+0.1% of FS)	(T ¹)±(0.1% of set+0.1% of FS)	(T ¹)±(0.1% of set+0.1% of FS)	(T ¹)±(0.1% of set+0.1% of FS)
(Full scale of High range)	(Full scale of High range)	(Full scale of High range)	(Full scale of High range)	(Full scale of High range)
Constant Power Mode				
Range	0W - 30W(6A)	0W - 300W(60A)	0W - 30W(1.5A)	0W - 300W(15A)
Setting Range	0W - 30.6W	0W - 306W	0W - 30.6W	0W - 306W
Resolution	1mW	10mW	1mW	10mW
Accuracy	(T ¹)±(0.6% of set + 1.4% of FS (Full scale of H range) + Vinx2/5000 K)	(T ¹)±(0.6% of set + 1.4% of FS (Full scale of H range) + Vinx2/5000 K)	(T ¹)±(0.6% of set + 1.4% of FS (Full scale of H range) + Vinx2/5000 K)	(T ¹)±(0.6% of set + 1.4% of FS (Full scale of H range) + Vinx2/5000 K)



PEL-3032AE

SPECIFICATIONS				
Model	PEL-3031AE		PEL-3032AE	
DYNAMIC MODE				
General TT & T2	0.05ms-30ms/Res: 1µs; 30ms-30s/Res: 1ms		0.05ms-30ms/Res: 1µs; 30ms-30s/Res: 1ms	
Accuracy	1µs/1ms±200ppm		1µs/1ms±200ppm	
Slew Rate(Accuracy 10%)	0.001 - 0.25A/µs		0.25 - 62.5mA/µs	
Slew Rate Resolution	0.001A/µs		0.25mA/µs	
Slow Rate Accuracy of Setting	±(10% + 15µs) *1 Time to reach from 10 % to 90 % when the current is varied from 2 % to 100 % (20 % to 100 % in L range) of the rated current.		±(10% + 15µs) *1 Time to reach from 10 % to 90 % when the current is varied from 2 % to 100 % (20 % to 100 % in L range) of the rated current.	
Constant Resistance Mode				
Current Setting Range	0 - 6A	0 - 60A	0 - 1.5A	0 - 15A
Current Resolution	0 - 6.12A	0 - 61.2A	0 - 1.53A	0 - 15.3A
Current Accuracy	0.2mA	2mA	0.05mA	0.5mA
Current Accuracy	±0.8% FS	±0.8% FS	±0.8% FS	±0.8% FS
Constant Resistance Mode Range				
Setting Range	60S-0.002S(0.1666Ω-500Ω)(300W/15V)		6S-0.0002S(0.1666Ω-5kΩ)(300W/50V)	
Resistance Resolution	6S-0.0002S(0.1666Ω-5kΩ)(300W/15V)		0.6S-0.00002S(1.6666Ω-50kΩ)(300W/500V)	
Resistance Accuracy	60S-0.002S(0.1666Ω-500Ω)(300W/15V)		6S-0.0002S(0.1666Ω-5kΩ)(300W/50V)	
Resistance Accuracy	6S-0.0002S(0.1666Ω-5kΩ)(300W/15V)		0.6S-0.00002S(1.6666Ω-50kΩ)(300W/500V)	
Resistance Accuracy	30000 steps		30000 steps	
Resistance Accuracy	(T ¹)±(1%set + 0.6S) + 0.002mS		(T ¹)±(1%set + 0.06S) + 0.002mS	
MEASUREMENT				
Voltage Readback Range	0 - 15V	0 - 150V	0 - 50V	0 - 500V
Resolution	0.5mV	5mV	2mV	20mV
Accuracy	(T ¹)±(0.1% of rdg + 0.1% of FS)	(T ¹)±(0.1% of rdg + 0.1% of FS)	(T ¹)±(0.1% of rdg + 0.1% of FS)	(T ¹)±(0.1% of rdg + 0.1% of FS)
Current Readback Range	0 - 6A	0 - 60A	0 - 1.5A	0 - 15A
Resolution	0.2mA	2mA	0.05mA	0.5mA
Accuracy	(T ¹)±(0.1% of rdg+ 0.1% of FS)	(T ¹)±(0.1% of rdg+ 0.2% of FS)	(T ¹)±(0.1% of rdg+ 0.1% of FS)	(T ¹)±(0.1% of rdg+ 0.2% of FS)
Power Read back H&L Range	0 - 300W	0 - 300W	0 - 300W	0 - 300W
CP Mode L Range	0 - 30W	0 - 30W	0 - 30W	0 - 30W
FUNCTION				
Sequence(Normal/Fast)	Normal sequence function: Max steps: 1000 steps/Step time: 1ms - 999h 59min 59s(3599940 sec) Fast sequence function: Max steps: 1000 steps/Step time: 25us - 600ms Max test time: 999h 59m: 59s(3599940sec) ; Max test AH: 9999.99Ah OCP Autotest function, OPP Autotest Function			
BATT Test Automation Test Function	Yes			
Soft Start In/Out Terminal Protection	Analog External Control, Current Monitor Output, Trigger In/Out Terminal(BNC) 10 Sets OCP, OPP, UVP, OVP, OTP, RVP			
OTHER				
Power Source Interface	100 - 120VAC/200 - 240VAC, 47 - 63Hz LAN(USB/RS-232 & RS-485(Std.)), GPIB(Opt.)			
Dimensions & Weight	213.8(W) x 124.0(H) x 400.5(D)mm, Approx. 7.5kg			

Note : *1 - If the ambient temperature is over 30 °C or below 20 °C, then T = ± [- 25 °C] × 100ppm/°C × Set
If the ambient temperature is in the range of 20°C-30°C, then T = 0 (It is the ambient temperature)

ORDERING INFORMATION

PEL-3031AE 150V/60A/300W Programmable Single-channel D.C. Electronic Load
PEL-3032AE 500V/15A/300W Programmable Single-channel D.C. Electronic Load

ACCESSORIES :

Quick Start Guide, CD ROM (User Manual, Programming Manual)x1, Power Cord (Region dependent), Front Terminal Washers-spring Washer(M6)x2, GTL-105A Remote Sense Cables(Red x 1, Black x 1)

OPTIONAL ACCESSORIES

GTL-246 USB cable, Type A - Type B

GTL-248 GPIB cable, 2.0m

GTL-259 RS-232 Cable with DB9 connector to RJ45

GTL-260 RS-485 Cable with DB9 connector to RJ45

GTL-261 Serial Master Cable+Terminator, 0.5M

GTL-262 RS-485 Slave cable

CRA-414 Rack Mount Kit(IIS)

CRA-414-E Rack Mount Kit(EIA)

PEL-010 Dust Filter

PEL-004 GPIB option

Rear Panel



PEL-010 Dust Filter



PEL-004 GPIB Option



GRA-414-J Rack Mount Kit (IIS)



GRA-414-E Rack Mount Kit (EIA)



GTL-259



GTL-260



GTL-261



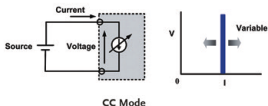
GTL-262



Programmable D.C. Electronic Load

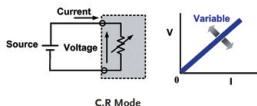
A. OPERATING MODE

The PEL-3000AE series provides four fundamental operating modes and three add-on modes of CC, CR and CP separately combining with CV. Users can set different load condition under different operating modes such as setting operating range for load level, Current Slew Rate, input voltage and load current. The input voltage

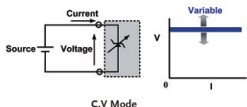


Under constant current mode, electronic load will sink the amount of current users has set. Different current settings via CC mode allow users to test the voltage changes of DC power supply which is called load regulation rate test.

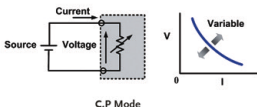
range has two levels - high and low. The load current operating range has two levels - high and low current levels which possess different resolution to meet test requirements of different power product specifications.



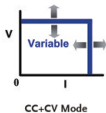
Under constant resistance mode, electronic load will sink load current, which is linearly direct proportion to input voltage. This mode can be utilized in testing voltage or the activation and current limit of power supply.



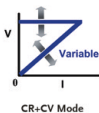
Under constant voltage mode, electronic load will sink sufficient current to regulate the voltage source to the set value. This mode allows users not only to test current limit function of power supply, but also to simulate battery operation in testing battery chargers.



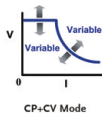
Under constant power mode, electronic load will sink load current, which is indirect proportion to input voltage to reach preset constant power requirement. Hence, the changes of input voltage will have indirect proportion effect on current sinking so as to reach constant power control.



+CV mode can be selected under CC, CR or CP mode. When +CV mode function is turned on and electronic load sinks more current than the maximum current of power supply under test, electronic load will automatically switch to CV mode. It is because that the current sunk is the maximum current of power device. Therefore,



power supply will switch to CC mode and PEL-3000AE will switch to CV mode to limit electronic load from sinking the total current of power supply so as to prevent power supply under test from damaging. Electronic load will cease operation once the voltage of DUT is lower than the set voltage under +CV mode.

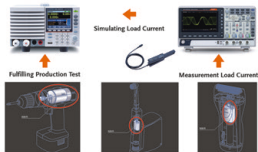
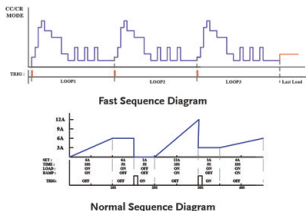


B. STATIC/DYNAMIC/SEQUENCE MODE

Function	Operation		Sequence	
	Static	Dynamic	Fast	Normal
Operating Condition Selection	Single fixed condition	Selection between two conditions	Selection from more than two conditions	Selection from more than two conditions
Operating Modes	All modes	<ul style="list-style-type: none"> Two conditions using same mode Support CC or CR mode 	<ul style="list-style-type: none"> Each condition must use same mode Support CC or CR mode 	<ul style="list-style-type: none"> Each condition is able to be used in different mode All modes
Adjustable Condition Setting	<ul style="list-style-type: none"> Value A / Value B Slew Rate 	<ul style="list-style-type: none"> Level 1 / Level 2 Timer 1 / Timer 2 Slew Rate 1 / Slew Rate 2 	<ul style="list-style-type: none"> Level Timer Slew Rate 	<ul style="list-style-type: none"> Level Timer Slew Rate
Sequence Step Combination	N/A	N/A	<ul style="list-style-type: none"> 1 Sequence 25µs/step 1,000 steps 	<ul style="list-style-type: none"> 10 Sequence 1ms/step 1,000 steps
Other Functions	N/A	Trigger Out function	Trigger Out function	<ul style="list-style-type: none"> Trigger Out function Ramp function

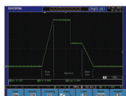
The PEL-3000AE Series, according to different test conditions, step or continuous changes, test speeds, and selectable modes, has three operating functions: Static, Dynamic and Sequence.

C. FAST SEQUENCE & NORMAL SEQUENCE



Power-driven Tools Simulation Test

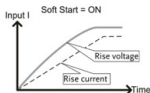
Set a complete sequence editing function to obtain following waveforms. Users can save development cost and time without using a PC to control electronic load and writing programs.



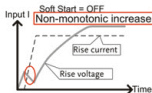
When operating the Sequence Function, PEL-3000AE Series follows the time and load settings of step1, step2, step3, etc. so as to realize different load current variation.

Ramp function of PEL-3000AE Series is able to set the current transition. When turned on, the current takes on a slope form; when turned off, the current takes on a step form.

D. SOFT START



The Soft Start function of PEL-3000AE Series allows users to determine the rise time of current sink that is to decide how much time is required to reach electronic load's set current, resistance or power value. PEL-3000AE's soft start function prevents inrush current and surge voltage from happening on DUT.



For instance, test applications using a power supply, LED and a DC load (activate the soft start function) can prevent inrush current and surge voltage from causing damages on LED.

E. BATT TEST AUTOMATION



BATT Test Automation Editing

The built-in BATT Test Automation of PEL-3000AE provides battery discharge applications with more flexible discharge stop time setting as well as rise and fall Slew Rate for discharge current settings. Under CP, CC or CR mode, the conditions for stop discharge can be set respectively.

For instance, set the input voltage for stop discharge current, the execution time for discharge current or total discharge current*time (AH) to satisfy the verification of battery capability.

Programmable D.C. Electronic Load

F. OCP TEST AUTOMATION



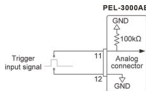
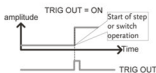
OCP test Automation for DUT(Power Supply). Provide users with high resolution OCP measurement values to verify DUT's OCP activation point. Provide users with measurement results so as to help them determine whether DUT's actual OCP activation point meets the regulations. Test the value of OCP by setting load current increment from start current to stop current. OCP's activation point can be accurately measured.

G. OPP TEST AUTOMATION



OPP test Automation for DUT(Power Supply). Provide users with high resolution OPP measurement values to verify DUT's OPP activation point. Provide users with measurement results so as to help them determine whether DUT's actual OPP activation point meets the regulations. Test the value of OPP by setting power increment from start power to stop power. OPP's activation point can be accurately measured.

H. TRIGGER IN/OUT BNC



Trigger In/Out function could be turned on or off by CONFIGURE setting of PEL-3000AE Series. The Trigger Input can be set the delay time while the Trigger Out Pulse Width can be set as well.

The trigger output signal is generated every time a switching operation is performed such as Dynamic mode or Fast/Normal sequence is executed when the trig out parameter is enabled.

The trigger output signal from TRIG OUT BNC is a 4.5V pulse of at least 2us with an impedance of 500ohm. The common

potential is connected to the chassis potential. The signal threshold level is TTL.

The TRIG IN BNC on the rear panel is used to resume a sequence after a pause. This action is useful to synchronize the execution of a sequence with another device. To resume a pause sequence, apply a high signal for 10us or more. The TRIG IN BNC is pulled down to earth internally using a 100Kohm resistor.

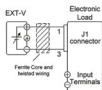
I. PROTECTION MODES

Function \ Protection	OCP	OVP	OPP	OTP	UVP
Adjustable Thresholds	✓	✓	✓	N/A	✓
Load Off	✓	✓	✓	Fixed	✓
Limit Function	✓	N/A	✓	N/A	N/A

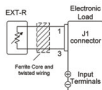
The PEL-3000AE Series provides many protective functions including over current protection (OCP), over voltage protection (OVP), over power protection (OPP), over temperature protection (OTP) and under voltage protection (UVP). Except for OTP, all thresholds

of protective functions are adjustable. When protective function is activated, electronic load will send out warning signal and terminate operation. Other than protective functions, Limit function can also

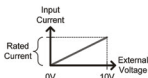
J. ANALOG EXTERNAL CONTROL



External Voltage Control

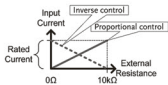


External Resistance Control



CC Mode

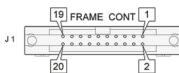
Input current = rated current x (external voltage/10)



CC Mode

Proportional Control: Input current = rated current x (external resistance/10k ohm)

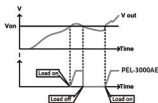
Inverse Control: Input current = rated current x (1 - external resistance/10k ohm)



J1 Connector

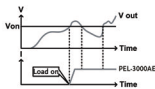
The PEL-3000AE Series provides the external analog channel control function, which allows users to connect J1 connectors on the rear panel to input voltage or to connect resistance to control electronic load operation. Users can integrate this function into test system and utilize signals generated from the test system to control PEL-3000AE Series.

K. VonN VOLTAGE AND Von LATCH FUNCTION



Von Latch = OFF

Von Voltage is the threshold voltage for electronic load to activate or terminate sinking current. When Von Latch is set to off, electronic load operation will be activated if input voltage is higher than Von Voltage and electronic load operation will be terminated if input voltage is lower than Von Voltage. When Von Latch is set to on, electronic load operation



Von Latch = ON

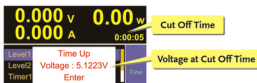
will be activated if input voltage is higher than Von Voltage and will continue operation even input voltage is lower than Von Voltage. Von Voltage function can test the transient maximum current capability provided by power supply.

L. TIMER FUNCTIONS



Elapsed Time

The PEL-3000AE series provides count time and cut off time functions. The display screen will show present activation time when electronic load is activated. When electronic load operation is terminated count time will stop and the total operation time will be shown on the display screen. The activation time of cut off time can be set to the maximum length of 999h 59min 59s. When electronic load is activated



Voltage at Cut Off Time

this function will start counting time. Electronic load will cease operation (load off) and show the final input voltage on the screen when preset time is reached. Timer function can provide information and application related to time. Users can obtain the total time of limiting electronic load operation to increase the agility of electronic load tests.

Programmable D.C. Electronic Load



PEL-2004A(B)

NEW



PEL-2002A(B)

NEW



FEATURES

- Sequence Function to do High Speed Load Simulations
- Flexible Configuration with Mainframes and Plug-in Modules
- Multiple Independent Load Inputs up to 8 Channels in a Mainframe
- Parallel Connection of Inputs for Higher Load Capacity
- Program Mode to Create Work Routines for Repetitive Tests
- OPP/OC/P/OT/RVP/UV Protection
- External Channel Control/Monitoring via Analog Control Connector
- PEL-2000A Series Interface Standard : USB, RS-232; Option : LAN, GPIB
- PEL-2000B Series Interface Standard : USB, RS-232, LAN; Option : GPIB

The PEL-2004A(B) and PEL-2002A(B) are multiple channel, programmable DC electronic loads with a modularized structure. The PEL-2000A(B) Series is designed to meet the continuing shift toward high speed operation in today's semiconductor market. As the power supply units, DC-DC converters, and batteries that drive semiconductor circuits need to follow this shift, power supply design, quality inspection and characteristic certification using high-speed performance loads have become necessary. The PEL-2000A(B) Series includes two types of mainframes and 4 types of load modules to accommodate users' requirements in a flexible manner. Any load module combination can be used with a mainframe to tailor a test system based on the number of channels, and the maximum load power, voltage and current of each channel. Multiple loads can be connected in parallel to provide a higher-power load to test higher power supply outputs. This flexibility significantly reduces the investment needed for future projects that have differed power requirements.

PEL-2004A(B) is a 4-slot mainframe with a master control unit to hold 4 load modules, while PEL-2002A(B) is a 2-slot mainframe with master control unit to hold 2 load modules. When PEL-2004A(B) is configured with 4 load modules rated at 350W each, the PEL-2000A(B) Series is able to sink up to 1.4kVA of power.

For higher load capacities, mainframes can be linked together in parallel with standard MIL-20-pin connectors. A maximum of 5 mainframes, including one master and 4 slaves can be chained together to create a total load capacity of 7kW for high current and high power applications. Using 4 dual channel load modules, PEL-2004A(B) is able to test 8 power supply outputs simultaneously.

The Sequence function allows each channel to change its load sink according to a predefined sequence at a rate of up to 100µs per step. Each sequence is able to run concurrently, under the control of one clock. This is one of the most powerful features of the PEL-2000A(B) Series as it is able to realistically simulate a multi-output power supply load. Under Dynamic mode, the load current or load resistance pulses between two preset levels at a pre-defined speed up to 25µs per step. This is often used as the standard test procedure to verify the response of a power supply to quick load changes. Most remarkably, multiple load channels can be connected in parallel to run Dynamic tests synchronously under a single clock. This Parallel Dynamic functionality gives the flexibility to perform dynamic tests for a high-power power supply without the need of another high-power load.

The PEL-2000A(B) Series includes a number of protection modes: Over Current Protection (OCP), Over Voltage Protection (OVP), Over Power Protection (OPP), Reverse Voltage Protection (RVP), and Under Voltage Protection (UVP). The protection modes are useful to protect both the load modules and the DUT(s).

A buzzer can be set for when a protection setting has been tripped. When a protection mode has been tripped, the load unit will display an alarm and stop sinking current/voltage. When a load unit is operating in CR or CV mode, the unit may need Over Current Protection to prevent excessive current being sunk. Over Current Protection stops the load from sinking more current than its recommended limit and prevents the load from burn-out damage. Over Voltage Protection is used to limit the amount of voltage sunk. If the OVP trips, the PEL-Series load will stop sinking voltage. Over Power Protection is used when the input power exceeds the specifications of the load. When OPP is tripped, the power will cease to be sunk. Reverse Voltage Protection prevents reverse voltage damage to the PEL-2000A(B) Series up to the specified rating. When Reverse Voltage Protection has been tripped, an alarm tone will sound until the reverse voltage is removed. Under Voltage Protection will turn off the load when the voltage drops below a set limit.

The Go/NoGo function is available to monitor test results all the time. When a test result goes beyond a preset limit range, a "No Go" indication will be shown on the display and a "No Go" signal can be sent out through the D-SUB interface for external device control. This Go/NoGo function is available for CC mode, CV mode and CR mode. Under "Program" mode, 12 programs each containing 10 panel-setup memories, can be edited to create work routines for repetitive tests. After a program has been executed, the results of all test steps, along with the Go/NoGo judgments, will be shown on the screen. For external control and system configuration, the PEL-Series has USB and RS-232 interfaces as standard and LAN as well as GPIB as an option. The LabView driver and Data Logging PC software are both supported for all the available interfaces. Each channel has an analog control/monitoring connector on the rear panel to externally turn a load on/off and to externally monitor load input current and voltage.

PEL-001 GPIB Card



GTL-249 Frame Link Cable



PEL-002 Rack Mount Kit



GTL-120 Test Lead



PEL-003 Panel Cover



GTL-121 Sense Lead



PEL-016 LAN Card
(for PEL-2000A Main Frame)



SPECIFICATIONS

	PEL-2020A(B)		PEL-2030A(B)			PEL-2040A(B)		PEL-2041A(B)			
CHANNEL	L/R	L/R	Left	Right	Right	one channel	one channel	one channel	one channel		
RANGE	LOW	HIGH	N/A	LOW	HIGH	LOW	HIGH	LOW	HIGH		
POWER	100W	100W	30W	250W	250W	350W		350W			
CURRENT	0-2A	0-20A	0-5A	0-4A	0-40A	0-7A	0-70A	0-1A	0-10A		
VOLTAGE	0-80V		0-80V			0-80V		0-500V			
MIN. OPERATING VOLTAGE(dc)(Typ.)	0.4V at 2A 0.2V at 1A	0.8V at 20A 0.4V at 10A	0.8V at 5A 0.4V at 2.5A	0.4V at 4A 0.2V at 2A	0.8V at 40A 0.4V at 20A	0.4V at 7A 0.2V at 3.5A	0.8V at 70A 0.4V at 35A	1V at 1A 0.5V at 0.5A	2V at 10A 1V at 5A		
STATIC MODE											
CONSTANT CURRENT MODE											
	Operating Range	0-2A	0-20A	0-5A	0-4A	0-40A	0-7A	0-70A	0-1A	0-10A	
	Setting Range	0-2.04A	0-20.4A	0-5.1A	0-4.08A	0-40.8A	0-7.14A	0-71.4A	0-1.02A	0-10.2A	
	Resolution	0.1mA	1mA	0.125mA	0.1mA	1mA	0.2mA	2mA	0.05mA	0.5mA	
	Accuracy	±(0.1%set + 0.1%F.S. ¹)	±(0.1%set + 0.2%F.S.)	±(0.1%set + 0.1%F.S.)	±(0.1%set + 0.1%F.S. ¹)	±(0.1%set + 0.2%F.S.)	±(0.1%set + 0.1%F.S. ¹)	±(0.1%set + 0.2%F.S.)	±(0.1%set + 0.1%F.S. ¹)	±(0.1%set + 0.2%F.S.)	
CONSTANT RESISTANCE MODE											
	Operating Range	0.075Ω-300Ω(100W/16V) 3.75Ω-15kΩ(100W/80V)	0.3Ω-1.2kΩ(30W/16V) 15Ω-60kΩ(30W/80V)	0.0375Ω-150Ω(250W/16V) 1.875Ω-7.5kΩ(250W/80V)	0.025Ω-100Ω(350W/16V) 1.25Ω-5kΩ(350W/80V)	1.25Ω-5kΩ(350W/125V) 50Ω-200kΩ(350W/500V)					
	Setting Range	0.075Ω-300Ω(100W/16V) 3.75Ω-15kΩ(100W/80V)	0.3Ω-1.2kΩ(30W/16V) 15Ω-60kΩ(30W/80V)	0.0375Ω-150Ω(250W/16V) 1.875Ω-7.5kΩ(250W/80V)	0.025Ω-100Ω(350W/16V) 1.25Ω-5kΩ(350W/80V)	1.25Ω-5kΩ(350W/125V) 50Ω-200kΩ(350W/500V)					
	Resolution ¹	0.333mS(100W/16V) 6.667μS(100W/80V)	83.333μS(30W/16V) 1.666μS(30W/80V)	0.666mS(250W/16V) 13.333μS(250W/80V)	1mS(350W/16V) 20μS(350W/80V)	20μS(350W/125V) 0.5μS(350W/500V)					
	Accuracy ²	3000 : ±(0.2%set + 0.1S)	1.2kΩ : ±(0.2%set + 0.1S)	1500 : ±(0.2%set + 0.1S)	1000 : ±(0.2%set + 0.1S)	5kΩ : ±(0.2%set + 0.02S)					
	With ≥2.5V at input	15kΩ : ±(0.1%set + 0.01S)	60kΩ : ±(0.1%set + 0.01S)	7.5kΩ : ±(0.1%set + 0.01S)	5kΩ : ±(0.1%set + 0.01S)	200kΩ : ±(0.1%set + 0.005S)					
NOTE : ¹ : S (siemens) is the unit of conductance, equal to one reciprocal ohm. ² : Accuracy must be calculated in conductivity units.											
CONSTANT VOLTAGE + CONSTANT CURRENT MODE											
	Operating Range	1-80V	1-16V	1-80V	1-16V	1-80V	1-16V	1-80V	1-16V	2.5-500V	2.5-125V
	Setting Range	0-81.6V	0-16.32V	0-81.6V	0-16.32V	0-81.6V	0-16.32V	0-81.6V	0-16.32V	0-510V	0-127.5V
	Resolution	2mV	0.4mV	2mV	0.4mV	2mV	0.4mV	2mV	0.4mV	10mV	2.5mV
	Accuracy	±(0.05%set + 0.1%F.S.)	±(0.05%set + 0.1%F.S.)	±(0.05%set + 0.1%F.S.)	±(0.05%set + 0.1%F.S.)	±(0.05%set + 0.1%F.S.)	±(0.05%set + 0.1%F.S.)	±(0.05%set + 0.1%F.S.)	±(0.05%set + 0.1%F.S.)	±(0.05%set + 0.1%F.S.)	±(0.05%set + 0.1%F.S.)
	Current Setting Range	0-2.04A	0-20.4A	0-5.1A	0-4.08A	0-40.8A	0-7.14A	0-71.4A	0-1.02A	0-10.2A	
	Resolution	0.1mA	1mA	0.125mA	0.1mA	1mA	0.2mA	2mA	0.05mA	0.5mA	
	Accuracy	±(0.1%set + 0.1%F.S. ¹)	±(0.1%set + 0.2%F.S.)	±(0.1%set + 0.2%F.S.)	±(0.1%set + 0.1%F.S. ¹)	±(0.1%set + 0.2%F.S.)	±(0.1%set + 0.1%F.S. ¹)	±(0.1%set + 0.2%F.S.)	±(0.1%set + 0.1%F.S. ¹)	±(0.1%set + 0.2%F.S.)	±(0.1%set + 0.2%F.S.)
CONSTANT POWER MODE + CONSTANT CURRENT MODE											
	Operating Range	1-10W	1-100W	1-30W	1-25W	1-250W	1-35W	1-350W	1-35W	1-350W	
	Setting Range	0-10.2W	0-102W	0-30.6W	0-25.5W	0-255W	0-35.7W	0-357W	0-35.7W	0-357W	
	Resolution	1mW	10mW	1mW	1mW	10mW	1mW	10mW	1mW	10mW	
	Accuracy	±(0.5%set + 0.5%F.S. ¹)	±(0.5%set + 0.5%F.S.)	±(0.5%set + 0.5%F.S.)	±(0.5%set + 0.5%F.S. ¹)	±(0.5%set + 0.5%F.S.)	±(0.5%set + 0.5%F.S. ¹)	±(0.5%set + 0.5%F.S.)	±(0.5%set + 0.5%F.S. ¹)	±(0.5%set + 0.5%F.S.)	
	Current Setting Range	0-2.04A	0-20.4A	0-5.1A	0-4.08A	0-40.8A	0-7.14A	0-71.4A	0-1.02A	0-10.2A	
	Resolution	0.1mA	1mA	0.125mA	0.1mA	1mA	0.2mA	2mA	0.05mA	0.5mA	
	Accuracy	±(0.1%set + 0.1%F.S. ¹)	±(0.1%set + 0.2%F.S.)	±(0.1%set + 0.2%F.S.)	±(0.1%set + 0.1%F.S. ¹)	±(0.1%set + 0.2%F.S.)	±(0.1%set + 0.1%F.S. ¹)	±(0.1%set + 0.2%F.S.)	±(0.1%set + 0.1%F.S. ¹)	±(0.1%set + 0.2%F.S.)	
NOTE : ¹ : F.S. = Full scale of H Range											
DYNAMIC MODE											
	T1&T2	0.025ms - 10ms / Res : 1μs		0.025ms - 10ms / Res : 1μs			0.025ms - 10ms / Res : 1μs		0.025ms - 10ms / Res : 1μs		
		10ms - 30s / Res : 1ms		10ms - 30s / Res : 1ms			10ms - 30s / Res : 1ms		10ms - 30s / Res : 1ms		
	Accuracy	1μs / 1ms ± 100ppm		1μs / 1ms ± 100ppm			1μs / 1ms ± 100ppm		1μs / 1ms ± 100ppm		
CONSTANT CURRENT MODE											
	Slew Rate	0.32 - 80mA/μs	3.2 - 800mA/μs	0.8 - 200mA/μs	0.64 - 160mA/μs	6.4 - 1600mA/μs	0.001 - 0.28A/μs	0.01 - 2.8A/μs	0.16 - 40mA/μs	1.6 - 400mA/μs	
	Slew Rate Resolution	0.32mA/μs	3.2mA/μs	0.8mA/μs	0.64mA/μs	6.4mA/μs	0.001A/μs	0.01A/μs	0.16mA/μs	1.6mA/μs	
	Slew Rate Accuracy of Setting	±(10% + 15μs)	±(10% + 15μs)	±(10% + 15μs)	±(10% + 15μs)	±(10% + 15μs)	±(10% + 15μs)	±(10% + 15μs)	±(10% + 15μs)	±(10% + 15μs)	
	Current Setting Range	0-2.04A	0-20.4A	0-5.1A	0-4.08A	0-40.8A	0-7.14A	0-71.4A	0-1.02A	0-10.2A	
	Current Resolution	0.1mA	1mA	0.125mA	0.1mA	1mA	0.2mA	2mA	0.05mA	0.5mA	
	Current Accuracy	±0.4% F.S.		±0.4% F.S.			±0.4% F.S.		±0.4% F.S.		
CONSTANT RESISTANCE MODE											
	Slew Rate	3.2 - 800mA/μs		0.8 - 200mA/μs			6.4 - 1600mA/μs		0.01 - 2.8A/μs		
	Slew Rate Resolution	3.2mA/μs		0.8mA/μs			6.4mA/μs		0.01A/μs		
	Slew Rate Accuracy of Setting	±(10% + 50μs)		±(10% + 50μs)			±(10% + 50μs)		±(10% + 50μs)		
	Resistance Setting Range	0.075Ω-300Ω(100W/16V) 3.75Ω-15kΩ(100W/80V)	0.3Ω-1.2kΩ(30W/16V) 15Ω-60kΩ(30W/80V)	0.0375Ω-150Ω(250W/16V) 1.875Ω-7.5kΩ(250W/80V)	0.025Ω-100Ω(350W/16V) 1.25Ω-5kΩ(350W/80V)	1.25Ω-5kΩ(350W/125V) 50Ω-200kΩ(350W/500V)					
	Resistance Resolution	0.333mS(100W/16V) 6.667μS(100W/80V)	83.333μS(30W/16V) 1.666μS(30W/80V)	0.666mS(250W/16V) 13.333μS(250W/80V)	1mS(350W/16V) 20μS(350W/80V)	20μS(350W/125V) 0.5μS(350W/500V)					
	Resistance Accuracy	3000 : ±(0.5%set + 0.1S) 15kΩ : ±(0.5%set + 0.01S)	1.2kΩ : ±(0.5%set + 0.1S) 60kΩ : ±(0.5%set + 0.01S)	1500 : ±(0.5%set + 0.1S) 7.5kΩ : ±(0.5%set + 0.01S)	1000 : ±(0.5%set + 0.1S) 5kΩ : ±(0.5%set + 0.01S)	5kΩ : ±(0.5%set + 0.02S) 200kΩ : ±(0.5%set + 0.005S)					
MEASUREMENT											
VOLTAGE READBACK											
	Range	0-16V	0-80V	0-16V	0-80V	0-16V	0-80V	0-16V	0-80V	0-125V	0-500V
	Resolution	0.32mV	1.6mV	0.32mV	1.6mV	0.32mV	1.6mV	0.32mV	1.6mV	2.5mV	10mV
	Accuracy	±(0.025%set + 0.025% F.S.)		±(0.025%set + 0.025% F.S.)			±(0.025%set + 0.025% F.S.)		±(0.025%set + 0.025% F.S.)		
CURRENT READBACK											
	Range	0-2A	0-20A	0-5A	0-4A	0-40A	0-7A	0-70A	0-1A	0-10A	
	Resolution	0.04mA	0.4mA	0.1mA	0.08mA	0.8mA	0.14mA	1.4mA	0.02mA	0.2mA	
	Accuracy	±(0.05%set + 0.05% F.S. ¹)		±(0.05%set + 0.05% F.S. ¹)			±(0.05%set + 0.05% F.S. ¹)		±(0.05%set + 0.05% F.S. ¹)		
POWER READBACK											
	Range	0-10W	0-100W	0-30W	0-25W	0-250W	0-35W	0-350W	0-35W	0-350W	
	Accuracy	±(0.1%set + 0.1% F.S. ¹)		±(0.1%set + 0.1% F.S. ¹)			±(0.1%set + 0.1% F.S. ¹)		±(0.1%set + 0.1% F.S. ¹)		
NOTE : ¹ : Power F.S. = Wrange F.S. x Irange F.S. ² : F.S. = Full scale of H Range											

Programmable D.C. Electronic Load



PEL-2000A(B) Series

PEL-2004A Rear Panel



PEL-2020A Rear Panel



PEL-2004B Rear Panel



PEL-2020B Rear Panel



SPECIFICATIONS

	PEL-2020A(B)	PEL-2030A(B)	PEL-2040A(B)	PEL-2041A(B)						
PROTECTIVE										
Over Power Protection										
Range	1~102W	0.9~30.6W	1.25~255W	1.75~357W						
Resolution	0.5W	0.15W	1.25W	1.75W						
Accuracy	±(2%set + 0.25%F.S)	±(2%set + 0.25%F.S)	±(2%set + 0.25%F.S)	±(2%set + 0.25%F.S)						
Over Current Protection										
Range	0.25~20.4A	0.0625~5.1A	0.5~40.8A	0.875~71.4A						
Resolution	0.05A	0.0125A	0.1A	0.175A						
Accuracy	±(2%set + 0.25%F.S)	±(2%set + 0.25%F.S)	±(2%set + 0.25%F.S)	±(2%set + 0.25%F.S)						
Over Voltage Protection										
Range	1~81.6V	1~81.6V	1~81.6V	1~81.6V						
Resolution	0.2V	0.2V	0.2V	0.2V						
Accuracy	±(2%set + 0.25%F.S)	±(2%set + 0.25%F.S)	±(2%set + 0.25%F.S)	±(2%set + 0.25%F.S)						
Over Temperature Protection	≈85°C	≈85°C	≈85°C	≈85°C						
Rated Power Protection										
Value	110W	33W	275W	385W						
Accuracy	±5%set	±5%set	±5%set	±5%set						
GENERAL										
SHORT CIRCUIT										
Current (CC)	≈2.2/2A	≈22/20A	≈5.5/5A	≈4.4/4A	≈44/40A	≈7.7/7A	≈77/70A	≈1.1/1A	≈11/10A	
Voltage (CV)	≈0V	≈0V	≈0V	≈0V	≈0V	≈0V	≈0V	≈0V	≈0V	
Resistance (CR)	≈3.75Ω	≈0.075Ω	≈15Ω	≈0.30	≈1.875Ω	≈0.0375Ω	≈1.25Ω	≈0.025Ω	≈50Ω	≈1.25Ω
INPUT RESISTANCE (LOAD OFF)	500kΩ (Typical)									
POWER SOURCE	100-120Vac/ 200-240Vac (90-132Vac/ 180-250Vac), 47 – 63Hz									
WEIGHT	Approx. 3.8kg									
DIMENSIONS & WEIGHT (PEL-2002A(B))	272(W) x 200(H) x 581(D) mm; Approx. 17.1kg (Full modules)									
DIMENSIONS & WEIGHT (PEL-2004A(B))	435(W) x 200(H) x 581(D) mm; Approx. 28.4kg (Full modules)									

ORDERING INFORMATION

- PEL-2020A(B) Dual Channel Module, (0~80V, 0~20A, 100W) x 2
- PEL-2030A(B) Dual Channel Module, (1~80V, 0~5A, 30W)+(1~80V, 0~40A, 250W)
- PEL-2040A(B) Single Channel Module, (0~80V, 0~70A, 350W)
- PEL-2041A(B) Single Channel Module, (0~500V, 0~10A, 350W)
- PEL-2004A(B) 4-Slot Programmable D.C. Electronic Load Mainframe
- PEL-2002A(B) 2-Slot Programmable D.C. Electronic Load Mainframe

Note : Load module cannot be used without a mainframe

ACCESSORIES :

- PEL-2002A(B)/2004A(B) User Manual x1, Power Cord x1
- PEL-2020A(B)/2030A(B)/2040A(B)/2041A(B) GTL-120 Test Lead x 1, GTL-121 Sense Lead x 1
- * PEL-003 x 3 (PEL-2004A(B)); PEL-003 x 1 (PEL-2002A(B))

OPTIONAL ACCESSORIES

- | | | | |
|---------|--|---------|--|
| PEL-001 | GPIB Card | GTL-248 | GPIB Cable (2m) |
| PEL-002 | PEL-2000A(B) Series Rack Mount Kit | GTL-249 | Frame Link Cable |
| PEL-003 | Panel Cover | GTL-246 | USB Cable, USB 2.0 A-B TYPE CABLE, 4P |
| PEL-016 | LAN Card (for PEL-2000A(B) Main Frame) | GTL-232 | RS-232C Cable, 9-pin, F-F Type, null modem, 2000mm |

A. MODULARIZED STRUCTURE/PROGRAM & INTERFACE

Modularized Structure

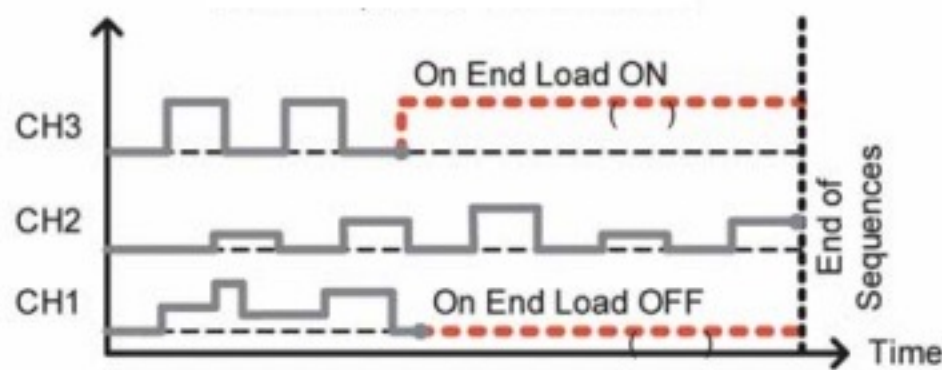
PEL-2004A(B) is a 4-slot mainframe with a master control unit made to hold 4 load modules, and PEL-2002A(B) is a 2-slot mainframe with a master control unit made to hold 2 load modules. The modularized structure of the PEL-2000A(B) Series allows any combination of mainframe and load module (PEL-2020A(B), PEL-2030A(B), PEL-2040A(B), PEL-2041A(B)) to be integrated into a custom-tailored system.

Multiple loads within the same mainframe can be connected in parallel to perform both static and dynamic tests. This flexibility makes the PEL-2000A(B) Series a very cost-effective instrument for testing a broad range of power supply outputs.

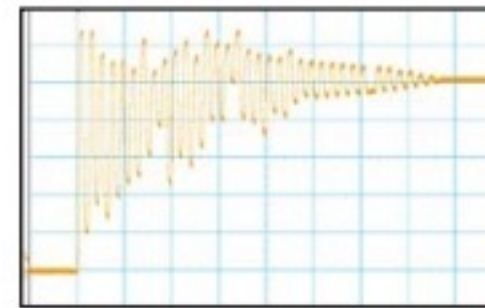
Program & Interface

The PEL-2000A(B) Series supports a total of 12 different programs and 10 sequences to each program. With a total of up to 120 different configurations. For external control and system configuration, the PEL-Series has USB and RS-232 interfaces as standard and GPIB as an option. The LabView driver and Data Logging PC software are supported for all the interfaces available. Each channel has an analog control/monitoring connector to externally turn a load on/off and to externally monitor load input current and voltage.

B. AUTOMATICALLY SEQUENCE FUNCTION



Sequence - On End Load

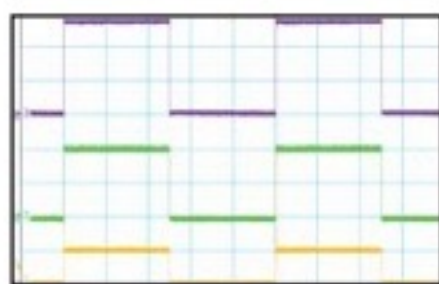


The figure above shows the current waveform of a simulation using the sequence function.

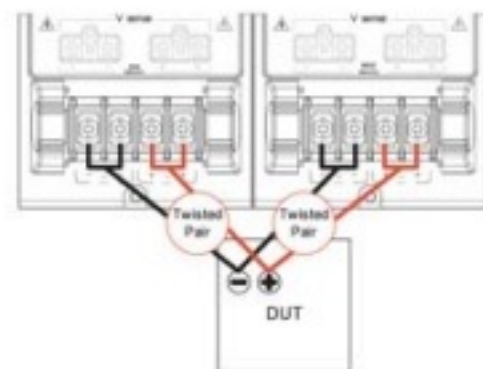
The Sequence function allows each channel to change its load sink according to a predefined sequence at a rate of up to $100\mu\text{s}$ per step. Each sequence is able to run concurrently, under the control of one clock. This is one of the most powerful features of the PEL-2000B Series as it is able to realistically simulate a multi-output power supply load. Under Dynamic mode, the load current or load resistance pulses between two preset levels at a pre-defined speed up to $25\mu\text{s}$ per step. This is often used as the standard test procedure to verify the response of a power supply to quick load changes.

The picture above is an example of a sequence used as a load profile for a single output switching power supply. A load profile is programmed to simulate the current drawn of a power supply load. By using a current probe to acquire a current waveform, PEL-2000A(B) Series is able to evaluate the performance of a power supply based on the load sequence that is programmed. An oscilloscope is then used to display the result.

C. PARALLEL DYNAMIC LOADING



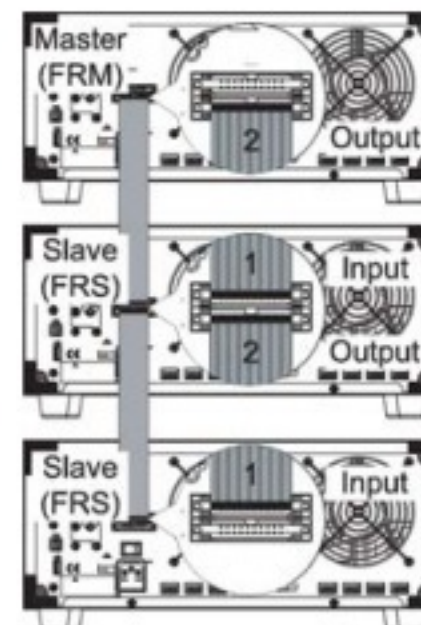
Dynamic Test



Wire Connection

All the load channels in a PEL-2000A(B) Series mainframe can be connected in parallel to perform any combination of static or dynamic loading. Under Dynamic mode, the load current or load resistance pulses between two preset levels at a predefined speed of up to $25\mu\text{s}$ per step. When the channels are connected in parallel, dynamic tests are synchronously clocked. The ability to perform parallel dynamic loading gives you the flexibility to perform dynamic tests to high-power power supplies without the need for a dedicated high power electronic load.

D. FRAME LINK



The PEL-2000A(B) Series allows multiple mainframes to be linked together with standard MIL 20-pin connectors to provide higher power load capacity. A maximum of 5 mainframes, including one master and 4 slaves, can be chained together to give a 7kW load capacity for high current and high power applications.

High Power DC Electronic Load



PEL-5000C Series

NEW



FEATURES

- * Maximum Power up to 192kW
- * Up to 8 units of Master/Slave Parallel Control
- * 5-digit Digital Voltage, Current and Power Meter
- * Large LCD Display
- * Display Voltage Value, Current Value, Watt Value at the Same Time
- * Suitable for Power Factor Regulator (PFC) Testing (600V, 1200V Models)
- * Automatically Perform OCP, OPP Test
- * The Power-on State Value Can be Set
- * Constant Current, Constant Resistance, Constant Voltage, Constant Power, Constant Current + Constant Voltage, Constant Power + Constant Voltage, Dynamic and Short Circuit Modes
- * Short Circuit Time Can be Set During Short Circuit Test
- * Over Current, Over Power, Over Temperature Protection and Over Voltage Warning
- * Voltage Polarity Display Can be Set to Positive Value ("+") or Negative Value ("-")
- * Support Solar Panel MPPT Test
- * Optional Interface: GPIB, RS232, USB, LAN

GW Instek PEL-5000C series single-channel electronic load provides 150V/ 600V/ 1200V models with a power range of 6kW~24kW. PEL-5000C has a total of 24 models featuring different combinations of power, voltage, and current. It can test and verify the specifications of batteries, electric vehicle chargers/charging stations, electric vehicle batteries and solar panels. PEL-5000C supports parallel connection for same voltage specification and different power models. PEL-5000C can support up to 8 units connected in parallel to provide a maximum power of 192kW.

For the scenario of battery testing, PEL-5000C specifically provides four battery discharge modes, namely CC+CV battery discharge test mode, CP+CV battery discharge test mode, CC+ UVP battery discharge test mode, and CP+ UVP battery discharge test mode. Users can choose a suitable test mode according to the test requirements. In addition to the four battery discharge modes, PEL-5000C also provides Time period discharge, Pulse discharge, and RAMP discharge modes. Users can set the discharge time, or discharge in the pulse current mode, or even set the rising/falling slew rate of the discharge current. These functions can be very flexible in the simulation of the battery discharge current waveform when an electric vehicle is running.

In order to meet the verification requirements of different DUTs, PEL-5000C provides a variety of test functions, including inrush current test mode, solar panel MPPT test mode, automated OCP, OPP test functions and 150 sets of parameter storage function. The 1200V model of PEL-5000C not only provides full power output at 1000V, but also provides 60% power output at 1200V output, which is higher than the 50% power output of other manufacturers of similar electronic loads. High-voltage batteries or chargers directly connected to the electronic load may cause damage to the electronic load. PEL-5000C has a built-in slow starter, which not only protects the DC load, but also saves the user's installation cost and setting time for measurement.

The communication interfaces supported by PEL-5000C include GPIB, RS232, USB, and LAN. The power, voltage and current of each model are shown in the following table:

ORDERING INFORMATION

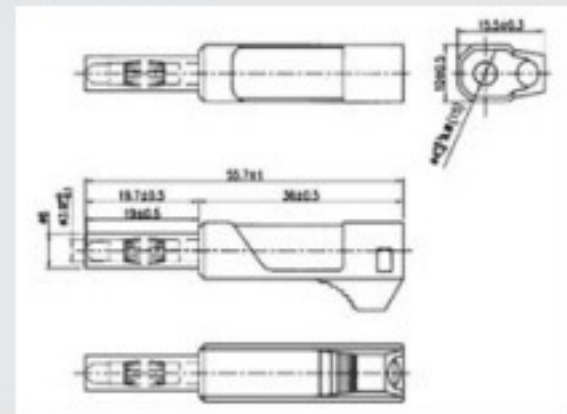
PEL-5006C-150-600	150V/600A/6kW	High Power DC Electronic Load
PEL-5008C-150-800	150V/800A/8kW	High Power DC Electronic Load
PEL-5010C-150-1000	150V/1000A/10kW	High Power DC Electronic Load
PEL-5012C-150-1200	150V/1200A/12kW	High Power DC Electronic Load
PEL-5015C-150-1500	150V/1500A/15kW	High Power DC Electronic Load
PEL-5018C-150-1800	150V/1800A/18kW	High Power DC Electronic Load
PEL-5020C-150-2000	150V/2000A/20kW	High Power DC Electronic Load
PEL-5024C-150-2000	150V/2000A/24kW	High Power DC Electronic Load
PEL-5006C-600-420	600V/420A/6kW	High Power DC Electronic Load
PEL-5008C-600-560	600V/560A/8kW	High Power DC Electronic Load
PEL-5010C-600-700	600V/700A/10kW	High Power DC Electronic Load
PEL-5012C-600-840	600V/840A/12kW	High Power DC Electronic Load
PEL-5015C-600-1050	600V/1050A/15kW	High Power DC Electronic Load
PEL-5018C-600-1260	600V/1260A/18kW	High Power DC Electronic Load
PEL-5020C-600-1400	600V/1400A/20kW	High Power DC Electronic Load
PEL-5024C-600-1680	600V/1680A/24kW	High Power DC Electronic Load
PEL-5006C-1200-240	1200V/240A/6kW	High Power DC Electronic Load
PEL-5008C-1200-320	1200V/320A/8kW	High Power DC Electronic Load
PEL-5010C-1200-400	1200V/400A/10kW	High Power DC Electronic Load
PEL-5012C-1200-480	1200V/480A/12kW	High Power DC Electronic Load
PEL-5015C-1200-600	1200V/600A/15kW	High Power DC Electronic Load
PEL-5018C-1200-720	1200V/720A/18kW	High Power DC Electronic Load
PEL-5020C-1200-800	1200V/800A/20kW	High Power DC Electronic Load
PEL-5024C-1200-960	1200V/960A/24kW	High Power DC Electronic Load

PEL-5015C-1200-600

Power rating 15 → 15kW
Maximum output current: 600 → 600A
Maximum output voltage: 1200 → 1200V

STANDARD ACCESSORIES

- PEL-5000C Series operation manual
- BANANA PLUGS : Please refer to Fig.1 x 1
- BNC – BNC CABLE : BNC to BNC CABLE, 1m x 1
- HD-DSUB : 15PIN Parallel wire Parallel Wire x 1



OPTIONAL ACCESSORIES

PEL-022	GPIB Card	PEL-030	GPIB+RS-232 Card
PEL-023	RS-232 Card	GTL-246	USB Cable, USB 2.0, A-B Type, 1200mm
PEL-024	LAN Card	GTL-248	GPIB Cable, Double Shielded, 2000mm
PEL-025	USB Card	GTL-250	GPIB Cable, Double Shielded, 600mm
PEL-026	Hook Ring x 4		
PEL-027-1	Rack Mount Kit For PEL-5006C		
PEL-027-2	Rack Mount Kit For PEL-5008C, PEL-5010C, PEL-5012C		
PEL-027-3	Rack Mount Kit For PEL-5015C, PEL-5018C		
PEL-027-4	Rack Mount Kit For PEL-5020C, PEL-5024C		
PEL-028	HANDLES, U-shaped Handle(fixed to the bracket)		

Rear Panel





PEL-5006C-150-600
PEL-5006C-600-420
PEL-5006C-1200-240



PEL-5008C-150-800
PEL-5008C-600-560
PEL-5008C-1200-320



PEL-5010C-150-1000
PEL-5010C-600-700
PEL-5010C-1200-400



PEL-5012C-150-1200
PEL-5012C-600-840
PEL-5012C-1200-480



PEL-5015C-150-1500
PEL-5015C-600-1050
PEL-5015C-1200-600



PEL-5018C-150-1800
PEL-5018C-600-1260
PEL-5018C-1200-720



PEL-5020C-150-2000
PEL-5020C-600-1400
PEL-5020C-1200-800



PEL-5024C-150-2000
PEL-5024C-600-1680
PEL-5024C-1200-960

Power / Voltage	150V	600V	1200V
6kW	PEL-5006C-150-600 (600A)	PEL-5006C-600-420 (420A)	PEL-5006C-1200-240 (240A)
8kW	PEL-5008C-150-800 (800A)	PEL-5008C-600-560 (560A)	PEL-5008C-1200-320 (320A)
10kW	PEL-5010C-150-1000 (1000A)	PEL-5010C-600-700 (700A)	PEL-5010C-1200-400 (400A)
12kW	PEL-5012C-150-1200 (1200A)	PEL-5012C-600-840 (840A)	PEL-5012C-1200-480 (480A)
15kW	PEL-5015C-150-1500 (1500A)	PEL-5015C-600-1050 (1050A)	PEL-5015C-1200-600 (600A)
18kW	PEL-5018C-150-1800 (1800A)	PEL-5018C-600-1260 (1260A)	PEL-5018C-1200-720 (720A)
20kW	PEL-5020C-150-2000 (2000A)	PEL-5020C-600-1400 (1400A)	PEL-5020C-1200-800 (800A)
24kW	PEL-5024C-150-2000 (2000A)	PEL-5024C-600-1680 (1680A)	PEL-5024C-1200-960 (960A)

PEL-022 GPIB Card



PEL-023 RS-232 Card



PEL-024 LAN Card



PEL-025 USB Card



PEL-026 Hook Ring



PEL-027-1-4 Rack Mount Kit



PEL-028 Handles



High Power DC Electronic Load

SPECIFICATIONS								
MODEL	PEL-5006C-150-600		PEL-5008C-150-800		PEL-5010C-150-1000		PEL-5012C-150-1200	
Power ^{*1}	6kW		8kW		10kW		12kW	
Current	0 – 60A	0 – 600A	0 – 80A	0 – 800A	0 – 100A	0 – 1000A	0 – 120A	0 – 1200A
Voltage	0 – 150V							
Min. Operating Voltage	0.7V @ 600A		0.7V @ 800A		0.7V @ 1000A		0.7V @ 1200A	
Protections								
Over Power Protection (OPP)	105%							
Over Current Protection (OCP)	104%							
Over Voltage Protection (OVP)	105%							
Over Temp Protection (OTP)	90°C ± 5°C							
Constant Current Mode								
Range ^{*2}	60A	600A	80A	800A	100A	1000A	120A	1200A
Resolution	0.96mA	9.6mA	1.28mA	12.8mA	1.6mA	16mA	1.92mA	19.2mA
Accuracy ^{*3}	± 0.05% of (Setting + Range)							
Constant Resistance Mode								
Range	15000Ω–0.25Ω	0.25Ω–0.0012Ω	11250Ω–0.1875Ω	0.1875Ω–0.0009Ω	9000Ω–0.15Ω	0.15Ω–0.0007Ω	7500Ω–0.125Ω	0.125Ω–0.0006Ω
Resolution	66.666μS	4.167μΩ	88.888μS	3.125μΩ	111.111μS	2.5μΩ	133.333μS	2.084μΩ
Accuracy	± 0.2% of (Setting + Range)							
Constant Voltage Mode								
Range	150V							
Resolution	2.5mV							
Accuracy	± 0.05% of (Setting + Range)							
Constant Power Mode								
Range	600W	6000W	800W	8000W	1000W	10000W	1200W	12000W
Resolution	9.6mW	96mW	12.8mW	128mW	16mW	160mW	19.2mW	192mW
Accuracy	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)
Constant Voltage Mode + Constant Current Mode								
Range	150V	600A	150V	800A	150V	1000A	150V	1200A
Resolution	2.5mV	9.6mA	2.5mV	12.8mA	2.5mV	3.2mA	2.5mV	19.2mA
Accuracy	± 1.0% of (Setting + Range)							
Constant Voltage Mode + Constant Power Mode								
Range	150V	6000W	150V	8000W	150V	10000W	150V	12000W
Resolution	2.5mV	96mW	2.5mV	128mW	2.5mV	160mW	2.5mV	192mW
Accuracy	± 1.0% of (Setting + Range)							
Surge Test								
Surge & Normal current	0~600A		0~800A		0~1000A		0~1200A	
Surge time	10~1000ms		10~1000ms		10~1000ms		10~1000ms	
Surge step	1~5							
MPPT Mode								
Algorithm	P&O							
Load mode	CV							
P&O interval	1000ms~60000ms ; resolution 1000ms							
Dynamic Mode								
Timing								
Thigh & Tlow	0.010~9.999 / 99.99 / 999.9 / 9999ms							
Resolution	0.001 / 0.01 / 0.1 / 1ms							
Accuracy	1μs / 10μs / 100μs / 1ms + 50ppm							
Slew Rate	0.0144A~0.9A/μs	0.144A~9A/μs	0.0192A~1.2A/μs	0.192A~12A/μs	0.024A~1.5A/μs	0.24A~15A/μs	0.0288A~1.8A/μs	0.288A~18A/μs
Resolution	0.0036A/μs	0.036A/μs	0.0048A/μs	0.048A/μs	0.006A/μs	0.06A/μs	0.0072A/μs	0.072A/μs
Min. Rise Time	66.7μs (typical)							
Current								
Range	0~60A	60~600A	0~80A	80~800A	0~100A	100~1000A	0~120A	120~1200A
Resolution	0.96mA	9.6mA	1.28mA	12.8mA	1.6mA	16mA	1.92mA	19.2mA
Measurement								
Voltage Read Back								
Range (5 Digital)	0~15V	15~150V	0~15V	15~150V	0~15V	15~150V	0~15V	15~150V
Resolution	0.25mV	2.5mV	0.25mV	2.5mV	0.25mV	2.5mV	0.25mV	2.5mV
Accuracy	± 0.025% of (Reading + Range)							
Current Read Back								
Range (5 Digital)	0~60A	60~600A	0~80A	80~800A	0~100A	100~1000A	0~120A	120~1200A
Resolution	0.96mA	9.6mA	1.28mA	12.8mA	1.6mA	16mA	1.92mA	19.2mA
Accuracy	± 0.05% of (Reading + Range)							
Power Read Back								
Range (5 Digital)	6000W		8000W		10000W		12000W	
Accuracy	± 0.06% of (Reading + Range)							
General								
Typical Short Resistance	0.0012Ω		0.0009Ω		0.0007Ω		0.0006Ω	
Maximum Short Current	600A		800A		1000A		1200A	
Load ON Voltage	0.25 – 62.5V							
Load OFF Voltage	0 – 62.5V							
Power Consumption	510VA		920VA		920VA		920VA	
Dimension (HxWxD)	445.6x481x757.3mm		571.6x481x757.3mm		571.6x481x757.3mm		571.6x481x757.3mm	
HxWxD (Not included Rack Mount Kit/heads)	341.6x445.2x757.3mm		467.6x445.2x757.3mm		467.6x445.2x757.3mm		467.6x445.2x757.3mm	
Weight	62 kg		77.5 kg		84.8 kg		92 kg	
Temperature ^{*4}	0~40°C							
Safety & EMC	CE							

Cooling : Advanced Fan Cooled

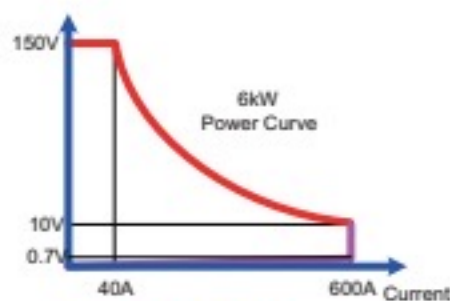
Input AC Power : 100~240 Vac ± 10% , 50/60Hz, Single-phase

Note *1 : The power rating specifications at ambient temperature = 25°C

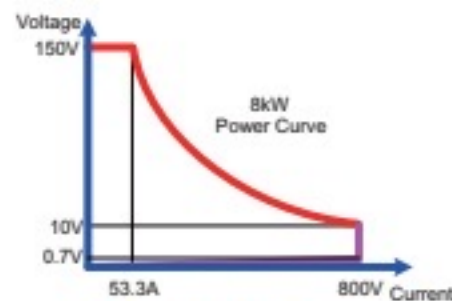
Note *2 : The range is automatically or forcing to range II only in CC Mode

Note *3 : If the operating current is below range 0.1%, the accuracy specification is 0.1% F.S.

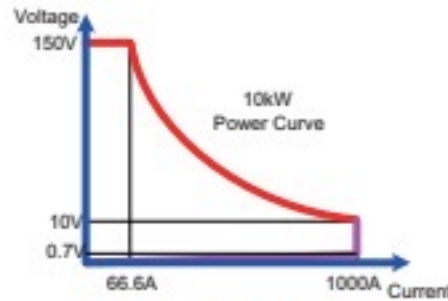
Note *4 : Operating temperature range is 0~40°C , all specifications apply for 25°C ± 5°C



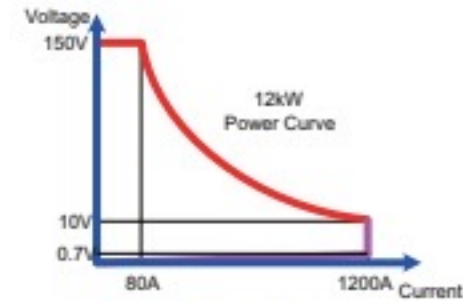
PEL-5006C-150-600



PEL-5008C-150-800



PEL-5010C-150-1000



PEL-5012C-150-1200

SPECIFICATIONS

MODEL	PEL-5015C-150-1500		PEL-5018C-150-1800		PEL-5020C-150-2000		PEL-5024C-150-2000	
Power ^{*1}	15k W		18 kW		20 kW		24 kW	
Current	0 – 150A	0 – 1500A	0 – 180A	0 – 1800A	0 – 200A	0 – 2000A	0 – 200A	0 – 2000A
Voltage	0 – 150V							
Min. Operating Voltage	0.7V @ 1500A		0.7V @ 1800A		0.7V @ 2000A		0.7V @ 2000A	
Protections								
Over Power Protection (OPP)	105%							
Over Current Protection (OCP)	104%							
Over Voltage Protection (OVP)	105%							
Over Temp Protection (OTP)	90°C±5°C							
Constant Current Mode								
Range ^{*2}	150A	1500A	180A	1800A	200A	2000A	200A	2000A
Resolution	2.4mA	24mA	2.88mA	28.8mA	3.2mA	32mA	3.2mA	32mA
Accuracy ^{*3}	± 0.05% of (Setting + Range)							
Constant Resistance Mode								
Range	6000Ω~0.1Ω	0.1Ω~0.0005Ω	5000Ω~0.0833Ω	0.0833Ω~0.0004Ω	4500Ω~0.075Ω	0.075Ω~0.0004Ω	4500Ω~0.075Ω	0.075Ω~0.0004Ω
Resolution	166.666μS	1.667μΩ	200μS	1.389μΩ	222.22μS	1.25μΩ	222.22μS	1.25μΩ
Accuracy	±0.2% of (Setting + Range)							
Constant Voltage Mode								
Range	150V							
Resolution	2.5mV							
Accuracy	± 0.05% of (Setting + Range)							
Constant Power Mode								
Range	1500W	15000W	1800W	18000W	2000W	20000W	2400W	24000W
Resolution	24mW	240mW	28.8mW	288mW	32mW	320mW	38.4mW	384mW
Accuracy	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)
Constant Voltage Mode + Constant Current Mode								
Range	150V	1500A	150V	1800A	150V	2000A	150V	2000A
Resolution	2.5mV	24mA	2.5mV	28.8mA	2.5mV	32mA	2.5mV	32mA
Accuracy	± 1.0% of (Setting + Range)							
Constant Voltage Mode + Constant Power Mode								
Range	150V	15000W	150V	18000W	150V	20000W	150V	24000W
Resolution	2.5mV	240mW	2.5mV	288mW	2.5mV	320mW	2.5mV	384mW
Accuracy	± 1.0% of (Setting + Range)							
Surge Test								
Surge & Normal current	0~1500A		0~1800A		0~2000A		0~2000A	
Surge time	10~1000ms		10~1000ms		10~1000ms		10~1000ms	
Surge step	1~5							
MPPT Mode								
Algorithm	P&O							
Load mode	CV							
P&O interval	1000ms~6000ms ; resolution 1000ms							
Dynamic Mode								
Timing								
Thigh & Tlow	0.010~9.999 / 99.99 / 999.9 / 9999ms							
Resolution	0.001 / 0.01 / 0.1 / 1ms							
Accuracy	1μs / 10μs / 100μs / 1ms + 50ppm							
Slew Rate	0.036A~2.25A/μs	0.360A~22.5A/μs	0.0432A~2.7A/μs	0.432A~27A/μs	0.048A~3A/μs	0.48A~30A/μs	0.048A~3A/μs	0.48A~30A/μs
Resolution	0.009A/μs	0.09A/μs	0.0108A/μs	0.108A/μs	0.012A/μs	0.12A/μs	0.012A/μs	0.12A/μs
Min. Rise Time	66.7μs(typical)							
Current								
Range	0~150A	150~1500A	0~180A	180~1800A	0~200A	200~2000A	0~200A	200~2000A
Resolution	2.4mA	24mA	2.88mA	28.8mA	3.2mA	32mA	3.2mA	32mA
Measurement								
Voltage Read Back								
Range (5 Digital)	0~15V	15~150V	0~15V	15~150V	0~15V	15~150V	0~15V	15~150V
Resolution	0.25mV	2.5mV	0.25mV	2.5mV	0.25mV	2.5mV	0.25mV	2.5mV
Accuracy	±0.025% of (Reading + Range)							
Current Read Back								
Range (5 Digital)	0~150A	15~1500A	0~180A	180~1800A	0~200A	200~2000A	0~200A	200~2000A
Resolution	2.4mA	24mA	2.88mA	28.8mA	3.2mA	32mA	3.2mA	32mA
Accuracy	± 0.05% of (Reading + Range)							
Power Read Back								
Range (5 Digital)	15000W		18000W		20000W		24000W	
Accuracy	± 0.06% of (Reading + Range)							
General								
Typical Short Resistance	0.0005Ω		0.0004Ω		0.0004Ω		0.0004Ω	
Maximum Short Current	1500A		1800A		2000A		2000A	
Load ON Voltage	0.25 ~ 62.5V							
Load OFF Voltage	0 ~ 62.5V							
Power Consumption	1320VA		1320VA		1700VA		1700VA	
Dimension (HxWxD)	760.6x481x757.3mm		760.6x481x757.3mm		886.6x481x757.3mm		886.6x481x757.3mm	
HxWxD(Not included Rack Mount Kit,wheels)	656.6x445.2x757.3mm		656.6x445.2x757.3mm		782.6x445.2x757.3mm		782.6x445.2x757.3mm	
Weight	116.5 kg		124 kg		140.5 kg		155 kg	
Temperature ^{*4}	0~40°C							
Safety & EMC	CE							

Cooling : Advanced Fan Cooled

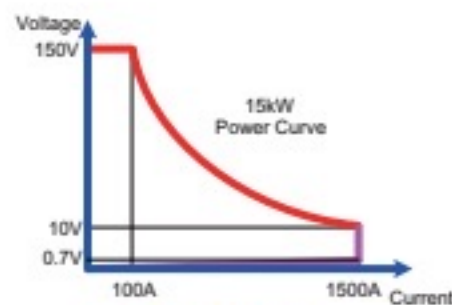
Input AC Power : 100~240 Vac ±10% , 50/60Hz, Single-phase

Note *1 : The power rating specifications at ambient temperature = 25 °C

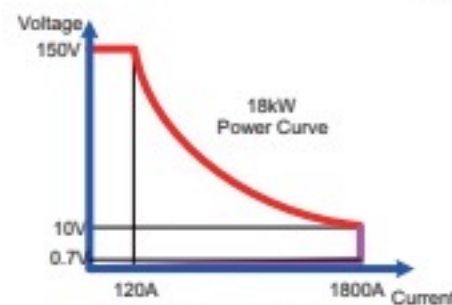
Note *2 : The range is automatically or forcing to range II only in CC Mode

Note *3 : If the operating current is below range 0.1%, the accuracy specification is 0.1% F.S.

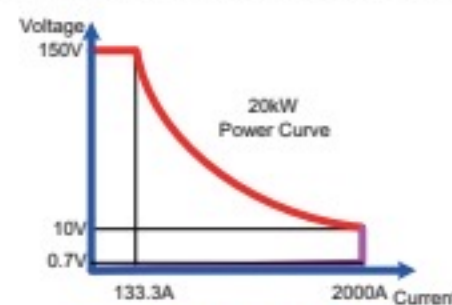
Note *4 : Operating temperature range is 0~40 °C ; all specifications apply for 25 °C±5 °C



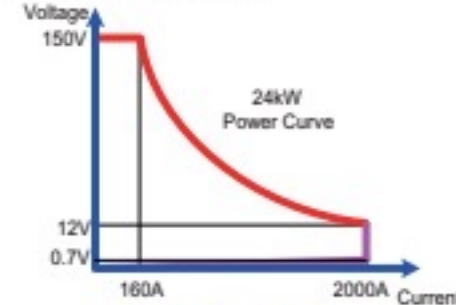
PEL-5015C-150-1500



PEL-5018C-150-1800



PEL-5020C-150-2000



PEL-5024C-150-2000

High Power DC Electronic Load

SPECIFICATIONS

MODEL	PEL-5006C-600-420		PEL-5008C-600-560		PEL-5010C-600-700		PEL-5012C-600-840	
Power ^{*1}	6kW		8kW		10kW		12kW	
Current	0 – 42A	0 – 420A	0 – 56A	0 – 560A	0 – 70A	0 – 700A	0 – 84A	0 – 840A
Voltage	0 – 600V							
Min. Operating Voltage	10V @ 420A		10V @ 560A		10V @ 700A		10V @ 840A	
Protections								
Over Power Protection (OPP)	105%							
Over Current Protection (OCP)	104%							
Over Voltage Protection (OVP)	105%							
Over Temp Protection (OTP)	90°C ± 5°C							
Constant Current Mode								
Range ^{*2}	42A	420A	56A	560A	70A	700A	84A	840A
Resolution	0.672mA	6.72mA	0.896mA	8.96mA	1.12mA	11.2mA	1.334mA	13.44mA
Accuracy ^{*3}	± 0.05% of (Setting + Range)							
Constant Resistance Mode								
Range	85712Ω–1.42853Ω	1.42853Ω–0.02384Ω	64284Ω–1.0714Ω	1.0714Ω–0.01788Ω	51427.2Ω–0.85712Ω	0.85712Ω–0.014304Ω	42856Ω–0.714267Ω	0.714267Ω–0.01192Ω
Resolution	11.6669μS	23.84μΩ	15.5559μS	17.88μΩ	19.4449μS	14.304μΩ	23.3339μS	11.92μΩ
Accuracy	± 0.2% of (Setting + Range)							
Constant Voltage Mode								
Range	600V							
Resolution	10mV							
Accuracy	± 0.05% of (Setting + Range)							
Constant Power Mode								
Range	600W	6000W	800W	8000W	1000W	10000W	1200W	12000W
Resolution	9.6mW	96mW	12.8mW	128mW	16mW	160mW	19.2mW	192mW
Accuracy	± 0.2% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.2% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.2% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.2% of (Setting+Range)	± 0.1% of (Setting+Range)
Constant Voltage Mode + Constant Current Mode								
Range	600V	420A	600V	560A	600V	700A	600V	840A
Resolution	10mV	6.72mA	10mV	8.96mA	10mV	11.2mA	10mV	13.44mA
Accuracy	± 1.0% of (Setting + Range)							
Constant Voltage Mode + Constant Power Mode								
Range	600V	6000W	600V	8000W	600V	10000W	600V	12000W
Resolution	10mV	96mW	10mV	128mW	10mV	160mW	10mV	192mW
Accuracy	± 1.0% of (Setting + Range)							
Surge Test								
Surge & Normal current	0~420A		0~560A		0~700A		0~840A	
Surge time	10~1000ms		10~1000ms		10~1000ms		10~1000ms	
Surge step	1~5							
MPPT Mode								
Algorithm	P&O							
Load mode	CV							
P&O interval	1000ms~6000ms ; resolution 1000ms							
Dynamic Mode								
Timing								
Thigh & Tlow	0.010~9.999 / 99.99 / 999.9 / 9999ms							
Resolution	0.001 / 0.01 / 0.1 / 1ms							
Accuracy	1μs / 10μs / 100μs / 1ms + 50ppm							
Slew Rate	0.0288~1.8A/μs	0.288A~18A/μs	0.0288A~1.8A/μs	0.288A~18A/μs	0.0336A~2.1A/μs	0.336A~21A/μs	0.0384A~2.4/μs	0.384A~24A/μs
Resolution	0.0072A/μs	0.072A/μs	0.0072A/μs	0.072A/μs	0.0084A/μs	0.084A/μs	0.0096A/μs	0.096A/μs
Current								
Range	0~42A	42~420A	0~56A	56~560A	0~70A	70~700A	0~84A	84~840A
Resolution	0.672mA	6.72mA	0.896mA	8.96mA	1.12mA	11.2mA	1.334mA	13.34mA
Measurement								
Voltage Read Back								
Range (5 Digital)	0~60V	60~600V	0~60V	60~600V	0~60V	60~600V	0~60V	60~600V
Resolution	1mV	10mV	1mV	10mV	1mV	10mV	1mV	10mV
Accuracy	± 0.025% of (Reading + Range)							
Current Read Back								
Range (5 Digital)	0~42A	42~420A	0~56A	56~560A	0~70A	70~700A	0~84A	84~840A
Resolution	0.672mA	6.72mA	0.896mA	8.96mA	1.12mA	11.2mA	1.334mA	13.34mA
Accuracy	± 0.05% of (Reading + Range)							
Power Read Back								
Range (5 Digital)	6000W		8000W		10000W		12000W	
Accuracy	± 0.06% of (Reading + Range)							
General								
Typical Short Resistance	0.0239Ω		0.0179Ω		0.0143Ω		0.00120Ω	
Maximum Short Current	420A		560A		700A		840A	
Load ON Voltage	0.4 – 100V							
Load OFF Voltage	0 – 100V							
Power Consumption	510VA		920VA		920VA		920VA	
Dimension (HxWxD)	445.6x481x757.3mm		571.6x481x757.3mm		571.6x481x757.3mm		571.6x481x757.3mm	
HxWxD (Not included Rack Mount Kit/wheel)	341.6x445.2x757.3mm		467.6x445.2x757.3mm		467.6x445.2x757.3mm		467.6x445.2x757.3mm	
Weight	62 kg		77.5 kg		84.8 kg		92 kg	
Temperature ^{*4}	0~40°C							
Safety & EMC	CE							

Cooling : Advanced Fan Cooled

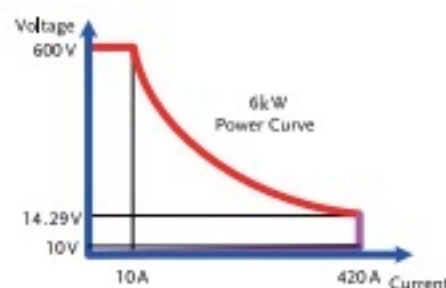
Input AC Power : 100~240 Vac ±10% , 50/60Hz, Single-phase

Note *1 : The power rating specifications at ambient temperature = 25 °C

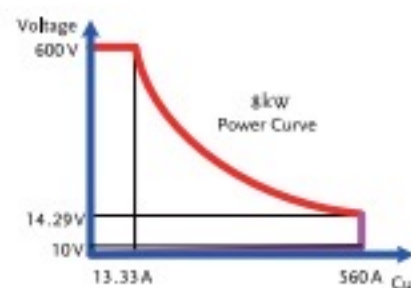
Note *2 : The range is automatically or forcing to range II only in CC Mode

Note *3 : If the operating current is below range 0.1%, the accuracy specification is 0.1% F.S.

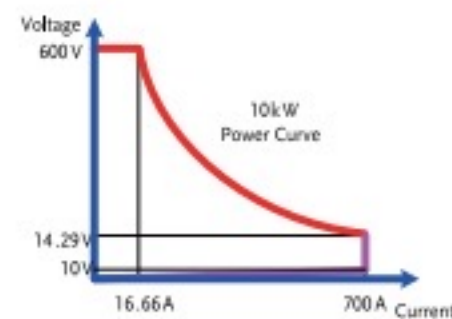
Note *4 : Operating temperature range is 0~40 °C , all specifications apply for 25 °C ± 5 °C



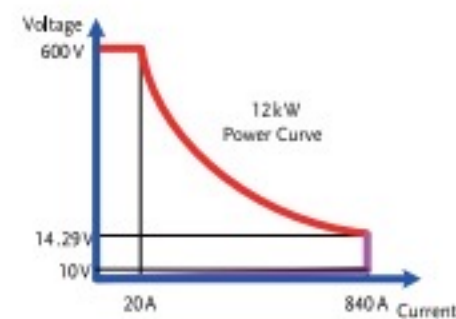
PEL-5006C-600-420



PEL-5008C-600-560



PEL-5010C-600-700



PEL-5012C-600-840

SPECIFICATIONS

MODEL	PEL-5015C-600-1050		PEL-5018C-600-1260		PEL-5020C-600-1400		PEL-5024C-600-1680	
Power ^{*1}	15 kW		18 kW		20 kW		24 kW	
Current	0 – 105A	0 – 1050A	0 – 126A	0 – 1260A	0 – 140A	0 – 1400A	0 – 168A	0 – 1680A
Voltage	0 – 600V							
Min. Operating Voltage	10V @ 1050A		10V @ 1260A		10V @ 1400A		10V @ 1680A	
Protections								
Over Power Protection (OPP)	105%							
Over Current Protection (OCP)	104%							
Over Voltage Protection (OVP)	105%							
Over Temp Protection (OTP)	90°C ± 5°C							
Constant Current Mode								
Range ^{*2}	105A	1050A	126A	1260A	140A	1400A	168A	1680A
Resolution	1.68mA	16.8mA	2.016mA	20.16mA	2.24mA	22.4mA	2.688mA	26.88mA
Accuracy ^{*3}	± 0.05% of (Setting + Range)							
Constant Resistance Mode								
Range	34284.8–0.571413Ω	0.571413–0.009536Ω	28570.67–0.476178Ω	0.476178–0.007947Ω	25713.6–0.42856Ω	0.42856–0.007152Ω	21428–0.357133Ω	0.357133–0.00596Ω
Resolution	29.1674μS	9.536μS	35.0009μS	7.947μS	38.8899μS	7.152μS	46.6679μS	5.96μS
Accuracy	± 0.2% of (Setting + Range)							
Constant Voltage Mode								
Range	600V							
Resolution	10mV							
Accuracy	± 0.05% of (Setting + Range)							
Constant Power Mode								
Range	1500W	15000W	1800W	18000W	2000W	20000W	2400W	24000W
Resolution	24mW	240mW	28.8mW	288mW	32mW	320mW	38.4mW	384mW
Accuracy	± 0.2% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.2% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.2% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.2% of (Setting+Range)	± 0.1% of (Setting+Range)
Constant Voltage Mode + Constant Current Mode								
Range	600V	1050A	600V	1260A	600V	1400A	600V	1680A
Resolution	10mV	16.8mA	10mV	20.16mA	10mV	22.4mA	10mV	26.88mA
Accuracy	± 1.0% of (Setting + Range)							
Constant Voltage Mode + Constant Power Mode								
Range	600V	15000W	600V	18000W	600V	20000W	600V	24000W
Resolution	10mV	240mW	10mV	288mW	10mV	320mW	10mV	384mW
Accuracy	± 1.0% of (Setting + Range)							
Surge Test								
Surge & Normal current	0~1050A		0~1260A		0~1400A		0~1680A	
Surge time	10~1000ms		10~1000ms		10~1000ms		10~1000ms	
Surge step	1~5							
MPPT Mode								
Algorithm	P&O							
Load mode	CV							
P&O interval	1000ms~60000ms ; resolution 1000ms							
Dynamic Mode								
Timing								
Thigh & Tlow	0.010–9.999 / 99.99 / 999.9 / 9999ms							
Resolution	0.001 / 0.01 / 0.1 / 1ms							
Accuracy	1μs / 10μs / 100μs / 1ms + 50ppm							
Slew Rate	0.0432A–2.7A/μs	0.432A–27A/μs	0.048A–3A/μs	0.48A–30A/μs	0.0528A–3.3A/μs	0.528A–33A/μs	0.0576A–3.6A/μs	0.576A–36A/μs
Resolution	0.0108A/μs	0.108A/μs	0.012A/μs	0.12A/μs	0.0132A/μs	0.132A/μs	0.0144A/μs	0.144A/μs
Current								
Range	0~105A	105~1050A	0~126A	126~1260A	0~140A	140~1400A	0~168A	168~1680A
Resolution	1.68mA	16.8mA	2.016mA	20.16mA	2.24mA	22.4mA	2.688mA	26.88mA
Measurement								
Voltage Read Back								
Range (5 Digital)	0–60V	60–600V	0–60V	60–600V	0–60V	60–600V	0–60V	60–600V
Resolution	1mV	10mV	1mV	10mV	1mV	10mV	1mV	10mV
Accuracy	± 0.025% of (Reading + Range)							
Current Read Back								
Range (5 Digital)	0~105A	105~1050A	0~126A	126~1260A	0~140A	140~1400A	0~168A	168~1680A
Resolution	1.68mA	16.8mA	2.016mA	20.16mA	2.24mA	22.4mA	2.688mA	26.88mA
Accuracy	± 0.05% of (Reading + Range)							
Power Read Back								
Range (5 Digital)	15000W		18000W		20000W		24000W	
Accuracy	± 0.06% of (Reading + Range)							
General								
Typical Short Resistance	0.0096Ω		0.0080Ω		0.0072Ω		0.0060Ω	
Maximum Short Current	1050A		1260A		1400A		1680A	
Load ON Voltage	0.4 ~ 100V							
Load OFF Voltage	0 – 100V							
Power Consumption	1320VA		1320VA		1700VA		1700VA	
Dimension (HxWxD)	760.6x481x757.3mm		760.6x481x757.3mm		886.6x481x757.3mm		886.6x481x757.3mm	
HxWxD ^(Not Included Rack Mount Kit/Reds)	656.6x445.2x757.3mm		656.6x445.2x757.3mm		782.6x445.2x757.3mm		782.6x445.2x757.3mm	
Weight	116.5 kg		124 kg		140.5 kg		155 kg	
Temperature ^{*4}	0–40°C							
Safety & EMC	CE							

Cooling : Advanced Fan Cooled

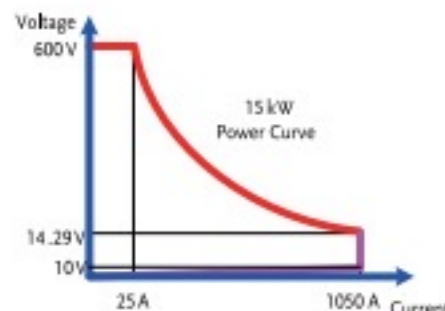
Input AC Power : 100~240 Vac ±10% , 50/60Hz, Single-phase

Note *1 : The power rating specifications at ambient temperature = 25 °C

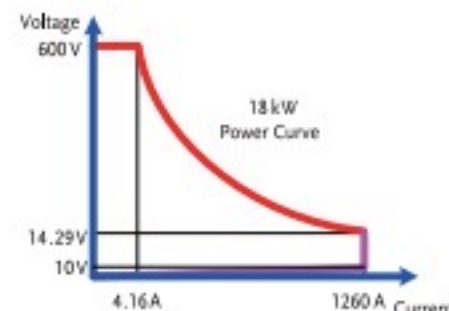
Note *2 : The range is automatically or forcing to range II only in CC Mode

Note *3 : If the operating current is below range 0.1%, the accuracy specification is 0.1% F.S.

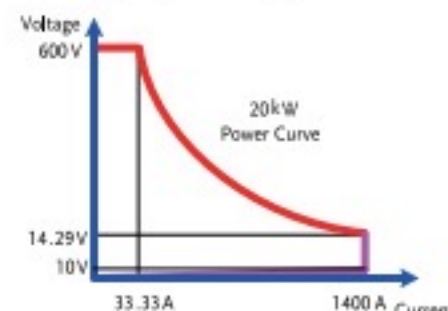
Note *4 : Operating temperature range is 0~40 °C , all specifications apply for 25 °C ± 5 °C



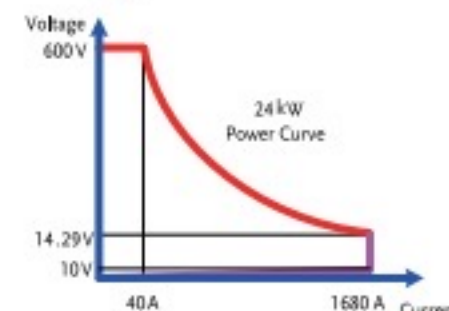
PEL-5015C-600-1050



PEL-5018C-600-1260



PEL-5020C-600-1400



PEL-5024C-600-1680

High Power DC Electronic Load

SPECIFICATIONS

MODEL	PEL-5006C-1200-240		PEL-5008C-1200-320		PEL-5010C-1200-400		PEL-5012C-1200-480	
Power ^{*1}	6 kW		8 kW		10 kW		12 kW	
Current	0 ~ 24A	0 ~ 240A	0 ~ 32A	0 ~ 320A	0 ~ 40A	0 ~ 400A	0 ~ 48A	0 ~ 480A
Voltage	0 ~ 1200V							
Min. Operating Voltage	15V @ 240A		15V @ 320A		15V @ 400A		15V @ 480A	
Protections								
Over Power Protection (OPP)	105%							
Over Current Protection (OCP)	104%							
Over Voltage Protection (OVP)	104%							
Over Temp Protection (OTP)	90°C ± 5°C							
Constant Current Mode								
Range ^{*2}	24A	240A	32A	320A	40A	400A	48A	480A
Resolution	0.384mA	3.84mA	0.512mA	5.12mA	0.64mA	6.4mA	0.768mA	7.68mA
Accuracy ^{*3}	± 0.05% of (Setting + Range)							
Constant Resistance Mode								
Range	30KΩ-5Ω	5Ω-0.0625Ω	22.5KΩ-3.75Ω	3.75Ω-0.0468Ω	18KΩ-3Ω	3Ω-0.0375Ω	15KΩ-2.5Ω	2.5Ω-0.0312Ω
Resolution	3.333μS	83.334μΩ	4.444μS	62.5μΩ	5.555μS	50μΩ	6.666μS	41.667μΩ
Accuracy	± 0.2% of (Setting + Range)							
Constant Voltage Mode								
Range	1200V							
Resolution	20mV							
Accuracy	± 0.05% of (Setting + Range)							
Constant Power Mode								
Range	600W	6000W	800W	8000W	1000W	10000W	1200W	12000W
Resolution	9.6mW	96mW	12.8mW	128mW	16mW	160mW	19.2mW	192mW
Accuracy	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)
Constant Voltage Mode + Constant Current Mode								
Range	1200V	240A	1200V	320A	1200V	400A	1200V	480A
Resolution	20mV	3.84mA	20mV	5.12mA	20mV	6.4mA	20mV	7.68mA
Accuracy	± 1.0% of (Setting + Range)							
Constant Voltage Mode + Constant Power Mode								
Range	1200V	6000W	1200V	8000W	1200V	10000W	1200V	12000W
Resolution	20mV	96mW	20mV	128mW	20mV	160mW	20mV	192mW
Accuracy	± 1.0% of (Setting + Range)							
Surge Test								
Surge & Normal current	0~240A		0~320A		0~400A		0~480A	
Surge time	10~1000ms		10~1000ms		10~1000ms		10~1000ms	
Surge step	1~5							
MPPT Mode								
Algorithm	P&O							
Load mode	CV							
P&O interval	1000ms~60000ms ; resolution 1000ms							
Dynamic Mode								
Timing								
Thigh & Tlow	0.010~9.999 / 99.99 / 999.9 / 9999ms							
Resolution	0.001 / 0.01 / 0.1 / 1ms							
Accuracy	1μs / 10μs / 100μs / 1ms + 50ppm							
Slew Rate	0.0192A~1.2A/μs	0.192A~12A/μs	0.0192A~1.2A/μs	0.192A~12A/μs	0.0224A~1.4A/μs	0.224A~14A/μs	0.0256A~1.6A/μs	0.256A~16A/μs
Resolution	0.0048A/μs	0.048A/μs	0.0048A/μs	0.048A/μs	0.0056A/μs	0.056A/μs	0.0064A/μs	0.064A/μs
Current								
Range	0~24A	24~240A	0~32A	32~320A	0~40A	40~400A	0~48A	48~480A
Resolution	0.384mA	3.84mA	0.512mA	5.12mA	0.64mA	6.4mA	0.768mA	7.68mA
Measurement								
Voltage Read Back								
Range (5 Digital)	0~120V	120~1200V	0~120V	120~1200V	0~120V	120~1200V	0~120V	120~1200V
Resolution	2mV	20mV	2mV	20mV	2mV	20mV	2mV	20mV
Accuracy	± 0.025% of (Reading + Range)							
Current Read Back								
Range (5 Digital)	0~24A	24~240A	0~32A	32~320A	0~40A	40~400A	0~48A	48~480A
Resolution	0.384mA	3.84mA	0.512mA	5.12mA	0.64mA	6.4mA	0.768mA	7.68mA
Accuracy	± 0.05% of (Reading + Range)							
Power Read Back								
Range (5 Digital)	6000W		8000W		10000W		12000W	
Accuracy	± 0.06% of (Reading + Range)							
General								
Typical Short Resistance	0.0625Ω		0.0469Ω		0.0375Ω		0.0313Ω	
Maximum Short Current	240A		320A		400A		480A	
Load ON Voltage	0.96 ~ 240V							
Load OFF Voltage	0 ~ 240V							
Power Consumption	510VA		920VA		920VA		920VA	
Dimension (HxWxD)	445.6x481x757.3mm		571.6x481x757.3mm		571.6x481x757.3mm		571.6x481x757.3mm	
HxWxD(Not included Rack Mount Kit/wheel)	341.6x445.2x757.3mm		467.6x445.2x757.3mm		467.6x445.2x757.3mm		467.6x445.2x757.3mm	
Weight	62 kg		77.5 kg		84.8 kg		92 kg	
Temperature ^{*4}	0~40°C							
Safety & EMC	CE							

Cooling : Advanced Fan Cooled

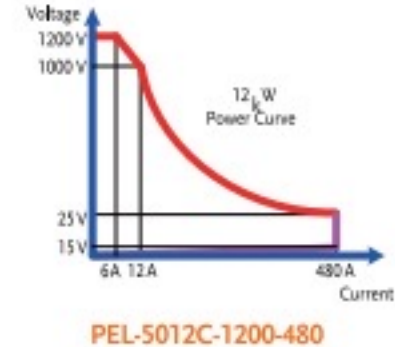
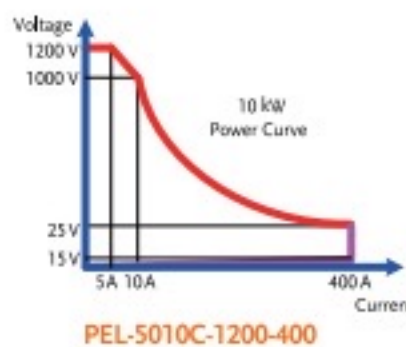
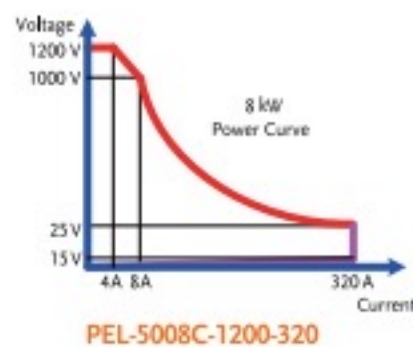
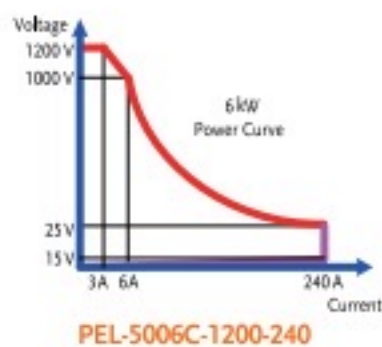
Input AC Power : 100~240 Vac ±10% * 50/60Hz, Single-phase

Note *1 : The power rating specifications at ambient temperature = 25°C

Note *2 : The range is automatically or forcing to range II only in CC Mode

Note *3 : If the operating current is below range 0.1%, the accuracy specification is 0.1% F.S.

Note *4 : Operating temperature range is 0~40°C * all specifications apply for 25°C ± 5°C



SPECIFICATIONS

MODEL	PEL-5015C-1200-600		PEL-5018C-1200-720		PEL-5020C-1200-800		PEL-5024C-1200-960	
Power ^{*1}	15kW		18kW		20kW		24kW	
Current	0 – 60A	0 – 600A	0 – 72A	0 – 720A	0 – 80A	0 – 800A	0 – 96A	0 – 960A
Voltage	0 – 1200V							
Min. Operating Voltage	15V @ 600A		15V @ 720A		15V @ 800A		15V @ 960A	
Protections								
Over Power Protection (OPP)	105%							
Over Current Protection (OCP)	104%							
Over Voltage Protection (OVP)	104%							
Over Temp Protection (OTP)	90°C±5°C							
Constant Current Mode								
Range ^{*2}	60A	600A	72A	720A	80A	800A	96A	960A
Resolution	0.96mA	9.6mA	1.152mA	11.52mA	1.28mA	12.8mA	1.536mA	15.36mA
Accuracy ^{*3}	± 0.05% of (Setting + Range)							
Constant Resistance Mode								
Range	12Ω~2Ω	2Ω~0.0250Ω	10KΩ~1.666Ω	1.666Ω~0.0208Ω	9KΩ~1.5Ω	1.5Ω~0.0187Ω	7.5KΩ~1.25Ω	1.25Ω~0.0156Ω
Resolution	8.3333μS	33.334μΩ	10μS	27.778μΩ	11.111μS	25μΩ	13.333μS	20.834μΩ
Accuracy	±0.2% of (Setting + Range)							
Constant Voltage Mode								
Range	1200V							
Resolution	20mV							
Accuracy	± 0.05% of (Setting + Range)							
Constant Power Mode								
Range	1500W	15000W	1800W	18000W	2000W	20000W	2400W	24000W
Resolution	24mW	240mW	28.8mW	288mW	32mW	320mW	38.4mW	384mW
Accuracy	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)	± 0.1% of (Setting+Range)
Constant Voltage Mode + Constant Current Mode								
Range	1200V	600A	1200V	720A	1200V	800A	1200V	960A
Resolution	20mV	9.6mA	20mV	3.2mA	20mV	3.84mA	20mV	15.36mA
Accuracy	± 1.0% of (Setting + Range)							
Constant Voltage Mode + Constant Power Mode								
Range	1200V	15000W	1200V	18000W	1200V	20000W	1200V	24000W
Resolution	20mV	240mW	20mV	288mW	20mV	320mW	20mV	384mW
Accuracy	± 1.0% of (Setting + Range)							
Surge Test								
Surge & Normal current	0~600A		0~720A		0~800A		0~960A	
Surge time	10~1000ms		10~1000ms		10~1000ms		10~1000ms	
Surge step	1~5							
MPPT Mode								
Algorithm	P&O							
Load mode	CV							
P&O interval	1000ms~60000ms ; resolution 1000ms							
Dynamic Mode								
Timing	0.010~9.999 / 99.99 / 999.9 / 9999ms							
Thigh & Tlow	0.001 / 0.01 / 0.1 / 1ms							
Resolution	1μs / 10μs / 100μs / 1ms + 50ppm							
Accuracy	± 0.0288A~1.8A/μs							
Slew Rate	0.0288A~1.8A/μs	0.288A~18A/μs	0.032A~2A/μs	0.32A~20A/μs	0.0352A~2.2A/μs	0.352A~22A/μs	0.0384A~2.4A/μs	0.384A~24A/μs
Resolution	0.0072A/μs	0.072A/μs	0.008A/μs	0.08A/μs	0.0088A/μs	0.088A/μs	0.0096A/μs	0.096A/μs
Current								
Range	0~60A	60~600A	0~72A	72~720A	0~80A	80~800A	0~96A	96~960A
Resolution	0.96mA	9.6mA	1.152mA	11.52mA	1.28mA	12.8mA	1.536mA	15.36mA
Measurement								
Voltage Read Back								
Range (5 Digital)	0~120V	120~1200V	0~120V	120~1200V	0~120V	120~1200V	0~120V	120~1200V
Resolution	2mV	20mV	2mV	20mV	2mV	20mV	2mV	20mV
Accuracy	±0.025% of (Reading + Range)							
Current Read Back								
Range (5 Digital)	0~60A	60~600A	0~72A	72~720A	0~80A	80~800A	0~96A	96~960A
Resolution	0.96mA	9.6mA	1.152mA	11.52mA	1.28mA	12.8mA	1.536mA	15.36mA
Accuracy	±0.05% of (Reading + Range)							
Power Read Back								
Range (5 Digital)	15000W		18000W		20000W		24000W	
Accuracy	± 0.06% of (Reading + Range)							
General								
Typical Short Resistance	0.0250Ω		0.0209Ω		0.0188Ω		0.0157Ω	
Maximum Short Current	600A		720A		800A		960A	
Load ON Voltage	0.96 ~ 240V							
Load OFF Voltage	0 ~ 240V							
Power Consumption	1320VA		1320VA		1700VA		1700VA	
Dimension (HxWxD)	760.6x481x757.3mm		760.6x481x757.3mm		886.6x481x757.3mm		886.6x481x757.3mm	
HxWxD (Not included Rack Mount Kit/height)	656.6x445.2x757.3mm		656.6x445.2x757.3mm		782.6x445.2x757.3mm		782.6x445.2x757.3mm	
Weight	116.5 kg		124 kg		140.5 kg		155 kg	
Temperature ^{*4}	0~40°C							
Safety & EMC	CE							

Cooling : Advanced Fan Cooled

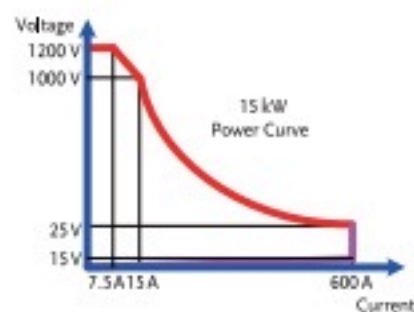
Input AC Power : 100~240 Vac ±10% , 50/60Hz, Single-phase

Note *1 : The power rating specifications at ambient temperature = 25°C

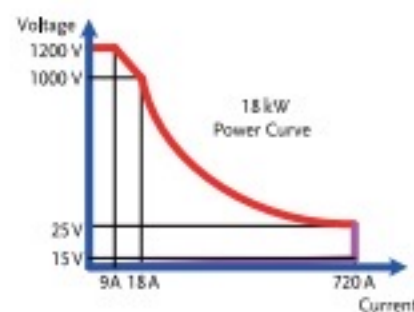
Note *2 : The range is automatically or forcing to range II only in CC Mode

Note *3 : If the operating current is below range 0.1%, the accuracy specification is 0.1% F.S.

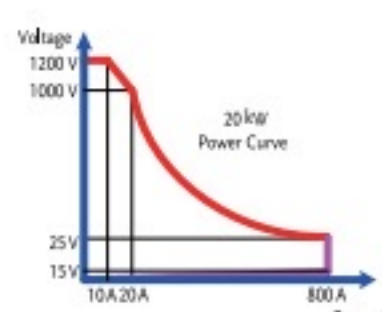
Note *4 : Operating temperature range is 0~40°C , all specifications apply for 25°C±5°C



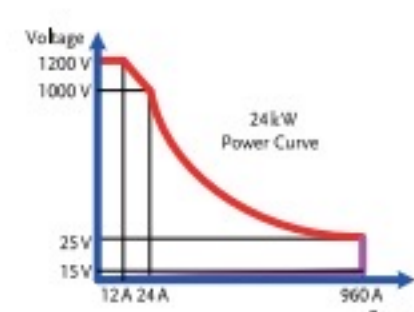
PEL-5015C-1200-600



PEL-5018C-1200-720



PEL-5020C-1200-800



PEL-5024C-1200-960

DC Electronic Load



PEL-503-80-50

NEW



PEL-507-80-140

NEW



FEATURES

- * 5-digit Digital Voltage, Current and Power Meter
- * Simultaneous Display of Voltage, Current, and Watts
- * Short-circuit Time Can be Set During Short-circuit Test
- * Automatic Test Function of Overcurrent Protection/Overpower Protection
- * The Battery Discharge Test Function Can Set the Discharge Stop Voltage(V_{batt}), Discharge Capacity(AH, WH) and Stop Discharge Time
- * Surge Test Can Simulate Boot Overshoot Current and Transient Current From Hot Plugging
- * Constant Current, Constant Resistance, Constant Voltage, Constant Power and Dynamic Mode
- * Overvoltage, Overcurrent, Overpower, Over Temperature Protection and Reverse Polarity Detection
- * Voltage Polarity Display Can be set to Positive Value "+" or Negative Value "-"
- * Communications Interface: RS232, USB

The PEL-500 series single-channel electronic load has a total of 5 models and provides 0~80V/ 0~500V voltage operating ranges and 250~700W power operating range. The series can be applied to R&D, quality control, ATE system and production test, including voltage source/current source test; switching power supply transient response; constant voltage mode for current limiting test; battery simulation; and battery discharge test.

The PEL-500 series provides a 5-digit digital display of voltage, current and power. Users can monitor the measurement data of the DUT at the same time. In order to facilitate users to evaluate whether the DUT can withstand the overshoot current, the PEL-500 series provides Surge test, which can simulate the boot overshoot current and the transient current from hot plugging. The built-in battery discharge test function can determine the conditions for stopping the discharge according to the test requirements of the DUT, including setting the discharge stop voltage (V_{batt}), discharge capacity (AH, WH) and stop discharge time.

Users can set the loading voltage/unloading voltage of the PEL-500 series for testing according to the characteristics of the DUT. When the output voltage of the DUT rises to the loading voltage value, the loading starts. When the output voltage drops to the unloading voltage, the loading ends. Users can use the GO/NG function to pre-set the judgment conditions according to the function and specifications of the DUT. The PEL-500 series will automatically generate the judgment results according to the set judgment conditions during the test.

Under the safety test requirements of the power supply, the PEL-500 series not only provides the Short test function, but also provides the automatic test function of overcurrent protection/overpower protection to simplify users' complicated manual operation and verify the OCP/OPP of the DUT's action points. The generated measurement results help users confirm whether the actual operating action points of the DUT for OCP/OPP are within the measurement regulations.

In addition to the function of providing load current waveforms to the oscilloscope via the BNC output terminal of Imonitor, the PEL-500 series also provides overvoltage, overcurrent, overpower and over temperature protection, and reverse polarity detection. When any one of them generates a trigger action, The PEL-500 series will have protective or reminding measures to protect the PEL-500 from damage due to abnormal operating ranges.

ORDERING INFORMATION

PEL-503-80-50	80V/50A/250W DC Electronic Load
PEL-504-80-70	80V/70A/350W DC Electronic Load
PEL-504-500-15	500V/15A/350W DC Electronic Load
PEL-507-80-140	80V/140A/700W DC Electronic Load
PEL-507-500-30	500V/30A/700W DC Electronic Load

PEL-507-500-30

Power rating: 7 → 700W

Maximum output current: 30 → 30A

Maximum output voltage: 500 → 500V

OPTIONAL ACCESSORIES

GTL-238	RS-232 Cable, 9-pin, M-F Type, 1000mm
GTL-246	USB Cable, USB 2.0, A-B Type, 1200mm

Note: * Regarding the product delivery date, please contact your regional sales representative.



Rear Panel



GTL-238 RS-232 Cable, 9-pin, M-F Type, 1000mm



Model	PEL-503-80-50	PEL-504-80-70	PEL-504-500-15	PEL-507-80-140	PEL-507-500-30						
INPUT RATINGS											
Power(Watt)	250 W	350 W	350 W	700 W	700 W						
Current(Ampere)	50 A	70 A	15 A	140 A	30 A						
Voltage(Volt)	80 V	80 V	500 V	80 V	500 V						
Min. Operating Voltage	1.0V @ 50A	1.2V @ 70A	6V @ 15A	0.9V @ 140A	3V @ 30A						
PROTECTIONS											
Over Power Protection(OPP)	≈262.5W	≈367.5W	≈367.5W	≈735W	≈735W						
Over Current Protection(OCP)	≈52.5A	≈73.5A	≈15.75A	≈147A	≈31.5A						
Over Voltage Protection(OVP)	≈84V	≈84V	≈525V	≈84V	≈525V						
Over Temp. Protection(OTP)	YES	YES	YES	YES	YES						
CC Mode											
Range	0-5.04-50.4A	0-7.02-70.2A	0-1.5-15A	0-14.04-140.4A	0-3-30A						
Resolution	0.084mA/0.84mA	0.117mA/1.17mA	0.025mA/0.25mA	0.234mA/2.34mA	0.05mA/ 0.5mA						
Accuracy	±0.1% of (SETTING + RANGE)										
CR Mode											
Range	0.016-1.6-96000Ω	0.0114-1.14-68400Ω	0.4-40-2400000Ω	0.0057-0.57-34200Ω	0.2-20-1200000Ω						
Resolution	26.666μΩ/0.010416mSiemens	19μΩ/0.014619mSiemens	666.667μΩ/0.416μSiemens	9.5μΩ/29.239μSiemens	333.334μΩ/0.833μSiemens						
Accuracy	±0.2% of (SETTING + RANGE)										
CV Mode											
Range	0-8.1-81V	0-8.1-81V	0-60-500V	0-8.1-81V	0-60-500V						
Resolution	0.135mV/1.35mV	0.135mV/1.35mV	1mV/10mV	0.135mV/1.35mV	1mV/10mV						
Accuracy	±0.05% of (SETTING + RANGE)										
CP Mode											
Range	0-25.02-250.2W (Imax=r1:5A, r2:50A)	0-35.04-350.4W (Imax=r1:7A, r2:70A)	0-35.04-350.4W (Imax=r1:1.5A, r2:15A)	0-70.02-700.2W (Imax=r1:14A, r2:140A)	0-70.02-700.2W (Imax=r1:3A, r2:30A)						
Resolution	0.417mW/4.17mW	0.584mW/5.84mW	0.584mW/5.84mW	1.167mW/11.67mW	1.17mW/117mW						
Accuracy	±0.5% of (SETTING + RANGE)										
Dynamic Mode											
THIGH/TLOW	10μS to 9.999 Sec										
Resolution	0.001/0.01/0.1/1mS										
Slew rate	L	0.032-2A/μs	0.0464-2.90A/μs	1-62.5mA/μs	0.0096-0.6A/μs	2-125mA/μs					
	H	3.2-200mA/μs	4.64-290mA/μs	10-625mA/μs	0.096-6A/μs	20-1250mA/μs					
Accuracy	±5%±10μs										
Measurement											
Voltage Read Back	Range (5 Digital)	0-8.1-81V	0-8.1-81V	0-60-500V	0-8.1-81V	0-60-500V					
	Resolution	0.135mV/1.35mV	0.135mV/1.35mV	1mV/10mV	0.135mV/1.35mV	1mV/10mV					
	Accuracy	±0.025% of (READING+ RANGE)									
Current Read Back	Range (5 Digital)	0-5.04-50.4A	0-7.02-70.2A	0-1.5-15A	0-14.04-140.4A	0-3-30A					
	Resolution	0.084mA/0.84mA	0.117mA/1.17mA	0.025mA/0.25mA	0.234mA/2.34mA	0.05mA/ 0.5mA					
	Accuracy	±0.1% of (READING+ RANGE)									
Power Read Back	Range (5 Digital)	25W	250W	35W	350W	35W	350W	70W	700W	70W	700W
	Resolution	0.001W	0.01W	0.001W	0.01W	0.001W	0.01W	0.001W	0.01W	0.001W	0.01W
	Accuracy	±0.1% of (READING + RANGE)									
Surge Test											
Surge & Normal current	0-50A	0-70A	0-15A	0-140A	0-30A						
Surge time	10-1000ms	10-1000ms	10-1000ms	10-1000ms	10-1000ms						
Surge step	1-5	1-5	1-5	1-5	1-5						
Battery Discharge Test											
UVP	0-81V	0-81V	0-500V	0-81V	0-500V						
Time	1-99999 Sec	1-99999 Sec	1-99999 Sec	1-99999 Sec	1-99999 Sec						
Capacity	0.1-19999.9AH/0.1-19999.9WH										
Others											
Load ON Voltage	0.1-25V		0.4-100V		0.1-25V	0.4-100V					
Accuracy	1% of (SETTING + RANGE)										
Load OFF Voltage	0-25V		0-100V		0-25V	0-100V					
Accuracy	0.05% of (SETTING + RANGE)										
Imonitor (Non-isolated)	5.04 A/V	7.02 A/V	1.5 A/V	14.04 A/V	3 A/V						
Current Monitor	Full scale: 10V										
Accuracy	0.5% of (SETTING + RANGE)										
Typical Short Resistance	0.018Ω	0.0169Ω	0.367Ω	0.0053Ω	0.087Ω						
Max. short Current	50A	70A	15A	140A	30A						
Power input	115/230 Vac±10%, 50/60Hz										
Interface (Standard)	USB/RS232										
Power Consumption	40 VA			60 VA							
Dimension (HxWxD)	205 x 123 x 477mm	205 x 123 x 477mm	205 x 123 x 477mm	205 x 231 x 480mm	205 x 231 x 480mm						
Weight	5.3kg	5.3kg	5.3kg	10.3kg	10.3kg						

AC & DC Electronic Load



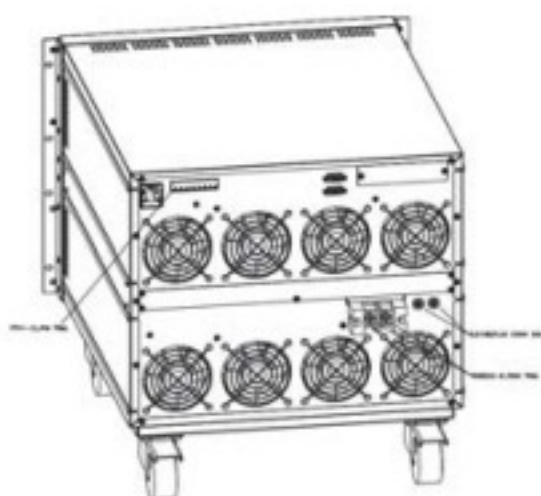
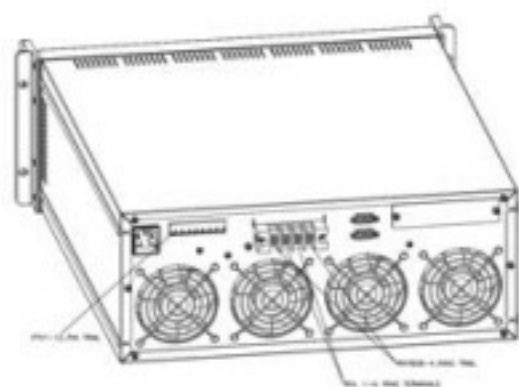
AEL-5000 Series

NEW



FEATURES

- * Turbo Mode (Multiplier Mode) Can Withstand up to 2 Times the Rating Current and Power of the Electronic Load in a Short Period of Time
- * Operating Mode: CC, linear CC, CR, CV, CP and AC Rectifier Loads
- * Measurement Items: Voltage Value(Vrms, Vpeak, Vmax., Vmin), Current Value(Irms, Ipeak, Imax., Imin.), Watt Value, Volt-ampere Value(VA), Frequency Value, Crest Factor, Power Factor, Voltage Total Distortion(V THD, VH), Current Total Distortion (I THD, IH), Etc
- * Eight Units Connected in Parallel up to 180kW for Single-phase and 540kW for Three-phase
- * Support Loading and Unloading Angle Control, Loading and Unloading Angle Control Can be set at the Full Range of 0-359 Degrees
- * Support Positive Half Cycle or Negative Half Cycle Load
- * Support SCR/TRIAC Current Phase Modulation Waveform, 90-degree Trailing Edge and Leading Edge
- * Support the Capacitive Load (Inrush Current)when the Power Supply is Turned on and the Transient Current (Surge Current) Test when the Load is Suddenly Connected (Hot Plug-in) During Operation
- * Crest Factor Range: 1.414~5.0
- * Power Factor Range: 0.1~1.0 Leading or Trailing
- * Frequency Range: DC, 40~440Hz (AEL-5003-480-18.75/AEL-5004-480-28: DC, 40~70Hz), and 800Hz and 1kHz Need to be Customized
- * Optional Control Interfaces: GPIB, RS-232, USB, LAN



GW Instek launches 20 models of the AEL-5000 series AC/DC electronic loads depending on the power range. The power range of a single unit is from 1875W to 22500W, and up to 8 units can be connected in parallel. The maximum power of single-phase parallel connection can reach 180kW, and the total power of 3-phase can reach 540kW, which are suitable for UPS, Inverter/Breaker, AC Power Source, Battery, Fuse/Breaker, DC Power Source and other applications.

The AEL-5000 series has built-in precision measurement circuits such as 16-bit A/D and DSP to provide accurate measurement items, which include voltage root mean square value (Vrms), current root mean square value (Arms), and watt value (Watt), volt-ampere (VA), crest factor (CF), power factor (PF), total harmonic distortion (THD), voltage total harmonic distortion (VTHD), current total harmonic distortion (ITHD), peak current (Ipeak), maximum current (Amax), minimum current (Amin), maximum voltage (Vmax), minimum voltage (Vmin), time measurement. In addition, built-in test modes include UPS Efficiency, PV Inverter Efficiency, UPS Back-up time, Battery Discharge time, UPS transfer time, Fuse/Breaker Trip/Non-Trip, short circuit simulation, OCP, OPP and other test modes.

The AEL-5000 series has the Turbo mode (ON or OFF can be selected) design, which can increase the current and power of the electronic load by 2 times in one second. For test applications that require transient high power and large current such as transient overload test of protective components or short circuit of Fuse/Breaker and AC power supply, OCP and OPP tests etc.. The Turbo mode provides the most economical solution.

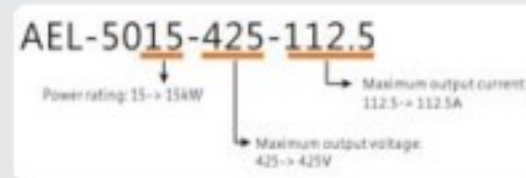
The AEL-5000 series also supports the Load On startup function (pre-set Load On). When the inverter or uninterruptible power supply is turned on, the series directly loads the set load current to verify that whether startup of the inverter or uninterrupted power supply connecting to the electrical appliance is stable. At the same time, the Load On start function can also set positive half cycle or negative half load to verify whether the output voltage of the inverter or uninterruptible power supply remains stable when the actual electrical appliance only has a positive half cycle or negative half cycle load current. Control load angle and unload angle can also be set (range 0~359 degrees) to verify the stability of the transient response of the inverter or uninterruptible power supply when the appliance is plugged in and unplugged. In addition, the series also supports SCR/TRIAC current phase modulation waveform, 90 degree Trailing Edge and Leading Edge settings.

For the application of the adjustable bandwidth (BW) function, when the bandwidth of the DUT does not match the bandwidth of the AEL-5000 series, there will be oscillations. Users can reduce the BW setting value accordingly to meet the response speed of the DUT. Inrush Current verifies whether the transient response of the inverter output voltage is stable when the electrical appliance is turned on (Inrush Current) and when the electrical appliance is suddenly connected (Surge Current).

The entire series of AEL-5000 provides over-voltage warning, over-current, over-power, and over-temperature protection. Analog Input terminal can control constant current, constant power and other working modes through external voltage. Vmonitor/Imonitor terminal is used to connect external voltage/current monitoring device. In addition, a variety of optional control interfaces are provided such as GPIB, RS-232, USB, and LAN to meet the needs of system integration.

ORDERING INFORMATION

AEL-5002-350-18.75	350V/18.75A/1875W	AC & DC Electronic Load
AEL-5003-350-28	350V/28A/2800W	AC & DC Electronic Load
AEL-5004-350-37.5	350V/37.5A/3750W	AC & DC Electronic Load
AEL-5006-350-56	350V/56A/5600W	AC & DC Electronic Load
AEL-5008-350-75	350V/75A/7500W	AC & DC Electronic Load
AEL-5012-350-112.5	350V/112.5A/11250W	AC & DC Electronic Load
AEL-5015-350-112.5	350V/112.5A/15000W	AC & DC Electronic Load
AEL-5019-350-112.5	350V/112.5A/18750W	AC & DC Electronic Load
AEL-5023-350-112.5	350V/112.5A/22500W	AC & DC Electronic Load
AEL-5002-425-18.75	425V/18.75A/1875W	AC & DC Electronic Load
AEL-5003-425-28	425V/28A/2800W	AC & DC Electronic Load
AEL-5004-425-37.5	425V/37.5A/3750W	AC & DC Electronic Load
AEL-5006-425-56	425V/56A/5600W	AC & DC Electronic Load
AEL-5008-425-75	425V/75A/7500W	AC & DC Electronic Load
AEL-5012-425-112.5	425V/112.5A/11250W	AC & DC Electronic Load
AEL-5015-425-112.5	425V/112.5A/15000W	AC & DC Electronic Load
AEL-5019-425-112.5	425V/112.5A/18750W	AC & DC Electronic Load
AEL-5023-425-112.5	425V/112.5A/22500W	AC & DC Electronic Load
AEL-5003-480-18.75	480V/18.75A/2800W	AC & DC Electronic Load
AEL-5004-480-28	480V/28A/3750W	AC & DC Electronic Load



STANDARD ACCESSORIES

AEL-5000 Series operation manual
 HD-DSUB : 15pin MALE to MALE 150cm x 1
 PTV1-12 PIN TRML : Please refer to Fig.1 x 6

AEL-5002-xxx-18.75/AEL-5003-xxx-28/AEL-5004-xxx-37.5

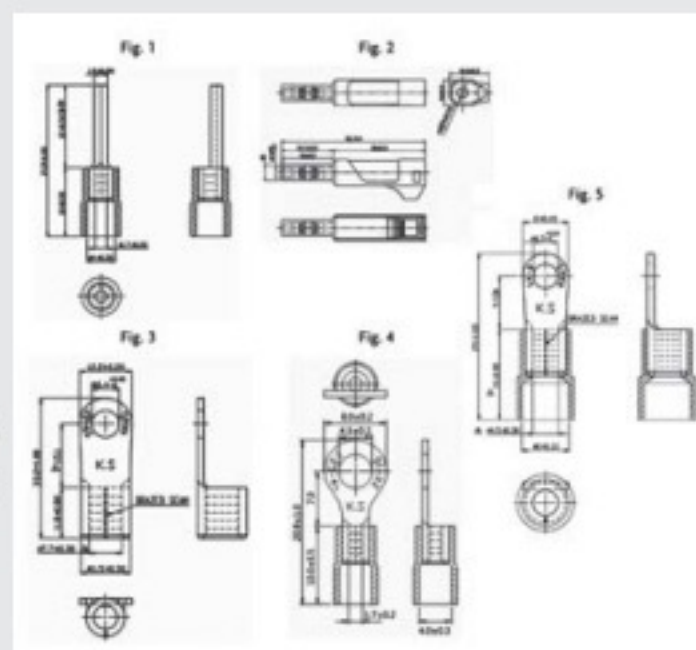
PVL 1-4 RING TERMINALS : Please refer to Fig.4 x 2
 RNYBS8-4 RING TRML : Please refer to Fig.5 x 2

AEL-5006-xxx-56/AEL-5008-xxx-78/AEL-5012-xxx-112.5/
 AEL-5015-xxx-112.5/AEL-5019-xxx-112.5/AEL-5023-xxx/112.5

SLS10B RED PLUG CONN 20A RED : Please refer to Fig.2;
 The terminal is used for Vsense x 1
 SLS10B BLK PLUG CONN 20A BLK : Please refer to Fig.2;
 The terminal is used for Vsense x 1
 RNB S22-6 RING TRML, #4 : Please refer to Fig.3 x 2

OPTIONAL ACCESSORIES

PEL-022	GPIB Card	PEL-030	GPIB+RS-232 Card
PEL-023	RS-232 Card	GTL-246	USB Cable, USB 2.0, A-B Type, 1200mm
PEL-024	LAN Card	GTL-248	GPIB Cable, Double Shielded, 2000mm
PEL-025	USB Card	GTL-250	GPIB Cable, Double Shielded, 600mm
PEL-028	HANDLES, U-shaped handle(fixed to the bracket)(for AEL-5006/5008/5012/5015)		
PEL-029	HANDLES Rack Accessories(for AEL-5002/5003/5004)		





AEL-5002-350-18.75 **AEL-5006-350-56** **AEL-5012-350-112.5** **AEL-5015-350-112.5** **AEL-5019-350-112.5** **AEL-5023-350-112.5**
AEL-5003-350-28 **AEL-5008-350-75** **AEL-5012-425-112.5** **AEL-5015-425-112.5** **AEL-5019-425-112.5** **AEL-5023-425-112.5**
AEL-5004-350-37.5 **AEL-5006-425-56**
AEL-5002-425-18.75 **AEL-5008-425-75**
AEL-5003-425-28
AEL-5004-425-37.5
AEL-5003-480-18.75
AEL-5004-480-28

MODEL	Power (W)		Current(Ampere)		Voltage(Volt)
	Turbo OFF	Turbo ON	Turbo OFF	Turbo ON	
AEL-5002-350-18.75	1875 W	3750W (x2)*	18.75 Arms / 56.25Apeak	37.5Arms/56.25Apeak (x2)*	50~350Vrms / 500Vdc
AEL-5003-350-28	2800W	5600W (x2)*	28 Arms / 84Apeak	56Arms/84Apeak (x2)*	
AEL-5004-350-37.5	3750 W	7500W (x2)*	37.5 Arms / 112.5Apeak	75.0Arms/112.5Apeak (x2)*	
AEL-5002-425-18.75	1875 W	3750W (x2)*	18.75 Arms / 56.25Apeak	37.5Arms/56.25Apeak (x2)*	50~425Vrms / 600Vdc
AEL-5003-425-28	2800W	5600W (x2)*	28 Arms / 84Apeak	56Arms/84Apeak (x2)*	
AEL-5004-425-37.5	3750 W	7500W (x2)*	37.5 Arms / 112.5Apeak	75.0Arms/112.5Apeak (x2)*	
AEL-5006-350-56	5600 W	11200W (x2)*	56.0 Arms / 168Apeak	112.0Arms/ 168Apeak (x2)*	50~350Vrms / 500Vdc
AEL-5008-350-75	7500 W	15000W (x2)*	75.0 Arms / 225Apeak	150.0Arms/225Apeak (x2)*	
AEL-5012-350-112.5	11250W	22500W (x2)*	112.5 Arms / 337.5Apeak	225Arms/337.5Apeak (x2)*	
AEL-5015-350-112.5	15000W	30000W (x2)*	112.5 Arms / 337.5Apeak	225Arms/337.5Apeak (x2)*	
AEL-5019-350-112.5	18750W	37500W (x2)*	112.5 Arms / 337.5Apeak	225Arms/337.5Apeak (x2)*	
AEL-5023-350-112.5	22500W	45000W (x2)*	112.5 Arms / 337.5Apeak	225Arms/337.5Apeak (x2)*	
AEL-5006-425-56	5600 W	11200W (x2)*	56.0 Arms / 168Apeak	112.0Arms/ 168Apeak (x2)*	50~425Vrms / 600Vdc
AEL-5008-425-75	7500 W	15000W (x2)*	75.0 Arms / 225Apeak	150.0Arms/225Apeak (x2)*	
AEL-5012-425-112.5	11250W	22500W (x2)*	112.5 Arms / 337.5Apeak	225Arms/337.5Apeak (x2)*	
AEL-5015-425-112.5	15000W	30000W (x2)*	112.5 Arms / 337.5Apeak	225Arms/337.5Apeak (x2)*	
AEL-5019-425-112.5	18750W	37500W (x2)*	112.5 Arms / 337.5Apeak	225Arms/337.5Apeak (x2)*	
AEL-5023-425-112.5	22500W	45000W (x2)*	112.5 Arms / 337.5Apeak	225Arms/337.5Apeak (x2)*	
AEL-5003-480-18.75	2800W	5600W (x2)*	18.75 Arms / 56.25Apeak	37.5Arms/56.25Apeak (x2)*	50~480Vrms / 700Vdc
AEL-5004-480-28	3750 W	7500W (x2)*	28 Arms / 84Apeak	56Arms/84Apeak (x2)*	

* Power and current boost rate of Turbo ON

AC & DC Electronic Load

SPECIFICATIONS

MODEL	AEL-5002-350-18.75	AEL-5003-350-28	AEL-5004-350-37.5	AEL-5002-425-18.75	AEL-5003-425-28	AEL-5004-425-37.5
Power (W)	1875 W	2800W	3750 W	1875 W	2800W	3750 W
Current(Ampere)	18.75 Arms / 56.25Apeak	28 Arms / 84Apeak	37.5 Arms / 112.5Apeak	18.75 Arms / 56.25Apeak	28 Arms / 84Apeak	37.5 Arms / 112.5Apeak
Voltage(Volt)	50-350Vrms / 500Vdc			50-425Vrms / 600Vdc		
FREQUENCY Range	DC, 40-440Hz(CC,CP Mode), DC-440Hz(LIN,CR,CV Mode)			DC, 40-440Hz(CC,CP Mode), DC-440Hz(LIN,CR,CV Mode)		
PROTECTIONS						
Over Power Protection	±1968.75Wrms or Programmable	±2940Wrms or Programmable	±3937.5Wrms or Programmable	±1968.75Wrms or Programmable	±2940Wrms or Programmable	±3937.5Wrms or Programmable
Over Current Protection	±19.687 Arms or Programmable	±28.4 Arms or Programmable	±39.375 Arms, or Programmable	±19.687 Arms or Programmable	±28.4 Arms or Programmable	±39.375 Arms, or Programmable
Over Voltage Protection	±367.5 Vrms / 525Vdc			±446.25 Vrms/630Vdc		
Over Temp. Protection	Yes			Yes		
OPERATION MODE						
Constant Current Mode for Sine-Wave						
Range	0-18.75A	0-28A	0-37.5A	0-18.75A	0-28A	0-37.5A
Resolution	0.3125mA/16bits	0.5mA/16bits	0.625mA/16bits	0.3125mA/16bits	0.5mA/16bits	0.625mA/16bits
Accuracy	± (0.1% of setting + 0.2% of range) @ 50/60Hz, ± 0.5% of (setting + range) @ DC and 400Hz			± (0.1% of setting + 0.2% of range) @ 50/60Hz, ± 0.5% of (setting + range) @ DC and 400Hz		
Linear Constant Current Mode for Sine-Wave, Square-Wave or Quasi-Square Wave, PWM Wave						
Range	0-18.75A	0-28A	0-37.5A	0-18.75A	0-28A	0-37.5A
Resolution	0.3125mA/16bits	0.5mA/16bits	0.625mA/16bits	0.3125mA/16bits	0.5mA/16bits	0.625mA/16bits
Accuracy	± (0.1% of setting + 0.2% of range) @ 50/60Hz, ± 0.5% of (setting + range) @ DC and 400Hz			± (0.1% of setting + 0.2% of range) @ 50/60Hz, ± 0.5% of (setting + range) @ DC and 400Hz		
Constant Resistance Mode						
Range	3.2 ohm - 64k ohm	2.0 ohm - 40k ohm	1.6 ohm - 32k ohm	3.2 ohm - 64k ohm	2.0 ohm - 40k ohm	1.6 ohm - 32k ohm
Resolution*1	0.0052083mS/16bits	0.0083333mS/16bits	0.010416mS/16bits	0.0052083mS/16bits	0.0083333mS/16bits	0.010416mS/16bits
Accuracy	±0.2% of (setting + range) @ 50/60Hz, ± (0.5% of setting + 2% of range) @ DC and 400Hz			±0.2% of (setting + range) @ 50/60Hz, ± (0.5% of setting + 2% of range) @ DC and 400Hz		
Constant Voltage Mode						
Range	50-350Vrms / 500Vdc			50-425Vrms / 600Vdc		
Resolution	0.01V			0.1V		
Accuracy	±(0.1% of setting + 0.1% of range)			±(0.1% of setting + 0.1% of range)		
Constant Power Mode						
Range	1875W	2800W	3750W	1875W	2800W	3750W
Resolution	0.1W	0.1W	0.1W	0.1W	0.1W	0.1W
Accuracy*4	±0.5% of (setting + range) @ 50/60Hz, ±2% of (setting + range)			±0.5% of (setting + range) @ 50/60Hz, ±2% of (setting + range)		
CREST FACTOR (CC & CP MODE ONLY)						
Range	0-2			0-2		
Resolution	0.1			0.1		
Accuracy	(0.5% / Irms) + 1% F.S.			(0.5% / Irms) + 1% F.S.		
POWER FACTOR (CC & CP MODE ONLY)						
Range	0-1 Lag or Lead			0-1 Lag or Lead		
Resolution	0.01			0.01		
Accuracy	1% F.S.			1% F.S.		
TEST MODE						
UPS Efficient Measurement		Non-Linear Mode			Non-Linear Mode	
Operating Frequency		Auto: 40-440Hz			Auto: 40-440Hz	
Current Range	0-18.75A	0-28A	0-37.5A	0-18.75A	0-28A	0-37.5A
PF Range	0-1			0-1		
Measuring Efficiency For PV Systems, Power Conditions for THD 80%		Resistive + Non-Linear Mode			Resistive + Non-Linear Mode	
Operating Frequency		Auto: 40-440Hz			Auto: 40-440Hz	
Current Range	0-18.75A	0-28A	0-37.5A	0-18.75A	0-28A	0-37.5A
Resistive Range	3.2 ohm - 64k ohm	2.0 ohm - 40k ohm	1.6 ohm - 32k ohm	3.2 ohm - 64k ohm	2.0 ohm - 40k ohm	1.6 ohm - 32k ohm
UPS Back-Up Function(CC,UN,CR,CP)						
UVP (VTH)		50-350Vrms / 500Vdc			50-425Vrms / 600Vdc	
UPS Back-Up Time		1-99999 Sec. (>27H)			1-99999 Sec. (>27H)	
Battery Discharge Function(CC,UN,CR,CP)						
UVP (VTH)		50-350Vrms / 500Vdc			50-425Vrms / 600Vdc	
Battery Discharge Time		1-99999 Sec. (>27H)			1-99999 Sec. (>27H)	
UPS Transfer Time						
Current Range	0-18.75A	0-28A	0-37.5A	0-18.75A	0-28A	0-37.5A
UVP (VTH)		2.5V			2.5V	
Time Range						
Fuse Test Mode						
Max. Current	Turbo OFF(CC1-3) Turbo ON(CC1) Turbo ON(CC1-2)	18.75Arms 28.0Arms 37.5Arms (x2)*3	28.0Arms 56.0Arms (x2)*3 75.0Arms (x2)*1	18.75Arms 28.0Arms 37.5Arms (x2)*3	28.0Arms 56.0Arms (x2)*3 75.0Arms (x2)*1	37.5Arms 75.0Arms (x2)*1 112.5Arms (x2)*1
Trip & Non-Trip Time	Turbo OFF(Time1-3) Turbo ON(Time1-2) Turbo ON(Time3)	0.01-333.33 Sec. 0.01-0.5 Sec. 0.01-600.00 Sec.	0.01-333.33 Sec. 0.01-0.5 Sec. 0.01-600.00 Sec.	0.01-333.33 Sec. 0.01-0.5 Sec. 0.01-600.00 Sec.	0.01-333.33 Sec. 0.01-0.5 Sec. 0.01-600.00 Sec.	0.01-333.33 Sec. 0.01-0.5 Sec. 0.01-600.00 Sec.
OFF Time		0.1-999.9 Sec.	0.1-999.9 Sec.	0.1-999.9 Sec.	0.1-999.9 Sec.	0.1-999.9 Sec.
Meas. Accuracy		±0.003 Sec.	±0.003 Sec.	±0.003 Sec.	±0.003 Sec.	±0.003 Sec.
Repeat Cycle		0-99999	0-99999	0-99999	0-99999	0-99999
Short/OPP/OCP Test Function						
Short Time	Turbo OFF Turbo ON	0.1-10Sec. or Cont. 0.1-15Sec.	0.1-10Sec. or Cont. 0.1-15Sec.	0.1-10Sec. or Cont. 0.1-15Sec.	0.1-10Sec. or Cont. 0.1-15Sec.	0.1-10Sec. or Cont. 0.1-15Sec.
OPP/OCP Step Time	Turbo OFF Turbo ON	100ms 100ms, up to 10 Steps	100ms 100ms, up to 10 Steps	100ms 100ms, up to 10 Steps	100ms 100ms, up to 10 Steps	100ms 100ms, up to 10 Steps
OCP Istop	Turbo OFF Turbo ON	18.75Arms 37.5Arms	28.0Arms 56.0Arms	18.75Arms 37.5Arms	28.0Arms 56.0Arms	37.5Arms 75.0Arms
OPP Pstop	Turbo OFF Turbo ON	1875W 3750W	2800W 5600W	1875W 3750W	2800W 5600W	3750W 7500W
Programmable Inrush Current Simulation: Inrush - Istop / Tstop						
Istart, Inrush Start Current	0-37.5A	0-56A	0-75A	0-37.5A	0-56A	0-75A
Inrush Step Time		0.1ms-100ms	0.1ms-100ms		0.1ms-100ms	0.1ms-100ms
Istop, Inrush Stop Current	0-18.75A	0-28A	0-37.5A	0-18.75A	0-28A	0-37.5A
Programmable Surge Current Simulation: S1/T1 - S2/T2 - S3/T3						
S1 and S2 Current	0-37.5A	0-56A	0-75A	0-37.5A	0-56A	0-75A
T1 and T2 Time		0.01-0.55Sec.	0.01-0.55Sec.		0.01-0.55Sec.	0.01-0.55Sec.
S3 Current	0-18.75A	0-28A	0-37.5A	0-18.75A	0-28A	0-37.5A
T3 Time		0.01-9.99Sec. or Cont.	0.01-9.99Sec. or Cont.		0.01-9.99Sec. or Cont.	0.01-9.99Sec. or Cont.
MEASUREMENTS						
VOLTAGE READBACK V METER						
Range	300V			600V		
Resolution	0.01V			0.01V		
Accuracy	±0.05% of (reading + range)			±0.05% of (reading + range)		
Parameter	Vrms, V Max/Min, +/-Vpk			Vrms, V Max/Min, +/-Vpk		
CURRENT READBACK A METER						
Range	9.375Arms/18.75Arms	14Arms/28Arms	18.75Arms/37.5Arms	9.375Arms/18.75Arms	14Arms/28Arms	18.75Arms/37.5Arms
Resolution	0.2mA/0.4mA	0.3mA/0.6mA	0.4mA/0.8mA	0.2mA/0.4mA	0.3mA/0.6mA	0.4mA/0.8mA
Accuracy	±0.05% of (reading + range) @ 50/60Hz			±0.05% of (reading + range) @ 50/60Hz		
Parameter	Irms, I Max/Min, +/-Ipk			Irms, I Max/Min, +/-Ipk		
WATT READBACK W METER						
Range	1875W	2800W	3750W	1875W	2800W	3750W
Resolution	0.03125W	0.05W	0.0625W	0.03125W	0.05W	0.0625W
Accuracy*4	±0.5% of (reading + range) @ 50/60Hz, ±2% of (reading + range)			±0.5% of (reading + range) @ 50/60Hz, ±2% of (reading + range)		
VA METER						
Parameter	VrmsxArms Correspond To Vrms and Arms			VrmsxArms Correspond To Vrms and Arms		
POWER FACTOR METER						
Range	+/- 0.000-1.000			+/- 0.000-1.000		
Accuracy	±(0.002±0.001/PP)*F			±(0.002±0.001/PP)*F		
Frequency METER(Hz)						
Range	DC, 40-440Hz			DC, 40-440Hz		
Accuracy	0.1%			0.1%		
Other Parameter METER	VA, VAR, CF, I, Ipeak, Imax, Imin, Vmax, Vmin, IHD, VHD, ITHD, VTHD					
OTHERS						
Start up Loading	Yes, Power on loading during Inverter / UPS start up			Yes, Power on loading during Inverter / UPS start up		
Load ON / OFF Angle	0 - 359 degree can be programmed for the angle of load ON and load OFF loading			0 - 359 degree can be programmed for the angle of load ON and load OFF loading		
Half Cycle and SCR/TRIAC Loading	Positive or Negative half cycle, 90° Trailing edge or Leading edge current waveform can be programmed			Positive or Negative half cycle, 90° Trailing edge or Leading edge current waveform can be programmed		
Master/Slave (3 Phase or Parallel Application)	Yes, 1 master and upto 7 slave units			Yes, 1 master and upto 7 slave units		
External Programming Input (OPTION)	F.S / 10Vdc, Resolution 0.1V			F.S / 10Vdc, Resolution 0.1V		
External SYNC Input	TTL			TTL		
Vmonitor (Isolated)	±500V / ±10V			±600V / ±10V		
Imonitor (Isolated)	±84Apk / ±10Vpk			±112.5Apk / ±10Vpk		
Interface (OPTION)	GPIB ; RS-232 ; LAN ; USB			GPIB ; RS-232 ; LAN ; USB		
MAX. Power Consumption	150VA			150VA		
Operation Temperature *2	0 - 40 °C			0 - 40 °C		
Current of Input Impedance(mA)@50/60Hz ; @ 400Hz	-V*0.3 ; -V*2.2	-V*0.45 ; -V*3.3	-V*0.6 ; -V*4.4	-V*0.3 ; -V*2.2	-V*0.45 ; -V*3.3	-V*0.6 ; -V*4.4
Dimension(H x W x D)	177 x 440 x 552.6 mm	177 x 440 x 552.6 mm	177 x 440 x 552.6 mm	177 x 440 x 552.6 mm	177 x 440 x 552.6 mm	177 x 440 x 552.6 mm
Weight	21.5kg	27.5kg	33.5kg	21.5kg	27.5kg	33.5kg

*1 ms (millisiemens) is the unit of conductance(G), one siemens equal to 1/Ω

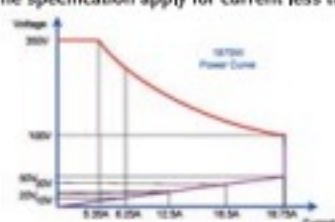
*2 Operating temperature range is 0-40°C, all specification apply for 25°C±5°C, Except as noted

*3 Turbo mode for up to 2X Current rating & Power rating support Fuse, Short/OCP/OPP test function

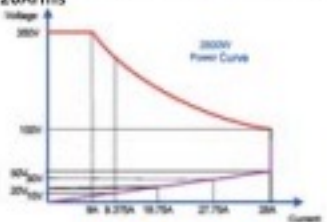
*4 The specification apply for current less than 20Arms

* All specifications apply for 50/60Hz

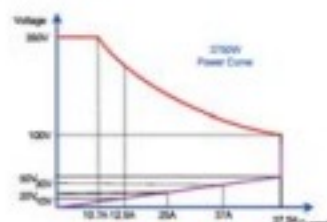
* All specifications subject to change without notice



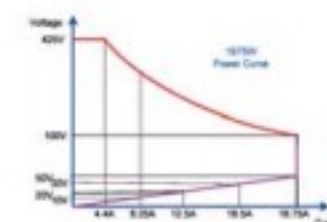
AEL-5002-350-18.75



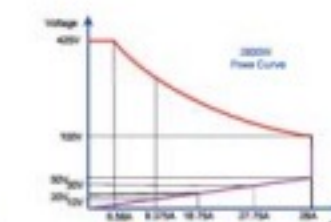
AEL-5003-350-28



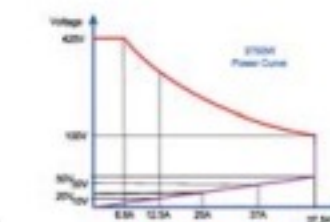
AEL-5004-350-37.5



AEL-5002-425-18.75



AEL-5003-425-28



AEL-5004-425-37.5

SPECIFICATIONS

MODEL	AEL-5006-350-56	AEL-5008-350-75	AEL-5012-350-112.5	AEL-5015-350-112.5	AEL-5019-350-112.5	AEL-5023-350-112.5	
Power (W)	5600W	7500W	11250W	15000W	18750W	22500W	
Current(Ampere)	56Arms / 168Apeak	75Arms / 225Apeak	112.5Arms / 337.5Apeak	112.5Arms / 337.5Apeak	112.5Arms / 337.5Apeak	112.5Arms / 337.5Apeak	
Voltage(Volt)	50-350Vrms / 500Vdc						
FREQUENCY Range	DC, 40-440Hz(CC,CP Mode) , DC-440Hz(LIN,CR,CV Mode)						
PROTECTIONS							
Over Power Protection	≅ 5880Wrms or Programmable	≅ 7875Wrms or Programmable	≅ 11812.5Wrms or Programmable	≅ 11812.5Wrms or Programmable	≅ 19687.5Wrms or Programmable	≅ 23625Wrms or Programmable	
Over Current Protection	≅ 58.8Arms, or Programmable	≅ 78.75Arms, or Programmable	≅ 118.125Arms or Programmable	≅ 118.125Arms or Programmable	≅ 118.125Arms or Programmable	≅ 118.125Arms or Programmable	
Over Voltage Protection	≅ 367.5Vrms/525Vdc						
Over Temp. Protection	Yes						
OPERATION MODE							
Constant Current Mode for Sine-Wave							
Range	0-56A	0-75A	0-112.5A	0-112.5A	0-112.5A	0-112.5A	
Resolution	1mA/16bits	1.25mA/16bits	1.875mA/16bits	1.875mA/16bits	1.875mA/16bits	1.875mA/16bits	
Accuracy	± 0.1% of setting + 0.2% of range @ 50/60Hz , ± 0.5% of (setting + range) @ DC and 400Hz						
Linear Constant Current Mode for Sine-Wave, Square-Wave or Quasi-Square Wave, PWM Wave							
Range	0-56A	0-75A	0-112.5A	0-112.5A	0-112.5A	0-112.5A	
Resolution	1mA/16bits	1.25mA/16bits	1.875mA/16bits	1.875mA/16bits	1.875mA/16bits	1.875mA/16bits	
Accuracy	± 0.1% of setting + 0.2% of range @ 50/60Hz , ± 0.5% of (setting + range) @ DC and 400Hz						
Constant Resistance Mode							
Range	1ohm - 20kohm	0.8ohm - 16kohm	0.533ohm - 10.666kohm	0.533ohm - 10.666kohm	0.533ohm - 10.666kohm	0.533ohm - 10.666kohm	
Resolution ¹⁾	0.016666mS/16bits	0.020832mS/16bits	0.031248mS/16bits	0.031248mS/16bits	0.031248mS/16bits	0.031248mS/16bits	
Accuracy	± 0.2% of (setting + range) @ 50/60Hz , ± 0.5% of (setting + range) @ DC and 400Hz						
Constant Voltage Mode							
Range	50-350Vrms / 500Vdc						
Resolution	0.1V						
Accuracy	± 0.2% of (setting + range) @ 50/60Hz						
Constant Power Mode							
Range	5600W	7500W	11250W	15000W	18750W	22500W	
Resolution	0.1W	0.1W	1W	1W	1W	1W	
Accuracy ^{1,4}	± 0.5% of (setting + range) @ 50/60Hz , ± 2% of (setting + range)						
CRIST FACTOR (CC & CP MODE ONLY)							
Range	v2-5						
Resolution	0.1						
Accuracy	± 0.5% / Irms + 1% F.S						
POWER FACTOR (CC & CP MODE ONLY)							
Range	0-1 Lag or Lead						
Resolution	0.01						
Accuracy	1% F.S						
TEST MODE							
UPS Efficient Measurement	Non-Linear Mode						
Operating Frequency	Auto : 40-440Hz						
Current Range	0-56A	0-75A	0-112.5A	0-112.5A	0-112.5A	0-112.5A	
PF Range	0-1						
Measuring Efficiency For PV Systems, Power Conditioners for THD 50%	Resistive + Non-Linear Mode						
Operating Frequency	Auto : 40-440Hz						
Current Range	0-56A	0-75A	0-112.5A	0-112.5A	0-112.5A	0-112.5A	
Resistive Range	1ohm - 20kohm	0.8ohm - 16kohm	0.533ohm - 10.666kohm	0.533ohm - 10.666kohm	0.533ohm - 10.666kohm	0.533ohm - 10.666kohm	
UPS Back-Up Function(CC, LIN, CR, CV)							
UVP (VTH)	50-350Vrms / 500Vdc						
UPS Back-Up Time	1-99999 Sec. (>27H)						
Battery Discharge Function(CC, LIN, CR, CV)							
UVP (VTH)	50-350Vrms / 500Vdc						
Battery Discharge Time	1-99999 Sec. (>27H)						
UPS Transfer Time							
Current Range	0-56A	0-75A	0-112.5A	0-112.5A	0-112.5A	0-112.5A	
UVP (VTH)	2.5V						
Time range	0.15ms-999.99ms						
Fuse Test Mode							
Max. Current	Turbo OFF(CC1-5) Turbo ON(CC) Turbo ON(CC1-2)	56Arms 112Arms (x2) ¹⁾	75Arms 150Arms (x2) ¹⁾	112.5Arms 225Arms (x2) ¹⁾	112.5Arms 225Arms (x2) ¹⁾	112.5Arms 225Arms (x2) ¹⁾	
Trip & Non-Trip Time	Turbo OFF(Time1-3) Turbo ON(Time1-2) Turbo ON(Time3)	0.01-333.33 Sec. 0.01-0.50 Sec. 0.01-600.00 Sec.				0.1-999.9 Sec.	± 0.003 Sec. 0-99999
OFF Time							
Meas. Accuracy							
Repeat Cycle							
Short/OPP/OCF Test Function							
Short Time	Turbo OFF Turbo ON	0.1-10Sec. or Cont. 0.1-15Sec.				100ms	100ms, up to 10 Steps
OPP/OCF Step Time	Turbo OFF Turbo ON						
OCF Istop	Turbo OFF Turbo ON	56Arms 112Arms	75Arms 150Arms	112.5Arms 225Arms	112.5Arms 225Arms	112.5Arms 225Arms	
OPP Pstop	Turbo OFF Turbo ON	5600W 11200W	7500W 15000W	11250W 22500W	15000W 30000W	18750W 37500W 45000W	
Programmable Inrush Current Simulation: Inrush - Istop / Trip							
Inrush Start Current	0-112A	0-150A	0-225A	0-225A	0-225A	0-225A	
Inrush Stop Time	0.1ms-100ms						
Inrush Stop Current	0-56A	0-75A	0-112.5A	0-112.5A	0-112.5A	0-112.5A	
Programmable Surge Current Simulation: S1/T1 - S2/T2 - S3/T3							
S1 and S2 Current	0-112A	0-150A	0-225A	0-225A	0-225A	0-225A	
T1 and T2 Time	0.01-0.5Sec.						
S3 Current	0-56A	0-75A	0-112.5A	0-112.5A	0-112.5A	0-112.5A	
T3 Time	0.01-0.99Sec. or Cont.						
MEASUREMENTS							
VOLTAGE READBACK V METER							
Range	500V						
Resolution	0.01V						
Accuracy	± 0.05% of (reading + range)						
Parameter	Vrms, V Max/Min, +/-Vpk						
CURRENT READBACK A METER							
Range	28Arms/56Arms	37.5Arms/75Arms	56.25Arms/112.5Arms	56.25Arms/112.5Arms	56.25Arms/112.5Arms	56.25Arms/112.5Arms	
Resolution	0.6mA/1.2mA	0.8mA/1.6mA	1.2mA/2.4mA	1.2mA/2.4mA	1.2mA/2.4mA	1.2mA/2.4mA	
Accuracy	± 0.1% of (reading + range) @ 50/60Hz						
Parameter	Irms, I Max/Min, +/-Ipk						
WATT READBACK W METER							
Range	5600W	7500W	11250W	15000W	18750W	22500W	
Resolution	0.1W	0.125W	0.1875W	0.25W	0.3125W	0.375W	
Accuracy ^{1,4}	± 0.5% of (reading + range) @ 50/60Hz , ± 2% of (reading + range)						
VA METER	VrmsxArms Correspond To Vrms and Arms						
Power Factor METER							
Range	+/- 0.000-1.000						
Accuracy	± 0.0002:(0.001/PF)*F						
Frequency METER(Hz)							
Range	DC, 40-440Hz						
Accuracy	0.1%						
Other Parameter METER	VA, VAR, CF, I, Ipeak, Imax, Imin, Vmax, Vmin, IHD, VHD, ITHD, VTHD						
OTHERS							
Start up Loading	Yes, Power on loading during Inverter / UPS start up						
Load ON / OFF Angle	0-359 degree can be programmed for the angle of load ON and load OFF loading						
Half Cycle and SCR/TRIAC Loading	Positive or Negative half cycle, 90° Trailing edge or Leading edge current waveform can be programmed						
Master/Slave (3 Phase or Parallel Application)	Yes, 1 master and upto 7 slave unit						
External Programming Input (OPTION)	F.S / 10Vdc, Resolution 0.1V						
External SYNC Input	TTL						
Vmonitor (Isolated)	± 500V / ± 10V						
Imonitor (Isolated)	± 168Apk / ± 10Vpk	± 225Apk / ± 10Vpk	± 337.5Apk / ± 10Vpk	± 337.5Apk / ± 10Vpk	± 337.5Apk / ± 10Vpk	± 337.5Apk / ± 10Vpk	
Interface (OPTION)	GPIB ; RS-232 ; LAN ; USB						
MAX. Power Consumption	270VA	270VA	390VA	510VA	630VA	750VA	
Operation Temperature ¹⁾	0-40 °C						
Current of Input Impedance(mA)@50/60Hz ; @ 400Hz	-V ¹⁾ 0.9 ; -V ¹⁾ 6.6	-V ¹⁾ 1.2 ; -V ¹⁾ 8.8	-V ¹⁾ 1.8 ; -V ¹⁾ 13.2	-V ¹⁾ 2.4 ; -V ¹⁾ 17.6	-V ¹⁾ 3.0 ; -V ¹⁾ 22	-V ¹⁾ 3.6 ; -V ¹⁾ 26.4	
Dimension(H x W x D)	457.8 x 480 x 593 mm	457.8 x 480 x 593 mm	635.7 x 480 x 593 mm	813.5 x 480 x 593 mm	1283 x 600 x 600 mm	1283 x 600 x 600 mm	
Weight	58 kg	70 kg	105 kg	140 kg	202 kg	295 kg	

¹⁾ ms (millisec) is the unit of conductance[G], one siemens equal to 1/Ω

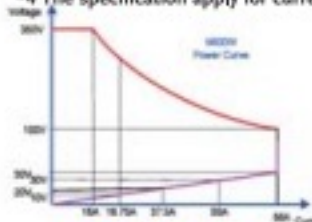
²⁾ Operating temperature range is 0-40°C, all specification apply for 25°C±5°C, Except as noted

³⁾ Turbo mode for up to 2X Current rating & Power rating support Fuse, Short/OCF/OPP test function

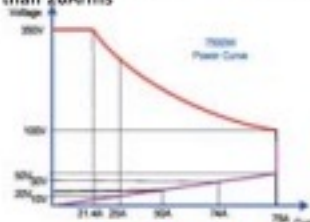
⁴⁾ The specification apply for current less than 20Arms

* All specifications apply for 50/60Hz

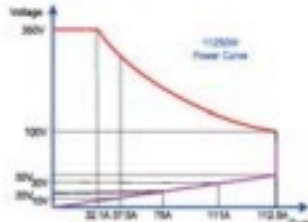
* All specifications subject to change without notice



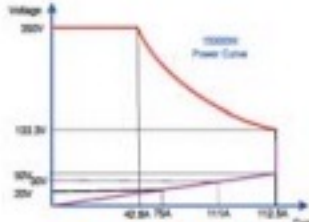
AEL-5006-350-56



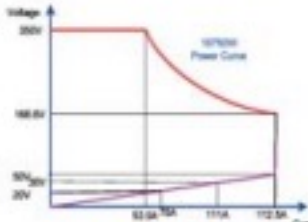
AEL-5008-350-75



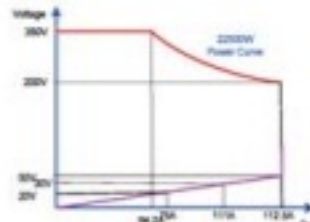
AEL-5012-350-112.5



AEL-5015-350-112.5



AEL-5019-350-112.5



AEL-5023-350-112.5

AC & DC Electronic Load

SPECIFICATIONS

MODEL	AEL-5006-425-56	AEL-5008-425-75	AEL-5012-425-112.5	AEL-5015-425-112.5	AEL-5019-425-112.5	AEL-5023-425-112.5
Power (W)	5600W	7500W	11250W	15000W	18750W	22500W
Current(Ampere)	56 Arms / 168Apeak	75 Arms / 225Apeak	112.5 Arms / 337.5Apeak	112.5 Arms / 337.5Apeak	112.5 Arms / 337.5Apeak	112.5 Arms / 337.5Apeak
Voltage(Volt)	50-425Vrms / 600Vdc					
FREQUENCY Range	DC, 40-440Hz(CC,CP Mode) , DC, 40Hz(LIN,CH,CV Mode)					
PROTECTIONS						
Over Power Protection	≠ 5880Wrms or Programmable	≠ 7875Wrms or Programmable	≠ 11812.5Wrms or Programmable	≠ 15750Wrms or Programmable	≠ 19687.5Wrms or Programmable	≠ 23625Wrms or Programmable
Over Current Protection	≠ 58.8 Arms, or Programmable	≠ 78.75 Arms, or Programmable	≠ 118.125 Arms, or Programmable	≠ 118.125 Arms, or Programmable	≠ 118.125 Arms, or Programmable	≠ 118.125 Arms, or Programmable
Over Voltage Protection	≠ 446.25 Vrms/630Vdc					
Over Temp. Protection	Yes					
OPERATION MODE						
Constant Current Mode for Sine-Wave						
Range	0-56A	0-75A	0-112.5A	0-112.5A	0-112.5A	0-112.5A
Resolution	1mA/16bits	1.25mA/16bits	1.875mA/16bits	1.875mA/16bits	1.875mA/16bits	1.875mA/16bits
Accuracy	± 0.1% of setting + 0.2% of range @ 50/60Hz , ± 0.5% of setting + range @ DC and 400Hz					
Linear Constant Current Mode for Sine-Wave, Square-Wave or Quasi-Square Wave, PWM Wave						
Range	0-56A	0-75A	0-112.5A	0-112.5A	0-112.5A	0-112.5A
Resolution	1mA/16bits	1.25mA/16bits	1.875mA/16bits	1.875mA/16bits	1.875mA/16bits	1.875mA/16bits
Accuracy	± 0.1% of setting + 0.2% of range @ 50/60Hz , ± 0.5% of setting + range @ DC and 400Hz					
Constant Resistance Mode						
Range	1 ohm - 20k ohm	0.8 ohm - 16k ohm	0.533 ohm - 10.666k ohm	0.533 ohm - 10.666k ohm	0.533 ohm - 10.666k ohm	0.533 ohm - 10.666k ohm
Resolution*1	0.01666mS/16bits	0.008332mS/16bits	0.051248mS/16bits	0.051248mS/16bits	0.051248mS/16bits	0.051248mS/16bits
Accuracy	± 0.2% of setting + range @ 50/60Hz , ± 0.5% of setting + range @ DC and 400Hz					
Constant Voltage Mode						
Range	50-425Vrms / 600Vdc					
Resolution	0.1V					
Accuracy	± 0.2% of setting + range @ 50/60Hz					
Constant Power Mode						
Range	5600W	7500W	11250W	15000W	18750W	22500W
Resolution	0.1W	0.1W	1W	1W	1W	1W
Accuracy*4	± 0.5% of setting + range @ 50/60Hz , ± 2% of setting + range					
CREST FACTOR (CC & CP MODE ONLY)						
Range	0-1 Lag or Lead					
Resolution	0.01					
Accuracy	1% F.S.					
POWER FACTOR (CC & CP MODE ONLY)						
Range	0-1 Lag or Lead					
Resolution	0.01					
Accuracy	1% F.S.					
TEST MODE						
UPS Efficiency Measurement	Non-Linear Mode					
Operating Frequency	Auto ; 40-440Hz					
Current Range	0-56A	0-75A	0-112.5A	0-112.5A	0-112.5A	0-112.5A
PF Range	0-1					
Measuring Efficiency For PV Systems, Power Conditioners for THD 50%	Resistive + Non-Linear Mode					
Operating Frequency	Auto ; 40-440Hz					
Current Range	0-56A	0-75A	0-112.5A	0-112.5A	0-112.5A	0-112.5A
Resistive Range	1 ohm - 20k ohm	0.8 ohm - 16k ohm	0.533 ohm - 10.666k ohm	0.533 ohm - 10.666k ohm	0.533 ohm - 10.666k ohm	0.533 ohm - 10.666k ohm
UPS Back-Up Function(CC, LIN, CH, CV)						
UVP (VTH)	50-425Vrms / 600Vdc					
UPS Back-Up Time	1-99999 Sec. (>27H)					
Battery Discharge Function(CC, LIN, CH, CV)						
UVP (VTH)	50-425Vrms / 600Vdc					
Battery Discharge Time	1-99999 Sec. (>27H)					
UPS Transfer Time						
Current Range	0-56A	0-75A	0-112.5A	0-112.5A	0-112.5A	0-112.5A
UVP (VTH)	2.5V					
Time range	0.15ms-999.99ms					
Fuse Test Mode						
Max. Current	Turbo OFF(CC1-3) Turbo ON(CC1) Turbo ON(CC1-2)	56Arms 112Arms (x2) ^{*3}	75Arms 150Arms (x2) ^{*3}	112.5Arms 225Arms (x2) ^{*3}	112.5Arms 225Arms (x2) ^{*3}	112.5Arms 225Arms (x2) ^{*3}
Trip & Non-Trip Time	Turbo OFF(Time1-3) Turbo ON(Time1-2) Turbo ON(Time3)	0.01-333.33 Sec. 0.01-0.50 Sec. 0.01-600.00 Sec.				
OFF Time	0.1-999.9 Sec.					
Meas. Accuracy	± 0.003 Sec.					
Repeat Cycle	0-99999					
Short/OPP/OCP Test Function						
Short Time	Turbo OFF Turbo ON	0.1-10Sec. or Cont. 0.1-1Sec.				
OPP/OCP Step Time	Turbo OFF Turbo ON	100ms 100ms, up to 10 Steps				
OCP Istop	Turbo OFF Turbo ON	56Arms 112Arms	75Arms 150Arms	112.5Arms 225Arms	112.5Arms 225Arms	112.5Arms 225Arms
OPP Pstop	Turbo OFF Turbo ON	5600W 11200W	7500W 15000W	11250W 22500W	15000W 30000W	18750W 37500W
Programmable Inrush Current Simulation: Inrush - Istop / Tstop						
Inrush Start Current	0-112A	0-150A	0-225A	0-225A	0-225A	0-225A
Inrush Stop Time	0.1ms-100ms					
Inrush Stop Current	0-56A	0-75A	0-112.5A	0-112.5A	0-112.5A	0-112.5A
Programmable Surge Current Simulation: S1/T1 - S2/T2 - S3/T3						
S1 and S2 Current	0-112A	0-150A	0-225A	0-225A	0-225A	0-225A
T1 and T2 Time	0.01-0.55Sec.					
S3 Current	0-56A	0-75A	0-112.5A	0-112.5A	0-112.5A	0-112.5A
T3 Time	0.01-9.99Sec. or Cont.					
MEASUREMENTS						
VOLTAGE READBACK V METER						
Range	600V					
Resolution	0.01V					
Accuracy	± 0.05% of (reading + range)					
Parameter	Vrms, V Max/Min, +Vpk					
CURRENT READBACK A METER						
Range	28Arms/56Arms	37.5Arms/75Arms	56.25Arms/112.5Arms	56.25Arms/112.5Arms	56.25Arms/112.5Arms	56.25Arms/112.5Arms
Resolution	0.6mA/1.2mA	0.8mA/1.6mA	1.2mA/2.4mA	1.2mA/2.4mA	1.2mA/2.4mA	1.2mA/2.4mA
Accuracy	± 0.1% of reading + range @ 50/60Hz					
Parameter	Irms, I Max/Min, +Ipk					
WATT READBACK W METER						
Range	5600W	7500W	11250W	15000W	18750W	22500W
Resolution	0.1W	0.125W	0.1875W	0.25W	0.3125W	0.375W
Accuracy*4	± 0.5% of reading + range @ 50/60Hz , ± 3% of reading + range					
VA METER	Vrms x Arms Correspond To Vrms and Arms					
Power Factor METER						
Range	+/- 0.000-1.000					
Accuracy	± 0.002 ± (0.001/ PF) %					
Frequency METER(Hz)						
Range	DC, 40-440Hz					
Accuracy	0.1%					
Other Parameter METER	VA, VAR, CF, I, Ipeak, Imax, Imin, Vmax, Vmin, IHD, VHD, ITHD, VTHD					
OTHERS						
Start up Loading	Yes, Power on loading during Inverter / UPS start up					
Load ON / OFF Angle	0 - 359 degree can be programmed for the angle of load ON and load OFF loading					
Half Cycle and SCR/TRIAC Loading	Positive or Negative half cycle, 90° Trailing edge or Leading edge current waveform can be programmed					
Master/Slave (3 Phase or Parallel Application)	Yes, 1 master and upto 7 slave unit					
External Programming Input (OPTION)	F.S / 10Vdc, Resolution 0.1V					
External SYNC Input	TTL					
Vmonitor (Isolated)	+600V / ±10V					
Imonitor (Isolated)	± 168Apk / ± 10Vpk	± 225Apk / ± 10Vpk	± 337.5Apk / ± 10Vpk	± 337.5Apk / ± 10Vpk	± 337.5Apk / ± 10Vpk	± 337.5Apk / ± 10Vpk
Interface (OPTION)	GPIO ; RS-232 ; LAN ; USB					
MAX. Power Consumption	270VA	270VA	390VA	510VA	630VA	750VA
Operation Temperature *2	0 - 40 °C					
Current of Input Impedance(mA)@50/60Hz ; @ 400Hz	-V*0.9 ; -V*6.6	-V*1.2 ; -V*8.8	-V*1.8 ; -V*13.2	-V*2.4 ; -V*17.6	-V*3.0 ; -V*22	-V*3.6 ; -V*26.4
Dimension H x W x D	457.8 x 480 x 593 mm	457.8 x 480 x 593 mm	635.7 x 480 x 593 mm	813.5 x 480 x 593 mm	1283 x 600 x 600 mm	1283 x 600 x 600 mm
Weight	58 kg	70 kg	105 kg	140 kg	260 kg	295 kg

*1 ms (millisiemens) is the unit of conductance(G), one siemens equal to 1/Ω

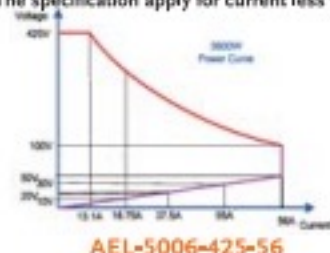
*2 Operating temperature range is 0-40°C, all specification apply for 25°C±5°C, Except as noted

*3 Turbo mode for up to 2X Current rating & Power rating support Fuse, Short/OCP/OPP test function

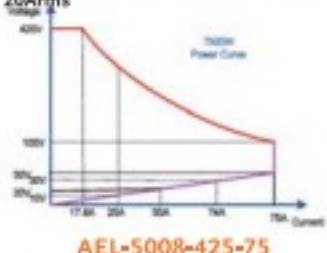
*4 The specification apply for current less than 20Arms

* AI specifications apply for 50/60Hz

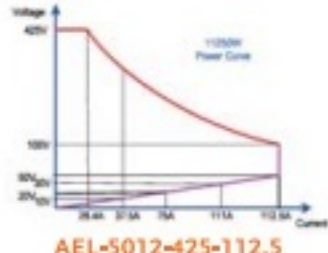
* AI specifications subject to change without notice



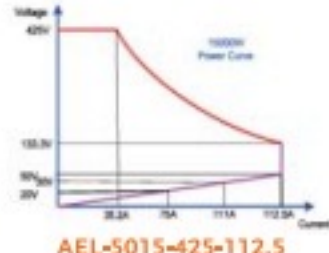
AEL-5006-425-56



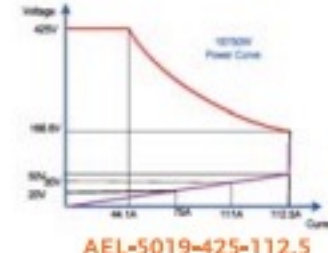
AEL-5008-425-75



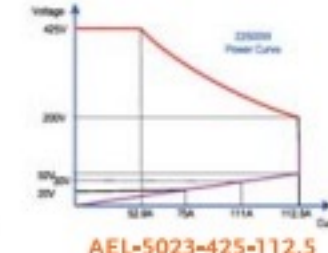
AEL-5012-425-112.5



AEL-5015-425-112.5



AEL-5019-425-112.5



AEL-5023-425-112.5

SPECIFICATIONS

MODEL	AEL-5003-480-18.75	AEL-5004-480-28
Power (W)	2800W	3750W
Current(Ampere)	18.75 Arms / 36.25Apeak	28 Arms / 84Apeak
Voltage(Volt)	50-480Vrms / 700Vdc	
FREQUENCY Range	DC, 40-70Hz(CC,CP Mode) ; DC-70Hz(LIN,CR,CV Mode)	
PROTECTIONS		
Over Power Protection	≈2940Wrms or Programmable	≈3937.5Wrms or Programmable
Over Current Protection	≈ 19.687 Arms or Programmable	≈ 29.4 Arms or Programmable
Over Voltage Protection	≈ 504Vrms / 735Vdc	
Over Temp. Protection	Yes	
OPERATION MODE		
Constant Current Mode for Sine-Wave		
Range	0-18.75A	0-28A
Resolution	0.3125mA/16bits	0.5mA/16bits
Accuracy	± 0.1% of setting + 0.2% of range @ 50/60Hz ; ± 0.5% of setting + range @ DC and 400Hz	
Linear Constant Current Mode for Sine-Wave, Square-Wave or Quasi-Square Wave, PWM Wave		
Range	0-18.75A	0-28A
Resolution	0.3125mA/16bits	0.5mA/16bits
Accuracy	± 0.1% of setting + 0.2% of range @ 50/60Hz ; ± 0.5% of setting + range @ DC and 400Hz	
Constant Resistance Mode		
Range	4 ohm - 80k ohm	2.5 ohm - 50k ohm
Resolution*1	0.004166mΩ/16bits	0.006666mΩ/16bits
Accuracy	±0.2% of setting + range @ 50/60Hz ; ± 0.5% of setting + range @ DC and 400Hz	
Constant Voltage Mode		
Range	50-480Vrms / 700Vdc	
Resolution	0.0125V	
Accuracy	±0.1% of setting + 0.1% of range	
Constant Power Mode		
Range	2800W	3750W
Resolution	0.1W	0.1W
Accuracy*4	±0.5% of (setting + range) @ 50/60Hz ; ±2% of (setting + range)	
CREST FACTOR (CC & CP MODE ONLY)		
Range	-2-5	
Resolution	0.1	
Accuracy	(0.5% / rms) + 1% F.S.	
POWER FACTOR (CC & CP MODE ONLY)		
Range	0-1 Lag or Lead	
Resolution	0.01	
Accuracy	1% F.S.	
TEST MODE		
UPS Efficiency Measurement		
Operating Frequency	Non-Linear Mode	
Current Range	0-18.75A	0-28A
PF Range	0-1	
Measuring Efficiency For PV Systems, Power Conditioners for THD 80%		
Operating Frequency	Auto ; 40-70Hz	
Current Range	0-18.75A	0-28A
Resistive Range	4 ohm - 80k ohm	2.5 ohm - 50k ohm
UPS Back-Up Function(CC,UN,OL,OP)		
LVP (VTH)	50-480Vrms / 700Vdc	
UPS Back-Up Time	1-99999 Sec. (>27H)	
Battery Discharge Function(CC,UN,OL,CP)		
LVP (VTH)	50-480Vrms / 700Vdc	
Battery Discharge Time	1-99999 Sec. (>27H)	
UPS Transfer Time		
Current Range	0-18.75A	0-28A
LVP (VTH)	2.5V	
Time range	0.15ms-999.99ms	
Fuse Test Mode		
Max. Current	Turbo OFF(CC1-3) Turbo ON(CC3) Turbo ON(CC1-2)	18.75Arms 37.5Arms (x2) *3 37.5Arms (x2) *3
Trip & Non-Trip Time	Turbo OFF(Time1-3) Turbo ON(Time1-2) Turbo ON(Time3)	0.01-333.33 Sec. 0.01-0.50 Sec. 0.01-600.00 Sec.
OFF Time		0.1-999.9 Sec.
Meas. Accuracy		±0.003 Sec.
Repeat Cycle		0-99999
Short/OPP/OCF Test Function		
Short Time	Turbo OFF Turbo ON	100ms
OPP/OCF Step Time	Turbo OFF Turbo ON	100ms, up to 10 Steps
OCF Isop	Turbo OFF Turbo ON	18.75Arms 37.5Arms
OPP Pstop	Turbo OFF Turbo ON	2800W 5600W
Programmable Inrush Current Simulation: Inrush - Instop / Yeop		
Inrush Start Current	0-37.5k	0-56A k
Inrush Stop Time		0.1ms-100ms
Instop, Inrush Stop Current	0-18.75A	0-28A
Programmable Surge Current Simulation: S1/T1 - S2/T2 - S3/T3		
S1 and S2 Current	0-37.5A	0-56A
T1 and T2 Time		0.01-0.5Sec.
S3 Current	0-18.75A	0-28A
T3 Time		0.01-9.99Sec. or Cont.
MEASUREMENTS		
VOLTAGE READBACK V METER		
Range	700V	
Resolution	0.0125V	
Accuracy	±0.05% of (reading + range)	
Parameter	Vrms, V Max/Min, +/-Vpk	
CURRENT READBACK A METER		
Range	9.375Arms/18.75Arms	14Arms/28Arms
Resolution	0.2mA/0.4mA	0.3mA/0.6mA
Accuracy	±0.05% of (reading + range) @ 50/60Hz	
Parameter	Imax, I Max/Min, +/-Ipk	
WATT READBACK W METER		
Range	2800W	3750W
Resolution	0.05W	0.0625W
Accuracy*4	±0.5% of (reading + range) @ 50/60Hz ; ±2% of (reading + range)	
VA METER	VrmsxArms Correspond To Vrms and Arms	
Power Factor METER		
Range	±0.000-1.000	
Accuracy	±(0.002+(0.001/(PF)*F)	
Frequency METER(Hz)		
Range	DC, 40-70Hz	
Accuracy	0.1%	
Other Parameter METER		
	VA, VAR, CF, I, Ipeak, Imax., Imin., Vmax., Vmin., IPHD, VHD, ITHD, VTHD	
OTHERS		
Start up Loading	Yes, Power on loading during inverter / UPS start up	
Load ON / OFF Angle	0 - 359 degree can be programmed for the angle of load ON and load OFF loading	
Half Cycle and SCR/TRIAC Loading	Positive or Negative half cycle, 90° Trailing edge or Leading edge current waveform can be programmed	
Master/Slave (3 Phase or Parallel Application)	Yes, 1 master and upto 7 slave units	
External Programming Input (OPTION)	F.S / 10Vdc, Resolution 0.1V	
External SYNC Input	TTL	
Vmonitor (Isolated)	±700V / ±10V	
Imonitor (Isolated)	±56.25Apk / ±10Vpk	
Interface (OPTION)	GPIB ; RS-232 ; LAN ; USB	
MAX. Power Consumption	150VA	
Operation Temperature °C	0 - 40 °C	
Current of Input Impedance(mA)@50/60Hz ; @ 400Hz	-V*0.1 ; -V*2.2	-V*0.4 ; -V*2.95
Dimension(H x W x D)	177 x 440 x 552.6 mm	177 x 440 x 552.6 mm
Weight	27.5kg	33.5kg

*1 ms (milliSiemens) is the unit of conductance(G), one siemens equal to 1/Ω

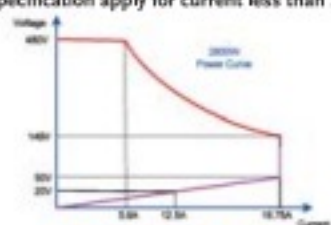
*2 Operating temperature range is 0-40°C, all specification apply for 25°C±5°C, Except as noted

*3 Turbo mode for up to 2X Current rating & Power rating support Fuse, Short/OCF/OPP test function

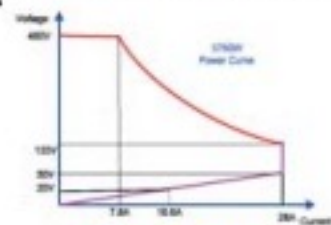
*4 The specification apply for current less than 20Arms

* All specifications apply for 50/60Hz

* All specifications subject to change without notice



AEL-5003-480-18.75



AEL-5004-480-28

PEL-022 GPIB Card



PEL-023 RS-232 Card



PEL-024 LAN Card



PEL-025 USB Card



PEL-028 HANDLES, U-shaped handle
(for AEL-5006/5008/5012/5015)



PEL-029 HANDLES Rack Accessories
(for AEL-5002/5003/5004)



High Power DC Electronic Load



PEL-5000G Series

NEW



FEATURES

- * 4U/6K High Power Density Design Also for Bench Testing
- * Turbo Mode Function, Which Allows 1.5 Times the Rated Power or Current to be Used Within Two Seconds
- * Turbo Mode can be Used with OCP/OPP/ BMS/Short Mode/Surge Mode/Hot Plug-In Testing
- * High Tolerance to Environmental Temperature, with 4k/5kW Models not Affected by Environmental Temperature in Power Usage
- * Can set the Power-on Status Value
- * Short Circuit Duration Can be set Within Short Circuit Test Voltage Meter Display Can be Configured as Polarity Positive ("+") or Negative ("-")
- * Optional Interface : GPIB, RS232, USB, LAN
- * Protection function Testing for Battery BMS
- * Protection Against V, I, W, and °C

GW Instek PEL-5000G series single-channel electronic load provides 150V/ 600V/ 1200V models with a power range of 4, 5, 6kW. PEL-5000G can test and verify the specifications of batteries, electric vehicle chargers/charging stations, electric vehicle batteries and solar panels. PEL-5000G supports parallel connection for same voltage specification and different power models. PEL-5000G can support up to 8 units connected in parallel.

PEL-5000G Series has its own control and display panel, CC / CR / CV / CP /Dynamic modes. The new Turbo mode is designed for overload or protection testing, which includes OCP, OPP, Short for AC/DC or DC/DC power source; Over Charge/Discharge and Short for Battery BMS protection; and Blow/Not Blow testing for Fuse, Breaker or PTC Current Protection Components.

Support Short, OCCP and OCPD protection tests for battery BMS protection testing, the peak current before protection and protection response time are measured. The BMS, Fuse, OCP and OPP single-key test functions on the module make test more efficient. The SHORT duration setting and SHORT_VH, SHORT_VL setting function, also can measure Short Voltage and Current. PEL-5000G also provides Programmable LOAD ON/OFF voltage, GO/NG meter check, Voltage meter display " + " or " - " is selectable

Dynamic can be simulated under CC, CP mode. The current Rise / Fall slew rate can be adjusted individually and there is an external signal input so that load can have a simulated Specific Load Current Waveform. PEL-5000G also provides 150 sets Store / Recall larger memory is much advance feature for each different application. The 150 sets test parameter and status storage function can call the storage memory real time in accordance with the auto sequence requirement, at any time to tune out the stored memory for use.

The communication interfaces supported by PEL-5000G include GPIB, RS232, USB, and LAN. The power, voltage and current of each model are shown in the following table:

PEL-022 GPIB Card



PEL-023 RS-232 Card



PEL-024 LAN Card



PEL-025 USB Card



PEL-028 Handles



PEL-031 Rack Mount Kit



PEL-032 9923 Current Waveform Generator + RS232 Interface

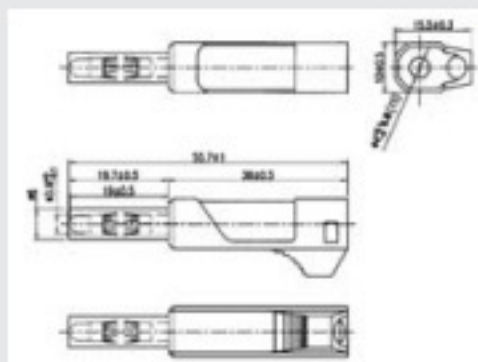


ORDERING INFORMATION

PEL-5004G-150-400	150V/400A/4000W High Power DC Electronic Load
PEL-5005G-150-500	150V/500A/5000W High Power DC Electronic Load
PEL-5006G-150-600	150V/600A/6000W High Power DC Electronic Load
PEL-5004G-600-280	600V/280A/4000W High Power DC Electronic Load
PEL-5005G-600-350	600V/350A/5000W High Power DC Electronic Load
PEL-5006G-600-420	600V/420A/6000W High Power DC Electronic Load
PEL-5004G-1200-160	1200V/160A/4000W High Power DC Electronic Load
PEL-5005G-1200-200	1200V/200A/5000W High Power DC Electronic Load
PEL-5006G-1200-240	1200V/240A/6000W High Power DC Electronic Load

PEL-5006G-1200-240

Power rating: 6 → 6A kW
Maximum output current: 240 → 240A
Maximum output voltage: 1200 → 1200V



STANDARD ACCESSORIES

- PEL-5000G Series operation manual
- BANANA PLUGS : Please refer to Fig.1 x 1
- BNC – BNC CABLE : BNC to BNC CABLE, 1m x 1
- HD-DSUB : 15PIN Parallel wire Parallel Wire x 1
- PEL-028 HANDLES, U-shaped handle(fixed to the bracket)
- PEL-031 Rack Mount Kit For PEL-5000G

OPTIONAL ACCESSORIES

PEL-022	GPIB Card	GTL-246	USB Cable, USB 2.0, A-B Type, 1200mm
PEL-023	RS-232 Card	GTL-248	GPIB Cable, Double Shielded, 2000mm
PEL-024	LAN Card	GTL-250	GPIB Cable, Double Shielded, 600mm
PEL-025	USB Card	PEL-032	9923 Current Waveform Generator + RS232 Interface
PEL-030	GPIB+RS-232 Card		

Note: * Regarding the product delivery date, please contact your regional sales representative.

Rear Panel



ACCESSORIES

MODEL	DESCRIPTION	APPLICABLE DEVICE
APS-001	CP/B Interface Card	APS-7000 Series
APS-002	RS-232C/USB Interface Card	APS-7050, APS-7100
APS-003	Output Voltage Capacity (0-400Vrms)	APS-7000 Series
APS-004	Output Frequency Capacity (45-99.9Hz)	APS-7000 Series
APS-007	RS-232 Interface Card	APS-7200, APS-7300
APS-008	Air Inlet Filter	ASR-3000 Series
ASR-001	Air Inlet Filter	ASR-2000 Series
ASR-002	External Three Phase Control Unit	ASR-2000 Series, ASR-3000 Series
GET-001	Extended Terminal with max.30A for 30V/80V/160V models	PSW-Series, PSW-Multi Series
GET-002	Extended Terminal with max.10A for 250V/800V models	PSW-Series, PSW-Multi Series
GET-003	Extended Universal Power Socket	ASR-2000 Series
GET-004	Extended European Power Socket	ASR-2000 Series
GET-005	Extended European Terminal with max.20A for 30V/80V/160V models	PSW-Series, PSW-Multi Series
GPS-001	Knob, Voltage/Current Protection Knob	GPS-183 Series, SPD-3606
GPW-001	UL/CSA Power Cord, 3000mm	PSU-Series
GPW-002	VDE Power Cord, 3000mm	PSU-Series
GPW-003	PSI Power Cord, 3000mm	PSU-Series
GPW-005	Power cord, 3m, 105 V _{rms} , UL/CSA type	ASR-3000 Series
GPW-006	Power cord, 3m, 105 V _{rms} , VDE type	ASR-3000 Series
GPW-007	Power cord, 3m, 105 V _{rms} , PSE type	ASR-3000 Series
GRA-401	Rack Mount Kit, 19", 4U Size	GPC-Series, GPR-M Series, PPE-3323, PPE-3633, PPT-Series, PEL-300
GRA-403	Rack Mount Kit, 19", 4U Size	PSH-Series
GRA-407	Rack Mount Kit, 19", 4U Size	PSM-Series
GRA-408	Rack Mount Kit, 19", 4U Size	PSJ-Series
GRA-409	Rack Mount Kit, 19", 3U Size	APS-1102A
GRA-410A	Rack Mount Kit (EIA), 19", 3U Size	PSW-Series, PSW-Multi Series
GRA-410J	Rack Mount Kit (JIS), 19", 3U Size	PSW-Series, PSW-Multi Series
GRA-413-E	Rack Mount Kit (EIA), 19", 3U Size	PEL-3211/J211H
GRA-413-J	Rack Mount Kit (JIS), 19", 3U Size	PEL-3211/J211H
GRA-414-E	Rack Mount Kit (EIA), 19", 3U Size	PEL-3021(H)/3041(H)/3111(H), PEL-3000A Series
GRA-414-J	Rack Mount Kit (JIS), 19", 3U Size	PEL-3021(H)/3041(H)/3111(H), PEL-3000A Series
GRA-418-E	Rack Mount Kit (EIA), 19", 3U Size	PSB-1000 Series
GRA-418-J	Rack Mount Kit (JIS), 19", 3U Size	PSB-1000 Series
GRA-419-E	Rack Mount Kit (EIA), 19", 2U Size	PCS-1000
GRA-419-J	Rack Mount Kit (JIS), 19", 2U Size	PCS-1000
GRA-423	Rack Mount Kit, 19", 2U Size	APS-7000/7000E Series
GRA-424	Rack Mount Kit, 19", 3U Size	PSB-2000 Series
GRA-428	Rack Mount Kit (EIA), 19", 3U Size	PPR-Series
GRA-429	Rack Mount Kit, 7U Size	APS-7200 Series
GRA-430	Rack Mount Kit, 9U Size	APS-7300 Series
GRA-431-J	Rack Mount Kit (JIS)	PPR-Series
GRA-431-E	Rack Mount Kit (EIA)	PPR-Series
GRA-439-J	Rack Mount Kit (JIS), 19", 3U Size	ASR-2000 Series
GRA-439-E	Rack Mount Kit (EIA), 19", 3U Size	ASR-2000 Series
GRA-441-J	Rack Mount Kit (JIS), 19", 3U Size	PPR-Series
GRA-441-E	Rack Mount Kit (EIA), 19", 3U Size	PPR-Series
GRA-442-J	Rack Mount Kit (JIS), 19", 3U Size	ASR-3000 Series
GRA-442-E	Rack Mount Kit (EIA), 19", 3U Size	ASR-3000 Series
GRA-449-J	Rack Mount Kit (JIS), 19", 3U Size	CPP-Series, CPP-3060/6030
GRA-449-E	Rack Mount Kit (EIA), 19", 3U Size	CPP-Series, CPP-3060/6030
CRJ-1101	Module Cable (R-3m)	PSB-2000 Series
CRM-001	Slide Bracket 2pcs/lot	PSU-Series
GTL-104A	Test Lead, U-type to Alligator Test Lead, Max. Current 10A, 1000mm	PPR/PSM/PSW/PST/GPC/CPD/CPP/CPR/CPJ/CPK/CPG/CPH/PPF-Series, PPE-3633, SPD-3606, PPK-Series, CPP-3060/6030
GTL-105A	Test Lead, Alligator to Banana Test Lead, Max. Current 3A, 1000mm	PPR/PSM/PSW/PST/GPC/CPD/CPP/CPR/CPJ/CPK/CPG/CPH/PPF-Series, PEL-2000B, PPE-3323, SPD-3606, PCS-1000I, PPK-Series
GTL-117	Test Lead, Banana to Probe Test Lead, 1200mm	PPH-1103/1103D/1106D
GTL-120	Test Lead, O-type to O-type Test Lead, Max. 40A, 1200mm	PSW-3000/3000H Series, PEL-2000A(B) Series
GTL-121	Sense Lead, O-type to Free Lead, 1200mm	PEL-2000A(B) Series
GTL-122	Test Lead, U-type to Alligator Test Lead, Max. Current 40A, 1200mm	PSH-Series, GPR-U Series, GPR-H Series
GTL-123	Test Lead, O-type to O-type Test Lead, 1200mm	PSW-Series, APS-7000 Series, PSB-1000 Series
GTL-130	Test Leads: 2 x red, 2 x black for 250V/800V models, 1200mm	PPR-Series, PSW-Multi Series
GTL-134	Test Leads for Rear Panel, 1200mm, 10A, 16 AWG	PPR-Series
GTL-137	Output Power wire/lead wire, 10AWG-50A, 600V/sense wire, 16AWG:20A, 600V)	ASR-3000 Series
GTL-201A	Ground Lead, Banana to Banana, European Terminal, 200mm	ATC-200/100 Series, PSM Series, GPD-Series, GPP-Series, GPS-X303 Series, SPD-3606, PPK-Series, CPP-3060/6030
GTL-202	Sense Lead, Banana to Banana Lead, European Terminal, 200mm	PSB-Series
GTL-203A	Test Lead, Banana to Alligator, European Terminal, Max. Current 3A, 1000mm	PPS/PST/CPD/CPP/CPG/CPH/PPF-Series, SPD-3606, PPH-1103/1103D/1106D, PPK-Series
GTL-204A	Test Lead, Banana to Alligator, European Terminal, Max. Current 10A, 1000mm	PPR/PSM/PSW/PPS/CPG/CPH/PPF/PPJ/PPK/CPD/CPP-Series, SPD-3606, PPH-1103/1103D/1106D, PPK-Series, CPP-3060/6030
GTL-205A	Temperature Probe Adapter (Thermal Coupling, K-Type), about 1000mm	PPK-Series
GTL-207A	Test Lead, Banana to Probe Test Lead, 800mm	PCS-1000I, GSM-20410
GTL-218	Test Lead, O-type to O-type Test Lead, Max. 200A, 1500mm	PSU/PSW/PEL-3000 Series
GTL-219	Test Lead, O-type to O-type Test Lead, Max. 200A, 3000mm	PSU/PSW/PEL-3000 Series
GTL-220	Test Lead, O-type to O-type Test Lead, Max. 300A, 1500mm	PSU/PSW/PEL-3000 Series
GTL-221	Test Lead, O-type to O-type Test Lead, Max. 300A, 3000mm	PSU/PSW/PEL-3000 Series
GTL-222	Test Lead, O-type to O-type Test Lead, Max. 400A, 1500mm	PSU/PSW/PEL-3000 Series
GTL-223	Test Lead, O-type to O-type Test Lead, Max. 400A, 3000mm	PSU/PSW/PEL-3000 Series
GTL-232	RS-232C Cable, 9-pin, F-F Type, null modem, 2000mm	PPR-Series
GTL-232A	RS-232C Cable, 9-pin, F-F Type, null modem, 2000mm	PPR-Series
GTL-234	RS-232C Cable, 9-pin, F-F Type, 2000mm	APS-1102A
GTL-238	RS-232 Cable, 9-pin, M-F Type, 1000mm	PEL-500 Series
GTL-240	USB Cable, USB 2.0, A/B Type (I, Type), 1200mm	PSW-Series, PSU-Series, APS-1102A, APS-7000 Series, PCS-1000I
GTL-246	USB Cable, USB 2.0, A/B Type (L, Type), 1200mm	PPR-Series, PSU-Series, PSB-2000 Series, PPH-1103/1103D, CPD-Series, GPC-Series, GPP-Series, APS-1102A, APS-7000 Series, PEL-3000/3000H Series, PEL-3000A Series, PEL-2000A(B) Series, PPK-Series, PEL-5000C Series, AEL-5000 Series, CPP-3060/6030, GSM-20410, PEL-5000C, ASR-3000 Series








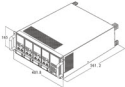

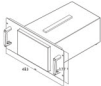

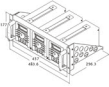

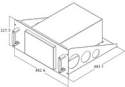

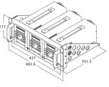

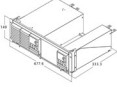

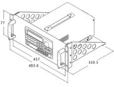

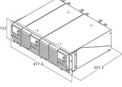

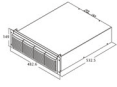

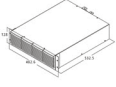
ACCESSORIES

MODEL	DESCRIPTION	APPLICABLE DEVICE
GTL-248	GPiB Cable, Double Shielded, 2000mm	PSB-2000 Series, PPH-150, PSW/PSH-Multi/PSU/PSH/PSM/PSW/PPF-Series, APS-7000 Series, PEL-1000/3000H Series, PEL-3000AE Series, PEL-2000A(B) Series, ASR-3000 Series, PEL-5000C Series, AEL-5000 Series, PEL-5000C Series, CSM-20H10
GTL-249	Frame Link Cable, 300mm	PEL-2000A(B) Series
GTL-250	GPiB Cable, Double Shielded, 600mm	PSW/PSH-Multi/PSU/PSH-Series, PSB-2000 Series, APS-7000 Series, PEL-5000C Series, AEL-5000 Series
GTL-255	Frame Link Cable, 300mm	PEL-1000/3000H Series
GTL-258	GPiB Cable, 25 pins Micro-D Connector	PPF-Series, PPF-Series, ASR-2000 Series, PSU-Series
GTL-259	RS-232 Cable with DB9 Connector to RJ45	PPX-Series, PPF-Series, PSU-Series
GTL-260	RS-485 Cable with DB9 Connector to RJ45	PPX-Series, PPF-Series, PSU-Series
GTL-261	Serial Master Cable + Terminator, 0.5M	PSU-Series, PPF-Series, PSU-Series, PPF-Series
GTL-262	RS-485 Slave Cable	PPX-Series, PPF-Series, PSU-Series
GLG-001	GPiB USB Adaptor, GPiB to USB Adaptor	CGS-3000 Series, PSB-Series, PSW-Multi Series
GUR-001A	RS232 USB Cable, 300mm	PPW-Series, PSW-Multi Series
GUR-001B	RS-232 to USB Adapter with #4-40 UNC Rivet Nut	PSW-Multi Series
PCS-001	Basic Accessory Kit	PCS-1000
PEL-001	GPiB Card	PEL-2000A(B) Series
PEL-002	Rack Mount Kit, PEL-2000 Series Rack Mount Kit	PEL-2000A(B) Series
PEL-003	Panel Cover	PEL-2000A(B) Series
PEL-004	GPiB Card	PEL-1000/3000H Series, PEL-3000AE Series
PEL-005	Connect Cu Plate	PEL-3000/3000H Series
PEL-006	Connect Cu Plate	PEL-3000/3000H Series
PEL-007	Connect Cu Plate	PEL-3000/3000H Series
PEL-008	Connect Cu Plate	PEL-3000/3000H Series
PEL-009	Connect Cu Plate	PEL-3000/3000H Series
PEL-010	Dust Filter	PEL-1000/3000H Series, PEL-3000AE Series
PEL-011	Load Input Terminal Cover	PEL-3000/3000H Series
PEL-012	Terminal Fittings Kits	PEL-3000/3000H Series
PEL-013	Flexible Terminal Cover	PEL-3000/3000H Series
PEL-014	I/I2 Protection Plug	PEL-3000/3000H Series
PEL-016	LAN Card	PEL-2000A(B) Series
PEL-018	LAN Card	PEL-3000/3000H Series
PEL-022	GPiB Card	PEL-5000C Series, AEL-5000 Series, PEL-5000C Series
PEL-023	RS-232 Card	PEL-5000C Series, AEL-5000 Series, PEL-5000C Series
PEL-024	LAN Card	PEL-5000C Series, AEL-5000 Series, PEL-5000C Series
PEL-025	USB Card	PEL-5000C Series, AEL-5000 Series, PEL-5000C Series
PEL-026	Hook Ring	PEL-5000C Series
PEL-027-1-4	Rack Mount Kit	PEL-5000C Series
PEL-028	HANDLE, U-shaped Handle(Fixed to the Bracket)	PEL-5000C Series, AEL-5000 Series
PEL-029	HANDLE, Rack Accessories(for AEL-5002/5003/5004)	AEL-5000 Series
PEL-030	GPiB+RS-232 Card	PEL-5000C Series, AEL-5000 Series, PEL-5000C Series
PEL-031	Rack Mount Kit	PEL-5000C Series
PEL-032	9923 Current Waveform Generator + RS232 Interface	PEL-5000C
PPX-C	GPiB Interface(Factory Installed)	PPF-Series
PSB-001	GPiB Card	PSB-2000 Series, PSB-1000 Series
PSB-003	Parallel Connection Kit (for Horizontal Installation), Kit Includes: (PSB-007 Joint Kit, Horizontal bus bar x 2, PSB-005 x1)	PSB-2000 Series, PSB-1000 Series
PSB-004	Parallel Connection Kit (for Vertical Installation) Kit Includes: (PSB-007 Joint Kit, Vertical bus bar x 2, PSB-005 x1) 1)	PSB-2000 Series, PSB-1000 Series
PSB-005	Parallel Connection Signal Cable	PSB-2000 Series, PSB-1000 Series
PSB-006	Serial Connection Signal Cable	PSB-2000 Series, PSB-1000 Series
PSB-007	Joint Kit: Includes 4 joining Plates, (M3x4)screws x 4, (M3x4)screw x 2	PSB-2000 Series
PSB-008	RS232C Cable (PSB-2000 Only)	PSB-2000 Series
PSB-101	Cable for 2 units of PSB-1000 units in Parallel Mode Connection	PSB-1000 Series
PSB-102	Cable for 3 units of PSB-1000 units in Parallel Mode Connection	PSB-1000 Series
PSB-103	Cable for 4 units of PSB-1000 units in Parallel Mode Connection	PSB-1000 Series
PSB-104	Cable for 2 units of PSB-1000 units in Series Mode Connection	PSB-1000 Series
PSB-105	GPiB Card	PSB-1000 Series
PSB-106	Basic Accessory Kit : M4 Terminal Screws and Washers x 2, M8 Terminal Bolts, Nuts and Washers x 2, Analog Control Protection Dummy x 1, Analog Control Lock Level x 2, Short Bar x 1	PSB-1000 Series
PSU-001	Front Panel Filter Kit(Factory Installed)	PSU-Series
PSU-01A	Joins a vertical stack of 2 PSU units together. 2U-sized handles x 2, joining plates x 2	PSU-Series
PSU-01B	Bus Bar for 2 units in parallel operation	PSU-Series
PSU-01C	Cable for 2 units in parallel operation	PSU-Series
PSU-02A	Joins a vertical stack of 3 PSU units Together. 3U-sized Handles x 2, joining plates x 2	PSU-Series
PSU-02B	Bus Bar for 3 units in Parallel Operation	PSU-Series
PSU-02C	Cable for 3 units in Parallel Operation	PSU-Series
PSU-03A	Joins a Vertical Stack of 4 PSU units Together. 4U-sized Handles x 2, joining plates x 2	PSU-Series
PSU-03B	Bus Bar for 4 units in Parallel Operation	PSU-Series
PSU-03C	Cable for 4 units in Parallel Operation	PSU-Series
PSU-212	RS232 Cable with DB9 Connector Kit	PSU-Series, PPF-Series
PSU-485	RS485 Cable with DB9 Connector Kit	PSU-Series, PPF-Series
PSU-GPiB	PSU GPiB Interface Card (Factory Installed)	PSU-Series
PSU-ISO-1	Isolated Current Remote Control Card (Factory Installed)	PSU-Series
PSU-ISO-V	Isolated Voltage Remote Control Card (Factory Installed)	PSU-Series
PSW-001	Accessory Kits	PSW-Series, PSW-Multi Series, PSB-1000 Series
PSW-002	Simple IDC Tool	PSW-Series, PSW-Multi Series, PSB-1000 Series
PSW-003	Contact Removal Tool	PSW-Series, PSW-Multi Series, PSB-1000 Series
PSW-004	Basic Accessory Kit for 30V/80V/160V models	PSW-Series, PSW-Multi Series
PSW-005	Series Operation Cable for 2 units(30V/80V/160V models only)	PSW-Series
PSW-006	Parallel Operation Cable for 2 units	PSW-Series
PSW-007	Parallel Operation Cable for 3 units	PSW-Series
PSW-008	Basic Accessory Kit for 250V/800V models	PSW-Series
PSW-009	Output Terminal Cover for 30V/80V/160V models	PSW-Series
PSW-010	Large Filler (Type II/III)	PSW-Series
PSW-011	Output Terminal Cover for 250V/800V models	PSW-Series
PSW-012	High Voltage Output Terminal for 250V/800V model	PSW-Series

ACCESSORIES

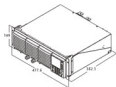
<p>GTL-101</p> 	<p>GTL-105A</p> 	<p>GTL-104A</p> 
<p>GTL-120</p> 	<p>GTL-121</p> 	<p>GTL-122</p> 
<p>GTL-123</p> 	<p>GTL-201A</p> 	<p>GTL-202</p> 
<p>GTL-203A</p> 	<p>GTL-204A</p> 	<p>GTL-218</p> 
<p>GTL-219</p> 	<p>GTL-220/GTL-222</p> 	<p>GTL-221/GTL-223</p> 
<p>GTL-232/GTL-232A</p> 	<p>GTL-240</p> 	<p>GTL-246</p> 
<p>GTL-248</p> 	<p>GTL-249</p> 	<p>GTL-250</p> 

ACCESSORIES

<p>GTL-253</p> 	<p>GTL-258</p> 	<p>GTL-259</p> 
<p>GTL-260</p> 	<p>GTL-261</p> 	<p>GTL-262</p> 
<p>PEL-002 Rack Mount Kit For: PEL-2000A Series</p>  	<p>GRA-401 Rack Mount Kit</p>  	
<p>GRA-408 Rack Mount Kit</p>  	<p>GRA-409 Rack Mount Kit For: APS-1102A</p>  	
<p>GRA-403 Rack Mount Kit For: PS34 Series</p>  	<p>GRA-410-J Rack Mount Kit (JIS) For: PSW Series</p>  	
<p>GRA-407 Rack Mount Kit For: PSM Series, PST Series</p>  	<p>GRA-410-E Rack Mount Kit (EIA) For: PSW Series</p>  	
<p>GRA-413-J Rack Mount Kit (JIS) For: PEL-3211/3211H</p>  	<p>GRA-413-E Rack Mount Kit (EIA) For: PEL-3211/3211H</p>  	

GRA-414-J Rack Mount Kit (JIS)

For : PEL-3021/3021H/3041/3041H/3111/3111H
PEL-3031AE/3032AE



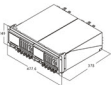
GRA-414-E Rack Mount Kit (EIA)

For : PEL-3021/3021H/3041/3041H/3111/3111H
PEL-3031AE/3032AE



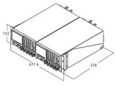
GRA-418-J Rack Mount Kit (JIS)

For : PSB-1000 Series



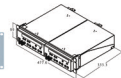
GRA-418-E Rack Mount Kit (EIA)

For : PSB-1000 Series



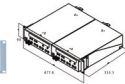
GRA-419 Rack Mount Kit (JIS)

For : PCS-1000I



GRA-419 EIA Rack Mount Kit

For : PCS-1000



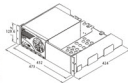
GRA-423 Rack Mount Kit

For : APS-7050/7100/7050E/7100E Series



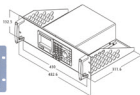
GRA-424 Rack Mount Kit

For : PSB-2000 Series



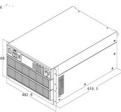
GRA-428 Rack Mount Kit (EIA)

For : PSP-Series



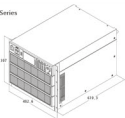
GRA-429 Rack Mount Kit

For : APS-7200 Series



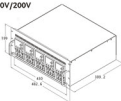
GRA-430 Rack Mount Kit

For : APS-7300 Series



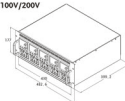
GRA-431-J Rack Mount Kit (JIS) with AC 100V/200V

For : PFR-Series



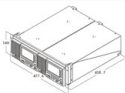
GRA-431-E Rack Mount Kit (EIA) with AC 100V/200V

For : PFR-Series



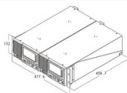
GRA-439-J Rack Mount Kit (JIS)

For : ASR-2000 Series



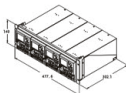
GRA-439-E Rack Mount Kit (EIA)

For : ASR-2000 Series



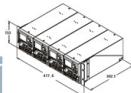
GRA-441-J Rack Mount Kit (JIS)

For : PFX-Series



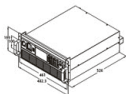
GRA-441-E Rack Mount Kit (EIA)

For : PFX-Series



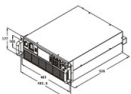
GRA-442-J Rack Mount Kit (JIS)

For : ASR-3000 Series



GRA-442-E Rack Mount Kit (EIA)

For : ASR-3000 Series



GRA-449-J Rack Mount Kit (JIS)

For : GPP-Series



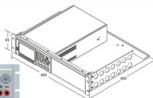
GRA-449-E Rack Mount Kit (EIA)

For : GPP-Series



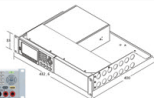
GRA-450-J Rack Mount Kit (JIS)

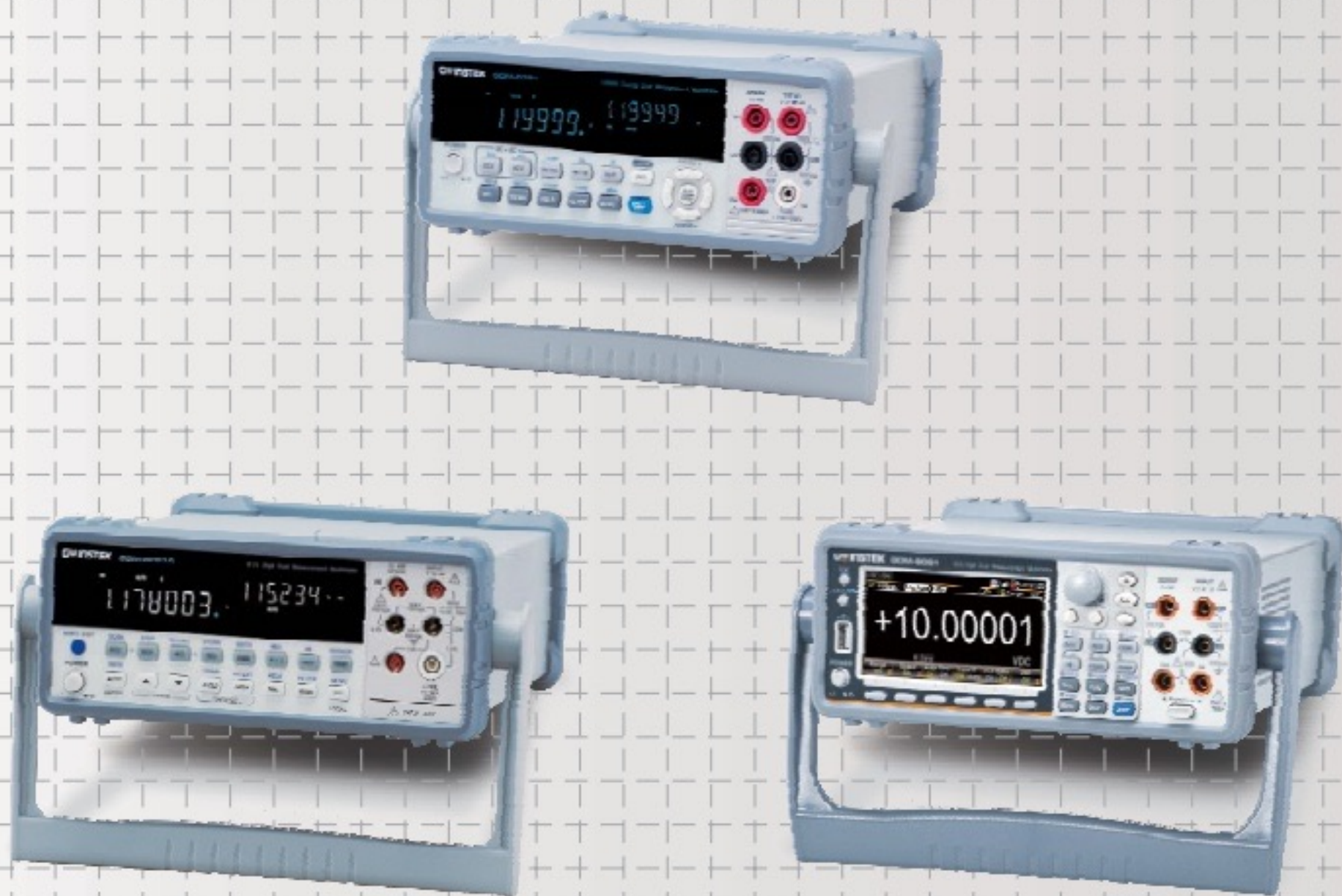
For : GSM-20H10, PPH-Series



GRA-450-E Rack Mount Kit (EIA)

For : GSM-20H10, PPH-Series





DIGITAL MULTIMETER

Digital Multimeters are the most commonly utilized instruments on many engineering workbenches. GW Instek provides a variety of digital multimeters ideal for you to satisfy the requirements of your customers in different situations.

The GDM-9000 series, 6 ½ DMM, has become the best asset for users in R&D verification, production testing and high-end educational institutions by its excellent performance and high-precision design.

The GDM-8200A series is divided into 6 ½ digits and 5 ½ digits. The GDM-8200A series has become the best tool for engineers in various multi-point measurement applications by adopting the design of a plug-in scanner card on the rear panel.

The GDM-8300 series and GDM-8245 feature 5 ½ digits and 4 ¾ digits (50,000 counts). The GDM-8300 series and GDM-8245 have become the best tools for technicians in service and maintenance, production testing and education institutions by the characteristics of low cost, excellent performance and ease of use.

PRODUCTS

- Digital Multimeter
-

DIGITAL METERS

DIGITAL MULTIMETER OVERVIEW

From 6 1/2 to 4 3/4 digits, the GDM-9000/8000 Series can deliver a measurement accuracy of up to 0.0035% and with high current fuse protection can withstand up to 12A. With the design focused on superior performance and ease of use, the GDM-9000/8000 Series has become some of the best assets for engineers and technicians in service & repair, production testing and educational institutions. USB, RS-232C, GPIB, LAN and Scanner card interfaces all make the series ideal for PC controlled applications.

BENCH-TOP DIGITAL MULTIMETER

MAIN FUNCTION \ MODEL	GDM-9061	GDM-9060	GDM-8261A	GDM-8255A
Display	6 1/2 (1200000 Counts) TFT LCD Dual Measurement	6 1/2 (1200000 Counts) TFT LCD Dual Measurement	6 1/2 (1200000 Counts) VFD Dual Measurement	5 1/2 (199999 Counts) VFD Dual Measurement
Autoranging	✓	✓	✓	✓
DCV Basic Accuracy	0.0035%	0.0075%	0.0035%	0.012%
Major Measurement Functions	AC & DC Voltage AC & DC Current (3A/10A) 2- & 4-wires resistance Continuity & Diode Frequency & Period Temperature (RTD/ Thermocouple/Thermistor) Capacitance	AC & DC Voltage AC & DC Current (3A) 2- & 4-wires resistance Continuity & Diode Frequency & Period Temperature (RTD/ Thermocouple/Thermistor) Capacitance	AC & DC Voltage AC & DC Current 2- & 4-wires resistance Continuity & Diode Frequency & Period Temperature (RTD/Thermocouple)	AC & DC Voltage AC & DC Current 2- & 4-wires resistance Continuity & Diode Frequency & Period Temperature (Thermocouple)
Advanced Functions	Math. (REL, dB, dBm, Compare, MA+B, Percent, 1/X); STAT (Min/Max/Average/P-P, STDEV); Display (Number, Trend Chart, Bar Meter, Histogram); Rear Input	Math. (REL, dB, dBm, Compare, MA+B, Percent, 1/X); STAT (Min/Max/Average/P-P, STDEV); Display (Number, Trend Chart, Bar Meter, Histogram)	REL, dB, dBm, Hold, Math, Max./Min., Compare, Store, Recall, AC+DC True RMS	REL, dB, dBm, Hold, Math, Max./Min., Compare, Store, Recall, AC+DC True RMS
Interface (Std.)	USB device (USBTMC/USB CDC) RS-232C, LAN, Digital I/O USB host	USB device (USBTMC/USB CDC) RS-232C, LAN, Digital I/O USB host	USB device (USB CDC) RS-232C, Digital I/O	USB device (USB CDC) RS-232C, Digital I/O
Optional	GPIB	GPIB	Scanner Card/GPIB/LAN	Scanner Card
Page	E3-6	E3-6	E7-8	E9-10

BENCH-TOP DIGITAL MULTIMETER

MAIN FUNCTION \ MODEL	GDM-8351	GDM-8342	GDM-8341	GDM-8245
Display	5 1/2 (120000 Counts) VFD Dual Measurement	50000 Counts VFD Dual Measurement	50000 Counts VFD Dual Measurement	50000 Counts LED Dual Display
Autoranging	✓	✓	✓	✓
DCV Basic Accuracy	0.012%	0.02%	0.02%	0.03%
Major Measurement Functions	AC & DC Voltage AC & DC Current 2- & 4-wires resistance Continuity & Diode Frequency & Period Capacitance Temperature (Thermocouple)	AC & DC Voltage AC & DC Current 2- wires resistance Continuity & Diode Frequency & Period Capacitance Temperature (Thermocouple)	AC & DC Voltage AC & DC Current 2-wires resistance Continuity & Diode Frequency & Period Capacitance	AC & DC Voltage AC & DC Current 2-wires resistance Continuity & Diode Frequency Capacitance
Advanced Measurement Functions	REL, dB, dBm, Hold, Math, Max./Min., Compare, AC+DC True RMS	REL, dB, dBm, Hold, Math, Max./Min., Compare, AC+DC True RMS	REL, dB, dBm, Hold, Math, Max./Min., Compare, AC+DC True RMS	REL, dBm, Hold, Max./Min., AC+Hz, AC+DC True RMS
Interface (Std.)	USB device (support USBTMC/ USB CDC) RS-232C, Digital I/O	USB device(USB CDC) USB host	USB device (USB CDC)	—
Optional	—	GPIB	—	—
Page	E11-12	E13-14	E13-14	E15

6 1/2 Digit Dual Measurement Multimeter



GDM-906X Series



GW Instek launches GDM-906X series 6 1/2 digit dual measurement multimeter (2 models: GDM-9061 and GDM-9060), featuring high precision DC voltage accuracy, fast sampling rate, 12 measurement functions (DC voltage/current, AC voltage/current, 2-wire/4-wire resistance, frequency, period, diode, continuity beeper, temperature, capacitance), 6 mathematical functions (dB/dBm/Compare/ MX+B/Percent and 1/X) as well as a variety of communications interfaces (USB device/host, RS-232C, LAN, digital I/O and optional GPIB) to provide comprehensive measurement capabilities, higher speed and accuracy.

The series adopts a 4.3-inch TFT graphical display and a fast sampling rate (GDM-9061: 10k/s, GDM-9060: 1k/s max.). In addition to the conventional digital display, displays can be collocated with bar meter, trend chart or histogram to make the panoramic view of the entire measurement process more completely and quickly presented. At the same time, the internal memory capacity (GDM-9061: 100k, GDM-9060: 10k) can simultaneously facilitate the trend plot or histogram measurement process and perform statistical calculations to simplify the complex trend analysis.

For user-friendly, the GDM-906X series incorporates some ingenious operational ideas, such as numeric soft keys for settings that require numerical input, upper/lower limits, LAN IP operational interfaces or messages, and multiple languages (English / Traditional Chinese/ Simplified Chinese/ Japanese / Korean) to shorten the operational and learning time of the meter.

For ATS measurement or remote control applications, the GDM-906X series provides GPIB (option can be installed at customer site) other than standard communications interfaces: USB, RS-232 and LAN. With respect to software supports, the GDM-906X series provides DMM-Viewer2 to assist users in observing or recording the data from the measurement process. In addition, LabVIEW driver is also provided to facilitate the program requirements of different system integrations.

FEATURES

- * 6 1/2 Digit Display: 1,200,000 Counts
- * 4.3" TFT Graphic LCD
- * DCV Basic Accuracy: 0.0035%(GDM-9061)/ 0.0075%(GDM-9060)
- * 12 Measurement Functions: DCV, ACV, DCI, ACI, 2-wire and 4-wire Resistance, Frequency, Period, Diode, Continuity, Temperature and Capacitance
- * Sampling Rate up to 10k SPS (GDM-9061)
- * Dual Measurements to Perform Two Selected Measurement Simultaneously
- * Offer Graphical Capabilities Including Histogram, Bar Meter and Trend
- * Temperature Measurement Support RTD, Thermistor as well as Thermocouple
- * Standard Interface: USB Host/Device, RS-232C, LAN, Digital I/O
- * Optional Interface: GPIB

SPECIFICATIONS				
DC CHARACTERISTICS				
				Accuracy : ± (% of reading + % of range)
DC Voltage	Range	Resolution	Input Resistance	Accuracy(1Year)(TCAL±5°C)
				GDM-9061 GDM-9060
	100.0000 mV	0.1µV	10MΩ or >10GΩ	0.0050 + 0.0035 0.0090 + 0.0065
	1.000000 V	1µV	10MΩ or >10GΩ	0.0048 + 0.0007 0.0080 + 0.0010
	10.00000 V	10µV	10MΩ or >10GΩ	0.0035 + 0.0005 0.0075 + 0.0005
Resistance	Range	Resolution	Test Current	Accuracy(1Year)(TCAL±5°C)
				GDM-9061 GDM-9060
	100.0000 Ω	100µΩ	1mA	0.010 + 0.004 0.014 + 0.007
	1.000000 kΩ	1mΩ	1mA	0.010 + 0.001 0.014 + 0.001
	10.00000 kΩ	10mΩ	100µA	0.010 + 0.001 0.014 + 0.001
DC Current	Range	Resolution	Burden Volt.	Accuracy(1Year)(TCAL±5°C)
				GDM-9061 GDM-9060
	100.0000 µA	100pA	< 0.11 V	0.05 + 0.025 0.05 + 0.025
	1.000000 mA	1nA	< 0.11 V	0.05 + 0.006 0.05 + 0.006
	10.00000 mA	10nA	< 0.04 V	0.05 + 0.020 0.05 + 0.020
Continuity	Range	Resolution	Test Current	Accuracy(1Year)(TCAL±5°C)
				GDM-9061 GDM-9060
	1000.000 Ω	0.001 Ω	1 mA	0.010 + 0.030 0.014 + 0.030
				GDM-9061 GDM-9060
	5.000000 V	1µV	1 mA	0.010 + 0.030 0.014 + 0.030
DC Ratio				
Accuracy Specification: ± (DC Input accuracy + DC Reference accuracy)				
TEMPERATURE CHARACTERISTICS				
RTD (Accuracy based on PT100)	Range	Resolution	Accuracy(1Year)(TCAL±5°C)	
	-200 °C ~ -100 °C	0.001 °C	0.09 °C	
	-100 °C ~ -20 °C	0.001 °C	0.08 °C	
	-20 °C ~ 20 °C	0.001 °C	0.06 °C	
	20 °C ~ 100 °C	0.001 °C	0.08 °C	
	100 °C ~ 300 °C	0.001 °C	0.12 °C	
Thermocouples (Accuracy based on ITS-90)	Type	Range	Resolution	Accuracy(1Year)(TCAL±5°C)
	E	-200 °C ~ +1000 °C	0.002 °C	0.2 °C
	J	-210 °C ~ +1200 °C	0.002 °C	0.2 °C
	T	-200 °C ~ +400 °C	0.002 °C	0.3 °C
	K	-200 °C ~ +1372 °C	0.002 °C	0.3 °C
	N	-200 °C ~ +1300 °C	0.003 °C	0.4 °C
	R	-50 °C ~ +1768 °C	0.01 °C	1 °C
	S	-50 °C ~ +1768 °C	0.01 °C	1 °C
Thermistor (2.2kΩ, 5kΩ, 10kΩ or User Type)	Range	Resolution	Accuracy(1Year)(TCAL±5°C)	
	-80 °C ~ 150 °C	0.01 °C	0.01 °C	
AC CHARACTERISTICS				
AC Voltage (True RMS)	Range	Resolution	Frequency	Accuracy(1Year)(TCAL±5°C)
				GDM-9061 GDM-9060
	100.0000 mV	0.1µV	3Hz ~ 5Hz	1.00 + 0.04 1.00 + 0.04
			5Hz ~ 10Hz	0.35 + 0.04 0.38 + 0.04
			10Hz ~ 20kHz	0.06 + 0.04 0.09 + 0.04
			20kHz ~ 50kHz	0.12 + 0.05 0.15 + 0.05
50kHz ~ 100kHz			0.60 + 0.08 0.63 + 0.08	
100kHz ~ 300kHz	4.00 + 0.50 4.00 + 0.50			



GDM-906X Series

SPECIFICATIONS																					
	1.000000 V to 750.000 V	1 μ V ~ 1mV	<table border="1"> <tr> <td>3Hz ~ 5Hz</td> <td>1.00 + 0.04</td> <td>1.00 + 0.04</td> </tr> <tr> <td>5Hz ~ 10Hz</td> <td>0.35 + 0.04</td> <td>0.38 + 0.04</td> </tr> <tr> <td>10Hz ~ 20kHz</td> <td>0.06 + 0.04</td> <td>0.09 + 0.04</td> </tr> <tr> <td>20kHz ~ 50kHz</td> <td>0.12 + 0.05</td> <td>0.15 + 0.05</td> </tr> <tr> <td>50kHz ~ 100kHz</td> <td>0.60 + 0.08</td> <td>0.63 + 0.08</td> </tr> <tr> <td>100kHz ~ 300kHz</td> <td>4.00 + 0.50</td> <td>4.00 + 0.50</td> </tr> </table>	3Hz ~ 5Hz	1.00 + 0.04	1.00 + 0.04	5Hz ~ 10Hz	0.35 + 0.04	0.38 + 0.04	10Hz ~ 20kHz	0.06 + 0.04	0.09 + 0.04	20kHz ~ 50kHz	0.12 + 0.05	0.15 + 0.05	50kHz ~ 100kHz	0.60 + 0.08	0.63 + 0.08	100kHz ~ 300kHz	4.00 + 0.50	4.00 + 0.50
3Hz ~ 5Hz	1.00 + 0.04	1.00 + 0.04																			
5Hz ~ 10Hz	0.35 + 0.04	0.38 + 0.04																			
10Hz ~ 20kHz	0.06 + 0.04	0.09 + 0.04																			
20kHz ~ 50kHz	0.12 + 0.05	0.15 + 0.05																			
50kHz ~ 100kHz	0.60 + 0.08	0.63 + 0.08																			
100kHz ~ 300kHz	4.00 + 0.50	4.00 + 0.50																			
AC Current (True RMS)	Range	Resolution	Frequency	Accuracy(1Year)(TCAL \pm 5°C)																	
				GDM-9061	GDM-9060																
	100.0000 μ A 10.00000 mA	100pA 10nA	3Hz ~ 5Hz	1.00 + 0.04	1.00 + 0.04																
			5Hz ~ 10Hz	0.35 + 0.04	0.38 + 0.04																
	1.000000 mA 100.0000 mA	1nA 100nA	10Hz ~ 5kHz	0.10 + 0.04	0.13 + 0.04																
			5kHz ~ 10kHz	0.18 + 0.04	0.20 + 0.04																
	1.000000 A	1 μ A	3Hz ~ 5Hz	1.00 + 0.04	1.00 + 0.04																
			5Hz ~ 10Hz	0.30 + 0.04	0.33 + 0.04																
	3.000000 A	1 μ A	10Hz ~ 5kHz	0.10 + 0.04	0.13 + 0.04																
			5kHz ~ 10kHz	0.15 + 0.04	0.18 + 0.04																
	10.00000 A	10 μ A	3Hz ~ 5Hz	1.00 + 0.04	1.00 + 0.04																
			5Hz ~ 10Hz	0.35 + 0.04	0.38 + 0.04																
CAPACITANCE CHARACTERISTICS																					
Capacitance	Range	Resolution	Accuracy(1Year)(TCAL \pm 5°C)																		
	1.000 nF	0.001nF	2.00 + 2.00																		
	10.00 nF	0.01nF	2.00 + 1.00																		
	100.0 nF	0.1nF	2.00 + 0.40																		
	1.000 μ F	0.001 μ F	2.00 + 0.40																		
	10.00 μ F	0.01 μ F	2.00 + 0.40																		
FREQUENCY AND PERIOD CHARACTERISTICS																					
Frequency/Period	Range	Frequency	Accuracy(1Year)(TCAL \pm 5°C)																		
	100.0000mV to 750.000V	3Hz ~ 5Hz	0.1																		
		5Hz ~ 10Hz	0.05																		
		10Hz ~ 40Hz	0.03																		
40Hz ~ 1MHz		0.006																			
GENERAL INFORMATION																					
Display	4.3" Color TFT WQVGA (480 x 272)																				
Standard Interface	RS-232C, USB Host/Device, LAN, Digital I/O																				
Power Source	AC 100 V/120 V/220 V/240 V \pm 10%																				
Power Line Frequency	50 Hz/60 Hz/400 Hz \pm 10%																				
Power Consumption	Max. 25VA																				
Dimensions & Weight	267(W) x 107(H) x 302(D) mm, Approx. 3.5kg																				

ORDERING INFORMATION

GDM-9061 6 ½ (1200000 counts) Digit Dual Measurement Multimeter
GDM-9060 6 ½ (1200000 counts) Digit Dual Measurement Multimeter

ACCESSORIES:
 Safety Instructions x 1, Power cord x 1, USB cable GTL-246 x 1, Test lead GTL-217 x 1,
 CD x 1 (including the complete user manual, upgrade program and PC software, DMM-Viewer2)

OPTION

GDM-90G1 GPIB card (*) GPIB can be installed at customer site

OPTIONAL ACCESSORIES

GTL-205A Temperature Probe Adapter with Thermal Coupling (K-type), approx. 1000mm	
GTL-234 RS-232C Cable, 9-pin female-female cable, approx. 2000mm	
GTL-248 GPIB Cable, approx. 2000mm	
GBM-01 4 Wire (kelvin clip) test lead, 90V(max.), approx..1100mm	
GRA-422 Rack Mount Kit, 19" 2U size	GDM-TL1 Test Lead Set
GRA-436 Rack Mount Kit, 19" 2U size for two sets	GSC-014 Soft Carrying Case for DMM Accessory

GDM-9061 Rear Panel



GDM-9060 Rear Panel



GTL-217 Test Lead



GSC-014 Soft Carrying Case for DMM Accessory



GDM-TL1 Test Lead Set



GTL-205A Temperature probe adaptor with thermocouple (K type)

Approx. 1m



6 1/2 Digit Dual Measurement Multimeter

A. IDEAL BENCHTOP PARTNER

	GDM-9061	GDM-9060
DCV Accuracy	0.0035%	0.0075%
Sampling Rate	10k/sec	1k/sec
Memory	100k	10k
Rear Input	Yes	No
Current Terminal (Front)	3A, 10A	3A
Current Terminal (Rear)	3A	—
Display	Number, Trend Chart, Bar Meter, Histogram	
Function	Voltage/Current : AC, DC Resistance : 2-Wire, 4-Wire Diode, Continuity, Temperature Frequency, Period, Capacitance	
Math.	REL, dB, dBm, Compare, MX+B, Percent, 1/X	
STAT.	Min/Max/Average/ P-P, STDEV	
Interface	RS-232C, USB Host/Device, LAN	

The GDM-906X series provides all fundamental measurement functions engineers require to design, develop, and test electronic circuits or products, including voltage, current, resistance, diode, and continuity beeper, frequency, temperature and capacitance. In addition, the series also features mathematical functions (dB, dBm, Compare, MX+B, 1/X and Percent), statistical functions (Min/Max/Average/P-P/STDEV), and a variety of standard communications interfaces. The series can meet specific measurement requirements and complex measurement applications whether for the benchtop operation or to be installed in the system.

B. DIVERSE DISPLAY MODE



In addition to the standard numeric display mode, it also provides a variety of graphical functions such as bar meter, trend chart and

histogram, so that the measurement results are no longer just a series of numbers, but a swift insight into the panoramic measurement.

C. DUAL MEASUREMENT AND DUAL TREND LINE



The dual measurement function has always been a unique feature of GW Instek digital multimeters, allowing two measurement functions to be performed simultaneously and displaying the test results separately so as to greatly improve the test speed of the multi-functional measurement tasks.

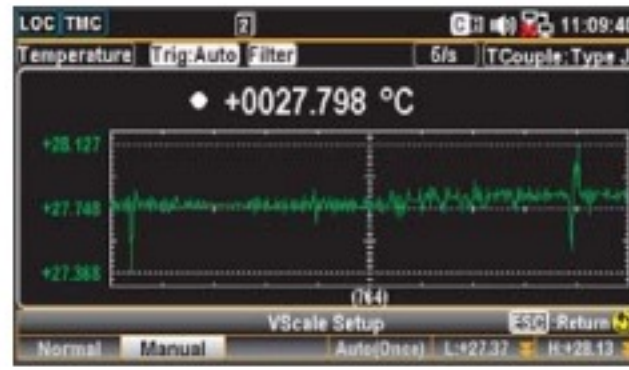
D. HIGH MEASUREMENT RESOLUTION AND HIGH SAMPLING RATE

GDM-9061 MEASUREMENT TYPE - DCV/DCI/2W/4W									
Refresh Rate Available									
6 1/2 Resolution			5 1/2 Resolution			4 1/2 Resolution			
5/s	20/s	60/s	100/s	400/s	1.2k/s	2.4k/s	4.8k/s	7.2k/s	10k/s

GDM-9060 MEASUREMENT TYPE - DCV/DCI/2W/4W									
Refresh Rate Available									
6 1/2 Resolution			5 1/2 Resolution			4 1/2 Resolution			
5/s	20/s	60/s	100/s	400/s	1k/s	—	—	—	—

The GDM-906X series provides high resolution of 0.1µV for voltage measurement, 100pA for current measurement, and 100µΩ for resistance measurement to meet the necessary requirements for precision measurement in specific applications. In addition, GDM-9061 is capable of achieving 10k readings per second with a display resolution of 4 1/2 digits, while GDM-9060 achieves 1k measurement readings per second with a display resolution of 5 1/2 digits; such a fast sampling rate is sufficient for current measurement needs.

E. TEMPERATURE MEASUREMENT



The GDM-906X series conducts temperature measurement and is ideal for a variety of temperature sensors, such as thermistors, RTDs, and thermocouples. The GDM-906X's temperature measurement supports commonly used thermocouple types (e.g. J / T / K..., etc.), using voltage

measurement terminals as thermocouple inputs, and calculating temperature based on voltage fluctuations; the function can be used as a temperature recorder if collocated with internal memory capacity and the trend chart function.

F. DIVERSE COMMUNICATIONS INTERFACE AND FAST TRANSFER RATE



For system integration applications, the GDM-906X series is equipped with RS232, USB and LAN as standard communications interfaces, and GPIB is an option (can be installed by customer) to meet the

requirements of different system integrations. Data transfer rate is up to 10k readings per second (GDM-9061) or 1k readings per second (GDM-9060) via USB/LAN/GPIB interfaces.

G. CONVENIENT PC SOFTWARE



The PC software DMM-Viewer2 is suitable for any computer communications interfaces (RS232C/LAN/USB/ GPIB) provided by the GDM-906X series for long-term data acquisition. The software not only allows users to control the settings of the GDM-906X series but also provides the observation mode or the recording mode for the captured data. For the observation mode, the measurement result is directly presented as the result of the trend plot or the histogram and the result is

not saved. For the recording mode, the measurement result is directly saved into the log file, but only the current display is shown in the process. The measured data and trend plot can be viewed after the recording mode is stopped. In addition, the GDM-906X series also provides LabVIEW driver to meet the software application requirements of system integration.

6 1/2 Digit Dual Measurement Multimeter



GDM-8261A is a high precision 6 1/2 digit Digital Multimeter with dual measurement displays, 11 measurement functions and 10 math functions at high accuracy (35ppm DC voltage accuracy) to accommodate the most frequently performed parameter measurements in various application fields today. GDM-8261A adopts a scanner card, which carries 16 V-Channels and 2 I-Channels, to facilitate the measurements of multiple-test points on either a device or multiple devices all at a press of a button. With this multi-point measurement capability, GDM-8261A can be used as a semi-auto ATE System to increase the throughput of manufacturing test or as a data logger to perform long term monitoring or characterization of a DUT. A PC Software, ExcelADDINS, is available with GDM-8261A to support multi-channel panel setting and data logging of the scanner card. Besides, a LabVIEW driver is also supported to help user create his/her own virtual instrument on the PC screen for easy programming. For ATE system measurements or remote control applications, both USB and RS-232C Interfaces are provided as standard, and either GPIB or LAN can be selected as optional interface for GDM-8261A.

GDM-8261A



FEATURES

- * 6 1/2 Digit Display : 1,200,000 Counts
- * DCV Basic Accuracy : 0.0035%
- * Dual Measurements to Perform Two Selected Measurements Simultaneously
- * Bright Vacuum Fluorescent Display (VFD)
- * 11 Measurement Functions & 10 Math Functions
- * High Resolution : Up to 100pA Resolution with DCI and 1nA with ACI Measurements
- * Temperature Measurement (RTD & Thermocouple) From -200°C ~ +1820°C
- * High Data Transmission Speed : Up to 2,400 readings/s Through USB Interface
- * Standard Interfaces : USB, RS-232C, Digital I/O
- * Optional Interfaces : GPIB or LAN
- * Optional Scanner Card : GDM-SC1A (V ch x 16, I ch x 2)
- * Free PC Software : Excel ADD-In, LabVIEW Driver

GDM-SC1A Scanner card

Multipoint Testing can be facilitated by simple insertion of scanner card.



GTL-247 USB Cable

A-A type cable, Approx. 1.8m



GDM-01 Calibration key



SPECIFICATIONS Accuracy : ± (% of reading + % of range) for 1-hour warm-up at 6 1/2 digits, slow mode						
FUNCTION						
Range (*1)	Resolution	Test Current or etc.	24 Hours 23°C ± 1°C	90 Days 23°C ± 5°C	1 Year 23°C ± 5°C	Temperature Coefficient 0°-18°C / 28°-55°C
DC VOLTAGE						
100.0000 mV	0.1 μV	10MΩ or >10GΩ	0.0030 + 0.0030	0.0040 + 0.0035	0.0050 + 0.0035	0.0005 + 0.0005
1.000000 V	1 μV	10MΩ or >10GΩ	0.0015 + 0.0004	0.0020 + 0.0005	0.0035 + 0.0005	0.0005 + 0.0001
10.00000 V	10 μV	11.11MΩ±1%	0.0020 + 0.0006	0.0030 + 0.0007	0.0048 + 0.0007	0.0005 + 0.0001
100.0000 V	0.1mV	10.1MΩ±1%	0.0020 + 0.0006	0.0035 + 0.0006	0.0081 + 0.0006	0.0005 + 0.0001
1000.000 V	1mV	10.1MΩ±1%	0.0025 + 0.0006	0.0044 + 0.0010	0.0090 + 0.0010	0.0005 + 0.0001
RESISTANCE (*2)						
100.0000 Ω	100 μΩ	1 mA	0.0030 + 0.0030	0.008 + 0.004	0.010 + 0.004	0.0008 + 0.0005
1.000000 kΩ	1mΩ	1 mA	0.0020 + 0.0005	0.008 + 0.001	0.010 + 0.001	0.0008 + 0.0001
10.00000 kΩ	10mΩ	100 μA	0.0020 + 0.0005	0.008 + 0.001	0.010 + 0.001	0.0008 + 0.0001
100.0000 kΩ	100mΩ	10 μA	0.0020 + 0.0005	0.008 + 0.001	0.010 + 0.001	0.0008 + 0.0001
1.000000 MΩ	1Ω	3.5 μA	0.0020 + 0.0010	0.008 + 0.001	0.010 + 0.001	0.0010 + 0.0002
10.00000 MΩ	10Ω	350 nA	0.0150 + 0.0010	0.020 + 0.001	0.040 + 0.001	0.0030 + 0.0004
100.0000 MΩ	100Ω	350 nA / 10 MΩ	0.3000 + 0.0100	0.800 + 0.010	0.800 + 0.010	0.1500 + 0.0002
DC CURRENT						
100.0000 μA	100pA	< 0.015 V	0.010 + 0.020	0.04 + 0.025	0.05 + 0.025	0.002 + 0.0030
1.000000 mA	1nA	< 0.15 V	0.007 + 0.005	0.03 + 0.005	0.05 + 0.005	0.002 + 0.0005
10.00000 mA	10nA	< 0.07 V	0.005 + 0.010	0.03 + 0.020	0.05 + 0.020	0.002 + 0.0020
100.0000 mA	0.1 μA	< 0.7 V	0.010 + 0.004	0.03 + 0.005	0.05 + 0.005	0.002 + 0.0005
1.000000 A	1 μA	< 0.8 V	0.050 + 0.006	0.08 + 0.010	0.10 + 0.010	0.005 + 0.0010
10.00000 A	10 μA	< 0.5 V	0.100 + 0.008	0.12 + 0.008	0.15 + 0.008	0.005 + 0.0008
CONTINUITY						
1000.000 Ω	0.001 Ω	1 mA	0.002 + 0.030	0.008 + 0.030	0.010 + 0.030	0.001 + 0.002
DIODE TEST (*3)						
1.000000 V	1 μV	1 mA (*4)	0.002 + 0.010	0.008 + 0.020	0.010 + 0.020	0.001 + 0.002

SPECIFICATIONS Accuracy : ± (% of reading + % of range) for 1-hour warm-up at 6 1/2 digits, slow mode						
FUNCTION						
Range (*1)	Resolution	Frequency or etc.	24 Hours 23°C ± 1°C	90 Days 23°C ± 5°C	1 Year 23°C ± 5°C	Temperature Coefficient 0°-18°C / 28°-55°C
TRUE RMS AC VOLTAGE (*5)						
100.0000mV	0.1 μV	3Hz-5Hz	1.00 + 0.03	1.00 + 0.04	1.00 + 0.04	0.100 + 0.004
		5Hz-10Hz	0.35 + 0.03	0.35 + 0.04	0.35 + 0.04	0.035 + 0.004
		10Hz-20kHz	0.04 + 0.03	0.05 + 0.04	0.06 + 0.04	0.005 + 0.004
		20kHz-50kHz	0.10 + 0.05	0.11 + 0.05	0.12 + 0.05	0.011 + 0.005
		50kHz-100kHz	0.55 + 0.08	0.60 + 0.08	0.60 + 0.08	0.060 + 0.008
		100 kHz-300kHz(*7)	4.00 + 0.50	4.00 + 0.50	4.00 + 0.50	0.200 + 0.020
1.000000V-750.000 V(*6)	1 μV-1mV	3Hz-5Hz	1.00 + 0.02	1.00 + 0.03	1.00 + 0.03	0.100 + 0.003
		5Hz-10Hz	0.35 + 0.02	0.35 + 0.03	0.35 + 0.03	0.035 + 0.003
		10Hz-20kHz	0.04 + 0.02	0.05 + 0.03	0.06 + 0.03	0.005 + 0.003
		20kHz-50kHz	0.10 + 0.04	0.11 + 0.05	0.12 + 0.05	0.011 + 0.005
		50kHz-100kHz	0.55 + 0.08	0.60 + 0.08	0.60 + 0.08	0.060 + 0.008
		100kHz-300kHz(*7)	4.00 + 0.50	4.00 + 0.50	4.00 + 0.50	0.200 + 0.020
TRUE RMS AC CURRENT (*5)						
1.000000 mA	1nA	3Hz-5Hz	1.00 + 0.04	1.00 + 0.04	1.0 + 0.04	0.100 + 0.006
		5Hz-10Hz	0.30 + 0.04	0.30 + 0.04	0.3 + 0.04	0.035 + 0.006
		10Hz-5kHz	0.10 + 0.04	0.10 + 0.04	0.1 + 0.04	0.015 + 0.006
		5kHz-10kHz	0.20 + 0.25	0.20 + 0.25	0.2 + 0.25	0.030 + 0.006
10.00000 mA	10nA	3Hz-5Hz	1.10 + 0.06	1.10 + 0.06	1.10 + 0.06	0.200 + 0.006
		5Hz-10Hz	0.35 + 0.06	0.35 + 0.06	0.35 + 0.06	0.100 + 0.006
		10Hz-5kHz	0.15 + 0.06	0.15 + 0.06	0.15 + 0.06	0.015 + 0.006
		5kHz-10kHz	0.35 + 0.70	0.35 + 0.70	0.35 + 0.70	0.030 + 0.006
100.0000 mA	100nA	3Hz-5Hz	1.00 + 0.04	1.00 + 0.04	1.00 + 0.04	0.100 + 0.006
		5Hz-10Hz	0.30 + 0.04	0.30 + 0.04	0.30 + 0.04	0.035 + 0.006
		10Hz-5kHz	0.10 + 0.04	0.10 + 0.04	0.10 + 0.04	0.015 + 0.006
		5kHz-10kHz	0.20 + 0.25	0.20 + 0.25	0.20 + 0.25	0.030 + 0.006



GDM-8261A

SPECIFICATIONS

Accuracy : ± (% of reading + % of range) for 1-hour warm-up at 6 1/2 digits, slow mode

TRUE RMS AC CURRENT (*5)

Range (*1)	Resolution	Frequency or etc.	24 Hours 23°C ± 1°C	90 Days 23°C ± 5°C	1 Year 23°C ± 5°C	Temperature Coefficient 0°-18°C/28°-55°C
1.000000 A	1µA	3Hz-5Hz	1.00 + 0.04	1.00 + 0.04	1.00 + 0.04	0.100 + 0.006
		5Hz-10Hz	0.30 + 0.04	0.30 + 0.04	0.30 + 0.04	0.035 + 0.006
		10Hz-5kHz	0.10 + 0.04	0.10 + 0.04	0.10 + 0.04	0.015 + 0.006
		5kHz-10kHz	0.35 + 0.70	0.35 + 0.70	0.35 + 0.70	0.030 + 0.006
10.00000 A	10µA	3Hz-5Hz	1.10 + 0.06	1.10 + 0.06	1.10 + 0.06	0.100 + 0.006
		5Hz-10Hz	0.35 + 0.06	0.35 + 0.06	0.35 + 0.06	0.035 + 0.006
		10Hz-5kHz	0.15 + 0.06	0.15 + 0.06	0.15 + 0.06	0.015 + 0.006
		5kHz-10kHz	0.35 + 0.70	0.35 + 0.70	0.35 + 0.70	0.030 + 0.006

FREQUENCY PERIOD (*8)

100.0000 mV- 750.0000 V(*6)	Resolution	Frequency	24 Hours 23°C ± 1°C	90 Days 23°C ± 5°C	1 Year 23°C ± 5°C	Temperature Coefficient 0°-18°C/28°-55°C
-	-	3 Hz-5 Hz	0.1	0.1	0.1	0.005
		5 Hz-10 Hz	0.05	0.05	0.05	0.005
		10 Hz-40 Hz	0.03	0.03	0.03	0.001
		40 Hz-300 kHz	0.006	0.01	0.01	0.001

TEMPERATURE (RTD) (*9)

Range	Resolution	Accuracy	24 Hours 23°C ± 1°C	90 Days 23°C ± 5°C	1 Year 23°C ± 5°C	Temperature Coefficient
-200 °C-600 °C	0.002 °C	-	-	-	0.06 °C (typical)	0.005 °C/°C (typical)

TEMPERATURE (THERMOCOUPLES) (*9)

Range	Resolution	Type	24 Hours 23°C ± 1°C	90 Days 23°C ± 5°C	1 Year 23°C ± 5°C	Temperature Coefficient
-200 - +1372 °C	0.003 °C	(J/K/N/T/E Type)	-	-	0.2 °C (typical)	0.004 °C/°C (typical)
-50 - +1820 °C	0.01 °C	(R/S/B Type)	-	-	1.0 °C	0.14 °C/°C

DISPLAY

VFD, Two Colors Display

INTERFACE

RS-232C, USB, Digital I/O

POWER SOURCE

AC 100V/120V/220V/240V±10%, 45 Hz - 66 Hz and 360 Hz - 440 Hz; Power Consumption : Max. 25VA

DIMENSIONS & WEIGHT

265(W) x 107(H) x 350(D) mm, Approx. 3.1 kg

Note : (*1) 20% overrange on all ranges, except 1000 Vdc/750Vac, 10A range and Continuity.

(*2) Specifications are for 4-wire ohms function, or 2-wire ohms using REL function.

(*3) Accuracy specifications are for the voltage measured at the input terminals only.

(*4) Variation in the current source will create some variation in the voltage drop across a diode junction.

(*5) Specifications are for sine wave input >5% of range.

(*6) 750 Vac range limited to 100 kHz

(*7) Typically 30% of reading error at 1 MHz.

(*8) Input > 100 mV. For 10 mV to 100 mV inputs, multiply % of reading error x10.

(*9) Specifications do not include probe accuracy and relative to simulated junction

ORDERING INFORMATION

GDM-8261A 6 1/2 Digit Dual Measurement Multimeter

ACCESSORIES :

Quick star guide x 1, Power cord x 1, Test lead GTL-207A x 1, USB cable GTL-247 x 1, CD x 1 (including complete user manual, upgrade program and PC software), Calibration key GDM-01 x 1 (for firmware upgrade)

OPTION

GDM-SC1A Scanner Card (V ch x 16, I ch x 2)

GDM-82G1 GPIB Card

GDM-82L1 LAN Card

* Either GPIB or LAN can be installed on each GDM-8261A

OPTIONAL ACCESSORIES

GTL-108A 4W Type test lead

GRA-422 Rack Mount Kit (19" 2U)

GTL-248 GPIB Cable, Approx. 2m

GRA-436 Rack Mount Kit, 19" 2U size for two sets

GTL-205A Temperature Probe Adaptor with Thermocouple (K type), Approx. 1m

GTL-232 RS-232C Cable, 9-pin Female to 9-pin, null Modem, Approx. 2m

GSC-014 Soft Carrying Case for DMM Accessory

GDM-TL1 Test Lead Set for All DMM

FREE DOWNLOAD

PC Software Excel ADD-In, RS-232C/USB Interface Supported

Driver LabVIEW Driver

* Three-year warranty, excluding accessories.

Rear Panel



GTL-205A Temperature probe adaptor with thermocouple (K type)

Approx. 1m



GTL-207A Test Lead

Approx. 0.8m



GTL-108A 4W Type Test Lead

Approx. 1.1m



GTL-232 RS-232C Cable

Approx. 2m



GSC-014 Soft Carrying Case for DMM Accessory



GDM-TL1 Test Lead Set



5 1/2 Digit Dual Display Digital Multimeter



GDM-8255A



FEATURES

- * 5 1/2 Digits (199,999 Counts Max.)
- * VFD Two Colors Display
- * 0.012% DCV Accuracy
- * True RMS (AC, AC+DC)
- * 9 Major Measuring Functions and 10 Advanced Measurement Functions
- * 2W/4W Resistance Measurement
- * High Voltage 1000V and 10A Current Range
- * Standard Interface : RS-232C, USB Device, Digital I/O
- * Free PC Software (DMM-VIEWER), LabVIEW Driver
- * Optional 16+2 Channels Scanner Card

GTL-205A Temperature probe adaptor with thermocouple (K type)

Approx. 1m



GTL-247 USB Cable

A-A type cable, Approx. 1.8m



GDM-01 Calibration key



GDM-SC1A Scanner card

Multipoint Testing can be facilitated by simple insertion of scanner card.



GDM-8255A portable precision multimeters feature 199,999 counts, a dual display, a 0.012% DCV accuracy and 2w/4w measurement. The VFD display technology provides the excellent observation of contrast and brightness.

GDM-8255A carries an extensive list of standard measurement items with a dual-display allowing two measurement items to be displayed simultaneously. Advanced measurement functions, such as Max/Min, Hold, Relative value and Compare, are suitable for a multiplicity of applications such as production testing, research and field verification. The USB, RS-232C and 9-pin digital I/O interface are included as standard features for remote control and data capturing for ATE applications.

For convenient PC-based remote control and extensive data capture, GDM-8255A includes DMM-Viewer software at no additional cost. DMM-Viewer mimics the operation of the multimeters on the PC, allowing you to quickly use the software with little effort.

The optional scanner card (GDM-SC1A) creates a self-contained multipoint measurement solution with plug-in design. This approach eliminates the complexities of multipoint measurements and data processing. The scanner lets users effectively measure multiple channels connected to a single GDM-8255A. Each scanner card has 16 general purpose channels and 2 extra channels for current (ACI, DCI) measurements. All channels are fully isolated (Hi and Lo). Up to two scanner cards can be inserted into each multimeter for a maximum of 36 channels. These optional modules not only provide customers with a complete hands-free multiple measurement solution, but also provide a cost effective upgrade path compared with purchasing dedicated instruments.

SPECIFICATIONS	
FULL SCALE	
	5 1/2 Digits (199,999 Counts Max.)
SAMPLE RATE	
	Slow : 5 1/2 digits, 10 readings/second Medium : 4 1/2 digits, 30 readings/second Fast : 3 1/2 digits, 60 readings/second
DC VOLTAGE	
Range	100mV, 1V, 10V, 100V, 1000V 5 ranges
Accuracy	100mV : ±(0.012% rdg + 8 digits) 1V – 1000V : ±(0.012% rdg + 5 digits)
Input Resistance	10M Ω
AC VOLTAGE True RMS	
Range	100mV, 1V, 10V, 100V, 750V 5 ranges 100mV ranges :
Accuracy	20Hz – 45Hz : ±(1% rdg + 100 digits) 45Hz – 10kHz : ± (0.2% rdg + 100 digits) 10kHz – 30kHz : ± (1.5% rdg + 300 digits) 30kHz–100kHz : ±(15% rdg + 300 digits) 1V, 10V, 100V, 750V ranges :
Input Resistance	20Hz – 45Hz : ±(1% rdg + 100 digits) 45Hz – 10kHz : ± (0.2% rdg + 100 digits) 10kHz – 30kHz : ± (1% rdg + 100 digits) 30kHz–100kHz : ±(3% rdg + 200 digits) 1.1M Ω in parallel with approx. 100pF
DC CURRENT	
Range	10mA, 100mA, 1A, 10A 4 ranges
Accuracy	10mA : ±(0.05% rdg + 15 digits) 100mA : ±(0.05% rdg + 5 digits) 1A, 10A range : ±(0.2% rdg + 5 digits)
AC CURRENT TRUE RMS	
Range	10mA, 100mA, 1A, 10A 4 ranges
Accuracy	10mA , 100mA range : 20Hz – 50Hz : ±(1.5% rdg + 100 digits) 50Hz – 10kHz : ±(0.5% rdg + 100 digits) 10kHz–20kHz : ±(2% rdg + 200 digits) 1A , 10A range : 50Hz – 10kHz : ±(1% rdg + 100 digits)
RESISTANCE	
Range	100 Ω, 1k Ω, 10k Ω, 100k Ω, 1M Ω, 10M Ω, 100M Ω 7 ranges
2W Accuracy	100 Ω range : ±(0.1% rdg + 8digits) (±) 1k Ω range : ±(0.08% rdg + 5 digits) (±) 10k Ω ranges : ±(0.06% rdg + 5digits) (±) 100k Ω – 1M Ω ranges : ±(0.06% rdg + 5digits) 10M Ω range : ±(0.3% rdg + 5 digits) 100M Ω range : ±(3% rdg + 8 digits)
4W Accuracy	100 Ω range : ±(0.05% rdg + 8 digits) 1k Ω – 1M Ω 4 ranges : ±(0.05% rdg + 5 digits) 10M Ω range : ±(0.3% rdg + 5 digits) 100M Ω range : ±(3% rdg + 8 digits)



GDM-8255A

SPECIFICATIONS

DIODE TEST

Open Circuit Voltage 2.0V, Test Current 0.5mA : Accuracy \pm (0.025%rdg + 5 digits)

FREQUENCY

10Hz–100kHz : Sensitivity 0.1V, Accuracy \pm (0.05%rdg + 15 digits)

100Hz–600kHz : Sensitivity 1V, Accuracy \pm (0.05%rdg + 3 digits)

600Hz–800kHz : Sensitivity 2.5V, Accuracy \pm (0.05%rdg + 3 digits)

CONTINUITY BEEPER

1 – 1000 Ω Define by user : Accuracy \pm (0.08%rdg + 5 digits)

TEMPERATURE

0 $^{\circ}$ C – 300 $^{\circ}$ C : J, K, T Type

OTHER FUNCTIONS

Auto range / Manual, Math : MX + B / % / 1/X Max, Min, dBm, dB, REL, Hold, Compare, Store, Recall

DISPLAY

VFD, Two Colors Display

INTERFACE

Digital I/O, USB, RS-232C

POWER SOURCE

AC 100V–240V \pm 10%, 50/60Hz; Power Consumption : Max. 20VA

DIMENSIONS & WEIGHT

265(W) x 107(H) x 350(D) mm, Approx. 2.6 kg

Note : (*)USE "REL" Mode

ORDERING INFORMATION

GDM-8255A 5 ½ Digit Dual Display Digital Multimeter

ACCESSORIES :

Quick start user manual x 1, Power cord x 1, Test lead GTL-207A x 1, USB Cable GTL-247 CD x 1 (including complete user manual, upgrade program and PC software DMM Viewer), Calibration key GDM-01 x 1

OPTION

GDM-SC1A Scanner Card (V ch x 16, I ch x 2)

OPTIONAL ACCESSORIES

GTL-108A 4W Type test lead

GTL-232 RS-232C Cable, 9-pin female to 9-pin, null modem for computer, Approx 2000mm

GTL-205A Temperature probe adaptor with thermocouple (K type), Approx. 1000mm

GRA-422 Rack Mount Kit (19", 2U)

GRA-436 Rack Mount Kit, 19" 2U size for two sets

GDM-TL1 Test Lead Set

GSC-014 Soft Carrying Case for DMM Accessory

FREE DOWNLOAD

PC Software DMM-VIEWER

Driver LabVIEW Driver

USB Driver

Rear Panel



GDM-TL1 Test Lead Set



GTL-108A 4W Type Test Lead

Approx. 1.1m



GTL-232 RS-232C Cable

Approx. 2m



GSC-014 Soft Carrying Case for DMM Accessory



GTL-207A Test Lead

Approx. 0.8m



5 1/2 Digit Dual Measurement Multimeter



GDM-8351



FEATURES

- * 5 1/2 Digit (120,000 Counts), VFD Display
- * Dual Measurement/Dual Display
- * The Basic Precision of DC Voltage : 0.012%
- * Selectable Measurement Speeds, the Maximum : 320 Readings/s
- * True RMS (AC, AC+DC) Measurements
- * Auto/Manual Selection
- * 12 Different Measurement Functions : AC/DC Voltage, AC/DC Current, AC+DC Voltage/Current, 2W/4W Resistance, Continuity Beeper, Diode Test, Capacitance, Frequency, Temperature
- * Many Auxiliary Functions : Max./Min., REL/REL#, Compare, Hold, dB, dBm, Math(MX+B, %, 1/X)
- * Digital I/O Provides Dual Mode(Standard Compare and User Definition Modes)
- * Standard RS-232C and USB Device Interface (Support USB CDC and USB TMC Modes)

GTL-207A Test Lead

Approx. 0.8m



GW Instek presents the brand new 5 1/2 Digit Dual Measurement Multimeter-GDM-8351 to replace GDM-8251A of the same category. GDM-8351 features VFD dual-display, maximum 120,000 counts, 0.012% basic DC voltage accuracy and USB/RS232C connectors to provide users with measurement precision, lucid data observation, and the convenient connection with the personal computer. In addition to the fundamental measurement items such as AC/DC voltage, AC/DC current, AC+DC voltage/current, 2W/4W resistance, frequency, temperature measurement, continuity beeper and diode test, GDM-8351 also equips with the capacitance measurement function. Furthermore, the GDM-8351 also provides many auxiliary functions, including maximum/minimum values, dB, dBm, compare, reading hold, algorithms (MX+B, 1/X, %) etc. to meet the measurement requirements for manufacturing process tests, educational experiments and testing facilities. For the external control, the pin of digital I/O interface not only provides the signal output frequently used by the compare function, but also allows users to define signal output for each pin. Under the self-definition mode, users can apply the I/O as a simple digital hardware. The external control requirement can be achieved by signals from each pin so as to help users reduce trouble of making hardware. With respect to remote control and retrieving data, GDM-8351, taking consideration of users' habitual practice and universal system interface, provides standard RS-232C and USB interface to edit control programs and read measurement results. It is worth noting that for utilizing the USB interface, users have options of selecting either USB CDC or USB TMC mode. While USB TMC is selected, users are able to control instrument with the USB interface exactly the same as controlling instrument with the GPIB interface; therefore, the relatively expensive GPIB connection cable is no longer required.

SPECIFICATIONS (*1)			
Range(*2)	Resolution	Test Current or Etc.	Accuracy(*3) 1 Year(23°C±5°C)
DC VOLTAGE			
100.000mV	1μV	10MΩ or >10GΩ	0.012 + 8
1.00000V	10μV	10MΩ or >10GΩ	0.012 + 5
10.0000V	100μV	11.1MΩ	0.012 + 5
100.000V	1mV	10.1MΩ	0.012 + 5
1000.00V	10mV	10MΩ	0.012 + 5
RESISTANCE			
100.000Ω	1mΩ	1mA	0.05 + 8
1.00000kΩ	10mΩ	1mA	0.05 + 5
10.0000kΩ	100mΩ	100μA	0.05 + 5
100.000kΩ	1Ω	10μA	0.05 + 5
1.00000MΩ	10Ω	1μA	0.05 + 5
10.0000MΩ	100Ω	0.5μA	0.30 + 5
100.000MΩ	1kΩ	0.5μA//10MΩ	3.00 + 8
DC CURRENT			
10.0000mA	100nA	1.1Ω	0.05 + 15
100.000mA	1μA	1.1Ω	0.05 + 5
1.00000A	10μA	0.1Ω	0.20 + 5
10.0000A	100μA	0.01Ω	0.20 + 5
CONTINUITY			
1000.00Ω	10mΩ	1mA	0.05 + 5
DIODE TEST			
6.0000V	100μV	1mA@6V	0.05 + 15
CAPACITANCE			
10.00nF	0.01nF	10μA	2.0 + 10
100.0nF	0.1nF	10μA	2.0 + 4
1.000μF	0.001μF	100μA	2.0 + 4
10.00μF	0.01μF	1mA	2.0 + 4
100.0μF	0.1μF	1mA	2.0 + 4

General	
Display	VFD, Two Colors Display
Interface	RS-232C, USB device (USBCDC & USBTMC)
Power Source	AC 100 V / 120 V / 220 V / 240 V ±10%, 50-60Hz ; Power Consumption Max. 15VA
Dimensions & Weight	265(W) x 107(H) x 302(D) mm, approx. 2.9kg

Note:

1. All specifications are applicable to the main (1st) display only and warmed up for at least 30 minutes and operated in the slow rate.
2. 20% overrange on all ranges, except 750V/10A range
3. Accuracy: ± (% of Reading + Digits)



GDM-8351

SPECIFICATIONS (*1)

Range(*3)	Resolution	Frequency or Etc.	Accuracy 1 Year (23°C±5°C)
True RMS AC (or AC+DC – AC Coupled) Voltage			
100.000mV	1μV	20Hz ~ 45Hz 45Hz ~ 10kHz 10kHz ~ 30kHz 30kHz ~ 100kHz	1.0 + 100 0.3 + 100 1.5 + 300 5.0 + 300
1.00000V	10μV	20Hz ~ 45Hz 45Hz ~ 10kHz 10kHz ~ 30kHz 30kHz ~ 100kHz	1.0 + 100 0.2 + 100 1.0 + 100 3.0 + 200
10.0000V	100μV	20Hz ~ 45Hz 45Hz ~ 10kHz 10kHz ~ 30kHz 30kHz ~ 100kHz	1.0 + 100 0.2 + 100 1.0 + 100 3.0 + 200
100.000V	1mV	20Hz ~ 45Hz 45Hz ~ 10kHz 10kHz ~ 30kHz 30kHz ~ 100kHz	1.0 + 100 0.2 + 100 1.0 + 100 3.0 + 200
750.00V	10mV	20Hz ~ 45Hz 45Hz ~ 10kHz 10kHz ~ 30kHz 30kHz ~ 100kHz	1.0 + 100 0.2 + 100 1.0 + 100 3.0 + 200
True RMS AC (or AC+DC – AC Coupled) Current			
10.0000mA	100nA	20Hz ~ 45Hz 45Hz ~ 2kHz 2kHz ~ 10kHz	1.5 + 100 0.5 + 100 2.0 + 200
100.000mA	1μA	20Hz ~ 45Hz 45Hz ~ 2kHz 2kHz ~ 10kHz	1.5 + 100 0.5 + 100 2.0 + 200
1.00000A	10μA	20Hz ~ 45Hz 45Hz ~ 2kHz 2kHz ~ 10kHz	1.5 + 100 0.5 + 100 2.0 + 200
10.0000A	100μA	20Hz ~ 45Hz 45Hz ~ 2kHz 2kHz ~ 10kHz	1.5 + 100 1.0 + 100 -----
FREQUENCY			
(Voltage) 10Hz – 1MHz	-----	-----	0.01 + 3
(Current) 20Hz – 10kHz	-----	-----	0.01 + 3
TEMPERATURE (Thermocouple)			
-200 °C ~ 0 °C	0.01 °C	J / T / K	0.6 °C (typical)
0 °C ~ +300 °C	0.01 °C	J / T / K	0.3 °C (typical)

ORDERING INFORMATION

GDM-8351 5 1/2 Digit Dual Measurement Multimeter

ACCESSORIES :

Safety Instruction Sheet x 1, Power cord x 1, Test lead GTL-207A x 1, CD x 1 (including complete user manual, driver and software)

OPTIONAL ACCESSORIES

GTL-108A	4Wire Test Lead (Kelvin Clip), Approx. 1100mm
GTL-205A	Temperature probe adaptor with thermocouple (K-type), Approx. 1000mm
GTL-232	RS-232C Cable, 9-pin female to 9-pin, null modem for computer, Approx. 2000mm
GTL-246	USB Cable, A-B type, Approx. 1200mm
GRA-422	Rack Mount Kit (19", 2U)
GDM-TL1	Test Lead Set
GSC-014	Soft Carrying Case for DMM Accessory

Rear Panel



GSC-014 Soft Carrying Case for DMM Accessory



GDM-TL1 Test Lead Set



GTL-205A Temperature probe adaptor with thermocouple (K type)

Approx. 1m



50000 Counts Dual Measurement Multimeter

Patent No. ZL201320125978.1



GDM-8341 GDM-8342



FEATURES

- * 50000 Counts Vacuum Fluorescent Display with Two Colors
- * Dual Measurement
- * Fast Measurement Rate Up to 40 readings/s for DCV
- * 0.02% DCV Basic Accuracy
- * Auto/Manual Ranging
- * True RMS (AC, AC+DC)
- * 11 Measurement Functions
- * Max./Min., REL, MX+B, 1/X, Ref %, Compare, Hold, dB, dBm
- * Standard USB Device for Communicating to PC
- * Temperature Measurement (GDM-8342 only)
- * USB Storage for Data Collection (GDM-8342 only)
- * Optional GPIB (factory install for GDM-8342 only)

GW Instek rolls out the new generation Dual Measurement Multimeter -- the GDM-8300 Series, which has two models - GDM-8341 and GDM-8342. Its exceptional features include 50,000 counts, VFD dual-display, 0.02% basic DC voltage accuracy and a USB protocol connector to provide users with measurement precision, lucid data observation, and the convenience to connect with the personal computer.

The GDM-8300 Series not only supports the fundamental measurement items provided by general multimeters, but also equips with capacitance and temperature measurement functions. Furthermore, the GDM-8300 Series also provides many auxiliary functions to meet the measurement requirements for manufacturing process tests, educational experiments and testing facilities.

With respect to storing and retrieving data, the GDM-8300 Series has two methods to offer: first, the USB flash drive storage function--- operating alone without connecting with a computer; second, USB interface (virtual COM port) and optional GPIB interface (must be installed in factory) for automatic measurement system users to conveniently save and retrieve data.

SPECIFICATIONS (*1*2)			
FUNCTION			
Range(*3)	Resolution	Test Current or etc.	Accuracy 1 Year (23°C±5°C)
DC VOLTAGE			
500.00mV	10µV	10MΩ or >10GΩ	0.02 + 4
5.0000V	100µV	10MΩ or >10GΩ	0.02 + 4
50.000V	1mV	11.1MΩ	0.02 + 4
500.00V	10mV	10.1MΩ	0.02 + 4
1000.0V	100mV	10MΩ	0.02 + 4
RESISTANCE			
500.00Ω	10mΩ	0.83mA	0.10 + 5 (*4)
5.0000kΩ	100mΩ	0.83mA	0.10 + 3 (*4)
50.000kΩ	1Ω	83µA	0.10 + 3
500.00kΩ	10Ω	8.3µA	0.10 + 3
5.0000MΩ	100Ω	830nA	0.10 + 3
50.000MΩ	1kΩ	560nA//10 MΩ	0.30 + 3
DC CURRENT			
500.00µA	10nA	0.06Vmax.	0.05 + 5
5.0000mA	100nA	0.6Vmax.	0.05 + 4
50.000mA	1µA	0.14Vmax.	0.05 + 4
500.00mA	10µA	1.4Vmax.	0.10 + 4
5.0000A	100µA	0.5Vmax.	0.25 + 5
10.000A	1mA	0.8Vmax.	0.25 + 5
CONTINUITY			
5000.0Ω	100mΩ	0.83mA	0.10 + 5
DIODE TEST			
5.0000V	100µV	0.83mA	0.05 + 5
CAPACITANCE			
5.000nF : 0.5-1nF	0.001nF	8.3µA	2.00 + 20
5.000nF : 1-5nF	0.001nF	8.3µA	2.00 + 10
50.00nF : 5-10nF	0.01nF	8.3µA	2.00 + 30
50.00nF : 10-50nF	0.01nF	8.3µA	2.00 + 10
500.0nF	0.1nF	83µA	2.00 + 4
5.000µF	1nF	0.56mA	2.00 + 4
50.00µF	10nF	0.83mA	2.00 + 4

SPECIFICATIONS (*1*2)			
FUNCTION			
Range(*3)	Resolution	Test Current or etc.	Accuracy 1 Year (23°C±5°C)
True RMS AC (or AC+DC - AC Couple) Voltage (*5*6)			
500.00mV	10µV	30Hz - 50Hz 50Hz - 10kHz 10kHz - 30kHz 30kHz - 100kHz	1.00 + 40 0.50 + 40 2.00 + 60 3.00 + 120
5.0000V	100µV	30Hz - 50Hz 50Hz - 10kHz 10kHz - 30kHz 30kHz - 100kHz	1.00 + 20 0.35 + 15 1.00 + 20 3.00 + 50
50.000V	1mV	30Hz - 50Hz 50Hz - 10kHz 10kHz - 30kHz 30kHz - 100kHz	1.00 + 20 0.35 + 15 1.00 + 20 3.00 + 50
500.00V	10mV	30Hz - 50Hz 50Hz - 10kHz 10kHz - 30kHz 30kHz - 100kHz	--- 0.50 + 15 1.00 + 20 3.00 + 50
750.0V	100mV	30Hz - 50Hz 50Hz - 10kHz 10kHz - 30kHz 30kHz - 100kHz	--- 0.50 + 15 --- ---

GTL-207A Test Lead

Approx. 0.8m





GDM-8300 Series

SPECIFICATIONS (*1*2)

True RMS AC (or AC+DC – AC Couple) Current (*5*6)

500.00µA	10nA	30Hz – 50Hz 50Hz – 2kHz 2kHz – 5kHz 5kHz – 20kHz	1.50 + 50 0.50 + 40 1.50 + 50 3.00 + 75
5.0000mA	100nA	30Hz – 50Hz 50Hz – 2kHz 2kHz – 5kHz 5kHz – 20kHz	1.50 + 40 0.50 + 20 1.50 + 40 3.00 + 60
50.000mA	1µA	30Hz – 50Hz 50Hz – 2kHz 2kHz – 5kHz 5kHz – 20kHz	1.50 + 40 0.50 + 20 1.50 + 40 3.00 + 60
500.00mA	10µA	30Hz – 50Hz 50Hz – 2kHz 2kHz – 5kHz 5kHz – 20kHz	1.50 + 40 0.50 + 20 1.50 + 40 3.00 + 60
5.0000 A	100µA	30Hz – 50Hz 50Hz – 2kHz	2.00 + 40 0.50 + 30
10.000A	1mA	30Hz – 50Hz 50Hz – 2kHz	2.00 + 40 0.50 + 30

FREQUENCY / PERIOD

10Hz – 500Hz	–	–	0.01 + 5
500Hz – 500kHz	–	–	0.01 + 3
500kHz – 1MHz	–	–	0.01 + 5

TEMPERATURE (THERMOCOUPLE)

-200 °C – +300 °C	0.1 °C	J / T / K type	2 °C (*7)
-------------------	--------	----------------	-----------

DISPLAY

VFD, Two Colors Display

INTERFACE

USB device, USB Host (GDM-8342 only)

POWER SOURCE

AC 100V/120V/220V/240V ±10%, 50 – 60Hz ; Power Consumption : Max. 15VA

DIMENSIONS & WEIGHT

265(W) x 107(H) x 302(D) mm, Approx. 2.9kg

Note: The specifications apply when the DMM is warmed up for at least 30 minutes and operates in slow rate.

ORDERING INFORMATION

GDM-8342 with GPIB 50000 counts Dual Measurement Multimeter with USB Host/Device and opt.01 GPIB

GDM-8342 50000 counts Dual Measurement Multimeter with USB Host/Device

GDM-8341 50000 counts Dual Measurement Multimeter with USB Device

ACCESSORIES :

Safety Instruction Sheet x 1, Power cord x 1, Test lead GTL-207A x 1, CD x 1
(including complete user manual, USB driver and PC software)

OPTION *

GDM-83G1 GPIB Interface * Factory installed for GDM-8342 only.

OPTIONAL ACCESSORIES

GTL-205A Temperature probe adaptor with thermocouple (K-type), Approx. 1000mm

GTL-246 USB Cable, USB 2.0, A-B Type, 1200mm

GTL-248 GPIB Cable, Double Shielded, 2000mm

GRA-422 Rack Mount Kit (19", 2U)

GDM-TL1 Test Lead Set

GSC-014 Soft Carrying Case for DMM Accessory

Rear Panel



1. All specifications are ensured only under main (1st) display.
2. Accuracy : ± (% of reading + digits)
3. 2% overrange on all ranges, except 10A is 20% overrange.
4. REL function is on.
5. The accuracy of AC+DC is equal to AC with 10 more digits added.
6. AC Characteristics are for sinewave input > 5% of range.
7. Specifications do not include probe accuracy.

GSC-014 Soft Carrying Case for DMM Accessory



GDM-TL1 Test Lead Set



GTL-205A Temperature probe adaptor with thermocouple (K type)

Approx. 1m



50000 Counts Dual Display Digital Multimeter



GDM-8245 (50000 Counts)



FEATURES

- * 50000 Counts Display
- * Multi-Function ACV, DCV, ACA, DCA, R, C, Hz, Continuity Beeper, Diode Test, Max/Min, REL, Hold, dBm
- * Dual Display Indicate ACV and Hz, DCV(ACV) and dBm
- * Manual or Auto Ranging
- * 0.03% DCV Accuracy
- * ACV Measuring Frequency Up to 50kHz
- * AC True RMS or AC + DC True RMS

Rear Panel



GTL-117 Test Lead

Approx. 1.1m



GDM-8245 is an economical bench-top DMM equipped with a rich set of features. GDM-8245 has large 7 segment LED dual display features up to 50,000 counts and the ability to show two measurements at extensive list of measurement items - DC Voltage/Current, AC Voltage/Current with true RMS, Resistance, Capacitance, Frequency, Continuity (with beeper), Diode Test, and dBm. Additional measurement functions, such as Max/Min, Hold and Relative value. With great range, good accuracy and ability to accept up to 20A of current, GDM-8245 is the perfect general purpose DMM.

SPECIFICATIONS	
DC VOLTAGE	
Range	500mV, 5V, 50V, 500V, 1000V 5 ranges
Accuracy	$\pm (0.03\% \text{ rdg} + 4 \text{ digits})$
Input Impedance	10M Ω
AC VOLTAGE TRUE RMS (AC OR AC + DC TRUE RMS)	
Range	500mV, 5V, 50V, 500V, 1000V 5 ranges
Accuracy	500mV ~ 50V 3 ranges : 20Hz ~ 45Hz : $\pm(1\% \text{ rdg} + 15 \text{ digits})$ 45Hz ~ 2kHz $\pm(0.5\% \text{ rdg} + 15 \text{ digits})$ 2kH~10kHz $\pm(1\% \text{ rdg} + 15 \text{ digits})$ 10kHz ~ 20kHz $\pm(2\% \text{ rdg} + 30 \text{ digits})$ 20kHz ~ 50kHz $\pm(5\% \text{ rdg} + 30 \text{ digits})$ 500V,1000V range : 45Hz ~ 1kHz $\pm(0.5\% \text{ rdg} + 15 \text{ digits})$
Input Impedance	10M Ω
DC CURRENT	
Range	500 μ A, 5mA, 50mA, 500mA, 2A, 20A 6 ranges
Accuracy	500 μ A~500mA 4ranges: $\pm(0.2\% \text{ rdg}+2 \text{ digits})$;2A~20A 2ranges: $\pm(0.3\% \text{ rdg}+2 \text{ digits})$
AC CURRENT TRUE RMS (AC OR AC + DC TRUE RMS)	
Range	500 μ A, 5mA, 50mA, 500mA, 2A, 20A 6 ranges
Accuracy	500 μ A ~ 20A 6 ranges 20Hz ~ 45Hz : $\pm(1\% \text{ rdg} + 15 \text{ digits})$; 45Hz ~ 2kHz : $\pm(0.5\% \text{ rdg} + 15 \text{ digits})$ 500 μ A ~ 50mA 3 ranges 2kHz ~ 10kHz : $\pm(1\% \text{ rdg} + 15 \text{ digits})$; 10kHz ~ 20kHz : $\pm(2\% \text{ rdg} + 15 \text{ digits})$
RESISTANCE	
Range	500 Ω , 5k Ω , 50k Ω , 500k Ω , 5M Ω , 20M Ω 6 ranges
Accuracy	500 Ω : $\pm(0.1\% \text{ rdg} + 4 \text{ digits})$; 5k Ω ~ 500k Ω 3 ranges : $\pm(0.1\% \text{ rdg} + 2 \text{ digits})$ 5M Ω : $\pm(0.2\% \text{ rdg} + 2 \text{ digits})$; 20M Ω : $\pm(0.3\% \text{ rdg} + 2 \text{ digits})$
DIODE TEST	
	The one range can check the forward voltage of diode. Maximum forward voltage 1.5V open voltage 2.8V
CAPACITANCE	
Range	5nF, 50nF, 500nF, 5 μ F, 50 μ F 5 ranges
Accuracy	$\pm(2\% \text{ rdg} + 4 \text{ digits})$
FREQUENCY	
Input Level (Sine Wave)	mV range : 10Hz ~ 50kHz : >120mV ; 50k ~ 150kHz : >200mV 5V ~ 50V range : 10Hz ~ 200kHz >1.2V ; 500V range : 20Hz ~ 1kHz >12V
FUNCTIONS	
	Auto Manual/Range, Max, Min, dBm, REL, Hold
CONTINUITY BEEPER	
	Built in buzzer sounds when conductance is less than 5 Ω
DISPLAY	
	Dual Display 0.4" and 0.5", 7 segment LED display
POWER SOURCE	
	AC 100V/120V/230V \pm 10%, 50/60Hz ; Power Consumption : Max. 8VA
DIMENSIONS & WEIGHT	
	251(W) x 91(H) x 291(D) mm, Approx. 2.6kg

ORDERING INFORMATION

GDM-8245 50,000 Counts Dual Display Digital Multimeter

ACCESSORIES :

User manual x 1, Power cord x 1, Test lead GTL-117 x 1

OPTIONAL ACCESSORIES

GDM-TL1 Test Lead Set

GSC-014 Soft Carrying Case for DMM Accessory

DIGITAL MULTIMETERS

HAND-HELD DIGITAL MULTIMETER

MODEL	GDM-541	GDM-533	GDM-532	GDM-531
Max. Display	22000	6000	9999	6000
Auto Ranging	✓	✓	✓	
Analog Bar	✓	✓		
True RMS	✓	✓	✓	
Display Backlight	✓	✓	✓	✓
Auto Power off	✓	✓	✓	✓
Curr. Range Protection	PTS & Fuse	PTS & Fuse	Fuse	Fuse
DC Voltage	1000V	1000V	999.9V	600V
AC Voltage	1000V	1000V	999.9V	600V
DC Current	20A	20A	9.99A	10A
AC Current	20A	20A	9.99A	
Resistance	220MΩ	60MΩ	99.99MΩ	60MΩ
Capacitance	220mF	60mF	9.999mF	9.999mF
Frequency	220MHz	10MHz	9.9MHz	
Diode	✓	✓	✓	✓
Continuity	✓	✓	✓	✓
Temperature		✓	✓	
Duty Cycle (%)	✓	✓	✓	
Transistor (hFE)	✓			
NCV Function	✓	✓	✓	✓
REL	✓	✓	✓	
Data Hold	✓	✓	✓	✓
Peak Hold	✓	✓		
MAX MIN	✓	✓		
LoZ ACV		✓		
LPF ACV	✓			
Audible / Visual Alarm	✓	✓	✓	✓
AC+DC Measurement	✓			
Interface	USB	USB		
Safety Rating	CAT III 1000V CAT IV 600V	CAT III 1000V CAT IV 600V	CAT II 1000V CAT III 600V	CAT III 600V
Page	E17-18	E17-18	E17-18	E17-18

Hand-Held Digital Multimeter



NEW

GDM-541



NEW

GDM-533



NEW

GDM-532



GDM-541 FEATURES

- * 22000 Counts Auto/Manual Ranging
- * 46 Segments Analogue Bar
- * ACV Measurement up to 1000V
- * AC+DC Voltage Measurement
- * Current Measurement up to 20A
- * Transistor (hFE) Measurement
- * Audible/Visual Alarm when Overload
- * True RMS/USB Interface

GDM-533 FEATURES

- * 6000 Counts Auto/Manual Ranging
- * 31 Segments Analogue Bar
- * LoZ ACV Measurement
- * ACV Measurement up to 1000V
- * Current Measurement up to 20A
- * Temperature Measurement
- * Audible/Visual Alarm when Overload
- * True RMS/USB Interface

GDM-532 FEATURES

- * 9999 Counts Auto/Manual Ranging
- * Display Backlight/Auto Power Off
- * Continuity Beeper/Diode Test
- * Temperature Measurement
- * Non-Contact Voltage (NCV) Detection
- * Data Hold and Relative Mode

The GDM-500 Series Hand Held DMM are a compact, high precision, battery operated multimeter series designed to meet of service engineers. The GDM-500 Series design is driven by mobile-oriented features: automatic power off to preserve battery life, a large backlight display for crisp viewing, a rotary selector and push buttons to ease operation, and then NCV (Non-Contact Voltage) function for outdoor use.

The basic functions match the depth of bench-top multimeters: fuse-protected current input, true RMS for accurate AC measurements, Audible/Visual Alarm when Overload, Auto ranging, Duty cycle and Relative mode. The compact, reliable and economical devices are ideal for any engineer.

SPECIFICATIONS

DC VOLTAGE	
Range	220.00mV, 2.2000V, 22.000V, 220.00V, 1000V(GDM-541) 60.00mV, 600.0mV, 6.000V, 60.00V, 600.0V, 1000V(GDM-533) 9.999mV, 99.99mV, 999.9mV, 9.999V, 99.99V, 999.9V(GDM-532) 600.0mV, 6000mV, 60.00V, 600.0V(GDM-531)
Best Accuracy	±(0.05%rdg + 5 digits) for GDM-541; ±(0.5%rdg + 3 digits) for GDM-533 ±(0.5%rdg + 3 digits) for GDM-532; ±(0.7%rdg + 3 digit) for GDM-531
Input Impedance	10 MΩ (At mV range : 1GΩ for GDM-541/533; 3GΩ for GDM-532)
AC VOLTAGE	
Range	220.00mV, 2.2000V, 22.000V, 220.00V, 1000.0V(GDM-541) 60.00mV, 600.0mV, 6.000V, 60.00V, 600.0V, 1000V(GDM-533) 9.999mV, 99.99mV, 999.9mV, 9.999V, 99.99V, 999.9V(GDM-532) 600.0V(GDM-531)
Best Accuracy	±(0.8%rdg + 10 digits) for GDM-541; ±(1.0%rdg + 3 digits) for GDM-533 ±(0.8%rdg + 3 digits) for GDM-532; ±(1.2%rdg + 3 digits) for GDM-531
Frequency Response	40Hz-10kHz for GDM-541; 40Hz-1kHz for GDM-533 45Hz-400Hz for GDM-532; 40Hz-400Hz for GDM-531
Input Impedance	10 MΩ
DC CURRENT	
Range	220.00μA, 2200.0μA, 22.000mA, 220.00mA, 20.000A(GDM-541) 600.0μA, 6000μA, 60.00mA, 600.0mA, 6.000A, 20.00A(GDM-533) 999.9μA, 999.9mA, 9.999A(GDM-532) 600.0μA, 60.00mA, 600.0mA, 10.00A(GDM-531)
Best Accuracy	±(0.5%rdg + 10 digits) for GDM-541; ±(1.0%rdg + 2 digits) for GDM-533 ±(0.8%rdg + 3 digits) for GDM-532; ±(1.0%rdg + 3 digits) for GDM-531
AC CURRENT	
Range	220.00μA, 2200.0μA, 22.000mA, 220.00mA, 20.000A(GDM-541) 600.0μA, 6000μA, 60.00mA, 600.0mA, 6.000A, 20.00A(GDM-533) 999.9μA, 999.9mA, 9.999A(GDM-532)
Best Accuracy	±(0.8%rdg + 10 digits) for GDM-541; ±(1.2%rdg + 5 digits) for GDM-533 ±(1.0%rdg + 3 digits) for GDM-532
RESISTANCE	
Range	220.00Ω, 2.2000kΩ, 22.000kΩ, 220.00kΩ, 2.2000MΩ, 22.000MΩ, 220.00MΩ(GDM-541) 600.0Ω, 6.000kΩ, 60.00kΩ, 600.0kΩ, 6.000MΩ, 60.00MΩ(GDM-533) 999.9Ω, 9.999kΩ, 99.99kΩ, 999.9kΩ, 9.999MΩ, 99.99MΩ(GDM-532) 600.0Ω, 6000Ω, 60.00kΩ, 600.0kΩ, 60.00MΩ(GDM-531)
Best Accuracy	±(0.5%rdg + 10 digits) for GDM-541; ±(1.0%rdg + 2 digit) for GDM-533 ±(0.8%rdg + 2 digits) for GDM-532; ±(0.8%rdg + 2 digits) for GDM-531
CONTINUITY BEEPER	
	Buzzer sounds if conductance less than 50Ω for GDM-541/533 Buzzer sounds if conductance less than 30Ω for GDM-532 Buzzer sounds if conductance less than 10Ω for GDM-531
DIODE TEST	
Open Circuit Voltage	GDM-541/533 : 3V (Approx.); GDM-532 : 3.3V (Approx.); GDM-531 : 2.1V (Approx.)
CAPACITANCE	
Range	22.000nF, 220.00nF, 2.2000μF, 22.000μF, 220.00μF, 2.2000mF, 22.000mF, 220.00mF(GDM-541) 60.00nF, 600.0nF, 6.000μF, 60.00μF, 600.0μF, 6.000mF, 60.00mF(GDM-533)
Best Accuracy	9.999nF, 99.99nF, 999.9nF, 9.999μF, 99.99μF, 999.9μF, 9.999mF(GDM-532/531) ±(3.0%rdg + 5 digits) for GDM-541/533; ±(4.0%rdg + 5 digits) for GDM-532/531
FREQUENCY	
Range	10Hz – 220MHz(GDM-541); 10Hz – 10MHz(GDM-533); 99.99Hz – 9.999MHz(GDM-532)
Best Accuracy	±(0.01%rdg + 5 digits) for GDM-541; ±(0.1%rdg + 4 digits) for GDM-533 ±(0.1%rdg + 5 digits) for GDM-532
Input Amplitude	≤20Vrms
TEMPERATURE	
Range	-40°C – 1000°C / -40°F – 1832°F
Best Accuracy	±(1.0%rdg + 3 °C) for GDM-533; ±(1.0%rdg + 5 °C) for GDM-532 ±(1.0%rdg + 4 °F) for GDM-533; ±(1.5%rdg + 5 °F) for GDM-532

SPECIFICATIONS

SPECIAL FUNCTION

Auto Ranging(GDM-541/533/532); True RMS(GDM-541/533/532); Analog Bar(GDM-541/533);
USB(GDM-541/533/532/531); Display Backlight(GDM-541/533/532/531); NCV Function(GDM-541/533/532/531);
Audible/Visual Alarm(GDM-541/533/531); AC+DC Voltage(GDM-541); LPF ACV(GDM-541); hFE Test(GDM-541);
LoZ ACV(GDM-533)

LCD DISPLAY

22000 counts (GDM-541), 6000 counts (GDM-533/531), 9999 counts (GDM-532)

POWER SOURCE

1.5V AAA x 4 (GDM-541/533); 1.5V AAA x 3 (GDM-532); 1.5V AAA x 2 (GDM-531)

DIMENSIONS & WEIGHT

89(W) x 186(H) x 49(D) mm, Approx. 400g (GDM-541/533)

81(W) x 169(H) x 46(D) mm, Approx. 400g (GDM-532)

76.5(W) x 155(H) x 49(D) mm, Approx. 255g (GDM-531)

ORDERING INFORMATION

GDM-541	22000 Counts Hand-Held DMM with True RMS Measurement and USB Interface
GDM-533	6000 Counts Hand-Held DMM with True RMS Measurement and USB Interface
GDM-532	9999 Counts Hand-Held DMM with True RMS Measurement
GDM-531	6000 Counts Hand-Held DMM

ACCESSORIES :

User manual, Test leads, Battery, USB cable & Adapter socket (GDM-541/533 only),
K-type thermocouple (GDM-533/532 only)

FREE DOWNLOAD

GDM-541 PC Software	Remote Software
GDM-533 PC Software	Remote Software



NEW

GDM-531



GDM-531 FEATURES

- * 6000 Counts Manual Ranging
- * Display Backlight/Auto Power Off
- * Capacitance Measurement
- * Non-Contact Voltage (NCV) Detection
- * Data Hold
- * Audible/Visual Alarm when Overload



LCR METERS

GW Instek offers high-precision bench-top LCR meters: the LCR-8200/LCR-6000 series which are designed for a variety of applications such as production testing, QC inspection, and design verification, etc. Reliable operability, accurate results, user-friendly interfaces, and automatic testing functions make the LCR-8200/LCR-6000 series one of the best choices for passive component tests.

Other than the bench-top LCR meters, GW instek also provides the LCR-900 series hand-held LCR meters to make quick and basic LCR measurements at an affordable price.

PRODUCTS

- Benchtop LCR Meter
 - Handheld LCR Meter
-

LCR METERS OVERVIEW

Test Frequency

Based on testing requirement, a test frequency can be set either as specificity frequency like component's datasheet specification or as the working frequency like component's real condition in circuit. Electrical components need to be tested at the frequency in which the final product/application is used.

Test Voltage

Most LCR meters can select the signal level applied to DUTs. Generally, the signal level is measured under an open circuit condition.

Accuracy and Speed

The testing speed of a LCR meter is actually a trade-off between testing accuracy. The more time it takes, the more accurate the measurement becomes. Conversely, the faster the measurement speed, the less accurate it becomes.

Measurement Parameters

Primary parameters L, C, R as well as Z, Y and DCR; Secondary parameters Q, D, θ (θ_r or θ_d) as well as X and G.

Range

In order to measure a wide range of impedance value, a measurement instrument must have several ranges. Selecting a range is usually done automatically according to the impedance of DUTs.

Averaging

Averaging is related to a LCR meter integration time. If the integration time is longer than cycles of the test signal, the measurement time will become longer, but the accuracy will be enhanced.

Bias Voltage and Bias Current

A LCR meter might include bias voltage or bias current function applicable to DUT which providing an extra source level to DUT when a LCR meter is taking measurement. Bias voltage uses with capacitance measurement commonly and bias current uses with inductance measurement.

BENCHTOP LCR METER

MODEL	Description (Main Function)	Page
LCR-8250A	50MHz High Frequency LCR Meter	E21-24
LCR-8230A	30MHz High Frequency LCR Meter	
LCR-8220A	20MHz High Frequency LCR Meter	
LCR-8210A	10MHz High Frequency LCR Meter	
LCR-8205A	5MHz High Frequency LCR Meter	
LCR-8230	30MHz High Frequency LCR Meter	
LCR-8220	20MHz High Frequency LCR Meter	
LCR-8210	10MHz High Frequency LCR Meter	
LCR-8205	5MHz High Frequency LCR Meter	
LCR-8201	1MHz High Frequency LCR Meter	
LCR-6300	10Hz ~ 300kHz Precision LCR Meter	E25-26
LCR-6200	10Hz ~ 200kHz Precision LCR Meter	
LCR-6100	10Hz ~ 100kHz Precision LCR Meter	
LCR-6020	10Hz ~ 20kHz Precision LCR Meter	
LCR-6002	10Hz ~ 2kHz Precision LCR Meter	

HANDHELD LCR METER

MODEL	Description (Main Function)	Page
LCR-916	100Hz/120Hz/1k/10k/100kHz Hand Held LCR Meter	E27-28
LCR-915	100Hz/120Hz/1k/10kHz Hand Held LCR Meter	
LCR-914	100Hz/120Hz/1kHz Hand Held LCR Meter	

High Frequency LCR Meter



LCR-8200(A) Series

NEW



FEATURES

- * Wide Test Frequency :
 LCR-8200A : DC, 10Hz ~ 50/30/20/10/5 MHz
 LCR-8200 : DC, 10Hz ~ 30/20/10/5/1 MHz
- * 7" LCD color Display
- * 0.08% Basic Accuracy
- * Displaying Four Measurement Results Simultaneously From 17 Selectable Measurement Parameters Freely
- * 15 Steps List Measurement
- * Two Curves Sweep Mode
- * Equivalent Circuit Model Analysis (LCR-8200A only)
- * Internal DC Bias Voltage $\pm 12V$
- * USB Storage Available
- * ALC Function Available
- * Standard Interfaces : RS-232C, USB Host/ Device, LAN, GPIB and Handler
- * Universal Power Input

GW Instek's high-frequency LCR tester ~ LCR-8200 (A), which includes two series, LCR-8200A and LCR-8200, has ten models and the maximum test frequency is up to 50MHz. The entire series adopts 7-inch color display and features a high measurement accuracy (0.08%). The measurement results can be presented numerically or graphically according to the selected measurement mode, allowing users to optimally interpret the characteristics of the DUT. At the same time, a full range of standard interfaces such as USB device / RS-232C / Handler and GPIB allow users to control the instrument by the most familiar interface without worrying about additional hardware investment costs. Furthermore, the series also provides USB storage function when operating in the graphics mode. The measured characteristic curves and values of the DUT are saved for subsequent analysis. The wide variety of features of the LCR-8200 (A) can help users easily respond to the test requirements of passive components in R&D, engineering, and production.

Under the numerical measurement mode, it is divided into MEAS measurement and LIST measurement. Under the MEAS measurement mode, users can select up to 4 (at least 1) desired measurement items from the 17 measurement parameters. Each selected measurement item can be set to compare (PASS/FAIL judgement) or to the BIN function to conduct judgement and sorting, so that users can easily learn the results of the measurement by color and sound. Under the LIST mode, users is allowed to set 15 test points and each test point can set parameters independently, including frequency/voltage/bias, and it even can set independent comparison function and numerical display mode (value, difference value, difference percentage). On top of that, under the LIST mode, the automatic trigger mode is also provided. After each LIST measurement is completed, the instrument will be in the mechanism of standby trigger. Users only need to place the next DUT, and the LIST test can be automatically performed that saves time of repeatedly pressing the trigger button.

Under the graphical measurement mode, the SWEEP measurement provides the ability to sweep two parameters simultaneously (TRACE A / TRACE B). The relative parameters of the sweep, including the sweep source (frequency, voltage, current or bias voltage), horizontal / vertical axis scale (LINEAR / LOG), speed...etc., even adding a bias, can be set and tested according to the actual needs of users. Besides, the LCR-8200A series provides 7 different equivalent circuit models which allows user analysis by 3-components or 4-components combination to characterize the operational characteristics of the circuit. After the sweep is completed, the scale can be automatically adjusted according to the selected TRACE, so that the whole observation is clearer and easier to read. Other than that, the swept graphics (bmp) and values (csv) can be saved to the flash drive for subsequent analysis and applications.

Whether it is for measurement data collection during the test process or the collocation for the system integration, the LCR-8200 (A) series offers the most comprehensive communications interfaces, including USB device, RS-232C, LAN for PC connection and even GPIB, which are all standard communications interfaces. Users can choose according to the habits of use and the convenience of the system architecture without any additional cost. In addition, the LCR-8200 (A) series also provides a Handler interface for system integration of PLCs or sorters.

OPTIONAL ACCESSORIES SELECTION GUIDE

ACCESSORY MODEL	BRIEF DESCRIPTION	LCR-8250A	LCR-8230A	LCR-8220A	LCR-8210A	LCR-8205A	-
		-	LCR-8230	LCR-8220	LCR-8210	LCR-8205	LCR-8201
LCR-05A	Test Fixture for axial & radial lead components (up to 50MHz)	✓	✓	✓	✓	✓	✓
LCR-06B	Test Lead with Kelvin clip (4 wire type)	△	△	△	△	△	✓
LCR-07	Test Lead with Alligator clip (2 wire type)	△	△	△	△	△	✓
LCR-08	Test Fixture (Tweezers) for SMD / Chip components	△	△	△	△	△	✓
LCR-10A	Test Fixture for bottom electrode components (up to 50MHz)	✓	✓	✓	✓	✓	✓
LCR-12	Test Lead with Kelvin clip (4 wire type)	△	△	△	✓	✓	✓
LCR-15A	Test Fixture for SMD / Chip components (up to 50MHz)	✓	✓	✓	✓	✓	✓
GTL-234	RS-232C cable	✓	✓	✓	✓	✓	✓
GTL-248	GPIB Cable	✓	✓	✓	✓	✓	✓
GTL-246	USB Cable	✓	✓	✓	✓	✓	✓
GRA-445	Rack Mount Kit, 19" 4U size	✓	✓	✓	✓	✓	✓

Note : "△" means the accessories work with a frequency limitation (under 1MHz)

LCR-05A



LCR-06B



LCR-07



LCR-08



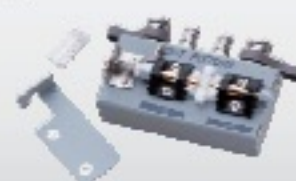
LCR-10A



LCR-12



LCR-15A



LCR-DB1





Rear Panel



LCR-8200(A) Series

SPECIFICATIONS						
	LCR-8250A	LCR-8230A	LCR-8220A	LCR-8210A	LCR-8205A	-
	-	LCR-8230	LCR-8220	LCR-8210	LCR-8205	LCR-8201
TEST FREQUENCY						
	DC, 10Hz~50MHz; 6 Digits, ±0.0007%	DC, 10Hz~30MHz; 6 Digits, ±0.0007%	DC, 10Hz~20MHz; 6 Digits, ±0.0007%	DC, 10Hz~10MHz; 6 Digits, ±0.0007%	DC, 10Hz~5MHz; 6 Digits, ±0.0007%	DC, 10Hz~1MHz; 6 Digits, ±0.0007%
OUTPUT IMPEDANCE						
	25 Ω / 100 Ω SELECTABLE					
BASIC ACCURACY						
	±0.08%					
TEST SPEED						
	MAX: 2.5ms(>10kHz), FAST: 50ms(>20Hz), MEDIUM: 100ms, SLOW: 300ms, SLOW2: 600ms					
TEST SIGNAL LEVEL						
AC Voltage	10mV – 2Vrms (FREQ. ≤ 1MHz), 10mV – 1Vrms (FREQ. > 1MHz or FREQ. ≤ 1MHz and RO=25 Ω)					
AC Current	100 μA – 20mA _{rms} (RO=100 Ω), 200 μA – 40mA _{rms} (RO=25 Ω)					
DCR Voltage	1Vdc (40mA max.)					
MEASUREMENT PARAMETERS						
	Maximum four parameters can be measured and displayed at the same time Impedance (Z), Inductance (Ls / Lp), Capacitance (Cs / Cp), AC Resistance (Rs / Rp), Quality Factor (Q), Dissipation Factor (D), Admittance (Y), Conductance (G), Reactance (X), Phase Angle (θ _d / θ _r), Susceptance (B), DC Resistance (Rdc)					
LIST MEASUREMENT						
Listed Steps	15					
Listed Parameters	Freq/Vac/Iac/DC Bias/Comp/BIN					
Trigger	AUTO, REPEAT, SINGLE					
SWEEP MEASUREMENT						
Swept Graphical	Two of measurement parameters					
Swept Parameters	Freq/Vac/Iac/BIAS V, Keep Trace					
EQUIVALENT CIRCUIT MODEL ANALYSIS ("A" series only)						
	7 different equivalent circuit models, 3-components, 4 types, 4-components, 3 types					
OTHER FUNCTIONS						
Auto Level Control (ALC)	Standard					
DC Bias	0 – ±12V					
Handler	PASS, FAIL and OK, NG or BIN 1-9					
OTHER FEATURES						
Correction	Open/Short/HF Load/Load					
V/I Monitor	Vac, Iac, Vdc, Idc					
Comparator	Value, Δ, Δ%					
Buzzer	OFF, Pass, Fail					
Average	1 to 64					
DISPLAY						
	7" LCD color display (800 x 480)					
INTERFACE						
	USB/GPIB/LAN/RS-232/Handler/USB Host/TRIGGER Input					
POWER SOURCE						
	AC 100V~240V, 50/60Hz; Consumption: 65VA (max.)					
DIMENSIONS & WEIGHT						
	346 (W) x 145 (H) x 335 (D) mm; Approx. 3.3kg					

* Difference between "A" series and "Non-A" series is only the "A" series provides the equivalent circuit model analysis.

ORDERING INFORMATION

LCR-8250A	DC, 10Hz~50MHz High Frequency LCR Meter	LCR-8230	DC, 10Hz~30MHz High Frequency LCR Meter
LCR-8230A	DC, 10Hz~30MHz High Frequency LCR Meter	LCR-8220	DC, 10Hz~20MHz High Frequency LCR Meter
LCR-8220A	DC, 10Hz~20MHz High Frequency LCR Meter	LCR-8210	DC, 10Hz~10MHz High Frequency LCR Meter
LCR-8210A	DC, 10Hz~10MHz High Frequency LCR Meter	LCR-8205	DC, 10Hz~5MHz High Frequency LCR Meter
LCR-8205A	DC, 10Hz~5MHz High Frequency LCR Meter	LCR-8201	DC, 10Hz~1MHz High Frequency LCR Meter

ACCESSORIES :

User Manual (CD) x 1, AC Power Cord x 1, Test Fixture LCR-06B x 1, Safety Sheet x 1

OPTION

LCR-05A	Test Fixture for Axial & Radial Lead Components (up to 50MHz)	LCR-12	Test Lead with Kelvin clip (4 wire type)	GTL-234	RS-232C cable
LCR-06B	Test Lead with Kelvin clip (4 wire type)	LCR-15A	Test Fixture for SMD/Chip components (up to 50MHz)	GTL-248	GPIB Cable
LCR-07	Test Lead with Alligator clip (2 wire type)			GTL-246	USB Cable
LCR-08	Test Fixture (Tweezers) for SMD/Chip Components	LCR-DB1	External DC Bias Voltage Box		
LCR-10A	Test Fixture for Bottom Electrode Components (up to 50MHz)	GRA-445	Rack Mount Kit, 19" 4U size		

High Frequency LCR Meter

A. THE PRESENTATION OF FLEXIBLE MEASUREMENT COMBINATIONS



LCR-8200(A) Series allows users to select and arrange measurement parameters. Users can select at least one parameter to maximum four parameters from the 17 measurement parameters according

to the measurement requirements and the presentation order can also be arranged in a desired manner. The set parameters can be stored in internal/external memory groups for subsequent recalls.

B. INDEPENDENT SETTING JUDGMENT



Each selected test parameter can independently set judgement and comparison such as value, difference value or difference percentage. Additionally, the display method can also be based on value, difference value or difference percentage to self-define the presentation of test results, and the observation is more in line

with the actual needs. In addition to using the warning sound, all the parameters set for comparison judgement will be displayed in different colors. "Red" means that the limit value is exceeded, and "Green" means that it is within the limit value, so that the judgment can be conducted smoothly under noisy environment.

C. LIST MEASUREMENT



The 15-point LIST measurement mode provides measurement values at a specific frequency or voltage of the DUT, and each set point can set independent comparison and judgement. When the trigger mode is set to "AUTO", the display "WAIT ON" will appear

on the measurement screen and LCR-8200(A) Series will detect the contact status of the fixture. When the DUT is connected, the test will start automatically.

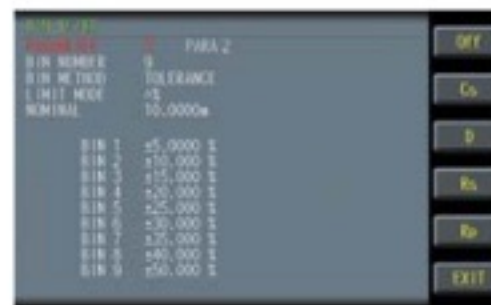
D. TWO-CURVE SWEEP



Up to 2 characteristic parameters of the DUT can be swept at the same time. Sweep type (frequency/Vac/Iac), axis form (LOG/LINEAR), sweep speed, even adding bias (internal), etc can be set according to the actual demands. After the sweep is completed, automatic adjustment can be used to obtain the best

observation display. The movable cursor can be used to obtain the measurement result of the specific position. Swept displays and point values can be saved to the flash drive via the USB host on the panel for subsequent analysis.

E. BIN FUNCTION



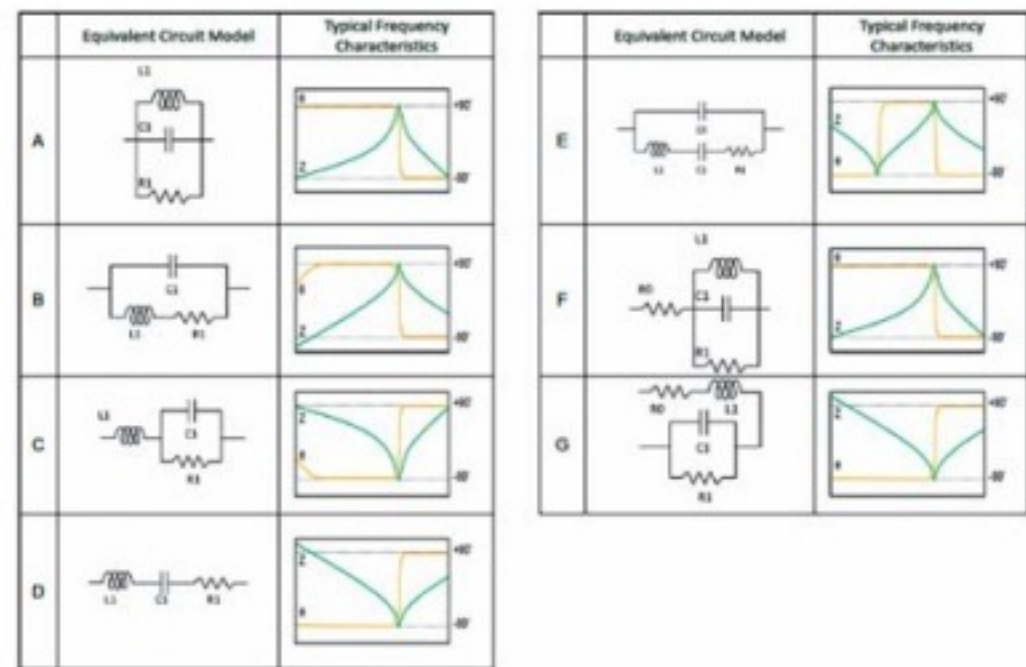
BIN settings for one specific parameter of the selected measurement parameters provide up to 9 BIN positions. Set the judgment basis for individual classifications according to the desired BIN methods (EQUAL/SEQUENTIAL/TOLERANCE/

RANDOM) and limit value mode (VALUE/delta/delta%). The result of this sorting can be obtained through the Handler interface. If directly connected to an external device such as a sorter, an immediate sorting can be performed.

F. EQUIVALENT CIRCUIT MODEL ANALYSIS



This function, which adopts the algorithm based on resonance theory, consists of 7 different equivalent circuit models. The 3-components analysis model is composed of 4 types, A, B, C and D, whereas the 4-components analysis model covers 3 types, E, F and G. By selecting suitable equivalent circuit model, the instrument will automatically calculate approximate value of each component parameter after measurement, and generate simulated curve (TRACE A/B SIMULATION) to compare with the measured curve (TRACE A/B).



Also, it's available to choose equivalent circuit model followed by directly input value of each component parameter to generate a simulated curve (TRACE A/B SIMULATION) to further compare with the measured curve (TRACE A/B). The parameters of both resonance frequency (SRF) and quality factor (Qm) can be displayed simultaneously.

Precision LCR Meter



LCR-6000 Series



FEATURES

- * 3.5" Color LCD
- * 5 Models (10Hz ~ 2kHz/20kHz/100kHz/200kHz/300kHz)
- * Consecutive Test Frequency
- * Basic Accuracy : 0.05%
- * Measuring Speed up to 25ms (Max.)
- * Full Frequency Range or Spot OPEN/SHORT
- * 16 Major/Secondary Parameter Measurement Combinations and Two Additional Monitoring Parameters (Maximum Four Different Parameters Can be Show Simultaneously)
- * DCR Measurement and Internal D.C. Bias Voltage ($\pm 2.5V$)
- * PASS/FAIL Judgment
- * Auto Level Control (ALC) Function
- * BIN Function Provides 9BIN and 1AUX, Totally 10BIN
- * 10 Steps Listed Tests to Select Different Frequency, Voltage and Current Criteria
- * Standard Interface : RS-232C, Handler and USB Host/Device
- * Compact Size, Ideal for Automatic Integration (2U, 1/2 Rack)

GW Instek introduces the brand new high precision LCR meter - LCR-6000 series, which, with five models, has a test frequency range extending from 2kHz/20kHz/100kHz/200kHz/300kHz (maximum) and with 0.05% basic accuracy. The compact size design, 2U height and 1/2 rack, is one of the practical features of the series which is the optimum space saver suitable for either bench top or system rack. The compacted LCR-6000 series with abundant features is absolutely the excellent tool for R&D, production test, IQC, etc. on implementing each test stages for passive components.

The LCR-6000 series provides rich functionalities with the compact size. First of all, the entire series adopts 3.5-inch color LCD and features opulent display parameters. In addition to simultaneously displaying setting criteria and measurement results, the series increases two additional monitoring parameters. In other words, there are four parameters, primary/secondary and two monitoring, simultaneously shown on the screen that tremendously enhances the measurement efficiency. The enlarge display mode not only emphasizes the measurement results, but also provides PASS/FAIL judgment to facilitate a rapid and convenient test result.

Convenience is one of the unique features. The LCR-6000 series comes equipped with two zero methods, which are full frequency range and spot. Users, without turning off the power and changing test fixture, can freely change frequency within the provided frequency range to conduct measurements. By so doing, tremendous time can be saved from repeatedly executing zero operation. Additionally, frequency range of the series is consecutive that allows users to input precise frequency value to conduct the most genuine test on components.

The LCR-6000 series also features diverse ancillary measurements to meet the measurement requirements of different materials. For instance, the series provides the automatic level control (ALC) function to satisfy the test voltage requirement of MLCC. For inductive component measurements, the series provides the adjustable test current function and the D.C. resistance measurement function. The optional external bias current adapter ($\pm 2.5A$) is to satisfy the measurement requirements. With respect to the D.C. bias voltage test for capacitive components requirements, the series allows users to conduct verification measurement on materials by its internal $\pm 2.5V$ adjustable voltage or via an optional external bias voltage adapter ($\pm 45V$). Furthermore, 10 steps of listed test functionalities allow users to set testing parameters (either by frequency, or voltage, or current) for each step based on users' requirements in order to observe the trend of DUT characteristics.

The LCR-6000 series has 10 memory sets defined by panel setting criteria to facilitate users in selecting test criteria and saving time in repeated settings. 10,000 measurement result storage capability can easily record measurement results instantaneously. The USB host allows easy access to recorded results without connecting the series to the PC. The USB host also allows USB to retrieve and save screen so as to assist users in compiling setting guidelines.

For the external control, the LCR-6000 series provides handler interface and collocates with its measurement sorting function (9BIN, AUX: 1BIN) to facilitate the connection with sorting machine so as to sort out the materials. For remote control and measurement result retrieval requirements, the LCR-6000 series provides RS-232C to assist setting control or measurement result retrieval via the PC commands. Additionally, the free PC software gives users an instant tool to store measurement results that saves time in developing programs.

The brand new compacted LCR-6000 series can effectively improve the limitation of space. Diverse measurement functionalities and display methods are making the series the high CP ratio choice in meeting the requirements of R&D, component assessment for engineering departments, category sorting requirements for component production, and IQC for verification on component specifications.

SPECIFICATIONS	
TEST FREQUENCY	
	LCR-6300 : 10Hz ~ 300kHz ($\pm 0.01\%$) (4 digits resolution) LCR-6200 : 10Hz ~ 200kHz ($\pm 0.01\%$) (4 digits resolution) LCR-6100 : 10Hz ~ 100kHz ($\pm 0.01\%$) (4 digits resolution) LCR-6020 : 10Hz ~ 20kHz ($\pm 0.01\%$) (4 digits resolution) LCR-6002 : 10Hz ~ 2kHz ($\pm 0.01\%$) (4 digits resolution)
OUTPUT IMPEDANCE	
	30 Ω / 50 Ω / 100 Ω selectable
BASIC ACCURACY	
Slow / Med	0.05%
Fast	0.1%
TEST SPEED	
	FAST : 25ms / MED : 100ms / SLOW : 333ms
TEST SIGNAL LEVELS	
AC Voltage	10.00mV- 2.00V ($\pm 10\%$) CV : 10.00mV- 2.00V ($\pm 6\%$)
AC Current	100.0 μ A- 20.00mA ($\pm 10\%$) CC : 100.0 μ A- 20.00mA ($\pm 6\%$) (@2VMax)
DCR	$\pm 2V$, 0.066A(Max), Output impedance fixed 30 Ω
DC BIAS	
Internal	$\pm 2.5V$ (0.5% + 0.005V)
DISPLAY RANGE	
R, X, Z	0.00001 Ω ~ 99.9999M Ω
G, B, Y	0.01nS ~ 999.999S
L	0.00001 μ H ~ 9999.99H
C	0.00001pF ~ 9999.99mF
D	0.00001 ~ 9.99999
Q	0.00001 ~ 99999.9
θ_d	-179.999° ~ 179.999°
θ_r	-3.14159 ~ 3.14159
DCR	0.00001 Ω ~ 99.9999M Ω
$\Delta\%$	-99999% ~ 99999%
TEST MODE	
Combinations	Cs-Rs, Cs-D, Cp-Rp, Cp-D, Lp-Rp, Lp-Q, Ls-Rs, Ls-Q, Rs-Q, Rp-Q, R-X, DCR, Z- θ_r , Z- θ_d , Z-D, Z-Q, Auto LCZ
Monitor Parameter (2 Selectable)	Z, D, Q, Vac, Iac, Δ , $\Delta\%$, θ_r , θ_d , R, X, G, B, Y



LCR-6000 Series

SPECIFICATIONS	
LISTED MODE	
	10 steps
BIN FUNCTION	
	Comparator (9BIN,AUX:1BIN)
MEMORY	
INT – Panel Setting	10 file name
INT – Measured Data	10000 Data (.csv)
USB Storage	10 file name for setting, 9999 file name for data, 999 Log file for LCD screen
OTHER FUNCTION	
Auto Level Control (ALC)	ON/OFF
Average	1~256 times
Trigger	INT / MAN / EXT / BUS
Delay	0ms~60s
Judgment	PASS / FAIL
Screen Capture	Saving into USB (Bmp form)
DISPLAY	
3.5" LCD, RGB color (320x240)	
INTERFACE	
RS-232(SCPI), Handler, USB Host/USB Device	
POWER SOURCE	
AC 100V ~ 240V, 50 ~ 60Hz, Max. 15W	
DIMENSIONS & WEIGHT	
265 (W) x 107 (H) x 312 (D) mm ; Approx. 3kg	

ORDERING INFORMATION

LCR-6300	10Hz ~ 300kHz Precision LCR Meter
LCR-6200	10Hz ~ 200kHz Precision LCR Meter
LCR-6100	10Hz ~ 100kHz Precision LCR Meter
LCR-6020	10Hz ~ 20kHz Precision LCR Meter
LCR-6002	10Hz ~ 2kHz Precision LCR Meter

ACCESSORIES :

Safety Sheet x 1, Power Cord x 1, Test Fixture LCR-06B x 1, CD x 1 (User manual/PC software)

OPTION

LCR-16	±45V DC Bias Voltage Box
LCR-17	±2.5A DC Bias Current Box

OPTIONAL ASSESSORIES

LCR-05	Test Fixture for Axial & Radial Lead Components
LCR-06B	Kelvin Clip Test Lead
LCR-07	Test Fixture, Two-Wire with Alligator Clips
LCR-08	Test Fixture (Tweezers) for SMD/Chip Components
LCR-15	Test Fixture for SMD/Chip Components (0201 to 1812)
GTL-232	RS-232C Cable, 9-pin Female to 9-pin, null Modem for Computer, Approx. 2m
GTL-246	USB Cable, USB 2.0 A-B TYPE CABLE, 4P
GRA-422	Rack Mount Kit
GRA-436	Rack Mount Kit, 19" 2U size for two sets

FREE DOWNLOAD

PC Software	LCR-6000 Series
Driver	LabVIEW Driver

Rear Panel



LCR-05

Patent:185538



Description:
Test fixture for measuring axial and radial lead components
Frequency: DC to 1MHz
Max. Voltage: +/- 35V

LCR-06B



Description:
Kelvin clip test lead
Frequency: DC to 1MHz
Max. Voltage: +/- 45V

LCR-07



Description:
Test leads for conventional component measurement.
Frequency: DC to 1MHz
Max. Voltage: +/- 35V

LCR-08

Patent:188540



Description:
SMD / chip tweezers
Frequency: DC to 1MHz
Max. Voltage: +/- 35V

LCR-15



Description:
SMD/chip test fixture
Frequency: DC to 10MHz
Max. Voltage: +/- 45V
Application size: 0201 to 1812

LCR-16



Description:
External DC Bias voltage box
Frequency: 40Hz to 1MHz
Max. Voltage: +/- 45V

LCR-17



Description:
External DC Bias Current Box
Frequency: 40Hz to 1MHz
Max. Current: +/- 2.5A

Hand Held LCR Meter



LCR-916/915/914 (100kHz/10kHz/1kHz)



FEATURES

- * 20,000/2,000 Counts Dual Display
- * Test Frequency : 100Hz/120Hz/1kHz/10kHz/100kHz Depend on Model
- * Auto LCR Mode for DUT Measuring
- * 0.2% Basic Accuracy
- * Measurement Parameters : L, C, R(AC/DC), D, Q, ESR, θ
- * Parallel/Series Testing Mode
- * Sorting Mode for Quality Control
- * 2Wire or 5Wire Measurement Available
- * Data Hold and Zero Mode Supported
- * Max and Min (LCR-916 Only)
- * Auto Range, Auto Backlit
- * Low Battery Indication
- * Auto Power Off
- * Data Collection or DC Power Operation (Optional for LCR-915)

The LCR-916/915/914 is a smart, convenient and fully-functional dual display handheld LCR meter. The test frequency extends as high as 100 kHz/10/1kHz, providing greater flexibility to test a wider range of components. The LCR-916/915/914 uses a dual 20,000/2000 count display. The 20000 count display is used for displaying primary parameters such as capacitance, inductance, reactance and resistance and a 2000 count display is for secondary parameters such as Q, D, ESR and RP measurements. Secondary measurements can also be combined with the primary measurement while the primary measurement is still being taken. The LCR-916/915/914 provides two measurement methods, 2 wire and 5 wire measurement, The LCR-916/915/914 also comes with a host of various standard or optional accessories to assist in testing a number of different component types. The meters also include handy functions such as data hold, tolerance sorting, zero mode and Min/Max (LCR-916 only).

The meters' USB interface can be used to log data to a PC using the LCR-900 software and provide the DC 5V needed to power the meter.

With the LCR-916/915/914, you can perform quick and basic LCR measurements with precision at an affordable price.

SPECIFICATIONS			
	LCR-916	LCR-915	LCR-914
TEST FREQUENCY			
	100Hz/120Hz/1kHz/10kHz/100kHz Selectable	100Hz/120Hz/1kHz/10kHz Selectable	100Hz/120Hz/1kHz Selectable
FULL SCALE			
	Main Display : 20,000/2,000 count Selectable; Sub Display : 2,000 count		
INDUCTANCE			
Range	20uH – 20kH depends on the selected test frequency		
Best Accuracy	± (0.2% rdg + 2 digits)		
Resolution	0.001uH – 0.001kH depends on the selected range		
CAPACITANCE			
Range	20pF – 20mF depends on the selected test frequency		
Best Accuracy	± (0.2% rdg + 2 digits)		
Resolution	0.001pF – 0.001mF depends on the selected range		
RESISTANCE			
Range	20Ω – 200MΩ depends on the selected test frequency		
Best Accuracy	± (0.2% rdg + 2 digits)		
Resolution	0.001Ω – 0.01MΩ depends on the selected range		
DC RESISTANCE			
Range	200Ω – 200MΩ		
Best Accuracy	± (0.2% rdg + 2 digits)		
Resolution	0.01Ω – 0.01MΩ depends on the selected range		
QUALITY FACTOR (Q)			
Range	0.000 – 999		
Accuracy	2 x (main parameter accuracy)		
Best Resolution	0.001		
DISSIPATION FACTOR (D)			
Range	0.000 – 999		
Accuracy	2 x (main parameter accuracy)		
Best Resolution	0.001		
PHASE ANGLE (θ)			
Range	-90.0° – 90.0°		
Accuracy	± (0.2% rdg + 5 digits)		
Resolution	0.1°		
MEASUREMENT CIRCUIT			
	Parallel or Series Selectable		
AUTO LCR MODE			
	Automatically identifies and measures the DUT when the meter is switched on		
SORTING MODE			
	±0.1%, ±0.2%, ±0.25%, ±0.5%, ±1.0%, ±2.0%, ±5.0%, ±10.0%, ±20.0% and +80%/-20% Selectable		
OTHER FUNCTIONS			
	Auto range, Auto back-light, Max, Min, Data Hold, Zero, 46 segments Analogue bar, Auto power off		
DISPLAY			
	LCD mono display		
INTERFACE			
	USB		
POWER SOURCE			
	AA Battery 1.5V x 4, DC 5V (through AC adapter or USB cable - optional for LCR-915/914)		
DIMENSIONS & WEIGHT			
	95(W) x 207(H) x 52(D) mm, Approx. 630 g		

Note : Specifications are performed by test cable length = 0m

AUTO LCR MODE



5Wire & 2Wire Measurement Terminal



Full Accessories



ORDERING INFORMATION

LCR-916	100kHz Hand-held LCR Meter
LCR-915	10kHz Hand-held LCR Meter
LCR-914	1kHz Hand-held LCR Meter

ACCESSORIES :

User manual x 1, Battery

OPTIONAL ACCESSORIES

Opt.01	4Wire DIP test lead
Opt.02	Accessory Pack for LCR-915
Opt.03	Accessory Pack for LCR-914
Opt.04	Magnetic Hang kit for LCR-914
GTL-253	USB Cable, USB 2.0 A-mini B type, Approx. 1400mm

Note : 1. The accessory pack for LCR-915 includes SMD test probe, AC adapter, USB cable and CD.

ACCESSORIES GUIDE

MODEL	LCR-916	LCR-915	LCR-914
① Shorting Cube	Standard	Standard	Standard
② Alligator Clip	Standard	Standard	Standard
③ Magnetic Hang Kit	Standard	Standard	Opt. 04
④ 4 Wire SMD Probe	Standard	Opt. 02	Opt. 03
⑤ AC Power Adapter	Standard	Opt. 02	Opt. 03
⑥ USB Cable	Standard	Opt. 02	Opt. 03
⑦ PC Software (CD)	Standard	Opt. 02	N/A
⑧ 4 Wire DIP Clip	Opt. 01	Opt. 01	Opt. 01



SAFETY TESTERS

Safety testers are designed to ensure safe operation of DUTs under various operating conditions and environment. GW Instek's, GPT-Series provides safe and quick measurement tools for AC/DC withstanding voltage tests, insulation resistance tests, and AC ground bond tests as well as ground continuity tests. Those tests are required by many international safety regulations such as CE, UL, VDE, and etc.

A dedicated option, multiplex scanner box, for specific safety tester series. This multiplex scanner box, GSB-01/02, has a function that distributes the test voltage or current provided by the GPT-9900A/9900/9800 Series to multiple test points.

We also have leakage current tester, GLC-9000, which supports all the major leakage current test standards for general electronic equipment.

PRODUCTS

- AC/DC/IR/GB Electrical Safety Analyzer
 - AC/DC Withstanding Voltage/Insulation Resistance/Ground Bond Tester
 - AC Ground Bond Tester
 - Multiplex Scanner Box
 - Leakage Current Tester
-

SAFETY TESTERS OVERVIEW

A safety tester is designed to ensure safe operation of DUT's under a number of operating conditions and environments. Thus, many of the international safety regulation, such as UL in USA, VDE in Germany, CE in EU, BS in the Great Britain and CSA in Canada, are constituted to standardize safety testing. GW Instek offers a series of Safety Testers for manufacturers to meet the mentioned regulations. The Safety Testers offered by GW Instek, GPT-15000/12000/9900/9800/9600/9500 Series are general multifunction safety testers and cover a variety of different usages based models: AC Hi-Pot, DC Hi-Pot, Insulation Resistance and Ground Bond as well as Continuity tests.

TEST ITEMS EXPLANATION

Hi-Pot (Withstanding)	<p>Purpose: Make sure users do not receive electrical shocks that might be caused by a breakdown of the electrical insulation when using product.</p> <p>Method: While operating the product under high voltage mode, measure the current leakage between AC primary circuits and low voltage secondary circuits, or between AC primary circuits and its ground, or between low voltage secondary circuits and its ground.</p>
ARC Detection	<p>Purpose: Check potential problems such as loose screws, bad material insulation, etc.</p> <p>Method: Measure the duration of a current spike caused by a dramatic change in voltage. Normally, an ARC Detection is performed during a Hi-Pot test.</p>
Insulation Resistance	<p>Purpose: Check the quality of insulation.</p> <p>Method: Measure the resistance between AC primary circuits and low voltage secondary circuits, or between AC primary circuits and its ground, or between low voltage secondary circuits and its ground.</p>
Ground Bond	<p>Purpose: Verify if exposed conductive parts of product and its power system ground are well connected and be able to sustain high current, until the fuse or circuit breaker shuts off the power.</p> <p>Method: Measure the resistance of a ground circuit and verify the adequacy of the connection. A Ground Bond test is for measuring the ground path with low voltage and high current.</p>
Continuity	<p>Purpose: Verifies that an electrical connection exists between the mains power ground and any conductive surface of the product.</p> <p>Method: A ground bond test is for measuring the ground path with low voltage and low current.</p>

GPT-9000 FAMILY (GPT-9900 Series, GPT-9800 Series and GPT-9600 Series)

The GPT-9000 family is a fully automatic electrical tester with 500VA, 200VA and 100VA test capacity which combines AC/DC Hi-pot, Insulation Resistance and high current ground bond (up to 32Aac) tests. The GPT-9000 family complies with electrical equipment and appliance testing standards such as UL, CSA and. The safety compliance, reliable test results, user-friendly and fully automatic interface make the GPT-9000 Series family an advanced safety tester series that can perform up to four essential electrical safety tests and deliver fast and reliable test results from a single test connection.

No Load Set Up of Trip Current and Output Voltage

With the GPT-9900/9800 Series, the trip current and output voltage can be set without high voltage, or using a load resistor.

Safety Fault Interrupt

With the built-in Safety Fault Intercept technology, the GPT-9900/9800/9600 Series are able to set the high limit current as a watchdog to detect whether the current is abnormal to shut-off the output power when tripped.

Flashing High voltage indicator

A flashing red LED indicator outputs a warning when a high voltage is present at the output.

Highly Efficiency Voltage Output

The high-efficiency PWM power amplifier of the GPT-9900/9800/9600 Series provides a very stable HV output and avoids load affecting the DUT.

Zero Crossing Turn-On

The Zero Crossing Turn-On feature ensures that the output voltage will start from the zero crossing point of a sine wave. This function prevents unexpected occurrences of spikes or arcs, and ensures accurate cut-off current.

Selectable Arc Detection

An Arc is a short duration (>10uS) current spike occurring due to a dramatic change in voltage or current. The GPT-9900/9800/9600Series offer selectable Arc detection setting value depending on the cutoff range to identify the potential problems in product quality such as loose screws, bad insulation material etc.

Controllable Ramp Up Time

During a AC/DC Hi-pot and IR test, an unfavorable condition such as spike in current might occur. The GPT-9900/9800 Series can control the ramp up time to prevent spikes, which might cause erroneous measurement results.

Memories of 100 AUTO, Each AUTO 16 Manu Steps of Test Set-Up

The GPT-9900/9800 Series provide 16 steps for test set-ups, each Manu step containing one electrical safety test. All 16 steps can be executed just by pressing a button. The GPT-9900/9800 Series offer 100 AUTO of memories to facilitate testing of up to 100 different products in a production line.

SAFETY TESTERS

SAFETY TESTING INSTRUMENTS

MODEL	Description (Main Function)	Page
GPT-15004	AC 500VA AC/DC/IR/GB Electrical Safety Analyzer	E33-38
GPT-15003	AC 500VA AC/DC/IR Electrical Safety Analyzer	E33-38
GPT-15002	AC 500VA AC/DC Electrical Safety Analyzer	E33-38
GPT-15001	AC 500VA AC Electrical Safety Analyzer	E33-38
GPT-12004	AC 200VA AC/DC/IR/GB Electrical Safety Analyzer	E33-38
GPT-12003	AC 200VA AC/DC/IR Electrical Safety Analyzer	E33-38
GPT-12002	AC 200VA AC/DC Electrical Safety Analyzer	E33-38
GPT-12001	AC 200VA AC Electrical Safety Analyzer	E33-38
GPT-9904	AC 500VA AC/DC Withstanding Voltage/Insulation Resistance/Ground Bond Tester	E39-40
GPT-9903A	AC 500VA AC/DC Withstanding Voltage/Insulation Resistance Tester	E39-40
GPT-9902A	AC 500VA AC/DC Withstanding Voltage Tester	E39-40
GPT-9901A	AC 500VA AC Withstanding Voltage Tester	E39-40
GPT-9804	AC 200VA AC/DC Withstanding Voltage/Insulation Resistance/Ground Bond Tester	E39-40
GPT-9803	AC 200VA AC/DC Withstanding Voltage/Insulation Resistance Tester	E39-40
GPT-9802	AC 200VA AC/DC Withstanding Voltage Tester	E39-40
GPT-9801	AC 200VA AC Withstanding Voltage Tester	E39-40
GSB-01	Multiplex Scanner Box – 8CH H.V.	E41-42
GSB-02	Multiplex Scanner Box – 6CH H.V./2CH G.B.	E41-42
GCT-9040	AC Ground Bond Tester	E43-44
GPT-9603	AC 100VA AC/DC Withstanding Voltage/Insulation Resistance Tester	E45-46
GPT-9612	AC 100VA AC Withstanding Voltage/Insulation Resistance Tester	E45-46
GPT-9602	AC 100VA AC/DC Withstanding Voltage Tester	E45-46
GPT-9601	AC 100VA AC Withstanding Voltage Tester	E45-46
GPT-9513	Multi-Channel Hipot Tester	E47-50
GPT-9503	Multi-Channel Hipot Tester	E47-50
GLC-10000	Leakage Current Tester	E51-52
GLC-9000	Leakage Current Tester	E53-54

SAFETY TESTERS

GPT-SERIES QUICK SELECTION GUIDE

MODEL	Output Capacity	Functions					Features						
		ACW	DCW	IR	GB	GC	SWEEP	ARC Detect	RAMP Up	RAMP Down	Rear Output	Barcode	
GPT-15004	500VA	✓*	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
GPT-15003	500VA	✓*	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
GPT-15002	500VA	✓*	✓			✓	✓	✓	✓	✓	✓	✓	✓
GPT-15001	500VA	✓*				✓	✓	✓	✓	✓	✓	✓	✓
GPT-12004	200VA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
GPT-12003	200VA	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
GPT-12002	200VA	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓
GPT-12001	200VA	✓				✓	✓	✓	✓	✓	✓	✓	✓
GPT-9904	500VA	✓*	✓	✓	✓		✓	✓	✓			✓	
GPT-9903A	500VA	✓*	✓	✓			✓	✓	✓			✓	
GPT-9902A	500VA	✓*	✓				✓	✓	✓			✓	
GPT-9901A	500VA	✓*					✓	✓	✓			✓	
GPT-9804	200VA	✓	✓	✓	✓			✓	✓				
GPT-9803	200VA	✓	✓	✓				✓	✓				
GPT-9802	200VA	✓	✓					✓	✓				
GPT-9801	200VA	✓						✓	✓				
GPT-9603	100VA	✓	✓	✓				✓					
GPT-9612	100VA	✓		✓				✓					
GPT-9602	100VA	✓	✓					✓					
GPT-9601	100VA	✓						✓					
GPT-9513	150VA	✓	✓	✓		✓		✓	✓	✓		8CH Scanner	
GPT-9503	150VA	✓	✓	✓		✓		✓	✓	✓		8CH Scanner	

* Short Current > 200mA

AC/DC/IR/GB Electrical Safety Analyzer



GPT-15004

NEW



GPT-15003/15002/15001

NEW



GPT-12004



GPT-12003/12002/12001



FEATURES

- ✦ 200VA/500VA AC Test Capacity (500VA short circuit current > 200mA)
- ✦ 7" TFT LCD
- ✦ Comply with IEC 61010-2-034 Design Requirement
- ✦ Manual Test Mode/Auto Test Mode
- ✦ RMS Current Measurement
- ✦ Zero Crossing Turn-on Operation
- ✦ Controllable Ramp-up & Ramp-down Time
- ✦ Statistics & Analysis Function
- ✦ Capacitive Load Testing Capability up to 47μF
- ✦ Sweep Function for DUT Characteristic Analysis
- ✦ Convenience Listed AUTO Mode Easy to Read Internal and Judge
- ✦ Internal Storage and USB Storage Available
- ✦ Barcode Function Available
- ✦ Setting Data Export/Import
- ✦ Rear Panel Output Available
- ✦ Standard Interface : RS-232C, USB Host/Device and Signal I/O
- ✦ Optional Interface : GPIB or LAN
- ✦ Universal Power Input

CW Instek introduces the flagship model (500VA/200VA output capacity) safety analyzer the GPT-10000 Series, which is the first safety analyzer in the world to comply with IEC 61010-2-034 (Safety requirement for electrical requirement for measurement, control and laboratory use – particular requirements for measurement equipment for insulation resistance and test equipment for electric strength), which stipulates that the requirements of the software and hardware interfaces must be followed while designing high voltage and insulation resistance test and measurement instruments so as to ensure that users are provided with necessary protection and warning while using the instruments.

The GPT-10000 Series safety analyzer has eight models: GPT-15004/GPT-12004 features AC/DC withstanding voltage test, insulation resistance test, AC ground bond test and continuity test; GPT-15003/GPT-12003 conducts AC/DC withstanding voltage test, insulation resistance test, and continuity test; GPT-15002/GPT-12002 carries out AC/DC withstanding voltage test and continuity test; GPT-15001/GPT-12001 executes AC withstanding voltage test and continuity test. The entire series utilizes a high-efficient PWM amplifier to effectively exclude the influence from the fluctuating input voltage or distorted waveforms so as to guarantee a stable high voltage output while conducting AC withstanding voltage test on the DUT to meet the safety regulations such as IEC - EN - UL - CSA - GB - JIS that demand the test requirements for various electronic/electrical products or parts.

To comply with IEC 61010-2-034 requirements, the series takes into account of safety by adopting the double insulation design for input power supply and output mechanism to enhance user safety. Additionally, the retracted on-off switch design (START key) and various (optional) mechanisms for test activation (for instance, press and hold for 1 second to activate, activation by pressing double keys, etc.) are incorporated into the series to avoid accidentally touching that results in high voltage/large current output causing damage and danger to products or users. High illumination LED lights (flashing or permanently lit) and a high volume audio indicator are included in designing the series to provide warnings of the status of the on-going tests or judgement results from the safety analyzer. On top of that, the DUT will be automatically discharged to the safe voltage (approximately 30V) after each test to prevent large residual test voltage from causing harm to users.

The series utilizes 7-inch color TFT LCD and inherits the consistent simplicity key design style of the product family to allow users to experience easy operations and a clear observation of the test results. The major test functions include AC withstanding voltage test (AC 5kV), DC withstanding voltage test (DC 5kV), insulation resistance test (DC 50V-5000V), ground bond test (AC 32A), and grounding continuity test (DC 100mA fixed). The series also allocates with superb output adjustment resolution, measurement resolution (AC withstanding voltage: 1μA; DC withstanding voltage: 0.1μA; insulation resistance: 0.1MΩ; ground bond: 0.1mΩ; continuity test: 0.01Ω), controllable voltage ramp up and ramp down time settings, and upper/lower limit judgement settings, and large capacitance test capability (up to 47μF) for DUT with large capacitance such as surge absorber and large capacitance on the input terminal of EMC/EMI prevention. For Insulation resistance, provides 10mA pre-charged current (fixed) to first rapidly fully charge the DUT's capacitive load and then to conduct test and measurement so as to avoid misjudgment from fluctuating inrush current. All the above features of the series facilitate a more flexible execution of the required tests so that users can obtain accurate test and measurement results.

The statistic function is the highlight of the series. Test items, number of tests, judgement results are recoded after testing and the test results can be shown by bar graph on the display. Users can immediately learn the status of test results and judgement distributing during the manufacturing process without using a PC. The other strong feature is the sweep function, which can be used for the analysis on product's crash point. Users can use the sweep mode to see the curve diagram of the test results after finishing the functional tests. Users also select any time point during the process to analyze the relation between voltage and current (when ACW or DCW is selected). The test result of the certain period of time can be swept by setting start and stop time points to analyze the relation between voltage and current under that time frame. Furthermore, the tabular continuity test function can combine 10 manual memory sets to carry out automatic tests or 9 manual memory sets with one connection device to connect next automatic test so as to increase the test items of the continuity test. Users can obtain various test values and judgement results without switching to a different display screen.

Other functions and features of the GPT-10000 series include 100 sets of manual test as well as 100 sets of auto test memory for the storage of different test conditions and the saved test conditions can be exported to another GPT-10000 through USB flash drive to quick replication and expansion of production line equipment; barcode scanner can be conducted to the front panel USB host of GPT-10000 for managing test condition of DUT and then be able to quick and correctly recall required test condition; rear output terminal for system integration; front panel remote control terminal mount/rear panel Signal I/O for users to conveniently control the analyzer's output/stop based upon the requirements. The USB storage function allows test results to be stored in the USB flash drive or internal memory to save the trouble of using a PC, and the function is conducive to the follow-up data analysis. For users with the requirements of PC control and test results recording, the series also provides RS-232C, USB and option GPIB or LAN.

SPECIFICATIONS

MODEL	GPT-15000 Series	GPT-12000 Series
AC WITHSTANDING		
Output-Voltage Range	0.050kV~5.000kV	0.050kV~5.000kV
Output-Voltage Resolution	1V	1V
Output-Voltage Accuracy	±1% (of setting + 5V) [no load]	±1% (of setting + 5V) [no load]
Maximum Rated Load	500 VA (5kV/100mA)	200 VA (5kV/40mA)
Maximum Rated Current	100mA (0.5kV<V≤5kV); 10mA (0.05kV≤V≤0.5kV)	40mA (0.5kV<V≤5kV); 10mA (0.05kV≤V≤0.5kV)
Output-Voltage Waveform	Sine wave	Sine wave
Output-Voltage Frequency	50 Hz / 60 Hz selectable	50 Hz / 60 Hz selectable
Voltage Regulation	±1% + 5V [maximum rated load – no load]	±1% + 5V [maximum rated load – no load]
Voltmeter Accuracy	±1% (of reading + 5V)	±1% (of reading + 5V)
Current Measurement Range	1μA~100.00mA	1μA~40.00mA
Current Test Resolution	1μA / 10μA / 100μA	1μA / 10μA
Current Measurement Accuracy	±1.5% of reading + 30μA	±1.5% of reading + 30μA
Current Offset	60μA Maximum	60μA Maximum
Window Comparator Method	Yes	Yes
ARC Detect	Yes	Yes
RAMP UP (Rise Time)	0.1s~999.9s	0.1s~999.9s
RAMP DOWN (Fall Time)	0.0s~999.9s	0.0s~999.9s
TIMER (Test Time) ^①	OFF, 0.3s~999.9s	OFF, 0.3s~999.9s
WATT TIME	0.0s~999.9s	0.0s~999.9s
GND	ON/OFF	ON/OFF



GPT-15004

SPECIFICATIONS		
MODEL	GPT-15000 Series	GPT-12000 Series
DC WITHSTANDING		
Output-Voltage Range	0.050kV-6.000kV	0.050kV-6.000kV
Output-Voltage Resolution	1V	1V
Output-Voltage Accuracy	$\pm(1\% \text{ of setting} + 5V)$ [no load]	$\pm(1\% \text{ of setting} + 5V)$ [no load]
Maximum Rated Load	100W (5kV/20mA)	50W (5kV/10mA)
Maximum Rated Current	20mA (0.5kV$V \leq 6kV$); 2mA (0.05kV$V \leq 0.5kV$)	10mA (0.5kV$V \leq 6kV$); 2mA (0.05kV$V \leq 0.5kV$)
Voltage Regulation	$\pm(1\% + 5V)$ [maximum rated load – no load]	$\pm(1\% + 5V)$ [maximum rated load – no load]
Voltmeter Accuracy	$\pm(1\% \text{ of reading} + 5V)$	$\pm(1\% \text{ of reading} + 5V)$
Current Measurement Range	1 μ A-20.00mA	1 μ A-10.00mA
Current Best Resolution	0.1 μ A/1 μ A/10 μ A	0.1 μ A/1 μ A/10 μ A
Current Measurement Accuracy	$\pm(1.5\% \text{ of reading} + 3\mu A)$ when I Reading <1mA; $\pm(1.5\% \text{ of reading} + 30\mu A)$ when I Reading ≥ 1 mA	$\pm(1.5\% \text{ of reading} + 3\mu A)$ when I Reading <1mA; $\pm(1.5\% \text{ of reading} + 30\mu A)$ when I Reading ≥ 1 mA
Current Offset	5 μ A Maximum	5 μ A Maximum
Window Comparator Method	Yes	Yes
ARC Detect	Yes	Yes
RAMP UP (Rise Time)	0.1s-999.9s	0.1s-999.9s
RAMP DOWN (Fall Time)	0.0s-999.9s	0.0s-999.9s
TIMER (Test Time) ^o	OFF, 0.3s-999.9s	OFF, 0.3s-999.9s
WAIT TIME	0.0s-999.9s	0.0s-999.9s
GND	ON/OFF	ON/OFF
INSULATION RESISTANCE		
	(Firmware version: V1.06 or later)	(Firmware version: V1.12 or later)
Output Voltage	50V-5000V dc	50V-5000V dc
Output-Voltage Resolution	50V	50V
Output-Voltage Accuracy	$\pm(1\% \text{ of setting} + 5V)$ [no load]	$\pm(1\% \text{ of setting} + 5V)$ [no load]
Resistance Measurement Test Voltage	Measurement Range / Accuracy	Measurement Range / Accuracy
50V $\leq V \leq 100V$	0.001M Ω -10.00G Ω	0.001M Ω -10.00G Ω
150V $\leq V \leq 450V$	0.001M Ω -20.00G Ω	0.001M Ω -20.00G Ω
500V $\leq V \leq 1200V$	0.001M Ω -50.00G Ω	0.001M Ω -50.00G Ω
1250V $\leq V \leq 5000V$	0.001M Ω -50.00G Ω	0.001M Ω -50.00G Ω
Voltage Regulation	$\pm(1\% + 5V)$ [maximum rated load – no load]	$\pm(1\% + 5V)$ [maximum rated load – no load]
Voltmeter Accuracy	$\pm(1\% \text{ of reading} + 5V)$	$\pm(1\% \text{ of reading} + 5V)$
Short-Circuit Current	10mA max.	10mA max.
Output Impedance	2k Ω	2k Ω
Window Comparator Method	Yes	Yes
RAMP UP (Rise Time)	0.1s-999.9s	0.1s-999.9s
RAMP DOWN (Fall Time)	0.0s-999.9s	0.0s-999.9s
TIMER (Test Time) ^o	0.3s-999.9s	0.3s-999.9s
WAIT TIME	0.0s-999.9s	0.0s-999.9s
GND	ON/OFF	ON/OFF
GROUND BOND		
Output-Current	03.00A-32.00A ac	03.00A-32.00A ac
Output-Current Resolution	0.01A	0.01A
Output-Current Accuracy	3A $\leq I \leq 8A$: $\pm(1\% \text{ of reading} + 0.2A)$; 8A $I \leq 32A$: $\pm(1\% \text{ of reading} + 0.05A)$	3A $\leq I \leq 8A$: $\pm(1\% \text{ of reading} + 0.2A)$; 8A $I \leq 32A$: $\pm(1\% \text{ of reading} + 0.05A)$
Test-Voltage	8V ac max (open circuit)	8V ac max (open circuit)
Test-Voltage Frequency	50Hz/60Hz selectable	50Hz/60Hz selectable
Ohmmeter Measurement Range	1m Ω - 650m Ω	1m Ω - 650m Ω
Ohmmeter Measurement Resolution	0.1m Ω	0.1m Ω
Ohmmeter Measurement Accuracy	$\pm(1\% \text{ of reading} + 2 \text{ m}\Omega)$	$\pm(1\% \text{ of reading} + 2 \text{ m}\Omega)$
Window Comparator Method	Yes	Yes
TIMER (Test Time) ^o	0.3s-999.9s	0.3s-999.9s
Test Method	Four Terminal	Four Terminal
GND	ON/OFF	ON/OFF

GPT-15004/12004 Rear Panel



GPT-15003/15002/15001 Rear Panel

GPT-12003/12002/12001 Rear Panel



GHT-117/GHT-117(EU)

High Voltage Adapter Box



GHT-118/GHT-118(EU)

High Voltage/Ground Bond Adapter Box



AC/DC/IR/GB Electrical Safety Analyzer

Interlock Key



GHT-119 Remote Cable

Approx. 500mm



GHT-205 High Voltage Test Probe



GHT-115 High Voltage/Continuity Test Lead



GTL-215 Test Lead



GPT-10KG1/10KL1 GPIB & LAN card



SPECIFICATIONS

MODEL	GPT-15000 Series	GPT-12000 Series
CONTINUITY TEST		
Output Current	100mA dc (fixed)	100mA dc (fixed)
Ohmmeter Measurement Range	0.10Ω - 70.00Ω	0.10Ω - 70.00Ω
Ohmmeter Measurement Resolution	0.01Ω	0.01Ω
Ohmmeter Measurement Accuracy	±(10% of reading + 2 Ω)	±(10% of reading + 2 Ω)
Window Comparator Method	Yes	Yes
TIMER (Test Time)*	0.3s-999.9s	0.3s-999.9s
MEMORY		
Single Step Memory	MANU : 100 blocks	MANU : 100 blocks
Automatic Testing Memory	AUTO : 100 blocks, Manu per auto : 10	AUTO : 100 blocks, Manu per auto : 10
INTERFACE		
Standard (Front)	REMOTE, USB host	REMOTE, USB host
Standard (Rear)	Rear Output, RS-232C, USB device,	Rear Output, RS-232C, USB device,
Option	Signal I/O, GPIB, LAN	Signal I/O, GPIB, LAN
DISPLAY		
	7" color LCD	7" color LCD
POWER SOURCE		
	AC 100V-240V ± 10%, 50Hz/60Hz; Power consumption : Max. 1000VA	AC 100V-240V ± 10%, 50Hz/60Hz; Power consumption : Max. 400VA
DIMENSIONS & WEIGHT		
	GPT-15001/15002/15003:380(W)x148(H) x492(D)mm; Approx.17kg(max.) ; GPT-15004 : 380(W)x148(H)x546(D)mm; Approx. 21kg	GPT-12001/12002/12003:380(W)x148(H) x436(D) mm; Approx. 11kg (max.) ; GPT-12004 : 380(W)x148(H)x454(D)mm; Approx. 15kg

Note : * TIMER Accuracy: ±f-(100ppm+20ms)

ORDERING INFORMATION

GPT-15004	AC 500VA AC/DC/IR/GB Electrical Safety Analyzer
GPT-15003	AC 500VA AC/DC/IR Electrical Safety Analyzer
GPT-15002	AC 500VA AC/DC Electrical Safety Analyzer
GPT-15001	AC 500VA AC Electrical Safety Analyzer
GPT-12004	AC 200VA AC/DC/IR/GB Electrical Safety Analyzer
GPT-12003	AC 200VA AC/DC/IR Electrical Safety Analyzer
GPT-12002	AC 200VA AC/DC Electrical Safety Analyzer
GPT-12001	AC 200VA AC Electrical Safety Analyzer

ACCESSORIES :

Quick Start Guide x 1, Power cord x 1, CDx1 (complete user manual), Interlock Key x 1, Remote Terminal Cable GHT-119 x 1, Test lead GHT-115 x 1 for GPT-15001/15002/15003/12001/12002/12003, Test lead GHT-115 x 1, GTL-215 x 1 for GPT-15004/12004

OPTION

GPT-10KG1	GPIB card	GPT-10KL1	LAN card
-----------	-----------	-----------	----------

OPTIONAL ACCESSORIES

GHT-117/GHT-117(EU)	High Voltage Adapter Box
GHT-118/GHT-118(EU)	High Voltage/Ground Bond Adapter Box
GHT-113	High Voltage Test Pistol
GHT-205	High Voltage Test Probe
GTL-232	RS232C Cable, 9-pin Female to 9-pin, null Modem for Computer
GTL-246	USB Cable, A-B type, approx. 1.2m
GTL-248	GPIB Cable, approx. 2m
GTL-264	Signal I/O Converted Cable, 15-pin Male to 9-pin Female, Approx. 200mm
GRA-440	Rack Adapter Panel (19", 4U)

SELECTION GUIDE

Model	Function	Output Capacity	AC	DC	IR	GB	Continuity	Rear Output
GPT-15001		500VA	✓				✓	✓
GPT-15002		500VA	✓	✓			✓	✓
GPT-15003		500VA	✓	✓	✓		✓	✓
GPT-15004		500VA	✓	✓	✓	✓	✓	✓
GPT-12001		200VA	✓				✓	✓
GPT-12002		200VA	✓	✓			✓	✓
GPT-12003		200VA	✓	✓	✓		✓	✓
GPT-12004		200VA	✓	✓	✓	✓	✓	✓

Note : GPT-15000 Series ACW short current > 200mA

AC/DC Withstanding Voltage/Insulation Resistance/Ground Bond Tester



GPT-9904



GPT-9903A/9902A/9901A



GPT-9804



GPT-9803/9802/9801



FEATURES

- * 500VA and 200VA AC Test Capacity
- * 240 x 64 Ice Blue Dot Matrix LCD
- * Manual/Auto Mode
- * Function Key for Quick Selecting
- * High Intensity Flash for Caution & Status Indication
- * Safety Interlock Function
- * Zero Crossing Turn-on Operation
- * Controllable Ramp-up Time
- * RMS Current Measurement
- * High Resolution : 1 μ A for Measuring Current, 2V for Setting Voltage
- * PWM Switching Amplifier to Enhance the Power Efficiency and Reliable Testing
- * Max. 100 Memory Block for Test Condition (Step) Setting. And Each Step can be Named Individually
- * Remote Terminal on the Front Panel for "Start" and "Stop" Control by External
- * Interface : RS-232C, USB Device, Signal I/O and GPIB (Optional)

The GPT-9900 series is built upon a platform of AC 500VA, and the GPT-9800 series is built upon a platform of AC 200VA maximum power output. Each series with 4 models, The GPT-9904 and GPT-9804 are a 4-in-1 model capable of performing AC withstanding, DC withstanding, insulation resistance and ground bond tests. The GPT-9903A and GPT-9803 are a 3-in-1 model capable of performing AC withstanding, DC withstanding and insulation resistance tests. The GPT-9902A and GPT-9802 are capable of performing both AC and DC withstanding tests, whereas the GPT-9901A and GPT-9801 are able to perform AC withstanding test. The high-efficiency PWM amplifier is the core of both series platform design to impede the influence from the voltage fluctuation of input AC source. Each series supports the major test items among all the needed for the compliance of the safety standards such as IEC, EN, UL, CSA, GB, JIS and other safety regulations.

Following a tidy and easy-to-use design concept, the both series are equipped with a simple & clear panel layout, a high resolution dot matrix LCD display, and color LED indicators, allowing operators to interpret measurement results easily and quickly. All major test functions, including AC withstanding (AC 5kV), DC withstanding (DC 6kV), insulation resistance (DC 50V ~ 1000V) and ground bond (AC 32A max.) tests, are performed under a high-stability voltage or current output with high-resolution measurement results. Further more, the test duration, ramp up time and upper/lower limits of the tripping current/resistance are fully-adjustable to accommodate a wide variety of safety tests with accurate measurement results.

The "Sweep" function of the GPT-9900 series is able to display the test results point by point all through the testing period to form a trace graph. This graphic display performs the characteristic verification of a DUT through observing the parameter response to the changes of the applied voltage or current or testing time.

Other significant functions and features are also incorporated with both series such as the output voltage is automatically cut off (within 150 μ s) upon the detection of an abnormal output voltage or a trip of current limits during test to protect the operator from hazardous injury and automatically discharges a DUT after test to eliminate excessive voltage on a DUT, the open-circuit detection to ensure proper connections of apparatus for ground bond test, 100 sets of memory to save and recall the panel settings for individual or sequential tests, a remote output on-off terminal on the front panel and a signal I/O port in the rear panel provided as the means for remote start/stop control of the safety tester, and RS-232C, USB and GPIB (optional) interfaces available for PC remote control and test result logging.

SPECIFICATIONS		
	GPT-9800 Series	GPT-9900 Series
AC WITHSTANDING		
Output-Voltage Range	0.050kV– 5.000kV ac	0.050kV– 5.000kV ac
Output-Voltage Resolution	2V/step	2V/step
Output-Voltage Accuracy	$\pm(1\%$ of setting + 5V) [no load]	$\pm(1\%$ of setting + 5V) [no load]
Maximum Rated Load	200 VA (5kV/40mA)	500 VA (5kV/100mA)
Maximum Rated Current	40mA (0.5kV<V \leq 5kV) 10mA (0.05kV \leq V \leq 0.5kV)	100mA (0.5kV< V \leq 5kV) 10mA (0.05kV \leq V \leq 0.5kV)
Output-Voltage Waveform	Sine wave	Sine wave
Output-Voltage Frequency	50Hz/60Hz selectable	50Hz/60Hz selectable
Voltage Regulation	$\pm(1\%$ of rdg + 5V) [full load \rightarrow no load]	$\pm(1\%$ of rdg + 5V) [full load \rightarrow no load]
Voltmeter Accuracy	$\pm(1\%$ of rdg + 5V)	$\pm(1\%$ of rdg + 5V)
Current Measurement Range	0.001mA–40.0mA	0.001mA–100.0mA
Current Best Resolution	0.001mA/0.01mA/0.1mA	0.001mA/0.01mA/0.1mA
AC Current Measurement Accuracy	$\pm(1.5\%$ of rdg+30counts)when HI SET <1.11mA $\pm(1.5\%$ of rdg+3counts)when HI SET \geq 1.11mA	$\pm(1.5\%$ of rdg+30counts)when HI SET <1.11mA $\pm(1.5\%$ of rdg+3counts)when HI SET \geq 1.11mA
Window Comparator Method	Yes	Yes
ARC Detect	Yes	Yes
RAMP (Ramp-Up Time)	0.1s–999.9s	0.1s–999.9s
TIMER (Test Time)*	OFF, 0.5s–999.9s	OFF, 0.5s–999.9s
Sweep Function*	NOT Support	Yes
GND	ON/OFF	ON/OFF
DC WITHSTANDING		
Output-Voltage Range	0.050kV–6.000kV dc	0.050kV–6.000kV dc
Output-Voltage Resolution	2V/step	2V/step
Output-Voltage Accuracy	$\pm(1\%$ of setting + 5V) [no load]	$\pm(1\%$ of setting + 5V) [no load]
Maximum Rated Load	50W(5kV/10mA)	100W (5kV/20mA)
Maximum Rated Current	10mA(0.5kV< V \leq 6kV) 2mA (0.05kV \leq V \leq 0.5kV)	20mA (0.5kV< V \leq 6kV) 2mA (0.05kV \leq V \leq 0.5kV)
Voltage Regulation	$\pm(1\%$ of rdg + 5V)[full load \rightarrow no load]	$\pm(1\%$ of rdg + 5V)[full load \rightarrow no load]
Voltmeter Accuracy	$\pm(1\%$ of rdg + 5V)	$\pm(1\%$ of rdg + 5V)
Current Measurement Range	0.001mA–10.0mA	0.001mA–20.0mA
Current Best Resolution	0.001mA/0.01mA/0.1mA	0.001mA/0.01mA/0.1mA
DC Current Measurement Accuracy	$\pm(1.5\%$ of rdg+30counts)when HI SET <1.11mA $\pm(1.5\%$ of rdg+3counts)when HI SET \geq 1.11mA	$\pm(1.5\%$ of rdg+30counts)when HI SET <1.11mA $\pm(1.5\%$ of rdg+3counts)when HI SET \geq 1.11mA
Window Comparator Method	Yes	Yes
ARC Detect	Yes	Yes
RAMP (Ramp-Up Time)	0.1s–999.9s	0.1s–999.9s
TIMER (Test Time)*	OFF, 0.5s–999.9s	OFF, 0.5s–999.9s
Sweep Function*	NOT Support	Yes
GND	ON/OFF	ON/OFF

SPECIFICATIONS				
	GPT-9800 Series		GPT-9900 Series	
INSULATION RESISTANCE				
Output Voltage	50V–1000V dc		50V–1000V dc	
Output-Voltage Resolution	50V/step		50V/step	
Output-Voltage Accuracy	±(1% of setting +5V)[no load]		±(1% of setting +5V)[no load]	
Resistance Measurement Range	1MΩ – 9500MΩ		0.001GΩ – 50.00GΩ	
	Test Voltage	Measurable Range	Accuracy	Measurable Range
	50V ≤ V ≤ 450V	1 – 50MΩ 51 – 2000MΩ	±(5% of rdg+1count) ±(10% of rdg+1count)	0.001–0.050GΩ 0.051–2.000GΩ
	500V ≤ V ≤ 1000V	1 – 500MΩ 501 – 9500MΩ	±(5% of rdg+1count) ±(10% of rdg+1count)	0.001–0.500GΩ 0.501–9.999GΩ 10.00–50.00GΩ
Window Comparator Method	Yes		Yes	
Output Impedance	600kΩ		600kΩ	
RAMP (Ramp-Up Time)	0.1s–999.9s		0.1s–999.9s	
TIMER (Test Time)	0.5s–999.9s		0.5s–999.9s	
GND	OFF (fix)		OFF (fix)	
Sweep Function*	NOT Support		Yes	
GROUND BOND				
Output-Current	03.00A–30.00A ac		03.00A–32.00A ac	
Output-Current Resolution	0.01A		0.01A	
Output-Current Accuracy	3A ≤ I ≤ 8A : ±(1% of setting+0.2A), 8A < I ≤ 30A : ±(1% of setting+0.05A)		3A ≤ I ≤ 8A : ±(1% of setting+0.2A), 8A < I ≤ 32A : ±(1% of setting+0.05A)	
Test-Voltage	6Vac max (open circuit)		6Vac max (open circuit)	
Test-Voltage Frequency	50Hz/60Hz selectable		50Hz/60Hz selectable	
Resistance Measurement Range	10mΩ – 650.0mΩ		10mΩ – 650.0mΩ	
Resistance Measurement Resolution	0.1mΩ		0.1mΩ	
Resistance Measurement Accuracy	±(1% of rdg + 2mΩ)		±(1% of rdg + 2mΩ)	
Window Comparator Method	Yes		Yes	
TIMER (Test Time)	0.5s–999.9s		0.5s–999.9s	
Sweep Function*	NOT Support		Yes	
Test Method	Four Terminal		Four Terminal	
MEMORY				
Single Step Memory	MANU : 100 blocks		MANU : 100 blocks	
Automatic Testing Memory	AUTO : 100 blocks, menu per auto:16		AUTO : 100 blocks, menu per auto:16	
INTERFACE				
Rear Output	NOT Support		Standard	
RS-232C	Standard		Standard	
USB	Standard		Standard	
GPIB	Option		Option	
Remote Terminal (Front)	Standard		Standard	
Signal I/O	Standard		Standard	
DISPLAY	240 x 64 Ice Blue Dot matrix LCD		240 x 64 Ice Blue Dot matrix LCD	
POWER SOURCE				
	AC100V/120V/220V/230V±10%,50/60Hz; Power Consumption : Max. 500VA		AC100V/120V/220V/230V±10%,50/60Hz; Power Consumption : Max. 1000VA	
DIMENSIONS & WEIGHT				
	330(W) x 148(H) x 452(D) mm Approx. 19kg max.		330(W)x148(H)x482(D)mm(GPT-9902A/9901A/9903A); 330(W)x148(H)x587(D)mm(GPT-9904); Approx. 27kg max.	

* The sweep function and timer off can only be performed when the tester is in the special MANU mode.

ORDERING INFORMATION

GPT-9904	AC 500VA AC/DC Withstanding Voltage/Insulation Resistance/Ground Bond Tester
GPT-9903A	AC 500VA AC/DC Withstanding Voltage/Insulation Resistance Tester
GPT-9902A	AC 500VA AC/DC Withstanding Voltage Tester
GPT-9901A	AC 500VA AC Withstanding Voltage Tester
GPT-9804	AC 200VA AC/DC Withstanding Voltage/Insulation Resistance/Ground Bond Tester
GPT-9803	AC 200VA AC/DC Withstanding Voltage/Insulation Resistance Tester
GPT-9802	AC 200VA AC/DC Withstanding Voltage Tester
GPT-9801	AC 200VA AC Withstanding Voltage Tester

ACCESSORIES :

Quick Start Guide x 1, Power cord x 1, CDx1 (complete user manual), Interlock Key x 1, Remote Cable GHT-119 x 1, Test lead GHT-114 x 1 for GPT-9903A/9902A/9901A/9803/9802/9801, Test lead GHT-114 x 1, GTL-215 x 1 for GPT-9904/9804

OPTION

GPT-9KG1	GPIB card	GSB-02	Multiplex Scanner Box(6CH H.V./2CH G.B.)
GSB-01	Multiplex Scanner Box(8CH H.V.)		

OPTIONAL ASSESSORIES

GHT-113	High Voltage Test Pistol	GTL-247	USB Cable, A-A type, approx. 1.8m
GHT-117/GHT-117(EU)	High Voltage Adapter Box	GTL-232	RS-232C Cable, 9-pin Female to 9-pin null Modem for Computer
GHT-118/GHT-118(EU)	High Voltage/Ground Bond Adapter Box	GRA-417	Rack Mount Kit
GHT-205	High Voltage Test Probe	GRA-433	Rack Mount Kit for GPT-9904 only
GTL-248	GPIB Cable, approx. 2m		

FREE DOWNLOAD

PC Software GPT-9000

Interlock Key



GHT-119 Remote Cable

Approx. 500mm



GHT-114 Clip High Voltage Probe

Approx. 1m



GTL-215 Test Lead

Approx. 1m



GHT-117/GHT-117(EU) High Voltage Adapter Box



GHT-118/GHT-118(EU) High Voltage/Ground Bond Adapter Box



Multiplex Scanner Box

ZL201420282101.8



GSB-01/02



FEATURES

- * Model : GSB-01 (8CH High Voltage Scanner Box), GSB-02 (6CH High Voltage and 2CH Ground Bond Scanner Box)
- * Multi-channel Outputs for Withstanding Voltage, Insulation Resistance, Ground Bond Tests
- * High-intensity LED for Channel, Status & Judgment Indications
- * Front & Rear Input Connector Design is Suitable for the GPT-9800/9900/9900A Series
- * A Maximum of 4 Scanner Boxes (32 CH) can be Connected to One GPT-9800/9900/9900A Series

The GSB-01/GSB-02, multiplex scanner box, is a dedicated option for GPT-9800/9900/9900A Series. The GSB-01 has connections for ACW, DCW and IR testing, while the GSB-02 also includes support for GB testing. It will provide reliable withstanding voltage, insulation resistance and ground bond testing for the electronic products and components.

This scanner box handles withstanding voltage 5kVac / 6kVdc and insulation resistance voltage 1kVdc as well as the ground bond current 40Aac supplied from safety tester proper. Each scanner box extends the output to 8 channels, a potential HI, LO or X can be set for each channel and AC/DC withstanding voltage, insulation resistance or ground bond test can be conducted depending on the model of scanner box.

A maximum 4 scanner boxes can be connected to one GPT-9800/9900/9900A series, it allows the output channel can be extended up to 32 channels. It is particularly well suited for multi-point safety testing as well for volume testing on factory floors.

SPECIFICATIONS		
	GSB-01	GSB-02
HIGH VOLTAGE RATING		
	5kVac/ 6kVdc	5kVac/ 6kVdc
HIGH CURRENT RATING		
	----	40Aac
NUMBER OF H.V. CHANNELS		
	8CH	6CH
NUMBER OF G.B CHANNELS		
	----	2CH
MAXIMUM NUMBER OF SCANNERS		
	4 Scanners (up to 32 channels)	
INTERFACE		
	RS-232C for connection between tester or scanner box	
POWER SOURCE		
	AC 100-240V ±10%, 50/60Hz; Power Consumption : Max. 50VA	
DIMENSIONS & WEIGHT		
	GSB-01 : 330(W) x 101 (H) x 399(D) mm GSB-02 : 330(W) x 101 (H) x 413(D) mm Approx. 5.5kg	

ORDERING INFORMATION

- GSB-01** Multiplex Scanner Box – 8CH H.V.
- GSB-02** Multiplex Scanner Box – 6CH H.V./ 2CH G.B

ACCESSORIES:

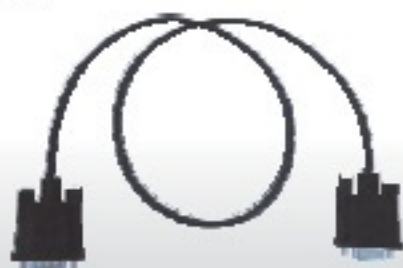
- Quick Start Guide x 1, Power Cord x 1, CD x 1 (Complete user manual),
- H.V. Wiring Lead GHT-108 x 1, G.B Wiring Lead GHT-109 x 1 (GSB-02 only),
- Communication Cable GTL-235 x 1
- Test Lead for GSB-01 : GHT-116R x 8, GHT-116B x 1
- Test Lead for GSB-02 : GHT-116R x 6, GHT-116B x 1, GTL-116R x 2, GTL-116B x 1

OPTIONAL ASSESSORIES

- GRA-438** Rack Mount Kit

GTL-235 Communication Cable

Approx. 700mm





GSB-01

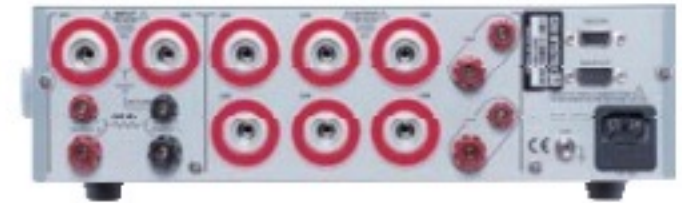


GSB-02

GSB-01 Rear Panel

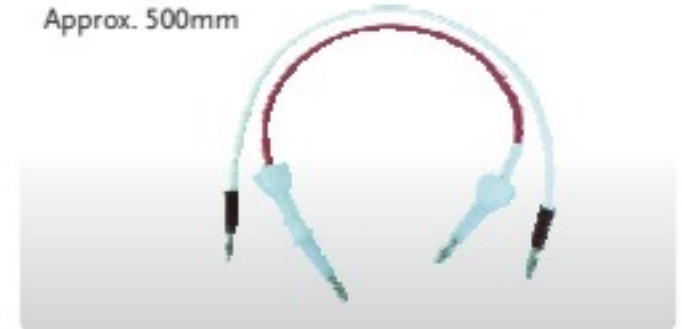


GSB-02 Rear Panel



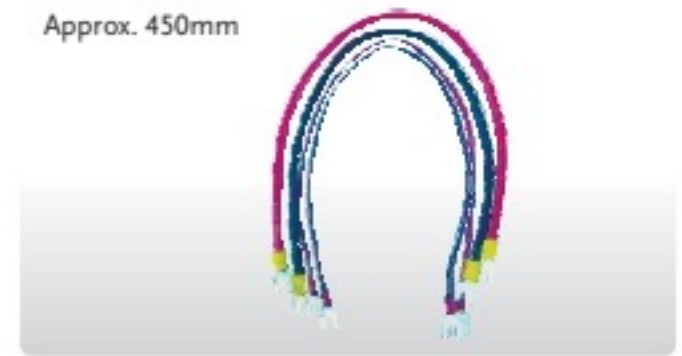
GHT-108 H.V. Wiring Lead

Approx. 500mm



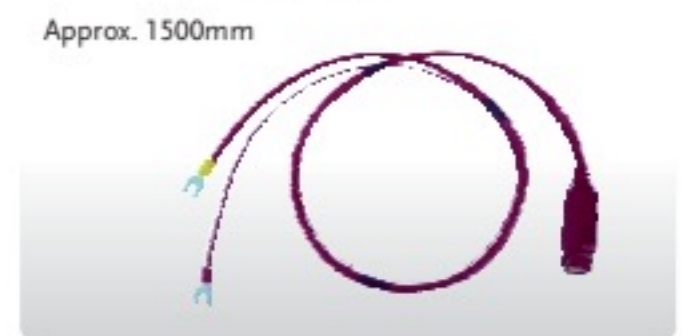
GHT-109 G.B Wiring Lead

Approx. 450mm



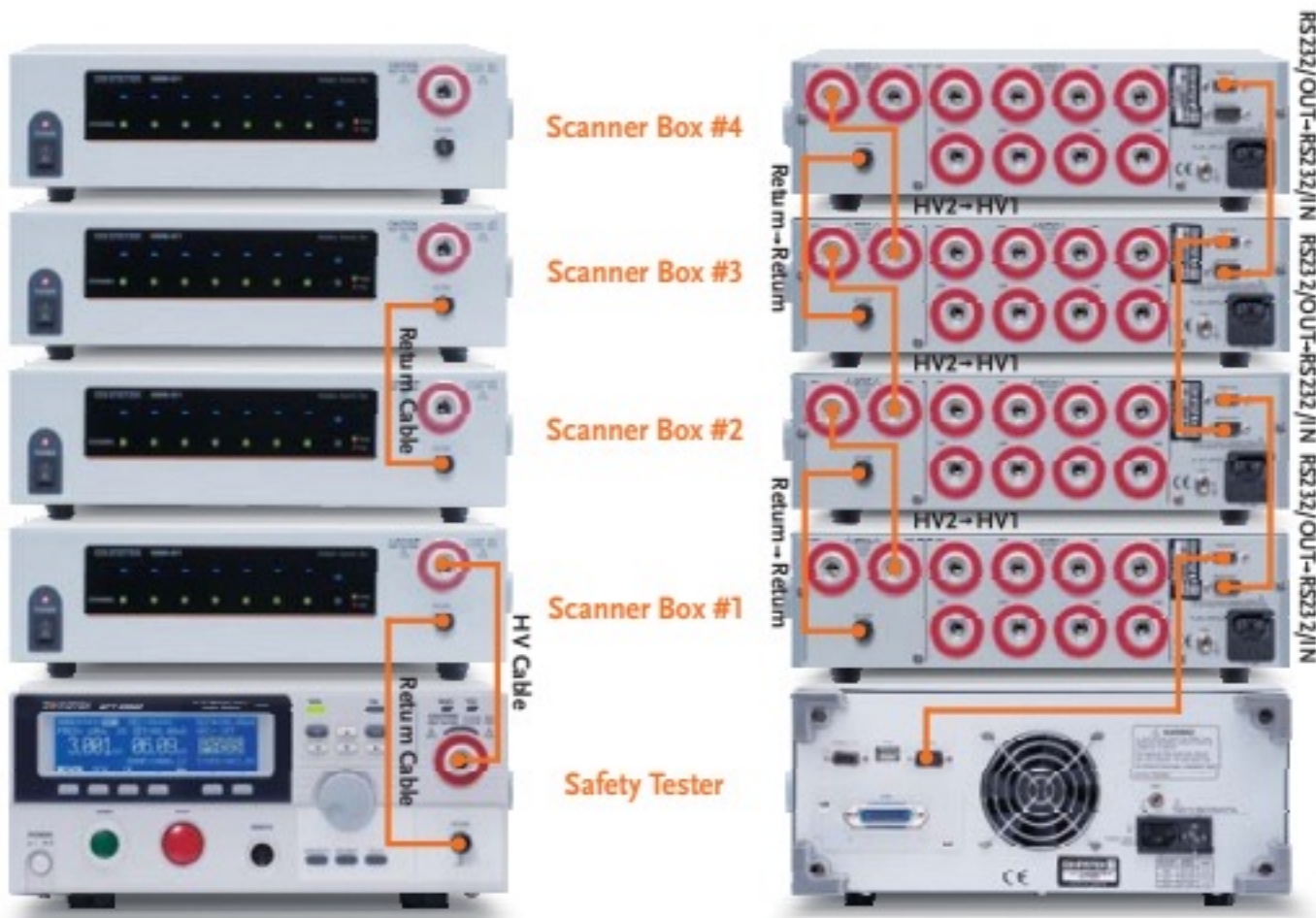
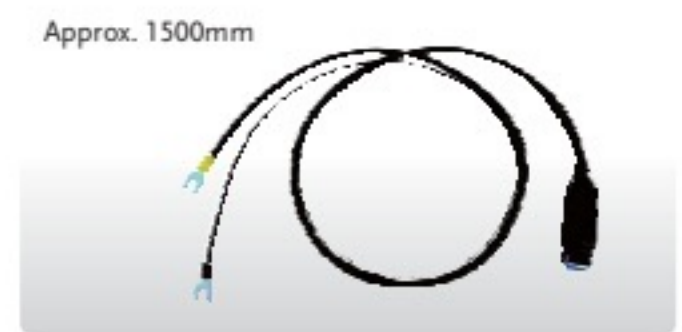
GTL-116R Test Lead

Approx. 1500mm



GTL-116B Test Lead

Approx. 1500mm



AC Ground Bond Tester



GCT-9040



FEATURES

- * AC 40A Ground Bond Tester
- * Measuring Resistance from $1m\Omega$ – $650m\Omega$
- * Connect with the GPT-9800/9900 Series to Become a Sequential Test or Simultaneous Test System
- * 240x64 Ice Blue Dot Matrix LCD
- * Function Key for Quick Selecting
- * High Intensity Flash for Caution & Status Indication
- * PWM Switching Amplifier to Enhance the Power Efficiency and Reliable Testing
- * Max. 100 Memory Block for Test Condition Setting
- * Remote Terminal on the Front Panel for “Start” and “Stop” Remote Active
- * Interface : USB Device, Signal I/O and GPIB (optional)

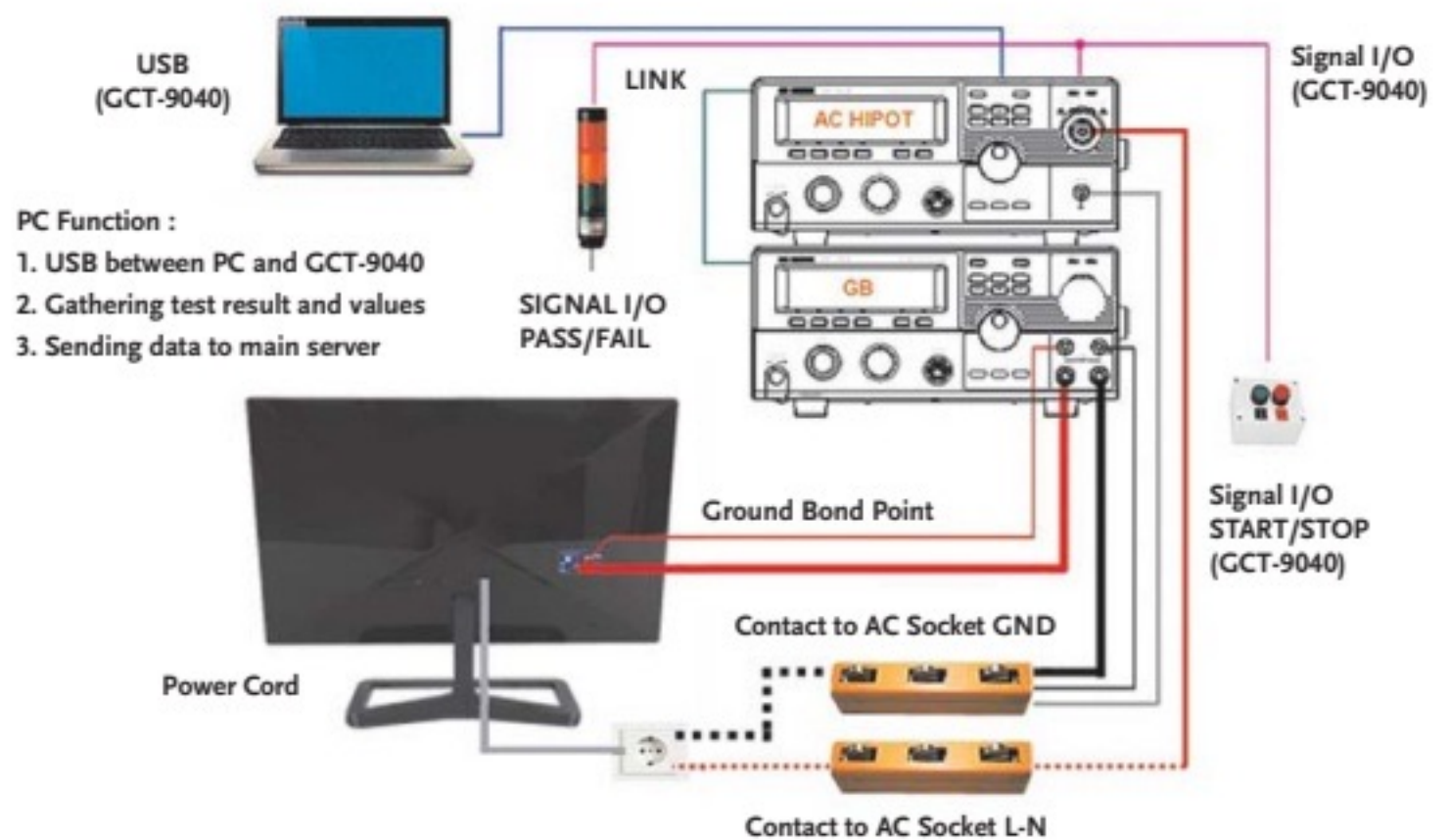
GW Instek rolls out 40A AC ground bond tester - GCT-9040 to augment the existing safety tester product line and to replace the legacy model GCT-630. GCT-9040 provides the maximum AC test current of 40A and adopts the PWM design the same as other models to ensure test efficiency and reliability. Furthermore, large LCD display, 100 memory blocks from setting criteria, and programmable communications interface together deliver users with higher readability and convenience.

In addition to the standalone ground bond test operation, GCT-9040, with 40A AC ground bond test capability, can also externally connect with GW Instek safety testers such as GPT-9800/9900/9900A series to augment users' product test requirements by the all-in-one test platform. For instance, GPT-9802 (AC/DC withstanding tester), via external connection, can be expanded to a safety tester system with three testing functionalities.

Additionally, after the safety tester system has been assembled, not only the sequential test function for the original all-in-one models can be executed, but also the simultaneous output test can be conducted. The simultaneous output test allows two testers to simultaneously test DUT so as to shorten the overall test time. Whether the safety tester system executes sequential test or simultaneous output test, GCT-9040 will automatically obtain control over two testers, including activation control, final status indication light, and pin signal output from Digital I/O etc. to avoid confusion caused by each tester's indication light.

Last but not least, GCT-9040, with respect to remote control and data retrieval, not only provides standard USB (optional GPIB) interface to control all functionalities but also controls connected safety testers (GPT-9800/9900/9900A series) via commands to read measurement results.

SIMULTANEOUS TEST (SCHEMATIC DIAGRAM FOR CONNECTION)





GCT-9040

Rear Panel



SPECIFICATIONS	
GROUND BOND	
Output-Current	03.00A~ 40.00A ac
Output-Current Resolution	0.01A
Output-Current Accuracy	3A ≤ I ≤ 8A: ±(1% of setting + 0.2A) 8A < I ≤ 40A: ±1% of setting + 0.05A
Test-Voltage	8Vac max (open circuit)
Test-Voltage Frequency	50Hz/60Hz selectable
Resistance Measurement Range	1.0mΩ ~ 650.0mΩ
Resistance Measurement Resolution	0.1mΩ
Resistance Measurement Accuracy	±(1% of reading + 2mΩ)
Window Comparator Method	Yes
TIMER (Test Time)	0.5s~999.9s
GND	OFF (fix)
Test Method	Four Terminal
MEMORY	
Single Step Memory	MANU : 100 blocks
INTERFACE	
LINK	For system connection
USB	Standard
GPIB	Option
Remote Terminal (Front)	Standard
Signal I/O	Standard
Display	240 x 64 Ice Blue Dot matrix LCD
POWER SOURCE & CONSUMPTION	
Source	AC 100 V / 120 V / 220 V / 230 V ±10%, 50/60Hz
Consumption	Max. 700VA
DIMENSIONS & WEIGHT	
330(W) x 148(H) x 460(D) mm; Approx. 17kg max.	

ORDERING INFORMATION

GCT-9040 40A AC Ground Bond Tester

ACCESSORIES:

Quick Start Guide x 1, Power cord x 1, Test lead GTL-215 x 1, LINK cable GTL-132 x 1, USB cable GTL-247 x 1, Remote Cable GHT-119 x 1, Interlock key x 1, CD x1 (complete user manual)

OPTION

GPT-9KG1 GPIB card

OPTIONAL ASSESSORIES

GTL-248 GPIB Cable, approx. 2m

GRA-417 Rack Mount Kit

GHT-119 Remote Cable

Approx. 500mm



GTL-215 Test Lead



GTL-132 LINK Cable



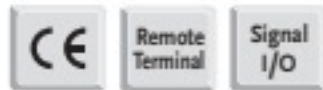
GCT-9040

SAFETY TESTER

AC/DC Withstanding Voltage/Insulation Resistance Tester



GPT-9600 Series



FEATURES

- * 100VA AC Test Capacity
- * 240 x 48 Ice Blue Dot Matrix LCD
- * RMS Current Measurement
- * ARC Detection
- * Zero Crossing Turn-on Operation
- * PWM Switching Amplifier to Enhance the Power Efficiency and Reliable Testing
- * Automatically Switching Input Source for World-wide Input Voltage
- * Light Design and Easy to Operation

GW Instek launches new economical safety testers, the GPT-9600 Series, which offers an affordable solution for supporting routine tests of major items of the safety standards such as IEC, EN, UL, CSA, GB, JIS and other safety regulations.

The GPT-9600 Series is built upon a platform of 100VA AC maximum power output. The GPT-9603 is a 3-in-1 model capable of performing AC withstanding, DC withstanding and insulation resistance tests. The GPT-9612 is capable of performing AC withstanding and insulation resistance tests. The GPT-9602 is capable of performing AC and DC withstanding tests, and GPT-9601 is able to perform AC withstanding test. The GPT-9600 Series is equipped with the high-efficiency PWM amplifier, which is the core of the platform design to impede the influence from the input AC voltage fluctuation and ensure a stable voltage output.

Following a tidy and easy-to-use design concept, the GPT-9600 Series renders users an intuitive operation environment by a simple and clear panel layout, a large LCD display and color LED indicators. The switching power supply, used as a universal input source, accommodates the power systems in most countries in the world. The GPT-9600 series, equipped with the same output voltage function as that of all GW Instek Safety Testers, indicates the expected output voltage before high voltage tests are applied. Furthermore, an AUTO mode, including test sequence selections of withstanding-then-insulation or insulation-then-withstanding, is designed for models carrying insulation Resistance test function to reduce the testing time of dual test items.

Other functions and features of GPT-9600 include: the zero crossing turn-on operation protects DUT from the impact of surge voltage output, the interlock function safeguards users from the hazardous shock of unintentional touch of the voltage output, a remote output on-off terminal in the front panel and a signal I/O port in the rear panel are provided as the means for remote start/stop control of the safety tester.

SPECIFICATIONS		
AC WITHSTANDING		
Output-Voltage Range	0.10kV~ 5.00kV ac	
Output-Voltage Resolution	10V	
Output-Voltage Accuracy	± (1.5% of setting + 2 counts) with no load	
Maximum Rated Load	100VA(5kV/20mA)	
Maximum Rated Current	20mA (0.5kV<V≤5kV); 5mA (0.1kV≤V≤0.5kV)	
Output-Voltage Waveform	Sine wave	
Output-Voltage Frequency	50Hz/60Hz selectable	
Voltage Regulation	±(1.5% + 2 counts) [full load → no load]	
Voltmeter Accuracy	±(1.5% of rdg + 2 counts)	
Current Measurement Range	0.01mA~20.0mA	
Current Best Resolution	0.01mA/0.1mA	
Current Measurement Accuracy	±(2.0% of rdg+10 counts)when HI SET<1.00mA ; ±(2.0% of rdg+3counts)when HI SET ≥1.00mA	
Current Judgment Accuracy	±(3.0% of setting+10 counts)when HI SET<1.00mA ; ±(3.0% of setting+3counts)when HI SET ≥1.00mA	
Window Comparator Method	Yes	
ARC Detect	Yes	
RAMP (Ramp-Up Time)	0.1s fixed	
TIMER (Test Time)	OFF, 1s~180s	
GND	ON	
DC WITHSTANDING		
Output-Voltage Range	0.10kV~6.00kV dc	
Output-Voltage Resolution	10V	
Output-Voltage Accuracy	± (1.5% of setting + 2 counts) with no load	
Maximum Rated Load	25W(5kV/5mA)	
Maximum Rated Current	6mA(0.5kV< V≤6kV); 2mA (0.1kV≤V≤0.5kV)	
Voltage Regulation	±(1.5% + 2 counts)[full load → no load]	
Voltmeter Accuracy	±(1.5% of rdg + 2 counts)	
Current Measurement Range	0.01mA~6.00mA	
Current Best Resolution	0.01mA	
Current Measurement Accuracy	±(2.0% of rdg+10 counts)when HI SET<1.00mA ±(2.0% of rdg+3counts)when HI SET ≥1.00mA	
Current Judgment Accuracy	±(3.0% of setting+10 counts)when HI SET<1.00mA ±(3.0% of setting+3counts)when HI SET ≥1.00mA	
Window Comparator Method	Yes	
ARC Detect	Yes	
RAMP (Ramp-Up Time)	0.1s fixed	
TIMER (Test Time)	OFF, 1s~180s	
GND	ON	
INSULATION RESISTANCE		
Output Voltage	50V, 100V, 250V, 500V, 1000V dc	
Output-Voltage Accuracy	±(3.0% of setting +1 count)[no load]	
Resistance Measurement Range	1MΩ~ 2000MΩ	
	Test Voltage	Accuracy
	50V/100V/250V	1 ~ 50MΩ ±(5% of rdg + 2MΩ) 51 ~ 2000MΩ ±(10% of rdg + 2MΩ)
	500V/1000V	1 ~ 500MΩ ±(5% of rdg + 2MΩ) 501 ~ 2000MΩ ±(10% of rdg + 2MΩ)



GPT-9600 Series

SPECIFICATIONS

Window Comparator Method	Yes
Output Impedance	600kΩ
RAMP (Ramp-Up Time)	0.1s fixed
TIMER (Test Time)	OFF, 1s-180s
GND	OFF (fix)
TEST MODE *	
Single	ACW, DCW, IR
Auto	AC-IR, IR-AC, DC-IR, IR-DC
INTERFACE	
Remote Terminal (Front)	Standard
Signal I/O	Standard
DISPLAY	
	240 x 48 Ice Blue Dot matrix LCD
POWER SOURCE	
	AC100V~120V/220V~240V±10% , 50/60Hz
POWER CONSUMPTION	
	400VA Max.
DIMENSIONS & WEIGHT	
	330(W)x148(H)x385(D)mm; Approx. 9kg max.

* The available "Test Mode" depends on selected model

ORDERING INFORMATION

GPT-9603 AC 100VA AC/DC Withstanding Voltage/Insulation Resistance Tester
GPT-9612 AC 100VA AC Withstanding Voltage/Insulation Resistance Tester
GPT-9602 AC 100VA AC/DC Withstanding Voltage Tester
GPT-9601 AC 100VA AC Withstanding Voltage Tester

ACCESSORIES :

Quick Start Guide x 1, Power cord x 1, CD x 1 (complete user manual), Interlock Key x 1, Remote Cable GHT-119 x 1, Test lead GHT-114 x 1

OPTIONAL ASSESSORIES

GHT-113 High Voltage Test Pistol
GHT-117/GHT-117(EU) High Voltage Adapter Box
GHT-205 High Voltage Test Probe
GRA-417 Rack Mount Kit

Rear Panel



Interlock Key



GHT-119 Remote Cable

Approx. 500mm



GHT-114 Clip High Voltage Probe

Approx. 1m



GHT-117/GHT-117(EU) High Voltage Adapter Box



Multi-Channel Hipot Tester



GPT-9500 Series

NEW



FEATURES

- * 150VA AC Test Capacity
- * 3 in 1 Tester : AC, DC, IR
- * Built-in 8 Channel Scanner
- * 480 x 272 Color TFT LCD
- * Test Parameter Export/Import Through USB Host
- * Statistics (Counter) Function
- * Insulation Resistance Measurement up to 10GΩ
- * Open/Short Check (OSC)
- * ARC Detection
- * Multi-language : Traditional/Simplified Chinese, English
- * Interface : RS-232C, USB Host/Device and Signal I/O

Model	GPT-9513	GPT-9503
Channel	8 CH	8 CH
Channel Status	H, L or X	H or X

GW Instek introduces a new multi-channel withstanding voltage tester-the GPT-9500 series. This series has 2 models and each model has a built-in 8-channel scanner. The series meets safety regulations: IEC, EN, UL, CSA, GB, JIS and other safety regulations. The series aims at the needs of the main test items of general electronic components or winding components during routine tests.

The GPT-9500 series is a three-in-one multi-channel tester, providing AC withstanding voltage (5kV max.), DC withstanding voltage (6kV max.), and insulation resistance (1000V max.). The design of the series conforms to the latest IEC-61010-2-034 standard requirements and it is built on the output platform of AC 150VA. The status of the 8 channels of GPT-9513 can be set to H, L or X according to the test requirements, especially suitable for winding components such as transformers to perform mutual testing of multiple points of single components. The status of the 8 channels of GPT-9503 only provides the setting of H or X, which is more suitable for general components such as passive components for high-voltage testing between two points.

The GPT-9500 series adopts 4.3" color LCD (480 x 272 resolution), which provides users with complete measurement information and a user-friendly operation interface, making operation and setting parameters easier and more convenient. AUTO test supports tabular display, therefore, there is unnecessary to switch the screen to see all the test results. At the same time, the series provides the statistical counting function. Users can quickly obtain the total number of tests and the number of NO-GOs without connecting an external counter. All scanning channels are all configured on the rear panel of the tester. Other than being relatively esthetic when the tester is mounted on the rack, the design can also avoid personal injury by preventing accidental contact during the output process. The disconnection detection function is provided for the series to avoid the misjudgment of the test caused by the disconnection of the wire.

Other functions and features of the GPT-9500 series include the export/import function of setting parameters, which can copy the settings of one tester to the same model testers on the production line through a USB flash drive. By so doing, the test stations of the production lines can be quickly expanded and the risk of errors caused by repeated inputs can also be avoided; the zero start function, which avoids the impact of instantaneous voltage on the DUT; the interlock function, which is a safety protection hardware structure to allow users to connect external protection devices; display in 3 languages, which include English, Traditional Chinese and Simplified Chinese; and the Signal I/O terminal and RS-232C/USB device on the rear panel, which can be used for external control and monitoring or measurement data acquisition.

SPECIFICATIONS	
AC WITHSTANDING	
Output-Voltage Range	0.050kV – 5.000kV
Output-Voltage Resolution	1V
Output-Voltage Accuracy	±(1% of setting + 5V) [no load]
Maximum Rated Load	150 VA (5kV/30mA)
Maximum Rated Current	30mA; 0.001mA – 10mA (0.05kV ≤ V ≤ 0.5kV) ; 0.001mA – 30mA (0.5kV < V ≤ 5kV)
Output-Voltage Waveform	Sine wave
Voltage Regulation	±(1% + 5V) [maximum rated load → no load]
Output-Voltage Frequency	50 Hz / 60 Hz selectable
Voltmeter Accuracy	±(1% of reading + 5V)
Current Measurement Range	0.001mA – 30.00mA
Current Best Resolution	1 μA (0.001mA – 9.999mA) ; 10 μA (10.00mA – 30.00mA)
Current Measurement Accuracy	±(1.5% of reading + 50 μA)
Current Offset	80 μA maximum
ARC Detect	Yes
RAMP TIME (Rise Time)	0.1s–999.9s
FALL Time	OFF–999.9s
WAIT Time	OFF–999.9s
TIMER (Test Time)	CONT ² , 0.3s–999.9s
TIMER Accuracy	±(100ppm + 20ms)
GND	ON/OFF
DC WITHSTANDING	
Output-Voltage Range	0.050kV–6.000kV
Output-Voltage Resolution	1V
Output-Voltage Accuracy	±(1% of setting + 5V) [no load]
Maximum Rated Load	50W (5kV/10mA)
Maximum Rated Current	10mA ; 0.001mA – 2mA (0.05kV ≤ V ≤ 0.5kV); 0.001mA – 10mA (0.5kV < V ≤ 6kV)
Voltmeter Accuracy	±(1% of reading + 5V)
Voltage Regulation	±(1% + 5V) [maximum rated load → no load]
Current Measurement Range	0.001mA – 10.00mA
Current Best Resolution	0.1 μA (0.1 μA – 999.9 μA) ; 1 μA (1 μA – 9.999mA) ; 10 μA (10.00mA)
Current Measurement Accuracy	±(1% of reading + 3 μA) when I Reading < 1mA ; ±(1% of reading + 10 μA) when I Reading ≥ 1mA
Current Offset	5 μA maximum
ARC Detect	Yes
RAMP TIME (Rise Time)	0.1s–999.9s
FALL Time	OFF–999.9s
WAIT Time	OFF–999.9s
TIMER (Test Time)	CONT ² , 0.3s–999.9s
TIMER Accuracy	±(100ppm + 20ms)
GND	ON/OFF



GPT-9500 Series

SPECIFICATIONS

INSULATION RESISTANCE

Output Voltage	0.050kV–1.000kV dc
Output-Voltage Resolution	1V
Output-Voltage Accuracy	± (1% of setting + 5V) [no load]
Resistance Measurement	0.1MΩ–10GΩ
Test Voltage	Measurement Range / Accuracy
50V ≤ V < 500V	0.1MΩ–10MΩ : ± (5% of reading + 3% fs) 10.1MΩ–50MΩ : ± (5% of reading + 1% fs) 50.1MΩ–2GΩ : ± (10% of reading + 1% fs)
500V ≤ V ≤ 1000V	0.1MΩ–10MΩ : ± (5% of reading + 3% fs) 10.1MΩ–500MΩ : ± (5% of reading + 1% fs) 500.1MΩ–10GΩ : ± (10% of reading + 1% fs)
Voltage Regulation	± (1% + 5V) [maximum rated load → no load]
Voltmeter Accuracy	± (1% of reading + 5V)
Short-Circuit Current	10mA max.
Output Impedance	2kΩ
RAMP TIME (Rise Time)	0.1s–999.9s
FALL Time	OFF–999.9s
WAIT TIME	OFF–999.9s
TIMER (Test Time)	0.3s–999.9s
TIMER Accuracy	±(100ppm + 20ms)
GND	ON/OFF

CONTINUITY TEST

Output-Current	100mA dc
Ohmmeter Measurement Accuracy	±(10% of reading+2Ω), ON/OFF

INTERFACE

Signal I/O	Standard
RS-232C	Standard
USB (Device)	Standard
USB (Host)	Standard (for Parameter/LCD Hardcopy)
Rear Output	Scanner

DISPLAY

4.3" Color LCD

POWER SOURCE

AC 100V–240V ±10%, 50Hz/60Hz

POWER CONSUMPTION

400VA Max.

DIMENSIONS & WEIGHT

320(W) x 120(H) x 435(D) mm; Approx. 11kg

* The specifications apply when the GPT-9500 is powered on for at least 30 minutes under +15°C~+35°C.

ORDERING INFORMATION

GPT-9513 AC 150VA Multi-Channel Hipot Tester
GPT-9503 AC 150VA Multi-Channel Hipot Tester

ACCESSORIES :

Quick Start Guide x 1, CD x 1 (Complete User Manual), Power Cord x 1,
Test Leads GHT-115 x 1, GHT-116B x 1, GHT-116R x 8

OPTIONAL ASSESSORIES

GTL-236 RS-232C Cable, 9-pin F-M type, approx. 2m
GTL-246 USB Cable, A-B type, approx. 1.2m

Rear Panel



GTL-236 RS-232C Cable



GHT-115 High Voltage/Continuity Test Lead



GHT-116R Test Lead

Approx. 1500mm



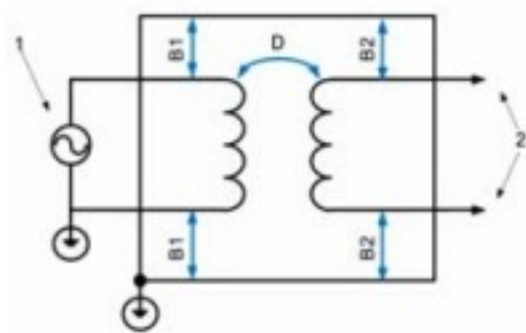
GHT-116B Test Lead

Approx. 1500mm



AC Multi-Channel Hipot Tester

A. MEETS IEC 61010-2-034 DESIGN REQUIREMENTS



Meets IEC 61010-2-034 Design Requirements

GPT-9500 is the world's first multi-channel hipot tester to comply with IEC 61010-2-034 (Safety requirement for electrical requirement for measurement, control and laboratory use – particular requirements for measurement equipment for insulation resistance and test equipment for electric strength).

Apart from this, the safety considerations also include double insulation for input and output voltages, safe output/warning mechanism, post-test discharge mechanism, etc. to ensure user safety during the operation.

B. FRIENDLY USER INTERFACE



4.3' Color LCD, High-brightness Indicator and Function Keys

Operation design in simplicity is incorporated into the tester through configuring the function keys at the bottom of the LCD screen to easily change the test function by just pressing the function keys, or by rotating the knob to change the measurement value, which greatly improves the convenience of operation; updating various status indicators on the front

panel immediately according to the status on the display, which not only provides users with a more comprehensive control of the test status, but also avoids unnecessary operation risks. For example, when the output is executed, the high-voltage output indicator will keep flashing.

C. COMPLETE INFORMATION PRESENTATION



Rich Information

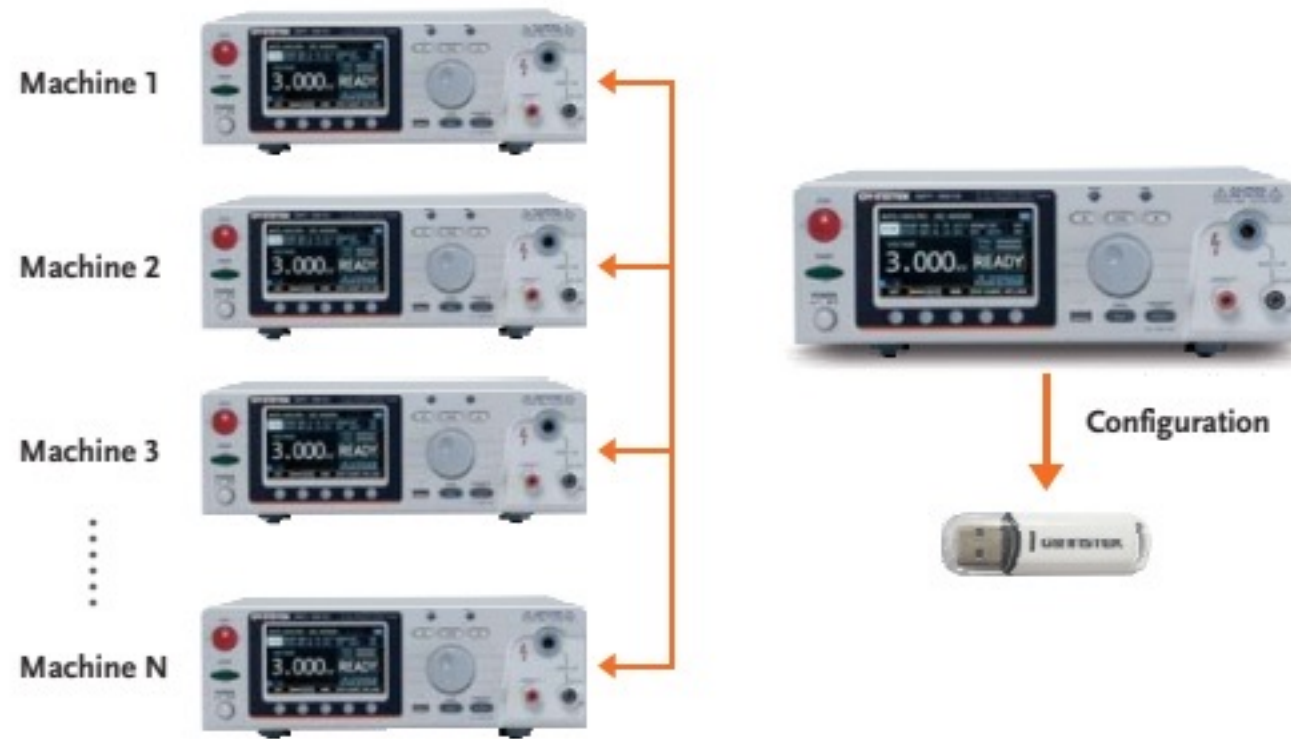
The large-sized LCD clearly and simultaneously displays the test voltage, test parameters, test status, measurement value and judgment result. The channel usage status and statistical counting results (the total number of tests and the number of FAILs) can be



AUTO Mode Listed Result

displayed simultaneously, hence, users can easily obtain complete information without switching the screen or connecting an external counter. In addition, AUTO mode also supports tabular testing, which greatly improves the convenience of observation.

D. CONVENIENT PARAMETER DUPLICATION



Export/Import of Setting Parameters

The GPT-9500 series supports the export/import of setting parameters via a USB flash drive. Users only need to set one tester, and the settings can be quickly and massively copied to all testers on production lines that not only

improves the efficiency of production testing, but also avoids errors caused by repeated inputs.

E. SETTING DATA EXPORT / IMPORT MECHANISM



Channels Configured on the Rear Panel

The channel outputs of the GPT-9500 series are all configured on the rear panel. Other than the aesthetics of the system configuration, it is more important to effectively reduce the possibility of accidental contact by

personnel. Each channel provides disconnection detection to avoid performing an invalid test.

Leakage Current Tester



GLC-10000

NEW



FEATURES

- ✦ Suitable for Medical Electrical & General Electrical of Leakage Current Measurement
- ✦ 7" Touch Pane with Color LCD
- ✦ 11 Different Measurement Network to Simulate the Resistance of Human Body (Including IEC 60601-1:2020 3.2rd)
- ✦ The Measurement of Maximum Allowable Leakage Current is Up to 50mA
- ✦ External Terminal for Extension MD Connection
- ✦ MD OUT Terminal can be Connected to an Oscilloscope for Convenient Comparison of Measured Waveforms
- ✦ 30 Sets Memories for Test Parameter; 1000 Sets Memories for Measured Data.
- ✦ Test Parameter Export/Import Function Through USB Host
- ✦ USB Storage for Measurement Data/ Screen Capture
- ✦ Various Standard Interfaces: RS-232C, USB Host & Device, LAN, Signal I/O and GPIB (Optional)

GTL-207A Test Lead

Approx. 0.8m



GLC-01 Alligator Clips



GLC-02 Foil Probe



GW Instek launches a new leakage current tester—GLC-10000, which features 11 simulated human impedance networks that comply with related safety regulations so as to conduct leakage current test for electric equipment under normal condition or single fault condition. These 11 simulated human impedance networks are comprised of networks for medical electric equipment and general electric and electronic equipment to ensure that the product design and manufacture are in compliance with requirements of safety regulations including IEC, EN, UL, etc.

GLC-10000 provides test requirements for most IT products, household appliances and other electronic and electric equipment, and even medical electronics in the measurement of leakage current (or touch current), including the required measurement network, measurement bandwidth of various current forms are all in compliance with the requirements of the latest version of the applicable regulations. Furthermore, in order to comply with the leakage current flow paths under different regulations, GLC-10000 provides 20 measurement options to meet the requirements of the old and latest versions of the standards.

GLC-10000 is equipped with a 7-inch TFT LCD touch screen, which makes the operation more convenient and fast, and the large screen allows setting information and test results to be displayed on the LCD at the same time, improving the readability of information observation. In addition, users can select the front socket output (10A max.) or the rear terminal block output (up to 20A) to measure the leakage current according to the current consumption of the DUT. 30 sets of internal memory can be used to store the measurement settings of users' products. In addition, 1000 sets of measurement results can be stored to conduct subsequent analysis.

For the rear panel configuration, GLC-10000 also provides a reserved MD external terminal block (EXT+/EXT-), and users can self-define the required simulated impedance networks (only applicable to parallel RC combination) to measure the leakage current to meet the requirements of new MD in future regulations. In addition, GLC-10000 provides a variety of standard interfaces, such as RS-232C, USB device, LAN and Remote I/O, and even GPIB (optional) to meet the needs of system control and data acquisition.

SPECIFICATIONS			
Ranges	Range	Resolution	Accuracy
DC			
50.00mA	4.00mA~50.00mA	10 μA	±(2%rdg+6dgt)
5.000mA	0.400mA~5.000mA	1 μA	±(2%rdg+6dgt)
500.0 μA	40.0 μA~500.0 μA	0.1 μA	±(2%rdg+6dgt)
50.00 μA	4.00 μA~50.00 μA	0.01 μA	±2.0%fs
AC / AC+DC			
			0.1Hz≤f≤15Hz 15Hz<f≤100kHz 100kHz<f≤1MHz
50.00mA	4.00mA~50.00mA	10 μA	±(4.0%rdg+10dgt) ±(2.0%rdg+6dgt) ±(2.0%rdg+10dgt)
5.000mA	0.400mA~5.000mA	1 μA	±(4.0%rdg+10dgt) ±(2.0%rdg+6dgt) ±(2.0%rdg+10dgt)
500.0 μA	40.0 μA~500.0 μA	0.1 μA	±(4.0%rdg+10dgt) ±(2.0%rdg+6dgt) ±(2.0%rdg+10dgt)
50.00 μA	4.00 μA~50.00 μA	0.01 μA	±4.0%fs ±2.0%fs ±2.0%fs
AC PEAK			
			15Hz≤f≤10kHz 10kHz<f≤100kHz 100kHz<f≤1MHz
75.0mA	5.0mA~75.0mA	100 μA	±(2.0%rdg+6dgt) ±5.0%fs ±15%fs
7.500mA	0.500mA~7.500mA	1 μA	±2.5%fs ±5.0%fs ±15%fs
750.0 μA	40.0 μA~750.0 μA	0.1 μA	±4%fs ±5.0%fs ±20%fs
EUT Voltage/Current Monitor			
300V	85V~300V	0.1V	±(5%rdg+10dgt)
20A	0.5A~20A	0.1A	±(2%rdg+5dgt)
POWER SUPPLY			
For GLC-10000	AC 100V~240V±10%, 50/60Hz ; Power consumption : Max. 50VA		
For EUT IN	AC 100V~240V±10%, 50/60Hz, 20A		
EUT OUT (Front)	AC 100V~240V, 50/60Hz, 10A		
EUT OUT (Rear)	AC 100V~240V, 50/60Hz, 20A		
INTERFACE			
RS-232C, USB host & device, LAN, Signal I/O and GPIB (Optional)			
DIMENSIONS & WEIGHT			
342 (W) x 133.87 (H) x 348.51 (D) mm; Approx. 7.5kg			

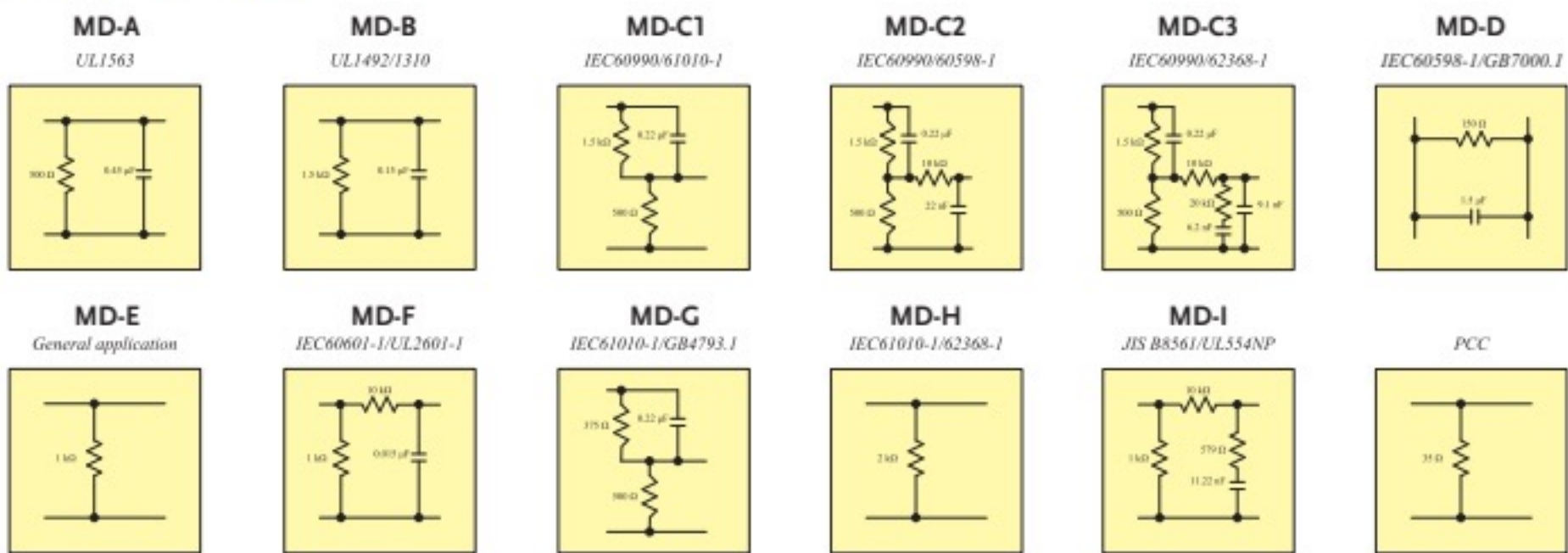


GLC-10000

Rear Panel



MEASUREMENT NETWORK (MD)



Note : 1. The standard numbers that are listed are only example; the MD can be used with all applicable standards.
2. PCC is for Meter mode only.

A. SIMPLE AND INTUITIVE SYSTEM



The color TFT touch screen makes operation intuitive and simple, whilst making it easier to observe test result.

B. VARIOUS MEASUREMENT NETWORK



Nine Measurement Network are available for measuring the leakage current of electrical and medical equipment.

C. VARIOUS STANDARD INTERFACES



The various practical interfaces are equipped as standard making control convenient and flexible.

ORDERING INFORMATION

GLC-10000 Leakage Current Tester

ACCESSORIES :

Power cord x 1, Test lead(GTL-207A) x 2, CD x 1(Complete user manual), Alligator clips(GLC-01) x 1 (Red x 2/Black x 2), Foil probe(GLC-02) x 1, Power Cord for EUT (GLC-03) x 1, Input & output terminal cover (GLC-04) x 1

OPTIONAL

GLC-10KG1 GPIB Card

OPTIONAL ACCESSORIES

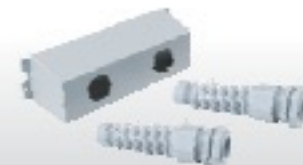
- GTL-232** RS-232C Cable
- GTL-240** USB Cable, USB 2.0, A-B Type (L Type), 1200mm
- GTL-246** USB Cable, USB 2.0 A-B TYPE CABLE, 4P
- GTL-248** GPIB Cable (2.0m)

GLC-03 Power Cord for EUT

Approx. 1.8m



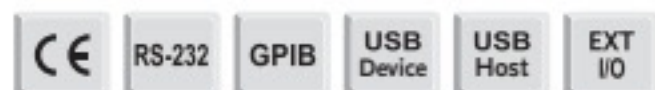
GLC-04 Input & Output Terminal Cover



Leakage Current Tester



GLC-9000



FEATURES

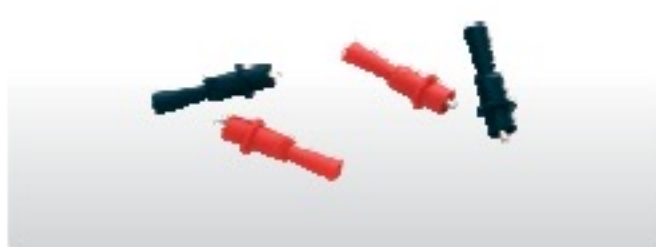
- ✦ Suitable for General Electrical of Leakage Current Measurement
- ✦ Touch Panel with Color LCD Display
- ✦ 9 Different Measurement Network to Simulate the Resistance of Human Body
- ✦ 50 Sets Preset Test Conditions Conform to the IEC 60990 ; 30 Sets Memories for Customer Defined
- ✦ 8 Different Types of Leakage Current
- ✦ Meter Function with SELV/CONV Function
- ✦ Upper & Lower Limitation for PASS/FAIL Judgment
- ✦ Various Leakage Current Measuring Mode : DC/AC/AC+DC/AC Peak
- ✦ Various Standard Interfaces : RS-232/ GPIB/USB Host & Device/EXT I/O

GTL-207A Test Lead

Approx. 0.8m



GLC-01 Alligator Clips



GLC-02 Foil Probe



The GLC-9000, leakage current tester, is used to perform leakage current (or called touch current) tests on general purpose electric (IEC 60990) equipment. This tester engages with nine measurement networks (or called Measuring Device) to provide the simulation of human body whilst the EUT (equipment under test) is taking a leakage current testing, in compliance with the specific standards or regulations such as IEC, UL, JIS...etc..

In order to provide a simple operation environment, the GLC-9000 equips a large TFT LCD touch panel to configure system as well as to present the measurement settings information and result simultaneously. Besides, there are 50 preset testing conditions, which conform to IEC60990 and other standards, for general electric equipment can be recalled to reduce the setting time. In addition, 30 sets of empty memory are available for user defined.

A Meter mode is also available for the GLC-9000. It uses the measurement terminal (T1/T2) to measure voltage as the same way of ordinary voltmeter. During the voltage measurement, the SELV function (safety extra low voltage) is applicable to detect the voltage value between measuring points whether exceeding the SELV setting.

SPECIFICATIONS				
	Ranges	Range	Resolution	Accuracy
DC				
	25.00mA	5.00mA ~ 25.00mA	10 μA	±(0.2%rdg+3dgt)
	5.000mA	0.500mA ~ 5.000mA	1 μA	±(0.2%rdg+3dgt)
	500.0 μA	50.0 μA ~ 500.0 μA	0.1 μA	±1.0%fs
	50.00 μA	4.00 μA ~ 50.00 μA	0.01 μA	±1.0%fs
AC or AC+DC				
	25.00mA	5.00mA ~ 25.00mA	10 μA	10Hz<f ≤100kHz ±(2.0%rdg+6dgt) 100kHz<f ≤1MHz ±(2.0%rdg+10dgt)
	5.000mA	0.500mA ~ 5.000mA	1 μA	±(2.0%rdg+6dgt) ±(2.0%rdg+10dgt)
	500.0 μA	50.0 μA ~ 500.0 μA	0.1 μA	±(2.0%rdg+6dgt) ±(2.0%rdg+10dgt)
	50.00 μA	4.00 μA ~ 50.00 μA	0.01 μA	±2.0%fs ±2.0%fs
AC PEAK				
	75.0mA	10.0mA ~ 25.0mA	100 μA	20Hz<f ≤1kHz ±(2.0%rdg+2dgt) 1kHz<f ≤ 10kHz ±(5.0%rdg+10dgt)
	10.00mA	1.00mA ~ 10.00mA	10 μA	±(2.0%rdg+2dgt) ±(5.0%rdg+10dgt)
	1.000mA	500 μA ~ 1.000mA	1 μA	±2.5%fs ±5.0%fs
	500.0 μA	40.0 μA ~ 500.0 μA	0.1 μA	±4.0%fs ±5.0%fs
EUT (V/I CHECK)				
Voltage	300V	85V ~ 300V	0.1V	±(2%rdg+10dgt)
Current	10A	0.5A ~ 10A	0.1A	±(2%rdg+5dgt)
METER MODE				
	AC/DC	10.0 ~ 300.0V	0.1V	±(3%rdg+2V)
	AC+DC	10.0 ~ 300.0V	0.1V	±(3%rdg+2V)
	AC Peak	15.0 ~ 430.0V	0.1V	±(3%rdg+2V)
INTERFACE				
RS-232C, GPIB, USB Host & Device, EXT I/O				
POWER SOURCE				
For GLC-9000: AC 100V/120V/220V/230V±10%, 50/60Hz; Power Consumption: Max. 30VA For EUT: AC 85V ~ 250V, 50/60Hz (264V Max.)				
DIMENSIONS & WEIGHT				
330 (W) x 150 (H) x 350 (D) mm; Approx. 5kg				

ORDERING INFORMATION

GLC-9000 Leakage Current Tester

ACCESSORIES :

User manual x 1, Power cord x 2, Test lead(GTL-207A) x 2, CD x1 (Complete user manual), Alligator clips(GLC-01) x 4(Red x 2/Black x 2), Foil probe(GLC-02) x 1,

OPTIONAL ACCESSORIES

GTL-232 RS-232C Cable
GTL-240 USB Cable, USB 2.0, A-B Type (L Type), 1200mm
GTL-246 USB Cable, USB 2.0 A-B TYPE CABLE, 4P
GTL-248 GPIB Cable (2.0m)

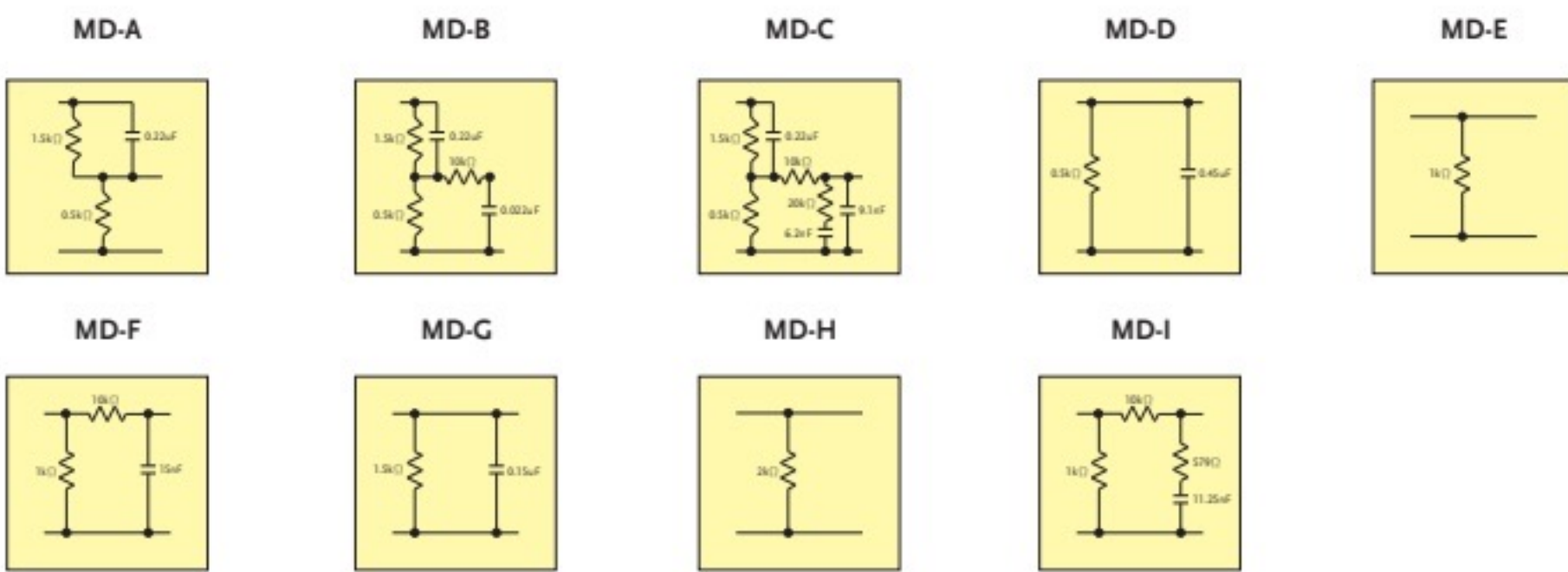


GLC-9000

Rear Panel



MEASUREMENT NETWORK (MD)



A. SIMPLE AND INTUITIVE SYSTEM



The color TFT touch screen makes operation intuitive and simple, whilst making it easier to observe test result.

B. VARIOUS MEASUREMENT NETWORK



Nine Measurement Network are available for measuring the leakage current of electrical and medical equipment.

C. VARIOUS STANDARD INTERFACES



The various practical interfaces are equipped as standard making control convenient and flexible.



OTHER METERS

In order to provide customers with a complete “one stop shopping” solution, GW Instek also offers many other special test and measurement instruments for different applications. For power related measurement, the GPM-8310/8213 (A.C./D.C.) digital power meters are suitable for middle to high-end application such as stand-by power measurements, SPEC Power® and other low-level power measurements. If you need to measure the resistance of material components, the GOM-800 Series D.C. milli-ohm meter is your ideal tool. As for audio signals related measurement, GW Instek provides GAD-201G automatic distortion meter and GVT-427B/417B A.C. millivolt meters. We also supply two models of the GBM-3000 Series battery meters with ranges of 300V and 80V. For current measurement, PCS-1000I is a high-precision D.C. and A.C. current shunt meter which carries built-in current shunts and high-accuracy current measurement circuits.

PRODUCTS

- DC Milli-Ohm Meter
 - Battery Meter
 - Digital Power Meter
 - Automatic Distortion Meter
 - AC Millivolt Meter
 - Precision Current Shunt Meter
-

OTHER APPLICATION METERS

COMPONENTS TESTING INSTRUMENT

MODEL	Description (Main Function)	Page
GOM-805	DC Milli-Ohm Meter 5mΩ ~ 5MΩ	E57-59
GOM-804	DC Milli-Ohm Meter 5mΩ ~ 5MΩ	

BATTERY METER

MODEL	Description (Main Function)	Page
GBM-3300	300V Battery Meter (including RS-232C/USB device/host and HANDLER interface)	E60-62
GBM-3080	80V Battery Meter (including RS-232C/USB device/host and HANDLER interface)	

POWER RELATED INSTRUMENT

MODEL	Description (Main Function)	Page
GPM-8330	DC and 0.1Hz~100kHz, Max. direct input of up to 1000V and 20A, 5" TFT LCD 3 input element model, Total 10 parameters display, waveform display for V / I / P, Harmonic measurement & analysis	E63-68
GPM-8320	DC and 0.1Hz~100kHz, Max. direct input of up to 1000V and 20A, 5" TFT LCD 2 input element model, Total 10 parameters display, waveform display for V / I / P, Harmonic measurement & analysis	E63-68
GPM-8310	DC and 0.1Hz~100kHz, Max. Direct Input of up to 600V and 20A, 5" TFT LCD Total 10 Parameters Display, Waveform Display for V / I / P, Harmonic Measurement & Analysis	E69-74
GPM-8213	DC and 45Hz~6kHz, Max. Direct Input of up to 600V and 20A, 4" TFT LCD Total 8 Parameters Display	E75-76

AUDIO RELATED INSTRUMENT

MODEL	Description (Main Function)	Page
GAD-201G	20Hz ~ 20kHz Automatic Distortion Meter	E77
GVT-427B/417B	AC Millivolt Meter (2CH/1CH)	E78

PRECISION CURRENT SHUNT METER

MODEL	Description (Main Function)	Page
PCS-1000I	Max. Voltage, AC 600V/DC 1000V, Max. Current, AC 300A/DC 300A	E79-82

D.C. Milli-Ohm Meter



GOM-804/805



FEATURES

- * 50,000 Counts Display
- * 3.5" (320 x 240) TFT LCD Display
- * High Accuracy of 0.05% Precision
- * 1Amp Test Current, 0.1 $\mu\Omega$ Resolution
- * Fast Measurement of 60 Readings Per Second
- * Four wire Resistance Measurement
- * Temperature Compensation Measurement Function
- * Delayed Measurement
- * 20 sets of Panel Setting Memory
- * Dry Circuit (GOM-805 Only)
- * Drive Modes :
 GOM-805:DC+/DC-, Pulsed, PWM, Zero, Standby
 GOM-804:DC+, Standby
- * Interface : USB Device, RS-232C, Handler/ Scan/EXT I/O, and GPIB(Option)

GOM-804/805 feature 3.5-inch TFT display, maximum 50,000 counts measurement display, the rapid sampling rate of 60 readings per second, optimum 0.05% measurement precision, four wire measurement method as well as the temperature measurement and temperature compensation measurement function to meet the requirement of low resistance measurement application. The GOM-805 also includes various drive modes and Dry circuit for contact resistance measurement applications. More features, including 20 sets of panel setting memory and many external control interface such as RS-232C, USB, Handler/Scan/EXT IO or GPIB (option), greatly elevate GOM-804/805 milliohm meter's convenience on practical applications.

GOM-804/805 adopt 3.5-inch color LCD to enhance the clarity of measurement results and to provide display for related setting criteria that tremendously brings up the completeness of test information. Additionally, GOM-804/805, with the optimum 0.05% precision, augment the measurement speed to 60 sampling rate per second and maintain the display digits of five instead of four despite of different speed selections. Furthermore, the independent functionality keys and direction keys together increase the operational convenience which allows users to complete their measurement tasks with intuitive convenience and speed.

GOM-805 provides Dry circuit and various drive modes (DC+, DC-, Pulsed, PWM) for measurement applications on different materials. The pulsed current output mode is suitable for interacting conductors of different materials and this output mode is to reduce the thermal EMF influence, which is caused by electric potential difference generated from different conductors acting on different temperatures while conducting low resistance measurements. The DC+ and DC- output modes are best for the measurement requirements of inductive components. The PWM output mode, ideal for changing temperature sensitive materials, can avoid resistance value variation which is due to over load happened on current measurement for a long period of time. During the DC+, DC- and Pulsed drive is supplied; the Dry circuit can work with them also. Dry circuit can limit the applied voltage under the open circuit voltage of 20mV to avoid over voltage occurred on the both ends of components. The over voltage will damage the oxide coating and the thin layer of contact surface, as a result, the validity of measurement will then be ruined. For instance, contact resistance of connector measurement is one of the applications.

With respect to connecting the external control, GOM-804/805 provide a D-sub 25-pin combined interface to execute, according to the functionalities, Handler, Scan or EXT IO for respectively connecting to a sorting machine; connecting to an external on-off switch, and directly conducting external trigger control. For remote control and measurement result retrieval requirements, GOM-804/805 also provide various interface selections such as RS-232C, USB, and GPIB (GOM-804(option)/GOM-805(standard) interface. Furthermore, the control commands are compatible to that of GOM-802 that saves time in adjusting programs while switching from the old model to the new model.

To sum up, GOM-804 evolves from GOM-802 platform with more advanced functionalities and specifications, including display digits, measurement speed and standard interface (RS-232C/USB). With all the capabilities of GOM-804, GOM-805 augments itself with new measurement abilities (Dry circuit and various drive modes) to meet the requirements of broader low resistance measurement applications.

SPECIFICATIONS			
	GOM-804		GOM-805
DISPLAY			
	50,000 counts		
SAMPLING RATE			
Slow	10 readings / s		
Fast	60 readings / s		
RESISTANCE MEASUREMENT			
Range	Resolution	Test Current	Accuracy
5m Ω	0.1 $\mu\Omega$	1A	$\pm(0.1\% \text{ reading} + 0.2\% \text{ of range})$
50m Ω	1 $\mu\Omega$	1A	$\pm(0.1\% \text{ reading} + 0.02\% \text{ of range})$
500m Ω	10 $\mu\Omega$	100mA	$\pm(0.05\% \text{ reading} + 0.02\% \text{ of range})$
5 Ω	100 $\mu\Omega$	100mA	$\pm(0.05\% \text{ reading} + 0.02\% \text{ of range})$
50 Ω	1m Ω	10mA	$\pm(0.05\% \text{ reading} + 0.02\% \text{ of range})$
500 Ω	10m Ω	1mA	$\pm(0.05\% \text{ reading} + 0.008\% \text{ of range})$
5k Ω	100m Ω	100 μA	$\pm(0.05\% \text{ reading} + 0.008\% \text{ of range})$
50k Ω	1 Ω	100 μA	$\pm(0.05\% \text{ reading} + 0.008\% \text{ of range})$
500k Ω	10 Ω	10 μA	$\pm(0.05\% \text{ reading} + 0.008\% \text{ of range})$
5M Ω (GOM-804)	100 Ω	1 μA	$\pm(0.2\% \text{ reading} + 0.008\% \text{ of range})$
5M Ω (GOM-805)	100 Ω	1 μA	$\pm(0.5\% \text{ reading} + 0.008\% \text{ of range})$
TEMPERATURE			
Range	-50 $^{\circ}\text{C}$ ~ 399.9 $^{\circ}\text{C}$		
Accuracy	-10 $^{\circ}\text{C}$ ~ 40 $^{\circ}\text{C}$: 0.3% \pm 0.5 $^{\circ}\text{C}$; Other : 0.3% \pm 1.0 $^{\circ}\text{C}$		
Resolution	0.1 $^{\circ}\text{C}$		
DRY CIRCUIT			
	-		Open circuit less than 20mV; For 500m Ω , 5 Ω , 50 Ω range only



GOM-804/805

SPECIFICATIONS		
	GOM-804	GOM-805
DRIVE MODE		
DC+ / DC-Pulsed	DC + Only	Yes
PWM	—	Yes
Zero	—	Yes
Standby(*)	Yes	Yes
OTHER FUNCTIONS		
	Trigger - Internal, Manual, External; Math - ABS, REL, %, TC; Average : 2 ~10 times; Measurement Delay; TC for Transformer; Compare; Diode; Continuity beeper; Binning (GOM-805 only)	
INTERFACE		
USB	Standard	Standard
RS-232C	Standard	Standard
HANDLER/SCAN/EXT I/O	Standard	Standard
GPIB	Option (factory installed)	Standard
DISPLAY		
	3.5" (320 x 240) TFT LCD	
MEMORY		
	20 sets for panel setting	
POWER SOURCE		
	AC 100 ~ 240 V, 50/60Hz	
CONSUMPTION		
	25VA (max.)	
DIMENSIONS & WEIGHT		
	223 (W) x 102 (H) x 283 (D) mm ; Approx. 3kg	

Note: (*)The Standby function must be collocated with the new PCB hardware; it is not applicable to sold instruments.

ORDERING INFORMATION

GOM-805	D.C. Milliohm Meter(Handler/RS-232C/USB Device/GPIB)
GOM-804 with GPIB	D.C. Milliohm Meter(Handler/RS-232C/USB Device/Opt.01 GPIB)
GOM-804	D.C. Milliohm Meter(Handler/RS-232C/USB Device)

ACCESSORIES :

Quick Start Guide x 1, Power cord x 1, Test lead GTL-308 x 1, CD x 1 (complete user manual)

OPTION

GOM-801G1 GPIB Card (only for GOM-804 and must be installed at factory before shipment)

OPTIONAL ACCESSORIES

PT-100	Platinum Temperature Probe
GTL-232	RS-232C cable 9-pin, F-F type, approx. 2000mm
GTL-246	USB cable, A-B type, approx. 1200mm
GTL-248	GPIB cable approx. 2000mm
GTL-309	Test lead, approx. 3m

FREE DOWNLOAD

Driver LabView Driver

Rear Panel



GTL-308 Test lead

Approx. 1.5m



GTL-309 Test lead

Approx. 3m



PT-100 Temperature Probe

Approx. 1.5m



D.C. Milli-Ohm Meter

A. TOTALLY REPLACING THE EXISTING MODELS



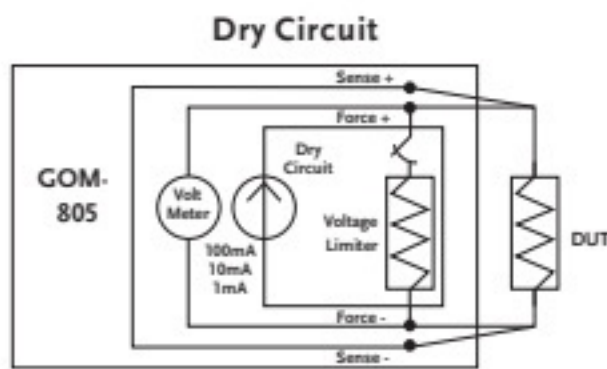
In terms of the basic functionalities and specifications, GOM-804/805 can absolutely replace the existing model_GOM-802. All GOM-802 functionalities can be found from GOM-804/805, including resistance measurement range, 1A test current (maximum), four wire measurement method, temperature probe (option, accessory model : PT-100) for temperature measurement and temperature compensation measurement, etc. The programming commands are also compatible to that of GOM-802. To simply put it, the brand new GOM-804/805 not only provide better display interface, fast measurement (60 readings per second), but also collocate with standard communications interface (RS-232C/USB device) to facilitate users in accomplishing measurement tasks rapidly. On top of that, model switching will not be a problem.

B. FASTER MEASUREMENT WITHOUT SACRIFICING RESOLUTION



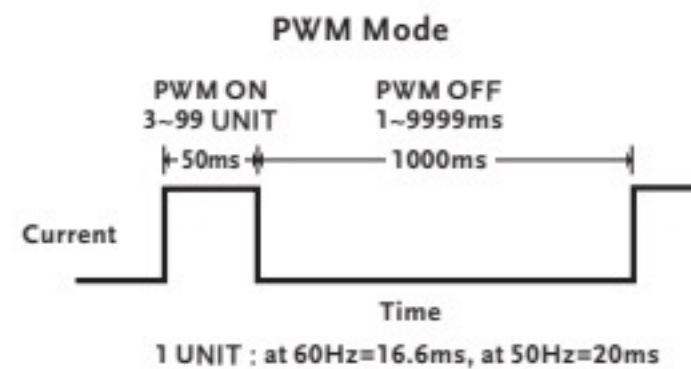
GOM-804/805 has two measurement speed selections, which are Fast reaching 60 readings per second, and Slow 10 readings per second. A major departure from the past, users, in the past, had to juggle between speed and display resolution. GOM-804/805 will not affect resolution despite of any speed selections and will maintain the highest display digits. In other words, reading resolution will not be changed by changing speed and the display digits remain the same.

C. DRY CIRCUIT TEST FOR GOM-805 ONLY



Dry circuit is to limit test voltage and current to certain levels which will not cause contact points to produce physically or electrically changed circuit and its most frequently used application is contact resistance of connector measurement. Based upon MIL-STD-1344 method 3002-1 low signal level contact resistance, tests must be applied under the maximum open circuit voltage of 20mV (or lower), and short circuit current of 100mA (or lower) to avoid over voltage for the both ends of components. The over voltage will damage the oxide coating and the thin layer of contact surface, as a result, the validity of measurement will then be ruined. GOM-805 provides three levels (500mΩ:100mA/5Ω:10mA/50Ω:1mA) to limit open circuit voltage at 20mV to execute Dry circuit tests.

D. VARIOUS DRIVE MODES FOR GOM-805 ONLY



GOM-805 provides various current output drive modes to satisfy diversified and accurate low resistance measurement applications. For instance, for interacting conductors of different materials, the pulsed current output mode can be applied to reduce the thermal EMF influence, which is caused by different conductors acting on different temperatures. The PWM output mode, ideal for changing temperature sensitive materials, can avoid resistance value variation which is due to over load on large current measurement in a long period of time. The DC+ and DC- output modes are best for the measurement requirements of inductive components.

E. STANDARD INTERFACE FOR CONTROL AND COMMUNICATIONS



With respect to connecting the external control, GOM-804/805 provide a D-sub 25-pin composite interface to execute, according to the functionalities, Handler, Scan or EXT IO for connecting to a sorting machine; connecting to an external on-off switch, and directly conducting external trigger control respectively. For remote control and measurement result retrieval requirements, GOM-804/805 also provide various interface

selections such as RS-232C, USB, and GPIB GOM-804(option)/GOM-805 (standard) interface. The commands of GOM-804/805 are compatible to that of GOM-802 that allows users to switch equipment with simple settings. There is no cost in adjusting existing programs and production delay will not be happening while switching from the old model to the new model.

Battery Meter



GBM-3300/3080



FEATURES

- * 3.5" TFT LCD (320x240)
- * Measurement Items: DC Voltage and AC Resistance
 - Voltage Measurement: 300V (GBM-3300) or 80V (GBM-3080)
 - Resistance Measurement: 0mΩ ~ 3.2kΩ (max.)
- * Basic Accuracy For Voltage Measurement: 0.01%
- * Basic Accuracy For Resistance Measurement: 0.5%
- * Measurement Resolution up to 0.1 μΩ and 10 μV, Suitable For Single-cell Measurement
- * Independent Go/NoGo Determination Function For Voltage and Resistance Respectively
- * The Judgment Mechanism of Test Lead (Probe) Disconnect/Contact Failure is to Ensure The Measurement Reliability
- * Standard Interfaces: USB Host/Device, RS-232C and Handler

GW Instek launches a new series of desktop battery tester, the GBM-3000 Series, which uses AC 1kHz as the test signal and measures battery's voltage and internal resistance to 300V (GBM-3300) and 80V (GBM-3080). The series features 3.5" TFT LCD, 4-wire measurement method, high-resolution (6-digit voltage/5-digit resistance) measurement display capability, and independent GO/NOGO determination of voltage and resistance, various communications interfaces, etc. to meet various types of battery measurements, ranging from single cell, battery cell, to the end product (battery), etc. so as to facilitate users in achieving accurate measurements at all stages of production.

The GBM-3000 Series provides excellent features for various types of batteries in measuring open circuit voltage and resistance. For voltage measurement, the accuracy is as high as ± (0.01% reading + 3 digits), and measurement resolution is up to 10 μV (at 8V). For resistance measurement, the accuracy reaches ± (0.5% reading + 5 digits) and the resolution achieves 0.1 μΩ (at 3mΩ) that is especially suitable for the sorting of single cell measurements, which is to achieve a better output balance for the follow-up series and parallel connections.

In the meantime, in order to facilitate users to quickly and clearly interpret the measurement results, the GBM-3000 Series features HI/LO determination respectively based on voltage and resistance, and can be switched to the simple (big numerical display) mode to meet the requirements of test accuracy, clear and easy-to-read, and elevated inspection efficiency and capabilities.

Other than the excellent measurement capabilities, the GBM-3000 Series also provides a number of functions to ensure effectiveness and convenience. For the effectiveness, the test lead (probe) contact status detection function is to effectively prompt users whether test lead (probe) and DUT are in good contact to ensure the validity of the measured value. In terms of convenience, the GBM-3000 Series provides two data storage methods (up to 10,000 lots of measurement values). "General storage" only stores the measured voltage and resistance values; "statistical storage" has the related parameters (Cp/Ckp/Mean/MAX/MIN...) for the statistical analysis. Users can store the data from the measurement process in the internal memory first and then transfer the data to the computer via flash drive for subsequent analysis without being limited to the connection with the computer.

In addition, for retrieving and storing measurement results via the transmission method, the GBM-3000 Series provides RS-232C/USB device (virtual COM) for writing programs and retrievals. The handler interface is provided for external trigger control via PLC. All interfaces are standard-equipped that not only save the cost of instruments, but also meet the requirement of using different automated measurement systems.

SPECIFICATIONS						
DISPLAY						
Screen	3.5" (320 x 240) TFT LCD					
Resistance	5 digits					
Voltage	6 digits					
TEST SPEED						
Slow	3 time/second					
Medium	14 time/second					
Fast	25 time/second					
Ex. Fast	65 time/second					
RESISTANCE MEASUREMENT						
Test Frequency	1kHz (±0.5Hz) Fixed					
Input Impedance	3mΩ ~ 300mΩ: 99kΩ, 3Ω ~ 3kΩ: 2MΩ					
Range	Range No.	Range	Max. scale	Resolution	Test Current	Open-circuit Voltage (Vpp,Max)
	0	3mΩ	3.1000mΩ	0.1 μΩ	100mA	8V
	1	30mΩ	31.000mΩ	1 μΩ	100mA	8V
	2	300mΩ	310.00mΩ	10 μΩ	10mA	7V
	3	3Ω	3.1000Ω	100 μΩ	1mA	3V
	4	30Ω	31.000Ω	1mΩ	100 μA	2V
	5	300Ω	310.00Ω	10mΩ	10 μA	1.5V
	6	3kΩ	3200.0Ω	100mΩ	10 μA	1.5V
Accuracy	Range No.	Speed	Accuracy		Temperature Coefficient	
	0	Slow Medium Fast EX. Fast	±0.5%rdg ± 10dgt ±0.5%rdg ± 15dgt ±0.5%rdg ± 20dgt ±0.5%rdg ± 40dgt		(±0.05%rdg ± 1dgt)/°C	
	1-6	Slow Medium Fast EX. Fast	±0.5%rdg ± 5dgt ±0.5%rdg ± 7dgt ±0.5%rdg ± 7dgt ±1.0%rdg ± 8dgt		(±0.05%rdg ± 0.5dgt)/°C	

Battery Meter

Rear Panel



GBM-3300/3080

GBM-01 4 Wire(kelvin clip) test lead, 90V(max.)

Approx. 1.1m



GBM-02 4 Wire(single pin) test probe, 80V(max.)

Approx. 1.1m



GBM-03 4 Wire(twin pin) test probe, 300V(max.)

Approx. 1.4m



GBM-S1 Short Bar



SPECIFICATIONS

VOLTAGE MEASUREMENT

Range	Range No.	Range	Max. scale	Resolution
	0	8V	±8.08000	10 μV
	1	80V	±80.8000	100 μV
	2	300V (For GBM-3300 only)	±303.000	1mV
Accuracy	Range No.	Speed	Accuracy	Temperature Coefficient
	0-2	Slow	±0.01%rdg ± 3dgt	(±0.001%rdg ± 0.3dgt)/°C
		Medium	±0.01%rdg ± 5dgt	
		Fast	±0.05%rdg ± 5dgt	
		EX. Fast	±0.10%rdg ± 6dgt	

OTHER FUNCTIONS

Range Selection	Auto range, Hold range, Nom range
Comparator	ABS, PER or SEQ
Contact Detection	OPEN & WIRE
Buzzer	OFF, Pass, Fail
Trigger	INT, EXT

INTERFACE

USB Host/USB Device/RS-232C/Handler

POWER SOURCE

AC 100~240V, 50-60Hz; Consumption: 10W

DIMENSIONS & WEIGHT

264(W) x 107(H) x 309(D) mm, Approx. 2.8kg

ORDERING INFORMATION

GBM-3300 300V Battery Meter (including RS-232C/USB device/host and HANDLER interface)

GBM-3080 80V Battery Meter (including RS-232C/USB device/host and HANDLER interface)

ACCESSORIES :

Safety sheet x 1, Power cord x 1, GBM-01 x 1 : 4 Wire(kelvin clip) test lead, 90V(max.), approx..1100mm, CD x 1 (including complete user manual and USB driver)

OPTIONAL ACCESSORIES

GBM-02 4 Wire (single pin) test probe, 80V (max.), approx. 1100mm

GBM-03 4 Wire (twin pin) test probe, 300V (max.), approx. 1400mm

GBM-S1 Short Bar (for GBM-02/GBM-03)

GTL-232 RS-232C cable, 9-pin Female to 9-pin, null modem for computer, Approx. 2000mm

GTL-246 USB cable, A-B type, approx.1200mm

GRA-422 Rack Mount kit

GRA-436 Rack Mount Kit, 19" 2U size for two sets

A. TWO DISPLAY MODES



Standard Mode

(Setting conditions and R+V measurement parameters)

The GBM-3000 series offers two display modes to facilitate users in maximizing the benefits of their measurements – Standard mode: The main measurement parameters (three combinations: R+V/R/V) and parameter settings for the related measurements can be displayed



Simple Mode

(R+V measurement parameters)

simultaneously. This mode is applicable to R&D design and engineering certification. Simple mode: Big numerical display only shows the results of main measurement parameters to increase the visibility of observations. This mode is suitable for production measurements.

B. INDEPENDENT GO/NOGO DETERMINATION



Independent HI/LO Setting

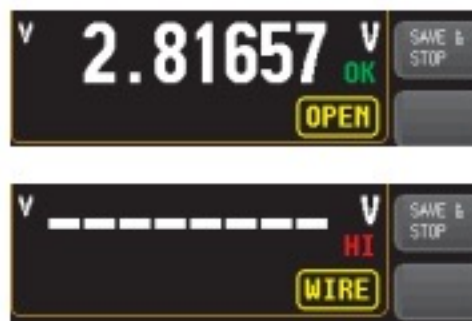
The GBM-3000 series provides independent HI/LO determination settings for both voltage and resistance and can be set according to the required mode, such as SEQ, PER or ABS. In addition to displaying



Separate & Totally Judgement

the results of the final determination, the results of individual measurement parameters are also provided for subsequent actions.

C. EXCELLENT SUPPLEMENTARY MEASUREMENT CAPABILITY



Disconnect/Contact Display

In addition to providing accurate measurements, the ability of the GBM-3000 Series to supplement the measurement of production lines is also a major feature of the series. For example, the ability to detect disconnect/contact. The display screen can clearly show bad contact of the test lead (probe).The series can store up to 10,000 lots of measurement data and has the statistical calculation function to allow



Statistical Function

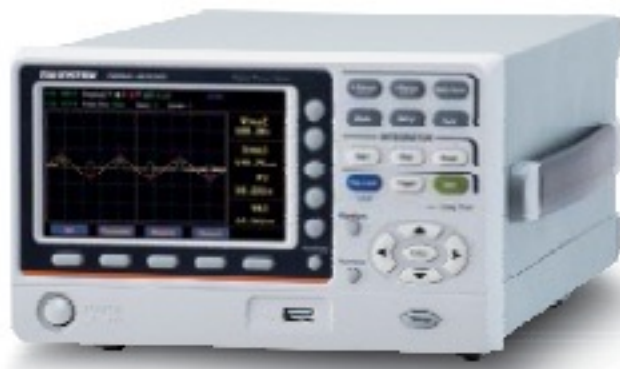
the status of the production process to be clearly observed and retained in real time without any manual calculation or connection to the computer. After the measurement is completed, the result can be transferred to the computer through flash drive for long-term storage and subsequent analysis.

D. COMPREHENSIVE STANDARD INTERFACES



Finally, the GBM-3000 series provides a variety of practical and standard-equipped interfaces including RS-232C/USB device/Handler, which are for measurement result collection in the remote program control or collocating with system integration for external trigger measurement through PLC.

Digital Power Meter



GPM-8320/8330

NEW



FEATURES

- * 5" TFT LCD
- * Voltage/Current Meter Test Freq. Bandwidth: DC, 0.1Hz ~ 100kHz
- * Waveform Display : V (Voltage), I (Current), P (Wattage)
- * Distorted wave Current/Voltage Measurement: Full Range for CF=3, and Half Range for CF=6 (or 6A)
- * Meeting IEC 61000-4-7 Harmonic Measurement (50/60Hz)
- * Wiring Selecting Button (1P3W, 3P3W, 3P4W, 3V3A)
- * Harmonic Measurement & Analysis up to 50 Orders
- * Auto Ranging Function for Integration Mode
- * Screen Capture Through USB Host
- * Provide External Current Sensor Input (EXT1/EXT2)
- * Standard Interface: RS-232C, USB Device/Host, LAN
- * Optional Interface: GPM-DA12 - GPIB + Digital I/O (Factory Installed Only)

GPM-002 Terminal Cover



GTL-209 Test lead



GTL-212A Test lead



GTL-214 DA12 Cable



GW Instek GPM-8320/8330 are digital power meters designed specifically for measuring power in three-phase AC power sources, making it suitable for most electrical and electronic product testing applications (GPM-8320 provides 2 modules, and GPM-8330 provides 3 modules). These models have a testing bandwidth of DC, 0.1Hz~100 kHz and feature 16-bit A/D converters and a sampling rate of 300 kHz. A 5-inch TFT LCD display, 5 digits of measurement readings, 25 different power measurement parameters, and high precision measurement capabilities are also provided. GPM-8320/8330 also feature waveform display capabilities (voltage/current/power), the integration measurement function, harmonics measurement and analysis of multiple orders (50/60Hz measurement complies with IEC61000-4-7 requirements), external sensor input terminals, and a variety of communications interfaces. These features help users achieve clear, convenient, and accurate power measurements, making them the most fully-featured and cost-effective power meters in the same category.

GPM-8320/8330 provide multiple input voltage configuration wiring modes (1P3W/3P3W/3P4W/3V3A). Users can choose the wiring mode according to their specific requirements to measure parameters for specific wiring methods, and even calculate efficiency. In addition, for a rated input voltage of 1000V and an input current of 20A, they support a minimum current range of 0.5A (resolution of 0.1mA), power measurement resolution of 0.1mW, crest factor of 3 (for half range, the CF can reach up to 6 or 6A), and voltage/current/power measurement accuracy of $\pm 0.1\%$ reading $\pm 0.05\%$ range. Users can select different measurement modes (AC+DC/ AC/ DC/ V-MEAN) to provide up to 25 related parameters for power measurement. These parameters include voltage (V_{rms} / V_{ac} / V_{dc} / V_{mn} / V_{+pk} / V_{-pk}), current (I_{rms} / I_{ac} / I_{dc} / I_{+pk} / I_{-pk}), frequency (VHz/ IHz), power (P/ P+pk/ P-pk), crest factor (CFV/ CFI), apparent power (VA), reactive power (VAR), power factor (PF), phase angle (DEG), total harmonic distortion (THDV/ THDI), maximum current ratio (MCR), and MATH calculation function. Therefore, they provide the best range and accuracy support for measuring the power consumption of electrical and electronic products.

GPM-8320/8330 also effectively utilize the advantages of TFT LCD display, providing results of parameter measurements in both numerical and graphical formats. In terms of numerical display, it offers a general mode and a multiple mode. The general mode includes 4 tabs (page1~page4), and each tab can display 10 measurement parameters (2 main measurements + 8 monitoring measurements). Users can freely combine these parameters to display the results of measurements from various modules. The multiple mode can simultaneously display the measurement results of three modules, which is particularly suitable for comparing differences in measurements between modules, such as unbalanced three-phase. This mode also offers 4 tabs, and each tab can display 8 measurement parameters. In terms of graphical display, they offer a simple oscilloscope mode to display voltage, current, and power parameters in waveform format. Additionally, the display provides numerical or bar chart display for the measurement and analysis of harmonics signals at various orders that not only satisfies the need for accuracy and clear readability in process testing, but also meets the diverse measurement application requirements for research and development, design and quality verification.

GPM-8320/8330 have comprehensive mechanisms and functions for auxiliary measurements. For applications that require measuring high voltage, they provide VT rate settings that can be used with external potential transformers. For measuring large current, it depends on the type of current transformer, whether it is a voltage output type or a current output type. If it is a current output type, it can be directly locked onto the meter's rear panel and used with CT rate settings for measurement. If it is a voltage output type, it can be measured through the external current sensor input terminals (EXT1/EXT2) provided by GPM-8320/8330. Automatic range switching can be customized to the required range to save unnecessary time spent on range switching. The internal memory of 10,000 data logs can store measurement data at the update rate set by GPM-8320/8330 or at a user-defined time interval for future analysis.

In terms of data acquisition and storage, GPM-8320/8330 offer a variety of communications interfaces, including RS-232C/USB device (virtual COM)/LAN, or optional GPIB. Users can choose to write programs to read measurement results according to their habits or in collocation with existing system interfaces. The USB host can support screen capture, internal data logging, and firmware updates for GPM-8320/8330. For those with the needs of using external signal control or data recorder for data recording, GPM-8320/8330 also offer an optional Digital I/O (DA12) interface (must be installed at the factory), which can be connected to external controllers such as PLC or data recorders to meet the needs of automated measurements or long recording applications.

ORDERING INFORMATION

GPM-8320	Digital Power Meter (RS-232C/USB device & Host/LAN)
GPM-8320 (with GPM-DA12)	Digital Power Meter (RS-232C/USB device & Host/LAN and opt. GPIB+DA12)
GPM-8320	Digital Power Meter (RS-232C/USB device & Host/LAN)
GPM-8320 (with GPM-DA12)	Digital Power Meter (RS-232C/USB device & Host/LAN and opt. GPIB+DA12)

ACCESSORIES :

Safety Instruction Sheet x 1, Power cord x 1, Test lead GTL-209 x 2, Test lead GTL-212A x 2 (for GPM-8320), Test lead GTL-209 x 3, Test lead GTL-212A x 3 (for GPM-8330), CD x 1 (including complete user manual and USB driver), DA12 cable GTL-214 (available for GPM-8320/8330 with GPM-DA12 only), GPM-002 Terminal Cover

OPTIONAL

GPM-DA12 GPIB+DA12 Interface (including cable, GTL-214)

Note : The option is 2-in-1 interface and must be installed in factory.

OPTIONAL ACCESSORIES

GTL-209	Test Lead, Banana to Bare-wire, Approx. 1000mm
GTL-212A	Test Lead, O-Type to Bare-wire, Approx. 1000mm
GTL-214	DA4 Cable, Approx. 1000mm
GTL-232	RS-232C cable, 9-pin Female to 9-pin, null modem for computer, Approx. 2000mm
GTL-246	USB Cable, A-B type, Approx. 1200mm
GTL-258	GPIB Cable, 25-pin Micro-D Connector, Approx. 1900mm
GRA-452	Rack Mount Kit, 19" 3U size

SPECIFICATIONS

INPUT		
Item	Specifications	
Input Type	Voltage / Current	Floating input through resistive voltage divider; Floating input through shunt
Measure Range	Voltage Current	15V, 30V, 60V, 150V, 300V, 600V, 1000V Direct input Sensor input 0.5A, 1A, 2A, 5A, 10A, 20A EXT 1: 2.5 V, 5 V, 10 V; EXT 2: 50 mV, 100 mV, 200 mV, 500 mV, 1 V, 2 V
Input Impedance	Voltage Current Sensor	Input resistance: approach 2 MΩ Input resistance: approach 5 mΩ Input range 2.5V ~ 10V (EXT1) Input range 50mV ~ 2V (EXT2) Input resistance: approach 100 kΩ Input resistance: approach 20 kΩ
Continuous Maximum Allowable Input	Voltage Current	Direct input range 0.5A ~ 20A Sensor input peak value of 1.5kV or RMS value of 1kV, whichever is less peak value of 100A or RMS value of 30A, whichever is less peak value less than or equal to 5 times of the rated range
Input Bandwidth	DC, 0.1 Hz ~ 100kHz	
Continuous Maximum Common-mode Voltage	600 Vrms, CAT II	
Line Filter	select OFF or ON (cut off frequency of 500 Hz)	
Frequency Filter	select OFF or ON (cut off frequency of 500 Hz)	
A/D Converter	Simultaneous conversion voltage and current inputs; Resolution 16bits; Maximum conversion rate Approx. 300kHz	
Display Update Interval	When the data update interval is 100 ms the numeric display 10 items display update interval is 200 ms. When the data update interval is 100 ms or 250ms and the numeric value display is set to Matrix or ALL Items display update interval is 500 ms. The waveform display update intervals are approximately 1s.	
VOLTAGE AND CURRENT ACCURACY		
Item	Specifications	
Requirements	Temperature Humidity Input waveform common-mode voltage Number of displayed digits Frequency filter	23 ± 5°C 30~75% RH Sine wave crest factor = 3 0 V 5 digits Turn on to measure voltage or current of 200 Hz or less After 30 minutes after warm-up time has passed; After measurement range is changed (zero-level compensation); Update interval is 250 ms
Accuracy	DC 0.1 Hz ≤ f < 45 Hz 45 Hz ≤ f ≤ 66 Hz 66 Hz < f ≤ 1 kHz 1 kHz < f ≤ 10 kHz 10 kHz < f ≤ 100 kHz	± (0.1% of reading + 0.2% of range) ± (0.1 % of reading + 0.2 % of range) ± (0.1 % of reading + 0.05 % of range) ± (0.1 % of reading + 0.2 % of range) ± (0.07 *f) % of reading + 0.3% of range) ± (0.5 % of reading + 0.5 % of range) ± [(0.04x(f-10))% of reading] Values for voltage in excess of 750V for which 30kHz < f < 100kHz are reference only.
Temperature Coefficient	Add	±0.03% of reading/°C within the range 5 to 18°C or 28 to 40°C.
When the Line Filter is Turned ON	45 ~ 66 Hz < 45 Hz	Add 0.3 % of reading Add 0.1 % of reading
Accuracy When the Crest Factor is Sset to 6 or 6A	accuracy obtained by doubling the measurement range error for the accuracy when the crest factor is set to 3	
Accuracy Changes Caused by Data Update Interval	When the data update interval is 100 ms, and Auto, add 0.05% of reading to the 0.1 Hz to 1 kHz accuracy.	
Influence of Temperature Changes After Zero-level Compensation or Range Change	Add 0.02% of range/°C to the DC voltage accuracy. Add the following value to the DC current accuracies. 5 mA/10 mA/20 mA/50 mA/100 mA/200 mA ranges 0.5 A/1 A/2 A/5 A/10 A/20 A ranges External current sensor input (/EXT 1) External current sensor input (/EXT 2)	5 μA/°C 500 μA/°C 1 mV/°C 50 μV/°C
Accuracy When the Crest Factor is Set to 6 or 6A	accuracy obtained by doubling the measurement range error for the accuracy when the crest factor is set to 3	
Accuracy Changes Caused by Data Update Interval	When the data update interval is 100 ms, and Auto, add 0.05% of reading to the 0.1 Hz to 1 kHz accuracy.	
ACTIVE POWER ACCURACY		
Item	Specifications	
Requirements	same as the conditions for voltage and current. Power factor 1	
Accuracy	DC 0.1Hz ≤ f < 45 Hz 45 Hz ≤ f ≤ 66 Hz 66 Hz < f ≤ 1kHz 1 kHz < f ≤ 10 kHz 10 kHz < f ≤ 100 kHz	(0.1 % of reading + 0.2 % of range) ± (0.3 % of reading + 0.2 % of range) ± (0.1 % of reading + 0.05 % of range) ± (0.2 % of reading + 0.2 % of range) ± (0.1 % of reading + 0.3 % of range) ± [(0.067x(f-1))% of reading] ± (0.5 % of reading + 0.5 % of range) ± [(0.09x(f-10))% of reading]
Influence of Power Factor	when power factor (λ) = 0 (S: apparent power) ± 0.1 % of S for 45 Hz ≤ f ≤ 66 Hz ± {(0.1 + 0.15 × f) % of S } for up to 100 kHz as reference data •f is frequency of input signal in kHz when 0 < λ < 1 (Φ: phase angle of the Voltage and current) (power reading) × [(power reading error%) + (power range %) × (power range / indicated apparent power value) + {tanΦ × (influence when λ=0)%}]	
When The Line Filter is Turned ON	45 ~ 66 Hz < 45 Hz	Add 0.3 % of reading Add 1 % of reading
Temperature Coefficient	same as the temperature coefficient for voltage and current	

Digital Power Meter

SPECIFICATIONS

Accuracy When The Crest Factor is Set to 6 or 6A	accuracy obtained by doubling the measurement range error for the accuracy when the crest factor is set to 3
Accuracy of Apparent Power S	voltage accuracy + current accuracy
Accuracy of Reactive Power Q	accuracy of apparent power + $(\sqrt{1.0004 - \lambda^2} - (\sqrt{1 - \lambda^2})) \times 100\%$
Accuracy of Power Factor Δ	$\pm [(\lambda - \lambda_0/1.0002) + \lambda \cos \theta - \cos\{\theta + \sin^{-1}(\lambda - \lambda_0/100)\}] \pm 1$ digit when voltage and current are at the measurement range rated input
Accuracy of Phase Difference Φ	$\pm [\theta - \cos^{-1}(\lambda/1.0002) + \sin^{-1}(\lambda - \lambda_0/100)] \pm 1$ digit when voltage and current are at the measurement range rated input
Accuracy When The Crest Factor is Set to 6 or 6A	accuracy obtained by doubling the measurement range error for the accuracy when the crest factor is set to 3
Accuracy Changes Caused by Data Update Interval	When the data update interval is 100 ms, and Auto, add 0.05% of reading to the 0.1 Hz to 1 kHz accuracy.


VOLTAGE, CURRENT AND ACTIVE POWER MEASUREMENTS

Item	Specifications																																
Measurement Method	Digital sampling method																																
Crest Factor	3 or 6 (6A)																																
Wiring System	Single-phase, two-wire (1 P 2 W)																																
Range Select	Select manual or auto ranging																																
Auto Range	Auto-range increase: The range is upped when any of the following conditions is met. Crest factor 3 Vrms or Irms exceeds 130% of the currently set measurement range. Vpk, Ipk value of the input signal exceeds 300% of the currently set measurement range. Crest factor 6 Vrms or Irms exceeds 130% of the currently set measurement range. Vpk, Ipk value of the input signal exceeds 600% of the currently set measurement range. Crest factor 6A Vrms or Irms exceeds 260% of the currently set measurement range. Vpk, Ipk value of the input signal exceeds 600% of the currently set measurement range. Auto-range decline: The range is downed when all of the following conditions are met. Crest factor 3 Vrms or Irms is less than or equal to 30% of the measurement range. Vrms or Irms is less than or equal to 125% of the next lower measurement range. Vpk, Ipk value of the input signal exceeds 300% of the currently set measurement range. Crest factor 6 or 6A Vrms or Irms is less than or equal to 30% of the measurement range. Vrms or Irms is less than or equal to 125% of the next lower measurement range. Vpk, Ipk value of the input signal exceeds 600% of the currently set measurement range.																																
Display Mode Switching	Vrms (the true RMS value of voltage and current) VOLTAGE MEAN (the rectified mean value calibrated to the RMS value of the voltage and the true RMS value of the current) AC DC																																
Measurement Synchronization Source	Select voltage, current, or off In the case of Auto Update Rate, select the voltage or current from the equipped element.																																
Line Filter	Select OFF or ON (cutoff frequency at 500 Hz).																																
Peak Measurement	Measures the peak (max, min) value of voltage, current or power from the instantaneous voltage, instantaneous current or instantaneous power that is sampled.																																
Zero-level Compensation	Removes the internal offset of the measure unit (After measurement range is changed)																																
Measurement Parameters	<table border="0"> <tr> <td>Voltage</td> <td>Vrms, Vmn, Vdc, Vac</td> <td>Frequency</td> <td>1Hz and VHz</td> </tr> <tr> <td>Current</td> <td>Irms, Idc, Iac</td> <td>Voltage Peak</td> <td>V+pk and V-pk</td> </tr> <tr> <td>Active Power</td> <td>P</td> <td>Current Peak</td> <td>I+pk and I-pk</td> </tr> <tr> <td>Apparent Power</td> <td>VA</td> <td>Active Power Peak</td> <td>P+pk and P-pk</td> </tr> <tr> <td>Reactive power</td> <td>VAR</td> <td>Total Harmonic Distortion</td> <td>THDI and THDV</td> </tr> <tr> <td>Power Factor</td> <td>PF</td> <td>Mathematical Computation</td> <td>MATH</td> </tr> <tr> <td>Crest Factor</td> <td>CFI, CFV</td> <td>Maximum Current Ratio</td> <td>MCR</td> </tr> <tr> <td>Phase Angle</td> <td>DEG</td> <td></td> <td></td> </tr> </table>	Voltage	Vrms, Vmn, Vdc, Vac	Frequency	1Hz and VHz	Current	Irms, Idc, Iac	Voltage Peak	V+pk and V-pk	Active Power	P	Current Peak	I+pk and I-pk	Apparent Power	VA	Active Power Peak	P+pk and P-pk	Reactive power	VAR	Total Harmonic Distortion	THDI and THDV	Power Factor	PF	Mathematical Computation	MATH	Crest Factor	CFI, CFV	Maximum Current Ratio	MCR	Phase Angle	DEG		
Voltage	Vrms, Vmn, Vdc, Vac	Frequency	1Hz and VHz																														
Current	Irms, Idc, Iac	Voltage Peak	V+pk and V-pk																														
Active Power	P	Current Peak	I+pk and I-pk																														
Apparent Power	VA	Active Power Peak	P+pk and P-pk																														
Reactive power	VAR	Total Harmonic Distortion	THDI and THDV																														
Power Factor	PF	Mathematical Computation	MATH																														
Crest Factor	CFI, CFV	Maximum Current Ratio	MCR																														
Phase Angle	DEG																																

FREQUENCY MEASUREMENT

Item	Specifications																																
Measurement Item	Voltage and current																																
Measurement Frequency Range	<table border="0"> <tr> <td>Data update interval</td> <td>Measurement Frequency Range</td> </tr> <tr> <td>0.1 s</td> <td>20 Hz ≤ f ≤ 100 kHz</td> </tr> <tr> <td>0.25 s</td> <td>10 Hz ≤ f ≤ 100 kHz</td> </tr> <tr> <td>0.5 s</td> <td>5 Hz ≤ f ≤ 100 kHz</td> </tr> <tr> <td>1 s</td> <td>2.0 Hz ≤ f ≤ 100 kHz</td> </tr> <tr> <td>2 s</td> <td>1.0 Hz ≤ f ≤ 100 kHz</td> </tr> <tr> <td>5 s</td> <td>0.5 Hz ≤ f ≤ 100 kHz</td> </tr> <tr> <td>10 s</td> <td>0.2 Hz ≤ f ≤ 100 kHz</td> </tr> <tr> <td>20 s</td> <td>0.1 Hz ≤ f ≤ 100 kHz</td> </tr> <tr> <td>Auto (*)</td> <td>0.1 Hz ≤ f ≤ 100 kHz</td> </tr> <tr> <td colspan="2">(*) Limit of the measurement lower limit frequency by the Timeout setting</td> </tr> <tr> <td>Timeout</td> <td>lower limit frequency</td> </tr> <tr> <td>1 s</td> <td>2.0 Hz</td> </tr> <tr> <td>5 s</td> <td>0.5 Hz</td> </tr> <tr> <td>10 s</td> <td>0.2 Hz</td> </tr> <tr> <td>20 s</td> <td>0.1 Hz</td> </tr> </table>	Data update interval	Measurement Frequency Range	0.1 s	20 Hz ≤ f ≤ 100 kHz	0.25 s	10 Hz ≤ f ≤ 100 kHz	0.5 s	5 Hz ≤ f ≤ 100 kHz	1 s	2.0 Hz ≤ f ≤ 100 kHz	2 s	1.0 Hz ≤ f ≤ 100 kHz	5 s	0.5 Hz ≤ f ≤ 100 kHz	10 s	0.2 Hz ≤ f ≤ 100 kHz	20 s	0.1 Hz ≤ f ≤ 100 kHz	Auto (*)	0.1 Hz ≤ f ≤ 100 kHz	(*) Limit of the measurement lower limit frequency by the Timeout setting		Timeout	lower limit frequency	1 s	2.0 Hz	5 s	0.5 Hz	10 s	0.2 Hz	20 s	0.1 Hz
Data update interval	Measurement Frequency Range																																
0.1 s	20 Hz ≤ f ≤ 100 kHz																																
0.25 s	10 Hz ≤ f ≤ 100 kHz																																
0.5 s	5 Hz ≤ f ≤ 100 kHz																																
1 s	2.0 Hz ≤ f ≤ 100 kHz																																
2 s	1.0 Hz ≤ f ≤ 100 kHz																																
5 s	0.5 Hz ≤ f ≤ 100 kHz																																
10 s	0.2 Hz ≤ f ≤ 100 kHz																																
20 s	0.1 Hz ≤ f ≤ 100 kHz																																
Auto (*)	0.1 Hz ≤ f ≤ 100 kHz																																
(*) Limit of the measurement lower limit frequency by the Timeout setting																																	
Timeout	lower limit frequency																																
1 s	2.0 Hz																																
5 s	0.5 Hz																																
10 s	0.2 Hz																																
20 s	0.1 Hz																																
Measurement Range	Auto switching among six types: 100mHz, 1 Hz, 10 Hz, 100 Hz, 1 kHz, 10 kHz, and 100 kHz.																																
Frequency Filter	Select OFF or ON (cut off frequency of 500 Hz)																																
Accuracy	Requirements When the input signal level is 30% or more of the measurement range If the crest factor is set to 3. (60% or more if the crest factor is set to 6 or 6A) • Frequency filter is ON when measuring voltage or current of 200 Hz or less. ± (0.06% of reading)																																

SPECIFICATIONS

INTEGRATION																									
Item	Specifications																								
Mode	Select manual integration mode, standard integration mode, or repetitive integration mode.																								
Timer	Automatically stop integration by setting a timer. Selectable range: 0 hours 00 minutes 00 seconds to 9999 hours 59 minutes 59 seconds																								
Accuracy	±(Power accuracy (or current accuracy) + 0.1% of reading) (fixed range)																								
Range Setting	Auto range or fixed range is available for Integration																								
Timer Accuracy	±0.02%																								
Remote Control	Start, stop and reset operations are available using an external remote signal. (option)																								
HARMONIC MEASUREMENT																									
Item	Specifications																								
Measured Item	Voltage, Current, Power																								
Measured Method	Zero-cross simultaneous calculation method																								
Frequency Range	10 Hz to 1.2 kHz.																								
FFT Data Length	4096 (Auto switch when both 50Hz/60Hz and update rate must be greater than or equal to 0.5s)																								
Sample rate, window width, and upper limit of Analysis orders*	<table border="1"> <thead> <tr> <th>Fundamental Frequency</th> <th>Sample rate</th> <th>Window Width</th> <th>upper limit of Analysis orders</th> </tr> </thead> <tbody> <tr> <td>45 Hz to 55 Hz</td> <td>f × 512</td> <td>10</td> <td>50</td> </tr> <tr> <td>54 Hz to 66 Hz</td> <td>f × 512</td> <td>12</td> <td>50</td> </tr> </tbody> </table>	Fundamental Frequency	Sample rate	Window Width	upper limit of Analysis orders	45 Hz to 55 Hz	f × 512	10	50	54 Hz to 66 Hz	f × 512	12	50												
Fundamental Frequency	Sample rate	Window Width	upper limit of Analysis orders																						
45 Hz to 55 Hz	f × 512	10	50																						
54 Hz to 66 Hz	f × 512	12	50																						
FFT Data Length	1024																								
Sample rate, window width, and upper limit of Analysis orders*	<table border="1"> <thead> <tr> <th>Fundamental Frequency</th> <th>Sample rate</th> <th>Window Width</th> <th>upper limit of Analysis orders</th> </tr> </thead> <tbody> <tr> <td>10 Hz to 67 Hz</td> <td>f × 1024</td> <td>1</td> <td>50</td> </tr> <tr> <td>67 Hz to 150 Hz</td> <td>f × 512</td> <td>2</td> <td>32</td> </tr> <tr> <td>150 Hz to 300 Hz</td> <td>f × 256</td> <td>4</td> <td>16</td> </tr> <tr> <td>300 Hz to 600 Hz</td> <td>f × 128</td> <td>8</td> <td>8</td> </tr> <tr> <td>600 Hz to 1200 Hz</td> <td>f × 64</td> <td>16</td> <td>4</td> </tr> </tbody> </table>	Fundamental Frequency	Sample rate	Window Width	upper limit of Analysis orders	10 Hz to 67 Hz	f × 1024	1	50	67 Hz to 150 Hz	f × 512	2	32	150 Hz to 300 Hz	f × 256	4	16	300 Hz to 600 Hz	f × 128	8	8	600 Hz to 1200 Hz	f × 64	16	4
Fundamental Frequency	Sample rate	Window Width	upper limit of Analysis orders																						
10 Hz to 67 Hz	f × 1024	1	50																						
67 Hz to 150 Hz	f × 512	2	32																						
150 Hz to 300 Hz	f × 256	4	16																						
300 Hz to 600 Hz	f × 128	8	8																						
600 Hz to 1200 Hz	f × 64	16	4																						
Accuracy	<table border="1"> <thead> <tr> <th>Frequency</th> <th>Voltage</th> <th>Current</th> <th>Power</th> </tr> </thead> <tbody> <tr> <td>10 Hz ≤ f < 45 Hz</td> <td>0.15% of reading + 0.35% of range</td> <td>0.15% of reading + 0.35% of range</td> <td>0.35% of reading + 0.50% of range</td> </tr> <tr> <td>45 Hz ≤ f < 440 Hz</td> <td>0.15% of reading + 0.35% of range</td> <td>0.15% of reading + 0.35% of range</td> <td>0.25% of reading + 0.50% of range</td> </tr> <tr> <td>440 Hz ≤ f < 1.2kHz</td> <td>0.20% of reading + 0.35% of range</td> <td>0.20% of reading + 0.35% of range</td> <td>0.40% of reading + 0.50% of range</td> </tr> </tbody> </table>	Frequency	Voltage	Current	Power	10 Hz ≤ f < 45 Hz	0.15% of reading + 0.35% of range	0.15% of reading + 0.35% of range	0.35% of reading + 0.50% of range	45 Hz ≤ f < 440 Hz	0.15% of reading + 0.35% of range	0.15% of reading + 0.35% of range	0.25% of reading + 0.50% of range	440 Hz ≤ f < 1.2kHz	0.20% of reading + 0.35% of range	0.20% of reading + 0.35% of range	0.40% of reading + 0.50% of range								
Frequency	Voltage	Current	Power																						
10 Hz ≤ f < 45 Hz	0.15% of reading + 0.35% of range	0.15% of reading + 0.35% of range	0.35% of reading + 0.50% of range																						
45 Hz ≤ f < 440 Hz	0.15% of reading + 0.35% of range	0.15% of reading + 0.35% of range	0.25% of reading + 0.50% of range																						
440 Hz ≤ f < 1.2kHz	0.20% of reading + 0.35% of range	0.20% of reading + 0.35% of range	0.40% of reading + 0.50% of range																						
<p>* 50Hz/60Hz Compliant IEC61000-4-7 (update rate must be > 0.5s)</p> <p>* Harmonic calculation: FFT method in which FFT data length is divided into 2 types: 1024 and 4096.</p> <p>* FFT data length automatically switches in accord with the Frequency and Update Rate of measured signal.</p>																									
D/A OUTPUT (OPTIONS)																									
Item	Specifications																								
Output Voltage	±5 V FS (approach ±7.5 V maximum) against each rated value.																								
Number Of Output Channels	12																								
Output Items	Set for each channel: V, I, P, VA, VAR, PF, DEG, VHZ, IHZ, Vpk, Ipk, WP, WP±, q, q±, Off																								
Accuracy	±(accuracy of each measurement item + 0.2% of FS) (FS = 5 V)																								
D/A Conversion Resolution	16 bits																								
Minimum Load	100 kΩ																								
Update Interval	Same as the data update interval. In the case of Auto Update Rate, update interval is equal to signal interval. More than 100ms.																								
Temperature Coefficient	±0.05%/°C of FS																								
REMOTE CONTROL INPUT/OUTPUT SIGNAL (OPTIONS)																									
Item	Specifications																								
Remote Control Input Signal	EXT HOLD, EXT TRIG, EXT START, EXT STOP, EXT RESET																								
Remote Control Output Signal	INTEG BUSY																								
I/O Level	TTL																								
I/O Logic Format	Negative logic, Falling edge																								
<p>* Q (VAR), S (VA), λ (PF) and Φ (DEG) are originated from the measured values including voltage, current and active power which go through computation process. In respect to distorted signal input, accordingly, the value acquired from other instruments, which employ different methods, may differ from that acquired from GPM-8320/8330 unit.</p> <p>* "Zero" will be shown for S or Q and "--" will be displayed for λ and Φ when either current or voltage is less than 0.5% of the rated range (less than or equivalent to 1% when crest factor is set 6)</p>																									
GENERAL																									
 Note	<p>The below are the basic conditions required to operate the GPM-8320/8330 within specifications:</p> <ul style="list-style-type: none"> • 1-year Calibration: Yearly • Operating Environment: 18~28 °C (64.4~82.4°F) • Humidity: <80%RH, • Accuracy: ± (% of reading + % of range) • The specifications apply when it warmed up for at least 30 minutes and operates in the slow rate. • The power supply cable must be grounded to ensure accuracy. • Input voltage and current must be standard sine wave. • The power factor must be 1. • The crest factor must be 3. • The common-mode voltage must be zero. 																								
Specification Condition	Temperature: 23°C±5°C; Humidity: <80%RH(non-condensing)																								
Operation Condition	Temperature 0°C ~ 40°C, <ul style="list-style-type: none"> • 30 ~ 40°C, Relative Humidity < 70%RH (non-condensing) • >40°C, Relative Humidity < 50%RH (non-condensing) Indoor use only Altitude: < 2000 meters Pollution degree 2																								
Storage Condition	Temperature -40°C ~ 70°C; Humidity: < 90%RH (non-condensing)																								
Power Source	AC 100-240V, 50-60Hz; Consumption Max. 35VA																								
Dimensions	220(W) x 132(H) x 402.5(D)mm(w/t bumpers)																								
Weight	Approx. 3.85kg																								

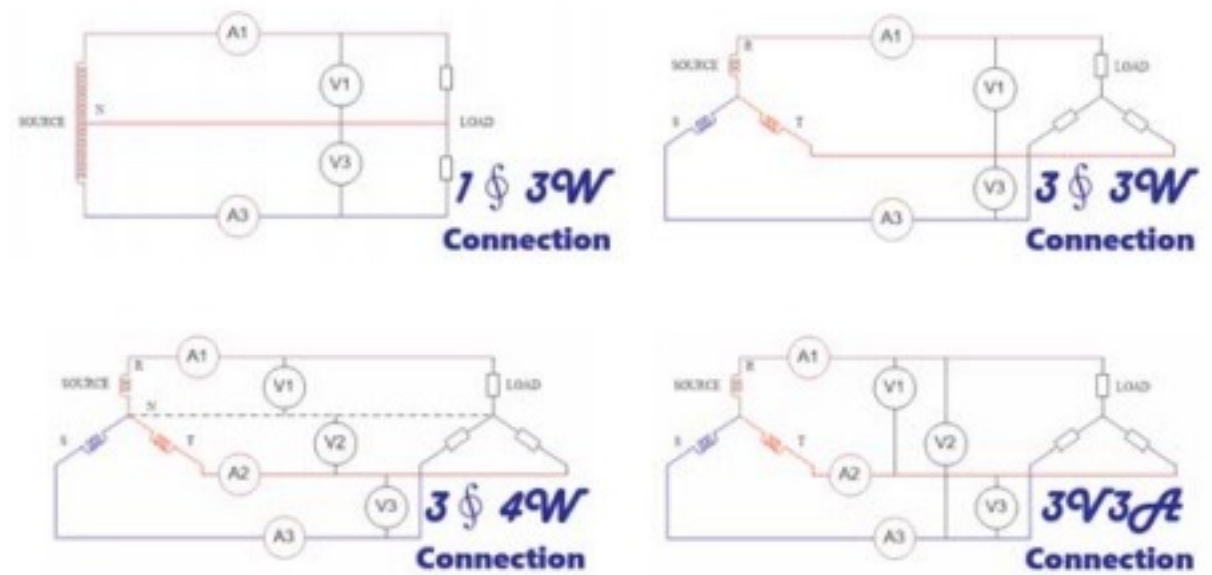
Digital Power Meter

A. WIRING SELECTION

1P3W 3P3W 3P4W 3V3A



GPM-8320/8330 provide multiple input voltage configuration wiring modes (1P3W/3P3W/3P4W/3V3A). Users can choose the wiring mode according to their specific requirements to measure parameters for specific wiring methods, and even calculate efficiency.



B. VARIOUS DISPLAY MODES



Numerical (Single) Mode

Numerical (Multiple) Mode

Numerical (Simple) Mode

Waveform Mode

Harmonics (Bar Graph) Measurement

Harmonics (List) Measurement

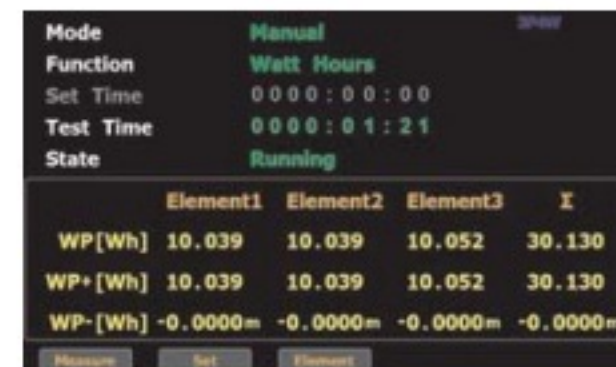
GPM-8320/8330 provide two display modes, numerical and graph, which help users maximize the benefits of their measurements. In numerical mode, there are two options: single and multiple. In single mode, there are four tabs that can be customized with the module's measurement settings, and each tab can display up to 10 measurement parameters (2 main and 8 secondary measurements). In multiple mode, there are also four tabs, and users can simultaneously observe the same 8 measurement parameters from three different modules. Parameters in both modes can be arranged and customized as needed, and a simple mode that displays only the first four parameters is also available regardless of which tab is selected. In graph mode, there is a simple oscilloscope function that

displays the waveforms of three parameters: voltage, current, and power. The horizontal scale can be adjusted (from 50us/div to 10ms/div depending on the set data update rate), and three waveform observation magnification ratios are available. When measuring harmonics, the harmonics measurement results of each order can be displayed in a bar chart, and a specific observation order can be specified. Additionally, all relevant values for harmonics of each order (voltage/current/power voltage distortion percentage/current distortion percentage/power distortion percentage/voltage phase angle/current phase angle) can be fully recorded and presented.

C. RICH MEASUREMENT PARAMETERS

Measurement Items	Symbols
Voltage	Vrms, V+pk, V-pk, Vac*, Vdc*, Vmn*
Current	Irms, I+pk, I-pk, Idc*, Idc*
Power	P, P+pk, P-pk, VA, VAR
Power Factor	PF
Crest Factor	CFV, CFI
Phase Angle	DEG
Frequency	VHz, IHz
Total Harmonic Distortion	THDV, THDI
Mathematical Computation	MATH
Maximum Current Ratio	MCR
Integration	WP, WP+, WP-, q, q+, q-, Vac, Iac

* : Only applicable to specific measurement modes and available for selection



GPM-8320/8330 provide a variety of measurement items, including voltage, current, frequency, active power, apparent power, reactive power, power factor, crest factor, total harmonic distortion, and even the ability to measure maximum current ratio. Additionally, GPM-8320/8330 are equipped with measurement functions for power or current time integration specific to the DUT. Users set a period of time to perform

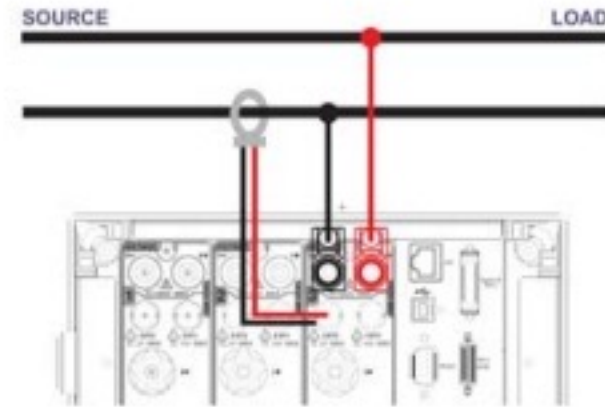
instantaneous power integration during this time, and then divide by the time to obtain the average power of the DUT. Moreover, during integration measurements, GPM-8320/8330 support automatic range switching function to obtain the most complete integration results in response to the power changes of the DUT in different time periods.

D. SUPERB MEASUREMENT ASSISTANCE



Ratio Configuration

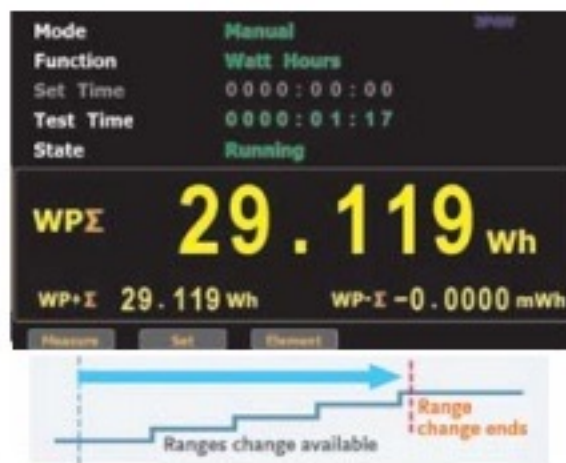
In terms of measurement support, GPM-8320/8330 perform exceptionally well. Firstly, in the measurement of high voltage/power, they provide voltage/power ratio settings to restore the attenuation rate to the true value. In addition, for large current measurement, other than the current ratio setting, there are also terminals (EXT1/EXT2) for external current sensors that can be connected to voltage output type current transformers, making large current measurement more convenient.



External Current Sensor Input

Furthermore, GPM-8320/8330 provide 4 sets of panel settings for storage/recall and a memory that can store up to 10,000 measurements. The measurement storage can record the measurement results according to the update rate or a user-defined time interval for later analysis. The USB host on the front panel supports screen capture, measurement value storage, and firmware updates.

E. FLEXIBLE LEVEL-CHANGING MECHANISM



Automatic level-changing under the integration function

GPM-8320/8330 offer automatic range switching mode for integral measurement, allowing users to calculate the total value of the DUT's power variation from the start to the end of the integration period. In



Self-defined automatic level-changing mechanism

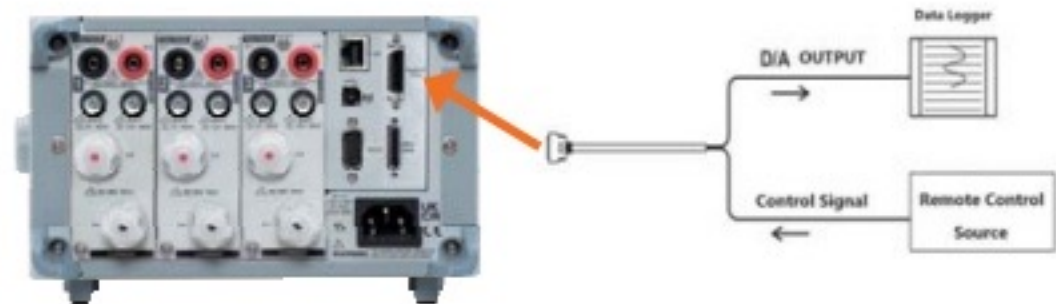
addition, GPM-8320/8330 also support a customizable range switching mechanism. Users can select the desired range, which not only saves time wasted during range switching but also speeds up the testing process.

F. CONVENIENT AND PRACTICAL INTERFACE



Practical Interface

GPM-8320/8330 offer a comprehensive and diverse set of communications interfaces, including RS-232/USB/LAN/GPIB (optional), suitable for users to remotely control and collect measurement results through command sets to program computer software. The optional Digital I/O (DA12) interface provides two different modes according to users' settings: including external control and DA12 output. When the setting is external control mode, users can activate, stop, trigger, or reset the integration measurement function through external signals.



DA12 Interface Mechanism

When it is set to DA12 output mode, users can define 12 measurement parameter values from the provided 17 measurement parameters (even the result of integration measurement) to output in a fixed range (full scale +5V) or manual range (full scale ±5V) and receive the results in collocation with a data recorder.

Digital Power Meter



GPM-8310



FEATURES

- * 5" TFT LCD
- * DC, 0.1Hz ~ 100kHz Voltage/Current Test Bandwidth
- * Two Numerical Display Modes
 - General Mode: Displays 2 Main Test Items + 8 Secondary Test Items
 - Simple Mode: Displays the Test Values of 4 Main Test Items
- * Waveform Display: V (voltage), I (current), P (power)
- * The Current/Voltage can be Measured to a Deformed Wave with CF of 3, and the Half-range CF can Reach 6 or 6A
- * Meeting the IEC 61000-4-7 Harmonics Measurement Requirements (50/60Hz)
- * 50th Order of Harmonic Measurement and Analysis (value and bar graph)
- * Integration Function Supports Automatic Level-changing
- * External Current Sensor Input Terminals (EXT1/EXT2)
- * Standard Interfaces: RS-232C, USB Device/Host, LAN, GPIB
- * Optional Interface: Digital I/O (DA4) (must be installed before leaving the factory)
- * Optional Accessory: GPM-001

GW Instek GPM-8310 is a digital power meter for single-phase (1P/2W) AC power measurement. Features include DC, 0.1Hz~100kHz test bandwidth, 16bits A/D, and 300 kHz sampling rate. It adopts 5" TFT LCD screen with a five-digit measurement display and provides 25 power measurement related parameters, and has a high-precision measurement capability. It also features the ability to display waveform (voltage/current/power), the integration measurement function, harmonic measurement and analysis of each order (meeting the IEC 61000-4-7 harmonics measurement requirements at 50/60Hz), external sensor input terminals, and various communication interfaces, etc., to help users achieve clear, convenient and accurate power measurements. This power meter is a most cost-effective power meter with most complete functionalities among the products of the same category.

The rated direct input voltage of GPM-8310 is 600V and the input current is 20A. The minimum current level is 5mA (resolution up to 0.1μA) and the power measurement resolution is 1μW. The crest factor can reach 3 (half measurement range can reach 6 or 6A), and the voltage/current/power measurement capability can reach (±0.05% reading ±0.1% level). Different measurement modes can be selected according to (AC+DC/AC/DC/V-MEAN), providing up to 25 relevant parameters for power measurement, including voltage (Vrms/Vac/Vdc/Vmn/V+pk/V-pk), current (Irms/Iac/I dc/I+pk/I-pk), frequency (VHz/IHz), power (P/P+pk/P-pk), crest factor (CFV/CFI), apparent power (VA), reactive power (VAR), power factor (PF), phase angle (DEG), total harmonic distortion rate (THDV/THDI), maximum current ratio (MCR), and the MATH calculation function. Hence, for the measurement of low current/low power such as standby power consumption, or the measurement of power consumption of general products, this power meter provides the best range and accuracy support.

GPM-8310 also makes good use of the advantages of the TFT LCD to display the results of parameter measurement by using numerical and graphical methods. In terms of numerical values, the general mode and the simple mode are provided. The general mode can display 10 measurement parameters (2 main measurements + 8 monitoring measurements), and the simple mode can display four measurement parameters. These displayed parameters can be arbitrarily selected from 25 power parameters according to the needs of users. In terms of graphic display, a simple oscilloscope mode is provided to display waveforms for three parameters including voltage, current and power. In addition, the measurement and analysis of each harmonic order of the measurement signal can be completely displayed by numerical values or bar graphs. This power meter not only meets the needs of accuracy and legibility in process testing, but also meets the needs of diverse measurement applications in R&D design and quality verification.

In addition, the performance of GPM-8310 in auxiliary measurement mechanism/function is also comprehensive. For the application of measuring large voltage, the VT rate setting can be used with an external voltage Potential Transformer. For the measurement of large current, the type of current transformer – voltage output type or current output type will determine the applied method. If it is a current output type, it can be directly locked to the rear panel of the instrument and collocated with the CT rate setting to conduct measurement. If it is a voltage output type, measurement can be conducted through the external current sensor input terminals (EXT1/EXT2) provided by GPM-8310. Automatic level-changing can self-define the required level to save level-changing time. 10,000 lots of internal memories can be used to store measurement data according to the update rate set by GPM-8310 or a user-defined time interval for subsequent analysis.

In terms of data retrieval and storage, GPM-8310 provides a variety of communication interfaces including RS-232C/ USB device (virtual COM)/LAN/GPIB. Users can write programs to read the measurement results according to their habits or with existing system interfaces and there is no need to procure interfaces. USB host supports GPM-8310 screen capture, internal record data access, and firmware update. For the needs of external signal control or the use of data recorder to record data, GPM-8310 also provides an optional Digital I/O (DA4) interface (must be installed before leaving the factory), which can be connected to an external controller such as PLC or a data recorder to meet the application of automatic measurement or long recording.

SPECIFICATIONS

INPUT	
Item	Specifications
Input Type	Voltage Floating input through resistive voltage divider
	Current Floating input through shunt
Measure Range	Voltage 15V, 30V, 60V, 150V, 300V, 600V
	Current
	Direct input 5mA, 10mA, 20mA, 50mA, 100mA, 200mA, 0.5A, 1A, 2A, 5A, 10A, 20A
	Sensor input EXT 1: 2.5 V, 5 V, 10 V EXT 2: 50 mV, 100 mV, 200 mV, 500 mV, 1 V, 2 V
Input Impedance	Voltage Input resistance: approach 2 MΩ
	Current
	Direct input range 5mA ~ 200mA Input resistance: approach 505 mΩ
	Direct input range 0.5A ~ 20A Input resistance: approach 5 mΩ
	Sensor input
	Input range 2.5V ~ 10V (EXT1) Input resistance: approach 100 kΩ Input range 50mV ~ 2V (EXT2) Input resistance: approach 20 kΩ
Continuous Maximum Allowable Input	Voltage peak value of 1.5kV or RMS value of 1kV, whichever is less
	Current
	Direct input range 5mA ~ 200mA peak value of 30 A or RMS value of 20A, whichever is less
	Direct input range 0.5A ~ 20A peak value of 100A or RMS value of 30A, whichever is less
Sensor input peak value less than or equal to 5 times of the rated range	
Input Bandwidth	DC, 0.1 Hz ~ 100kHz
Continuous Maximum Common-mode Voltage	600 Vrms, CAT II
Line Filter	select OFF or ON (cut off frequency of 500 Hz)
Frequency Filter	select OFF or ON (cut off frequency of 500 Hz)
A/D Converter	Simultaneous conversion voltage and current inputs Resolution 16bits Maximum conversion rate Approx. 300kHz



GPM-8310

Rear Panel



SPECIFICATIONS	
VOLTAGE AND CURRENT ACCURACY	
Item	Specifications
Requirements	Temperature 23 ± 5°C Humidity 30~75% RH Input waveform Sine wave crest factor = 3 common-mode voltage 0 V Number of displayed digits 5 digits Frequency filter Turn on to measure voltage or current of 200 Hz or less After 30 minutes after warm-up time has passed After measurement range is changed (zero-level compensation) Update interval is 250 ms
Accuracy	DC ± (0.1% of reading + 0.2% of range) 0.1 Hz ≤ f < 45 Hz ± (0.1 % of reading + 0.2 % of range) 45 Hz ≤ f ≤ 66 Hz ± (0.1 % of reading + 0.05 % of range) 66 Hz < f ≤ 1 kHz ± (0.1 % of reading + 0.2 % of range) 1 kHz < f ≤ 10 kHz ± (0.07 *f) % of reading + 0.3% of range 10 kHz < f ≤ 100 kHz ± (0.5 % of reading + 0.5 % of range) ± [(0.04x(f-10))% of reading] Add ±0.03% of reading/°C within the range 5 to 18°C or 28 to 40°C.
Temperature Coefficient	±0.03% of reading/°C within the range 5 to 18°C or 28 to 40°C.
When the Line Filter is Turned ON	45 ~ 66 Hz Add 0.2 % of reading < 45 Hz Add 0.5 % of reading
Accuracy When the Crest Factor is Sset to 6 or 6A	accuracy obtained by doubling the measurement range error for the accuracy when the crest factor is set to 3
Accuracy Changes Caused by Data Update Interval	When the data update interval is 100 ms, and Auto, add 0.05% of reading to the 0.1 Hz to 1 kHz accuracy.
Influence of Temperature Changes After Zero-level Compensation or Range Change	Add 0.02% of range/°C to the DC voltage accuracy. Add the following value to the DC current accuracies. 5 mA/10 mA/20 mA/50 mA/100 mA/200 mA ranges 5 μA/°C 0.5 A/1 A/2 A/5 A/10 A/20 A ranges 500 μA/°C External current sensor input (/EXT1) 1 mV/°C External current sensor input (/EXT2) 50 μV/°C
Accuracy When the Crest Factor is Set to 6 or 6A	accuracy obtained by doubling the measurement range error for the accuracy when the crest factor is set to 3
Accuracy Changes Caused by Data Update Interval	When the data update interval is 100 ms, and Auto, add 0.05% of reading to the 0.1 Hz to 1 kHz accuracy.
ACTIVE POWER ACCURACY	
Item	Specifications
Requirements	same as the conditions for voltage and current.
Accuracy	Power factor 1 DC (0.1 % of reading + 0.2 % of range) 0.1Hz ≤ f < 45 Hz ± (0.3 % of reading + 0.2 % of range) 45 Hz ≤ f ≤ 66 Hz ± (0.1 % of reading + 0.05 % of range) 66 Hz < f ≤ 1kHz ± (0.2 % of reading + 0.2 % of range) 1 kHz < f ≤ 10 kHz ± (0.1 % of reading + 0.3 % of range) ± [(0.067x(f-1))% of reading] 10 kHz < f ≤ 100 kHz ± (0.5 % of reading + 0.5 % of range) ± [(0.09x(f-10))% of reading]
Influence of Power Factor	when power factor (λ) = 0 (S: apparent power) ± 0.1 % of S for 45 Hz ≤ f ≤ 66 Hz ± {(0.1 + 0.15 × f) % of S } for up to 100 kHz as reference data *f is frequency of input signal in kHz when 0 < λ < 1 (Φ: phase angle of the Voltage and current) (power reading) × [(power reading error%) + (power range %) × (power range / indicated apparent power value) + {tanΦ × (influence when λ=0)%}]
When The Line Filter is Turned ON	45 ~ 66 Hz Add 0.3 % of reading < 45 Hz Add 1 % of reading
Temperature Coefficient	same as the temperature coefficient for voltage and current
Accuracy When The Crest Factor is Set to 6 or 6A	accuracy obtained by doubling the measurement range error for the accuracy when the crest factor is set to 3
Accuracy of Apparent Power S	voltage accuracy + current accuracy
Accuracy of Reactive Power Q	accuracy of apparent power + (√1.0004 - λ2) - (√1 - λ2) × 100 %
Accuracy of Power Factor λ	± [(λ-λ)/1.0002] + λ cosα - cos{α + sin-1 (influence from the power factor when λ = 0%/100)} ± 1 digit when voltage and current are at the measurement range rated input
Accuracy of Phase Difference φ	± [α - cos-1(λ/1.0002) + sin-1 (influence from the power factor when λ = 0 % / 100)] ± 1 digit when voltage and current are at the measurement range rated input
Accuracy When The Crest Factor is Set to 6 or 6A	accuracy obtained by doubling the measurement range error for the accuracy when the crest factor is set to 3
Accuracy Changes Caused by Data Update Interval	When the data update interval is 100 ms, and Auto, add 0.05% of reading to the 0.1 Hz to 1 kHz accuracy.

GPM-001 Test Fixture/Test Fixture(EU)



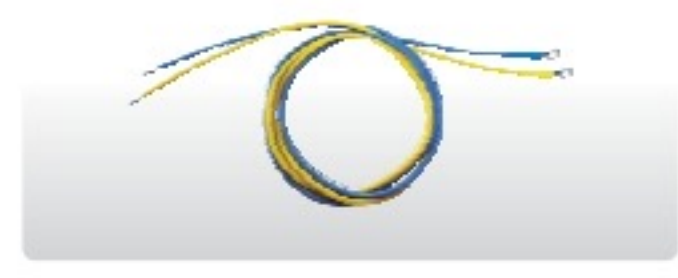
GTL-209 Test Lead



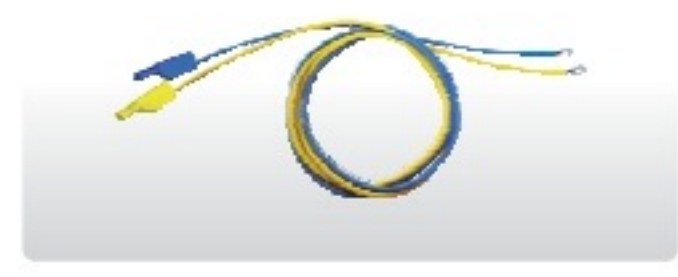
GTL-210 Test Lead



GTL-212 Test Lead



GTL-213 Test Lead



Digital Power Meter


SPECIFICATIONS

VOLTAGE, CURRENT AND ACTIVE POWER MEASUREMENTS

Item	Specifications																												
Measurement Method	Digital sampling method																												
Crest Factor	3 or 6 (6A)																												
Wiring System	Single-phase, two-wire (1 P2 W)																												
Range Select	Select manual or auto ranging																												
Auto Range	Auto-range increase The range is upped when any of the following conditions is met. Crest factor 3 Urms or Irms exceeds 130% of the currently set measurement range. Upk, Ipk value of the input signal exceeds 300% of the currently set measurement range. Crest factor 6 Urms or Irms exceeds 130% of the currently set measurement range. Upk, Ipk value of the input signal exceeds 600% of the currently set measurement range. Crest factor 6A Urms or Irms exceeds 260% of the currently set measurement range. Upk, Ipk value of the input signal exceeds 600% of the currently set measurement range. Auto-range decline The range is downed when all of the following conditions are met. Crest factor 3 Urms or Irms is less than or equal to 30% of the measurement range. Urms or Irms is less than or equal to 125% of the next lower measurement range. Upk, Ipk value of the input signal exceeds 300% of the currently set measurement range. Crest factor 6 or 6A Urms or Irms is less than or equal to 30% of the measurement range. Urms or Irms is less than or equal to 125% of the next lower measurement range. Upk, Ipk value of the input signal exceeds 600% of the currently set measurement range.																												
Display Mode Switching	Vrms (the true RMS value of voltage and current) VOLTAGE MEAN (the rectified mean value calibrated to the RMS value of the voltage and the true RMS value of the current) AC DC																												
Measurement Synchronization Source	Select voltage, current, or off In the case of Auto Update Rate, select the voltage or current from the equipped element.																												
Line Filter	Select OFF or ON (cutoff frequency at 500 Hz).																												
Peak Measurement	Measures the peak (max, min) value of voltage, current or power from the instantaneous voltage, instantaneous current or instantaneous power that is sampled.																												
Zero-level Compensation	Removes the internal offset of the measure unit (After measurement range is changed)																												
Measurement Parameters	<table border="0"> <tr> <td>Voltage</td> <td>Vrms , Vmn, Vdc , Vac</td> </tr> <tr> <td>Current</td> <td>Irms , Idc , Iac</td> </tr> <tr> <td>Active Power</td> <td>P</td> </tr> <tr> <td>Apparent Power</td> <td>VA</td> </tr> <tr> <td>Reactive power</td> <td>VAR</td> </tr> <tr> <td>Power Factor</td> <td>PF</td> </tr> <tr> <td>Crest Factor</td> <td>CFI, CFV</td> </tr> <tr> <td>Phase Angle</td> <td>DEG</td> </tr> <tr> <td>Frequency</td> <td>IHz and VHz</td> </tr> <tr> <td>Voltage Peak</td> <td>V+pk and V-pk</td> </tr> <tr> <td>Current Peak</td> <td>I+pk and I-pk</td> </tr> <tr> <td>Active Power Peak</td> <td>P+pk and P-pk</td> </tr> <tr> <td>Total Harmonic Distortion</td> <td>THDI and THDV</td> </tr> <tr> <td>Maximum Current Ratio</td> <td>MCR</td> </tr> </table>	Voltage	Vrms , Vmn, Vdc , Vac	Current	Irms , Idc , Iac	Active Power	P	Apparent Power	VA	Reactive power	VAR	Power Factor	PF	Crest Factor	CFI, CFV	Phase Angle	DEG	Frequency	IHz and VHz	Voltage Peak	V+pk and V-pk	Current Peak	I+pk and I-pk	Active Power Peak	P+pk and P-pk	Total Harmonic Distortion	THDI and THDV	Maximum Current Ratio	MCR
Voltage	Vrms , Vmn, Vdc , Vac																												
Current	Irms , Idc , Iac																												
Active Power	P																												
Apparent Power	VA																												
Reactive power	VAR																												
Power Factor	PF																												
Crest Factor	CFI, CFV																												
Phase Angle	DEG																												
Frequency	IHz and VHz																												
Voltage Peak	V+pk and V-pk																												
Current Peak	I+pk and I-pk																												
Active Power Peak	P+pk and P-pk																												
Total Harmonic Distortion	THDI and THDV																												
Maximum Current Ratio	MCR																												

FREQUENCY MEASUREMENT

Item	Specifications																																
Measurement Item	Voltage and current																																
Measurement Frequency Range	<table border="0"> <tr> <td>Data update interval</td> <td>Measurement Frequency Range</td> </tr> <tr> <td>0.1 s</td> <td>20 Hz ≤ f ≤ 100 kHz</td> </tr> <tr> <td>0.25 s</td> <td>10 Hz ≤ f ≤ 100 kHz</td> </tr> <tr> <td>0.5 s</td> <td>5 Hz ≤ f ≤ 100 kHz</td> </tr> <tr> <td>1 s</td> <td>2.0 Hz ≤ f ≤ 100 kHz</td> </tr> <tr> <td>2 s</td> <td>1.0 Hz ≤ f ≤ 100 kHz</td> </tr> <tr> <td>5 s</td> <td>0.5 Hz ≤ f ≤ 100 kHz</td> </tr> <tr> <td>10 s</td> <td>0.2 Hz ≤ f ≤ 100 kHz</td> </tr> <tr> <td>20 s</td> <td>0.1 Hz ≤ f ≤ 100 kHz</td> </tr> <tr> <td>Auto (*)</td> <td>0.1 Hz ≤ f ≤ 100 kHz</td> </tr> <tr> <td>(*)</td> <td>Limit of the measurement lower limit frequency by the Timeout setting</td> </tr> <tr> <td>Timeout</td> <td>lower limit frequency</td> </tr> <tr> <td>1 s</td> <td>2.0 Hz</td> </tr> <tr> <td>5 s</td> <td>0.5 Hz</td> </tr> <tr> <td>10 s</td> <td>0.2 Hz</td> </tr> <tr> <td>20 s</td> <td>0.1 Hz</td> </tr> </table>	Data update interval	Measurement Frequency Range	0.1 s	20 Hz ≤ f ≤ 100 kHz	0.25 s	10 Hz ≤ f ≤ 100 kHz	0.5 s	5 Hz ≤ f ≤ 100 kHz	1 s	2.0 Hz ≤ f ≤ 100 kHz	2 s	1.0 Hz ≤ f ≤ 100 kHz	5 s	0.5 Hz ≤ f ≤ 100 kHz	10 s	0.2 Hz ≤ f ≤ 100 kHz	20 s	0.1 Hz ≤ f ≤ 100 kHz	Auto (*)	0.1 Hz ≤ f ≤ 100 kHz	(*)	Limit of the measurement lower limit frequency by the Timeout setting	Timeout	lower limit frequency	1 s	2.0 Hz	5 s	0.5 Hz	10 s	0.2 Hz	20 s	0.1 Hz
Data update interval	Measurement Frequency Range																																
0.1 s	20 Hz ≤ f ≤ 100 kHz																																
0.25 s	10 Hz ≤ f ≤ 100 kHz																																
0.5 s	5 Hz ≤ f ≤ 100 kHz																																
1 s	2.0 Hz ≤ f ≤ 100 kHz																																
2 s	1.0 Hz ≤ f ≤ 100 kHz																																
5 s	0.5 Hz ≤ f ≤ 100 kHz																																
10 s	0.2 Hz ≤ f ≤ 100 kHz																																
20 s	0.1 Hz ≤ f ≤ 100 kHz																																
Auto (*)	0.1 Hz ≤ f ≤ 100 kHz																																
(*)	Limit of the measurement lower limit frequency by the Timeout setting																																
Timeout	lower limit frequency																																
1 s	2.0 Hz																																
5 s	0.5 Hz																																
10 s	0.2 Hz																																
20 s	0.1 Hz																																
Measurement Range	Auto switching among six types: 100mHz, 1 Hz, 10 Hz, 100 Hz, 1 kHz, 10 kHz, and 100 kHz.																																
Frequency Filter	Select OFF or ON (cut off frequency of 500 Hz)																																
Accuracy	<table border="0"> <tr> <td>Requirements</td> <td>When the input signal level is 30% or more of the measurement range If the crest factor is set to 3. (60% or more if the crest factor is set to 6 or 6A) • Frequency filter is ON when measuring voltage or current of 200 Hz or less.</td> </tr> <tr> <td></td> <td>± (0.06% of reading)</td> </tr> </table>	Requirements	When the input signal level is 30% or more of the measurement range If the crest factor is set to 3. (60% or more if the crest factor is set to 6 or 6A) • Frequency filter is ON when measuring voltage or current of 200 Hz or less.		± (0.06% of reading)																												
Requirements	When the input signal level is 30% or more of the measurement range If the crest factor is set to 3. (60% or more if the crest factor is set to 6 or 6A) • Frequency filter is ON when measuring voltage or current of 200 Hz or less.																																
	± (0.06% of reading)																																

SPECIFICATIONS																																	
INTEGRATION																																	
Item	Specifications																																
Mode	Select manual integration mode, standard integration mode, or repetitive integration mode.																																
Timer	Automatically stop integration by setting a timer. Selectable range: 0 hours 00 minutes 00 seconds to 9999 hours 59 minutes 59 seconds																																
Accuracy	$\pm(\text{Power accuracy (or current accuracy)} + 0.1\% \text{ of reading})$ (fixed range)																																
Range Setting	Auto range or fixed range is available for Integration																																
Timer Accuracy	$\pm 0.02\%$																																
Remote Control	Start, stop and reset operations are available using an external remote signal. (option)																																
HARMONIC MEASUREMENT																																	
Item	Specifications																																
Measured Item	Voltage, Current, Power																																
Measured Method	Zero-cross simultaneous calculation method																																
Frequency Range	10 Hz to 1.2 kHz.																																
FFT Data Length	1024																																
Sample Rate, Window Width, and Upper Limit of Analysis Orders*	4096 (Auto switch when both 50Hz/60Hz and update rate > 0.1s conditions are met)																																
	<table border="1"> <thead> <tr> <th>Fundamental Frequency</th> <th>Sample rate</th> <th>Window Width</th> <th>upper limit of Analysis orders</th> </tr> </thead> <tbody> <tr> <td>10 Hz to 44 Hz</td> <td>$f \times 1024$</td> <td>1</td> <td>50</td> </tr> <tr> <td>45 Hz to 55 Hz</td> <td>$f \times 512$</td> <td>10</td> <td>50</td> </tr> <tr> <td>54 Hz to 66Hz</td> <td>$f \times 512$</td> <td>12</td> <td>50</td> </tr> <tr> <td>67 Hz to 150 Hz</td> <td>$f \times 512$</td> <td>2</td> <td>32</td> </tr> <tr> <td>150 Hz to 300 Hz</td> <td>$f \times 256$</td> <td>4</td> <td>16</td> </tr> <tr> <td>300 Hz to 600 Hz</td> <td>$f \times 128$</td> <td>8</td> <td>8</td> </tr> <tr> <td>600 Hz to 1200 Hz</td> <td>$f \times 64$</td> <td>16</td> <td>4</td> </tr> </tbody> </table>	Fundamental Frequency	Sample rate	Window Width	upper limit of Analysis orders	10 Hz to 44 Hz	$f \times 1024$	1	50	45 Hz to 55 Hz	$f \times 512$	10	50	54 Hz to 66Hz	$f \times 512$	12	50	67 Hz to 150 Hz	$f \times 512$	2	32	150 Hz to 300 Hz	$f \times 256$	4	16	300 Hz to 600 Hz	$f \times 128$	8	8	600 Hz to 1200 Hz	$f \times 64$	16	4
Fundamental Frequency	Sample rate	Window Width	upper limit of Analysis orders																														
10 Hz to 44 Hz	$f \times 1024$	1	50																														
45 Hz to 55 Hz	$f \times 512$	10	50																														
54 Hz to 66Hz	$f \times 512$	12	50																														
67 Hz to 150 Hz	$f \times 512$	2	32																														
150 Hz to 300 Hz	$f \times 256$	4	16																														
300 Hz to 600 Hz	$f \times 128$	8	8																														
600 Hz to 1200 Hz	$f \times 64$	16	4																														
Accuracy	<table border="1"> <thead> <tr> <th>Frequency</th> <th>Voltage</th> <th>Current</th> <th>Power</th> </tr> </thead> <tbody> <tr> <td>$10 \text{ Hz} \leq f < 45 \text{ Hz}$</td> <td>0.15% of reading + 0.35% of range</td> <td>0.15% of reading + 0.35% of range</td> <td>0.35% of reading + 0.50% of range</td> </tr> <tr> <td>$45 \text{ Hz} \leq f < 440 \text{ Hz}$</td> <td>0.15% of reading + 0.35% of range</td> <td>0.15% of reading + 0.35% of range</td> <td>0.25% of reading + 0.50% of range</td> </tr> <tr> <td>$440 \text{ Hz} \leq f < 1.2\text{kHz}$</td> <td>0.20% of reading + 0.35% of range</td> <td>0.20% of reading + 0.35% of range</td> <td>0.40% of reading + 0.50% of range</td> </tr> </tbody> </table>	Frequency	Voltage	Current	Power	$10 \text{ Hz} \leq f < 45 \text{ Hz}$	0.15% of reading + 0.35% of range	0.15% of reading + 0.35% of range	0.35% of reading + 0.50% of range	$45 \text{ Hz} \leq f < 440 \text{ Hz}$	0.15% of reading + 0.35% of range	0.15% of reading + 0.35% of range	0.25% of reading + 0.50% of range	$440 \text{ Hz} \leq f < 1.2\text{kHz}$	0.20% of reading + 0.35% of range	0.20% of reading + 0.35% of range	0.40% of reading + 0.50% of range																
Frequency	Voltage	Current	Power																														
$10 \text{ Hz} \leq f < 45 \text{ Hz}$	0.15% of reading + 0.35% of range	0.15% of reading + 0.35% of range	0.35% of reading + 0.50% of range																														
$45 \text{ Hz} \leq f < 440 \text{ Hz}$	0.15% of reading + 0.35% of range	0.15% of reading + 0.35% of range	0.25% of reading + 0.50% of range																														
$440 \text{ Hz} \leq f < 1.2\text{kHz}$	0.20% of reading + 0.35% of range	0.20% of reading + 0.35% of range	0.40% of reading + 0.50% of range																														
* 50Hz/60Hz Compliant IEC61000-4-7																																	
D/A OUTPUT (OPTIONS)																																	
Item	Specifications																																
Output Voltage	$\pm 5 \text{ V FS}$ (approach $\pm 7.5 \text{ V}$ maximum) against each rated value.																																
Number Of Output Channels	4																																
Output Items	Set for each channel: V, I, P, VA, VAR, PF, DEG, VHZ, IHZ, Vpk, Ipk, WP, WP \pm , q, q \pm , Off																																
Accuracy	$\pm(\text{accuracy of each measurement item} + 0.2\% \text{ of FS})$ (FS = 5 V)																																
D/A Conversion Resolution	16 bits																																
Minimum Load	100 k Ω																																
Update Interval	Same as the data update interval. In the case of Auto Update Rate, update interval is equal to signal interval. More than 100ms.																																
Temperature Coefficient	$\pm 0.05\% / ^\circ\text{C}$ of FS																																
REMOTE CONTROL INPUT / OUTPUT SIGNAL (OPTIONS)																																	
Item	Specifications																																
Remote Control Input Signal	EXT HOLD, EXT TRIG, EXT START, EXT STOP, EXT RESET																																
Remote Control Output Signal	INTEG BUSY																																
I/O Level	TTL																																
I/O Logic Format	Negative logic, Falling edge																																
DIGITAL IO SIGNAL (OPTIONS)																																	
Item	Specifications																																
I/O Control Output Signal	OUT1, OUT2, OUT3, OUT4																																
I/O Level	TTL																																
I/O Sink Current	Max 100mA (per/ch)																																
<p>* Q (VAR), S (VA), λ (PF) and Φ (DEG) are originated from the measured values including voltage, current and active power which go through computation process. In respect to distorted signal input, accordingly, the value acquired from other instruments, which employ different methods, may differ from that acquired from GPM-8310 unit.</p> <p>* "Zero" will be shown for S or Q and "-" will be displayed for λ and Φ when either current or voltage is less than 0.5% of the rated range (less than or equivalent to 1% when crest factor is set 6).</p>																																	
GENERAL																																	
 Note	<p>The below are the basic conditions required to operate the GPM-8310 within specifications:</p> <ul style="list-style-type: none"> • 1-year Calibration: Yearly • Operating Environment: 18~28 °C (64.4~82.4 °F) • Humidity: <80%RH, • Accuracy: \pm (% of reading + % of range) • The specifications apply when it warmed up for at least 30 minutes and operates in the slow rate. • The power supply cable must be grounded to ensure accuracy. • Input voltage and current must be standard sine wave. • The power factor must be 1. • The crest factor must be 3. • The common-mode voltage must be zero. 																																
Specification Condition	Temperature: 23°C \pm 5°C Humidity: <80%RH(non-condensing)																																
Operation Condition	Temperature 0°C ~ 40°C, <ul style="list-style-type: none"> • 30 ~ 40°C, Relative Humidity < 70%RH (non-condensing) • >40°C, Relative Humidity < 50%RH (non-condensing) Indoor use only Altitude: < 2000 meters Pollution degree 2																																
Storage Condition	Temperature -40°C ~ 70°C Humidity: < 90%RH (non-condensing)																																
Power Source	AC 100-240V, 50-60Hz ; Consumption Max. 30VA																																
Dimensions	268(W) x 107(H) x 379(D) mm (w/t bumpers)																																
Weight	Approx. 2.9kg																																

Digital Power Meter

ORDERING INFORMATION

- GPM-8310** Digital Power Meter with RS-232C/USB device & host/LAN/GPIB
- GPM-8310 with DA4** Digital Power Meter with RS-232C/USB device & host/LAN/GPIB and opt. DA4

ACCESSORIES : Safety Instruction Sheet x 1, Power cord x 1, Test lead GTL-209 x 1, Test lead GTL-212 x 1, CD x 1 (including complete user manual and USB driver) DA4 cable GTL-214 (available for GPM-8310 with DA4 only)

OPTIONAL

- GPM-DA4** DA4 Interface (including cable, GTL-214)
Note : Optional DA4 interface must be installed in factory.

OPTIONAL ACCESSORIES

- | | | | |
|--------------------|---|----------------|-----------------------------|
| GPM-001 | Test Fixture (including GTL-210 x 2, GTL-213 x 1) | GTL-248 | GPIB Cable, Approx. 2000mm |
| GPM-001(EU) | Test Fixture (including GTL-210 x 2, GTL-213 x 1) | GRA-422 | Rack Mount Kit, 19" 2U size |
| GTL-209 | Test Lead, Banana to Bare-wire, Approx. 1000mm | | |
| GTL-210 | Test Lead, Banana to Banana, Approx. 1000mm | | |
| GTL-212 | Test Lead, O-Type to Bare-wire, Approx. 1000mm | | |
| GTL-213 | Test Lead, O-Type to Banana, Approx. 1000mm | | |
| GTL-214 | DA4 Cable, Approx. 1000mm | | |
| GTL-232 | RS-232C cable, 9-pin Female to 9-pin, null modem for computer, Approx. 2000mm | | |
| GTL-246 | USB Cable, A-B type, Approx. 1200mm | | |

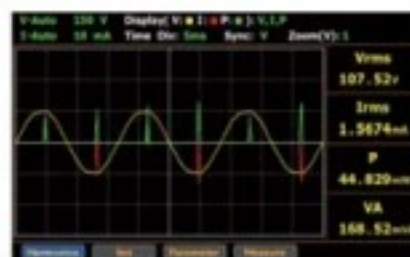
A. VARIOUS DISPLAY MODES



Numerical (General) Mode



Numerical (Simple) Mode



Waveform Mode



Harmonic (Bar Graph) Measurement



Harmonic (Table Column) Measurement

GPM-8310 provides the numerical value display mode and the waveform display mode, which help users to maximize the benefit of their measurement. Under the numerical mode, there are the general mode and the simple mode. The general mode has related measurement settings and can simultaneously display 10 measurement parameters (2 main measurements and 8 secondary measurements). The simple mode displays only 4 measurement parameter results. The parameters in each mode can be arranged and combined as required. Under the graphic mode, a simple oscilloscope function is provided to display the waveforms of three parameters including voltage, current and power. The horizontal

scale can be adjusted (from 25us/div ~ 1s/div according to the set data update rate), and 3 magnification rates for waveform observation are also provided for users to select. In the harmonic measurement, the measurement results of each order of harmonics can be displayed by bar graphs, and a specific observation order can be specified. The relevant values of each order of harmonics (voltage/current/power/voltage distortion ratio/current distortion ratio/power distortion ratio/voltage phase angle/current phase angle) can be completely recorded and displayed.

B. RICH MEASUREMENT PARAMETERS

Measurement Items	Symbols
Voltage	Vrms, V+pk, V-pk, Vac*, Vdc*, Vmn*
Current	Irms, I+pk, I-pk, Iac*, Idc*
Power	P, P+pk, P-pk, VA, VAR
Power Factor	PF
Crest Factor	CFV, CFI
Phase Angle	DEG
Frequency	VHz, IHz
Total Harmonic Distortion	THDV, THDI
Maximum Current Ratio	MCR
Integration	WP, WP+, WP-, q, q+, q-, Vac, Iac

Note : "*" Only applicable to specific measurement modes for selection



GPM-8310 provides a variety of measurement items and functions, including voltage, current, frequency, effective power, apparent power, reactive power, power factor, crest factor, total harmonic distortion, and can also measure the maximum current ratio. GPM-8310 is also equipped with the measurement function of power or current time integration for the DUT. Users set a period of time to perform instantaneous power

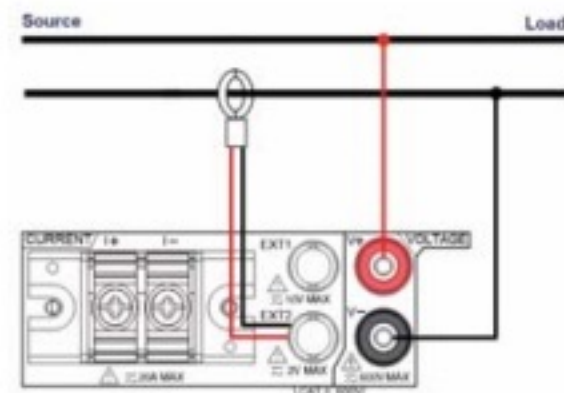
integration at the set time period, and then divide by the time to obtain the average power of the DUT. In addition, when performing integration measurement, GPM-8310 supports automatic level-changing function for the power change of the DUT at different times in order to obtain the most complete integration result within the set time.

C. SUPERB MEASUREMENT ASSISTANCE



Ratio Configuration

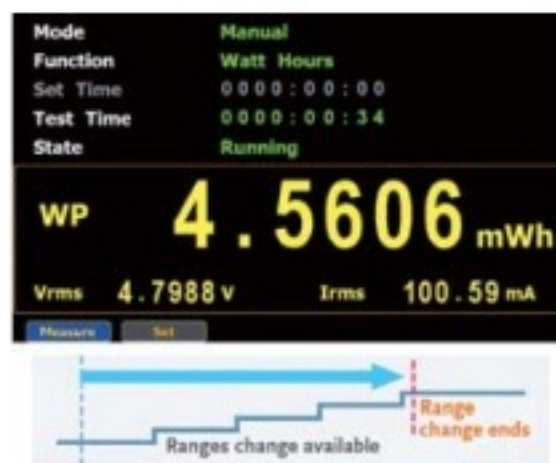
With respect to the support of measurement assistance, the performance of GPM-8310 is outstanding. First of all, for the measurement of high voltage/high power, the setting of voltage ratio/power ratio is provided to restore the attenuated ratio to a true value. For the measurement of large current, other than the setting of current ratio, external current sensor terminals (EXT1/EXT2) can be utilized to connect with a voltage output type current transformer, making large current measurement more



External Current Sensor Input

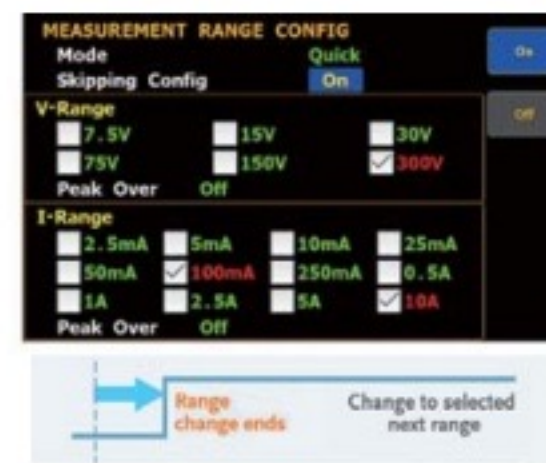
convenient. In addition, GPM-8310 provides 4 sets of panel settings for storage/recall and memory for storing 10,000 lots of measurement values. The measurement storage can log the measurement results based upon the update rate or a self-defined time interval to facilitate the subsequent analysis. The USB host on the front panel supports screen capture, measurement value storage, and GPM-8310 firmware update.

D. FLEXIBLE LEVEL-CHANGING MECHANISM



Automatic level-changing under the integration function

GPM-8310 provides the measurement of the integration function under the automatic level-changing mode to allow users to fully calculate the total value of the power consumption of the DUT from the beginning to the end of the integration function. In addition, GPM-8310 also supports



Self-defined automatic level-changing mechanism

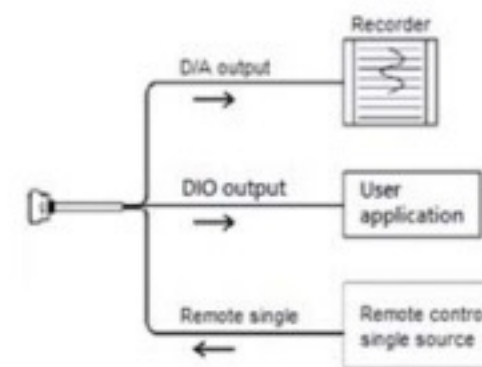
self-defined setting mechanism for level-changing. Users can select the required level to be changed to save time on level-changing and expedite the test.

E. CONVENIENT AND PRACTICAL INTERFACE



Practical Interface

GPM-8310 provides comprehensive and diverse communications interfaces including RS-232 / USB / LAN / GPIB, which are suitable for customers to write computer software for remote control and the collection of measurement results through commands. The optional Digital I/O (DA4) interface provides 3 different modes: the external control mode, the DA4 output mode and the self-defined output mode based on user settings. When the setting is in the external control mode, it allows users to activate, stop, trigger or reset the integration measurement



DA4 Interface Mechanism

function through external signals. When the setting is in the DA4 output mode, users can define 4 measurement parameter values from the 25 measurement parameters provided (even with the result of integration measurement) to produce outputs by a fixed level (full scale +5V) or a manual level (full scale $\pm 5V$) and receive results by collocating with a data recorder. When the setting is in the self-defined output mode, a communications interface is required to control the action of each defined pin through commands.

Digital Power Meter



GPM-8213



FEATURES

- * 4" TFT LCD
- * Basic Accuracy : $\pm(0.1\% \text{ of reading} + 0.1\% \text{ of range})$
- * Two Data Display Modes
 - Standard Display : Displaying Two Major Measurement Items + Six Minor Measurement Items
 - Simple Display : Displaying Test Data of Four Different Measurement Items
- * Met the Requirement of IEC 62301 Power Measurement
 - Voltage/Current Test Frequency Bandwidth : DC ~ 6kHz
 - Watt Resolution : 1mW
 - Current Resolution : 0.1mA
 - Current/Voltage Measurements Reach CF=3 for Distorted Wave and CF=6 for Half Range
 - W-h Power vs Time/A-h Current vs Time Integration Function
 - Total Harmonic Distortion Measurement
- * Front Panel Test Terminal
- * Standard Interfaces : RS-232C, USB Device, LAN
- * Optional Test Fixture : GPM-001

GPM-8213 power meter is designed specifically for single-phase (1P/2W) AC power supply's power measurements. Powerful features, including 4" TFT LCD, five-digit measurement display, 19 power measurement parameters, integral measurement function, high-accuracy voltage/current/power measurement capabilities, front/rear panel input terminals, and various communications ports, are to facilitate users with clear, convenient, and accurate power measurements.

GPM-8213 provides as many as 19 power measurement parameters, including voltage ($V_{rms}/V_{+pk}/V_{-pk}$), current ($I_{rms}/I_{+pk}/I_{-pk}$), frequency (VHz/IHz), power ($P/P_{+pk}/P_{-pk}$), crest factor (CFV/CFI), apparent power (VA), reactive power (VAR), power factor (PF), phase angle (DEG), total harmonic distortion (THDV/THDI), high-accuracy voltage/current/power measurement capabilities (reading: $\pm 0.1\%$; level: $\pm 0.1\%$). The advantages of TFT LCD have been efficiently deployed to simple mode and standard mode. Simple mode displays conventional power meter's four measurement parameters to meet the requirement of accuracy and clarity for the test on manufacturing process. Standard mode extends the display to the maximum of 8 measurement parameters (2 major measurements + 6 monitor measurements) to satisfy the various measurement application requirements of R&D, design, and quality verification.

For DUT requiring IEC 62301/EN 50564 standby power consumption test, GPM-8213 provides the optimal measurement supports, including test frequency bandwidth of DC~6kHz, the minimum current level of 5mA (resolution: 0.1uA), power measurement resolutions (1uW for minimum current and voltage levels; 1mW for maximum current and voltage levels), crest factor reaching 3 (half range reaching 6), and measurement of total harmonic distortion (at least 13th order power harmonic). For large voltage/large current measurement applications of general power measurement, GPM-8213 provides PT/CT rate function to collocate with external potential transformer or current transformer to meet the measurement requirements.

With respect to data retrieval and storage, the standard RS-232C/USB interfaces (virtual COM)/LAN can be utilized to edit and retrieve programs or the optional GPIB interface (installed by manufacturer) can be selected to meet users' automatic test system requirements.

SPECIFICATIONS

INPUT		
ITEM RATING VOLTAGE	Voltage	Range
RATING CURRENT		600 Vrms
IMPEDANCE(50/60Hz)	Current	20 Arms
	Current	2.4 MΩ
		5mA~200mA : 500 mΩ
MAXIMUM VOLTAGE		0.5A~20A : 5 mΩ
MAXIMUM CURRENT		700 Vrms
MAXIMUM COMMON MODE VOLTAGE		25 Arms
LOW PASS FILTER	Cutoff frequency	300 V
		500 Hz
PARAMETERS		
ITEM MEASUREMENT	Voltage	Symbol
	Current	Vdc, Vrms, V+pk, V-pk
	Power	Idc, Irms, I+pk, I-pk
	Crest Factor	P, P+pk, P-pk, VA, Var
	Power Factor	CFV, CFI
	Frequency	PF
	Angle	VHz, IHz
	Total Harmonic Distortion	Deg
	Integration	THDV, THDI
DISPLAY DIGITS		Time, WP, WP+, WP-, q, q+, q-
FREQUENCY BANDWIDTH		5 digits
AVERAGE		DC, 45Hz~6kHz
PT RATE		1, 2, 4, 8, 16, 32, 64
CT RATE		1 ~ 9999.999
DISPLAY MODE	Standard	1 ~ 9999.999
	Simple	8 measurement Item
		4 measurement Item
VOLTAGE		
ITEM RANGE	CF=3	Range
	CF=6	15V, 30V, 60V, 150V, 300V, 600V
CREST FACTOR		7.5V, 15V, 30V, 75V, 150V, 300V
ACCURACY	Effective Range	3 or 6 (selectable)
	DC	1% ~ 105% of range
	45Hz ≤ f ≤ 66Hz	$\pm(0.2\% \text{ of reading} + 0.2\% \text{ of range})$
	66Hz < f ≤ 1kHz	$\pm(0.1\% \text{ of reading} + 0.1\% \text{ of range})$
	1kHz < f ≤ 6kHz	$\pm(0.1\% \text{ of reading} + 0.2\% \text{ of range})$
TEMPERATURE EFFECT	Filter(ON)	$\pm 3\%$ of reading
RESIDUAL NOISE	5-18° C / 28-40° C	Add 0.3% of reading@45Hz ~ 66Hz
		Add $\pm 0.03\%$ of reading/° C
		0.5% of range



GPM-8213

SPECIFICATIONS

CURRENT		
ITEM MEASUREMENT	CF=3	Range 5mA, 10mA, 20mA, 50mA, 100mA, 200mA, 0.5A, 1A, 2A, 5A, 10A, 20A
	CF=6	2.5mA, 5mA, 10mA, 25mA, 50mA, 100mA, 250mA, 0.5A, 1A, 2.5A, 5A, 10A
CREST FACTOR ACCURACY	Effective Range	1% ~ 105% of range
	DC	±(0.2% of reading+0.2% of range)
	45Hz ≤ f ≤ 66Hz	±(0.1% of reading+0.1% of range)
	66Hz < f ≤ 1kHz	±(0.1% of reading+0.2% of range)
	1kHz < f ≤ 6kHz	±3% of reading
	Filter(ON)	Add 0.3% of reading@45Hz ~ 66Hz
TEMPERATURE EFFECT	5-18° C/28-40° C	Add ±0.03% of reading/° C
RESIDUAL NOISE		0.5% of range
POWER		
ITEM MEASUREMENT	Effective Range	1% ~ 110% of range
ACCURACY	DC	±(0.2% of reading+0.2% of range)
	45Hz ≤ f ≤ 66Hz	±(0.1% of reading+0.1% of range)
	66Hz < f ≤ 1kHz	±(0.1% of reading+0.3% of range)
	1kHz < f ≤ 6kHz	±3% of reading
	Filter(ON)	Add 3% of reading@45Hz~66Hz
TEMPERATURE EFFECT	5-18° C/28-40° C	Add ±0.03% of reading/° C
FREQUENCY		
ITEM MEASUREMENT	Filter(ON)	Range
	Filter(OFF)	30.000 Hz~499.99 Hz
PARAMETER		30.000 Hz~9.9999 kHz
EFFECTIVE RANGE		Voltage, Current
ACCURACY		10%~105% of voltage input
		±0.06% of reading
INTEGRATION		
ITEM MEASUREMENT	Accuracy	Range
INTERGRATION	Range	±(voltage or current accuracy+0.1% of reading)
TIME	Accuracy	0 hour 00 min ~ 9999 hour 59 min
		±0.01%±1second
DISPLAY		
4" TFT LCD		
POWER CONSUMPTION		
Max. 25VA		
INTERFACE		
RS-232C, USB device, LAN		
POWER SOURCE		
AC 100~240 V, 50-60Hz		
DIMENSIONS & WEIGHT		
270(W) x 110(H) x 350(D) mm, Aapprox. 2.9kg		

ORDERING INFORMATION

GPM-8213 with GPIB Digital Power Meter (RS-232C/USB device/LAN/Opt.01 GPIB)

GPM-8213 Digital Power Meter (RS-232C/USB device/LAN)

ACCESSORIES :

Safety Sheet x 1, Power Cord x 1, Test Lead GTL-209 x 2, CD x 1 (User manual/ USB driver)

OPTIONAL

GPM-82G1 GPIB card (factory installed)

OPTIONAL ACCESSORIES

GPM-001 Test Fixture (including GTL-210 x 2, GTL-213 x 1)

GPM-001(EU) Test Fixture (including GTL-210 x 2, GTL-213 x 1)

GTL-209 Test Lead, Banana to Bare-wire, Approx. 1000mm

GTL-210 Test Lead, Banana to Banana, Approx. 1000mm

GTL-212 Test Lead, O-Type to Bare-wire, Approx. 1000mm

GTL-213 Test Lead, O-Type to Banana, Approx. 1000mm

GTL-232 RS-232C cable, 9-pin Female to 9-pin, null modem for computer, Approx. 2000mm

GTL-246 USB Cable, A-B type, Approx. 1200mm

GTL-248 GPIB Cable, Approx. 2000mm

GRA-422 Rack Mount Kit, 19" 2U size

GRA-436 Rack Mount Kit, 19" 2U size for two sets

Rear Panel



GPM-001 Test Fixture/Test Fixture(EU)



GTL-209 Test Lead



GTL-210 Test Lead



GTL-212 Test Lead



GTL-213 Test Lead



Automatic Distortion Meter



The GAD-201G distortion meter is aimed at total harmonic distortion (THD) and AC voltage measurement at audio frequency range, from 20 ~ 20kHz. Frequency and voltage are displayed simultaneously on dual meters, with measurement range automatically switching over full scale. The frequency keys cover 400Hz, 1kHz, and 10kHz for commonly used measurement frequencies. The output terminals can feed basic waveforms (X) and harmonic distortion (Y) to an external monitoring device. Residual distortion, including hum and noise, is kept to a minimum level of 0.03%, making GAD-201G ideal for high-end audio applications.

GAD-201G

FEATURES

- * Automatic Level & Distortion Measurements
- * Auto or Hold Function Can be Selectable
- * 0.1% ~ 100% in 7 Distortion Measuring Ranges
- * 20Hz ~ 20kHz in 3 Continuous Ranges
- * 400Hz, 1kHz, 10kHz 3 Spot Frequency
- * 1mVrms ~ 300Vrms in 12 ACV Measuring Ranges

GTL-103 Test Lead

Banana-Alligator Heads
Approx. 1.2m



SPECIFICATIONS

DISTORTION MEASUREMENT

Range	0.1% – 100% full scale in 7 ranges by auto ranging
Fundamental Frequency Range	20Hz – 20kHz in 3 continuous ranges with fine adjustment tuning and 3 spots for 400Hz, 1kHz and 10kHz only
Input Level	100mVrms – 300Vrms
Automatic Level Control Range	±10dB
Fundamental Rejection	80dB or above
Second Harmonic Accuracy	Within ±1dB at a basic frequency of 20Hz – 20kHz
Residual Distortion	(Including hum and noise) Less than 0.03%

AC VOLTAGE MEASUREMENT

Range	1mVrms to 300Vrms full scale in 12 ranges by auto ranging
Frequency Response	20Hz – 200kHz ±1dB
Input Impedance	100kΩ ±10%, 70pF or less (Unbalanced)
Accuracy	Within ±3% of full scale (at 1kHz)
Residual Noise	Less than 10μV (input short circuited)
Output Level	X : 1Vrms, Y : 500mVrms at meter full scale
Output Impedance	Approx. 600Ω

POWER SOURCE

AC 100V/120V/220V/240V ±10%, 50/60Hz; Power Consumption : Max. 25VA

DIMENSIONS & WEIGHT

310(W) x 165(H) x 300(D)mm, Approx. 4.6 kg

ORDERING INFORMATION

GAD-201G Automatic Distortion Meter

ACCESSORIES :

User manual x 1 , Power cord x 1
Test lead GTL-103 x 1

A.C. Millivolt Meter



GVT-427B (2CH)
GVT-417B (1CH)



The GVT-427B/417B Series is a compact analog AC millivoltmeter ideal for low level voltage measurements with a remarkable $300\mu\text{V}$ full scale sensitivity. GVT-427B has dual independent channels that can be used simultaneously or separately for measurement. Voltage scale is separated into 12 ranges, easily accessible by the large rotary selector. The wide measurement range, frequency (10Hz ~ 1MHz) and voltage (-70dB ~ +40dB), provides ample headroom for most applications.

FEATURES

- * $300\mu\text{V}$ Full Scale Sensitivity
- * Measures Frequency From 10Hz ~ 1MHz
- * Measures From -70dB ~ +40dB in 12 Ranges
- * Dual Channel (GVT-427B)

GTL-101 Test Lead

BNC-Alligator Heads
Approx. 1.2m



SPECIFICATIONS

INPUT	
Voltage Range	300 μV – 100V of Full Scale in 12 ranges
Decibel Range	-70dB – +40dB in 12 ranges
Accuracy	$\pm 3\%$ of full scale
Operating Mode	GVT-427B : Ch1 and Ch2 separately or simultaneously at Ch1 GVT-417B : one Ch1 only
Frequency Response	20Hz – 200kHz $\pm 3\%$, 10Hz – 1MHz $\pm 10\%$ (reference 1 kHz)
Impedance	1M Ω , approx, 40pF
OUTPUT	
Level	Approx. 0.1Vrms at full scale
Distortion	Less than 2%
POWER SOURCE	
AC 115V/230V $\pm 10\%$, 50/60Hz; Power Consumption : Max. 10VA	
DIMENSIONS & WEIGHT	
130(W) x 210(H) x 295(D)mm; Approx. 2.8 kg	

ORDERING INFORMATION

GVT-427B 2 Channels AC Millivolt Meter
GVT-417B 1 Channel AC Millivolt Meter

ACCESSORIES :

User manual x 1 , Power cord x 1
Test Lead GTL-101 x 2 for GVT-427B
Test Lead GTL-101 x 1 for GVT-417B

Note : GVT-427B Without Approved

Isolated Output High Precision Current Shunt Meter



PCS-1000I



FEATURES

- * 6 1/2 Digit Voltage and Current Measurement Resolution
- * Simultaneous Current and Voltage Measurement
- * Five Current Measurement Levels(AC & DC) : 30mA/300mA/3A/30A/300A
- * AC Voltage Measurement Levels : 200mV/2V/20V/200V/600V
- * DC Voltage Measurement Levels : 200mV/2V/20V/200V/1000V
- * Standard : USB Device & GPIB
- * CE Verification

GW Instek rolls out the new PCS-1000I isolated output high precision current shunt meter, which inherits the simultaneous voltage and current measurement function of PCS-1000. PCS-1000I adopts five sets of independent shunt resistors to provide five current measurement levels, including 300A, 30A, 3A, 300mA, and 30mA to meet the requirements of different current level measurements. Internally, PCS-1000I utilizes two sets of 24bits ADCs and low temperature coefficient electronic components to mainly focus on the current measurement of power supply devices. High precision PCS-1000I can be used in adjusting and calibrating instruments. Additionally, temperature variation will not cause PCS-1000I to yield any measurement errors. PCS-1000I can automatically select optimal measurement level with the maximum resolution so as to replace manual selection to save operational time.

PCS-1000I provides a BNC output, which can connect with an oscilloscope to directly observe current waveform variation without using a current probe. General oscilloscopes do not have isolated channels and their input and output are structured at a common point, therefore, the output load will likely result in measurement errors. PCS-1000I's isolated current output design can prevent measurement errors from an oscilloscope with non-isolated outputs. PCS-1000I, a high precision AC/DC current shunt meter, not only provides USB and GPIB communications interfaces for users to remotely control the instrument but also conducts simultaneous voltage and current measurements. The SCPI communications commands of PCS-1000I allow users to remotely control PCS-1000I via a PC to operate measurement data read backs.

SPECIFICATIONS

DC CHARACTERISTICS

DC Voltage

Range	Half Year 23 °C ± 5 °C	Temperature Coefficient/°C
200.0000 mV	0.0050 + 0.0035	0.0005 + 0.0005
2.000000 V	0.0050 + 0.0010	0.0005 + 0.0001
20.00000 V	0.0050 + 0.0010	0.0005 + 0.0001
200.0000 V	0.0050 + 0.0010	0.0005 + 0.0001
1000.000 V	0.0050 + 0.0020	0.0005 + 0.0001

Accuracy specification : ±(% of reading + % of range);voltage input resistance: 10MΩ for all DC voltage ranges

DC Current

Range	Burden Voltage	Half Year 23 °C ± 5 °C	Temperature Coefficient/°C
30.00000 mA	< 0.4 V	0.01 + 0.005	0.001 + 0.002
300.0000 mA	< 0.5 V	0.01 + 0.005	0.001 + 0.002
3.000000 A	< 0.8 V	0.01 + 0.005	0.001 + 0.002
30.00000 A*1	< 0.8 V	0.01 + 0.005	0.001 + 0.002
300.0000 A*1	< 0.8 V	0.02 + 0.005	0.001 + 0.002

Accuracy specification : ± (% of reading + % of range)

Isolated DC Current Monitor Accuracy

Range	Half Year 23 °C ± 5 °C DC Accuracy	Temperature Coefficient/°C
30.00000 mA	0.1 + 0.05	0.001
300.0000 mA	0.1 + 0.05	0.001
3.000000 A	0.1 + 0.05	0.001
30.00000 A*1	0.1 + 0.05	0.001
300.0000 A*1	0.2 + 0.05	0.001

Accuracy specification : ±(% of output + % of full scale);monitor output voltage for the full scale current = 3V

AC CHARACTERISTICS

True RMS AC Voltage

Range	Frequency	Half Year 23 °C ± 5 °C	Temperature Coefficient/°C
200.0000 mV	45Hz~2kHz 2kHz~10kHz 10kHz~20kHz	0.5 + 0.05 1.0 + 0.05 2.0 + 0.10	0.005 + 0.005
2.000000 V			0.005 + 0.005
20.00000 V			0.005 + 0.005
200.0000 V			0.005 + 0.005
600.000 V			0.005 + 0.005

Accuracy specification : ±(% of reading + % of range)

True RMS AC Current

Range	Frequency	Half Year 23 °C ± 5 °C	Temperature Coefficient/°C
30.00000 mA	45Hz~2kHz 2kHz~10kHz	0.5 + 0.05 1.0 + 0.05	0.03 + 0.006
300.0000 mA			0.03 + 0.006
3.000000 A			0.03 + 0.006
30.00000 A*1	45Hz~400Hz	0.5 + 0.05	0.03 + 0.006
300.0000 A*1			0.03 + 0.006

Accuracy specification : ±(% of reading + % of range)



PCS-1000I

Rear Panel



PCS-001 Basic Accessory Kit



SPECIFICATIONS

Isolated AC Current Monitor Accuracy

Range	Frequency	Half Year 23°C±5°C AC Accuracy	Temperature Coefficient/°C
30,00000 mA	45Hz~2kHz	0.2 + 0.05	0.001
300,0000 mA			0.001
3,0000000 A	2kHz~10kHz	0.5 + 0.05	0.001
30,00000 A*1	45Hz~400Hz	0.5 + 0.05	0.001
300,0000 A*1			0.001

Accuracy specification : ±(% of output + % of full scale); monitor output voltage for the full scale current = 3V; The specifications are only applicable when the input is 10% or greater of the full scale range

GENERAL

Power Supply	100 V/120 V/220 V/240 V ±10%
Power Line Frequency	50/60 Hz
Operating Environment	Full accuracy for 0 °C ~ 55 °C, Full accuracy to 80% R.H. at 40 °C
Storage Environment	-40 °C ~ 70 °C
Power Consumption	Max 35VA
Dimensions Weight	210(W) x 80(H) x 390(D)mm ; Approx. 5 kg

(The specifications apply when the PCS-1000I is powered on for at least 30 minutes to warm-up to a temperature of 18 °C ~ 28 °C, unless specified otherwise.)

Note: *1 The accuracy for 30A/300A levels must be increased by a power factor of 8 ppm/watt.

ORDERING INFORMATION

PCS-1000I Isolated Output High Precision Current Shunt Meter

ACCESSORIES :

Quick Operation Guide, User Manual (CD) x 1, AC Power Cord x 1 (Region Dependant)

GTL-105A Alligator Clip Test Lead (3A Max)

GTL-207A Banana Plug Test Lead

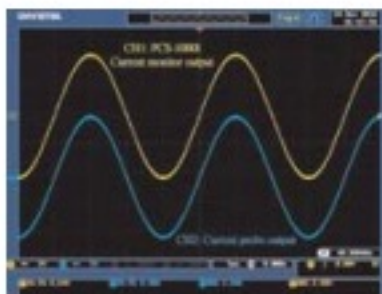
GTL-240 USB Cable

PCS-001 Basic Accessory Kit

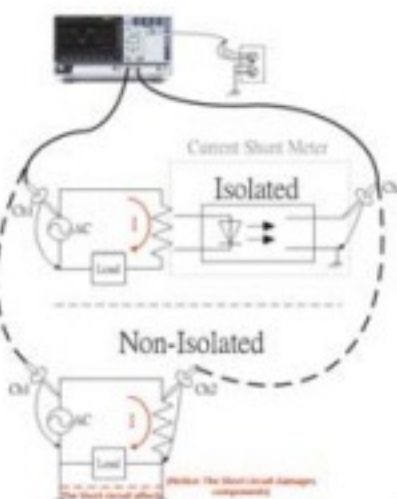
OPTIONAL ACCESSORIES

GRA-419-J Rack Mount Kit (JIS)

GRA-419-E Rack Mount Kit (EIA)



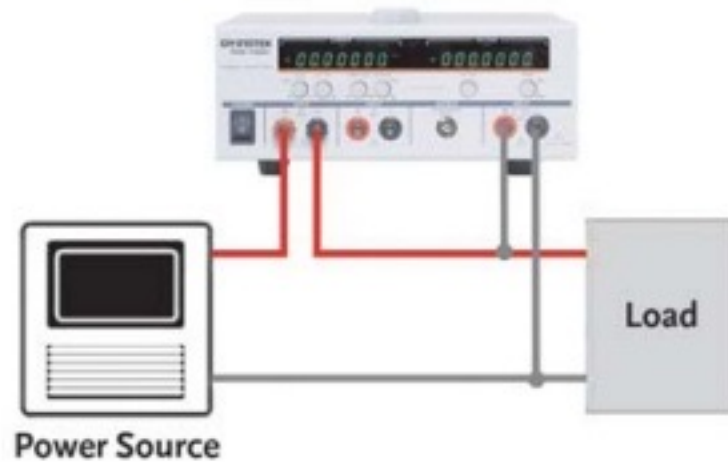
PCS-1000I VS. Current Probe for Measurement



The Measurement Issue for Non-Isolated Shunt Meter

Isolated Output High Precision Current Shunt Meter

A. SIMULTANEOUS VOLTAGE AND CURRENT MEASUREMENT



PCS-1000I high precision AC and DC shunt meter can simultaneously measure current and voltage with the maximum 6 1/2 measurement resolution. The above diagram shows the connection method of

simultaneous measurement. Compared with the test of conventional meters from other brands, PCS-1000I is simple in connection and there is no requirement of any additional instrument.

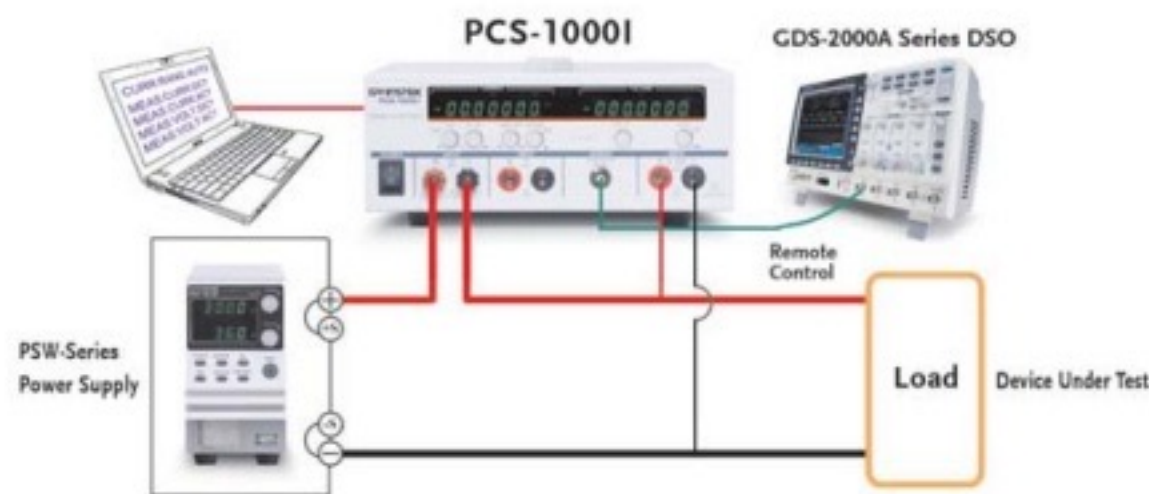
B. FIVE SETS OF SHUNT RESISTORS TO SWITCH MEASUREMENT



The switching measurement of five independent shunt resistors provides excellent resolution than that of a single shunt resistor.

Under 30mA range, the resolution is 0.01uA, which is ideal for very small current measurement.

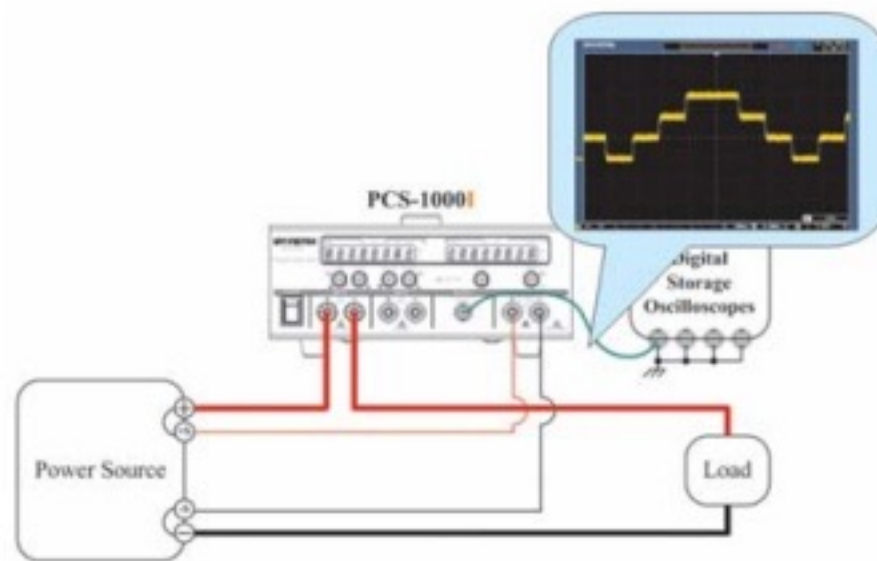
C. REMOTE CONTROL APPLICATION



PCS-1000I is not only a high precision AC/DC shunt meter but also provides users with USB and GPIB communications interface so as to remotely control operational sequence. The SCPI commands of PCS-1000I allow users to read back measurement value via a computer remotely controlling PCS-1000I. As shown on the above diagram, the series connection between

PCS-1000I and DUT and the parallel connection between voltage input and DUT are arranged to conduct simultaneous voltage and current measurement on DUT. Via the connection between communications and a notebook computer, PCS-1000I can be remotely controlled by operating the notebook computer and edited sequence.

D. ISOLATED OUTPUT CURRENT OUTPUT DESIGN



PCS-1000i adopts isolated current output design. Its BNC output can directly connect with an oscilloscope to avoid measurement errors resulted from the common ground of oscilloscope's analog input measurement.

E. AUTOMATIC RANGE-SWITCHING MEASUREMENT FUNCTION

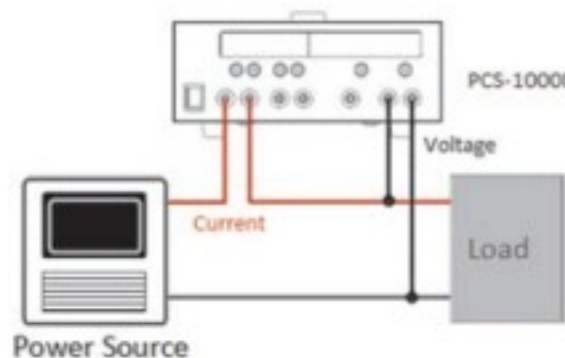


Press and hold Auto key, PCS-1000i will automatically select the maximum measurement resolution for users to save time in manual selection.

F. CONNECTION COMPARISON

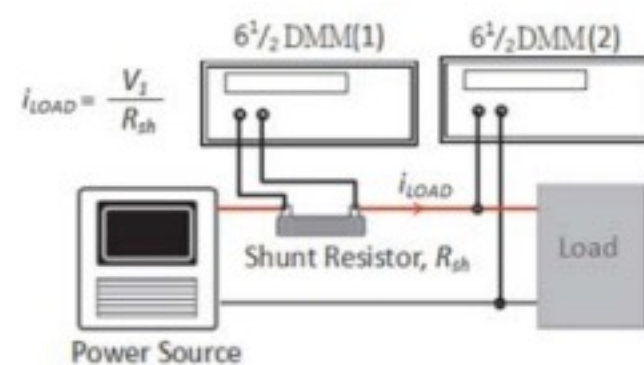
PCS-1000i can simultaneously measure current and voltage with 6 1/2 measurement resolution. The left diagram shows the connection method of simultaneous measurement. Compared with the test of conventional meters from other brands, PCS-1000i is simple in connection and there is no requirement of any additional instrument.

PCS-1000i Conducts Simultaneous Voltage and Current Measurement



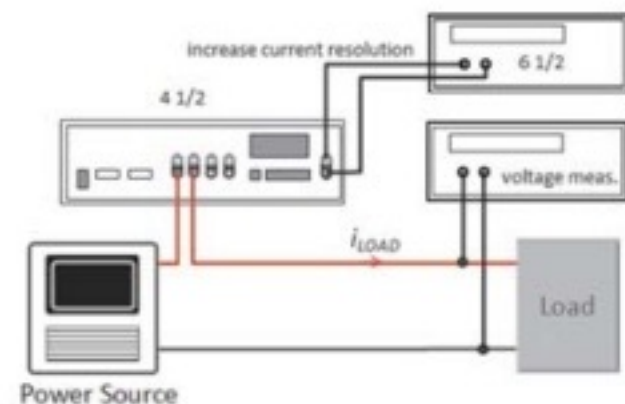
1. Only one PCS-1000i is needed to measure voltage and current
2. Easy connection
3. USB and GPIB communications on the rear panel can be used for data communication while connecting with a PC

Shunt Resistor Conducts Current and Voltage Measurement



1. One voltage meter is needed to measure voltage on shunt and the voltage will be converted to current. For simultaneous voltage and current measurement, one extra voltage meter is required
2. Complex connection
3. For data communication with a PC, the PC must be connected to two voltage meters

Conventional Shunt Meter Conducts Current and Voltage Measurement



1. This method requires one shunt meter, one current meter to increase current measurement resolution, and one voltage meter to measure voltage
2. Complex connection
3. For data communication with a PC, the PC must be connected to two meters

ACCESSORIES

MODEL	DESCRIPTION	APPLICABLE DEVICE
GBM-01	4 Wire (kelvin clip) Test Lead, 90V (max.), Approx. 1100mm	GBM-3300/3080
GBM-02	4 Wire (single pin) Test Probe, 80V (max.), Approx. 1100mm	GBM-3300/3080
GBM-03	4 Wire (twin pin) Test Probe, 300V (max.), Approx. 1400mm	GBM-3300/3080
GBM-S1	Short Bar (for GBM-02/GBM-03)	GBM-02/03
GDM-01	Calibration Key	GDM-8261A/8255A
GDM-82G1	GPIB card for GDM-8261A	GDM-8261A
GDM-82L1	LAN card for GDM-8261A	GDM-8261A
GDM-83G1	GPIB card for GDM-8342 (factory install)	GDM-8342
GDM-90G1	GPIB card for GDM-906X series	GDM-906X Series
GDM-SC1A	Scanner Card, 16+2 Channels	GDM-8261A/8255A
GDM-TL1	Test Lead Set	All GDM-Series
GHT-108	H.V. Wiring Lead, Approx. 500mm	GSB-01/02
GHT-109	G.B Wiring Lead, Approx. 450mm	GSB-02
GHT-113	High Voltage Test Pistol, Approx. 2000mm	All GPT-Series
GHT-114	High Voltage Test Lead, Approx. 1000mm	GPT-9900A/9900/9800/9600 Series
GHT-115	High Voltage / Continuity Test Lead, Approx. 1000mm	GPT-10000 Series, GPT-9500 Series
GHT-116B	High Voltage Test Lead (Black only), Approx. 1500mm	GSB-01/02, All GPT-Series, GPT-9500 Series
GHT-116R	High Voltage Test Lead (Red only), Approx. 1500mm	GSB-01/02, All GPT-Series, GPT-9500 Series
GHT-117	High Voltage Adapter Box	GPT-15003/15002/15001/12003/12002/12001, GPT-9903A/9902A/9901A, GPT-9803/9802/9801, GPT-9600
GHT-117(EU)	High Voltage Adapter Box	GPT-15003/15002/15001/12003/12002/12001, GPT-9903A/9902A/9901A, GPT-9803/9802/9801, GPT-9600
GHT-118	High Voltage/Ground Bond Adapter Box	GPT-15004/12004/9904/9804
GHT-118(EU)	High Voltage/Ground Bond Adapter Box	GPT-15004/12004/9904/9804
GHT-119	Remote Terminal Cable, Approx. 500mm	All GPT-Series, GCT-9040
GHT-205	High Voltage Test Probe, Approx. 1100mm	All GPT-Series
GLC-01	Alligator Clips	GLC-10000, GLC-9000
GLC-02	Foil Probe	GLC-10000, GLC-9000
GLC-03	Power Cord for EUT	GLC-10000
GLC-04	Input & Output Terminal Cover	GLC-10000
GLC-10KG1	GPIB Card	GLC-10000
GOM-80G1	GPIB card for GOM-804 (factory install)	GOM-804
GPM-001	Test Fixture (Universal or Europe type socket)	GPM-8310, GPM-8213
GPM-82G1	GPIB card for GPM-8213 (factory install)	GPM-8213
GPM-002	Terminal Cover	GPM-8320/8330
GPM-DA4	DA4 Interface (factory install)	GPM-8310
GPM-DA12	GPIB+DA12 Interface (including cable, GTL-214)	GPM-8320/8330
GPT-10KG1	GPIB card for GPT-10000 series	GPT-10000 Series
GPT-10KL1	LAN card for GPT-10000 series	GPT-10000 Series
GPT-9KG1	GPIB card for GPT-9900/9800 series and GCT-9040	GPT-9900A/9900/9800 Series, GCT-9040
GRA-417	Rack Mount Kit, 19", 4U Size	GPT-9900A/9800/9600 Series, GCT-9040
GRA-419-E	Rack Mount Kit (EIA), 19", 2U Size	PCS-10001
GRA-419-J	Rack Mount Kit (JIS), 19", 2U Size	PCS-10001
GRA-422	Rack Mount Kit, 19", 2U Size	GDM-906X Series, GDM-8261A/8255A/8351/834X Series, LCR-6000 Series, GBM-Series, GPM-8310/8213
GRA-433	Rack Mount Kit, 19", 4U Size	GPT-9904
GRA-436	Rack Mount Kit 19", 2U Size for two sets	GDM-906X Series, GDM-8261A/8255A, LCR-6000 Series, GBM-3000 Series, GPM-8213
GRA-438	Rack Mount Kit 19", 2U Size	GSB-01/02
GRA-440	Rack Mount Kit 19", 4U Size	GPT-10000 Series
GRA-445	Rack Mount Kit 19", 4U Size	LCR-8200(A) Series
GRA-452	Rack Mount Kit, 19" 3U Size	GPM-8320/8330
GSC-014	Soft Carrying Case for DMM Accessory	All GDM-Series
GTL-101	Test Lead, BNC (P/M) to Alligator, Approx. 1100mm	GVT-Series
GTL-103	Test Lead, Banana to Alligator, Approx. 1200mm	GAD-201G
GTL-105A	Test Lead, Banana to Alligator, Current 3A max. Approx. 1000mm	PCS-10001
GTL-108A	4 Wire (kelvin clip) Test Lead, Approx. 1100mm	GDM-8261A/8255A/8351
GTL-115	G.B. Test Lead, U type to Alligator, Approx. 1000mm	GPT-9904/9804
GTL-116B	G.B. Test Lead (Black only), U type to Alligator, Approx. 1500mm	GSB-02, GPT-9904/9804
GTL-116R	G.B. Test Lead (Red only), U type to Alligator, Approx. 1500mm	GSB-02, GPT-9904/9804
GTL-117	Test Lead, Banana to Probe, Approx. 1200mm	GDM-8245
GTL-132	LINK Cable, Approx. 250mm	GCT-9040
GTL-205A	Temperature Probe Adaptor with Thermocouple (K-type), Approx. 1000mm	GDM-906X Series, GDM-8261A/8255A/8351/834X Series
GTL-207A	Test Lead, Banana to Probe, Approx. 1000mm	GDM-8261A/8255A/8351/834X Series, GLC-10000, GLC-9000, PCS-10001
GTL-209	Test Lead, Banana to Bare-wire, Approx. 1000mm	GPM-8310/8213, GPM-8320/8330
GTL-210	Test Lead, Banana to Banana, Approx. 1000mm	GPM-001
GTL-212	Test Lead, O-Type to Bare-wire, Approx. 1000mm	GPM-8310
GTL-212A	Test Lead, O-Type to Bare-wire, Approx. 1000mm	GPM-8320/8330
GTL-213	Test Lead, O-Type to Banana, Approx. 1000mm	GPM-001
GTL-214	DA4 Cable, Approx. 1000mm	GPM-8310, GPM-8320/8330
GTL-215	G.B. Test Lead, U type to Alligator, Approx. 1000mm	GPT-15004/12004, GCT-9040, GPT-9904/9804
GTL-217	Test Lead, Banana to Probe, Approx. 1400mm	GDM-906X Series
GTL-232	RS-232C Cable, 9-pin F-F type, null modem for computer, Approx. 2000mm	GDM-8261A/8255A/8351, GPT-10000/9900A/9900/9800 Series, GLC-10000, GLC-9000, GOM-805/804, GBM-Series, GPM-8310/8213, GPM-8320/8330
GTL-234	RS-232C Cable, 9-pin F-F type, null modem for computer, Approx. 2000mm	GDM-906X Series, LCR-8200(A) Series
GTL-235	Communication Cable, Approx. 700mm	GSB-01/02
GTL-236	RS-232C Cable, 9-pin F-M type, Approx. 2000mm	GPT-9500 Series
GTL-240	USB Cable, USB 2.0 A-B type (L shape), Approx. 1200mm	GLC-10000, GLC-9000, PCS-10001
GTL-246	USB Cable, USB 2.0 A-B type, Approx. 1200mm	GDM-906X Series, GDM-8351/8342/8341, LCR-8200(A) Series, LCR-6000 Series, GPT-10000/9500 Series, GLC-10000, GLC-9000, GOM-805/804, GBM-Series, GPM-8310/8213, GPM-8320/8330
GTL-247	USB Cable, USB 1.1 A-A type, Approx. 1800mm	GDM-8261A/8255A, GPT-9900A/9900/9800 Series, GCT-9040


ACCESSORIES

MODEL	DESCRIPTION	APPLICABLE DEVICE
GTL-248	GPIB Cable, Approx. 2000mm	GDM-906X Series, GDM-8261A/8342, LCR-8200(A) Series, GPT-10000/9900A/9900/9800 Series, GLC-10000, GLC-9000, GOM-805/804, GPM-8310/8213
GTL-253	USB Cable, USB 2.0 A-mini B type, Approx. 1400mm	LCR-900 Series
GTL-258	GPIB Cable, 25-pin Micro-D Connector, Approx. 1900mm	GPM-8320/8330
GTL-264	Signal I/O Converted Cable, 15-pin Male to 9-pin Female. Approx. 200mm	GPT-10000 Series
GTL-308	4 Wire (kelvin clip) + Shield Test Lead, Approx. 1500mm	GDM-906X Series, GOM-805/804
GTL-309	4 Wire (kelvin clip) + Shield Test Lead, Approx. 3000mm	GDM-906X Series, GOM-805/804
LCR-05	Test Fixture for Axial & Radial Leaded Components	LCR-8200(A) Series, LCR-6000 Series
LCR-05A	50MHz Test Fixture for Axial & Radial Leaded Components (including STD-LOAD kit)	LCR-8200(A) Series
LCR-06B	Test Lead with Kelvin clip (4 wire type), Approx. 750mm	LCR-8200(A) Series, LCR-6000 Series
LCR-07	Test Lead with Alligator clip (2 wire type), Approx. 750mm	LCR-8200(A) Series, LCR-6000 Series
LCR-08	Test Fixture (Tweezers) for SMD/Chip Components, Approx. 750mm	LCR-8200(A) Series, LCR-6000 Series
LCR-10A	50MHz Test Fixture for Bottom Electrode Components (including STD-LOAD kit)	LCR-8200(A) Series
LCR-12	Test Lead with Kelvin clip (4 wire type), Approx. 600mm	LCR-8200(A) Series
LCR-15	Test Fixture for SMD/Chip components	LCR-8200(A) Series, LCR-6000 Series
LCR-15A	50MHz Test Fixture for SMD/Chip components (including STD-LOAD kit)	LCR-8200(A) Series
LCR-16	DC Bias Voltage Box (+/- 45V)	LCR-6000 Series
LCR-17	DC Bias Current Box (+/- 2.5A)	LCR-6000 Series
LCR-DB1	External DC Bias Voltage Box (+/- 200V)	LCR-8200(A) Series
PCS-001	Basic Accessory Kit	PCS-1000I
PT-100	Temperature Probe, Approx. 1500mm	GOM-805/804

ACCESSORIES

<p>GBM-01</p> 	<p>GBM-02</p> 	<p>GBM-03</p> 
<p>GBM-S1</p> 	<p>GDM-01</p> 	<p>GDM-SC1A</p> 
<p>GDM-TL01</p> 	<p>GHT-108</p> 	<p>GHT-109</p> 
<p>GHT-113</p> 	<p>GHT-114</p> 	<p>GHT-115</p> 
<p>GHT-116B</p> 	<p>GHT-116R</p> 	<p>GHT-117 / GHT-117 (EU)</p> 
<p>GHT-118</p> 	<p>GHT-118 (EU)</p> 	<p>GHT-119</p> 
<p>GHT-205</p> 	<p>GLC-01</p> 	<p>GLC-02</p> 

ACCESSORIES

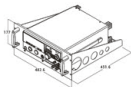
<p>GPM-001</p> 	<p>GPM-001 (EU)</p> 	<p>GSC-014</p> 
<p>GTL-101</p> 	<p>GTL-103</p> 	<p>GTL-105A</p> 
<p>GTL-108A</p> 	<p>GTL-115</p> 	<p>GTL-116B</p> 
<p>GTL-116R</p> 	<p>GTL-117</p> 	<p>GTL-132</p> 
<p>GTL-205A</p> 	<p>GTL-207A</p> 	<p>GTL-209</p> 
<p>GTL-210</p> 	<p>GTL-212/212A</p> 	<p>GTL-213</p> 
<p>GTL-214</p> 	<p>GTL-215</p> 	<p>GTL-217</p> 

ACCESSORIES

<p>GTL-308</p> 	<p>GTL-309</p> 	<p>GTL-232</p> 
<p>GTL-234</p> 	<p>GTL-235</p> 	<p>GTL-236</p> 
<p>GTL-240</p> 	<p>GTL-246</p> 	<p>GTL-247</p> 
<p>GTL-248</p> 	<p>GTL-250</p> 	<p>GTL-253</p> 
<p>LCR-DB1</p> 	<p>PT-100</p> 	<p>GDM-82G1</p> 
<p>GDM-82L1</p> 	<p>GDM-90G1</p> 	<p>GPT-9KG1</p> 
<p>GPT-10KG1</p> 	<p>GPT-10KL1</p> 	<p>GTL-264</p> 

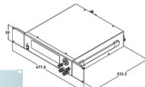
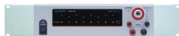
GRA-417 Rack Mount Kit

For : GPT-9900A/9800/9600 Series, C.CT-9040



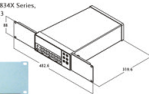
GRA-438 Rack Mount Kit

For : CSB-01/02



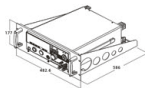
GRA-422 Rack Mount Kit

For : GDM-906X Series, CDM-8261A/8255A/8351/834X Series, LCR-6000 Series, CBM Series, GPM-8310/8213



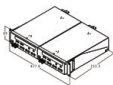
GRA-433 Rack Mount Kit

For : CPT-9904



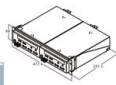
GRA-419 EIA Rack Mount Kit

For : PCS-10000



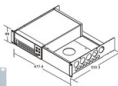
GRA-419 JIS Rack Mount Kit

For : PCS-10001



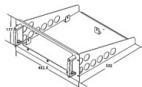
GRA-436 Rack Mount Kit

For : GDM-906X Series, CDM-8261A, GDM-8255A, LCR-6000 Series, CBM-3000 Series, GPM-8213



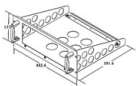
GRA-440 Rack Mount Kit

For : CPT-10000 Series



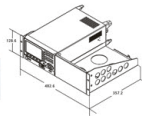
GRA-445 Rack Mount Kit

For : LCR-8200(A) Series



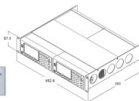
GRA-452 Rack Mount Kit

For : CPM-8320/8330














GRA-454 Rack Mount Kit

For : DAQ-9600



ACCESSORIES

FIXTURE MODEL	DESCRIPTION	CONNECTION	DUT PACKAGE	APPLICATION
LCR-05 	Test fixture for measuring axial and radial lead components Frequency: DC to 1MHz Max. Voltage: +/- 35V	4 Wire	Axial & radial lead components	Suitable for axial & radial lead type L, C, R
LCR-05A 	Test Fixture for axial & radial leaded components Frequency: DC to 30MHz Max. Voltage: +/- 45V (Including SHORT Bar and STD LOAD)	4 Wire	Axial & radial lead components	Suitable for axial & radial lead type L, C, R
LCR-06B 	Kelvin clip test lead Frequency: DC to 1MHz Max. Voltage: +/- 45V	4 Wire (Kelvin clip)	Odd-shaped components	Suitable for low R or high C
LCR-07 	Test leads for conventional component measurement. Frequency: DC to 1MHz Max. Voltage: +/- 35V	2 Wire (Alligator clip)	Conventional component for in-circuit, board-mounted components	Suitable for low C or high R
LCR-08 	SMD/chip tweezers Frequency: DC to 1MHz Max. Voltage: +/- 35V	4 Wire (SMD/chip tweezers)	SMD components	Suitable for SMD type L, C, R
LCR-10A 	Test Fixture for bottom electrode components Frequency: DC to 30MHz Max. Voltage: +/- 45V	4 Wire (SMD/chip tweezers)	SMD/chip components	Range:0402 to 2512 (Including SHORT Bar and STD LOAD)
LCR-12 	Kelvin clip test lead Frequency : DC to 10MHz Max. Voltage : +/- 35V Approx. 0.6m	Kelvin clip test lead		
LCR-15 	SMD/chip test fixture Frequency: DC to 10MHz Max. Voltage: +/- 45V	4 Wire (SMD/chip test fixture)	SMD/chip components	Suitable for SMD Range:0201 to 1812
LCR-15A 	Test Fixture for SMD/Chip components Frequency: DC – 30MHz Max. Voltage: +/- 45V	4 Wire (SMD/chip test fixture)	SMD/chip components	Range: 0201 to 1812 (Including STD LOAD)
LCR-16 	External DC Bias voltage box Frequency: 40Hz to 1MHz Max. Voltage: +/- 45V			
LCR-17 	External DC Bias Current Box Frequency: 40Hz to 1MHz Max. Current: +/- 2.5A			

WINS TAIWAN EXCELLENCE AWARD



GDS-1000-U Series Digital Storage Oscilloscope 2012	AFG-3000 Series Arbitrary Function Generator 2012	PEL-2000 Series Programmable D.C. Electronic Load 2012
GDS-300/200 Series Digital Storage Oscilloscope 2015	PEL-3000 Series Programmable D.C. Electronic Load 2015	GDS-2000E Series Digital Storage Oscilloscope 2016
C 1100 ASK/FSK Tester 2018	GPM-8213 Digital Power Meter 2018	C-1200 LoRa Tester 2019
SKTS-5000 Smart Keys Test Solution 2020	GPT-12000 Series AC/DC/IR/GB Electrical Safety Analyzer 2020	C-3200 LoRaWAN Tester 2021
GDS-3000A Series 650/350 MHz Digital Storage Oscilloscope 2022	PPX-Series Programmable High-precision D.C. Power Supply 2022	GSM-20H10 Source Measure Unit 2022
		GPM-8310 Digital Power Meter 2021
		GDM-906X Series 6 1/2 Digit Dual Measurement Multimeter 2019
		GSP-9330 3.25GHz Spectrum Analyzer 2017

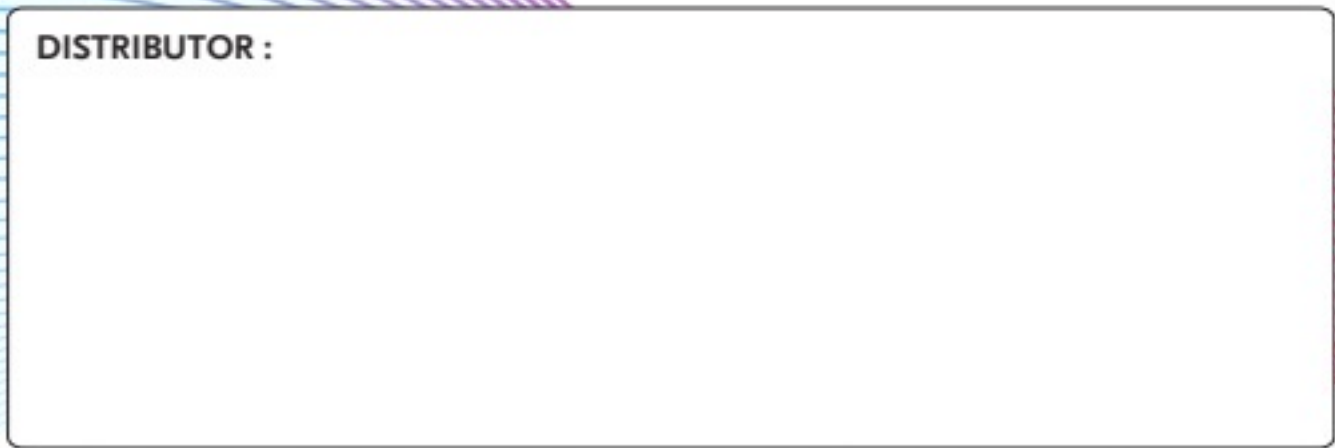
GW INSTEK
Simply Reliable



Your Most Trustworthy Partner

For more information, please visit our website: <http://www.gwinstek.com>

DISTRIBUTOR :



Specifications subject to change without notice.

2023-24CL-2023.08-1000

Global Headquarters

GOOD WILL INSTRUMENT CO., LTD.

No.7-1, Jhongsing Road, Tucheng Dist., New Taipei City 236, Taiwan
T +886-2-2268-0389 F +886-2-2268-0639
E-mail: marketing@goodwill.com.tw

China Subsidiary

GOOD WILL INSTRUMENT (SUZHOU) CO., LTD.

No. 521, Zhujiang Road, Snd, Suzhou Jiangsu 215011 China
T +86-512-6661-7177 F +86-512-6661-7277

Malaysia Subsidiary

GOOD WILL INSTRUMENT (SEA) SDN. BHD.

No. 1-3-18, Elit Avenue, Jalan Mayang Pasir 3,
11950 Bayan Baru, Penang, Malaysia
T +604-6111122 F +604-6115225

Europe Subsidiary

GOOD WILL INSTRUMENT EURO B.V.

De Run 5427A, 5504DG Veldhoven, THE NETHERLANDS
T +31(0)40-2557790 F +31(0)40-2541194

U.S.A. Subsidiary

INSTEK AMERICA CORP.

5198 Brooks Street Montclair, CA 91763, U.S.A.
T +1-909-399-3535 F +1-909-399-0819

Japan Subsidiary

TEXIO TECHNOLOGY CORPORATION.

7F Towa Fudosan Shin Yokohama Bldg., 2-18-13 Shin
Yokohama, Kohoku-ku, Yokohama, Kanagawa,
222-0033 Japan
T +81-45-620-2305 F +81-45-534-7181

Korea Subsidiary

GOOD WILL INSTRUMENT KOREA CO., LTD.

Room No.503, Gyeonginro 775 (Mullae-Dong 3Ga,
Ace Hightech-City B/D 1Dong), Yeongduengpo-Gu,
Seoul 150093, Korea.
T +82-2-3439-2205 F +82-2-3439-2207

India Subsidiary

GW INSTEK INDIA LLP.

No.2707/B&C, 1st Floor UNNATHI Building,
E-Block, Sahakara Nagar, Bengaluru-560 092. India
T +91-80-6811-0600 F +91-80-6811-0626

GW INSTEK

Simply Reliable



Website



Facebook



LinkedIn