FX80 Series
OPM/OLS/OLTS/ORL Meters

The FX80 family of optical test sets are lightweight, handheld, rugged and easy-to-use devices for installing, maintaining and troubleshooting legacy, CWDM, DWDM and FTTx/PON fiber networks.

Key Features

Platform

- High contrast, backlit LCD - visible indoors and outdoors
- Handheld, lightweight rugged design
- Protective rubber boot with tilt bail stand
- Splash and dust resistant design
- Non-volatile storage for saved test results
  - 1920 single wavelength records
  - 960 multi-wavelength 1G PON records
  - 480 multi-wavelength 10G PON records
- Date/time stamp of test results
- Programmable thresholds with Pass/Fail (FX80/FX81 only)
- USB interface for tethering or test result transfer
- Bluetooth interface (optional) for test result transfer
- Rechargeable Li-polymer battery
- Micro-USB, 5 Volt DC adapter/charger

Software Support

- Fiberizer® LT-Sync Windows PC software for transferring test results and generating basic pdf or Excel reports
- Fiberizer Desktop Plus and Fiberizer Cloud software for advanced result post processing and on/off-line reporting
- Fiberizer Mobile OLTS for transferring test results via USB or optional Bluetooth I/F and generating basic PDF reports (USB for Android™ devices only)

Product List

FX80 1G EPON/GPON Optical Power Meter
- Pass-through OPM for 1G FTTx networks

FX81 10G EPON/XG(S) PON Optical Power Meter
- Pass-through OPM for 1G/10G FTTx networks

FX81T 10G EPON/XG(S) PON Optical Power Meter
- Terminated, Filtered OPM for 1G/10G FTTx networks

FX82 Optical Power Meter
- General purpose OPM with VFL option for legacy networks

FX83 Optical Light Source
- General purpose λ OLS with VFL option for legacy networks

FX84 Optical Loss Test Set
- Uni-directional OLTS with VFL option*

FX85 Optical Loss Test Set with ORL
- Uni-directional OLTS with VFL option* and ORL**

FX86 CWDM Optical Light Source
- Fixed, quad λ CWDM OLS per ITU-T G.694.2 grid

FX87 DWDM Optical Light Source
- Tunable OLS per ITU-T G.694.1 grid with WaveID OPM

*MOQ - Consult factory   ** Singlemode only

A New Generation of Handheld Optical Test Sets

The FX80 product family offers high performance test capabilities at an affordable price. A comprehensive range of different and unique test sets have been thoughtfully developed to address exacting test requirements. Each device is equipped with a large, TFT LCD display simplifying setup and allowing viewing of measurements in almost any test environment. Test results can be downloaded directly via USB cable or optional Bluetooth to a PC for basic report generation or transferred to Fiberizer Desktop Plus or Cloud applications for advanced archiving and processing.

FX80 Family Comparison									
Model #	FX80	FX81	FX81T	FX82	FX83	FX84	FX85	FX86	FX87
Device Type	OPM	OPM		OPM	OLS	OLTS	OLTS/ORL	OLS	TLS
Primary Test Application	EPON/ GPON	EPON/GPON XG(S)-PON 10G EPON		Legacy λ, CWDM option	Legacy λ	Legacy λ, One way loss CWDM option	Legacy λ, One way loss	CWDM	DWDM
Fiber Type	SM	SM		MM/SM	MM*/SM	MM*/SM	SM	SM	SM
Broadband Power Meter	○	○		●	--	●	●	--	○
xPON levels - Filtered - Upstream - Downstream	Yes Yes Yes	Yes Yes Yes	Yes No Yes	Legacy λ, No No Yes	--	Legacy λ, No No Yes	Legacy λ, No No Yes	--	Legacy λ, No No Yes
Optical Light Source (OLS)	--	--		--	Up to 4 fixed legacy λ	Up to 4 fixed legacy λ	Up to 4 fixed legacy λ	4 fixed user defined λ, 20 nm steps per ITU-T G.694.2	97 C-band λ, 50GHz steps per ITU-T G.694.1
VFL	○	--		○	○	●	●	--	--
ORL	--	--		--	--	--	SM only	--	--
Bluetooth I/F	○	○		○	--	○	○	--	○

○ Optional   ● Included   ● MOQ required - check with factory   -- Not supported

*Requires external Encircled Flux (EF) Mode Conditioner to provide IEC 61280-1-4 Ed. 2.0 and TIA-568-14-B compliance
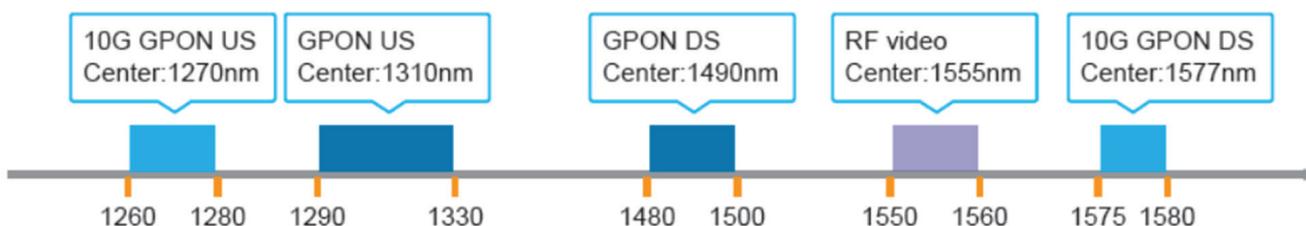
FX80 1G EPON/GPON Power Meter (Pass-Through)

The FX80 PON power meter is designed to verify, activate and troubleshoot E-PON or G-PON networks. The wavelength selective through mode enables simultaneous, non-intrusive measurement of 1490 nm downstream and 1310 nm upstream burst signals, including an optional 1550 nm video overlay signal. A broadband optical power meter or visual fault locator provides optional functionality.

FX81 1G/10G EPON/GPON Power Meter (Pass-Through)

The FX81 PON power meter supports both legacy EPON/GPON as well as next generation XG(S)-PON or 10G EPON technologies. The passive low loss, through-mode design automatically filters the multiple wavelengths of each co-existing technology to calibrated, high performance photodetectors which are optimized for upstream TDM burst and downstream broadcast type transmission. Power levels for each detected wavelength are displayed simultaneously for simplified viewing and analysis.

FX81T 1G/10G EPON/GPON Power Meter (Terminated)

The FX81T PON power meter performs wavelength selective level measurements on EPON/GPON including next generation XG(S)-PON or 10G EPON systems. The unit automatically filters each downstream wavelength to calibrated, high performance photo-detectors and power levels are displayed simultaneously for simplified viewing and analysis.

10G GPON US Center:1270nm	GPON US Center:1310nm	GPON DS Center:1490nm	RF video Center:1555nm	10G GPON DS Center:1577nm

1260 1280   1290   1330   1480 1500   1550 1560   1575 1580

1G PON and 10G PON Test Application

The FX80, FX81 and FX81T power meters are purpose-built tools for PON signal level verification. A specialized filtered design providing wavelength selective measurements differentiates them from ordinary power meters. Both Terminated and Pass-Through models feature low insertion loss and can be connected at various test points in the Optical Distribution Network (ODN). The Pass-Through models are typically connected at the customer ONT/ONU location during service activation to verify downstream and upstream signal levels, while the Terminated model is mostly used to verify downstream level/s during the construction phase or 10G brownfield upgrade. Precise measurements at the OLT, coexistence filter (CEx), splitter or other checkpoint points according to user-defined Pass/Fail criteria accelerate span testing, new service activation and/or scheduled maintenance tasks.
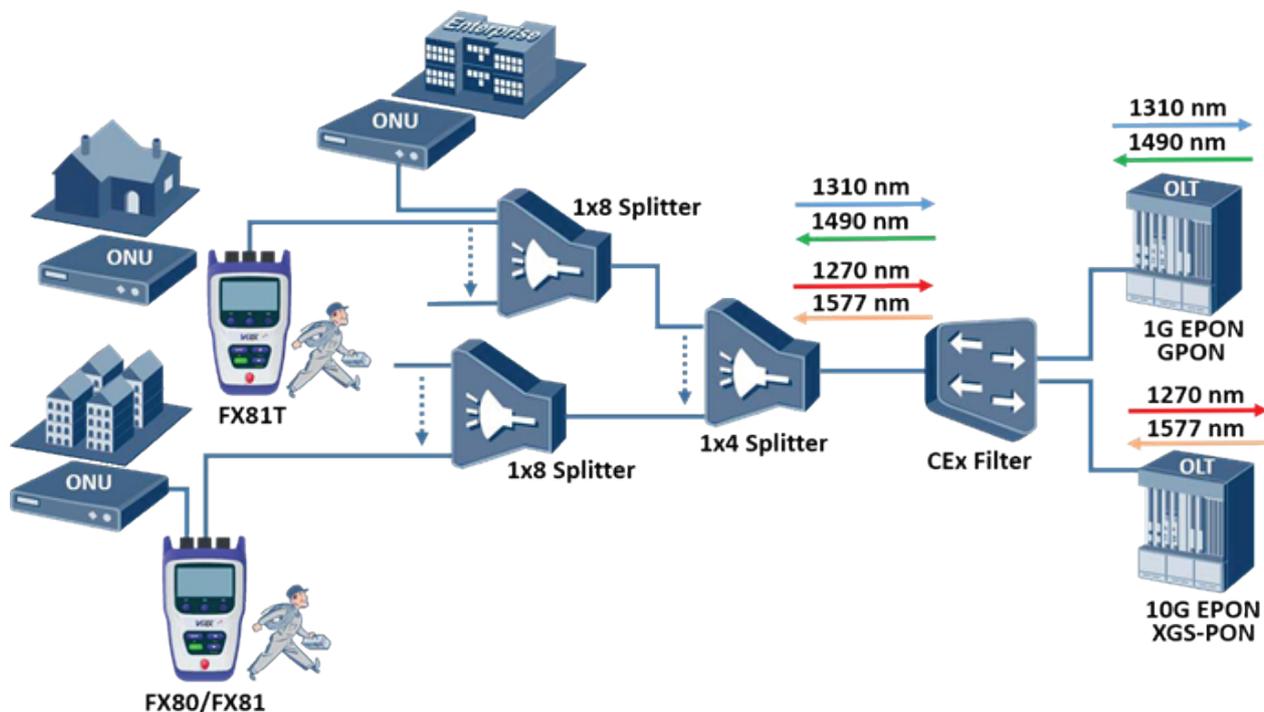
FX82 Optical Power Meter (OPM)

The broadband OPM features a large, 1 mm InGaAs detector ensuring superb measurement accuracy over a wide wavelength and dynamic range. The detector's flat spectral response across the 1500-1600 nm window is particularly suited for DWDM C-band measurements. The optical power meter is factory calibrated at all legacy wavelengths and all CWDM wavelengths can be added as an option.

The unit measures continuous wave signal levels and detects 270 Hz, 330 Hz, 1 kHz, and 2 kHz modulated signals used for fiber identification. When paired with a VeEX optical light source in CW mode supporting WaveID, the unit automatically recognizes the incoming wavelength and applies the correct calibration factor accordingly. Interchangeable adapters support a wide range of industry connector types.

FX83 Optical Light Source (OLS)

The OLS is fitted with high performance lasers offering excellent wavelength and power stability over a broad operating temperature range. Each source is equipped with WaveID which is compatible VeEX optical power meters for fiber identification. The OLS can be configured with up to four singlemode wavelengths (1310 nm, 1490 nm, 1550 nm, or 1625 nm) on a single output port for verifying FTTx/PON telecom, CATV or government/defense fiber network applications.

Alternatively, up to four wavelengths (850/1300 nm multimode and 1310/1550 nm singlemode) can be configured on two individual ports for testing LAN/WAN access and enterprise/data centers that still utilize both multimode and singlemode fiber types. The Multi-wave (loop) function automatically toggles through all wavelengths for faster loss measurements.

When performing loss on multimode fiber networks, the standards recommend a LED source be used to control the launch conditions. In such test applications, VeEX recommends the use of an external, mode conditioner which modifies the FX83's laser output to provide repeatable launch conditions. Encircled Flux (EF) defined in TIA-526-14-B and referenced in TIA-568-C.0-2, ISO/IEC 11801 and ISO/IEC 14763-3 standards, mandates EF launch conditions for all multimode fiber loss measurements, including sectional attenuation (dB/km), link loss (dB), connector and splice loss (dB). EF compliance ensures maximum accuracy and repeatability between measurements by overcoming under-filled and over-filled launch conditions.
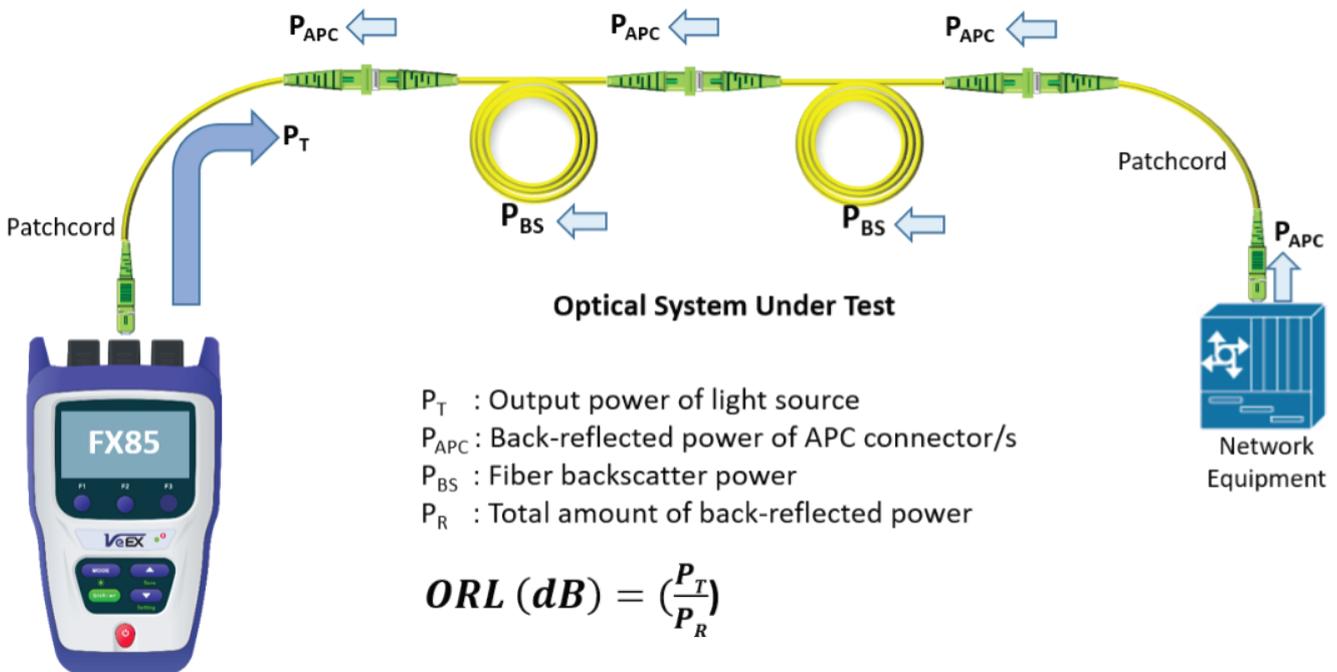
FX84 Optical Loss Test Set (OLTS)

The OLTS combines both power meter and light source functions into a single test unit. Individual test ports support uni-directional loss measurements allowing two technicians on opposite ends of a fiber link to test simultaneously. The auto-loop mode toggles the light source wavelengths automatically, while the OPM test partner detects the incoming wavelength/s using the WaveID feature. Single-ended loss is usually measured by mating the cable under test to a reference launch cable and measuring the power at the remote end.

Launch fiber

Launch fiber

2 fibers under test

Location A

Location B
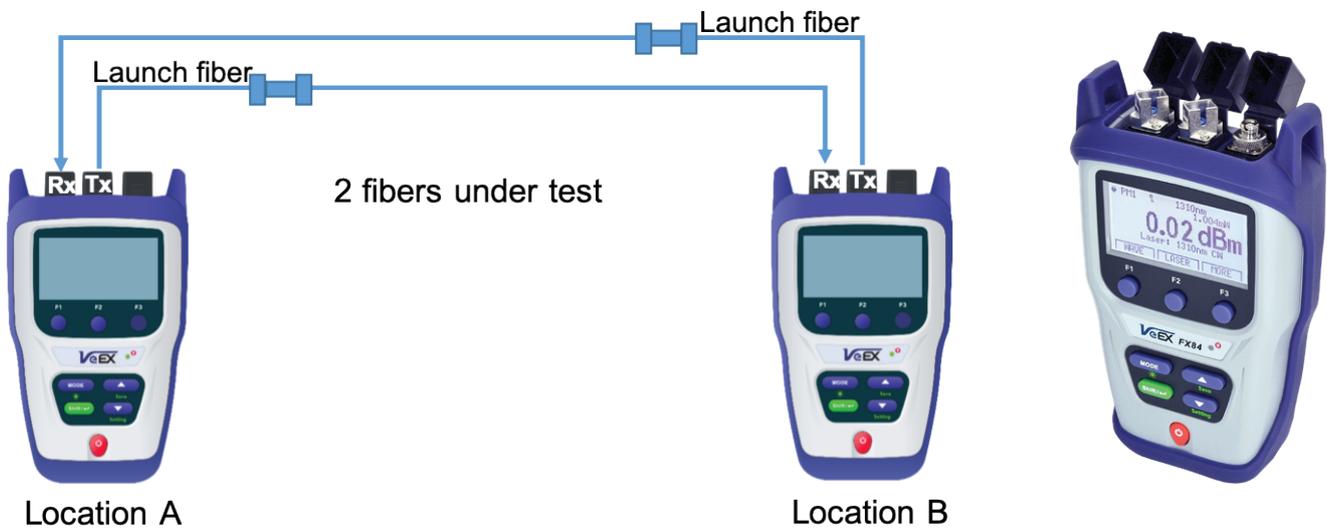
FX85 OLTS with Optical Return Loss (ORL)

As network bit rates increase, link optical return loss (ORL) must be minimized to reduce bit errors. Furthermore, optical systems employing high-speed lasers, analog transmission (CATV), or Raman amplifiers also require low return loss for optimal performance.

The FX85 integrates laser source, optical power meter, and optical return loss test functions into a single tester. The unit performs insertion loss and ORL at single or multiple wavelengths on a single fiber simultaneously reducing test time significantly. The unit's sensitive power meter, stabilized laser source and angled (APC) test port enables up to a 70 dB measurement range.

P_{APC}

P_{APC}

P_{APC}

P_T

Patchcord

P_{BS}

P_{BS}

Patchcord

P_{APC}

Optical System Under Test

FX85

Network Equipment

P_T : Output power of light source
P_{APC} : Back-reflected power of APC connector/s
P_{BS} : Fiber backscatter power
P_R : Total amount of back-reflected power

$$ORL\ (dB) = \left(\frac{P_T}{P_R}\right)$$

Visual Fault Locator (VFL) Option

The VFL is an ideal tool for fiber identification and is often the tool of choice to visually locate major defects in optical distribution frames or within an OTDR's dead zone. The VFL employs a Class 2 eye-safe laser with 1 mW output supporting a 3-5 km test range.

xWDM Network Testing

As CWDM and DWDM networks proliferate in access, metro and regional networks, a new generation of cost effective CWDM and DWDM light sources are required for construction, service activation and troubleshooting.

The FX86 CWDM or FX87 DWDM light sources can be used in conjunction with Optical Power meters (OPM) or Optical Channel Checkers (OCC), to characterize the entire link loss or verifying continuity to the final customer destination.
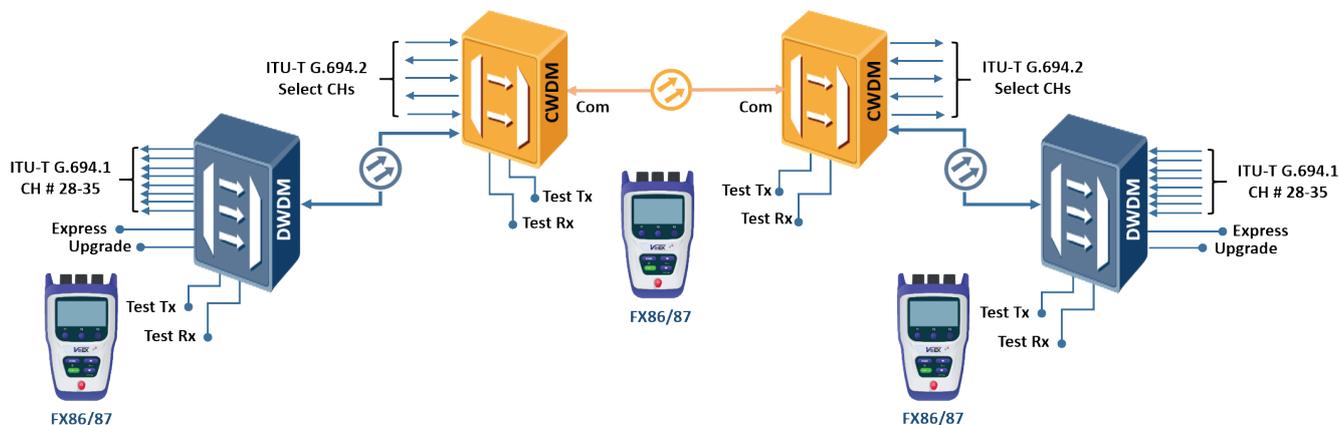
FX86 CWDM Optical Light Source (OLS)

The FX86 can be configured with any four CWDM wavelengths. Each output generates an independent ITU-T G.694.2 wavelength which can be modulated individually for unique fiber identification purposes. The output ports are fitted with SC/APC connectors and a built-in dust and laser safety shutter.

The FX86 can also be configured with four wavelengths that closely emulate GPON and XG(S)-PON technologies. When paired with the FX82 power meter and CWDM calibration option, technicians can accurately verify loss budgets of each PON type prior to any OLT deployment.

FX87 DWDM Tunable Light Source (TLS)

The FX87 is designed to test and verify DWDM systems operating in the C-band spectrum. The laser can be tuned in 50 GHz steps from C62 (1527.994) to C14 (1566.314 nm) per the ITU-T G.694.1 frequency grid.

When paired with a companion FX87 equipped with OPM option, technicians can accurately measure end-to-end link loss on systems that include mux/demux network elements.

Paired with an Optical Channel Checker, technicians can also perform non-intrusive, end-to-end continuity tests without impacting other channels or disrupting service.

The optional OPM and VeEX's proprietary WaveID can be used in an OLTS loopback mode to check continuity and loss from a single test location which minimizes truck rolls and improves efficiency.

Fiberizer Software Applications

Fiberizer software applications dramatically increase technician efficiency, workflow integration and process compliance. Test results from any FX80 series power meter can be transferred and processed in several ways depending on customer requirements or work practices.

Fiberizer LT-Sync

Windows PC software enabling technicians to transfer test results from any FX80 series power meter via USB or optional Bluetooth interface. Basic reporting in csv or pdf is supported including transfer or upload to Fiberizer Desktop Plus or Fiberizer Cloud applications.

Fiberizer Mobile OLTS (FMOLTS)

Software Application for mobile devices to transfer test results from any FX80 series power meter via USB cable (Android devices only) or optional Bluetooth interface. Technicians can subsequently upload test results directly from their mobile device to Fiberizer Cloud for further processing or archiving.

Fiberizer Desktop-Plus

Windows PC software for advanced post-processing, reporting and management of optical power meter results including test data from OTDR and Fiber Inspection Scopes.

Fiberizer Cloud

Enables technicians to store, analyze and access all power meter test data in a single on-line repository. Employing and leveraging advanced Cloud technology, this unique solution provides superior centralized test data management capability. Fully HTML5 compatible, technicians can use any browser, on any device to access their test data from almost any location, at any time.

Fiberizer Cloud and Fiberizer Desktop Plus applications are designed to work together - test data between your Cloud account and Fiberizer Desktop Plus software are automatically synchronized when saved in the VeEX Jobs folder. Project test results can easily be shared with your team and/or even with your customers.

Fiberizer Mobile

Fiberizer Cloud Repository

FX80 series OPM

Test Results

xWDM OPM

CW OPM xPON OPM

Fiberizer LT-Sync
Fiberizer Desktop Plus

Optical Specifications[1]

PON Optical Power Meter - FX80	
PON Types	BPON, EPON, GPON
Test Ports	Pass-Through (ONU, OLT)
Upstream Measurement (nm) Burst Power Level Range (dBm)	1310 -35 to +10
Downstream Measurement (nm) 1490 nm Power Level Range (dBm) 1550 nm Power Level Range (dBm)	1490 and 1550 -40 to +12 -40 to +25
Calibrated Wavelengths (nm)	1310/1490 or 1310/1490/1550 nm
Spectral Passband (nm)[11] 1310 nm 1490 nm 1550 nm	 1260 to 1360 1470 to 1505 1535 to 1570
Pass-through Insertion Loss (dB)[2,4]	≤1.5
Pass-through Isolation (dB)	≥30
ORL (dB)	@1550 nm: ≥60
Power Measurement Accuracy(dB)[2,9,10]	±0.5
Linearity (dB)	±0.1, ±0.2 @ 1550 nm (≥40 dBm)
Refresh Rate of Display (Hz)	2.5

XG(S)-PON | 10G EPON Power Meter	FX81 Pass-Through OPM	FX81 Terminated OPM
# Test Ports (5 lambda | 4 lambda models)	ONT/OLT | ONT/OLT, optional OPM	OLT/OPM, optional VFL
Calibrated Wavelengths (nm)	1270/1310/1490/1550/1577 or 1270/1310/1490/1577	1490/1577
Continuous Data Measurement Range (dBm) - OLT - 1490 nm - 1577 nm	 -40 to +12 -40 to +12	 N/A N/A
Burst Data Measurement Range (dBm) – ONT/ONU - 1270 nm - 1310 nm	 -35 to +10 -35 to +10	 N/A N/A
RF Video Data Measurement Range (dBm) - OLT - 1550 nm	-40 to +25	
Spectral Passband (nm)[11] - 1270 - 1310 - 1490 - 1550 - 1577	 1260 to 1280 1290 to 1330 1480 to 1500 1535 to 1570 1573 to 1585	 N/A N/A 1480 to 1500 1540 to 1560 1573 to 1585
Power Measurement Accuracy, (dB)[2,9,10]	±0.5	
Pass-through Insertion Loss, (dB)[2,9,10]	≤1.5	N/A
Linearity, (dB)	±0.1	
Display Resolution (dB)	0.1 dB for FX81 0.01 dB for FX81T	
Results	dBm, W, dB, Pass/Fail	
Interface (with dust cap protection)	Fixed SC/APC	

Visual Fault Locator (VFL) Option - FX80/82/83/84[14]/85[14]	
Emitter Type	Laser
Wavelength (nm)	655 nm ±5 nm
Output Power (mW)[2]	1 mW
Laser Safety	Class 2
Modulation	CW, 1 Hz, 2 Hz
Connector Type[7]	Universal 2.5 mm

Optical Specifications[1] *cont'd*

Broadband Optical Power Meter - FX80/81/81T/82/84/85	
Wavelength Range (nm)	800 to 1700
Calibrated Wavelengths (nm)	Standard - 850/1300/1310/1490/1550/1625/1650 Optional - CWDM ITU-T 694.2 grid (FX82 and FX84 only)
Detector Type[8]	InGaAs
Measurement Range (dBm) Standard (PM1) High Power (PM2)[9]	-70 to +10 -50 to +25
Power Measurement Accuracy, % (dB)[12]	±5 (±0.22)
Linearity, % (dB)	±2.5 (±0.11)
Readout Resolution (dB)	±0.01
Tone Detection (Hz)	270/330/1000/2000
Wave ID (Auto)	Compatible with VeEX light sources
Optical Adaptors (interchangeable)	ST/SC/FC/LC, Universal 2.5/1.25 mm

Optical Return Loss (ORL) - FX85 only	
Fiber Type	Singlemode, 9/125 µm
Wavelengths (nm)	1310/1490/1550/1625
ORL Range (APC) (dB)[13]	0 to 65
ORL Uncertainty (dB)[2,5]	±0.5 (0 to 50), ±1 (50 to 60)
Readout Resolution (dB)	0.01

Optical Light Source - FX83/84/85		
Fiber Type	Singlemode, 9/125 µm	Multimode, 50/125 µm[6]
Center Wavelengths (nm)	1310/1490/1550/1625	850/1300
Wavelength Tolerance (nm)	±2	±20 to 50
Line Width (nm)	≤1	≤50/135, 40-200 nm
Output Power (dBm)	>-2.5, ~0 (typ)	>-4, ~0 (typ)
Laser Safety	Class 1M	
Power Stability (dB)	±0.03 (15 min) ±0.1 (8 hr)	±0.05 (15 min) ±0.1 (8 hr)
Modulation (Hz)	CW and 270/330/1000/2000	
WaveID	Yes	
Optical Connectors	Fixed (SC/FC/ST/LC) Optional Universal Interface with interchangeable adaptors (SC/FC/ST/LC)	

CWDM Light Source - FX86	
Center Wavelength (nm)	ITU-T G.694.2 grid ±2 nm
Output Ports	Four maximum, equipped with protective shutter
Spectral Width (nm)	≤1
Output Power (dBm)[3]	>-1.5, ~0 (typ)
Side Mode Suppression Ratio (dB)	35
Optical Isolation (dB)[14]	40
Laser Safety	Class 1M
Power Stability (dB)	±0.03 (15 min) ±0.1 (8 hr)
Modulation	CW, 270 Hz, 330 Hz, 1 kHz, 2 kHz
WaveID	All 18 wavelengths as fitted, one port at a time
Optical Connector Type	Fixed SC/APC connectors

Optical Specifications[1] *cont'd*

DWDM Tunable Light Source - FX87	
C-Band Tuning Range (nm)	1527.60 to 1566.31
Spectral Width (kHz)	500
Grid Spacing	ITU-T G.694.1 DWDM 50 GHz grid ±2 nm
Output Power (dBm)[3]	+5
Side Mode Suppression Ratio (dB)	40
Optical Isolation (dB)	25
Laser Safety	Class 1M
Power Stability (dB)	±0.03 (15 min)
Modulation (Hz)	270/330/1000/2000
WaveID	Yes
Optical Connector Type	Fixed SC/APC connector

*Check with factory

**Per Unit

Notes

1. All specifications valid at 23°C ±1 °C after 15 minutes warm up
2. Typical value
3. Uncertainty is valid at calibration conditions
4. At 1550 nm for singlemode
5. ORL accuracy up to 60 dB; ORL accuracy between 60 dB to 66 dB, >±1 dB uncertainty
6. For multimode requires Encircled Flux compliant reference cord
7. 2.5 mm to 1.25 mm converter available
8. Filtered InGaAs detector used for high power PM2 version
9. Calibration conditions, -10 dBm
10. Calibrated wavelengths.
11. FWHM (typical)
12. Range -65 to +6 dBm
13. ORL from 45 dB to 65 dB only when calibrated with 14.7 dB reference cable and APC terminator/mandrel
14. MOQ - Consult factory

General Specifications

Size:	164.39 x 100 x 46.93 mm (6.47 x 3.94 x 1.85 in)**
Weight:	<400 g (<0.7 lbs.)**
Construction:	Rugged, polycarbonate chassis, 1 meter drop tested
Battery Life:	ORL mode only w/o backlight >14 hours
	OLS mode only w/o backlight >55 hours (FX83/FX84/FX85 models)
	OPM modes w/o backlight ~34 hours (measuring live signal)
Power Supply:	5 VDC charger, Micro USB interface
Connectivity:	Micro USB or optional Bluetooth
Test Data:	Transfer via LT-Sync or Fiberizer Mobile
Display:	High contrast LCD (124x68 pixels)
Operating Temp:	-10°C to +50°C (unless noted)
Storage Temp	-20°C to +70°C
Humidity:	0% to 95%, non-condensing

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