RXT-4100 OTDR Module
Test Option

RXT-1200
Modular Test Platform

The RXT-4100 Fiber Optics test module for the VeEX® RXT-1200 platform 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 with a single test platform ensuring maximum test productivity.

Platform Highlights

Software
- Flexible software architecture supports dual test applications running simultaneously
- ReVeal™ PC software to maintain instrument firmware, manage test configurations, process measurement results and generate customer test reports
- 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

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
- Intelligent 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

Key Features

Optical Testing
- Multimode and Singlemode Wavelength options - 850, 1300, 1310, 1490, 1550, 1625 & 1650 nm
- Filtered 1625 or 1650 nm OTDR port for in-service measurements
- OTDR ports feature live fiber detection
- High dynamic range (up to 45 dB) for long haul fibers and testing through high-count PON splitters
- Sampling points up to 128,000
- FTTx/PON optimized test parameters for best in class dead zones
- Event dead zone < 1m, Attenuation dead zone < 5m
- Telcordia GR-196 and SR-4731.sor file formats
- Intelligent Link Mapping (multi-pulse widths, multi-wavelengths)
- Optional Built-in Visual Fault Locator
- Optional Optical Power Meter
- Optional Light Sources
- Optional Fiber Inspection Scope (USB)
- Upload OTDR traces and Fiberscope images directly to Fiberizer Cloud via wired or wireless internet connection
- Built-in launch fiber to characterize OTDR connections and short fibers used in FTTA applications
- Universal 2.5 mm optical interfaces with inter-changeable optical adaptors (SC/FC/ST/LC)

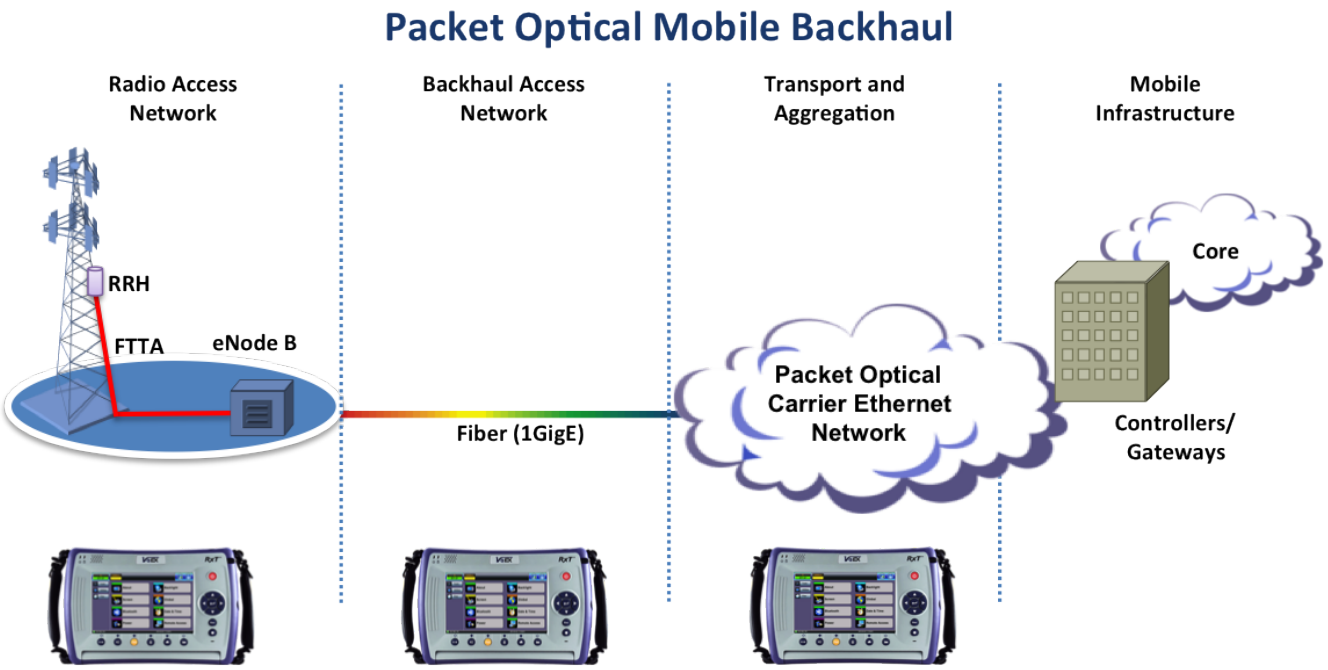
Multi Service Applications

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. Leveraging the powerful "tried-and-tested" VePAL V300 platform, the RXT-4100 OTDR tackles both optical physical layer and Ethernet test challenges head-on.

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 GPON, 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.



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:

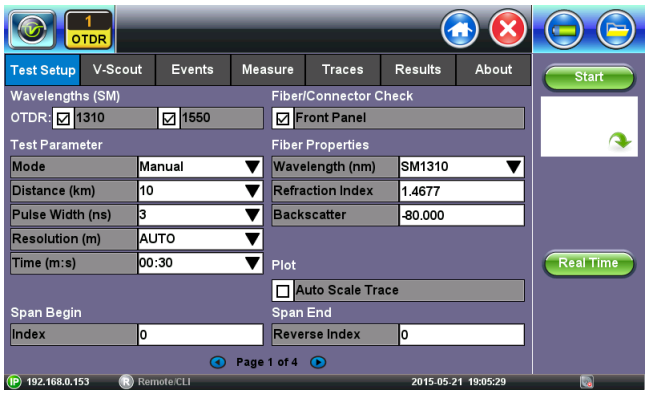
- Multimode/Singlemode OTDR - locate and characterize fiber link, splice and connector losses
- Fiber Fault Finder - quickly find breaks and bends
- Power meter and Light Source - perform power and loss measurements
- Visual Fault Locator - check patch cords and enclosures for light leakage
- Fiberscope - 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

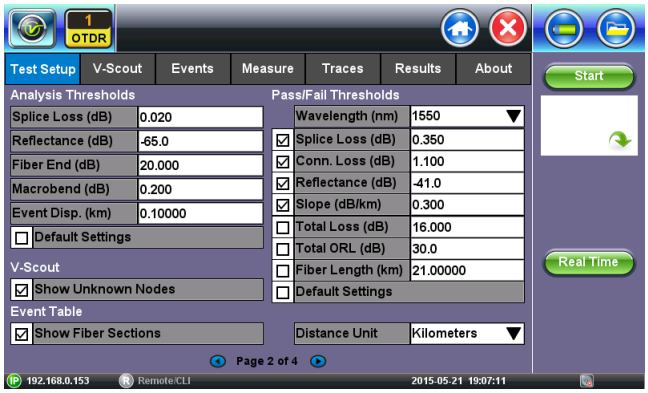
An intuitive menu structure offers simple test setup for Novice and Expert users alike. Test parameters can be configured manually by the user or set automatically by the unit.

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



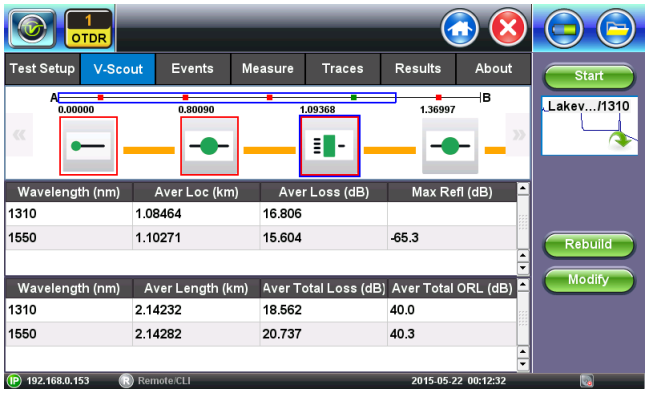
Analysis Thresholds

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.



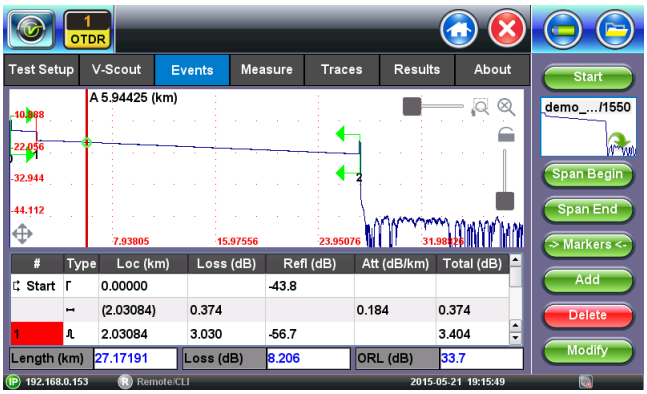
V-Scout Link Mapping

Multiple pulse width acquisitions and advanced algorithms quickly characterize the fiber under test and display the optical events using intuitive symbols. This optional feature eliminates event interpretation and provides greater analysis confidence to the user, regardless of OTDR skill set.

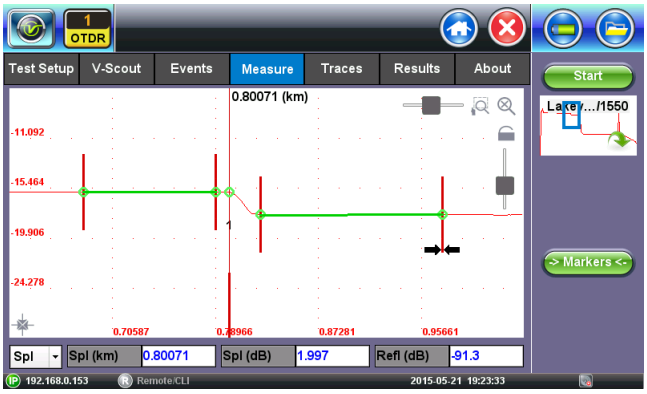


Advanced Trace Analysis

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.

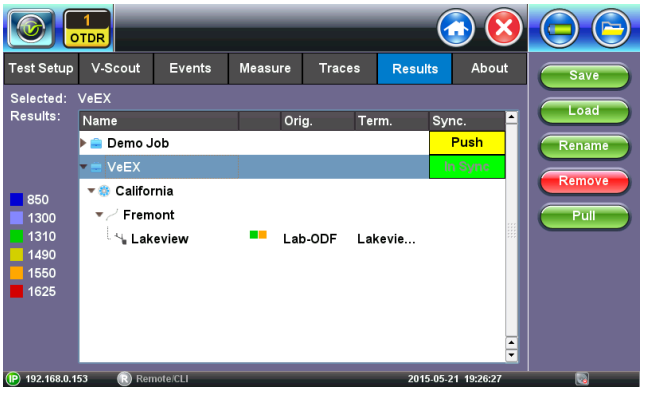


The RXT-4100 OTDR employs specialized techniques developed from decades of experience to locate and measure connectors, splices, optical splitters and macro-bends.



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 Loss Test Set (OLTS)

Fully automated, bidirectional loss testing for up to three wavelengths are supported. An intuitive patchcord referencing procedure reduces reference errors ensuring accurate and repeatable insertion loss measurements. Predefined pass/fail thresholds, cable identification parameters including technician comments can be saved.

ReVeal RXTS PC software

ReVeal RXTS is an all-in-one software tool included with every RXT-4100 OTDR. The Windows compatible software enables the transfer of test data and other setup criteria between the tester and a PC.

Features include:

- Create test profiles and Pass/Fail thresholds offline to eliminate setup errors
- Archive test results and related installation information
- Generate professional acceptance reports
  - OTDR traces
  - Certification loss results/OPM loss results
  - Connector end-face images from Fiber Inspection scope
- Batch editing of OTDR traces using embedded Fiberizer utility
- Multi-language support including English, French, German, Spanish, Portuguese, and Russian

Optical Power Meter (OPM)

An optional Optical Power Meter (OPM) can be fitted to measure absolute or relative optical power levels. The OPM incorporates a highly sensitive and stable InGaAs detector with six calibrated wavelengths providing accurate level measurements from +5 to -65 dBm. A high power version is available for CATV applications for levels ranging from + 27 to - 45 dBm.

PON Network Installation

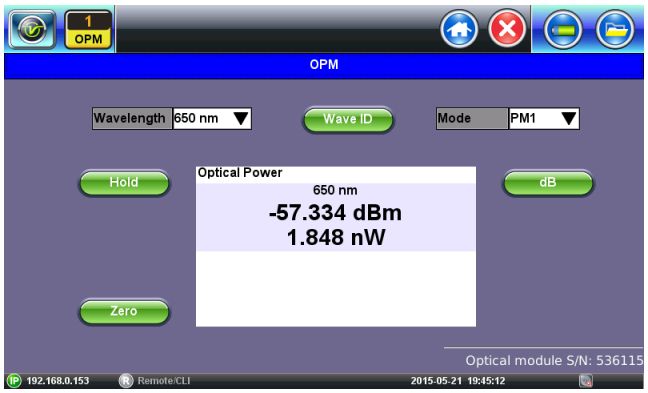
The PONT OPM option is designed for ONT splitter installation testing and rapid ONT troubleshooting. The OPM measures downstream signals simultaneously using PON specific wavelength filters and a specialized photo detector. Both 1490 nm (data) and 1550 nm (video) power levels at the ONT or other FTTx PON test points can easily be verified.

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 tester 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.

Test 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 printed directly to pdf, exported to a PC for offline report generation or uploaded to Fiberizer Cloud depending on User documentation requirements.



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 contaminates is also included.

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.

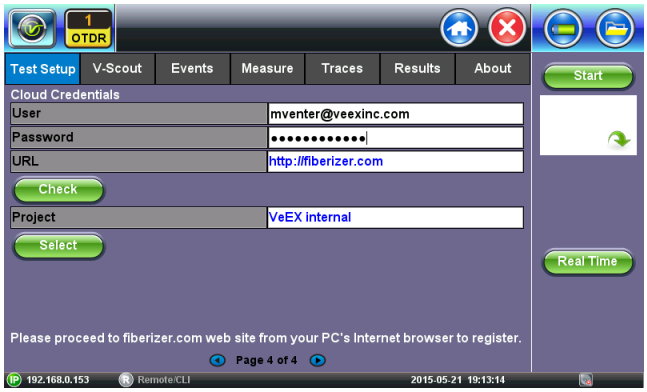
Streamlining onsite data reporting

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

OTDR	Multimode	Singlemode
Wavelength (± 20 nm)	850/1300	1310/1490/1550//1625//1650
Dynamic Range (db)[2]	Refer to Ordering Guide	Refer to Ordering Guide
Pulse width (ns)	3, 10, 25, 100, 300, 1000, 3000, 10000, 20000	
Event dead zone (m)[3]	Refer to Ordering Guide	Refer to Ordering Guide
Attenuation dead zone (m)[4]	Refer to Ordering Guide	Refer to Ordering Guide
Distance range (km)	0.5 to 80	0.5 to 240
Distance Units	Kilometers, Miles or Feet	
Distance Measurement Accuracy (m)[5]	± (0.5 + resolution + $2x10^{-5}$ x L)	
Sampling resolution (m)	0.08 to 7.6	
Sampling points	Up to 128,000	
Loss resolution (dB)	0.01 dB	
Attenuation Linearity (dB/dB)	± 0.03	
Group Index Range (IoR)	1,3000 to 1,7000	
Measurement time	User defined	
Internal memory capacity (SD card)	>5,000 traces, Bellcore GR196 and Telcordia SR-4731 sor format	
Fiber analysis	Automatic, event table, user defined PASS/FAIL thresholds	
Link Mapping	Link characterization with intuitive icons using Multi-pulse widths, multi wavelengths	
Fiber type	Multimode, 50/125 µm	Single mode, 9/125 µm
OTDR Laser safety	IEC 60825-1, Class 1M	
Optical connectors (OTDR/LS)	Universal 2.5 mm interface, FC/SC/ST/LC adaptors optional	

Optical Test Options	Multimode	Singlemode
Visual Fault Locator (VFL)	Optional	
-Wavelength (nm)	650 ± 10 nm	
-Output (mW)	Max 1 mW	
-Laser Safety	IEC 60825-1, Class II	
Light Source (LS) - (O/P shared with OTDR)	Optional	
-Wavelengths (nm)	850/1300	1310/1490/1550//1625//1650
-Output power (dBm)	N/A	> -4
-Level Instability (dB)	N/A	Better than ± 0.05 (15 min)
Optical Power Meter (OPM)	Optional	
-Calibrated wavelengths (nm)	850/1300	1310/1490/1550/1625/1650
-Power range (dBm) - PM1, PM2	-60 to +3 (PM1) / -40 to +23 (PM2)	-65 to +7 (PM1) / -45 to +27 (PM2)
-Accuracy, %	± 8	± 5
-Linearity, %	± 6	± 2.5
Optical connectors (VFL/OPM)	Universal 2.5 mm interface, FC/SC/ST/LC adaptors optional	

Notes:

1. Unless noted, all specifications are valid at 23°C ± 2°C (73.4°F ± 3.6°F) using FCUPC connectors
2. Typical dynamic range after three-minute averaging and SNR = 1
3. Typical dead zone using 3 ns pulse and reflections below -45 dB
4. Typical dead zone using 10 ns pulse and reflections below -45 dB
5. Excludes uncertainty due to fiber refractive index (IoR) setting

Optical Test Functions

Optical Specifications				Test Application						
Multimode OTDR										
Wavelength (nm)	Dynamic Range (dB)	Dead Zone (m)		LAN	Access	FTTx PON	Live PON	CATV	Metro	Long Haul
		Event	Loss							
850/1300	28/30	<1	<5	☑	☑					
Singlemode OTDR										
Wavelength (nm)	Dynamic Range (dB)	Dead Zone (m)		LAN	Access	FTTx PON	Live PON	CATV	Metro	Long Haul
		Event	Loss							
1310/1550	39/36	<1	<5		☑	☑		☑	☑	
1310/1490/1550	39/35/36	<1	<5			☑				
1310/1550/1625	39/36/39	<1	<5		☑	☑		☑	☑	
1310/1550//1625(F)	39/36//39	<1	<5		☑	☑	☑		☑	
1310/1550//1650(F)	39/36//39	<1	<5		☑	☑	☑		☑	
1310/1490/1550//1625(F)	41/40/39//39	<1	<5			☑	☑			
Long Range										
1310/1550	43/43	<1	<5		☑			☑		
1310/1490/1550	43/38/43	<1	<5			☑				
1310/1550/1625	43/43/39	<1	<5		☑	☑		☑	☑	☑
1310/1550//1625(F)	43/43/39	<1	<5		☑	☑	☑		☑	☑
1310/1550//1650(F)	43/43/39	<1	<5		☑	☑	☑		☑	☑
1310/1490/1550//1625(F)	43/38/43/39	<1	<5			☑				
Ultra Long Range										
1310/1550	45/44	<1	<5		☑	☑		☑	☑	☑
1310/1550/1625	45/44/41	<1	<5		☑	☑		☑	☑	☑
1310/1550//1625(F)	45/44/41	<1	<5		☑	☑	☑		☑	☑
Combo Multimode/Singlemode OTDR										
Wavelength (nm)	Dynamic Range (dB)	Dead Zone (m)		LAN	Access	FTTx PON	Live PON	CATV	Metro	Long Haul
		Event	Loss							
850//1310/1550	26//38/35	<1	<5	☑	☑				☑	

Hardware Options
Standard OPM (+7 dBm)
High Power OPM (+25 dBm)
PON OPM (dual wavelengths, 1550 nm (+23 dBm) and 1490 nm (+7 dBm))
Visual Fault Locator (650 nm)
Light Soure (per OTDR laser fitted)

General Specifications

Size	290 x 140 x 66 mm (W x H x D) 11.40 x 5.50 x 2.60 in
Weight	Less than 3 kg (less than 6.6 lb)
Battery	Li-ion smart battery, 5200 mAh 10.8 VDC
Power Supply (AC Adaptor)	Input: 100-240 VAC, 50-60 Hz, Output: 15 VDC, 5.33 A
Operating Temperature	0˚C to 45˚C (32˚F to 113˚F)
Storage Temperature	-20˚C to 70˚C (-4˚F to 158˚F)
Humidity	5% to 95% non-condensing
Display	TFT 7” full color touch-screen display
Ruggedness	Survives 1m drop to concrete on all sides
Management Interfaces	USB, RJ45, 10/100-T Ethernet, Bluetooth (optional), Data Card/GPS (optional), WiFi (optional)
Languages	Multiple languages can be supported
System Memory	128 Mbyte RAM, 2 Gbyte SD

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