

RXT-4100+ OTDR Module

500,000 Data Points with 3 cm Resolution



for RXT-1200 Modular Test Platform

The RXT-4100+ Fiber Optics test module for the VeEX® RXT-1200 platform is the world's first field portable OTDR to offer up to 500,000 data points with 3 cm resolution. The RXT-4100+ features a range of Optical test functions including OTDR, OPM, Light Source and VFL. Multi-protocol OTN, SDH/SONET, Ethernet, Fibre Channel and Synchronous Packet Networks utilizing optical fibers can easily be verified as well as OSA testing on CWDM/DWDM network with a single test platform ensuring maximum test productivity.



Platform Highlights

Software

- Flexible modular architecture supports multiple technologies and applications
- Fiberizer® Desktop+ PC software for fiber trace analysis
- Fiberizer Cloud based trace analysis and data management
- R-server support for centralized work force management and test results repository
- Web browser and EZ-Remote to support remote access

Hardware

- High resolution, 7" full color TFT touch-screen viewable in any lighting condition
- Connectivity via 10/100Base-T Management interface, WiFi™, Bluetooth®, or 3G Card for back office applications
- Built-in microphone and speaker for VoIP & VF applications
- Smart fan operation with built-in temperature sensor
- Interchangeable Li-ion battery pack for extended test time
- USB-A Interface for USB flash drives and fiber inspection probe connection
- Optional built-in GPS module for geotagging OTDR traces

Key Module Features

Optical Testing

- Multimode and singlemode wavelength options - 850, 1300, 1310, 1490, 1550, 1625, and 1650 nm
- Filtered 1625 or 1650 nm OTDR port for in-service measurements
- OTDR ports feature live fiber signal detection
- High dynamic range for long haul fiber signal detection
- Sampling points up to 500,000
- Event dead zone³ <0.8m type, attenuation dead zone⁴ <3.5m type
- Telcordia GR-196 and SR-4731.sor file formats
- Optional V-Scout/V-Profile mode – Smart Link Mapping using intuitive icons derived from multiple test acquisitions
- Optional Built-in Visual Fault Locator
- Optional Optical Power Meter with WaveID detection
- Optional Light Sources with WaveID and Loop mode
- Optional Fiber Inspection Scope (USB)
- Upload OTDR traces, OLTS results and Fiberscope images directly to Fiberizer Cloud
- Built-in G.657 launch fiber
- Universal 2.5 mm optical interfaces with inter-changeable optical adaptors (SC/FC/ST/LC)



Value added data post processing

Fiberizer Cloud

cloud.fiberizer.com

Multi Service Applications

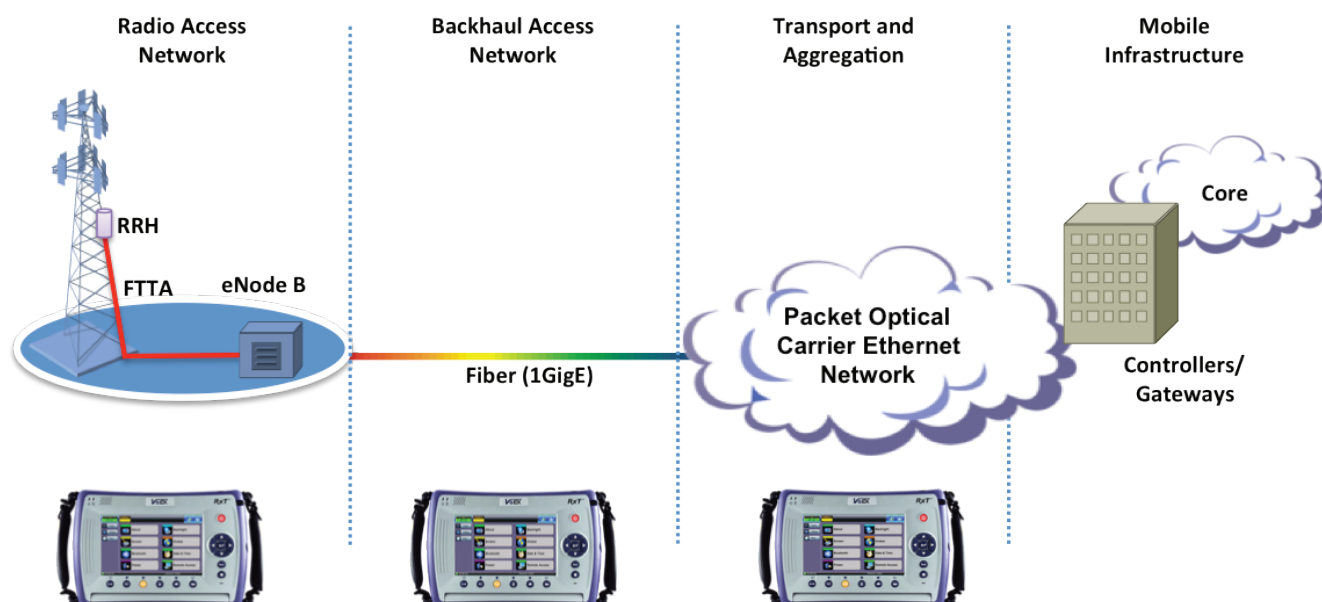
Today's converged transport and service networks operating on optical fiber infrastructures demands a test tool that incorporates a range of test functions without compromising capability, portability, speed or cost. The RXT-1200 chassis allows technicians to swap the RXT-4100+ OTDR module for other RXT test modules such as Optical Spectrum Analysis or Ethernet testing.

Mobile Network Optical Testing

Packet-optical networks play a key role in aggregating mobile traffic and handling the mix of circuit/TDM and IP/Ethernet traffic transport ensuring a smooth transition to an all-IP infrastructure. Optical fiber has long been considered to be the optimal access technology because it offers the best characteristics for capacity and QoS. There are many fiber options including Carrier Ethernet and dark fiber/wavelengths present in mobile networks today including Fiber-to-the-Antenna (FTTA) in the Radio Access Network. Providers are increasingly being forced to replace traditional coaxial-based systems with fibers to the top of the cell tower, in an effort to squeeze out more capacity to meet the demand for LTE/4G services.

So as existing cell towers are retrofitted with 2nd and 3rd generation FTTA systems and the backhaul access network evolves rapidly to optical fiber, service providers not only need technicians who are skilled in fiber cable installation, testing and repair, but also a flexible multi-functional tester that can support a variety of optical and Ethernet tests. Fiber testing is now considered mandatory as part of any mobile site build documentation, especially as these records will enable any fast and successful field repair in future.

Packet Optical Mobile Backhaul



The RXT-4100+ OTDR Solution

Fiber centric Ethernet is fast becoming the dominant access and metro technology for many operators, and field technicians have to be equipped with a test solution that allows them to characterize the fiber as well as the Ethernet transmission running over it. The powerful RXT-4100+ OTDR responds to this demand by integrating the right combination of optical tools and test features so that a fiber link can be qualified in a single platform, eliminating additional truck rolls. The RXT-4100+ OTDR all-in-one optical solution offers:

- Multimode/Singlemode OTDR - locate and characterize fiber link, splice and connector losses
- Fiber Fault Finder - quickly find breaks and bends with improved accuracy due to having upto 500,000 datapoints and resolution as low as 3 cm
- Power meter and light source - perform power and loss measurements
- Visual Fault Locator - check patch cords and enclosures for light leakage
- Fiberscope - check dirty and/or damaged connectors
- Built-in launch fiber to characterize very short fiber spans and loss characteristics of the first connector of fiber under test

Optical Time Domain Reflectometer (OTDR)

Intuitive Test Setup

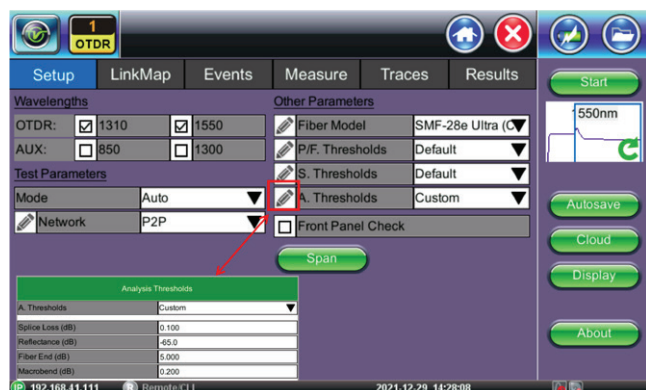
An intuitive menu structure offers simple test setup for Novice and Expert users alike. Test parameters can be configured manually by the user or set automatically by the unit.

Several wavelength combinations covering both multimode and singlemode applications are available, including short haul FTTX, Metro and long haul networks.



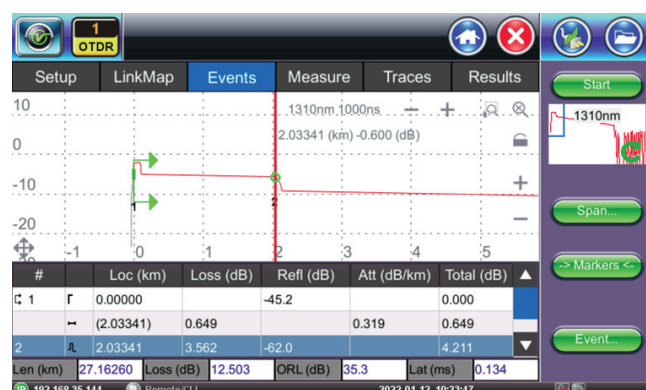
Analysis Thresholds

User defined thresholds for splice loss, connector loss, fiber lengths and reflectance can be preset to assess a fiber's condition. Color coding used in the event table will display events exceeding Pass/Fail thresholds and alert technicians of a potential problem.



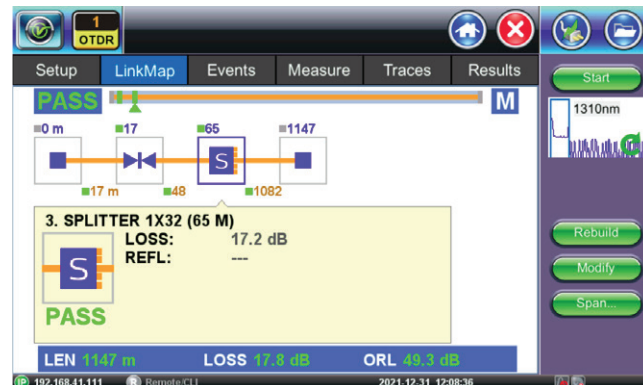
Accurate Event Analysis

Reliable event detection and accurate analysis are crucial to document fiber links properly at the time of installation. These baseline records are essential to troubleshooting faulty fiber networks and reducing system downtime afterwards.



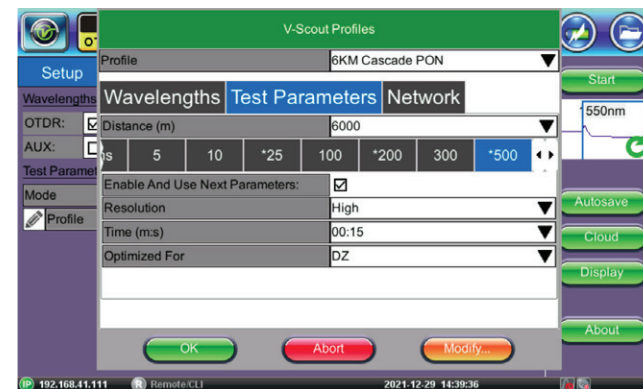
V-Scout Link Mapping

Advanced algorithms evaluate separate acquisitions and characterize the fiber span using intuitive symbols. Each individual acquisition can be customized and user defined as a test profile depending on network type or application. This optional feature eliminates event interpretation and provides greater analysis confidence to the user, regardless of OTDR skill set.



V-Scout Profiles

V-Scout Profiles put the operator back into the driver seat. Users can now build their own custom V-Scout test Plan and optimize it for their specific project using V-Scout Profiles test mode. This test mode is automated testing without giving up control. Just tell us the maximum test range and V-Scout profile will recommend the test pulse you should use but you have the power to add/change/delete settings. You can choose to accept the default settings for Resolution and Test Time or override them as well.



Live Fiber Check

The OTDR automatically checks if light is present on the fiber under test prior to making any measurement. The unit disables the laser transmitter if traffic is detected preventing any possible service disruption and potential receiver damage.

Latency Measurement

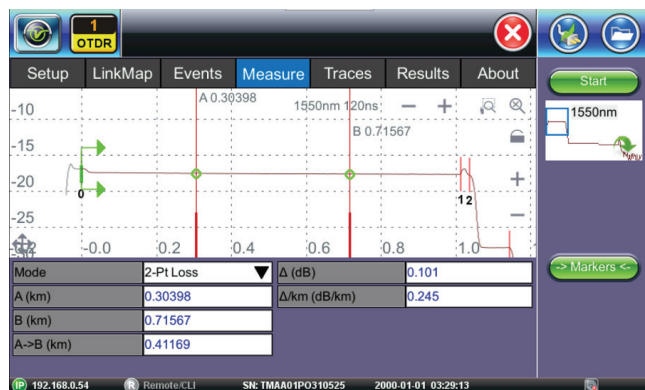
VeX OTDRs can be used to measure latency in a fiber span. Latency is the time it takes for the signal to travel from point A to point B. Within the optical fiber itself, latency is dependent upon the refractive index and remains relatively constant at a specific optical wavelength. These fiber properties allow data center operators, especially those providing co-location services to the financial sector, to "calibrate" and optimize optical links to ensure uniform latency among all customers.

The RXT-4100+ OTDR employs specialized techniques developed from decades of experience to locate and measure connectors, splices, optical splitters and macro-bends.



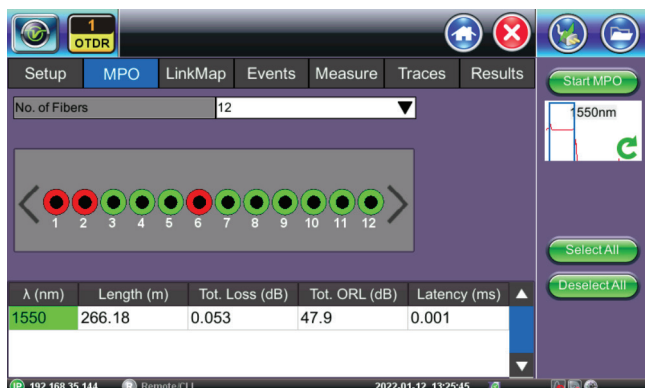
Internal Launch Fiber

Near end fiber analysis is greatly improved thanks to a built-in G.657 launch fiber. Excellent dead zone performance and 3 cm sampling resolution allows the OTDR to evaluate loss and reflectance of the first connection and short fiber spans common in FTTA applications.



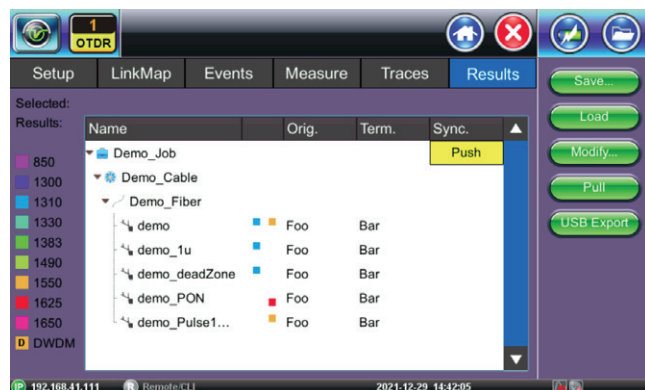
OX-MPO-12

The OX-MPO-12 is a compact singlemode switch that can be used to facilitate OTDR testing on high-density fiber network environments where MPO/MTP ribbon cables are utilized. When used with a fan-out cable, you can increase efficiency by preparing up to 12 simplex fibers and while testing you can clean/inspect the next group of 12 fibers to be tested.



OTDR Results

Traces in the Telcordia SR-4731 sor format are saved in a logical hierarchy for easy sorting and archiving. Trace files can be pushed directly to Fiberizer Cloud from the tester using an Internet connection so that work supervisors have immediate access to test data being measured on site. Reference trace files can also be “pulled” from Fiberizer Cloud server for troubleshooting and restoration purposes.



Visual Fault Locator (VFL)

The optional Visual Fault Locator is a useful tool to identify poor connections, bad fusion splices and macrobends in fiber management closures. Operating at 650 nm, this visible source offers up to 5 km (3 miles) of range.

Optical Light Source (OLS)

The OTDR port can operate as a stable light source for loss testing. The output supports WaveID which automatically sets the wavelength when paired with compatible VeEX optical power meters. The source output can also be modulated for use with industry standard fiber identifiers.



Optical Power Meter (OPM)

An optional Optical Power Meter (OPM) can be fitted to measure absolute or relative optical power levels. Results can be saved manually or continuously for laser drift monitoring. The OPM incorporates a highly sensitive and stable InGaAs detector with eight calibrated wavelengths providing accurate level measurements from +10 to -65 dBm. A high power version is available for CATV applications for levels ranging from +25 to -50 dBm.

WaveID

The OPM employs WaveID, a unique wavelength detection system common to most VeEX optical test products. The OPM automatically recognizes a single or multi-wavelength signal transmitted by another VeEX optical OLS with WaveID connected to the far end of the link under test. The OPM measures the level at the corresponding wavelength automatically, eliminating setup errors and saving test time.

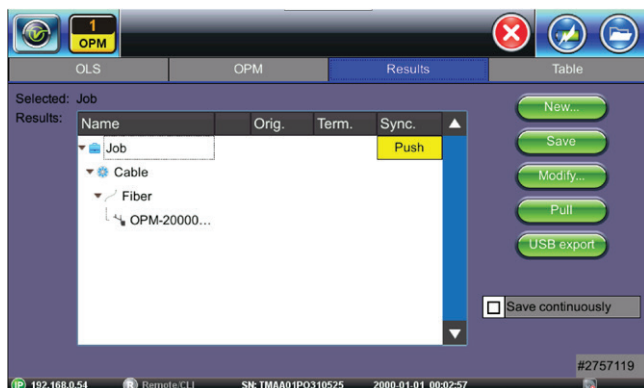
Switchable Adapters

The OTDR and OPM interfaces accept VeEX thread-on adapters, which can be swapped out in a matter of seconds. The UCI (Universal Connector Interface) and removable adapters interface with a variety of industry standard connector styles fitted with either angled or non-angled connector versions. A protective dust cap to protect the adapter from dirt and other contaminants is also included.



Power Meter Results

OPM and OLTS test data can be saved to internal memory using the same file-naming convention applied to OTDR traces. Saved results can be exported to USB for offline report generation or push/pull to Fiberizer Cloud depending on user documentation requirements.



FiberScope

VeEX offers various models of FiberScopes that can be used in conjunction with the OTDR. Whether testing simplex fiber or ribbon, we have a FiberScope to meet your needs.

DI-1000 - USB powered Wired FiberScope for simplex and ribbon cable testing; manual focus with external MPO tip with controls.

DI-1000MPO - USB powered wired Fiberscope for simplex and ribbon cable testing; manual focus with built-in controls for ribbon cable inspection.

DI-3000 - WiFi or wired FiberScope with Auto-Focus for simplex connector inspection; manual focus with external MPO tip with controls.

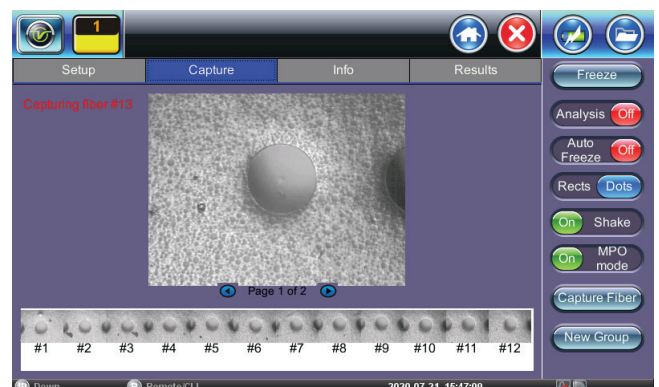
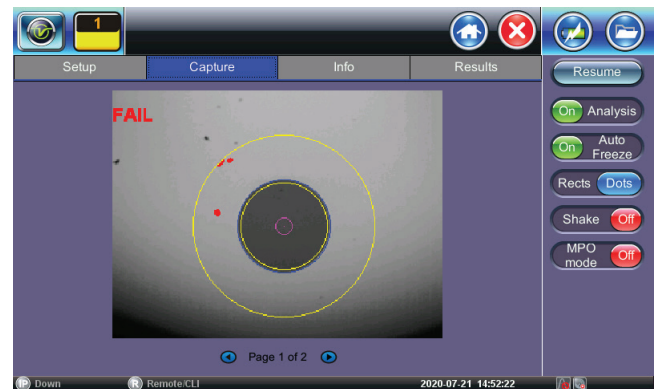
DI-1000



DI-3000



DI-1000MPO



OTDR Trace Analysis and Documentation

Fiberizer® Desktop+

Fiberizer Desktop+ is a standalone PC software application to analyze traces acquired by the RXT-4100+ OTDR. Supplied as a standard accessory, Users can edit traces manually, create event tables, generate reports using built-in templates and much more. This viewer displays trace files conforming to Telcordia (Bellcore) GR-196 & SR-4731 *.sor formats, and offers both 2-point and 5-point loss measurement modes. It also supports batch processing, a very useful feature for analyzing multiple fibers in a single cable. The software does not require Internet access to operate, but it can be interfaced with Fiberizer Cloud OTDR trace viewer at any time.

Work from Anywhere, Anytime

Fiberizer® Cloud

Fiberizer Cloud not only empowers the OTDR, but also the Workforce. Going way beyond traditional OTDR reporting methods or concepts, this cloud-based solution provides superior centralized test data management capabilities including powerful web based trace analyses. You can work from almost anywhere, at anytime because Fiberizer Cloud is a full online web service.

Streamlining Onsite Data Reporting

Fiber technicians and contractors tasked to validate new fiber installations or restoring cable routes after an outage are generally obliged to submit measured data (.sor files) and related documentation to the network operator as proof of delivery before being paid. Valuable time however is often wasted after the onsite work is completed, because critical test files are usually first stored to some local storage media before being transferred to a colleague via email for verification and further reporting.

Fiberizer Cloud streamlines this information exchange, eliminating costly paper, e-mail or other time consuming communication methods - instead, time wastage can be avoided by transferring traces of jobs completed directly from the OTDR to Fiberizer Cloud. Professional PDF or MS Excel reporting functionality is also available, and users can create their own templates for reports. Bi-directional analysis of OTDR traces, tested from both ends of the optical fiber, can also be performed.

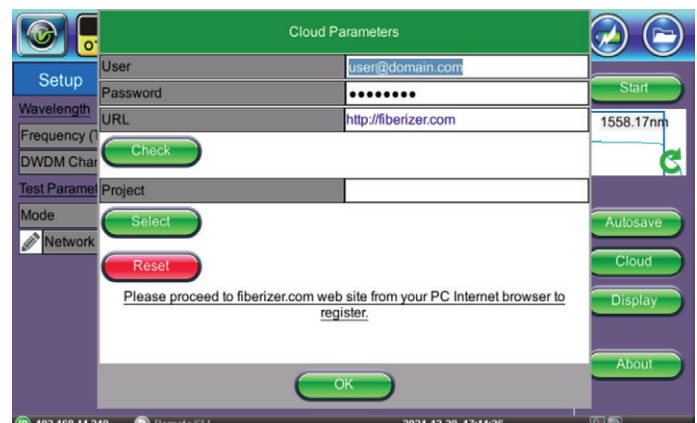


Fiberizer Cloud Connectivity

Pair the RXT-4100+ OTDR Multiservice tester via Bluetooth to a mobile Smartphone, Laptop or Tablet PC and efficiently upload OTDR test data directly to the Cloud server using any available wireless technology (3G, WiFi).

Total Compatibility

Fiberizer Cloud is compatible with both Windows and MacOS browsers, not limiting users to PC platforms only. OTDR trace files in Telcordia (Bellcore) GR-196 & SR-4731 *.sor formats are securely transferred via HTTPS connection, a fast reliable communication protocol commonly used in today's Internet applications. Another outstanding feature is compatibility with other OTDR vendor trace data formats, so users can reference or compare other OTDR traces and vice versa.



Optical Connector Protector (Hardware Option)



Optical Connector Protector

The innovative, patent pending field-replaceable optical ferrule system¹ adds an extra layer of protection to the internal end-face of calibrated optical test ports, preventing contamination and accidental damage.

Users can quickly replace the ferrule² without the need for any tool while maintaining the integrity of the instrument's factory calibration. This novel approach eliminates the downtime, logistical hurdles and high cost associated with sending test sets to a service center for repair and recalibration.

All components in the system are reusable, with the exception of the small replaceable ferrule, helping to reduce environmental waste.



Replaceable Ferrule



**Optical Protector Cover
(optional)**

*1 Patent pending
2 Spare ferrules available in
pack of 4 for APC or UPC*

Field-Replaceable Optical Ferrule System

Universal Adapter

The universal connector adapter allows users to change the optical connector type conveniently whenever needed. Available in FC, SC, ST and LC.

Locking Ring

To secure the replaceable ferrule at its optimum location for the best performance.

Replaceable Ferrule with APC or UPC End-face

The self-aligned field-replaceable ferrule can be changed out in seconds. Users can select between APC or UPC end-face, ensuring compatibility with any test application requirement.

Optical Connector Protector Base

The panel mount protector base is made from high-grade stainless steel using a precision CNC process. This achieves proper alignment of the replaceable ferrule, minimizing insertion loss.



Specifications¹

OTDR	Multimode	Singlemode
Wavelength (± 20 nm) ²	850/1300	1310/1490/1550/1625/1650
Laser safety class	Class 1, 21 CFR 1040.10	
Dynamic Range ³ (dB)	Refer to Ordering Guide	
Display Range (dB)	0.1 to 54.165	
Event dead zone ⁴ (m)	Refer to Ordering Guide	
Attenuation dead zone ⁵ (m)	Refer to Ordering Guide	
Distance range (km)	0.1 to 80	0.1 to 400
Distance Units	Meter, Kilometer, Feet, Kilofeet or Mile	
Readout resolution (m)	0.01	
Sampling resolution (m)	0.03 to 8	0.03 to 16
Sampling points	Up to 500,000	
Distance uncertainty ⁶ (m)	$\pm (0.5 + \text{resolution} + 3 \times 10^{-5} \times L)$	
Group index range	1.2000 to 1.8000 in 0.0001 steps	
Launch conditions ⁷	EF compliant	N/A
Linearity (dB/dB)	0.03	
Loss resolution (dB)	0.01	
Measurement time	Realtime, auto or user defined presets (5s, 15s, 30s, 1 min, 2 min, 3 min, 10 min)	
Measurement modes	Loss (2-PT or LSA, dB/km), Reflectance, ORL, Latency	
Reflectance accuracy (dB)	± 2.0	
Reflectance display resolution (dB)	0.1	
Typical real-time refresh (sec)	0.2	
Optical Interface	Fixed connector or optional universal interface with interchangeable adaptors	

Optical Test Options	Multimode	Singlemode
Visual Fault Locator (VFL)	Optional	
-Wavelength (nm)	650 \pm 10 nm	
-Output (mW)	+1	
-Laser Safety Class	IEC 60825-1, Class II	
-Optical connector	Universal 2.5 mm interface; Optional 2.5 mm to 1.25 mm converter	
Optical Light Source ⁸ (LS)	Optional	
-Wavelengths (nm)	850/1300	1310/1490/1550/1625/1650
-Output power (dBm)	>-4	>-2.5 typ
-Source mode	CW, 270, 330, 1000, 2000 Hz	
-WaveID	Standard feature; Auto detection of OLS wavelength	
Optical Power Meter ⁹ (OPM)	Optional	
-Calibrated wavelengths (nm) ¹⁰	850/1300	1310/1490/1550/1625/1650
-Power level range (dBm)	-65 to +10 (PM1) or -50 to +26 (PM2)	
-Accuracy, % (dB)	± 8 (0.36 dB)	± 5 (0.22 dB)
-Linearity, % (dB)	± 6 (0.27 dB)	± 2.5 (0.11 dB)
Optical connectors adaptor	Universal FC, SC, ST, or LC	

Notes:

- Unless noted, all specifications are valid at 23°C \pm 2°C (73.4°F \pm 3.6°F) using FC/UPC connectors.
1625/1650 nm SM live-port built-in filter highpass > isolation > 30 dB from 1270 nm to 1585 nm.
- Typical central/nominal wavelength deviation for 850, 1300, 1310, and 1550 nm is ± 20 ; for 1490/1625/1650 nm it is typically ≤ 10 nm depending on optical configuration.
- Typical dynamic range with longest pulse, three-minute averaging is the difference between extrapolated backscatter level at the start of test fiber to SNR = 1.
- Typical EDZ measured on SM 1310 nm with -45 dB reflection and MM 850 nm using shortest pulse measured 1.5 db down from either side of the peak of an unsaturated reflective event. Other wavelengths typical values may be slightly more.
- Typical ADZ measured on SM 1310 nm with reflectance -55 dB. Typical ADZ measured on MM 850 nm with reflectance -45 dB. ADZ measured 0.5 dB above linear regression.
- Does not include uncertainty due to fiber index.
- Compliant with Encircled Flux TIA-526-14-B and IEC 61280-4-1 Ed. 2.0 using an external EF conditioner.

Optical Test Functions

OTDR Configurations			Deadzone (m)		
Order #	Wavelength (nm)	Dyn Range (dB)	Event ³ (typ)	Attenuation ⁴ (typ)	Applications
Multimode					
Z07-22-227P	850/1300	22/22	<1	<5	Multimode network
Point-to-Point Singlemode - 1 Wavelength					
Z07-22-170P	1550	50	0.8	4	Short/ultra long network
Z07-22-171P	1625 (F)	41	0.8	<4	PON drop
Z07-22-172P	1625 (F)	50	0.8	3.5	LAN/WAN to ultra long network
Z07-22-173P	1650 (F)	41	0.8	3.5	PON drop, long haul fault locator
Z07-22-174P	1650 (F)	48	0.8	3.5	PON drop, long haul fault locator
Point-to-Point Singlemode - 2 Wavelengths					
Z07-22-116P	1310/1550	38/36	0.85	4	Short/medium haul, wireless front haul and backhaul
Z07-22-117P	1310/1550	40/38	0.85	4	LAN/WAN to metro network
Z07-22-118P	1310/1550	43/43	0.8	3.5	LAN/WAN to long haul network
Z07-22-199P	1310/1550	46/45	0.8	3.5	LAN/WAN to very long haul network
Point-to-Point Singlemode - 3 Wavelengths					
Z07-22-120P	1310/1490/1550	39/35/36	0.85	<4	Short/medium haul, PON construction, wireless fronthaul and backhaul
Z07-22-123P	1310/1550/1625	39/36/39	0.85	<4	Short/medium haul, wireless front haul and backhaul
Z07-22-124P	1310/1550/1625	43/43/39	0.85	3.5	Short/long haul, wireless front haul and backhaul
Z07-22-125P	1310/1550/1625	45/44/41	0.8	3.5	Short/long haul, wireless front haul and backhaul
Z07-22-175P	1310/1550/1650	43/43/39	0.85	3.5	Short/very long haul, wireless front haul and backhaul
Point-to-Point Singlemode - In-Service Testing*					
Z07-22-176P	1310/1490//1625 (F)	39/37//38	0.85	<4	Short to medium networks
Z07-22-126P	1310/1550//1625 (F)	40/38//39	0.85	<4	Short to medium networks
Z07-22-127P	1310/1550//1625 (F)	43/43//39	0.85	3.5	Short/long haul networks
Z07-22-129P	1310/1550//1650 (F)	40/38//39	0.85	<4	Short/medium networks
Z07-22-130P	1310/1550/1650 (F)	43/43//39	0.85	3.5	Short/long networks

Notes cont'd

8. OLS shares the same test port as the OTDR.
9. MM specifications are improved if EF mode conditioner used in measurements.
10. Depends on OTDR - For MM 850/1300, SM 1310/1490/1550/1625/1650; additional wavelengths available

*Can be used to test a single splitter with up to 32 split.

RXT-1200 General Specifications

Chassis Size	260 x 180 x 65 mm 10.2 x 7.1 x 2.6 in
Module Size	208 x 155 x 30 mm 8.2 x 6.1 x 1.2 in
Chassis Weight	1.86 kg (4.10 lb) with battery
Module Weight	650 g (1 lb)
Operating Temperature	-10°C to 50°C (14°F to 122°F)
Humidity	5% to 95% non-condensing
Ruggedness	Survives 1m drop to concrete on all sides
Languages	Multiple languages can be supported
System Memory	128 Mbyte RAM, 16 Gbyte SD

Order #	Additional Options
499-05-638	V-Scout Link Mapper
Z66-00-170P	Standard OPM, +10 dBm to -65 dBm, including one set of FC and SC adaptors
Z66-00-171P	High Power (CATV) OPM, +25 dBm to -50 dBm, including one set of FC and and SC adaptors
Z66-00-169P	VFL, 1 mW, equipped with universal 2.5 mm receptacle with dust cap
Z66-00-287P	Light source, shares optical connector with OTDR port
Z66-00-008P	DI-1000 Video Fiber scope, USB 2.0 version w/PC connectors (1.25 mm, 2.5 mm, LC and SC/FC)
Z06-00-040P	DI-1000MPO Digital Fiber Inspection Microscope kit for Single and Multifiber connectors including standard accessories
Z06-00-043P	DI-3000 Video Fiber Scope, WiFi/USB 2.0 version including standard tips



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