# RXT-4111 DWDM OTDR Module

**VeEX**


2016 LIGHTWAVE INNOVATION REVIEWS 4.5

# RXT-1200
**Modular Test Platform**

The RXT-4111 test module for the VeEX® RXT-1200 platform features a tunable DWDM OTDR for testing optical Mux/Demux to verify channel routing and end to end connectivity. Multi-service DWDM networks can be verified with a single test platform ensuring maximum test productivity.
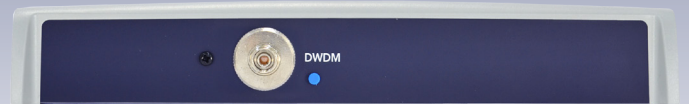
## Platform Highlights

### Software

- Advanced software architecture supports simultaneous test applications
- VeExpress™ Cloud or Enterprise server versions to maintain instrument firmware and manage test assets or inventory
- ReVeal™ PC software to manage test configurations, and remote control
- Fiberizer Desktop PC software for advanced trace analysis and report generation
- Fiberizer Cloud trace analysis and data management
- R-server support for centralized work force management and test results repository
- Optional Fiber Inspection Scope (USB) support with V-Scope function

### 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
- Intelligent fan operation with built-in temperature sensor
- Interchangeable Li-ion battery pack for extended test time
- USB-A Interface for USB flash drives, USB wireless dongles and fiber inspection probe connection

## Key Features

### Optical Testing

- Test DWDM Mux/Demux at ITU-T G.694.1 wavelengths
- Full C-band tuning (89 channels at 50 GHz spacing)
- Integrated wavelength locker stable to within ± 2.5 GHz
- High dynamic range (up to 42 dB) for long haul fibers and testing through DWDM multiplexers/OADMs/de-multiplexers
- Sampling points up to 256,000
- 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
- Optional V-Scout Link Mapping (multi-pulse widths, multi-wavelengths)
- Optional DWDM Light Source via OTDR port
- Push/Pull 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 fiber spans
- Universal 2.5 mm optical interfaces with inter-changeable optical adaptors (SC/FC/ST/LC)

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# DWDM

Dense Wavelength Division Multiplexing (DWDM) is a transmission technology that multiplexes multiple optical carrier signals on a single fiber by using different wavelengths (colors).

The ITU-T G.694.1 frequency grid specifies the DWDM wavelengths in the C-band (1525-1565 nm) and L-band (1565-1620 nm). The most popular implementation occurs in the Conventional or C band which has the ability to transport up to 80 wavelengths in the 1550 nm region - the spectrum supports the lowest attenuation and best amplification efficiency with erbium-doped fiber amplifiers (EDFA).

Leveraging the powerful "tried-and-tested" RXT-1200 platform, the RXT-4111 OTDR module tackles DWDM network test challenges head-on.

## Test Application

Telco, Mobile and CATV operators offering or utilizing DWDM technology need to characterize, maintain and troubleshoot these fiber networks using new OTDR test methods
- Networks need to be verified at the discrete ITU G.694.1 wavelengths
- End-to-end loss through multiplexers, OADM and de-multiplexers needs to be checked
- Attenuation and Macrobending can be verified across the C-band
- End-to-end continuity testing using stable source should be performed prior to service turn up
- Wavelength provisioning - verify new wavelength services and routes without disrupting traffic on active channels
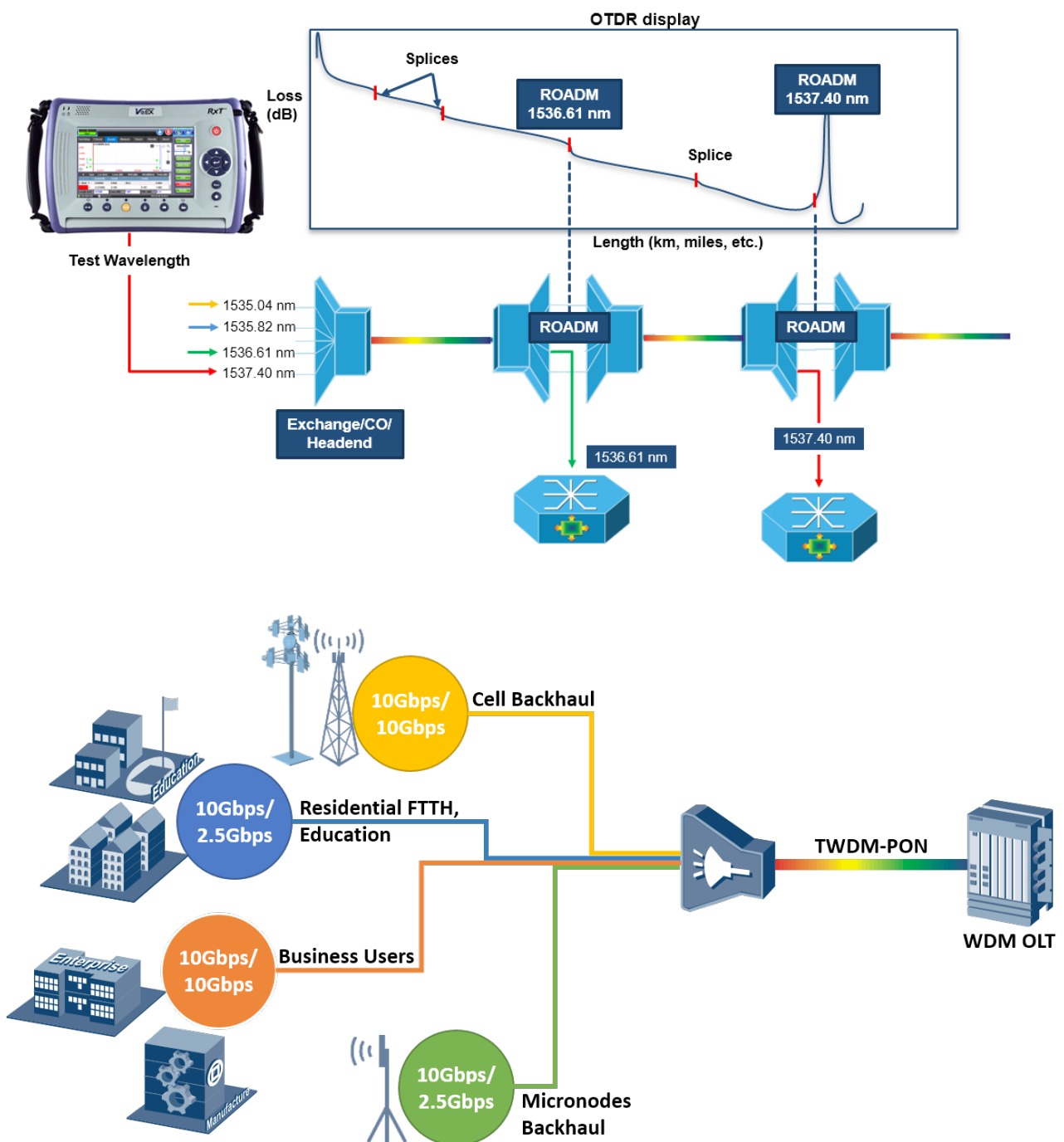
# Optical Time Domain Reflectometer (OTDR)

## 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.

Up to 89 x DWDM wavelengths at 50 GHz spacing in the C-band are supported via a very precise and stable tunable laser. Channel spacings of 100 GHz, 200 GHz and custom tables are also supported.
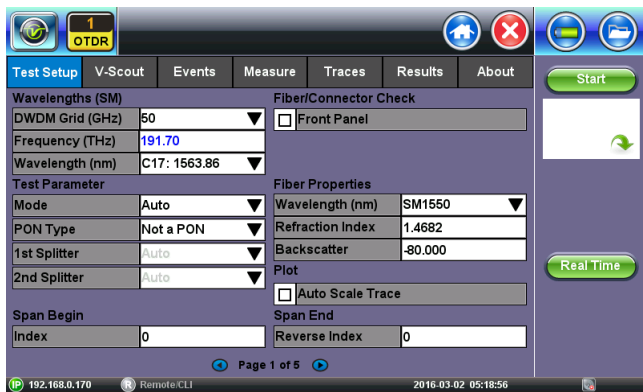


## Analysis Thresholds

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 DWDM link under test and display the optical events and elements using intuitive symbols. This optional feature eliminates event interpretation and provides greater analysis confidence to the user, regardless of OTDR skill set.
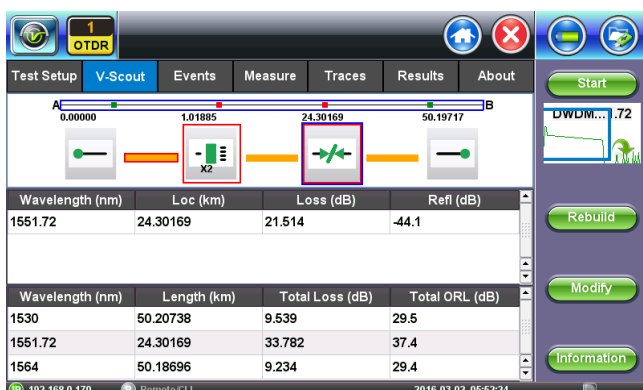


## Advanced Trace Analysis

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



The DWDM OTDR employs specialized software algorithms developed from decades of experience to measure fiber attenuation including anomalies such as connectors, splices, and macro-bends. Precise location and analysis of ROADM network elements is also supported.



## OTDR Results

OTDR Traces are saved in Telcordia SR-4731 format in a logical hierarchy for easy sorting and storage.

Traces can be pushed directly to Fiberizer Cloud using any available internet connection or can be pulled for fault finding and reference purposes.
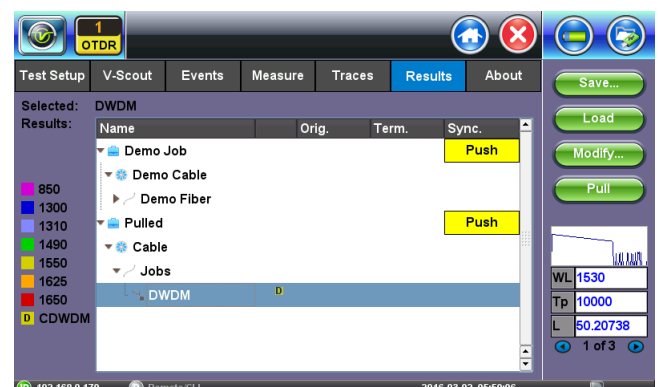
# OTDR Trace Analysis and Documentation

### Fiberizer™ Desktop

Fiberizer Desktop is a standalone PC software application to analyze traces acquired by the RXT-4111 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-4111 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 Parameter | |
|---|---|
| Wavelength (nm) - Tunable range Wavelength (THz) | 1563.86 to 1528.77 (C-band) 191.70 to 196.10 |
| Wavelength Accuracy (± GHz) | ± 2.5 |
| Channel Spacing per ITU-T 694.1 grid (GHz) | 50, 100, 200 or Custom table |
| Number of Channels | 89 (max) |
| Side-Mode Suppression Ratio (SMSR) (dB) | 40 (min) |
| Dynamic Range (db) | 42 |
| Pulse Widths (ns) | 3, 10, 25, 100, 300, 500, 1000, 3000, 10000, 20000 |
| Event Dead Zone (m) | < 1 |
| Attenuation Dead Zone (m) | < 5 |
| Distance Display Range (km) | 0.5 to 400 |
| Distance Units | Kilometers, Meters, Kilofeet, Feet, Miles |
| Distance Accuracy (m)[5] | $\pm (0.5 + \text{resolution} + 2\times10^{-5} \times L)$ |
| Sampling Resolution (m) | 0.04 to 7.6 |
| Sampling Points | Up to 256,000 |
| Loss Resolution (dB) | 0.001 |
| Attenuation Linearity (dB/dB) | ± 0.05 |
| Group Index Range (IoR) | 1,3000 to 1,7000 |
| Measurement Time | Fixed time intervals, Auto and Real Time (Live) |
| 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 |
| Intelligent Link Mapping (V-Scout) | Link characterization with intuitive icons using multi-pulse widths, multi wavelengths |
| Fiber Type | Single mode, 9/125 µm |
| OTDR Laser Safety | IEC 60825-1, Class 1M |
| Optical Connectors (OTDR/LS) | Fixed or Universal 2.5 mm, UPC or APC interface, FC/SC/ST/LC adaptors optional |

| Hardware Options |
|---|
| Light Soure (per OTDR laser) |

**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

## General Specifications

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

**VeEX**
The Verification Experts