

# FTB-5240S/BP Optical Spectrum Analyzers



100G

WDM AWARE™  
TECHNOLOGY

EXFO TFv  
Test Function Virtualization

EXFO Connect  
Compatible



Feature(s) of this product is/are protected by one or more of : US patents 6,612,750; US patents 8,373,852; US patent 6,636,306 and equivalent patents pending and granted in other countries; US patent 8,358,930 and equivalent patents pending and granted in other countries; US patent 8,787,753; US patent 8,364,034 and equivalent patents pending and granted in other countries; US patent 9,438,336 and equivalent patents pending and/or granted in other countries; patent appl. US 2014/0086574 A1; and US design patent D737,429.

Highly accurate, easy-to-use intelligent optical spectrum analyzers (OSAs) for analysis of CWDM and DWDM networks.

## KEY FEATURES

First third-party 40G/100G/200G Pol-Mux OSNR option on the market; compliant with the IEC 61282-12 standard

Intelligent in-band OSNR measurement for 40 Gbit/s and ROADM deployments

Automatic impairment identification for faster troubleshooting

Compliant with Recommendation ITU-T G.697

One-button operation for easy setup and automatic measurement

Fast and cost-effective in-service PMD analysis option

Truly portable spectral characterization for DWDM network commissioning and troubleshooting

Flexibility to analyze WDM, EDFA, drift, spectral transmittance, and Fabry-Perot and DFB laser

Large 10-inch display on the FTB-2 Platform

EXFO Connect-compatible: automated asset management

Offers EXFO TFv—Test Function Virtualization, including FTB OnDemand time-based licenses

## PLATFORM COMPATIBILITY



Platform  
FTB-500



Platform  
FTB-2 or FTB-2 Pro



## OSNR MEASUREMENTS UP TO POL-MUX 40G/100G/200G

OSNR has long been recognized as a key performance indicator in wavelength-division multiplexing (WDM) networks, because it provides a multichannel assessment of signal quality in a very short time. In addition, OSNR can predict bit error rate (BER) within just a few minutes, while typical BER tests must run for hours or days.

The IEC 61280-2-9 standard defines OSNR measurement as the power ratio between the signal power and the noise at half the distance between the peaks. However, in ROADM or 40 Gbit/s systems, this method may lead to incorrect results, because the noise level between the peaks is no longer directly correlated with the noise level at the channel wavelength. EXFO's in-band OSNR is the answer to this challenge.

**WDM AWARE™**  
POL-MUX TECHNOLOGY

For Pol-Mux signals at 40G, 100G and 200G, neither the IEC nor the in-band method work. This calls for a new measurement method: Pol-Mux OSNR.

## FIRST POL-MUX OSA IN THE MARKET

EXFO's Pol-Mux OSA is the first third-party instrument for Pol-Mux OSNR measurements that is not limited to any specific system vendor. The new commissioning assistant, which is the key feature of the new Pol-Mux OSA, is perfect for Pol-Mux OSNR measurements during turn-up. Based on the channel shutdown method, it provides highly accurate amplified spontaneous emission (ASE) OSNR measurements.

The commissioning assistant can be utilized after the user has first taken a measurement at the receiver with all of the channels turned on, and then acquired a series of traces, each taken with one channel turned off. The Pol-Mux OSA then performs the Pol-Mux OSNR calculations via a user-friendly wizard.

The commissioning assistant therefore greatly accelerates OSNR measurements based on the channel shutdown method, and drastically reduces potential human errors. In addition, two standards-compliant calculation approaches are available in the commissioning assistant: one compliant with the IEC-61282-12 standard, and the other compliant with the China Communications Standards Association (CCSA) method YD/T 2147-2010.

## WDM-AWARE TECHNOLOGY

- › Intelligent setup and analysis on a per-channel basis based on the bit rate, modulation scheme, as well as the network configuration experienced by the wavelength (ROADM, filters, etc.)
- › First time right: no guesswork, which eliminates truck rolls
- › Training time is significantly reduced as this ready-to-go unit can be taken directly into the field for the live EXFO DWDM experience
- › Most accurate and adaptive in-band method on the market

**WDM AWARE™**  
IN-BAND TECHNOLOGY

## ANALYZE ANY WDM NETWORK

The FTB-5240S and FTB-5240BP Optical Spectrum Analyzer (OSA) series covers your DWDM applications and all channel spacings, from 25 GHz DWDM to CWDM. This is what we call "no-compromise performance," whatever your network specificities and testing requirements.





## POWERFUL PLATFORMS, POWERFUL COMBO

The FTB-5240S OSA test module can be housed in either the FTB-500, FTB-2 or FTB-2 Pro platforms. The FTB-2 Pro is the most compact high-speed deployment and multiservice testing solution to deliver all the tools needed for maximum field efficiency on the market today. The platform boasts a 10-inch, high-resolution, widescreen display that clearly shows the details of complex multichannel DWDM traces acquired with the OSA. It operates on the latest Microsoft Windows 8.1 Pro OS, and is EXFO Connect compatible.

When equipped with the Pol-Mux OSNR option, this versatile OSA can also be combined with the FTB-88100NGE Power Blazer module (a 100G SONET, SDH, OTN and Ethernet tester), housed in the FTB-500 platform, creating a unique test solution for commissioning 40G/100G circuits.

## IMPAIRMENT IDENTIFICATION FOR FASTER TROUBLESHOOTING

Operators want to reduce their OPEX, yet WDM networks are becoming increasingly complex, with new technologies being deployed (tighter channel spacing, polarization-multiplexed signals, etc.) that increase the number of potential causes for failure. While past impairment types were relatively few and well-known (excessive loss, high dispersion, excessive ASE noise, etc.), these newly deployed technologies give rise to previously uncommon impairments, such as crosstalk and nonlinear effects. As such, telecommunications companies need to find ways to identify these impairments and their impact on signal degradation.

This is now possible with EXFO's WDM Investigator, which provides detailed information about the signal and noise for each channel. This efficient impairment identification makes it possible to pinpoint the defective component more rapidly, thus decreasing troubleshooting time and OPEX. The WDM Investigator provides information on link characteristics, such as the presence of polarization-multiplexed signals or the presence of carved noise due to filters or ROADMs. It also checks the presence of several types of impairments (crosstalk, nonlinear effects, carrier leakage and PMD pulse spreading), and gives an assessment of their severity (OK, warning, risk).



## PAYBACK IN JUST A FEW TICKETS

A single unsuccessful troubleshooting ticket can cost astronomical amounts. Each truck roll costs approximately \$200 to \$300 per hour for the truck, equipment and technician alone. Replacing the wrong 40G transmitter card will amount to another \$10 000 or more, and service-level-agreement (SLA) penalties, which can take effect as early as one hour after failure of business services, cost around \$10 000 per hour, per channel. Add it all up, and a single troubleshooting ticket can cost between \$20 000 and \$30 000. The WDM Investigator helps avoid lengthy troubleshooting, and pays for itself in just a few tickets.

## POWERFUL FEATURES FOR SIMPLE NETWORK TESTING

The application software of the FTB-5240S/BP OSAs has been designed to optimize all testing operations—boosting productivity.



### Favorites Button

The Favorites button enables direct access to your defined configuration list—right in the field.

### Referencing

Deploy and commission your network right from day one. Then, as maintenance, upgrades and troubleshooting occur, compare the latest measurement with the original ones. Rapidly and directly see all changes, those made on purpose and otherwise.



### SCPI Commands

It is now possible to control the OSA remotely with a full-featured WDM mode SCPI command set.



### Print to PDF

Generate a PDF report directly from the unit, making it much quicker and easier to convert reports into an e-mail-friendly format.

### Drift Measurements

You can monitor power, wavelengths and OSNR over time. You can also visualize the current and historical status of all channels in a single interface called drift dashboard, which enables you to view the WDM trace of any acquisition that displays a change of state (i.e., when a threshold is crossed). You can also build a drift trace from a past DWDM acquisition.



### Advanced EDFA Analysis

Since amplifiers are critical elements in all networks, it is crucial to ensure that they are optimized, that the gain is well-distributed and that the output power is flat. Now, you can further optimize EDFAs by measuring key parameters, such as gain per channel, noise figure, gain flatness and gain slope. More importantly, you can save and print this valuable information.



### Accurate Spectral Transmittance

With the advent of larger spectral content through the implementation of 40G and 100G, knowing the bandwidth of a given filter as well as the residual network bandwidth guarantees proper transmission. The Spectral Transmittance software feature compares the filtered wavelength to the nominal one, showing insertion loss, channel isolation and bandwidth at different power levels.



### Laser Analysis

Make sure that your transmitters are within specifications. With the DFB Laser Analysis feature, you can characterize a DFB laser source for central wavelength, peak power, bandwidth, SMSR, and much more. Automatically characterize Fabry-Perot lasers for central wavelength, RMS width and full-width half-max (FWHM).



**FTB-2 PRO**  
**COMPACT PLATFORM**  
**FOR HIGH-SPEED AND**  
**MULTISERVICE TESTING**



**FTB-500**  
**BOUNDLESS.**  
**CAPABILITIES.**  
**TESTING UNLIMITED.**

| WINDOWS ENVIRONMENT | MODULARITY | BUILT-IN APPLICATIONS | THIRD-PARTY APPLICATIONS |  
 | TOUCHSCREEN | FIELD-MINDED RUGGEDNESS | WIRELESS CONNECTIVITY | USB | WI-FI | BLUETOOTH |

**Note**  
 Advanced features available as options on the FTB-2 and FTB-2 Pro platforms.





**EXFO TFv**  
Test Function Virtualization

## TIME-BASED SOFTWARE LICENSES WITH FTB OnDEMAND

Part of EXFO Test Function Virtualization—TFv, FTB OnDemand enables customers to activate a specific software option for a specific period of time, on a specific module. This flexibility is perfect for situations where a test function is only needed for a specific project or to try a software option before purchase. This new solution reduces costs and increases business efficiency while providing greater flexibility. WDM Investigator and Commissioning Assistant options are available through FTB OnDemand.

## EXFO | Connect **AUTOMATED ASSET MANAGEMENT. PUSH TEST DATA IN THE CLOUD. GET CONNECTED.**

EXFO Connect pushes and stores test equipment and test data content automatically in the cloud, allowing you to streamline test operation from build-out to maintenance.

## SOFTWARE TEST TOOLS

This series of platform-based software testing tools enhance the value of the FTB-2 Platform, providing additional testing capabilities without the need for additional modules or units.

### SOFTWARE APPLICATIONS

**ConnectorMax2**

Providing lightning-fast results in the first step of fiber-link testing, ConnectorMax2 is the industry's first platform-based, automated inspection application; it delivers quick pass/fail assessment of connector endfaces and is specifically designed to save both time and money in the field.

**FastReporter2**  
EFFICIENT POST-PROCESSING SOFTWARE

Consolidated data management and post-processing tool designed to increase reporting productivity for connector endface inspection and all types of optical-layer testing: optical link mapper (iOLM), OTDR, ORL, loss, PMD and chromatic dispersion (CD).

## SPECIFICATIONS<sup>a</sup>

SPECTRAL MEASUREMENT		
	FTB-5240S and FTB-5240S-P	FTB-5240BP
Wavelength range (nm)	1250 to 1650	1250 to 1650
Wavelength uncertainty (nm) <sup>b</sup>	±0.05 ±0.01 <sup>c, d</sup>	±0.03 ±0.01 <sup>c, d</sup>
Reference	Internal <sup>e</sup>	Internal
Resolution bandwidth (FWHM) (nm) <sup>f</sup>	0.065 <sup>b, d</sup>	0.033 <sup>b, d</sup>
Wavelength linearity (nm)	±0.01 <sup>b, d</sup>	±0.01 <sup>b, d</sup>
Wavelength repeatability 2σ (nm)	±0.003 <sup>g</sup>	±0.002 <sup>g</sup>

POWER MEASUREMENT			
	FTB-5240S and FTB-5240S-P	FTB-5240BP	HPW Option
Dynamic range (dBm) (per channel) <sup>b</sup>	-80 <sup>h</sup> to 18	-80 <sup>h</sup> to 18	-70 <sup>h</sup> to 23
Maximum total safe power (dBm)	23	23	29
Absolute power uncertainty (dB) <sup>i</sup>	±0.5	±0.5	±0.5
Power repeatability 2σ (dB) <sup>d, g</sup>	±0.05	±0.04	±0.05

OPTICAL MEASUREMENT			
	FTB-5240S and FTB-5240S-P	FTB-5240BP	HPW Option
Optical rejection ratio at 1550 nm (dB) at 0.2 nm (25 GHz) at 0.4 nm (50 GHz)	35 (40 typical) 45 (50 typical)	45 (50 typical) 50 (55 typical)	35 (40 typical) 45 (50 typical)
Channel spacing	25 to 200 GHz CWDM	12.5 to 200 GHz CWDM	25 to 200 GHz CWDM
PDL at 1550 nm (dB)	±0.08 <sup>d</sup>	±0.06 <sup>d</sup>	
ORL (dB)	≥40	≥40	
Measurement time (s) <sup>d, j</sup> (includes scanning, analysis and display)	<1 (with the FTB-500 Platform)	<1 (with the FTB-500 Platform)	

IN-BAND OSNR MEASUREMENT <sup>d, k</sup>		
	FTB-5240S-P only	FTB-5240BP
OSNR dynamic range (dB)	>35 <sup>l</sup>	>35 <sup>l</sup>
OSNR measurement uncertainty (dB)	±0.5 <sup>m</sup>	±0.5 <sup>m</sup>
Repeatability (dB)	±0.2 <sup>n</sup>	±0.2 <sup>n</sup>
Data signals	Up to 100 Gbit/s <sup>o</sup>	Up to 100 Gbit/s <sup>o</sup>
Measurement time (s) <sup>d, j</sup> (includes scanning, analysis and display)	<6 (eight scans)	<6 (eight scans)
Analysis modes	WDM, EDFA, drift, spectral transmittance, DFB, BP	WDM, EDFA, drift, spectral transmittance, DFB

### Notes

- a. All specifications are for a temperature of 23 °C ± 2 °C with an FC/UPC connector unless otherwise specified, after warm-up.
- b. From 1520 to 1610 nm.
- c. After user calibration in the same test session within 10 nm from each calibration point.
- d. Typical.
- e. Integrated and wavelength-independent self-adjustment.
- f. Full width at half maximum.
- g. Over one minute in continuous acquisition mode.
- h. With averaging.
- i. At 1550 nm, -10 dBm input.
- j. 45 nm span, full resolution, 20 peak analysis.

- k. In-band OSNR measurement performed with 64 scans.
- l. For an optical noise level of > -60 dBm.
- m. With PMD ≤ 15 ps and no crosstalk, uncertainty specification is valid for OSNR ≤ 25 dB. With PMD ≤ 15 ps and crosstalk, uncertainty specification is valid for OSNR ≤ 20 dB.
- n. Repeatability specification is valid for OSNR ≤ 25 dB.
- o. Except for Pol-Mux and fast polarization scrambled signals.

POL-MUX OSNR MEASUREMENT	
<b>Commissioning assistant<sup>a</sup></b>	
Modulation formats	Any, including all coherent/Pol-Mux formats like DP-QPSK, DP-BPSK, DP-8-QAM, DP-16-QAM, DP-64-QAM, etc.
Data signals	Up to 400 Gbit/s
Measurements time <sup>b, c</sup>	1 minute and 20 seconds (100 scans) for trace with all channels on. <5 seconds for traces with a single channel off.

GENERAL SPECIFICATIONS		
Temperature	operating storage	0 °C to 40 °C (32 °F to 104 °F) -20 °C to 50 °C (-4 °F to 120 °F)
Relative humidity		0 % to 95 % noncondensing
Battery life (hours)		5 (with the FTB-500 Platform)
Connectors		EI (EXFO UPC Universal Interface) EA (EXFO APC Universal Interface)
Size (H x W x D)	FTB-5240S module FTB-5240BP module	96 mm x 51 mm x 260 mm (3 3/4 in x 2 in x 10 1/4 in) 96 mm x 76 mm x 260 mm (3 3/4 in x 3 in x 10 1/4 in)
Weight	FTB-5240S module FTB-5240BP module	1.5 kg (3.3 lb) 1.7 kg (3.8 lb)

SELECTION GUIDE				
OSA Module	CWDM	DWDM (100 GHz spacing)	DWDM (50 GHz spacing)	ROADM + 40 Gbit/s network
FTB-5240S	X	X	X	
FTB-5240S-P	X	X	X	X
FTB-5240BP	X	X	X	X

LASER SAFETY
Class 1 laser product

**Notes**  
 a. Data acquisition and analysis available on FTB-500 and FTB-2.  
 b. Typical.  
 c. 1525 nm to 1570 nm.



**ORDERING INFORMATION**

**FTB-5240S-XX-XX-XX**

**Model**

FTB-5240S = Optical spectrum analyzer  
 FTB-5240S-P = Optical spectrum analyzer with polarization controller  
 FTB-5240S-HPW = Optical spectrum analyzer with high-power option  
 FTB-5240S-P-HPW = Optical spectrum analyzer with polarization controller and high-power option

**Connector adapter \***

EI-EUI-28 = UPC/DIN 47256  
 EI-EUI-76 = UPC/HMS-10/AG  
 EI-EUI-89 = UPC/FC narrow key  
 EI-EUI-90 = UPC/ST  
 EI-EUI-91 = UPC/SC  
 EI-EUI-95 = UPC/E-2000  
 EI-EUI-98 = UPC/LC  
 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

**Software option**

00 = Without software option  
 Adv = Enables advanced measurement mode <sup>a</sup>  
 InB = Enables the in-band OSNR option <sup>b</sup>  
 Inv = Enables the WDM Investigator option <sup>b, c</sup>  
 Com = Enables the commissioning assistant option <sup>b</sup>

Example: FTB-5240S-P-HPW-EI-EUI-89-InB  
 \* EXFO Universal Interface is protected by US patent 6,612,750.

**FTB-5240BP-XX-XX**

**Model**

FTB-5240BP = High resolution optical spectrum analyzer

**Connector adapter \***

EI-EUI-28 = UPC/DIN 47256  
 EI-EUI-76 = UPC/HMS-10/AG  
 EI-EUI-89 = UPC/FC narrow key  
 EI-EUI-90 = UPC/ST  
 EI-EUI-91 = UPC/SC  
 EI-EUI-95 = UPC/E-2000  
 EI-EUI-98 = UPC/LC  
 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

**Software option**

Adv = Enables advanced measurement mode <sup>d</sup>  
 InB = Enables the in-band OSNR option <sup>d</sup>  
 Inv = Enables the WDM Investigator option <sup>c</sup>  
 Com = Enables the commissioning assistant option

Example: FTB-5240BP-EI-EUI-89-Adv-InB-Inv

**Notes**

- a. Available with the FTB-2 and FTB-2 Pro platforms. Included in FTB-500 platforms.
- b. Available with FTB-5240S-P and FTB-5240S-P-HPW only.
- c. Available only if InB is enabled.
- d. Always included.

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