FTBx-740C xWDM OTDR series

C-BAND DWDM AND 18-WAVELENGTH CWDM TUNABLE OTDR SERIES FOR METRO ETHERNET AND C-RAN LINK CHARACTERIZATION

iOLM READY

NEW OTDR GENERATION

C-Band DWDM and all 18 CWDM ITU channels in single OTDRs for testing through MUX/DEMUX channels, providing a complete end-to-end link characterization or troubleshooting for commercial services, C-RAN networks and metro Ethernet deployments.

KEY FEATURES

CWDM+DWDM combo available in compact FTB-1v2

C-BAND ITU DWDM grid channels 12-62 selection in a single OTDR port

18 CWDM channels covered in a single OTDR port

Test through MUX/DEMUX/OADM

In-service testing of active networks

High-resolution and short dead zones

Select favorite channels list

iOLM-ready: one-touch multiple acquisitions, with clear go/no-go results presented in a straightforward visual format

APPLICATIONS

Single-ended construction and troubleshooting solution

CWDM and DWDM metro Ethernet links

Commercial services deployments

Fiber deep, remote PHY and node splitting

CBH antenna feeds and C-RAN networks

RELATED PRODUCTS AND OPTIONS

Platform
FTB-1v2/FTB-1 Pro

Platform
FTB-2/FTB-2 Pro

Platform
FTB-4 Pro

Fiber inspector probe
FIP-400B (WiFi or USB)

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WAVELENGTH-DIVISION MULTIPLEXING BASICS

Wavelength-division multiplexing (WDM) is a technology that multiplexes (aggregates) several optical carrier signals onto a single optical fiber link by using different wavelengths in order to increase the bandwidth of an optical fiber link.
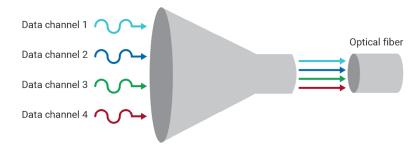

Figure 1. WDM acts as an "optical funnel" using different colors of light (wavelengths) for each signal.

CWDM VS. DWDM

Besides traditional WDM that relies on 1310 nm and 1550 nm, there are two main patterns aggregating a greater number of wavelengths/signals that have been widely used to expand the capacity of a network without adding more fiber: coarse wavelength division multiplexing (CWDM) and dense wavelength division multiplexing (DWDM).

CWDM uses up to 18 wavelengths, from 1271 nm to 1611 nm, with a channel spacing of 20 nm[a]. DWDM has been mainly deployed over the C-Band (1525–1565 nm) with channel spacing from 1.6 nm (200 GHz) to 0.4 nm (50 GHz)[b].
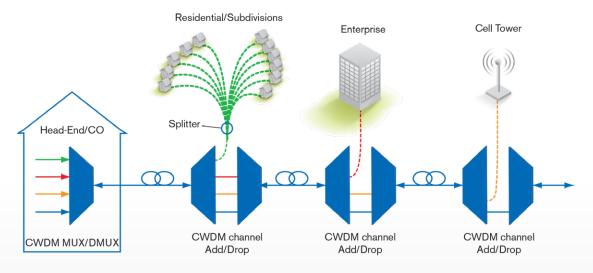

Figure 2. Each customer (enterprise or tower) receives a wavelength via an add/drop multiplexer (OADM)
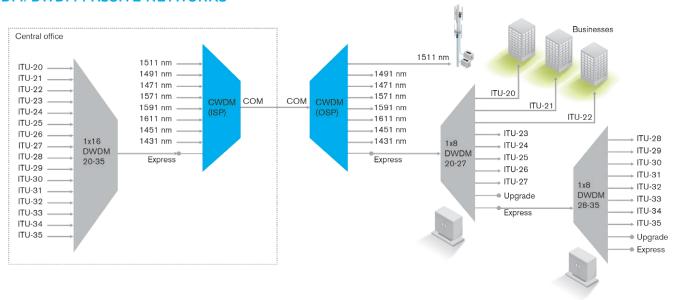
APPLICATIONS

CWDM and DWDM are gaining popularity for C-RAN or commercial services deployments in which each wavelength can address a specific site, such as a cell tower or a customer.

Both CWDM and DWDM approaches are not mutually exclusive and co-exist in hybrid passive networks that feature DWDM over CWDM to maximize fiber capacity.

a. As defined in ITU-T G. 694.2
b. As per ITU-T G. 694.1, DWDM is also available over the L-Band (1570–1610 nm) and spectral grids are defined down 12.5 GHz channel spacing.

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CWDM/DWDM PASSIVE NETWORKS

WHY USE AN xWDM OTDR DURING CONSTRUCTION?

Point-to-multipoint xWDM systems (CWDM and/or DWDM) in access networks, such as C-RAN or commercial services deployments, feature different topologies than in metro/core networks. In these scenarios, it is critical to ensure link continuity, meaning that the right wavelength is connected to the right port on the WDM multiplexer (MUX), demultiplexer (DEMUX) or optical add-drop modules (OADM). Wavelengths must be dropped at the right site by using the right OADM, and by connecting the fiber to the right port. It is a simple but very common issue in access networks of cable operators or fronthaul rings that could be avoided or fixed on-site before leaving the job site. An OTDR using the same channel/wavelength to test through MUX/DEMUX/ OADM can provide users, from a single-ended, single operator, with a complete view of the link and total loss budget. Knowing the actual distances between the head-end and the target site, an OTDR can confirm that a wavelength is properly addressed.

USE A xWDM TUNABLE OTDR FOR:

› Single-ended CWDM/DWDM fiber characterization

› Validating the continuity and end-to-end loss through MUX, OADM and DEMUX, during construction

› In-service testing using the customer's wavelengths port—all without impacting other customer wavelengths and with no downtime

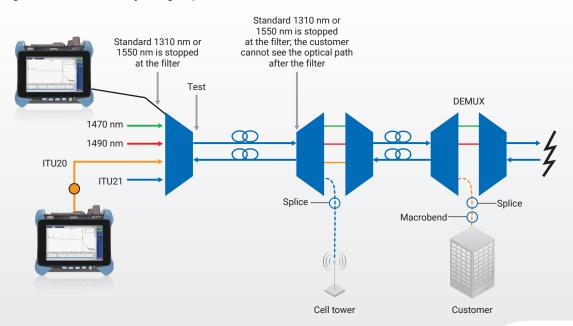› Troubleshooting and characterization by a single operator from the head-end

Figure 3. With a CWDM/DWDM OTDR, network service providers can see and validate the complete optical path prior to turning up the service.

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FTBx-740C xWDM OTDR SERIES

This series includes one CWDM OTDR module to cover all 18 CWDM channels from a single port and one DWDM tunable OTDR module to cover DWDM C-Band channels. This solution is available in the FTB-1v2/FTB-1 Pro, FTB-2/FTB-2 Pro and FTB-4 Pro platforms.

The FTBx-740C xWDM OTDR series has been designed with EXFO's renowned high-quality standards to stabilize central channels under test, preventing any drift/leakage into adjacent channels, which would otherwise affect other valuable customers. The OTDR's GUI lets the technician define a list of favorite channels over the C-Band (DWDM) or CWDM grid (CWDM) for quicker access and a more efficient test routine.

Figure 4. FTBx-740C-CWDM or FTBx-740C-DWC single module for FTB-1v2 single- and dual-carrier FTB-2/FTB-4 Pro mainframe

FTB-1v2 DC COMBOS: COMPACT AND FULLY LOADED FOR HYBRID PASSIVE CWDM/DWDM NETWORKS

Both CWDM and DWDM OTDRs can be housed in the compact and powerful FTB-1v2 dual-carrier platform[a].With the best CWDM and DWDM testing specifications in the industry, field technicians are empowered to capture accurate, first-time-right measurements in the fastest manner possible without carrying heavy equipment, missing a wavelength or requiring users to swap modules to cover the complete application.

The dual-carrier FTB-1v2 with CWDM and DWDM modules is ideal for use for commercial services in fiber-to-the building (FTTB), fiber-to-the-premises (FTTP) and fronthaul deployments that are evolving and migrating from CWDM to hybrid DWDM or any other WDM point-to-multipoint network architecture. With this test kit, multiple-service operators (MSOs) and contractors always have the required CWDM or DWDM wavelength to characterize through MUX, OADM and DEMUX, provide complete end-to-end link characterization and validate complete optical paths prior to turning up a service or troubleshooting for commercial services.

1. DWDM OTDR port
2. CWDM OTDR port
3. Mic/headset jack
4. Micro SD card slot
5. 1 GigE port
6. USB 3.0 port (1)
7. USB 2.0 ports (2)
8. VFL
9. Power meter

LOADED WITH FEATURES TO BOOST YOUR EFFICIENCY

Real-time averaging

Activates the OTDR laser in continuous shooting mode, the trace refreshes in real time and allows to monitor the fiber for a sudden change. Perfect for a quick overview of the fiber under test.

Automode

Used as a discovery mode, this feature automatically adjusts the distance range and the pulse width in function of the link under test. It is recommended to adjust the parameters to perform additional measurements to locate other events.

Zoom tools

Zoom and center to facilitate the analysis of your fibers. Draw a window around the area of interest and center in the screen quicker.

Set parameters on the fly

Dynamically change OTDR settings for the ongoing acquisition without stopping or returning to submenus.

a. Refer to FTB-1v2 specification sheet for more details.
b. This picture is shown as a guideline only. Actual module may differ.

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iOLM—REMOVING THE COMPLEXITY FROM OTDR TESTING

OTDR TESTING COMES WITH ITS SHARE OF CHALLENGES. . .

WRONG OTDR TRACES

COUNTLESS TRACES TO ANALYZE

REPEATING THE SAME JOB TWICE

COMPLEX INSTRUMENT TRAINING/SUPPORT

i OLM | intelligent Optical Link Mapper

In response to these challenges, EXFO developed a better way to test fiber optics: the intelligent Optical Link Mapper (iOLM) is an OTDR-based application designed to simplify OTDR testing by eliminating the need to configure parameters, and/or analyze and interpret multiple complex OTDR traces. Its advanced algorithms dynamically define the testing parameters, as well as the number of acquisitions that best fit the network under test. By correlating multipulse widths on multiple wavelengths, the iOLM locates and identifies faults with maximum resolution—all at the push of a single button.

HOW DOES IT WORK?

Dynamic multipulse acquisition → Intelligent trace analysis → All results combined into a single link view → Comprehensive diagnosis →

Turning traditional OTDR testing into clear, automated, first-time-right results for technicians of any skill level.

Patent protection applies to the iOLM, including its proprietary measurement software. EXFO's Universal Interface is protected by US patent 6,612,750.

THREE WAYS TO BENEFIT FROM THE iOLM

COMBO

Run both iOLM and OTDR applications (Oi code)

UPGRADE

Add the iOLM software option to your iOLM-ready unit, even while in the field

iOLM ONLY

Order a unit with the iOLM application only

iOLM FEATURES VALUE PACK

In addition to the standard iOLM feature set, you can select added-value features as part of the **Advanced** or **Pro** packages. Please refer to the iOLM specification sheet for the complete and most recent description of these value packs.

iOLM FOR CWDM AND DWDM NETWORKS

All iOLM benefits tailored to CWDM and DWDM network topologies and challenges: optimized CWDM/DWDM algorithm, new icon to represent MUX, DEMUX and OADM.

Typical CWDM/DWDM passive networks will exhibit a series of high loss MUX/DEMUX or OADM, which would lead the technician to use longer pulse widths to reach the end of the link at the expense of front-end resolution, in a very similar way to what has been seen in PON networks. iOLM's dynamic multipulse acquisition accurately characterizes the complete link with all necessary pulses, for best resolution along the link and generating a single iOLM file per link to facilitate reporting.

Many CWDM/DWDM passive networks rely on duplex fibers for TX/RX on the same wavelength, iLoop will greatly increase efficiency in those cases, by characterizing TX and RX link in a single acquisition. iLoop will guide the user in the test sequence and will automate all the process of generating single files and reports per link.[a]

EXFO

GET THE BEST OUT OF YOUR DATA POST-PROCESSING—ONE SOFTWARE DOES IT ALL

FastReporter

This powerful reporting software is the perfect complement to your OTDR, and can be used to create and customize reports to fully address your needs.

FULLY AUTOMATED FIBER INSPECTION PROBE

100%
automated [a]

Neglecting to clean, inspect and certify connectors can lead to serious, time-consuming problems accounting for up to 80% of network failures.

Equipped with the FIP-400B, it is now easy to include connector certification in your regular method of procedures without compromising the efficiency of your technicians. You'll no longer leave any stones unturned or any connectors uninspected!

1-step
process [a]

Years of experience in the field has given EXFO the insight and expertise to re-engineer a truly unique and innovative fiber inspection probe that greatly simplifies and speeds up this critical step.

57%
shorter test time [b]

Housing a unique automatic focus-adjustment system, the FIP-400B automates each operation in the connector endface inspection sequence. **The result: fiber inspection is now a quick, one-step process that can be performed by technicians of all skill levels.**
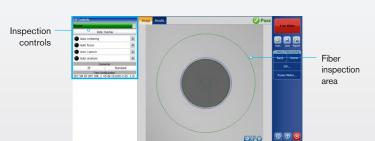
Five models to fit your budget

FEATURES	USB WIRED			WIRELESS	
	Basic **FIP-410B**	Semi-automated **FIP-420B**	Fully automated **FIP-430B**	Semi-automated **FIP-425B**	Fully automated **FIP-435B**
Three magnification levels	√	√	√	√	√
Image capture	√	√	√	√	√
Five-megapixel CMOS capturing device	√	√	√	√	√
Automatic fiber image-centering function	X	√	√	√	√
Automatic focus adjustment	X	X	√	X	√
Onboard pass/fail analysis	X	√	√	√	√
Pass/fail LED indicator	X	√	√	√	√
WiFi connectivity	X	X	X	√	√

For more information, visit www.EXFO.com/fiberinspection.

POWERFUL CONNECTOR ENDFACE IMAGE VIEWING AND ANALYSIS SOFTWARE

Inspection controls

Fiber inspection area

› Automatic pass/fail analysis of the connector endfaces

› Lightning-fast results in seconds with simple one-touch operation

› Complete test reports for future referencing

› Stores images and results for record-keeping

a. FIP-430B and FIP-435B models.
b. Data sourced from EXFO's case study, with calculation based on typical analysis time.

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All specifications valid at 23 °C ± 2 °C with an FC/APC connector, unless otherwise specified.

TECHNICAL SPECIFICATIONS

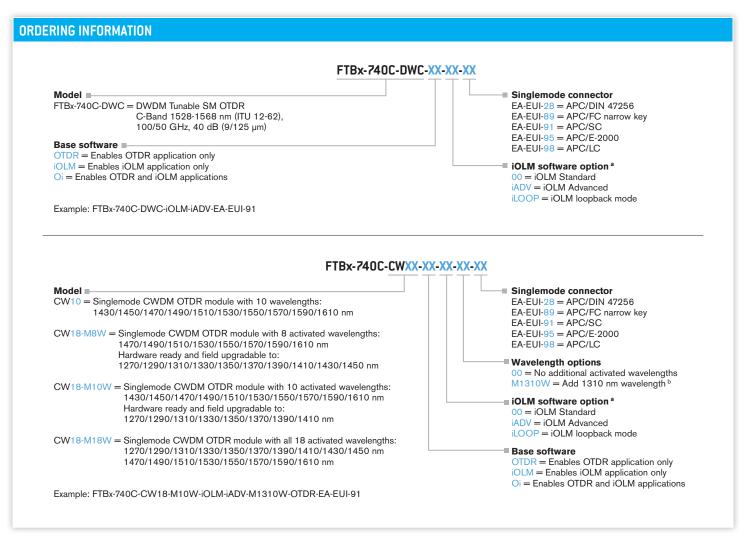|	FTBx-740C-CWDM	FTBx-740C-DWC
Laser nominal wavelength (nm)	1270, 1290, 1310, 1330, 1350, 1370, 1390, 1410, 1430, 1450, 1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610	C-Band tunable 1527.99-1567.95 nm ITU-T G694.1 Channels 12-62 (191.2 THz - 196.2 THz)
Central wavelength uncertainty (nm) [a]	±3	DWDM 50Ghz channel wavelength control
Channel spacing tuning	N/A	50 GHz and 100 GHz increments on ITU-T G694.1 grid
Dynamic range at 20 μs (dB) [b]	>37	40
Event dead zone (m) [c]	1.1	0.7
Attenuation dead zone (m) [c]	5	3.5
Distance range (km)	0.1 to 400	0.1 to 400
Pulse widths (ns)	5 to 20 000	5 to 20 000
Sampling points	Up to 256 000	Up to 256 000
Sampling resolution (m)	0.04 to 10	0.04 to 10
Distance accuracy (m) [d]	±(0.75 + 0.0025 % x distance + resolution)	±(0.75 + 0.0025 % x distance + resolution)

GENERAL SPECIFICATIONS

Size (H x W x D)	158 mm x 24 mm x 174 mm (6 ¼ in x $^{15}/_{16}$ in x 6 $^{7}/_{8}$ in)	
Weight	0.4 kg (0.9 lb)	
Temperature	Operating	Refer to platform's specification sheet
	Storage	−40 °C to 70 °C (−40 °F to 158 °F)
Relative humidity	0% to 95% non-condensing	

LASER SAFETY

ATTENTION
CAUTION
LASER 1M

For complete details on all available configurations, refer to the ordering information section.

a. Typical, using 10 μs pulse.
b. Typical dynamic range with a three-minute averaging at SNR = 1.
c. Typical for reflectance at −45 dB, using a 5-ns pulse.
d. Does not include uncertainty due to fiber index.

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ORDERING INFORMATION

FTBx-740C-DWC-XX-XX-XX

Model
FTBx-740C-DWC = DWDM Tunable SM OTDR
C-Band 1528-1568 nm (ITU 12-62),
100/50 GHz, 40 dB (9/125 µm)

Base software
OTDR = Enables OTDR application only
iOLM = Enables iOLM application only
Oi = Enables OTDR and iOLM applications

Example: FTBx-740C-DWC-iOLM-iADV-EA-EUI-91

Singlemode connector
EA-EUI-28 = APC/DIN 47256
EA-EUI-89 = APC/FC narrow key
EA-EUI-91 = APC/SC
EA-EUI-95 = APC/E-2000
EA-EUI-98 = APC/LC

iOLM software option [a]
00 = iOLM Standard
iADV = iOLM Advanced
iLOOP = iOLM loopback mode

FTBx-740C-CWXX-XX-XX-XX-XX

Model
CW10 = Singlemode CWDM OTDR module with 10 wavelengths:
1430/1450/1470/1490/1510/1530/1550/1570/1590/1610 nm

CW18-M8W = Singlemode CWDM OTDR module with 8 activated wavelengths:
1470/1490/1510/1530/1550/1570/1590/1610 nm
Hardware ready and field upgradable to:
1270/1290/1310/1330/1350/1370/1390/1410/1430/1450 nm

CW18-M10W = Singlemode CWDM OTDR module with 10 activated wavelengths:
1430/1450/1470/1490/1510/1530/1550/1570/1590/1610 nm
Hardware ready and field upgradable to:
1270/1290/1310/1330/1350/1370/1390/1410 nm

CW18-M18W = Singlemode CWDM OTDR module with all 18 activated wavelengths:
1270/1290/1310/1330/1350/1370/1390/1410/1430/1450 nm
1470/1490/1510/1530/1550/1570/1590/1610 nm

Example: FTBx-740C-CW18-M10W-iOLM-iADV-M1310W-OTDR-EA-EUI-91

Singlemode connector
EA-EUI-28 = APC/DIN 47256
EA-EUI-89 = APC/FC narrow key
EA-EUI-91 = APC/SC
EA-EUI-95 = APC/E-2000
EA-EUI-98 = APC/LC

Wavelength options
00 = No additional activated wavelengths
M1310W = Add 1310 nm wavelength [b]

iOLM software option [a]
00 = iOLM Standard
iADV = iOLM Advanced
iLOOP = iOLM loopback mode

Base software
OTDR = Enables OTDR application only
iOLM = Enables iOLM application only
Oi = Enables OTDR and iOLM applications

a. Available for models: CW18-M8W AND CW18-M10W.
b. Please refer to the iOLM specification sheet for the complete and most recent description of these value packs.

OTDR CONNECTOR

APC connectors generate lower reflectance than UPC, which is a critical parameter that affects performance, particularly in dead zones. APC connectors provide better performance than UPC connectors, thereby improving testing efficiency. APC connectors on OTDR port are mandatory with FTBx-740C series.

Note: UPC connectivity is available through an hybrid test jumper. Simply replace EA-XX by EI-XX in the ordering part number to get one free of charge hybrid test jumper for APC to UPC (SC/APC to SC/UPC or FC/APC to FC/UPC or LC/APC to LC/UPC).

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