

MTP300C

Mobile Radio Test Platform

Data Sheet





Introduction

In the environment of ever-changing wireless communications technologies, TESCO enables you to test a variety of wireless technology standards with one-box platform type equipment, MTP300C.

MTP300C is not only fast and accurate but also light and user-friendly to work with. It is an optimized product to run quick and precise tests in mass production as well as R&D of diverse wireless devices.

MTP300C, with its SDR-based system, can change the target of measurement by either modifying or upgrading loaded software without hardware change. This makes MTP300C to be an efficient and economical testing system in the long term, while sufficing the various needs of customers.

Features

Diverse Wireless Communicates Technologies Supported by 1 Set of Equipment

- **Wide Frequency Range (2400 MHz ~ 2500 MHz, 4900MHz ~ 7200MHz)**

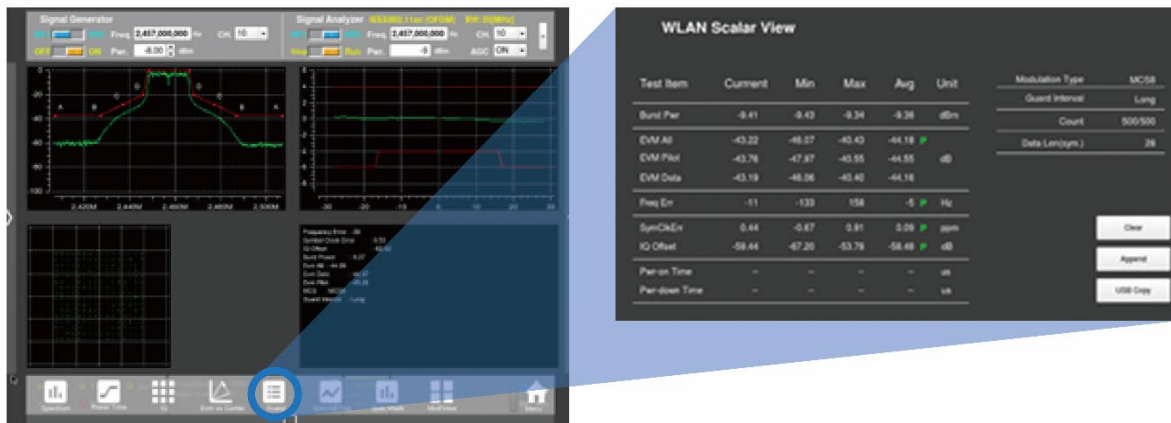
Covering a wide range of frequency from 2400 MHz to 2500 MHz and 4900 MHz to 7200 MHz, it is possible to choose the frequency range for various standards.

- **Expandability Based on SDR (Software Defined Radio)**

MTP300C can measure expanding variety of RF wireless technologies through software upgrade without hardware change.

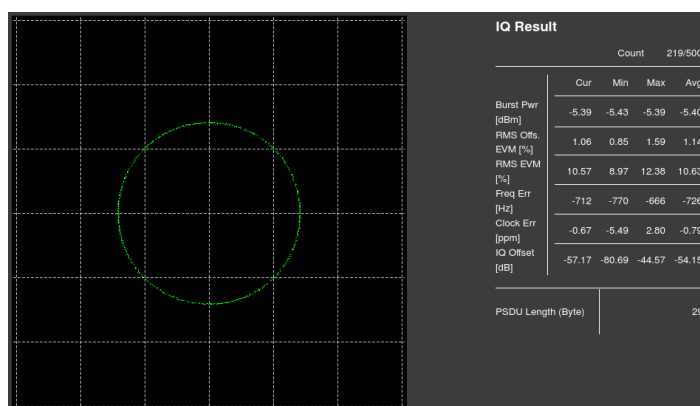
WLAN and Bluetooth Test Support

- WLAN IEEE802. 11a/b/g/n/p/ac/ax Test Support (Non-signaling Test)**
 - IEEE802. 11 a/b/g/n support (S300C-W01 option)
 - IEEE802. 11 ac 80 & 160 MHz bandwidth support (S300C-W02 option)
 - IEEE802. 11p support (specialized in vehicle communications system) (S300C-W03 option)
 - IEEE802. 11ax 160 MHz Bandwidth, 1024-QAM support (Wi-Fi 6E, 2.4 GHz & 5 GHz&6GHz) (S300C-W04 option)
 - Provides WLAN-specialized measuring functions (Spectrum, EVM Constellation, Power-Time, EMV vs Carrier, Spectral Flatness, Spectrum Mask)
 - Provides Scalar function to measure RF test items frequently used in mass production at once.



- Support Bluetooth v5.3 Standard**
 - Bluetooth v5.3 Specification Compliant
 - Bluetooth signaling test support
 - Bluetooth non-signaling test support
 - Provides BR, EDR test cases and diverse Bluetooth measuring functions
 - Bluetooth Low Energy test cases and measuring functions
 - Supports Audio (SCO Link) Functional Testing (Headset, A2DP audio profile)

- ZigBee IEEE802. 15. 4 Support**
 - IEEE802. 15. 4 OQPSK PHY support
 - Provides ZigBee-specialized measuring functions (Spectrum, Power Time, IQ Constellation, EVM)



- **Optimized for Mass Production**

- With two RF ports supporting dual or parallel tests, it fits for various producing solutions to cut the cost.
- Easy to use in production lines with 2U full rack size.
- Expandable to many wireless standards and economical.

- **Easy Remote Controlling System**

MTP300C provides easy remote control through VISA library.

Also, its SCPI standard commands can minimize the effort and time required to establish a test system in production line.

- **Provides Custom Made Testing Solution**

TESCOM offers custom made wireless measuring environment for each customer to help mobile device production.

In comprehensive measuring perspective rather than one testing instrument, the optimal testing solution is provided with our shield boxes, antenna couplers, fixtures, and automation software.

- **Low Cost**

The most effective solution at the lowest cost.

Ordering Information

Order No.	Description
MTP 300C Basic Model B300C-00	WIDE-BAND Radio Tester (H/W), Basic
WiFi Options	
S300C-W01	WLAN IEEE 802.11a/b/g/n Option
S300C-W02	WLAN IEEE 802.11ac Option
S300C-W03	WLAN IEEE 802.11p Option
S300C-W04	WLAN IEEE 802.11ax Option (WIFI6E)
Bluetooth Options	
S300C-B01	Classic Bluetooth BR(Basic rate), EDR Option
S300C-B02	Bluetooth Low-energy Option
S300C-B03	Audio Option
Zigbee Option	
S300C-Z01	Zigbee IEEE 802.15.4 Option

Mechanical Specifications

1. General RF Generator

Frequency Range	2400 MHz to 2500 MHz, 4900 MHz to 7200 MHz
Frequency Resolution	10 Hz
Frequency Uncertainty	Same as timebase + frequency resolution

Output Power Range (Continuous Wave)		
RF1 Port, RF2 Port	2400 MHz to 2500 MHz 4900 MHz to 7200 MHz	- 100 dBm to +5 dBm
Output Level Uncertainty		
RF1 Port, RF2 Port	Output level \geq -80 dBm Output level $<$ -80 dBm	$< \pm 1.0$ dB $< \pm 1.4$ dB
Output Level Resolution		
RF1 Port, RF2 Port	2400 MHz to 2500 MHz 4900 MHz to 7200 MHz	0.01 dB
Output Level Repeatability		
RF1 Port, RF2 Port	Output level \geq -80 dBm Output level $<$ -80 dBm	$< \pm 0.15$ dB $< \pm 0.40$ dB
VSWR		
RF1 Port, RF2 Port	2400 MHz to 2500 MHz 4900 MHz to 7200 MHz	< 1.4
harmonic response (2 nd)		
RF1 Port, RF2 Port	2400 MHz to 2500 MHz 4900 MHz to 7200 MHz	< -40 dBc
harmonic response (3 rd)		
RF1 Port, RF2 Port	2400 MHz to 2500 MHz 4900 MHz to 7200 MHz	< -40 dBc
Phase Noise		
RF1 Port, RF2 Port	2400 MHz to 2500 MHz	< -90 dBc (Carrier offset: 1 kHz) < -100 dBc (Carrier offset: 10 kHz) < -110 dBc (Carrier offset: 100 kHz)
	4900 MHz to 7200 MHz	< -90 dBc (Carrier offset: 1 kHz) < -100 dBc (Carrier offset: 10 kHz) < -105 dBc (Carrier offset: 100 kHz)
RMS Phase Jitter		
RF1 Port, RF2 Port	2400 MHz to 2500 MHz 4900 MHz to 7200 MHz	< 0.45 degrees (100 Hz to 10 MHz)
CW Output Spurious		
RF1 Port, RF2 Port	2400 MHz to 2500 MHz 4900 MHz to 7200 MHz	Inband Spurious (BW=80 MHz): < -40 dBc Outband Spurious (BW=80 MHz): < -40 dBc
CW Output AM Noise		
RF1 Port, RF2 Port	2400 MHz to 2500 MHz 4900 MHz to 7200 MHz	RMS $< \pm 0.5\%$ Peak $< \pm 1.0\%$
TX SNR (Continuous Wave)		
RF1 Port, RF2 Port	2400 MHz to 2500 MHz 4900 MHz to 7200 MHz (Port Max Power, 5 MHz offset from carrier)	> 90 dB, 1 kHz

2. General RF Analyzer

Frequency Range	2400 MHz to 2500 MHz, 4900 MHz to 7200 MHz
Frequency Resolution	10 Hz
Frequency Uncertainty	Same as timebase + frequency resolution

Input Power Range (Continuous Wave)		
RF1 Port, RF2 Port	2400 MHz to 2500 MHz 4900 MHz to 7200 MHz	-80 dBm to +25 dBm
Input Level Uncertainty		
RF1 Port, RF2 Port	+25 dBm \geq P \geq -60 dBm -60 dBm $>$ P \geq -80 dBm	< \pm 1.0 dB < \pm 1.2 dB
Input Spectrum Flatness [100 MHz Span]		
RF1 Port, RF2 Port	2400 MHz to 2500 MHz 4900 MHz to 7200 MHz	< \pm 1.0 dB
Input Level Resolution		
RF1 Port, RF2 Port	2400 MHz to 2500 MHz 4900 MHz to 7200 MHz	0.01 dB

VSWR		
RF1 Port, RF2 Port	2400 MHz to 2500 MHz 4900 MHz to 7200 MHz	< 1.4

Spurious Response		
RF1 Port, Port RF2	2400 MHz to 2500 MHz (at Max input level) 4900 MHz to 7200 MHz (at Max input level)	Spurious < -40 dBc

Harmonic Response (2 nd)		
RF1 Port, RF2 Port	f_{1n} =1200 MHz to 1250 MHz f_{2nd} =2400 MHz to 2500 MHz f_{1n} =2450 MHz to 3600 MHz f_{2nd} =4900 MHz to 7200 MHz	< -40 dBc < -40 dBc

Harmonic Response (3 rd)		
RF1 Port, RF2 Port	f_{1n} =800 MHz to 834 MHz f_{3rd} =2400 MHz to 2502 MHz	< -60 dBc
	f_{1n} =1666 MHz to 2400 MHz f_{3rd} =4900 MHz to 7200 MHz	< -60 dBc

Phase Noise		
RF1 Port, RF2 Port	2400 MHz to 2500 MHz	< -90 dBc (Carrier offset: 1 kHz) < -100 dBc (Carrier offset: 10 kHz) < -110 dBc (Carrier offset: 100 kHz)

Spurious Response	4900 MHz to 7200 MHz	< -90 dBc (Carrier offset: 1 kHz) < -100 dBc (Carrier offset: 10 kHz) < -105 dBc (Carrier offset: 100 kHz)
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RMS Phase Jitter		
RF1 Port, RF2 Port	2400 MHz to 2500 MHz 4900 MHz to 7200 MHz	< 0.45 degrees (100 Hz ~ 10 MHz)

2-1. GPRF Power Meter

Frequency Range	2400 MHz to 2500 MHz, 4900 MHz to 7200 MHz	
Bandwidth	5 MHz, 10 MHz, 20 MHz	
Detector	RMS	
DANL (Displayed Average Noise Level)	REF PW > -20 dBm, 2400 MHz to 2500 MHz, 4900 MHz to 7200 MHz Bandwidth: 5 MHz	> 60 dB

Input Power Range	Bandwidth: 5 MHz	-80 dBm to +25 dBm
Input Level uncertainty	Center frequency and peak detector	See the general RF Analyzer

2-2. GPRF Spectrum Measurements

Frequency Range	See general RF Analyzer	
Frequency Resolution	See general RF Analyzer	
Frequency Span	25 MHz, 50 MHz, 100 MHz	
Detector	Average, Peak	
Dynamic Range	REF PW > -10 dBm, 2400 MHz to 2500 MHz, 4900 MHz to 7200 MHz SPAN: 25 MHz (Equivalent to RBW -> 29 kHz)	> 55 dB
Input Power Range	See general RF Analyzer	
Input Level Uncertainty	Center frequency and peak detector	See general RF Analyzer

3. Timebase

Oscillator Type	OCXO	
Max. frequency Drift	+15 °C to +35 °C, referenced to +25 °C	< ±0.05 ppm
Maximum Aging	< ±0.1 ppm / year	
Warm-up Time	To within ±0.1 ppm at 25 °C	< 30 min

4. RF Port Isolation

Transmit (Output) Isolation	RF1 Port (Output) → RF2 Port (Coupling Power)	< -100 dB
	RF2 Port (Output) → RF1 Port (Coupling Power)	< -100 dB
Receive (Input) Isolation	RF1 Port (Input) → RF2 Port (Coupling Power)	< -100 dB
	RF2 Port (Input) → RF1 Port (Coupling Power)	< -100 dB

5. Reference Port (BNC connector, Rear Panel)

Reference Input Port	10 MHz Input Frequency Range	< ±1.0 ppm
	10 MHz Input Power Level Range	-5 dBm to +10 dBm
	Impedance	50 Ω
Reference Output Port	10 MHz Frequency Accuracy	< ±0.05 ppm
	Output Power Range	+9 dBm to +15 dBm
	Impedance	50 Ω

WLAN Specifications

Standard: IEEE 802.11 a/b/g/n/p/ac/ax

1. WLAN RF Generator

Frequency Range		
RF1 Port, RF2 Port	WLAN IEEE 802.11b/g/n (2.4 GHz band)	2400 MHz to 2500 MHz
	WLAN IEEE 802.11a/n/p/ac/ax (5 GHz band)	4900 MHz to 6000 MHz
	WLAN IEEE 802.11ax (6 GHz band)	6000 MHz to 7200 MHz
Output Burst Power Level Range (DSSS)		
RF1 Port, RF2 Port	2400 MHz to 2500 MHz	-100 dBm to +5 dBm
Output Burst Power Level Range (OFDM)		
RF1 Port, RF2 Port	2400 MHz to 2500 MHz 4900 MHz to 7200 MHz	-100 dBm to -5 dBm
RMS EVM (Typical)		
RF1 Port, RF2 Port	2400 MHz to 2500 MHz (IEEE 802.11b: 20 MHz)	< 2 %, RMS < 4 %, peak
	2400 MHz to 2500 MHz (IEEE 802.11g/n: 20/40 MHz)	< -45 dB
	4900 MHz to 7200 MHz (IEEE 802.11a/n/ac/ax: 20/40/80 MHz)	< -42 dB
	4900 MHz to 7200 MHz (IEEE 802.11ac/ax: 160 MHz)	< -40 dB
Spectral Flatness (RF1 Port, RF2 Port)		
IEEE 802.11a/g/n/ac/ax (20 MHz / 40 MHz)	A-B	< ±0.5 dB
	B-D	< ±1.0 dB
IEEE 802.11ac/ax (80 MHz)	A-B	< +1.0 dB
	B-D	< +1.0 dB
IEEE 802.11ac/ax (160 MHz)	A-B	< +1.0 dB
	B-D	< +1.5 dB
Carrier Suppression		
RF1 Port, RF2 Port	IEEE 802.11b	> 45 dB
Transmit Power-on and Power-down Ramp		
RF1 Port, RF2 Port	IEEE 802.11b	< 2 us

1-1. WLAN Waveform Creator (PC Software)

Arbitrary Waveform Files	WLAN IEEE 802.11b DSSS, DBPSK/DQPSK/CCK WLAN IEEE 802.11a/g/n/p OFDM, 64QAM WLAN IEEE 802.11 ac OFDM, 256QAM WLAN IEEE 802.11 ax OFDM, Single-User 1024QAM	xxxxxx.twf
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2. WLAN RF Analyzer

Frequency Range	WLAN IEEE 802.11b/g/n (2.4 GHz band)	2400 MHz to 2500 MHz
	WLAN IEEE 802.11a/n/p/ac/ax (5 GHz band)	4900 MHz to 6000 MHz
	WLAN IEEE 802.11ax (6 GHz band)	6000 MHz to 7200 MHz
Statistics	Statistical count	1 to 100
	Values	Current, average, minimum, maximum, standard deviation

2-1. Modulation Analysis

Bandwidth	5 MHz, 10 MHz, 20 MHz, 40 MHz, 80 MHz, 160 MHz
Level range (RF1 Port, RF2 Port)	Port Max Power to -30 dBm
Payload length	≥ 16 symbols

Measured Parameters		
Scalar View	IEEE 802.11a/g/n/p/ac/ax	Modulation Type, Guard Interval, Data Length Burst Power EVM All, EVM Pilot, EVM Data Center Frequency Error Symbol Clock Error I/Q Offset
	IEEE 802.11b	Modulation Type, Guard Interval, Data Length Burst Power RMS EVM, Peak EVM, 1k Chips EVM Center Frequency Error Chip Clock Error Carrier Suppression
Graphical	IEEE 802.11a / g / n / p / ac / ax	Spectrum Measurement Power vs. Time EVM vs. Carrier EVM vs. Symbol IQ Constellation Spectral Flatness Spectrum Mask
	IEEE 802.11b	Spectrum Measurement Power vs. Time IQ Constellation Spectrum Mask

Residual RMS EVM(Average 10 Times, Input level > -30 dBm)		
RF1 Port / RF2 Port	2400 MHz to 2500 MHz (IEEE 802.11b: 20 MHz)	< 2 %, RMS < 4 %, Peak
	2400 MHz to 2500 MHz (IEEE 802.11g/n: 20/40 MHz)	< -46 dB
	4900 MHz to 7200 MHz (IEEE 802.11a/n/ac/ax: 20/40 MHz)	< -44 dB
	4900 MHz to 7200 MHz (IEEE 802.11ac/ax: 80 MHz)	< -43 dB
	4900 MHz to 7200 MHz (IEEE 802.11ac/ax: 160 MHz)	< -42 dB

IQ Offset (Average 10 Times)		
RF1 Port, RF2 Port	2400 MHz to 2500 MHz 4900 MHz to 7200 MHz	< -45 dBc
Center Frequency Error (Average 10 Times)		
RF1 Port, RF2 Port	2400 MHz to 2500 MHz 4900 MHz to 7200 MHz	< ±0.5 ppm
Symbol Clock Error (Average 10 Times)		
RF1 Port, RF2 Port	2400 MHz to 2500 MHz 4900 MHz to 7200 MHz	< ±0.5 ppm
Spectrum Flatness (Average 10 Times)		
RF1 Port, RF2 Port	2400 MHz to 2500 MHz 4900 MHz to 7200 MHz	< ±0.5 ppm < ±1.0 ppm

Bluetooth Specifications

Standard
Bluetooth Core Specification Version 5.3 RF. TS. P33 / RF-PHY. TS. P20

1. Bluetooth RF Generator

Frequency Range	
RF1 Port, RF2 Port	2400 MHz to 2500 MHz

GFSK Modulation	
GFSK bit rate	1 Mbps, B X T = 0.5
Modulation index	Basic Rate 0.32 Bluetooth Low Energy 0.5
Modulation index range	Basic Rate 0.28 ~ 0.35 Bluetooth Low Energy 0.45 ~ 0.55
Modulation index resolution	0.01

DPSK Modulation		
π/4 DQPSK bit rate	2-DHx packet types	2 Mbps
8DPSK bit rate	3-DHx packet types	3 Mbps
Symbol rate	1 Mbps	

Output Burst Power Level Range	
RF1 Port, RF2 Port	See general RF generator

Output Level Uncertainty	
RF1 Port, RF2 Port	See general RF generator

Dirty TX (Dirty mode ON)	
Frequency offset range	±100 kHz
Frequency offset range resolution	1 kHz
Modulation index	Basic Rate 0.28 ~ 0.35 Bluetooth Low Energy 0.45 ~ 0.55
Drift (sinusoidal with)	Deviation ±25 kHz (single slot), ±50 kHz (multi-slot),

(Basic Rate)	Modulation frequency	1600 Hz (single slot) 500 Hz (3 slot), 300 Hz (5 slot)
Drift (sinusoidal with) (EDR)	Deviation Modulation period	±10 kHz 100 us
Drift (sinusoidal with) (Bluetooth Low Energy)	Deviation Modulation frequency	±50 kHz 625 Hz

2. Bluetooth RF Analyzer

Frequency Range		
RF1 Port, RF2 Port	2400 MHz to 2500 MHz	
Sampling Rate	40 MHz	
Spectrum RBW	~ 40 kHz at 10 MHz span	
Level Range	Port Max Power to -80dBm	

GFSK Analyzer		
Frequency deviation resolution	100 Hz	
Payload length	≥ 3 bytes	

Measured parameters		
Scalar View	Bluetooth Low Energy	Average Power
		Power ripple
		Frequency Deviation
		Frequency Drift
Graphical	Basic Rate, EDR, Low Energy	Max. Drift Rate
		Initial Frequency Drift
		Bits above threshold
	Basic Rate, EDR	Spectrum
		Power vs. Time
		Modulation vs. Time
Bluetooth Low Energy	Power vs. Channel	
	Constellation	
		PER measurement

3. Bluetooth Test Cases

Transmitter Tests		
RF.TS. p33	RF/TRM/CA/BV-01 ~ 16	
Receiver Tests		
RF.TS. p33	RF/RCV/CA/BV-01, 02, 06, 07, 08, 10	

4. Bluetooth Low Energy Test Cases

Transmitter Tests		
RF-PHY.TS.p20	RFPHY/TRM/BV-01, 03, 05, 06, 08 ~ 23 RFPHY/TRM/PS/BV-01 ~ 04	

Receiver Tests

RF-PHY.TS.p18	RFPHY/RCV/BV-01, 06 ~ 08, 12 ~ 14, 18 ~ 20, 24 ~ 27, 30 ~ 33, 36, 37 RFPHY/RCV/IQC/BV-01 ~ 06 RFPHY/RCV/IQDR/BV-07 ~ 12
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5. BLE Direct Test Mode methods for DUT

HCI Interface (Accessible Host Controller Interface)

Front Panel USB 2.0	USB cable	Direct connection
Rear Panel UART(BT)	RS-232C type cable	Direct connection

2-Wire UART Interface (Non-ACCESSIBLE Host Controller Interface)

Rear Panel UART(BT)	RS-232C type cable	Direct connection
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Zigbee Specifications

Standard	IEEE 802.15.4
Frequency Range	See general RF generator

Offset EVM

RF1 Port, RF2 Port	OQPSK PHY 2450 MHz	< 3 % @ -50 dBm, RMS < 8 % @ -50 dBm, Peak
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EVM (Typical)

RF1 Port, RF2 Port	OQPSK PHY 2450 MHz	< 10 % @ -50 dBm, RMS < 20 % @ -50 dBm, Peak
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1. Zigbee RF Generator

Output Burst Power Level Range

RF1 Port, RF2 Port	See general RF generator
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2. Zigbee RF Analyzer

Frequency Range	See general RF Analyzer
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2-1. Modulation Analysis

Supported PHY	OQPSK	2450 MHz
Level Range	RF1 Port, RF2 Port	Port Max Power to -50 dBm

Measured Parameters		
Scalar View	Supported PHY	PSDU Length
		Burst Power
Graphical	Supported PHY	RMS Offset EVM, Peak Offset EVM
		RMS EVM, Peak EVM
		Center Frequency Error
		Symbol Clock Error
		I/Q Offset
Graphical	Supported PHY	Spectrum Measurement
		Power vs. Time
		EVM vs. Chip
		IQ Constellation (IQ Chip)

Offset EVM		
RF1 Port / RF2 Port	Supported PHY	< 3 %, RMS < 8 %, Peak

IQ Offset (Average 10 Times)		
RF1 Port, RF2 Port	Supported PHY	< -40 dBc
Center Frequency Error (Average 10 Times)		
RF1 Port, RF2 Port	Supported PHY	< ±1.0 ppm
Symbol Clock Error (Average 10 Times)		
RF1 Port, RF2 Port	Supported PHY	< ±3.0 ppm

Port Descriptions

1. Front Panel

I/O	Function	Type
Soft Power Button	Power on/off	Push on/off button
RF Port 1(TDD)	One-way I/O port (Half-Duplex IN/OUT Port)	N Type, Female, 50 Ω
RF Port 2(TDD)	One-way I/O port (Half-Duplex IN/OUT Port)	N Type, Female, 50 Ω
Ref. Int/Ext LED	10 MHz reference indicator	LED indicator
Error LED	Hardware errors and warnings, Remote queue warnings	LED indicator
Remote LED	Remote control indicator	LED indicator
Ready LED	Status indicator	LED indicator
Multi	TBD	LED indicator
RF Port1(TDD) LED	VSA Input - IN LED green VSG Output - OUT LED green	LED indicator
RF Port2(TDD) LED	VSA Input - IN LED green VSG Output - OUT LED green	LED indicator
USB 2.0	USB 2.0 compatible connection to external controller	2 x USB 2.0 type A connector

2. Rear Panel

2-1. Remote Control Interfaces

I/O	Function	Type
LAN	TCP/IP interface	Ethernet RJ-45 connector, 1Gbps

2-2. General I/O

I/O	Function	Type
10 MHz Ref Input	10 MHz reference input	BNC female
10 MHz Ref Output	10 MHz reference output	BNC female
VGA	For using an external monitor.	HDMI connector
USB 3.0	USB 3.0 compatible connection to external controller	USB 3.0 type A connector
Normal / Recovery Switch	OS Recovery Download at Recovery Switch	Select Type Switch
AC In	AC power input	Power Switch & Fuse (Spare included)
	Rated voltage	100 ~ 240 VAC (±10 %)
	Rated frequency	50 Hz to 60 Hz (±5 %)
	Power consumption	< 100 W(Maximum), < 75 W(Typical) < 10 W(Standby),

General and Environmental

Temperature	Operating temperature range	+5 °C to +45 °C
	Storage temperature range	-5 °C to +55 °C
	Specification validity temperature	+15 °C to +35 °C
Dimension	440 mm W x 439 mm D x 100.5 mm H	
Weight	8.0 kg	
Packing Size	540 mm W x 540 mm D x 240 mm H	
Packing weight	Approx. 10.0 kg	
Recommended Calibration Period	12 months	
Warranty	12 months	

* The size or weight of a package may vary depending on how the product is packed.

