

Telecom

CATV/Broadband

VeSion®

PON

NEMs

Fiber Optics/FTTH

100G

400G

# PRODUCT CATALOG

>> TEST & MEASUREMENT SOLUTIONS >>

# ABOUT VeEX Inc.

VeEX® develops innovative test and measurement solutions for next generation communication equipment and networks. Founded in April 2006 by test and measurement industry veterans, VeEX products blend advanced technology and vast technical expertise with the discerning measurement needs of customers.



## PRODUCTS & SOLUTIONS

VeEX products diligently address all stages of network deployment, maintenance, field service turn-up, and integrate service verification features across Copper, Fiber Optics, CATV/DOCSIS, Mobile 4G/5G backhaul and fronthaul, next generation Transport network, Fibre Channel, Carrier & Metro Ethernet technologies, WLAN and Synchronization.

### Fiber Optics/FTTH

VeEX Fiber Optics solutions are optimized for P2P, xWDM, FTTx/PON, R-PHY/DAA and C-RAN/FTTA. VeEX VeSion®, RFTS/RTU, FX, MTTplus, RXT, TX products and fiber accessories are used in construction, service activation/QoE, network verification, troubleshooting and monitoring. Whether it's Voice, Video, Internet or Data services, VeEX Optical test solutions can certify any type of communication network that uses fiber optics such as Transport, Metro, Access networks and even hyperscale Data Center environments.

### Ethernet/IP

RTU, RXT®, TX, MTTplus and MTX products help service providers, equipment manufacturers and installers perform efficient QoE assessment and SLA QoS validation of Ethernet business services, Ethernet backhaul, and packet transport networks. Test interface rates ranging from Fast Ethernet to 400 Gigabit Ethernet, coupled with Y.1564, RFC2544, RFC6349, and broadband speedtest applications address all aspects of converged IP networking.

### Transport

RXT, TX, MTTplus and MTX products offer the widest range of legacy and next generation transmission test capabilities from Nx64 kbps to 400 Gbps condensed into the industry's smallest form factor. PDH/T-Carrier, SDH/SONET, OTN, Ethernet, eCPRI, CPRI, and Fiber Channel test functions can all be integrated via scalable hardware and software options ensuring a single "future-proof" multi-service test platform.

### NEMs

VeEX is focused on serving the Network Equipment Manufacturers (NEMs) segment effectively with its complete product line aimed at testing within the NEMs specific environment and test cycle. We have a product for every testing group and depending on which phase of the testing cycle, a specific solution for qualifying the equipment within the R&D department, field turn up testing or post sales troubleshooting.

## Cable TV/Broadband

CX, AT, VeSion and Network Probe products are optimized for digital CATV and DOCSIS/OFDM signal validation while retaining legacy analog carrier measurement capability. Select models incorporate true DOCSIS 3.1 OFDM analysis to verify multi-gigabit services. Other models address key prequalification and maintenance test requirements for High-Split and DOCSIS 4.0 Extended Spectrum applications. Additional applications include Upstream signal generation/analysis, TDR, Forward/Return path sweep, Forward/Return path monitoring systems, and MPEG analysis.

## GLOBAL PRESENCE

VeEX's multinational structure consists of specialized business units operating in different parts of the world. Management, finance, sales and marketing entities are headquartered in Fremont, California, USA, capitalizing on the advanced technical and commercial resources that Silicon Valley has to offer. Regional sales offices are located in Philadelphia, Pennsylvania; Shenzhen, China; Beijing, China; Bangkok, Thailand; Kuala Lumpur, Malaysia; Mexico City, Mexico; Guatemala city, Guatemala; and Seoul, Korea. R&D centers are strategically located in Fremont, California; Atlanta, Georgia; Tampa Bay, FL; Plymouth, UK; Minsk, Belarus; Beijing, China; ChengDu, China; and Montreal, Canada, with regional service centers in Plymouth, UK; New Taipei City, Taiwan; Tampa Bay, FL; and Fremont, CA, USA.

## CUSTOMER BASE

Over 200,000 units have been shipped since volume production began. AT&T, Verizon, Alcatel-Lucent, British Telecom, Charter Communications, Claro, Comcast, Cox, Deutsche Telekom, Colt, TATA, Entel, Ericsson, Global Crossing, Nokia Siemens Networks, Optus, Relacom, SingTel, SKBB, Telecom Malaysia, Telefonica, Telekom Austria, TeliaSonera, Telkom SA, Spectrum, True, UPC, Virgin Media, Vodafone, China Mobile, Chung-Hwa Telecom, Hyper scale Data Center, and many others comprise the growing reference list.

# TABLE OF CONTENTS

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▶ TELECOM .....	4
▶ CATV/BROADBAND .....	6
▶ VESION® .....	7
▶ FIBER OPTICS/FTTH .....	8
▶ NOAPP™ .....	12
▶ NEMS .....	13
▶ 400G/100G .....	15



# TELECOM SOLUTIONS

VeEX offers a complete set of Test and Measurement solutions for Business Services, Access, Metro, Core, Transport and Utility networks. Versatile test platforms combine an unparalleled range of technologies to help optimize network performance and reliability. VeEX products address all stages of deployment and field service turn-up to deliver the highest quality services during installation, verification, maintenance, and troubleshooting of networks.

## TX300s Series Multi-Service Test Set with VeExpress™

The TX300s, with VeExpress license management, is a full-featured, field-configurable portable test solution for Carrier Ethernet, Backhaul, Mobile, Transport and field Synchronization testing. This flexible and multi-tasking platform supports Carrier Ethernet, OTN, SDH, SONET, PDH, DSn networks, and offers extensive support for Mobile Backhaul technologies with SyncE, 1588v2 PTP and CPRI/OBSAI testing. The all-inclusive hardware reduces CAPEX with no factory returns necessary for upgrades. Test features can be purchased, rented, leased and shared as needed. This allows proactive management of software and hardware assets, ultimately optimizing OPEX.



- Up to four (4) independent test ports
- OTU4, OTU3, 100GE, 50GE, 40GE, 25GE options
- OTU1/2/1e/2e, ODU0, ODUflex
- SONET/SDH up to OC-192/STM-64
- DSn/PDH: DS1, DS3, E1, E3, E4
- G.703 64k Codir & C37.94
- CPRI: 614.4 Mbps to 12.164 Gbps (up to 24.330 Gbps with TX300s-100GX)

- OBSAI: 768 Mbps to 6.144 Gbps
- Ethernet: 10/100/100BASE-T, 2.5G/5G/10GBASE-T (via copper SFP+)
- Fibre Channel: 1/2/4/8/10/16G (up to 32G with TX300s-100GX)
- SyncE & 1588v2 PTP: Server and Client Clock emulation, protocol monitoring and decoding, wander analysis
- OTDR/OLS/OPM/VFL/FiberScope option for testing P2P/FTTA/MPO fibers
- Built-in Precision Clock Options: Atomic Clock and multi-band GNSS
- VeSion, R-Server, VeExpress, EZ-Remote™, Web Remote, VNC, SCPI
- Up to two factory-installed test modules (hardware options)



TX340s Dual Test Port Hardware Option



TX300s-100Gx Hardware Option

## RXT® Modern Modular Test Platform with VeExpress

With extreme modularity and an open platform concept, the RXT continues to define the test set of the future. The RXT's capability to combine multiple technologies, from legacy 64k to state-of-the-art 2x400G, into a rugged modular handheld platform increases the productivity of technicians who are responsible for the installation, verification, and maintenance of today's complex services. Its intuitive user interface also boosts productivity by helping technicians and field engineers to make their job easier, accelerating the learning curve, and reducing training requirements.

- Flexible test module design accommodates different module sizes allowing future growth of the RXT platform into more complex technologies and high-end applications, including 2x400GE, 8x100GE and ready for 800G!
- Multi-technology: Ethernet, Fibre Channel, Fiber Optics, WDM, OTN, SDH/SONET, PDH/DSn, eCPRI, CPRI/OBSAI
- Supported modules: 400G, 100G, Multi-Service (64k to 16G), OSA, tunable xWDM OTDRs



400G

- 400GE PAM4 OSFP and QSFP-DD
- 200GE PAM4 QSFP56
- 100GE PAM4 SFP-DD and 50GE SFP56
- 100G & 40G Ethernet and OTN
- Ethernet: 10/100/1000BASE-T, 100BASE-FX/1000BASE-X, 1000BASE-X, 25GE, 50GE
- Fibre Channel: 1/2/4/8/10/16/32G
- CPRI: 614.4 Mbps to 24.330 Gbps
- eCPRI: 10G and 25G
- OBSAI: 768 Mbps to 6.144 Gbps
- OTN: OTU1/2/1e/2e, ODU0, ODUflex
- SONET/SDH/PDH/DSn up to OC-192/STM-64
- SyncE & 1588v2 PTP: Master and Slave Clock emulation, protocol monitoring and decoding, PDV, Time Error measurements and wander analysis
- Built-in Precision Clocks: Atomic Clock and Multi-band GNSS receiver option



RXT-6402 400G



RXT-6200 100G

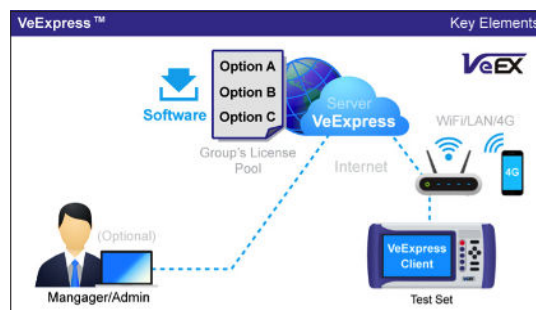


RXT-3400 Multi-Service

## VeExpress™ Cloud-based Software and License Management Service

VeExpress is a centralized (cloud) service hosted by VeEX, which allows customers to seamlessly manage the software licenses for their geographically-dispersed fleet of test equipment and users. The basic service is provided free of charge, with the purchase of supported test sets, and allows users to:

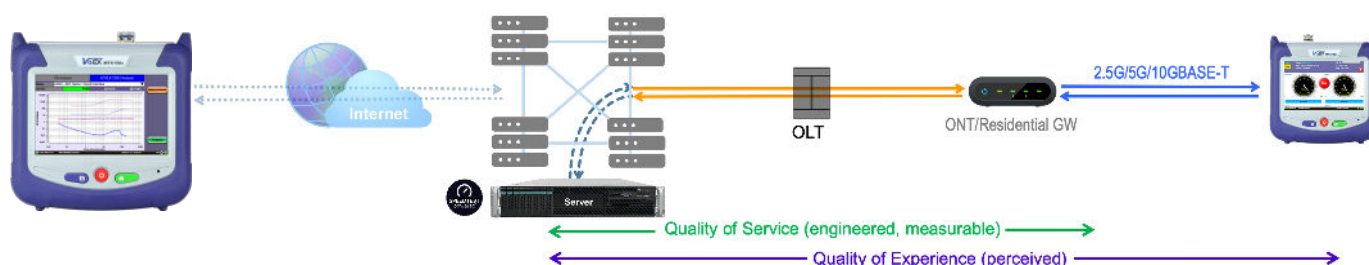
- Purchase licenses: Retrieve newly purchased test features directly to the test set (new functions become immediately available)
- License sharing: Release existing licenses from one test set, back to the company's common pool, so it can be immediately retrieved by another user who needs it
- Rent licenses: Temporary licenses can be leased from VeEX to support special projects or for newer technology trials
- Keep test sets up-to-date: Download and update platform and modules' software directly from the server to the test set



## MTX150x Ethernet Services Installation Test Set

The MTX150x is a fully-integrated and self-contained Ethernet services test solution for Layer 1-to-4+ applications and Fibre Channel (SAN). This rugged and ultra-portable field handheld test set can be configured with interfaces and technologies required by field technicians to install, verify, maintain and troubleshoot Metro Ethernet links, Business services, Internet Access and other packet-base services up to 10 Gbps. Optimized for field technicians installing, verifying, troubleshooting and maintaining modern Transport, Carrier Ethernet, Metro, Storage Area, as well as fiber, backhaul networks.

- Smallest and most affordable full-featured Ethernet test set
- Dual SFP+ and Dual RJ45 test ports
- Dual-port testing capabilities
- Throughput, BERT, Loopback
- RFC2544 Throughput, latency, frame loss and back-to-back tests
- 2.5G/5G/10GBASE-T via native RJ-45 port
- IPv4 and IPv6 support
- V-SAM test suite compliant with ITU-T Y.1564 standard
- Q-in-Q (VLAN stacking), MPLS, MPLS-TP, PBB, and PPPoE support
- Layer 4+ test suite: V-TEST (speed test), V-FTP, RFC6349 V-PERF upload and download tests
- SyncE with ESMC/SSM and Wander Measurement
- L2CP Transparency
- Patent pending NoApp™ QR code capability for faster result transfer



## MTX150 Multi-Service Installation & Maintenance Test Set

The MTX150 is a fully-integrated and self-contained 10G multi-service test solution for Internet, Ethernet (LAN/WAN), SyncE, Fibre Channel (SAN), SDH, SONET, PDH, DS<sub>n</sub>, C37.94 G.703 Codirectional and Datacom interfaces.



- Ethernet, Fibre Channel, SDH/SONET, PDH/DS<sub>n</sub>, Datacom and G.703 64K Codirectional Testing
- SFP+ Optical Interface for 10GBASE-X, 100/1000BASE-X, SyncE, 1/2/4GFC, STM-0 to 64, OC-1 to 192, IEEE C37.94
- RJ45 for 10/100/1000BASE-T

## MTX150x Lite Multi-Gig Internet Services & Ethernet Speed Test Solution

The MTX150x Lite is an optimized QoE test solution (Layer 4+ applications) for multi-Gigabit services from 10 Mbps to 10 Gbps on copper and fiber interfaces.

- V-TEST Throughput Test supports VeEX Mode and Speedtest Powered™ Mode based on Ookla® technology
- V-PERF, support of RFC6349
- SFP+ test interface for 100/1000BASE-X and 10GBASE-R
- Built-in RJ45 test with PHY for 10/100/1000BASE-T, 2.5GBASE-T, 5GBASE-T, 10GBASE-T (no adapters required)
- Patent pending NoApp QR code capability for faster result transfer



## MTTplus Compact Modular Test Platform and Modules

The MTTplus platform provides a modern, powerful and cost-effective modular test toolkit for today's wide range of evolving test needs. The compact MTTplus addresses the challenges of communication service providers to increase efficiency and productivity while lowering operational and capital expenditures associated with handling multiple technologies required to address today's Access, Business, Carrier Ethernet, Transport and Core services. Available test modules cover legacy and modern Access (copper and fiber), FTTx, Metro, Carrier Ethernet, WLAN and Transport technologies.

### MTTplus-340 Multi-Service Test Module

A full-featured test solution for OTN, SONET, SDH, PDH, DS<sub>n</sub>, 64K Codirectional, C37.94, Carrier Ethernet, Fibre Channel, SyncE, PTP and CPRI/OBSAI.

### MTTplus-410+ Fiber Optics Test Module

This complete toolkit offers a full range of optical test features that support OTDR, OPM, Light Source and VFL. Specially tuned PON OTDR modules available. Geo Tagging of optical test data and picture capture allows technicians to fully document any test location.



### MTTplus-420 GPON Test Module

During service activation, the MTTplus-420 measures optical power levels and non-intrusively decodes messages exchanged between the OLT and ONT, simplifying FDP cabinet rebuild. Its key features help network engineers with advanced network troubleshooting.

### MTTplus-522 OSP+ Test Module

The MTTplus-522 combines key copper verification features with optional DSL/G.fast modem emulation. It is designed for Service Providers deploying broadband services over a DSL or G.fast access network.

# CATV/BROADBAND SOLUTIONS

As the demand for multi-gigabit services increases, operators face major deployment challenges that can affect service delivery and reliability. VeEX offers a comprehensive cable product portfolio to fully characterize every aspect of the cable network, from headend to the home, and from Access to the Core. This enables operators to quickly deliver next-generation services, optimize network quality and reliability, and ensure SLA and end-to-end QoS compliance during the installation, verification and maintenance of business-oriented services.

## **CX380C** Budget Friendly Advanced Maintenance

- Fast 1.8 GHz Spectrum Analyzer
- VeCheck Full Band Scan
- DOCSIS 3.1 Cable Modem with V-TEST Throughput
- DOCSIS 3.1 OFDM Analysis with patented Subcarrier Scans
- Comprehensive SLM
- In Service Sweep
- Compatible with SWP-BOX™ for fast and accurate Forward & Return Sweep: for D3.1 & D4.0 network prequalification and maintenance
- Layer 4+ V-PERF and V-TEST Throughput
- Cable Toolkit with TDR and DMM
- Built in Optical Power Meter



## **SWP-BOX™** Portable Extended Spectrum Sweep for DOCSIS 3.1 & 4.0 and DAA / R-PHY Network Expansion

VeEX's new patent pending SWP-BOX consists of a high performance transmitter/receiver that works in conjunction with the CX380C Maintenance meter, together comprising a full field Sweep System. Field portability and ease-of-use makes the SWP-BOX a game changer for DOCSIS 4.0/DAA plant prequalification, yielding significant time and cost savings.

- World's First Portable Sweep transmitter and receiver designed for DOCSIS 4.0 Extended Spectrum and high-split migration
- Works with the CX380C for a complete, stand alone, field Sweep System
- Extended forward path sweep up to 1.8 GHz and return path sweep to 204 MHz
- Reduces test setup from hours to minutes, yielding significant OpEx savings compared to traditional sweep systems
- Fast and accurate Sweep for network maintenance
- Integration with VeSion® R-Server system, supporting data collection and test result management



## **CX310** Handheld DOCSIS 3.1 Installation and Fulfillment

Equipped with a DOCSIS 3.1 cable modem supporting true OFDM analysis and V-TEST throughput measurements, the CX310 offers unrivaled price and performance in a lightweight, ultra-portable form factor. Key features include VeCheck Full Band Scan, OFDM Subcarrier Scans (patented) and HIP Home Certification.

- Frequency range from 5 to 1218 MHz
- DOCSIS 3.1 Cable Modem with true OFDM Analysis
- Key SLM features include fast VeCheck Full Band Scan and Single Channel QAM analysis
- MER and Pre/Post BER measurements of QAM carriers
- Return Path and Forward Path Ingress Scan
- V-TEST Throughput Test supports VeEX Mode and Speedtest Powered Mode based on Ookla technology
- Home Installation Process/Certification Auto Tests
- TDR for Cable Fault Location



## **AT2500-3G** Headend Maintenance

The AT2500-3G is the industry's most complete 3 GHz Advanced Spectrum Analyzer and multi-standards test solution. Incorporating a high-resolution color touch-screen, the AT2500-3G features spectrum analysis, digital channel, VeCheck, MPEG analysis and Satellite feed test capabilities. Comprehensive SLM measurements include Single Channel, Fast real-time plant level scan, Headend Check, and FCC Digital POP tests.

- 3 GHz high sensitivity professional grade Spectrum Analyzer with built-in automatic filters for increased dynamic range
- Annex A, B, C, DOCSIS 3.1, ISDB-T
- Superior QAM demodulation capability, with excellent BER performance and MER range up to 47 dB
- MPEG Explorer: QAM channel MPEG-TS analysis
- DOCSIS 3.1 OFDM analysis and Subcarrier Scan
- Headend Check auto test for the entire selected Channel Table lineup
- Satellite DVB-S & DVB-S2 analysis





VeSion® Cloud-Based One System Platform represents the next step in innovation for Network Monitoring. VeSion integrates RF monitoring, Fiber Pt-Pt or PON, MPEG, Sweep, PNM, advanced DOCSIS Monitoring, DOCSIS Burst Demodulation, Carrier Class Ethernet Performance testing and monitoring, as well as Workflow and Asset Management systems all under one umbrella. The VeSion system reduces network troubleshooting and problem resolution time significantly and is accessible anytime, anywhere, via web browser or mobile apps.

## **VeSion R-Server™**

The VeX R-Server workflow system is a comprehensive application suite for managing and optimizing workflow for centralized engineers, managers and field technicians.

- A complete, centralized workflow and asset management system
- Dynamic testing result navigation for both quick analysis and in-depth compliance verification
- Flexible distributed architecture for easy expansion
- Secured IP connection and VX-Connect app tethering for access from any location with Internet connection or phone service
- Attach GNSS/GPS location data to results for physical GIS mapping through VX-Connect
- Reduce OpEx by ensuring the job is done right the first time; Lower CapEx by integrating multiple test solutions that improve workforce productivity
- Upgradeable solutions protect investments & address future needs

## **Cloud-Based One System Platform**



**Results from anywhere, anytime, at any location**

## **VeSion RF Probes**

### **CX180R+ Return Path Monitoring System**

The CX180R+'s compact 1U rackmount chassis supports simultaneous and continuous ingress scanning of 10 test ports at a fast sweep rate and spectrum analysis up to 245 MHz.

### **CX280X All-in-One RF Monitoring**

The CX280X rackmount monitoring system is a cost-effective RF switching solution for Forward Path monitoring. With 16 built-in RF ports, the CX280X can be deployed to any Forward Path system for monitoring, troubleshooting, on demand test and auditing needs.

- |   |                                  |
|---|----------------------------------|
| • 1.8 GHz Spectrum Analysis               | • VeCheck Full Band Scan         |
| • Fast MPEG Monitoring                    | • Advanced SLM                   |
| • DOCSIS 3.1 OFDM Analysis and Monitoring | • QAM Health                     |
|   | • ISDB-T Analysis and Monitoring |

## **VeSion Ethernet**

### **RTU-300+ Ethernet Performance Testing and Monitoring**

The RTU-300+ is a centralized remote test unit for performance testing of Carrier Ethernet and high-speed broadband networks. With a strong feature set for Layer 2 and Layer 3 testing, combined with Layer 4 stateful TCP testing, it is the ideal solution for both Telco and MSO applications. Multiple RTU-320 modules are supported via VeSion, allowing for a distributed network of RTUs in the service provider network for effective service provisioning, activation, and assurance. The RTU-600x module extends the testing range to 400 Gbps.

- 10/100/1000BASE-T, 100BASE-FX, 1000BASE-X ports; 10GE, 25GE, 40GE, 100GE ports
- Full line rate traffic generation & analysis for all supported interfaces
- Acts as a responder for field multiple portable units (concurrent multi-session)
- V-SAM (Y.1564), RFC2544, Loopback; VPERF (RFC6349)

## **VeSion RFTS**

VeSion Remote Fiber Test System (RFTS) is a centralized monitoring system that sweeps across many fiber routes to quickly report outages or degradation. RTU 4000/4100 probes, which can also operate in standalone mode, are deployed at various sites and communicate with VeSion cloud system to read/write data to a centralized storage point. Intuitive dashboard with KPIs and a simple yet efficient integrated GIS system make VeSion RFTS a convenient platform for not only monitoring and testing fiber but visualizing and storing the data as well.

- RTU-4000/4100 OTDR (1550, 1625 or 1650 nm available)
- OXA-4000 and OXC-4000 series optical switches (1x8, 1x16, 1x32, 1x64 or 1x128, 1x256, 1x288 (OXC only), 1x512 (OXA only)) with optional built-in integrated FVDM for in-service monitoring
- Integrated in VeSion Eco-system
- Provides real-time fiber network health with alarms and analysis

## **Fiberizer®**

### **Fiber Optics Test Data Management, Remote & Cloud Applications**

Software solutions for remote optical testing and data post-processing for managing test data and generating reports that integrate OTDR, link map, GPS coordinates, OLTS (loss and ORL), connector inspection, and captured images. Available for Window PC, Mobile Apps (Android™, iPhone® and iPad® devices) and Fiberizer Cloud (browser). See website for software applications or register for a Fiberizer Cloud account at [www.fiberizer.com](http://www.fiberizer.com).



# FIBER OPTICS/FTTH SOLUTIONS

VeEX offers a complete set of test and measurement solutions optimized for today's FTTx, xPON, DAA, DWDM, CWDM and Metro networks and are perfectly suited for demanding outside plant environments. The fast growing optical product range complements existing VeEX Transmission and Ethernet testing solutions and addresses the technical requirements of network construction, service activation, and troubleshooting.

## FTTH SOLUTIONS

### FX120/FX120 Lite PON Analyzer and Multi-Gig Test Set

- Service activation and advanced troubleshooting at the ONT location with PON-ID/MAC ID/ONU ID and SN
- Verify D/S and U/S optical power levels for GPON/XGS-PON/EPON/10G EPON networks
- Non-intrusively capture and decode downstream PLOAM messages
- ONT and TC-SYNC status indicator
- Complete Layer 4+ test suite up to 10G: V-TEST (Ookla Speedtest), V-PERF (RFC6349), and V-FTP upload and download tests (FX120 only)
- Patent pending NoApp QR code capability for faster result transfer



### MTX150x Lite Multi-Gig Internet Services & Ethernet Speed Test Solution

- V-TEST Throughput Test supports VeEX Mode and Speedtest Powered Mode based on Ookla technology
- V-PERF, support of RFC6349
- SFP+ test interface for 100/1000BASE-X and 10GBASE-R
- Built-in RJ45 test with PHY for 10/100/1000BASE-T, 2.5GBASE-T, 5GBASE-T, 10GBASE-T (no adapters required)
- Patent pending NoApp QR code capability for faster result transfer



### FX41xT PON Terminated Power Meter

- Terminated power meter for 1G/10G xPON applications
- 2 Terminated Wavelengths
  - 1490/1577 nm PON Downstream signals
- Additional Broadband OPM or VFL option
- Patent pending NoApp QR code capability for faster result transfer



### FX81/81T PON Optical Power Meter

- Power meter for 1G/10G xPON applications
- Terminated or pass-through options
  - Pass-through option: 4 or 5 wavelengths
    - 1270/1310 nm Upstream PON Burst/CW signals
    - 1490/1577 nm PON Downstream signals
    - Optional 1550 nm RF video
  - Terminated option (FX81T): 2 or 3 wavelengths
    - 1490/1577 nm PON Downstream signals
    - Optional 1550 nm RF video
- Optional broadband OPM
- Patent pending NoApp QR code capability for faster result transfer



### FX150+ PON OTDR Test Set

- Advanced PON OTDR with balanced/unbalanced splitters and taps analysis
- Up to 46 dB Dynamic Range and 0.8/3.5m Dead Zones
- 0.03m resolution & up to 256,000 data points
- OTDR, OPM, Light Source and VFL support
- Attach GNSS/GPS location data to results for physical GIS mapping through V-Connect mobile app



### FL41 Fault Locator (FL)

- Verify short fiber links during service activation
- Distance Range: 10m to 20 km
- Optional filter for in-service testing
- Optical power meter included



## GENERAL PURPOSE

### FX10+ Pen Style Visual Fault Locator

- Output power: 1 mW or 10 mW versions
- Wavelength: 650 nm  $\pm$  10 nm
- Connector: 2.5 mm universal; optional 2.5 mm to 1.25 converter adapter



### FX15 Optical Fiber Identifier

- Traffic detection and direction
- Supports 250  $\mu$ m, 900  $\mu$ m, 2 mm and 3 mm fibers
- Tone detection LEDs (270 Hz, 1 kHz, 2 kHz) with audible warning



### FX40/FX45 Optical Power Meter & Light Source

- Singlemode and Multimode testing
- OPM & OLS configurations
- OLTS (FX45 only) configurations
- Date/Time stamping of test results (FX45/48 only)
- VFL optional (selected FX40 OPM version only)



### FX82/82s Optical Power Meter (OPM)

- Wavelength range 800 to 1650 nm
- WaveID to auto-detect incoming VeEX OLS signal wavelength
- 7 calibrated wavelengths, optional add for all CWDM wavelengths
- Standard +10 dBm or High Power +23 dBm available
- Detect modulated OLS/Tone 270/330/1000/2000 Hz
- FX82s Sweep Receiver to pair with FX87s





## GENERAL PURPOSE CONT'D

### FX83 Optical Light Source (OLS)

- Dual, Tri and Quad wavelength options
- Multimode - 850, 1300 nm
- Singlemode - 1310, 1490, 1550, and 1625 nm
- Modes: CW/Auto or Modulated (270/330/1000/2000 Hz)



### FX84 Loss Test Set (OLTS)

- OPM/OLS
- Uni-directional insertion loss
- Singlemode and Multimode configurations
- WaveID when paired with VeEX OLS (except FX40)
- Bluetooth option to transfer results to Android mobile device or PC



## OTDRs - GENERAL PURPOSE

### FX150+ Mini OTDR

- Quad MM/SM configurations for P2P and PON
- Up to 46 dB Dynamic Range and 0.8/3.5m Dead Zones
- 0.03m resolution and up to 256,000 data points
- Filtered 1625 or 1650 nm port for in-service testing
- Attach GNSS/GPS location data to results for physical GIS mapping through V-Connect mobile app



### RXT-4100+ OTDR Module

- Fiber Optics test module for the RXT platform
- Quad MM/SM configurations for P2P & PON
- Up to 50 dB Dynamic Range and 0.8/3.5m Dead Zones
- 0.03m resolution and up to 500,000 data points
- OTDR, OPM, OLS, VFL and FiberScope support
- Attach GNSS/GPS location data to results for physical GIS mapping through V-Connect app
- Geo Tagging of test data using GNSS/GPS option of RXT platform



### MTTplus-410+ Fiber Optics Test Module

- 3 cm OTDR resolution with up to 500,000 sampling points
- Supports a full range of test functions including OTDR, OPM, light source and VFL
- Dynamic Range up to 50 dB and event Dead Zone 0.85m
- OTDR, OPM, OLS, VFL and FiberScope support
- Attach GNSS/GPS location data to results for physical GIS mapping through V-Connect app
- Geo Tagging of test data using GNSS/GPS option of MTTplus platform



### OPX-BOXe Ultra-Portable OTDR

- Ideal for use with Mobile devices and to add OTDR capability to existing VeEX platforms
- Multimode and Singlemode configurations
- Up to 43 dB Dynamic Range and <1m Dead Zones
- Up to 128,000 sampling points
- Optional Light Source and/or Visual Fault Locator (VFL)
- WiFi & Bluetooth (wireless) and USB & Ethernet (wired) remote control



## xWDM

### FX86 CWDM Quad Optical Light Source (OLS)

- Quad output, stabilized DFB laser source
- Supports any four CWDM or XG(S)-PON lambdas
- Outputs can be activated and modulated independently (270 Hz, 330 Hz, 1 kHz, 2 kHz)



### FX87/87s DWDM Tunable Laser Source (TLS)

- Full C-Band tuning (97 channels @ 50 GHz spacing)
- Wavelength Range: 1527.60 to 1566.31 nm
- Frequency Range: 191.40 to 196.25 THz
- ITU-T G.984.1 Wavelength grid compliant
- Broadband OPM optional
- FX87s Sweep Generator to pair with FX82s



### RXT-4113+ xWDM OTDR Module

- Available in CWDM 18/10/8-Ch ITU-T 694.2, DWDM 50 GHz ITU-T 694.1 C-band Ch14 to Ch62, Combo CWDM+DWDM or new combo DWDM+1310/1550/1625(F) configurations
- DWDM Integrated wavelength locker stable to within  $\pm 2.5$  GHz
- Ideal for R-PHY and FiberDeep testing whether testing WDM side or Splitter side of FLM
- Ideal for testing C-RAN network
- LinkMap to identify WDM or Splitter events
- End-to-end continuity testing using either CWDM or DWDM CW light source (via OTDR port)
- CWDM/DWDM 270/1000/2000Hz OLS Modulation
- Attach GNSS/GPS location data to results for physical GIS mapping through V-Connect app
- OLS/OPM/VFL/FiberScope options



# FIBER OPTICS SOLUTIONS

## OSA RXT OSA Module

- S, C and C+L band wavelength ranges
- Fast scanning - full spectrum in < 5s
- Simultaneous measurements - up to 160 channels
- DWDM channel spacing down to 25 GHz\*
- Channel & Span power measurement
- High wavelength accuracy:  $\pm 50$  pm
- Continuous sweep with min/max hold
- In-band OSNR measurement
- High dynamic range: > 50 dB
- OSNR measurement: > 40 dB\*



\* module dependent

## OCC FX180X/FX182 Optical Channel Checker

- CWDM or DWDM configurations
- Summary, Tile, Bar, and Table Graph display
- Adjustable Pass/Fail threshold with color coding
- Peak Power and Channel Wavelength measurement
- User-defined channel tables



## FIBER INSPECTION - GENERAL PURPOSE

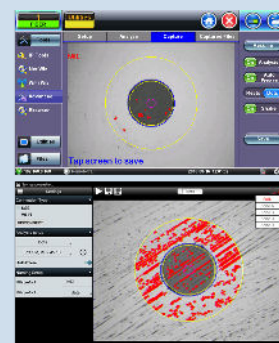
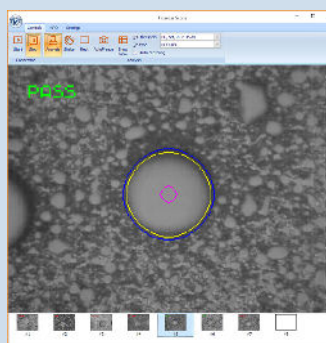
### DI-3000 Digital Fiber Inspection Scope

The DI-3000 is an auto-focus digital fiber inspection microscope with WiFi/USB connectivity. The host platform displays a high resolution magnified image and provides Pass/Fail analysis.

- One hand (left or right side), one touch operation
- Wireless connectivity with host device via WiFi
- Wired connectivity with host device via USB cable
- Fast (2-4s), auto-focus image capture with focus indication
- 1/4" CMOS camera enabling 400x magnification



### Compatible Host Platforms/Software



Compatible with a wide variety of VeEX host devices:

- Android mobile devices with Fiberizer® FMS software
- iOS® mobile devices with Fiberizer FMIOS software
- Windows PCs equipped with Fiberizer Scope software
- VeEX test platforms equipped with USB or WiFi option (MTTplus, TX300 Series, V150 Series and RXT)

### DI-1000 Digital Fiber Inspection Scope

- Optimized for single fiber inspection
- Precise and stable one-finger focus knob
- One hand operation
- Inspect patch cords and bulkheads
- Compatible with TX300s series, RXT-1200 platform, MTTPlus platform, V150-series, and PCs
- Direct USB 2.0 connection to test set
- Powered by USB
- Robust for field use (no motors or batteries)
- Ergonomic design
- Comprehensive line of tips available
- Quick tip replacement



### DI-1000 MPO+ Digital Fiber Inspection Scope

- Optimized for multi-fiber (MPO/MTP®) inspection
- Focus and X/Y tip controls built-into device
- Precise and reliable single-finger focusing
- Ergonomic design offering one-handed operation
- Robust for field use (no motors or batteries)
- Inspect patch cords and bulkheads
- Supports 12 to 48 fiber MTP/MPO connector types
- Large field of view (FOV) 680 x 510  $\mu$ m
- 1/3 inch CMOS sensor
- Blue LED light source for end face illumination
- Compatible with largest variety of host devices
- USB connection to tester
- Powered by USB



## REMOTE FIBER TEST SYSTEM (RFTS) & OPTICAL SWITCHES

Fiber Monitoring is a proven, proactive, risk-reduction and asset protection approach of pinpointing fiber degradation and breaks that threaten strategic infrastructure providing service to thousands of customers. VeEX's remote fiber test system (RFTS) is designed and optimized to test and monitor point-to-point fibers used in metro and long-distance core applications, as well as point-to-multipoint fibers employed in PON access networks.

The Remote Fiber Test System (RFTS) consists of the RTU-4000 platform with the RTU-4100 OTDR optical test module. A modular architecture and a wide range of test modules supports live or dark fiber testing in either point to point or FTTx networks. Advanced analysis algorithms along with state-of-the-art OTDR technology ensures fiber faults or anomalies can be detected quickly and accurately for troubleshooting and restoration purposes, improving workflow and reducing Mean Time to Repair (MTTR).

### RTU-4000 Modular Remote Test Platform

- Small 1U, 19" or 23" rackmount profile and construction
- Compatible with VeEX's OXA/C-4000 optical switches
- Supports RTU-4100 OTDR module
- Connectivity via Ethernet Management interface



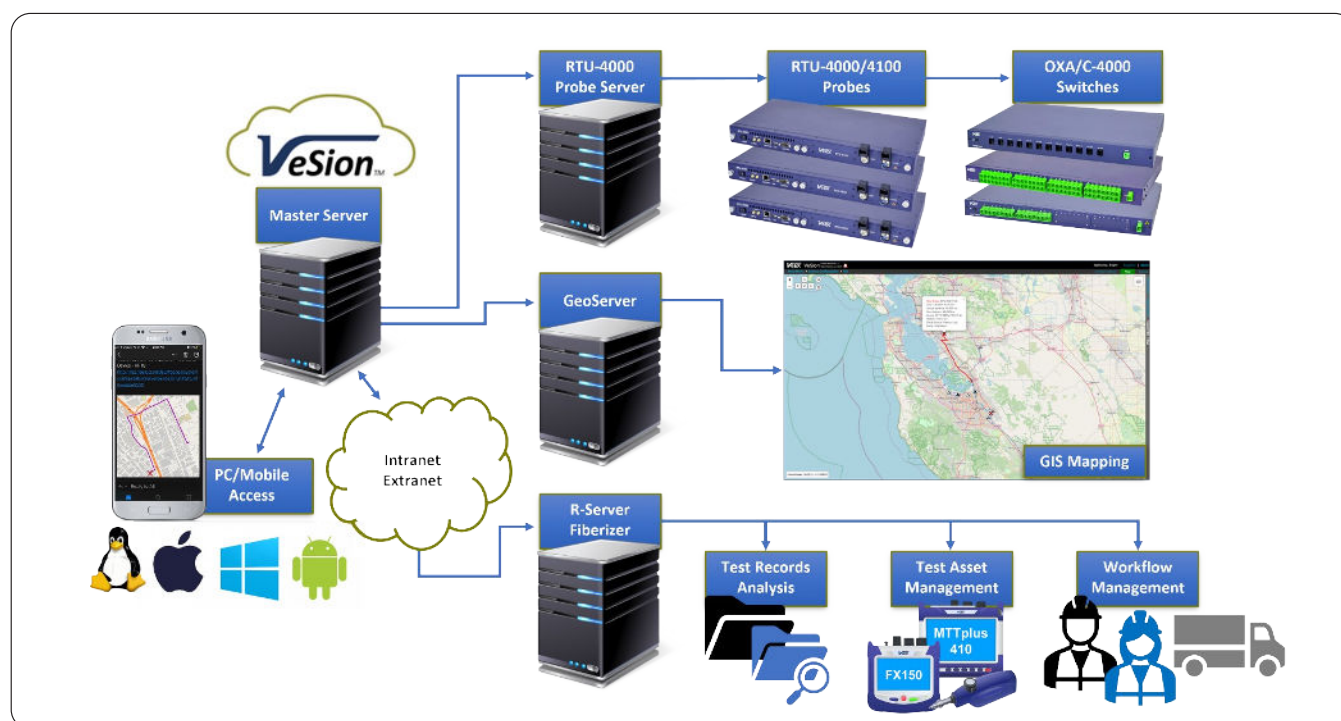
### OXA/OXC-4000 Optical Switches

- 1x8, 1x16, 1x32 and 1x128, 1x256, 1x288 (OXC only), 1x512 (OXA only) configurations
- SC/APC, LC/APC, MPO/APC connector support
- Compact form factor
- Wide passband and low insertion loss
- Protocol and bit-rate independent
- Single mode fiber support
- Fast switching time, <15 ms for adjacent channels
- OXC-4000 series
  - Ethernet control via VeSion
  - Cascading of switches to achieve higher port count
- OXA-4000 series
  - RS232 control direct from RTU-4000
  - Built-in FWDM option for in-service testing



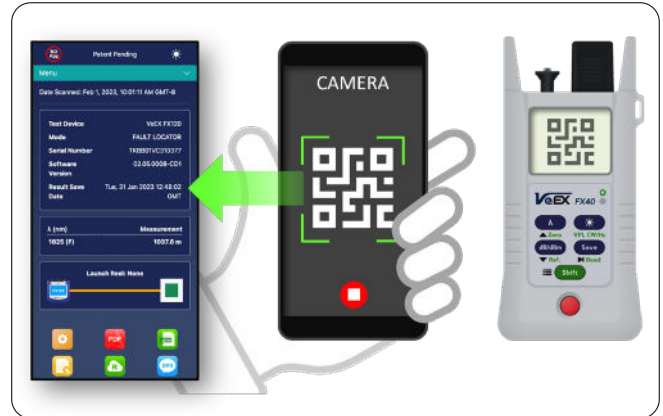
### RTU-4100 Optical Test Module (OTDR)

- Up to 50 dB Dynamic Range
- Up to 500,000 sampling points with 3 cm resolution
- OTDR test port equipped with live fiber detection for monitoring P2P or PON networks
- Built-in launch fiber to verify first connection to fiber under test



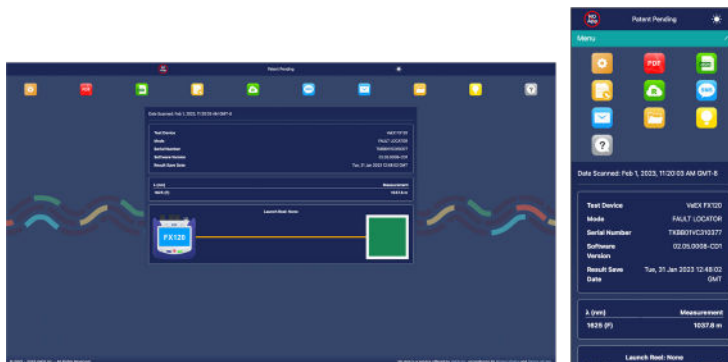


VeEX's innovative NoApp technology revolutionizes the way data is processed from small meters to advanced test sets. By using QR code technology, our patent pending NoApp streamlines workflow and reporting, making it fast, efficient and hassle-free. Our cloud service enables test sets to easily transfer test result KPIs to a phone, tablet, or PC. With NoApp, users can instantly generate test reports and share them seamlessly or upload them to a centralized R-Server or cloud. NoApp is compatible with any smartphone or smart device equipped with a camera and QR code reader functionality, eliminating the need for a separate mobile application. Simply scan the QR code and gain immediate access to test result key performance indicators (KPIs).



## Advantages

- No App installation
- No recurrent installations or constant release updates that are required for the everchanging iOS and Android ecosystems
- Works with any modern smartphone, tablet or PC camera supporting native QR code scanning
- Responsive design to support all screen sizes
- Always up-to-date with the latest features and bug fixes
- Requires little to no maintenance downtime



## Features

- GPS tagging
- PDF report export
- Share result via email and SMS
- Upload result to VeEX's R-Server
- Add multiple results into a project

VeEX provides the global communications and data networking industry with test and measurement products and services that enable efficient development, verification, manufacturing, deployment and management of high-performance optical networks. Network Equipment Manufacturers (NEMs) can benefit from advanced traffic generation and analysis specifically designed for R&D, SVT/QA, production, remote, and automated testing environments. In addition, VeEX offers field portable solutions for NEMs pre and post sales support.

## MPA® Multi-Protocol Analyzer

The MPA Multi-Protocol Analyzer is an advanced packet optical transport traffic generation and analysis platform specifically designed for the demands of R&D, SVT, and manufacturing testing environments. The MPA modular platform provides simultaneous independent multi-port testing from 400 Gbps to 10 Mbps for Ethernet/IP, OTN & SDH/SONET and Fibre Channel.

### Applications

- Network equipment, systems, and IC development
- Signal integrity verification
- Transceiver validation
- Design verification and system testing (SVT)
- Production and manufacturing test
- Network verification and service delivery



### Simultaneous and Independent Multi-Port, Multi-Rate, Multi-Protocol, & Multi-User Testing

QSFP-DD • QSFP56 • QSFP28 • QSFP+ • CFP2-DCO • CFP2 • CFP4 • SFP56 • SFP28 • SFP+ • SFP  
Physical Layer • Ethernet/IP • OTN & SONET/SDH • Fibre Channel

### Features

#### Ethernet/IP Traffic Generation & Analysis

- Full line rate layer 1-4 multi-stream, throughput, frame loss, latency, packet jitter, and BERT characterization
- PCS & RS-FEC layer testing
- RFC 2544 and Y.1564 compliance testing
- Service disruption time (SDT) measurement

#### OTN Traffic Generation & Analysis

- OTL and FEC layer testing
- Multi-Channel OTN testing with support for parallel testing of up to 80xODU0s
- Advanced multi-stage OTN multiplexing with Ethernet, GFP, Fibre Channel, SDH/SONET, & PRBS clients
- Complete overhead/trace generation and analysis with byte capture
- Thru mode with error & alarm stimulus testing
- Service disruption time and delay measurements

#### SONET/SDH Traffic Generation & Analysis

- Multi-Channel SONET/SDH testing with support for parallel testing up to 192 channels
- PRBS and GFP/Ethernet mapping clients
- Complete overhead/trace generation and analysis with byte capture
- Thru mode with error & alarm stimulus testing
- Pointer & APS sequence generation and analysis
- Service disruption time and delay measurements

#### Fiber Channel Traffic Generation & Analysis

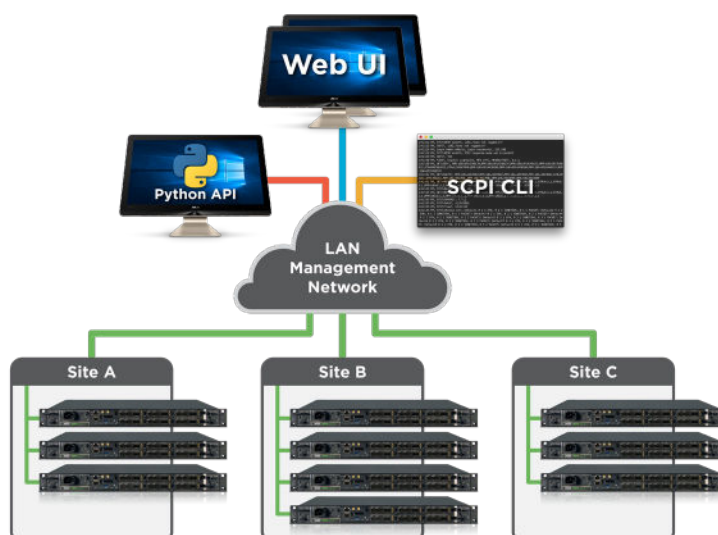
- Full line rate throughput, frame loss, latency and BERT characterization
- FEC layer testing
- Fibre Channel switch login and performance verification with FLOGI/PLOGI
- Buffer-to-buffer credit and flow control analysis
- Service disruption time measurement

#### Transceiver, Physical, and Layer 1 Testing

- Laser tuning and PM measurements for pluggable coherent QSFP-DD and CFP2-DCO
- Pre-FEC & Post-FEC BER analysis
- Multi-Lane Unframed BERT - PAM4 PRBSQ, SSPRQ & NRZ PRBS test patterns for signal integrity validation
- Transceiver and MDIO/I2C testing
- High speed lane clock stressing/analysis and optical power level verification
- Transceiver temperature measurement and 3.3V power rail adjustment and monitoring

#### Test Automation and Scripting

- Full instrument control with native Python API or SCPI CLI
- Supports multiple independent tests and connections with mixed control types including GUI



## TEST MODULES

Modules based on an advanced programmable FPGA designs which provide best signal integrity and future proof hardware to support current and emerging testing applications.

### MPM-400DCO



- 400G CFP2-DCO and QSFP-DD ports
- 400GE, 200GE, 4x100GE, 100GE, 8x50GE, 50GE, 4x25GE, 4x10GE & OTU4
- FlexE 400GE, 200GE, 100GE QSFP PHY testing with client up to 400G
- Coherent CFP2-DCO, QSFP-DD ZR, and QSFP56/28 transceiver support
- Laser tuning and PM measurements for pluggable coherent QSFP-DD and CFP2-DCO
- CFP2 and QSFP-DD ports support both PAM4 and NRZ modes
- Dual independent port operation
- Advanced MDIO and I2C applications including external control for transceiver module debug
- Comprehensive FEC layer validation including symbol error per codeword analysis
- MAC/Ethernet/IP/UDP layer throughput & traffic verification
- Multi-Lane Unframed BERT/PRBSQ, SSPRQ PAM4 and NRZ pattern testing
- Hardware ready for FlexO/OTUCn and other applications

### MPM-400AR



- Dual port 400GE, 200GE, 4x100GE, 100GE, 50GE, 4x25GE, 25GE, 4x10GE, 10GE & OTU4; Single Port 8x50GE
- FlexE 400GE, 200GE, 100GE QSFP PHY testing with client up to 400G
- Coherent ZR/ZR+ transceiver support with laser tuning and PM measurements
- 2x QSFP-DD ports, 2x QSFP56, & 2x SFP56 ports support both PAM4 and NRZ modes
- Independent port operation provides support for various types of network aggregation/wrap test applications
- Transceiver and cable testing with I2C read/write capability
- Comprehensive FEC layer validation including symbol error per codeword analysis
- MAC/Ethernet/IP/UDP layer throughput & traffic verification
- Multi-Lane Unframed BERT/PRBSQ, SSPRQ PAM4 and NRZ pattern testing
- Hardware ready for FlexO/OTUCn and other applications

### MPM-600G



- QSFP28-based module supports six independent 100G/40G Ethernet or OTN transport tests
- The MPA platform supports up to two MPM 600G modules, providing up to 12x 100G test ports
- 100GE, 100GE IEEE 802.3bj Clause 91 RS-FEC for SR4, & 40GE
- OTUCn (n=1-6), OTU4, OTU3, OTU3e1, & OTU3e2
- Flex Ethernet (FlexE) traffic generation and analysis with 100GBASE-R PHY, shim/calender overhead, and MAC layer control/testing
- FlexE testing using 1 to 4 100GE QSFP28 PHYs with client rate to 400G

### MPM-100AR



- 100GE, 100GE IEEE 802.3bj Clause 91 RS-FEC for SR4, & 40 GE
- Dual port 10/25/25G RS-FEC Ethernet
- OTUCn (n=1-6), OTU4, OTU3, OTU3e1, & OTU3e2
- Dual port OTU2, OTU2e & OTU1e
- STL256.4 STM256/OC768
- Dual port 10/16/32G FEC Fibre Channel
- CPRI Unframed L1 BERT 24.33024G
- QSFP28 and dual SFP28 ports

### MPM-100G

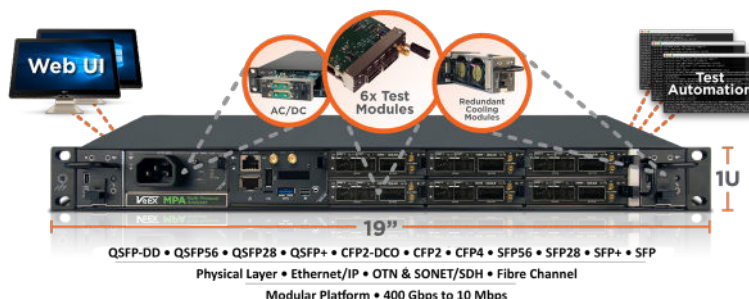


- 100GE, 100GE IEEE 802.3bj Clause 91 RS-FEC for SR4, & 40GE
- OTUCn (n=1-6), OTU4, OTU3, OTU3e1, & OTU3e2
- STL256.4 STM256/OC768
- CFP4 and QSFP28 ports

### MPM-10G



- 10GE LAN/WAN, 1G, 100M, 2500BASE-X, 10M/100M/1000M/10GBASE-T Ethernet
- OTU1, OTU2, OTU1e, OTU2e, OTU1f, OTU2f
- SDH STM0/1/4/16/64 & SONET OC1/3/12/48/192
- Fibre Channel 1/2/4/8/10G
- CPRI Unframed L1 BERT 614.4M to 12.16512G
- Dual SFP+ ports





With the exploding growth of high-speed and high-availability services, testing and verification tools must change to keep up. Not all 400G and 100G T&M applications are the same. From Field, CO, Data Center (cross-connect and interconnect), Manufacturing, to R&D environments, VeEX has the right tools to pinpoint your specific testing requirements and environmental needs. Whether it is a portable do-it-all handheld for the field, or a high port density rack-mount, VeEX solutions share a common user interface and feature set allowing seamless interaction between field and core network teams.

## RXT® Modern Modular Test Platform

### RXT-6402



#### Advanced Dual 400G Multi-Service Test Module

- 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)
- Up to four concurrent and independent tests
- Native QSFP-DD, QSFP56 and SFP-DD PAM4 hardware for best-in-class signal integrity (no adapters required)
- Provides all the necessary features to test all common form factors including QSFP-DD, QSFP56, SFP-DD transceivers, DAC, AOCs, networking equipment and 400GE links
- Wide range of supported 400GE interfaces, including 400GBASE-SR8, FR8, LR8, DR4, FR4, LR4, CR8, CR4 and 400ZR/ZR+

### RXT-6200



#### 100G Universal Test Module

- CFP4 and QSFP28 interfaces for 100GE, OTU4 and 50GE applications
- Independent Dual-Port testing, up to 2x 112G
- Supports IEEE 802.3bj Clause 91 RS-FEC
- QSFP+ for 40GE, OTU3
- SFP28 for 25GE, 32G FC, CPRI up to 24.330G (CPRI 10), 25G eCPRI
- SFP+ for 10GE/1GE/100M, OTU2/2e/1e/1, STM-64/16/4/1/0, OC192/48/12/3/1, and Fibre Channel 16/10/8/4/2/1G and CPRI up to 12.165G (CPRI 9) and 10G eCPRI
- Electrical interfaces for legacy 10/100/1000M, SDH/SONET and PDH/DSn testing

### RXT-6000e



#### 100G Multi-Service Test Module

- CFP2 and QSFP28 interfaces for 100GE, OTU4 and 50GE applications
- Supports IEEE 802.3bj Clause 91 RS-FEC
- CFP4 support via CFP2-to-CFP4 adapter
- QSFP+ for 40GE, OTU3
- SFP28 for 25GE, 32G FC, CPRI up to 24.330G (CPRI 10), 25G eCPRI
- SFP+ for 100BASE-FX, 1000BASE-X, 10GBASE-X, OTU2/2e/1e/1, STM-64/16/4/1/0, OC192/48/12/3/1, and Fibre Channel 16/10/8/4/2/1G and CPRI up to 12.165G (CPRI 9) and 10G eCPRI

## MPA Multi-Protocol Analyzer

### MPM-400DCO



- 400G CFP2-DCO and QSFP-DD ports
- 400GE, 200GE, 4x100GE, 100GE, 8x50GE, 50GE, 4x25GE, 4x10GE & OTU4
- FlexE 400GE, 200GE, 100GE QSFP PHY testing with client up to 400G
- Coherent CFP2-DCO, QSFP-DD ZR, and QSFP56/28 transceiver support
- Laser tuning and PM measurements for pluggable coherent QSFP-DD and CFP2-DCO
- CFP2 and QSFP-DD ports support both PAM4 and NRZ modes
- Dual independent port operation
- Advanced MDIO and I2C applications including external control for transceiver module debug
- Comprehensive FEC layer validation including symbol error per codeword analysis
- MAC/Ethernet/IP/UDP layer throughput & traffic verification
- Multi-Lane Unframed BERT/PRBSQ, SSFPRQ PAM4 and NRZ pattern testing
- Hardware ready for FlexO/OTUCn and other applications

### MPM-400AR



- Dual port 400GE, 200GE, 4x100GE, 100GE, 50GE, 4x25GE, 25GE, 4x10GE, 10GE & OTU4; Single Port 8x50GE
- FlexE 400GE, 200GE, 100GE QSFP PHY testing with client up to 400G
- Coherent ZR/ZR+ transceiver support with laser tuning and PM measurements
- 2x QSFP-DD ports, 2x QSFP56, & 2x SFP56 ports support both PAM4 and NRZ modes
- Independent port operation supports various types of network aggregation/wrap test applications
- Transceiver & cable testing with I2C read/write capability
- Comprehensive FEC layer validation including symbol error per codeword analysis
- MAC/Ethernet/IP/UDP layer throughput and traffic verification
- Multi-Lane Unframed BERT/PRBSQ, SSFPRQ PAM4 and NRZ pattern testing
- HW ready for FlexO/OTUCn & other applications

### MPM-600G



- QSFP28-based module supports (6) independent 100G/40G Ethernet or OTN transport tests
- The MPA platform supports up to (2) MPM 600G modules, providing up to 12x 100G test ports
- 100GE, 100GE IEEE 802.3bj Clause 91 RS-FEC for SR4, & 40GE
- OTUCn (n=1-6), OTU4, OTU3, OTU3e1, OTU3e2
- Flex Ethernet (FlexE) traffic generation & analysis with 100GBASE-R PHY, shim/calender overhead, and MAC layer control/testing
- FlexE testing using 1 to 4 100GE QSFP28 PHYs with a client rate to 400G

### MPM-100AR



- 100GE, 100GE IEEE 802.3bj Clause 91 RS-FEC for SR4, & 40 GE
- Dual port 10/25/25G RS-FEC Ethernet
- OTUCn (n=1-6), OTU4, OTU3, OTU3e1, and OTU3e2
- Dual port OTU2, OTU2e & OTU1e
- STL256.4 STM256/OC768
- Dual port 10/16/32G FEC Fibre Channel
- CPRI Unframed L1 BERT 24.33024G
- QSFP28 and dual SFP28 ports

### MPM-100G



- 100GE, 100GE IEEE 802.3bj Clause 91 RS-FEC for SR4, and 40 GE
- OTUCn (n=1-6), OTU4, OTU3, OTU3e1, OTU3e2
- STL256.4 STM256/OC768
- CFP4 and QSFP28 ports

