

# MTX642

Dual 400G Portable Test Set  
400G Down to 10M Ethernet Testing



True All-in-One, from 10M to 400GE  
Dual test ports for all interfaces  
Up to two independent tests  
Best-in-class intelligent cooling system

NEW



## Compact 2x400GE multi-service handheld test set

VeEX MTX642 is the industry's most compact dual 400GE portable test solution. With a 7-inch capacitive LCD and intuitive user interface, it is the fastest to operate, and most flexible 400GE solution. From boot-up to dual 400GE testing in under two minutes, the MTX642 is truly in a class of its own. The MTX642 supports the latest tests interfaces, RJ45 to QSFPDD, commonly found in the Core, Metro, Datacenter, and Access Network applications.

## Highlights

The MTX642 is an advanced handheld test solution designed with dual test engines, enabling comprehensive support for both legacy and next-generation optical transceiver form factors across a broad spectrum of applications, including Transport, Core, Metro, P2P links, DCI, transceivers, AOC, AEC, ACC, DAC, and breakout testing. It also offers native RJ45 (copper) interface support for rates up to 10G BASE-T, addressing the requirements of modern multi-gigabit access services.

Optimized for fast field operations, the MTX642 goes from power-up to dual 400GE testing in under two minutes, making it exceptionally suited for time-critical tasks, such as troubleshooting transceiver, network equipment verification, installation, maintenance, and commissioning tasks. With the industry-wide adoption of 400GE, its intuitive graphical user interface (GUI) and smart, predefined configurations streamline the test process, empowering users to perform advanced testing immediately with application-specific test applications.

Representing a new standard in high-speed Ethernet (HSE) testing, the MTX642 is designed for user accessibility, minimizing onboarding time and simplifying complex test procedures for operators at any experience level. As a result, it is an essential tool for professionals engaged in high-speed Ethernet deployment.

- 2x400GE concurrent testing capabilities
- Offers dual ports for all pluggable optics form factors, required for AOC/DAC, fan-out and wrap-around tests (from 10M to 400GE)
- Native PAM4 hardware for best-in-class signal integrity (no adapters required)
- Supports testing for all common form factors, including QSFP-DD, QSFP56, SFP-DD, and SFP56 transceivers, DACs, AOCs, network equipment and 400GE links
- Wide range of supported 400GE interfaces, including 400GBASE-SR8, FR8, LR8, DR4, FR4, LR4, CR8, CR4 and 400ZR/ZR+
- Complete industry-standard Ethernet for Layers 2, 3 and 4
- Stateful TCP Performance Test up to 400GE
- I2C/MDIO registers Read and Write
- Per-lane PAM4 host pre-emphasis settings
- Signal integrity check with FEC codeword symbol errors distribution and Skew
- Transceiver power consumption monitoring (voltage, current) and variable voltage supply
- Internal and external (cage) QSFP-DD temperature monitoring with overheating protection
- Battery operation improves mobility and efficiency
- High-efficiency intelligent cooling system

## Test Ports

Supported Test Interface (Ports)	MTX642
2x QSFP-DD	●
2X QSFP56/QSFP28/QSFP+	●
2x SFP-DD/SFP56/SFP28	●
2x SFP+/SFP	●
2x RJ45	●
1x SMA Clock Input	●
1x SMA GPS/GNSS antenna	●
Test Applications	
400GE	●
200GE	●
100GE	●
50GE	●
40GE	●
25GE	●
10GE	●
1000BASE	●
100BASE	●
10/100/1000BASE-T	●
2.5G/5G/10GBASE-T	●

## Applications

- Bring-into-service, verification and troubleshooting of high-speed Ethernet links (Transport, Core, DCI, Node, Metro, Access, P2P)
- Optical transceivers verification
- DAC, ACC, AEC, and AOC verification, requiring full dual port capabilities
- Breakout tests
- Evaluation labs and field support
- Comprehensive test applications for layers 1-4, from 10M to 400GE
- Full rate 400GE Throughput and frame loss measurements
- PCS & RS-FEC layer testing
- PAM4 signal integrity testing with multi-lane unframed BERT
- I2C/MDIO verification and programming
- Advanced optical transceiver test
- Portable for field testing, evaluations, demonstrations, interop check, benchmarking, troubleshooting, link verification, etc
- Maintenance and troubleshooting of legacy transmission equipment, interfaces and links
- Robust construction and enhanced cooling for field applications



### PAM4 Interfaces

- Native PAM4 support for 400G QSFP-DD, QSFP56, SFP-DD, SFP56, transceivers
- 400GBASE-SR8, FR8, LR8, DR4, FR4, LR4, CR8, CR4, and 400ZR/ZR+
- Supports IEEE 802.3bs and MSA compliant transceivers
- 300W supply supporting power classes 1 through 8
- Cage temperature monitoring
- QSFP-DD high-temperature warning threshold, overheat protection and field-replaceable external QSFP-DD head cooling system
- Per-lane post and pre-emphasis settings
- Lane BERT with independent test patterns

### MDIO Read/Write

- Complete MDIO I2C access
- Raw read/write capability for all MDIO registers
- Formal display of commonly used fields
- Module hardware control pin read/write access

### Optical Power Measurement

- Global and per lane output enable/disable
- Received per lane and composite optical power level monitoring

### Transmit Clock Sources

- Internal 2.5 ppm VCXO and optional GPS 1PPS
- Recovered: from the incoming signal
- External: 1.544 MHz, 2.048 MHz, 10 MHz, BITS/1.544 Mbps, SETS/2.048 Mbps, and 1PPS via 50 Ohm SMA Connector

### Line Frequency Offset Generation

- Line frequency offset generation  $\pm 100$  ppm in steps of 0.1 ppm

### Line Frequency Measurement Capability

- Displays measured transmit line frequency in kHz
- Displays measured transmit line frequency offset from reference clock in current, min, max ppm
- Measures all lanes

### Stress Test: Pre and Post-FEC Test Suite

- Simple one button pass/fail test for verifying all transceiver properties
- Advanced user defined thresholds
- Simple test report includes settings, Pass/Fail, and detailed results
- Frequency pulling range stress test
- Pre and Post FEC test

### Advanced Optical Transceiver Test Suite

#### Applications

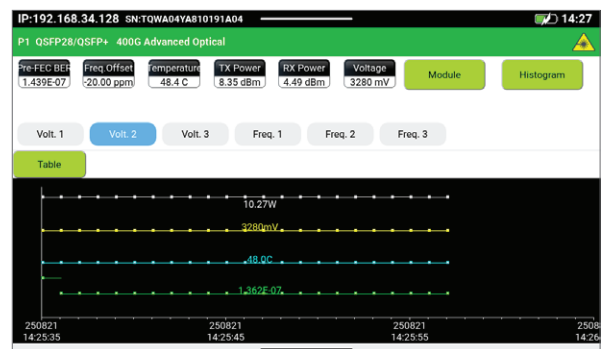
- Transceiver Check - A robust test suite for checking the health of optical transceivers, designed to validate the performance, reliability, and interoperability of high-speed transceivers such as QSFP-DD, QSFP56/28/+, SFP-DD, SFP56/28/+, and others. These tests help confirm signal integrity and module reliability under real-world conditions.

- Interoperability Assurance - Testing tools simulate various operating environments to ensure modules work across different platforms and vendors. This is especially important when integrating third-party components into existing systems. The I2C read/write access function also allows for deep diagnostics and settings to troubleshoot new vendors, models, early evaluation of samples (beta or alpha).
- Benchmarking different models and vendors

The Advanced Optical Transceiver Test Suite includes:

- Power Supply Voltage Sweep:  $\pm 5\%$  range to test voltage tolerance
- BER (Bit Error Rate) Performance: Customizable thresholds to assess signal integrity
- Clock Frequency Pulling Range:  $\pm 100$  ppm to simulate timing variations
- Pre-Emphasis Adjustment: For signal conditioning
- I2C Read/Write Access: For module diagnostics, settings and troubleshooting
- Temperature Monitoring: Transceiver (internal) and cage (external)

The tests can be run manually or in sequence, with results displayed in summary tabs indicating pass/fail status and detailed diagnostics. By automating test sequences and providing clear pass/fail summaries, these tools reduce manual effort and speed up validation cycles.



Page	Upper	Address	Read	Write	0x00															
					0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
128					18	46	49	4E	49	53	41	52	20	20	20	20	20	20	20	20
144					20	00	90	65	46	54	43	44	34	33	31	33	45	31	50	43
160					4C	20	20	20	41	30	58	34	4B	41	51	57	44	20	20	20
176					20	20	20	20	20	20	32	31	30	32	32	35	30	30	00	00
192					00	00	00	00	00	00	00	00	00	A0	30	00	07	00	00	00
208					00	00	F0	00	06	00	00	00	00	00	00	00	00	00	00	C8
224					00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
240					00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00

## Multi-lane Unframed BERT Testing

Per lane BERT testing for transceiver and equipment characterization and acceptance testing

### Test Patterns

- PRBS, PRBS31Q, PRBS13Q normal or inverted
- Per lane test pattern selection
- Pre-FEC error threshold definition
- Error Generation
- Bit error per lane and global
- Insertion: Single

### Error Measurement

- Per lane loss of pattern sync
- Per lane bit error count, average and current bit error rates
- Aggregate bit error results
- Events table tracking

## Ethernet Testing

Reliability, scalability and Quality of Service are the attributes needed for Ethernet to turn into carrier-grade Ethernet. With standard features including RFC2544, VSAM, Throughput, MPLS and VLAN support, this test set has all the tools necessary to truly ensure end-to-end carrier-grade Ethernet services.

### Key Features

- Transmit frequency offset to stress the network up to 100 ppm
- Optical Lane BERT
- FEC Layer Testing with Skew generation/monitoring
- PCS Layer Testing with Skew generation/monitoring
- Throughput, latency, jitter, frame loss, and back-to-back measurements per industry-recommendation RFC2544
- ITU-T Y.1564 support
- Multi-stream testing with up to 32 fully independent and configurable streams
- IPv4 and IPv6 traffic generation
- MAC Flooding
- Q-in-Q (VLAN stacking) and multiple MPLS tag support
- BER testing at Layer 2 and Layer 3 with or without VLAN and MPLS tags
- Smart Loop mode for Layer 2, Layer 3, and Layer 4 with all key measurements on received traffic provided on the loopback port
- One-way latency measurement between remote devices (with GPS synchronization)
- Line rate packet capture with Wireshark™ decode

### Test Interfaces

MSA compliant transceiver interfaces

QSFP-DD

- 400GBASE

QSFP56/QSFP28/QSFP+

- 200GBASE

- 40GBASE-R

SFP-DD/SFP56/SFP28

- 100GBASE-R

- 50GBASE-R

- 25GBASE-R

SFP+/SFP

- 10GBASE-X

- 1000BASE-X

- 100BASE-FX

RJ45

- 10/100/1000BASE-T

- 2.5G/5G/10G BASE-T

### 400GE/200GE Testing

- Layer 2-4 support
- Throughput (16 streams)
- Service Disruption Time measurements
- RFC2544
- ITU-T Y.1564 (V-SAM)
- IP Functions: Ping, Trace Route, ARP
- Packet Capture (PCAP) and Decoding
- PCS/FEC Analysis
- Multi-lane Unframed BERT Testing

### 100GE/50GE/40GE Testing

- Throughput (32 streams)
- V-SAM (ITU-T Y.1564)
- RFC2544
- PCS analysis
- IP Functions: Ping, Trace Route, ARP
- Loopback: Layer 2 and Layer 3
- Multi-Lane Unframed BERT testing
- Packet Capture (PCAP) and Decoding

### 25GE/10GE/1GE Testing

- 10/100/1000/2.5G/5G/10GBASE-T
- Throughput (32 streams on 10GE and 25GE), 16 on RJ45
- V-SAM (ITU-T Y.1564)
- RFC2544
- IP Functions: Ping, Trace route, ARP
- Loopback: Layer 2 and 3
- Packet Capture

## FEC Layer Generation

### Skew Generation

- Per lane static skew generation

### FEC Lane

- FEC lane marker swapping and rotation

### Error Generation

- FEC Correctable Codeword, single and rates
- FEC Uncorrectable, single and rates
- Invalid Transcoded block

### Alarm Generation

- Per lane FEC alignment marker loss (LOAMPS)
- FEC LOA
- High SER

## Platform Highlights

## Transceiver Test Applications\*

### Information Display

- Displays commonly used transceiver information saved in the I2C registers such as vendor name, part number, serial number, HW/FW revisions, power class, etc.

### QSFP-DD Application Advertising

- Provides the modules, programmed capabilities
- Programs the modules internal settings

### Laser (ITLA) Tuning

- Grid spacing, channel number, frequency, wavelength
- Fine tuning offset
- Displays modules, internally reported frequency and wavelength measurements
- Displays modules, programmed capabilities

### Coherent Optical Power

- Coherent optical power adjustment and measurement

### Optical Power

- Global and per optical lane power output enable/disable
- TX and RX per lane and broadband optical power level monitoring
- Current, min and max measurements
- Verifies transceiver internal or user defined thresholds for high alarm, high warning, low alarm, and low warning alarms

### TX Bias Current

- Current, min and max measurements
- Verifies transceiver internal or user defined thresholds for high alarm, high warning, low alarm, and low warning alarms

### Coherent QSFP-DD C-CMIS Media and Host Performance Monitoring Stats (PM)

- Media Lane PM: Frames with Uncorrectable Errors, Corrected Bits, Frames, and Bits
- Data Path Host Interface PM: Frames with Uncorrectable Errors, Corrected Bits, Frames, and Bits
- Chromatic Dispersion
- Differential Group Delay
- Second Order Polarization Mode Dispersion
- State of Polarization Rate of Change
- Polarization Dependent Loss
- Carrier Frequency Offset
- OSNR
- eSNR
- Error Vector Magnitude
- TX Optical Power
- RX Optical Power
- RX Optical Signal Power
- Modulation Error Ratio

\*Note: Features are dependent on the installed pluggable transceiver.

### Temperature Monitoring

- Internal and cage temp monitoring
- Current, min and max measurements
- Verifies transceiver internal or user defined thresholds for high alarm, high warning, low alarm, and low warning alarms

### Variable 3.3V $\pm 5\%$ Transceiver Power

- Each port supports a variable 3.3V transceiver power supply to qualify transceiver specifications
- Provides host estimated current, min, and max transceiver power, voltage, and current measurements
- Displays the transceiver internal current, min, and max voltage measurements
- Verifies transceiver internal or user defined thresholds for high alarm, high warning, low alarm, and low warning alarms

### I2C

- Complete I2C register read/write access

### Advanced Optical Transceiver Test Suite

- Pre-FEC BER validation on a per-lane basis, over operational voltage and frequency offset range to verify optical module integrity before FEC is applied to the PAM4 signal
- Pre-Framed BER (Lane BERT) validation for non PAM4 interfaces
- Voltage, temperature, and Pre-FEC BER are monitored and displayed for the duration of the test. A histogram function clearly displays all three measurements for easy correlation and tracking of any abnormal changes.
- Pre-FEC BER and Optical Power threshold settings for PASS/FAIL indication
- Pre-emphasis: Pre-taps, post-taps, and attenuation settings for PAM4 signal conditioning on the host side to help verify and stress transceiver tolerance and performance
- Supply Voltage Tolerance Verification: Sweep range from 3.135V to 3.465V (3.300V +/- 5%) to verify compliance with optical transceiver MSA standard
- Power Consumption Verification: Monitors the optical transceiver's power consumption (Watts), to verify conformance to its specified power class
- Temperature Monitoring: QSFP-DD module and cage temperature monitoring with built-in shutdown protection of the optical module if the temperature increases beyond a certain high temperature
- Frequency Tolerance Verification: Sweep range from -100 ppm to +100ppm (in 0.1ppm/step)
- I2C Baud Rate Sweep: QSFP-DD and OSFP sweep range 100K to 4000K. QSFP28 sweep range (20K to 1000K).FEC & Skew Layer Analysis

## FEC & Skew Layer Analysis

### FEC Lane

- FEC lane identification
- FEC Codeword error distribution (signal integrity)

### Skew Analysis

- Per lane skew analysis in bit time and picoseconds
- User defined alarm threshold for received skew measurement Error Measurement
- Supports counts, current and average error rates
- FEC Correctable Codeword
- FEC Correctable Symbol
- Correctable Bits, Ones, Zeroes
- FEC Uncorrectable
- FEC Symbol Error Distribution
- 256B/257B transcoding error

### Alarm Measurement

- Per lane FEC alignment marker loss
- FEC LOA, LoAMPS
- High SER

## Ethernet/IP

### Traffic Generation/Test Stream Flow

Test flow is generated with a signature field in the beginning of the UDP payload area for traceability and measurement purposes

- MAC/IP/UDP formatted traffic generation
- IP Version: IPv4 or IPv6
- MAC/IP/UDP source and destination addressing
- User defined Ethernet Type, Traffic Class, Hop Limit, Flow label fields
- Frame sizes: 64 to 16,000 bytes
- Test Pattern: Variable
- VLAN tags up to 4 levels with user defined TPID, PCP/QOS, DEI, VID
- MPLS tags up to 4 levels with user defined label, TC, S(bottom), TTL

### Traffic Rate Generation

- Full rate generation and analysis
- Constant rate by % BW and Mbps

### Error Generation

Supports single and rate generation.

- Test pattern bit and sequence errors
- IP Checksum

### Alarm Generation

- Remote and local fault alarms
- Auto reply to local fault

## Results

### Result Filtering

- Results can be filtered by VLAN tag TPID

### Transmit and Receive Port Counts

- Packets, packets/second, bytes, Mbps, % BW
- VLAN packets, MPLS packets
- IPv4 & IPv6 packets

### Receive Port Counts

- UDP, IGMP, ICMP packets
- Broadcast, multicast, unicast
- Jumbo, super jumbo packets (greater than 9000 bytes)

### Distribution Results

- VLAN distribution by tag level and quality of service level
- MPLS distribution by tag level and traffic class
- Packet size distribution for 64, 65-127, 128-255, 256-511, 512-1023, 1024-1518, 1519-max byte ranges with support for counts, percentage and graphing

### Utilization Counts

- Total, IPv4, IPv6, VLAN, MPLS
- Current, min, max, and average % BW, Mbps, and packets per second statistics for generated and received traffic

### Errors

Displays counts, errored seconds, current and average error rates

- Code, undersized, invalid FCS, invalid IP

### Alarms

- Loss of link, local fault, remote fault

### Test Stream Results

- Transmitted and received packet counts, byte counts and rate in %BW
- Test stream sequence errors, bit errors and lost frame counts in errored seconds, current and average rates
- User-defined pass/fail threshold alarm from sequence errors, bit errors and lost frames
- Latency min, max, and average measurements in microseconds
- Packet jitter min, max, and average measurements in microseconds

### Test Results & Reports

- LEDs and detailed statistical counters
- Graphs and Histograms
- Event log history showing event, count, day/time, and duration
- Test reporting options including PDF

### Test Profiles

Supports save and restore of test profiles

The MTX642 is an advanced field-oriented handheld test platform offering a full range of high-speed link and service testing capabilities. From Access to Core to Data Center applications, up to 2x400G, it covers a complete range of communication technologies, including Ethernet, OTN, EoOTN, Fibre Channel, OTDR and more.

- Smallest, lightest, complete, and truly portable handheld test solution for 1G to 400G
- Runs up to two independent tests, including 2x 400G
- Supports high-power class and coherent transceivers
- Fast boot-up and ready-to-test times
- Built-in VeSion® R-Server™ client for test results upload, workflow integration, and asset management (optional)
- Built-in VeExpress™ client for cloud-based asset management, software updates and licenses.
- Flexible remote access and remote control via EZ Remote™, web browser, and VNC®
- Fast test results transfer via USB memory stick and web client
- LAN, Wi-Fi® and Bluetooth® management interface options
- Color LCD with capacitive multi-touch screen
- Intuitive graphical user interface for straightforward operation
- High-capacity Li-ion battery pack offers over an hour of continuous operation running two 400GE tests
- Optional built-in high-precision multi-band GNSS Receiver and clock reference for timing applications

### Test Results Management

Local and remote web-based interface provides easy access of test results with save, view, export, generate PDF, rename, lock and delete functions.

- Export results to USB memory stick
- PDF, CSV, HTML+XML, PCAP, and image formats
- File organizer
- Filtering per test result type file sorting by name, port, test type, date, size, locked/unlocked
- Screen capture: Screen shots saved in PNG

### Web Remote Access (WiFi, LAN, VPN)

Control, access and monitor test sets remotely, within private networks. Platform/OS independent, works with standard web browsers on PC, Mac, tablets and smartphones. No app or software installation required. No registration or personal data required.

- Web-based VNC® server (no PC client required)
- Compatible with standard multi-platform VNC® clients

### EZ-Remote™ Cloud Service (Internet)

Control, access and monitor test sets at remote sites over the internet. Platform/OS independent, works with standard web browsers on PC, Mac, tablets and smartphones. No app or software installation required. Secured QR links to invite remote colleagues to collaborate. No registration or personal data required.

- On-demand remote control functionality that works over the internet through firewalls
- Connect to VeEX test sets online anywhere in the world with any computer, tablet or smartphone, using standard web browser client
- Functionalities: Screen-sharing, remote control and access to test results download

### VeExpress™ License & Asset Management

This basic cloud service helps keep the test set fleet up-to-date and optimizes license ownership, by managing software updates, licenses (owned, rented, or shared), with basic asset tracking.

### VeSion® R-Server Asset & Workflow Management

Advanced cloud/hosted service manages test set fleets, test results, data aggregation and analysis, workflow and job closing, reporting, asset management and protection.

#### General

<b>Data Storage</b>	
Internal	32 GB Flash storage
External <sup>1</sup>	USB Memory sticks and SSD dongles
Remote <sup>1</sup>	Upload via VeSion R-Server, Bluetooth and Browser
<b>Connectivity/Management</b>	
Ethernet	1x RJ45 10/100/1000BASE-T FDX
Wi-Fi <sup>1</sup>	Built-in, 802.11a/b/g/n
Bluetooth <sup>1</sup>	Built-in, v4.2
USB	1x USB Type-A 1x USB Type-C (USB-C)
<b>Precision Clock Sources</b>	
GNSS Receiver <sup>1</sup>	SMA(f) antenna input with 5 VDC power Dual band GPS/GLONASS/ Galileo/Beidou
External Clock In	SMA(f)
<b>Display (LCD)</b>	
Size	7" (154.2 x 84.92 mm)
Type	TFT Color LCD, 1024 x 600 pixels
Input	Capacitive multi-touch
<b>Dimensions<sup>2</sup></b>	
(W x H x D)	226 x 190 x 85 mm 8.90 x 7.48 x 3.35 in
<b>Weight<sup>2,3</sup></b>	
	2.3 kg (5.0 lb)
<b>Battery</b>	
Type	High-capacity Li-Ion
Autonomy	>1 hour running 2x 400GE tests
<b>AC/DC Adapter</b>	
AC Input	100-240 VAC, 50-60 Hz
DC Output	160 W, 24 VDC, 6.67 A
<b>Environmental</b>	
Operating Temp. <sup>4</sup>	0°C to 40°C (32°F to 104°F)
Storage Temp.	-20°C to 70°C (-4°F to 158°F)
Humidity	5% to 90% non-condensing
Compliance	RoHS, WEEE, CE

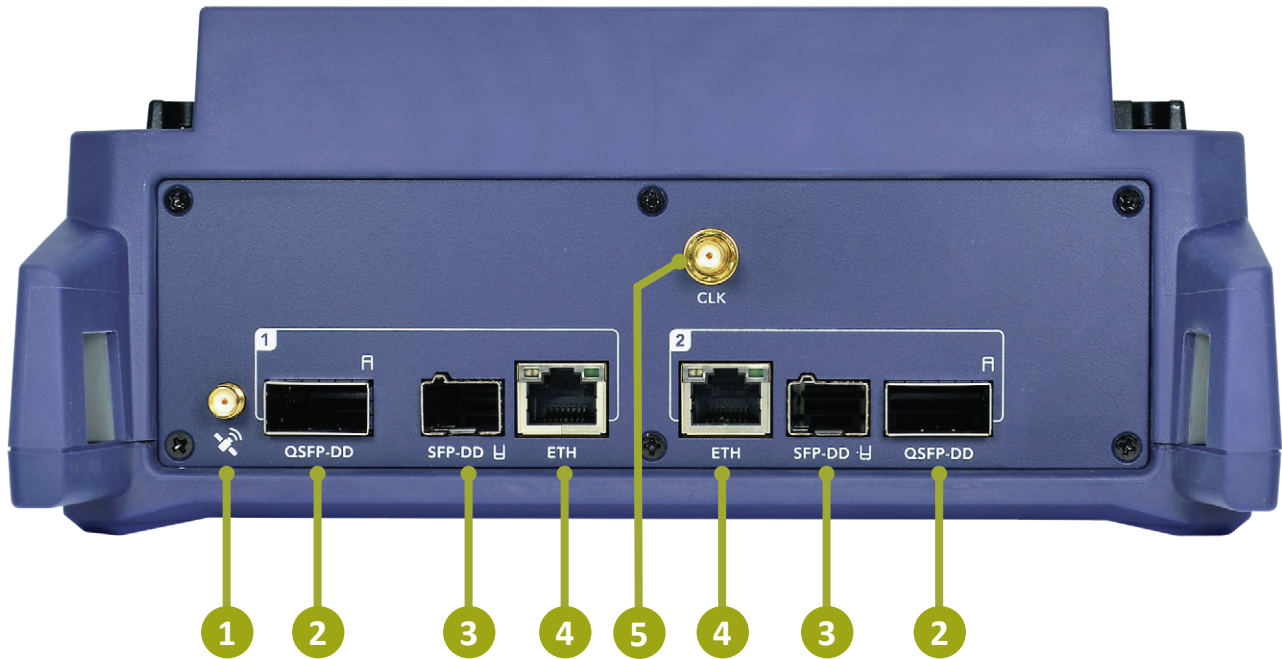
<sup>1</sup> Optional.

<sup>2</sup> Excludes transceivers, optional hardware, and accessories.

<sup>3</sup> Depends on hardware configuration.

<sup>4</sup> Performance for up to 100G applications. For 400GE applications it is recommended to be operated below 32°C (90°F).

\*All trademarks are property of their respective owners



- 1 SMA, GPS/GNSS
- 2 2x QSFP-DD/QSFP56/QSFP28/QSFP+ (400G, 200G, 100G, 50G, 40G)
- 3 2x SFP-DD/SFP56/SFP28/SFP+ (100G, 50G, 25G, 10GE, 1GE)
- 4 2x RJ45 10/100/1000BASE-T, 2.5G/5G/10GBASE-T
- 5 SMA External Clock