RXT-4510 OSA Module
CWDM and DWDM Testing

RXT-1200
Modular Test Platform

Optical Spectrum/Channel Checker for CWDM and DWDM Networks

Using superior micro-optic design and MEMS tuning technology, the new RXT-4510 module offers 0.11 nm resolution and measures key optical parameters such as wavelength, channel power, and OSNR.

Platform Highlights

- Precise measurement of WDM wavelengths
- Wide wavelength range
- High wavelength accuracy and resolution
- Built-in wavelength reference
- High power sensitivity
- Excellent power accuracy
- Rugged, reliable design - No moving parts
- Superior shock resistance
- Periodic calibration not required
- Ultra-low power consumption
- Low temperature sensitivity
- Intuitive operation with dedicated test functions
- Touch screen for simple zooming and navigation
- Battery operating time > 8 hours

Key Features

- Wavelength range from 1260 to 1650 nm, fullband
- DWDM channel spacing down to 25 GHz
- Resolution 0.11 nm C-band
- In-band OSNR measurement
- Fast continuous scanning at ≤ 5 sec
- Simultaneous measurements of up to 200 channels
- Channel power measurement
- Channel threshold detection
- Span power measurement
- Continuous sweep with min/max hold
- Channel frequency and wavelength delta vs. ITU grid
- High wavelength accuracy: ± 50 pm
- High dynamic range: ≥ 65 dB
- OSNR measurement: up to 40 dB
- Low Polarization Dependent Loss (PDL): < 0.3 dB
- Universal optical interface with industry standard adaptors
- Supports 10/40/100 Gbps non-coherent modulation types
- DWDM channel monitoring per ITU G.694.1 grid
- CWDM channel monitoring per ITU G.694.2 grid
- OSNR measurement compliant with IEC 61280-2-9

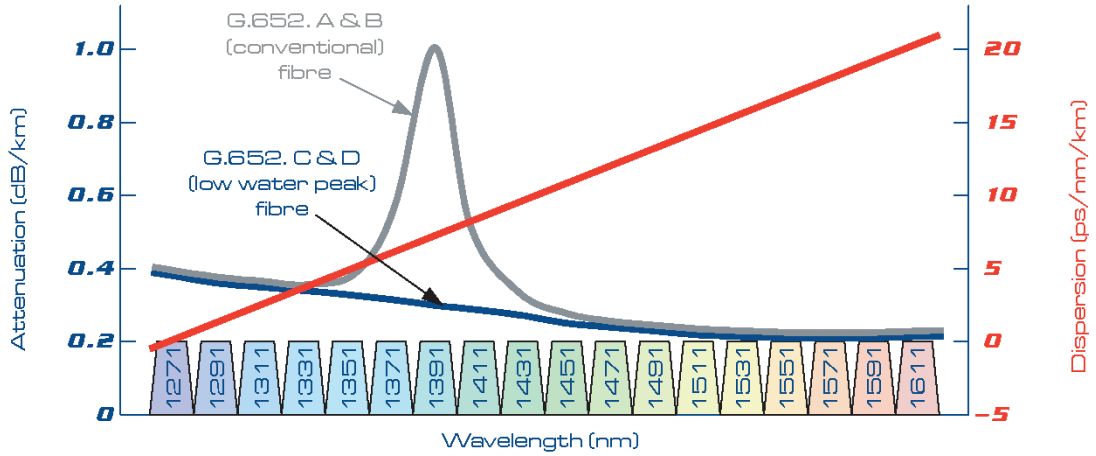
Applications

The RXT-4510 module offers a perfect balance of features between a full featured OSA and an optical channel checker (OCC). The unit features the most important spectrum analysis capabilities required to install, commission and troubleshoot DWDM and CWDM networks. High reliability is achieved through a rugged mechanical design which features no moving parts and does not require periodic calibration. The hardware and user interface are optimized for simplicity - measurements settings are also kept to a minimum, making it easy to use for any skill level. Despite its simple operation, the unit still features the most critical OSA measurement capabilities such as precise power and wavelength characterization.

CWDM Technology

Coarse Wavelength Multiplexing (CWDM) technology is used frequently in enterprise or metro networks to increase bandwidth capacity economically. CWDM transmission systems can transport up to 16 channels (wavelengths) in the 1270 nm to 1610 nm spectrum with a 20 nm channel interval. The width of each channel is 13 nm while the remaining 7 nm is designed to be the guard band to the next channel. Due to the 20 nm channel spacing, cost-effective un-cooled lasers can be used.

CWDM technology is often used to transport different types of services, e.g. Ethernet, SDH/SONET, and Fibre Channel (FC) but it has limitations in the distance over which the traffic is transported and also in the total channel count.



ITU-T G.694.2 - CWDM Wavelength Grid

Testing CWDM Networks

Test parameters in a CWDM network are normally less stringent compared to DWDM systems – due in part to more lenient laser wavelength tolerances and wide pass-band filters being used. Since there are no active components like Erbium Doped Fibre Amplifiers (EDFA) to create noise in a CWDM network, using a complex and expensive OSA would be an overkill and inappropriate for field testing.

The RXT-4510 Full band OSA option quickly determines the presence/absence of each of the 16 wavelengths and checks their power levels accurately. Thanks to excellent test mode sensitivity and a large power input range of 65 dB dynamic range, the OSA can be connected to a 20 dB monitoring tap on the OADM, making it ideal for non-intrusive channel analysis.

Sophisticated MEMS tuning technology that has no moving parts, allows the unit to make faster measurements than most complex OSAs, enabling quick troubleshooting of a CWDM network.

Applications

DWDM Technology

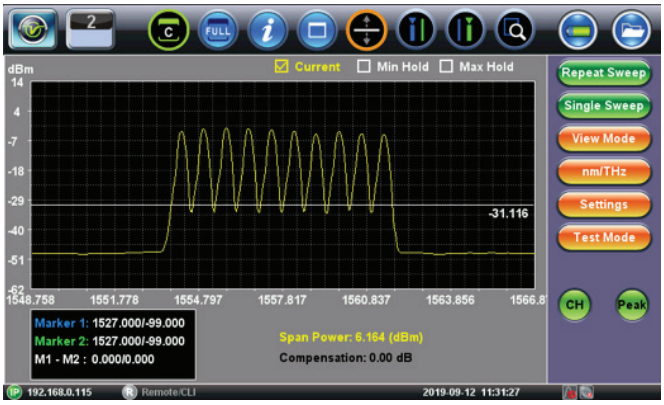
DWDM technology is particularly suitable for long-haul transmission systems because it can operate with Erbium Doped Fiber Amplification (EDFA) and ROADMs. The ITU-T G.694.1 recommendation defines the wavelengths found in the C-band (1527-1567 nm) and L-band (1567-1621 nm) with channel spacing at 25 GHz (0.2 nm), 50 GHz (0.4 nm), 100 GHz (0.8 nm) or 200 GHz (1.6 nm). Densely packed channels aren't without their limitations especially as precision lasers must keep channels exactly on target.

Testing DWDM Networks

Boasting impressive specifications, the OSA is suitable for lab operation or harsh field environments. An Athermal design assures calibration is valid over all temperature ranges resulting in accurate power and wavelength measurement in adverse or controlled conditions. The OSA supports C-band or C+L-band measurements with superior wavelength and channel resolution. The unit is an indispensable tool for checking critical parameters responsible for transmission faults.

Critical DWDM Parameters

- Channel wavelength or frequency stability
- In-band OSNR using Channel ON/OFF mode
- Channel wavelength and frequency delta vs. ITU grid
- Levels below threshold or fluctuating over time
- Optical Signal-to-Noise Ratio (OSNR) below limits
- Excessive noise level per channel bandwidth
- Noisy amplifiers (EDFA)
- Channel Crosstalk (channels too close together)



Viewing Modes

Measurements can be viewed in graphical and tabular formats and the display can be optimized "on the fly" during or after the test depending on what information needs to be presented. A level threshold can be set to display channels above a defined limit or it can also be used to reduce the number of overall channels viewed.

Ch#	Peak (nm)	Center (nm)	Delta(nm)	Power	OSNR	BW 3dB	f 20dB(nm)
1	1270.429	1270.407	N/A	-7.266	N/A	N/A	N/A
2	1290.953	1290.995	N/A	-6.020	N/A	N/A	N/A
3	1308.527	1308.449	N/A	-5.648	N/A	N/A	N/A
4	1328.978	1329.065	N/A	-5.691	N/A	N/A	N/A
5	1348.637	1348.624	N/A	-5.160	N/A	N/A	N/A
6	1369.381	1369.387	N/A	-5.457	N/A	N/A	N/A
7	1390.482	1390.417	N/A	-6.500	N/A	N/A	N/A
8	1410.741	1410.800	N/A	-6.234	N/A	N/A	N/A
9	1429.901	1429.921	N/A	-4.312	N/A	N/A	N/A
10	1450.620	1450.617	N/A	-4.703	N/A	N/A	N/A
11	1470.561	1470.551	N/A	-6.199	N/A	N/A	N/A

Zooming - Specific channel/s can be analyzed in detail by defining a zoomed area on screen using a stylus or finger.

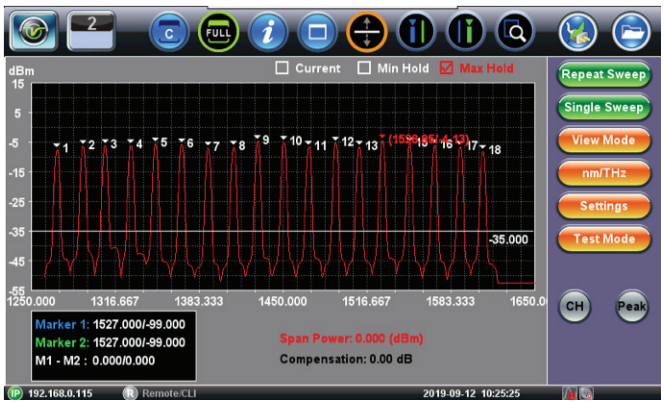
Channel Search - Quickly identifies valid DWDM channels. Markers are placed automatically on the channel along with wavelength and level information.

Peak Search/Hold – Simplifies channel measurement and enables long-term stability testing of wavelength or level with drift function. Peak hold is also very useful to verify power levels before and after signal amplification (EDFA).

Channel On/Off Mode (In-band OSNR)

WDM networks are becoming more complex with new technologies being deployed (tighter channel spacing, polarization-multiplexed transmission and flex grid systems, etc.) that increase the possibility of failure. These technologies provide added risk of crosstalk and non-linear effects.

This commissioning tool, based on the channel shut down method, supports OSNR measurements during turn up while providing highly accurate amplified spontaneous emission (ASE) OSNR measurements.



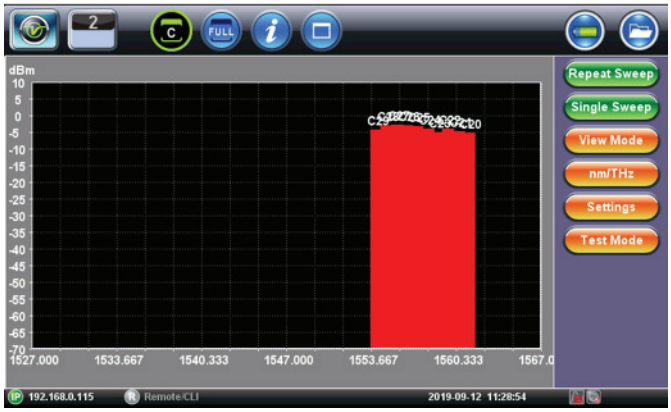
Applications *cont'd*

Channel Analysis

DWDM and CWDM channels are scanned and detected automatically according to pre-defined ITU spectrum grids. For DWDM, this includes 25, 50, 100 and 200 GHz channel spacings in the C and C+L bands as defined by ITU-T G.694.1 recommendations, including Flex Grid applications down to 37.5 GHz. For CWDM, this covers channel spacing defined in G.694.2 recommendation.

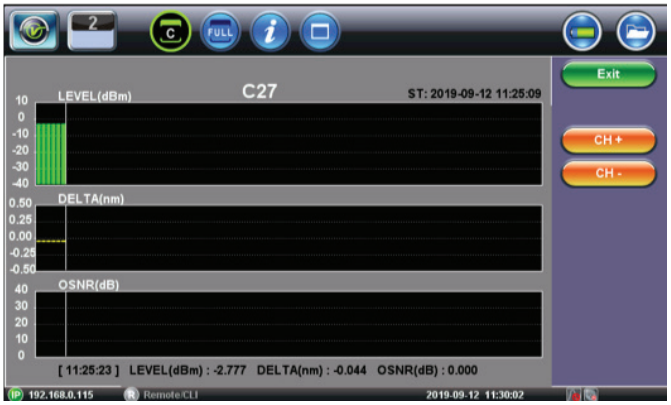
Bar Graph View

Results can be displayed in spectrum or bar chart mod. This convenient "channel checker" not only verifies the ITU channel #, but also the performance of each channel simplifying the installation, maintenance and upgrades of xWDM systems.



Channel Drift Monitoring

Intuitive histograms allow the user to monitor signal dynamics and identify performance change over time.



Setup Menu

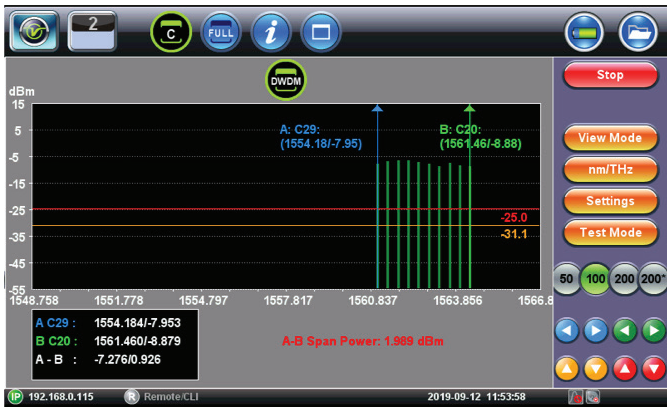
Being able to set alarm thresholds to visualize the current or historical status of channels is a powerful tool to optimize operational performance.

Event Table

Frequency drifts, power level deviations and OSNR fluctuations are listed with time stamps in a comprehensive event table which stores up to 1,000 events along with the alarm type and value detected.

Optical Channel Checker

DWDM and/or CWDM channels are scanned and detected automatically according to pre-defined ITU spectrum grids. Designed for technician who simply want a quick Go/No Go indicator.



Specifications[1]

Parameter	Unit	Full Band + C Band	C+L Band		C Band
Wavelength Range[2]	nm	1260 - 1650	1527-1567, 1571-1611 or 1527 - 1567, 1567-1607	1527-1611	1527 - 1567
Number of Channels	#	Up to 200 Channels @ 25 GHz (module dependent)			
Channel Spacing[3]	GHz	25, 33, 37.5, 50, 100, 200 GHz or Flex Grid down to 25 GHz, or User Defined (C Band)			
Maximum Input Power	dBm	30			
Input Power Range	dBm	+15 to -50			
Channel Peak Power Accuracy[4,5]	dB	± 0.5[3]	± 0.5		± 0.5
Integrated Channel Power Accuracy[4,5]	dB	± 1.0			
Power Measurement Repeatability[5]	dB	± 0.1			
Polarization Dependent Loss (PDL)[7]	dB	< 0.3	< 0.3		< 0.3
Absolute Wavelength Accuracy	pm	± 50	± 50		± 50
Wavelength Repeatability	pm	± 10	± 10		± 10
Wavelength Resolution (FWHM)	nm	3.5 Full / 0.1 C Band typical	0.1 typical	0.25 nm	0.1 typical
Wavelength Readout	pm	10/1	1		1
Optical Rejection Ratio (ORR)[8]	dB	> 40			
Noise Floor[9]	dBm	≥ 65 dBm fullband			
Sweep Time	s	≤ 5 seconds			
Optical Interface		Universal base with interchangeable FC, SC, LC, E2000 adaptors			

Notes:

1. Unless otherwise stated, all specifications valid at 23°C ± 2°C (73°F ± 3.6°F) using FC/UPC connector
2. Fullband mode 1260-1650 nm; C-band mode 1527-1567 nm; C+L band 1527-1567 nm and 1571-1611 nm
3. C+L band (1527-1611nm) module Channel Spacing limited 50 to 200GHz. Channel overlap can impact OSNR measurement.
4. Specifications guaranteed for input power range from -10 to -40 dBm
5. Does not include PDL
6. Accuracy ±0.5 for C-band; ±1.0 for Fullband
7. PDL < 0.3 for C-band; < 0.5 for Fullband
8. ORR @ 200 GHz
9. Noise Floor ≥ -65 dBm Fullband; ≥ -55 dBm for C-band and C+L band

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