GDS-2000A Series

VPO
Visual Persistence Oscilloscope

300/200/100/70MHz Digital Storage Oscilloscope

3 Year WARRANTY

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
- 2Mpoints 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
- Optional 8 or 16 Additional Digital Channels with Logic Analyzer(MSO) & Serial Bus I^2C/SPI/UART Trigger and Decode Software
- Optional Function Generator
- Flexible Remote Control Connectivity(Standard:USB;Optional:LAN/GPIB)

GW INSTEK
Simply Reliable

Every Acquisition is Key to Success

2GSa/s Real-time Sampling Rate and up to 300MHz Bandwidth

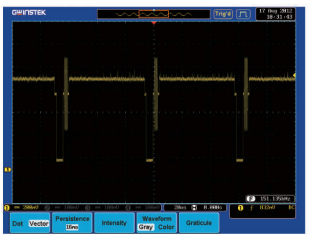
The GDS-2000A Series Digital Storage Oscilloscope offers 2 and 4-channel configurations and wide bandwidth selections, including 300MHz, 200MHz, 100MHz and 70MHz. Each model provides 2GSa/s maximum real-time sampling rate and 100GSa/s high-speed equivalent-time sampling rate. Equipped with an 8-inch 800 x 600 high-resolution TFT LCD display, 1mV/div to 10V/div vertical range and 1ns/div to 100s/div time base, the GDS-2000A Series is able to faithfully demonstrate waveforms of complicated and obscure signals.

2Mega Point Record Length, Waveform Search and Segmented Memory Functions

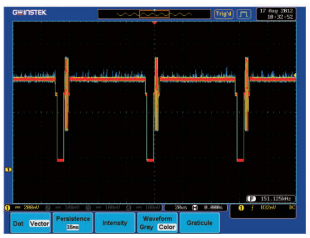
The GDS-2000A Series provides 2Mega point record length, and Waveform Search and Segmented Memory functions as standard features. The events of interest can be captured and saved into the Segmented Memory, which can be divided into 2048 sections, for observation, while the irrelevant waveforms can be ignored. Consequently, the overall efficiency of memory usage can be enhanced. Under Waveform Search mode, after the input signal is triggered, the GDS-2000A Series is able to Search and Mark the waveform sections, which comply with user-defined search condition and threshold level within the whole memory. Meanwhile, with Zoom window and Play/Pause button to browse through whole displayed waveform, the user can rapidly navigate all the waveforms in an efficient way.

80,000 wfm/s Waveform Update Rate and VPO Technique

The waveform update rate of 80,000wfm/s enables users to accurately acquire and examine inrush signals and elusive glitches without missing any detail. Attributed to the advanced signal processing technique, VPO (Visual Persistence Oscilloscope), the grayscale display of waveforms shown on GDS-2000A distinguishes the signals from one another according to their occurrence frequencies respectively.



Gray Mode



Color Mode

Upgrade to Mixed Signal Oscilloscope (MSO)

The GDS-2000A Series provides the flexibility of easy conversion from a DSO into a MSO (Mixed Signal Oscilloscope) under a plug-and-play concept. As two plug-in compartments are available at the rear panel to accommodate various plug-in modules, the GDS-2000A Series DSO with an 8 or 16 digital channels module performs MSO functions perfectly at the user's installation of the module. The analysis and decoding functions of parallel bus and serial bus such as I^2C, SPI, and UART are supported after the module is installed. GDS-2000A is regarded as an effective tool in signal analysis, trouble diagnosis and defect debug.

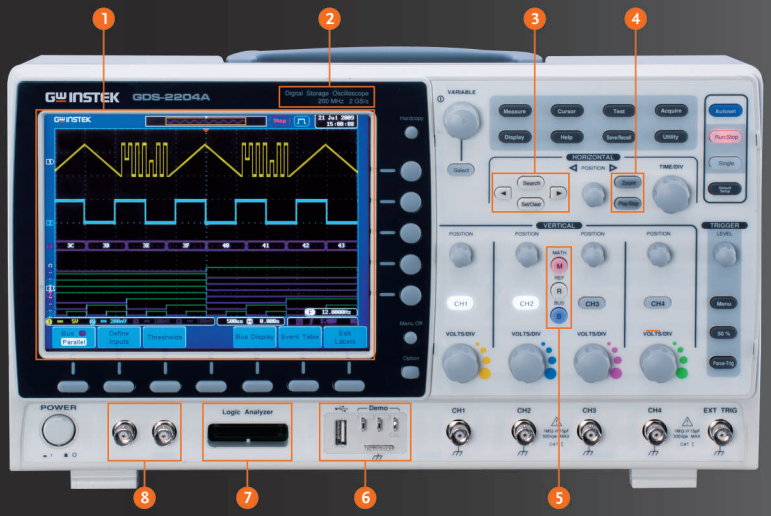
3MHz Function Generator Option

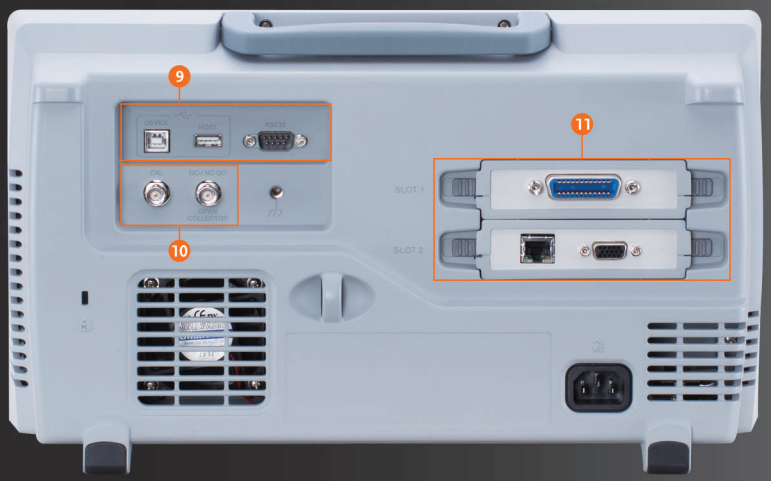
The plug-in module of DDS (Direct Digital Synthesis) based function generator is provided as an option of the GDS-2000A series. The function generator, with 3MHz bandwidth, is able to generate Sine, Triangle and Square waveforms, with variable duty cycle of the square waveform. Two function generators can be used at the same time to provide dual output signals. With the stimulus source, the verification of electrical characteristics and functionality of the DUT (Device Under Test) can be done in one DSO.

Design for Plugged-in Options

Besides Logic Analyzer and Function Generator modules, the GDS-2000A series also provides optional LAN/SVGA Interfaces module and GPIB interface module for user's selection. The Modularized Structure offers a dramatic elasticity allowing user to upgrade the DSO with field-installable options after the purchase of the main body. Two modules can be used simultaneously as the maximum capacity of the GDS-2000A options, which include (1) 8-Channel Logic Analyzer (2) 16-Channel Logic Analyzer, (3) DDS Function Generator (4) LAN/SVGA Interfaces Module, (5) GPIB Interface Module.

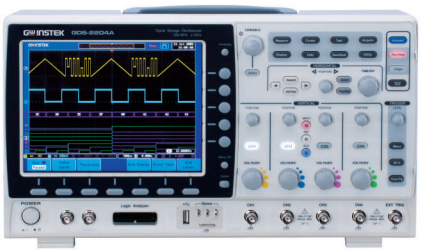
PANEL INTRODUCTION



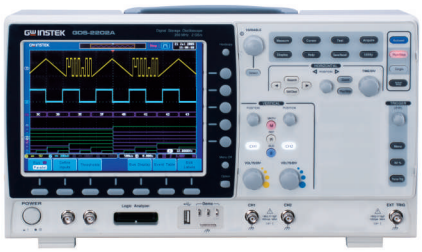


CE | USB High Speed | PC Software | Labview Driver | PictBridge Compatible

1. 8 inch TFT LCD Display
2. 2GSa/s Real-time Sampling Rate
3. Waveform Search Function
4. Zoom and Play/Pause
5. Math Computing, Waveform Reference and Serial Bus Function
6. Three Demonstration Output
7. Digital Channel Input Terminals
8. DDS Function Generator Output
9. Standard Interface : USB, RS-232C
10. CAL and Go/NoGo Output
11. Option Module : LAN/SVGA, GPIB, Function Generator, Logic Analyzer



4 Channel Model



2 Channel Model

SELECTION GUIDE

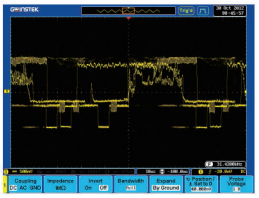
Model	GDS-2304A	GDS-2302A	GDS-2204A	GDS-2202A	GDS-2104A	GDS-2102A	GDS-2074A	GDS-2072A
Bandwidth	300MHz	300MHz	200MHz	200MHz	100MHz	100MHz	70MHz	70MHz
Channels	4	2	4	2	4	2	4	2
* Record Length	2M	2M	2M	2M	2M	2M	2M	2M
* Real-time Sampling	2 GSa/s	2 GSa/s	2 GSa/s	2 GSa/s	2 GSa/s	2 GSa/s	2 GSa/s	2 GSa/s
Waveform Update Rate	80,000wfms/s	80,000wfms/s	80,000wfms/s	80,000wfms/s	80,000wfms/s	80,000wfms/s	80,000wfms/s	80,000wfms/s

* 1M point record length and 1GSa/s real-time sampling rate per channel for full channel operation.

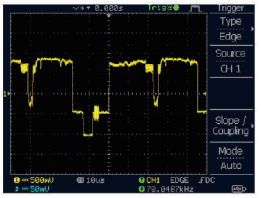
A. GENERAL DESCRIPTION

With modern design concepts and up-to-date component technologies, the GDS-2000A Series DSO possesses a number of outstanding features, such as segmented memory, waveform search function, modularized logic analyzer and Function Generator. The aim of GDS-2000A design is to fit the requirements in embedded system development field and general application industries. As the GDS-2000A Series is a full-fledged DSO carrying a complete set of features, it is also a very useful tool to cover a broad range of educational applications related to signal analysis, trouble diagnosis and defect debugging in the electronic and electric fields.

*** 80,000 wfms/s Update Rate**



80,000 wfms/s



500 wfms/s

The waveform update rate of 80,000 wfms/s enables users to dynamically examine the jittery signal and elusive glitches without missing any detail. The concept is similar to the movie player. The faster movie player, which can bring more film images to the screen in a certain time interval, displays better visual effect than the slower ones. This is especially true when it comes to the replay of fast moving article.

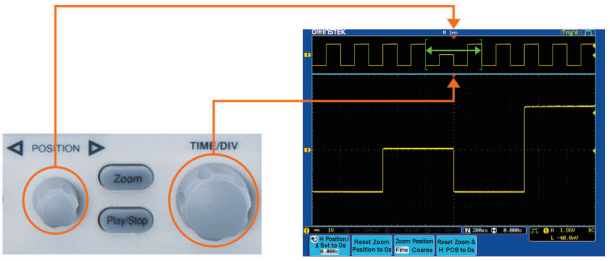
*** VPO**

Attributed to the advanced signal processing technique, VPO, the grayscale display of waveforms shown on GDS-2000A Series distinguishes the signals from one another according to their occurrence frequencies respectively. Based on the same statistics technology used for grayscale display, the color mode can be selected to differentiate the occurrence frequencies among various waveforms on the screen.

*** 2Mega Point Record Length**

With the collaboration of 2Mega point record length, the 2GSa/s sampling rate can bring the waveform acquisition into full play. During a certain period, sufficient record length is necessary for the input signal to be acquired under a high sampling rate. The long memory gives the benefit of mass data acquisition, however, also brings up a challenge on how to quickly find the waveform sections or events of interest within the whole memory length.

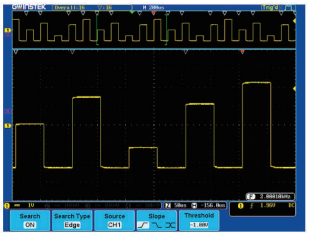
B. ZOOM WINDOW



Zoom Window

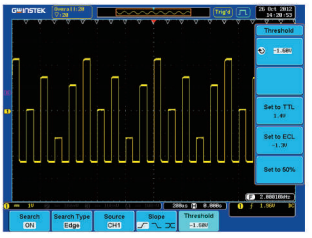
The GDS-2000A Series is equipped with Zoom Window feature which enables users to display the detailed zoomed waveform located by the Zoom Window. Under Zoom mode, the entire inbound waveforms and Zoom range cursors are displayed in the upper window, and the waveform details in the Zoom window are displayed in the bottom window. Users can tune the zoomed range by adjusting Time/Div selection, and pan the window by rotating the scrolling knob position.

C. PLAY / PAUSE



The Play/Pause button (▶ / II) on the front panel can be controlled to automatically browse the entire inbound waveforms by moving the Zoom window across the display, which enables user to further investigate the events of interest. The browse speed and the rolling direction of the zoomed screen can be adjusted based on users' requirements. The rolling screen can be paused by pressing “pause” button. Collaborating with search markers, the Play/Pause function substantially facilitates the time-consuming task to locate and examine the events of interest at different spots within the whole memory.

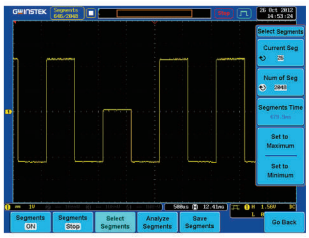
D. WAVEFORM SEARCH AND MARKERS

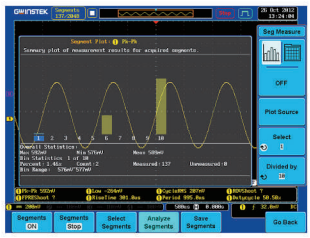


2Mega point record length means that actually there are over thousands of waveform data points being processed and displayed in all times. Impact on engineers is how they can access the events of interest efficiently amongst the huge amount of data. the GDS-2000A Series offers the Search functions to accelerate the navigation over the whole waveform data so that the engineers can locate the events of interests with efficiency. The searching conditions of waveform are set by selecting Search Type and specifying the Threshold settings. All the complying waveforms will be marked and the total amount of events will be counted and displayed. User can use the forward or backward arrow key to navigate the events of interest from one to another. Press Set/Clear button to place (or clear) the marker on the waveform.

There are four search types including Edge, Pulse Width, Runt and Rise/Fall Times to be selected. Additional type of Bus can be selected in case that the digital channel is equipped.

E. SEGMENTED MEMORY





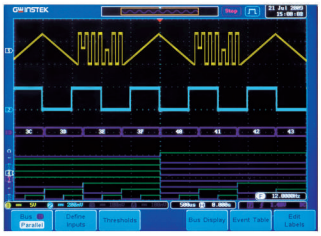
In the system and circuit development, engineers spend most of their time and resource on diagnosis and troubleshooting with DSO. In many cases, only small part of waveform data is of the real concern. Consequently, the efficiency of memory space utilization has been raised- if DSO only processes the concerned waveforms and ignores the irrelevant ones- , which means more data can be processed within the 2Mega memory.

The GDS-2000A Series possesses advantages of Segmented Memory as mentioned above. When being activated, the 2M memory is divided into a number of segments specified by the user. According to the trigger condition, 1k point data will be stored in each segmented memory. The maximum amount of segments is up to 2,048 with 8ns resolution. This is useful for analyzing the serial bus decoding, pulse, jitter glitch, runt, and inrush waveforms.

Repeatedly press the Play/ Pause button (▶ / ll) key can play the segment from the first to the last, as well as pause and replay backwards. Controlling the Variable scrolling knob facilitates the playing speed, therefore, the users can make a swift jump to one particular segment among all. Moreover, Segment Analysis can be used for statistics analysis.

F. MIXED SIGNAL OSCILLOSCOPE (MSO)

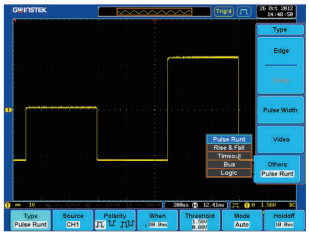
Logic Analyzer Module



With a plug-in 8 or 16 digital channels module, a 12 or 20-channel MSO can be upgraded from DSO by on-site installation. The analysis and decoding functions of parallel bus and serial bus such as I^2C, SPI, and UART will be processed after the module installation.

Besides, it can measure digital and analog signal of embedded circuit design under an appropriate triggering mode. This further analyzes whether the timing sequence is correct or not.

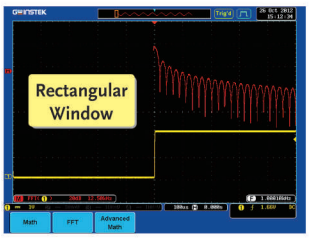
G. COMPLETE TRIGGER FUNCTIONS AND 36 AUTOMATIC MEASUREMENTS

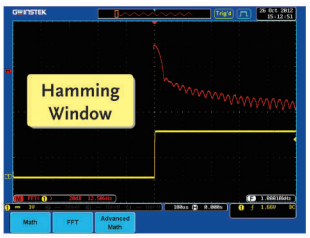


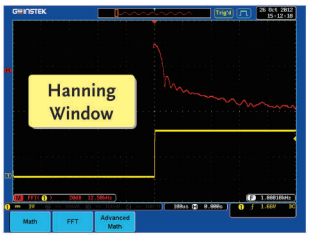
The GDS-2000A Series offers abundant trigger functions. In addition to the Edge, Delay, Pulse Width, Alternate, Single, Rise & Fall Time Trigger, the GDS-2000A Series also provides Video and Runt Trigger. The analysis and decoding functions of parallel bus and serial bus such as I^2C, SPI, and UART are supported after the 8 or 16 digital channels module is installed. Complete Trigger Functions make the GDS-2000A Series a powerful tool in its class for capturing and analyzing any kind of signals.

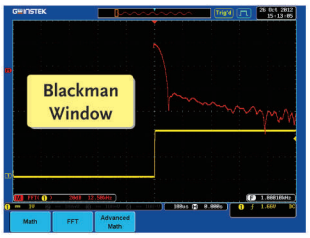
The GDS-2000A Series offers up to 36 waveform measurements, including voltage/current, time/frequency, and delay measurements. 8 out of 36 measurements can be selected to simultaneously display on one single screen. With statistics mode, users can analyze mean, maximum, minimum, and standard deviation of the captured waveform. With the great amount of the analyzing statistics, users may ensure the integrity of the signal and the abnormal waveforms.

H. FFT AND MATH OPERATION FUNCTIONS

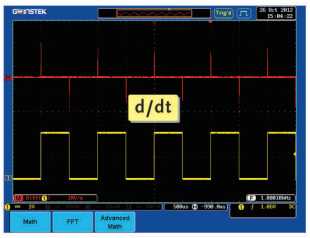


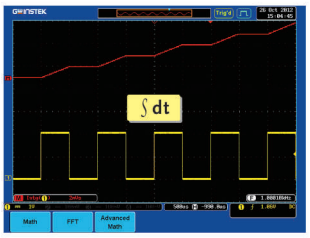






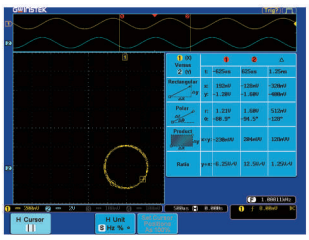
The FFT (Fast Fourier Transform) function of the GDS-2000A Series supports Rectangular, Hamming, Hanning , and Blackman Window Functions. Users can choose one window function based on the input signal type and the specific application. In order to provide the best observation condition, the zoom-in and shift functions for both horizontal and vertical axis are designed to be adjustment. Besides, the vertical unit is selectable among dBuV RMS and Linear RMS as well.





In addition to the general math operations, the advanced math operation like integral, derivative and square root are provided to predict or simulate the behaviors of integrator, differentiator and square root circuit for input signal to fulfill the applications of research and development.

I. X-Y MODE

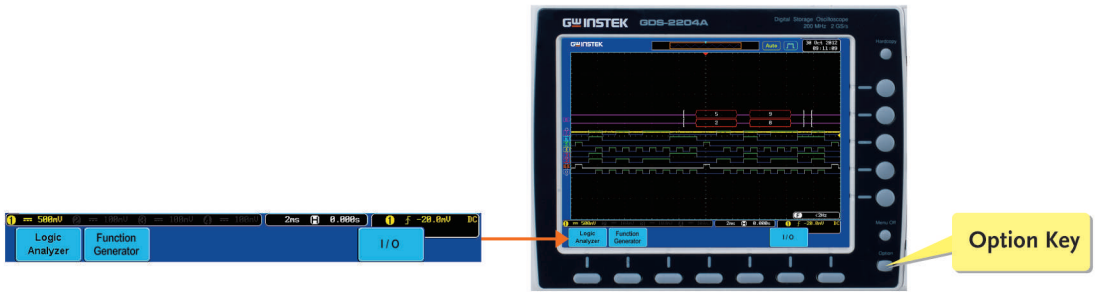


The X-Y mode of GDS-2000A Series defines CH1 and CH3 as the horizontal axis and CH2 and CH4 as the vertical axis, allowing the display of 2 sets of X-Y patterns simultaneously. The measurement items include Rectangular, Polar, Product, and Ratio that fits most of the popular X-Y applications. Dissimilar from traditional oscilloscopes, the GDS-2000A Series can concurrently display input signal and X-Y measurement results on the screen. The applications of X-Y mode include Lissajous figure plot, and IQ constellation diagram.l.

J. FREE REMOTE CONTROL SOFTWARE

Using a USB port accommodated with FreeWave remote monitoring software is the convenient way to capture data from the GDS-2000A Series. With FreeWave, a screenshot can be saved as an image file (.bmp/.jpg), waveform data (.csv). Not only can FreeWave monitor and record waveforms over a long period of time, but previous recorded waveforms can also be examined. Thus, instrument settings can be configured without the need to learn incomprehensible command line syntax. Free Wave enables the users to reach measurement goals of remote control without tedious procedure.

K. OPTION KEY

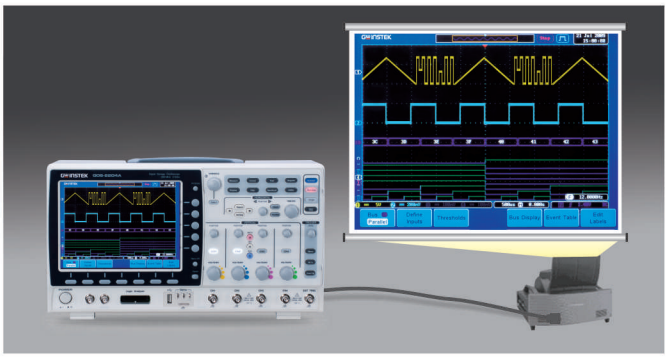


The GDS-2000A Series provides shortcut Option key to simplify the operation of optional modules. With the shortcut button, the highlighted functions such as selected software, logic analyzer, function generator and communication interfaces can subsequently be switched for various measurements and communication interfaces operations.

L. OPTION OF DDS SIGNAL GENERATORS

The GDS-2000A Series provides the options of two sets of 3MHz function generators that can generate diverse waveforms such as sine, square, triangle, and pulse waveforms. With this stimulus source, the electrical characteristics and functionality of DUT can be tested in one GDS-2000A Series, which fulfills measurement requirements from omni-dimensions.

M. VARIOUS INTERFACES SUPPORT



Two standard USB interfaces located at both front panel and rear panel are used for easy access of stored data. USB device port at the rear panel is available for remote control or a hardcopy print-out through a PictBridge compatible printer. SVGA/LAN interfaces module (option), and GPIB interface module (option) are provided for ATE applications. SVGA video output (on the same card with LAN) allows the screen image being transferred to external projector or large display screens.

SPECIFICATIONS

		GDS-2072A	GDS-2074A	GDS-2102A	GDS-2104A	GDS-2202A	GDS-2204A	GDS-2302A	GDS-2304A
VERTICAL	**Channels**	2Ch+EXT	4Ch+EXT	2Ch+EXT	4Ch+EXT	2Ch+EXT	4Ch+EXT	2Ch+EXT	4Ch+EXT
	Bandwidth **Rise Time** **Bandwidth Limit**	DC~70MHz(-3dB) 5ns 20MHz		DC~100MHz(-3dB) 3.5ns 20MHz		DC~200MHz(-3dB) 1.75ns 20M/100MHz		DC~300MHz(-3dB) 1.17ns 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	300V (DC+AC Peak), 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, FFTrms, 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-Harris							
TRIGGER	**Source**	Ch1 ,CH2, CH3*, CH4*, Line, EXT, 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, 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, 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 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 TTL open collector output							
	Kensington Style Lock	Rear-panel security slot connects to standard Kensington-style lock							
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^2C, SPI, UART), 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							
POWER SOURCE MISCELLANEOUS	**Line Voltage Range**	AC 100V ~ 240V, 48Hz ~ 63Hz, 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								

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

Specifications subject to change without notice. DS-2000AGD1BH

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

Quick start guide , User manual CD x 1, Power cord x 1

GTP-070A-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
DS2-8LA	8-Channel Logic Analyzer : includes 8-Channel Logic Analyzer Card(GLA-08)and 8-Channel Logic Analyzer Probe (GTL-08LA)
DS2-16LA	16-Channel Logic Analyzer includes 16 Channel Logic Analyzer Card(GLA-16) and 16-Channel Logic Analyzer Probe (GTL-16LA)

OPTION ACCESSORIES

GTL-08LA	8-Channel Logic Analyzer Probe
GTL-16LA	16-Channel Logic Analyzer Probe
GLA-08	8-Channel Logic Analyzer Card
GLA-16	16-Channel Logic Analyzer Card

FREE DOWNLOAD

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

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