FX180 micro OSA

Micro Optical Spectrum Analyzer for CWDM or DWDM Fiber Network Testing

Available in two test configurations, CWDM or DWDM C-band, the FX180 measures key parameters such as wavelength, channel power, drift and OSNR. This compact, robust, lightweight tester supports Spectrum view and an optional Fiber Scope for checking connectors.

Platform Highlights

- Robust, handheld design for field environments
- High resolution, 5" TFT color touch-screen for easy viewing
- Intuitive display, simple function keys and touch-screen for fast navigation and easy operation
- Internal data storage with expandable SD card
- Micro-USB OTG interface for flash drives, fiber inspection probe connection and test data transfer
- Rechargeable Lithium Polymer battery with capacity indicator, low voltage alarm and Auto-off function
- > 9 hours continuous operation without recharging batteries
- Built-in WiFi option to perform software upgrades
- Built-in Bluetooth option for pairing Mobile devices

Key Features

- Table View, Spectrum View and Channel Drift Analysis
- Precise Wavelength, Signal Level and OSNR required to confirm DWDM network service quality
- Built-in wavelength reference
- Sweep time < 5 seconds
- Simultaneous measurements of up to 96 channels @ 50 GHz
- DWDM channel spacing down to 50 GHz
- Generate and save test results in HTML file format
- Single or Continuous Repeat Sweep
- High wavelength accuracy: ± 50 pm
- Dynamic Measurement range: ≥ 65 dB
- *OSNR measurement range: 10-25 dB
- **Special noise filter (iOSNR) for improved noise measurement
- Low Polarization Dependent Loss (PDL): < 0.3 dB
- DWDM Optical Rejection Ratio: > 40 dB @ 200 GHz
- Optional universal interface with interchangeable adaptors
- OSNR measurements per IEC 61280-2-9
- CWDM channel measurements per ITU-T G.694.1 grid
- DWDM C-Band channel measurements per ITU-T G.694.1 grid

*OSNR values depend on source level, modulation and channel spacing.
**Applying noise filter can improve OSNR results up to 3-5 dB @ 100 GHz and up to 10-15 dB @ 50 GHz

Applications

The FX180 micro OSA is a ruggedized, handheld, easy-to-use measurement tool for CWDM and DWDM fiber networks. Within less than 5 seconds of connecting to the network, the test set will simultaneously display all channels in histogram, vertical bars or tabular format.

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 1271 nm to 1611 nm spectrum with a 20 nm channel spacing. The width of each channel is 13 nm with the remaining 7 nm designed to be the guard band to separate from 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.
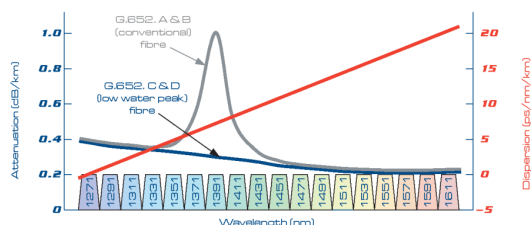
Testing CWDM Networks

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 micro OSA quickly determines the presence/absence of each of the 16 wavelengths and checks their power levels accurately. Thanks to excellent sensitivity and a large power input range of 65 dB dynamic range, the micro 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 has no moving parts providing a rugged tool that allows the unit to make faster measurements enabling quick troubleshooting of a CWDM network.

DWDM Technology

DWDM technology is particularly suitable for long-haul transmission systems because its supports Erbium Doped Fiber Amplification (EDFA). The ITU-T G.694.1 recommendation defines the wavelengths found in the C-band (1527-1567 nm) and L-band (1565-1620 nm) with channel spacing at 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 micro OSA provide performance suitable for labs but is rugged enough for 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 micro OSA supports Full band or C-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
- Channel wavelength and frequency drift delta vs. ITU grid
- Level is stable or above threshold
- Optical Signal-to-Noise Ratio (OSNR) below limits
- Excessive noise level per channel bandwidth

Features

Fast Startup

The FX180 micro OSA powers up and is ready to perform measurements in less than 60 seconds, making it one of the fastest units in the industry. Technicians can start to work almost immediately to check the network and determine the effects of provisioning new services on the existing network.

Fast Scan

The micro OSA has a scan sweep time < 5 seconds. Users may choose a single sweep test or a continuous repeat sweep test mode which allows users to monitor changes that may occur over time.

Histogram View

The Histogram view shows a graphical representation of all in-Service channels on one screen. This Display mode allows the user to easily compare signal levels of all channels. It can also be used to view if the add/drop channel impacts overall system signal levels. Good channels are displayed as a green bar. Any channel that is below the threshold will be red.
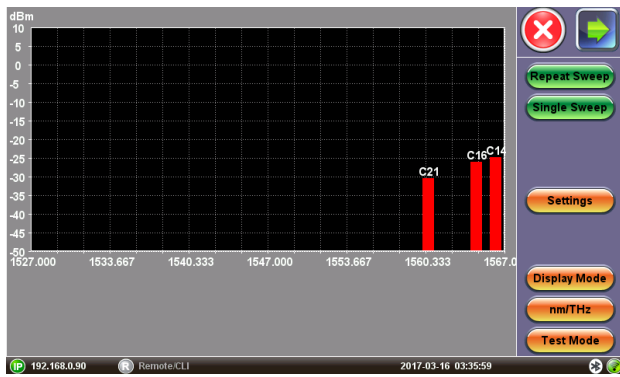
The Repeat Sweep allows the user to drill down specifically into a single channel view to monitor continuous channel performance including signal level, laser drift and OSNR. The user can move the cursor to go back in time to reverify signal anomalies that recently occurred.

Select any channel in the histogram view to get a detailed channel test view including: signal level, wavelength frequency, drift from ITU-channel, OSNR, 3 dB and 20 dB bandwidths.
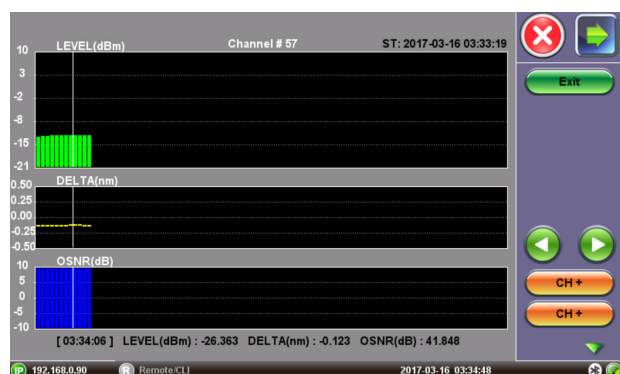

Channel Table View

View all channels simultaneously in tabular format. User defined Alarm thresholds are used to highlight issues in red.

ITU#	Peak (nm)	Center (nm)	Delta(nm)	Power	OSNR	BW 3dB	20dB
C29	1554.165	1554.166	-0.031	-15.812	36.223	20.5	48.6
C28	1554.963	1554.964	-0.023	-14.582	37.453	20.1	48.9
C27	1555.779	1555.776	-0.032	-14.379	37.656	20.1	48.9
C26	1556.570	1556.580	-0.015	-14.684	37.773	19.6	48.6
C25	1557.388	1557.397	-0.025	-14.945	40.438	20.3	49.8
C24	1558.217	1558.215	-0.044	-15.508	39.875	19.9	49.7
C23	1559.001	1559.007	-0.018	-16.195	39.188	19.6	48.7
C22	1559.831	1559.830	-0.037	-15.480	41.086	19.9	50.7
C21	1560.626	1560.634	-0.020	-16.234	40.699	19.2	49.1
C20	1561.448	1561.447	-0.029	-16.309	40.625	19.3	50.4

HTML Test Report

Save test results using auto or custom filename in HTML file format.
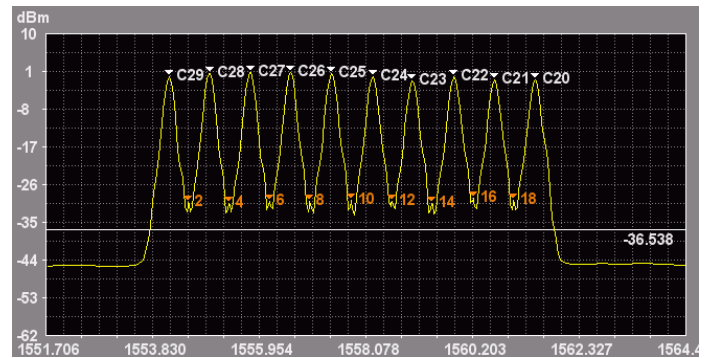
Table

Channel #	Peak (nm)	Peak (THz)	Center (nm)	Center (THz)	Delta(nm/GHz)	Power(dBm)	OSNR	BW 3dB	20dB(GHz)
C29	1554.184	192.894	1554.183	192.894	-0.050 / 6.2	-0.762	43.639	12.7	35.1
C28	1554.987	192.794	1554.984	192.795	-0.047 / 5.8	0.039	43.604	13.2	35.3
C27	1555.791	192.695	1555.794	192.694	-0.044 / 5.4	0.430	43.439	14.0	34.4
C26	1556.605	192.594	1556.598	192.595	-0.050 / 6.2	0.125	43.590	14.0	34.4
C25	1557.420	192.493	1557.417	192.493	-0.057 / 7.0	-0.242	43.676	12.9	35.3
C24	1558.236	192.392	1558.238	192.392	-0.063 / 7.8	-0.910	42.930	13.8	34.2
C23	1559.024	192.295	1559.026	192.295	-0.041 / 5.0	-1.730	41.668	13.8	34.2
C22	1559.851	192.193	1559.852	192.193	-0.057 / 7.0	-1.148	43.283	13.1	35.0
C21	1560.660	192.093	1560.656	192.094	-0.054 / 6.6	-1.812	42.182	13.2	35.1
C20	1561.460	191.995	1561.463	191.995	-0.041 / 5.0	-1.633	42.922	14.0	33.6

Simple Software Upgrades

Firmware upgrades are performed easily via the micro USB port connected via an OTG to a USB memory stick. Updates are available at no charge for registered users.

Extended Battery Operation

The micro OSA provides over 9 hours of operation on a single charge. A low voltage indicator warns the user when the device power reaches critical levels.

Spectrum View

Spectrum View enhances the versatility of the unit and is a powerful feature for more advanced signal analysis. Signal properties such as channel overlap, spurious noise and four-wave mixing can be analyzed as more channels are added to the network.

In the Spectrum view, the micro OSA allows the user to zoom in for better viewing of that specific channel when troubleshooting.
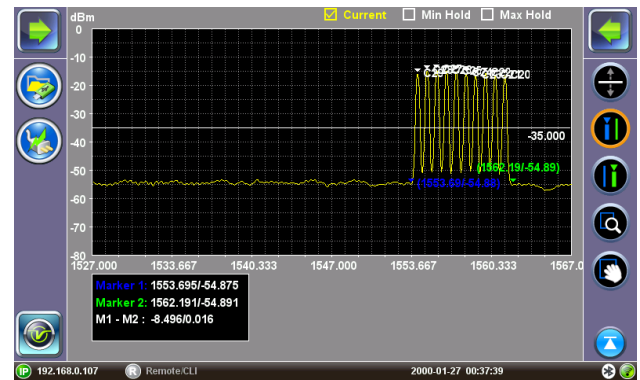
Fiberscope Option

An optional Fiber microscope can be used to assess the cleanliness of the optical connector's surface and is perfectly suited for bulkhead adapter or male connector inspection. The probe connects directly to the unit's micro-USB OTG port to obtain its power and to transfer images. Single finger focusing with an automatic image focus and capture feature simplifies operation.

The probe features inter-changeable heads and is supplied with bulkhead adapter tips for FC/PC, SC/PC, and LC/PC connector style, including male connector adapters.

Software for viewing connector end-face images which have been transferred and saved on a Windows® PC is available as an option.

Optional software automatically captures the focused image and analyzes the connector condition and provides a report with Pass/Fail criteria according to the IEC 61300-3-35 Sect 5.4 standard.

Optical Specifications[1]

Parameters	Unit	CWDM	DWDM C Band[2]
Wavelength Range	nm	1260 - 1650	1527 - 1567[2]
Number of Channels	#	up to 20	up to 96
Channel Spacing	GHz/nm	20 nm	50 GHz
Input Power Range	dBm	-50 to +15	
Maximum Input Power	dBm	30	
Wavelength Resolution (FWHM)	nm	3.5[4]	0.18 (22.5 GHz)
Absolute Wavelength Accuracy[3]	pm	± 300	± 50
Wavelength Repeatability[3]	pm	± 100	± 10
Absolute Channel Power Accuracy[3,5]	dB	± 1.0	± 0.5
Relative Power Accuracy[3,5]	dB	± 0.8	± 0.4
Power Measurement Repeatability[5]	dB	± 0.1	
OSNR Range[3]	dB	N/A	10 to 25
OSNR Accuracy[3]	dB	N/A	± 1.5
Polarization Dependent Loss (PDL)	dB	< 0.5	< 0.3
Noise Floor	dBm	-65	-55
Optical Rejection Ratio (ORR) -At 50 GHz offset -At 200 GHz offset	dB	 N/A N/A	 > 30 > 40
Wavelength Readout	pm	10	1
Optical Return Loss	dB	> 30	
Sweep Time	sec	< 5	
Optical Interface		Fixed or Universal base with interchangeable adapters	

Notes:

1. Unless noted, all specifications are valid at 23°C ± 2°C (73.4°F ± 3.6°F) using FC/UPC connectors.
2. Specifications guaranteed for channel spacing ≥ 42 GHz, OSNR ≥ 10 dB and adjacent channel level variation ≤ 6 dB. OSNR values depend on source level, modulation and channel spacing (i.e. source > 0 dBm NRZ @ 100 GHz can show OSNR approximately 40 dB).
3. Specifications guaranteed for input power range from -40 to -10 dBm.
4. Typical CWDM FWHM is 3.2 nm.
5. Does not include PDL.

General Specifications

Dimensions	150 x 150 x 70 mm
Weight	0.7 kg nominal
Battery	Lithium Polymer battery, 10 Ah with low voltage indication
Battery Autonomy	>9 hours continuous operation
Operating Temperature	0˚C to 50˚C (32˚F to 122˚F)
Storage Temperature	-40˚C to 60˚C (-40˚F to 140˚F)
Humidity	5% to 80%, non-condensing
Display	5" high resolution TFT color touchscreen LCD
Interfaces	Micro-USB with On The Go (OTG) support
AC Adaptor	Input: 100-240 VAC (50/60 Hz), 1.5A max Output: 12 VDC
Memory	Internal 8 Gbyte micro SD card
Connectivity	WiFi 802.11 b/g/n (optional), Bluetooth (optional)
Languages	English (others available on demand)
Certifications	CE & ROHS compliant
Safety Standards	AC adaptor - IEC 61010-1, Class II (GOST 12.2.091)

Ordering Information

Handheld Optical Channel Analyzer Models
Description
CWDM micro OSA (1260 to 1650 nm)
DWDM C Band micro OSA (1527 to 1567 nm)

Additional Options
Bluetooth + WiFi Option
Fiber Scope Option
OTG USB Cable