Optical Spectrum Analyzer

IQS-5250B

- Optical rejection of 45 dBc at ± 25 GHz
- Resolution bandwidth of 33 pm in the C+L-band
- Wavelength accuracy of ± 15 pm
- Range of 950 nm to 1650 nm
- Internal wavelength referencing
- Patented design

Fiber-optic test, measurement, monitoring and automation solutions

EXFO

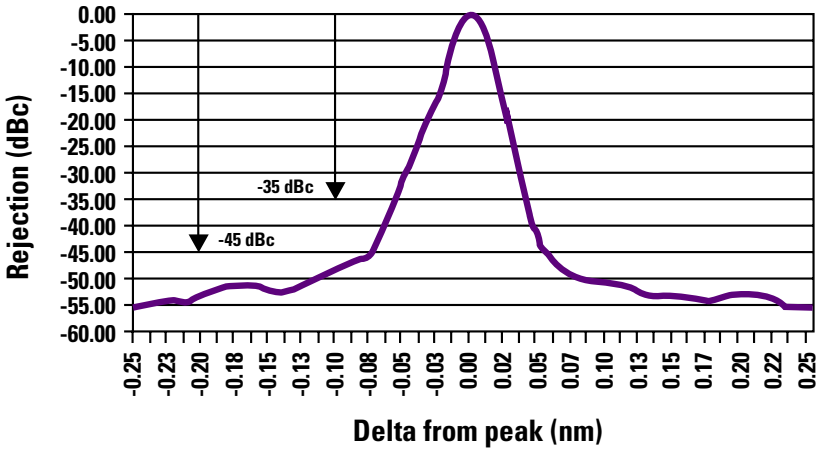
An Efficient Measurement Solution

To achieve maximum efficiency in your manufacturing environment, EXFO created the IQS-5250B* Optical Spectrum Analyzer (OSA). This next-generation OSA delivers true spectral distribution of CW and modulated signals. Measurement of signal-to-noise ratio (SNR) and sidemode depth profile can now be performed accurately, even when characterizing very closely spaced peaks. This innovative OSA design meets all testing requirements for systems and components with 50 GHz spacing. The IQS-5250B* OSA is an efficient three-slot module for the IQS-500 Intelligent Test System, only from EXFO.

Choose the IQS-OSA combo, which combines IQS-505P Controller advantages with IQS-5250B performance.

Key Features

- Modular integration with the IQS-500 Intelligent Test System
- Multipeak or multiple-absorption line user-calibration for enhanced wavelength accuracy
- Standard in situ reference source and automatic referencing in the C+L band
- Advanced software features, including trace comparison and automated analysis



Typical response of the IQS-5250B's double-pass monochromator design. Values indicate guaranteed rejection level at positions 0.1 nm and 0.2 nm from a strong signal.

* United States Patent No. 6,636,306 and equivalent in other countries

Boost Throughput on the Production Floor

Obtain high-resolution and high-sensitivity scans without the wait. The IQS-5250B OSA can measure and analyze 4000 data points over a 10 nm range in about 850 ms.

To optimize speed and sensitivity as a function of power level expected, select a detection range from six different possibilities. Choose the highest sensitivity range to get fast, sensitive readings. Ideal for alignment purposes where initial signal power may be very low; its sensitvity enables you to use this versatile OSA almost like a power meter or as a feedback signal. For the largest range selection, obtain the full dynamic range of the OSA (+15 dBm down to –75 dBm) in only a few seconds.

High Resolution for Dense Signal Analysis

With 33 pm (or ~4.5 GHz) resolution bandwidth defined as the FWHM of the OSA filter shape, the instrument can analyze all densely spaced signals, including important 50 GHz ITU-grid WDM signals, high-speed modulated lasers or emitters and DWDM passive components, which are critical for today's networks.

Combined with a very sharp rejection ratio (–35 dBc at 0.1 nm), the optical signal-to-noise ratio (OSNR) and modulated band profile can be measured with high accuracy.

To ensure accurate noise and broad signal power measurements, the noise equivalent bandwidth (NEB) of the OSA is calibrated at many points from 950 nm to 1650 nm.

Top-of-the-Line Wavelength Accuracy

The IQS-5250B performs a wavelength auto-calibration on request to ensure long-term accuracy over the entire C+L-band. The OSA auto-calibration is performed against an internal reference source that emits light at a precise wavelength within the C+L-band. This internal referencing ensures long-term wavelength uncertainty of ± 30 pm.

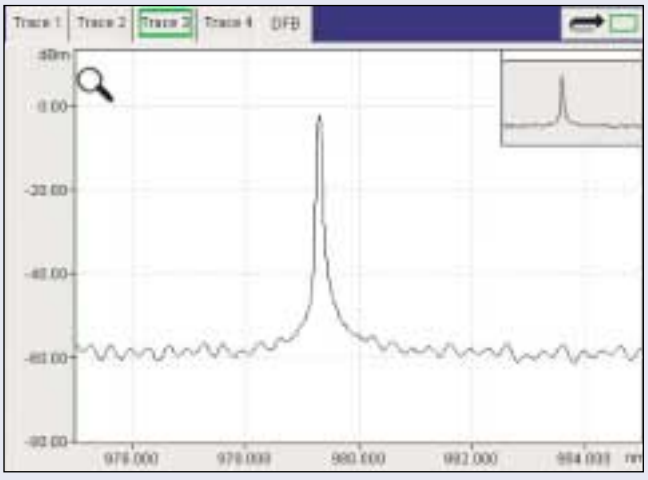
External user calibrations can be performed through a specific calibration menu in the easy-to-use software, minimizing wavelength uncertainty within a given working session. A user calibration performed with a tunable laser or DFB, or with a broadband LED illuminating traceable gas cell absorption lines, will ensure an uncertainty of less than ± 15 pm over the entire C+L-band. Calibrate with the instrument set you prefer. The OSA grating rotates on a no-gear DC motor, upon which is placed a high-resolution encoder that samples data points every 2.5 pm.

Calibration Features

- Standard, internal, hands-free wavelength calibration
- Peak or absorption line user calibration
- Revert to factory calibration at any time

Optimized Specifications at 980 nm

The IQS-5250B was designed to improve performance in the critical 980 nm range. Resolution bandwidth was lowered to less than 70 pm without affecting performance in the C+L-band. Backreflectance was significantly reduced compared to most OSAs on the market. The IQS-5250B OSA features excellent repeatability (a few hundredths of a dB) and sensitivity as low as –70 dBm, making it an ideal tool for accurate measurement of optical pumps, wavelength stabilizers, WDM filters and 980 nm components.



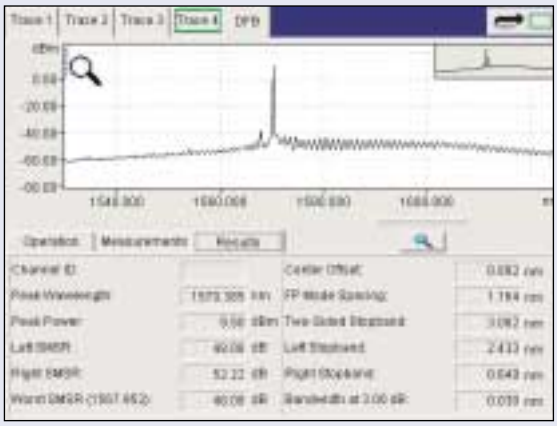
External cavity 980 nm laser spectrum showing high resolution and sharp response.

Powerful Software, In-Depth Analysis

From the main menu, select Active Automated Test and choose the parameters you want to display in the results window.

DFB Testing

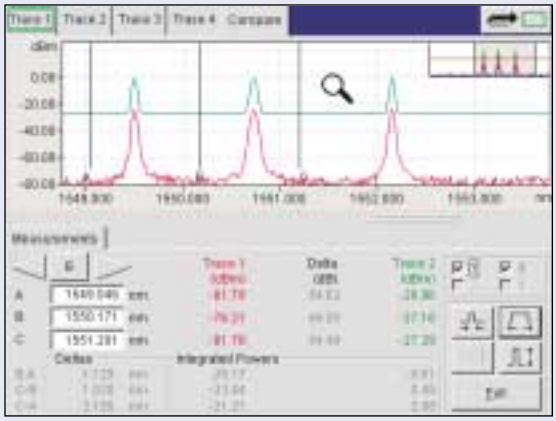
Calculate important parameters for characterizing distributed feedback (DFB) devices or others with similar functions to DFB, such as DBR. In addition, obtain up to four traces of the same DFB, under different electrical current or temperature operating conditions, providing powerful analysis sessions. Also, define the depth at which bandwidth (DFB signal width) is measured.



Analysis of the DFB signal acquired in trace 4. The Measurements tab gives access to functions such as power between markers. Eleven parameters can be measured. Results can be saved as an ASCII file or retrieved through the GPIB bus or using ActiveX commands.

Trace Comparison

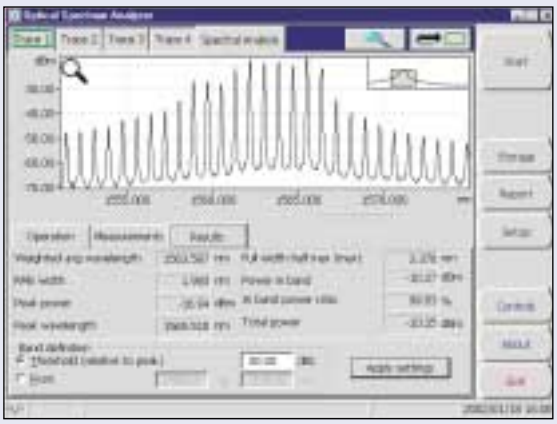
Select the Compare function to compare up to four different traces from any device (GFF, Bragg grating filter or TFF transmission curve, DFB, Fabry-Perot, LED or ASE profile), then display the traces simultaneously in the Application tab. Select two traces and use markers to analytically compare power differences between points measured on each curve.



The Compare function allows you to display up to 4 traces. Two traces can be compared using markers for integrated power, power levels and more.

Generic and Multimode (Fabry-Perot) Spectral Analysis

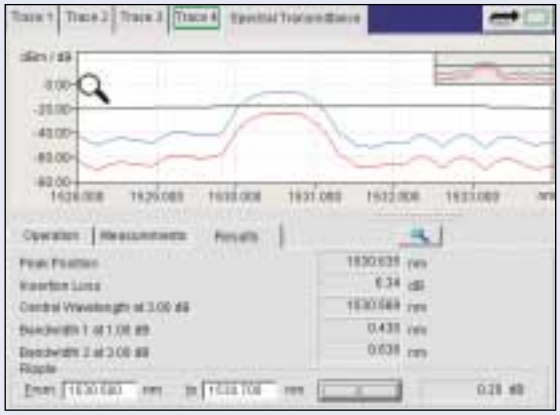
Acquire a signal from a modulated laser or an LED having a broad, non-uniform distribution and measure its fundamental characteristics such as central wavelength, RMS width and FWHM. The test also offers a more specific calculation allowing the characterization of Fabry-Perot laser diodes or equivalent, such as VCSELs. The latter specifically measures spectrum properties from the multiple mode intensities of a distribution Fabry-Perot.



Automatic calculation of most common spectral characteristics. Above—a calculation based on power underneath the trace.

Spectral Transmittance

Select any reference trace (usually a broadband signal) and acquire the signal transmitted through a filtering device and automatically calculate insertion loss characteristics such as central wavelength, ripple and other relevant parameters.



The spectral transmittance test allows passive component transmission (loss) analysis, providing full passband filter characterization. Change different bandwidth levels and re-analyze data without acquiring a new trace. Save results and trace together in an ASCII format (.txt) file for export into Microsoft® Excel or other applications.

Drift Analysis

The OSA software measures, displays and reports time-varying, multiwavelength signal power, wavelength and OSNR. Up to 200 channels can be acquired simultaneously.

Wavelength, peak power and the OSNR of composite WDM peaks can be followed with time. The software features alarm, width definition and visual faults, as well as simultaneous display and analysis of two parameters. Scroll from peak to peak with the button arrow.

Expand Your Test Options

Markers, Peak/Dip Search, Auto-Zooming

Program the three vertical markers to relocate at specified wavelengths. These markers allow you to better define and measure peak properties such as central wavelength, FWHM and OSNR. They can also be used to measure the total power between two wavelengths.

The measurement tab allows the selection of standard marker point-to-point displacement, peak-to-peak or absorption line-to-absorption line, either right or left.

Click on the magnifier icon to automatically zoom into the nearest peak event. The software automatically sets the three markers so that peak analysis can be performed faster.

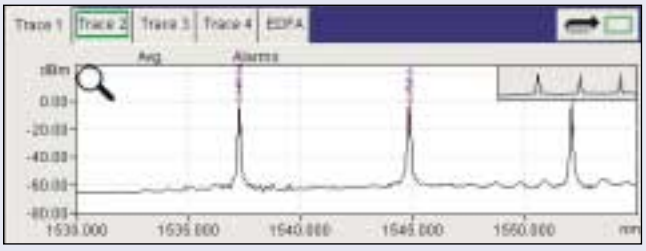
Efficient User Interfaces

Trace Storage

True efficiency is achieved when both hardware and software are designed to decrease time spent in the manufacturing process.

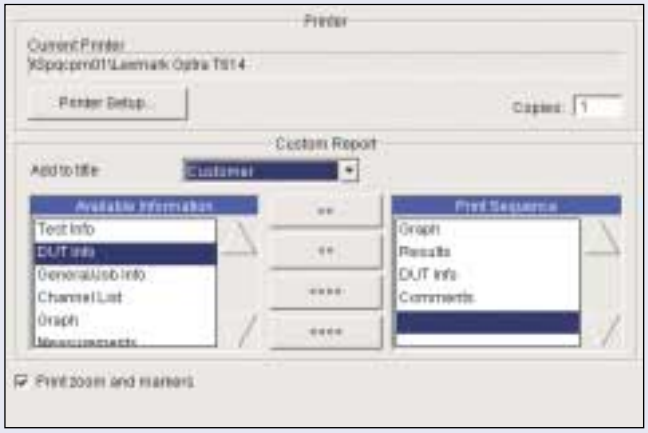
Simplified trace management allows for quick, easy storage of active display trace anywhere on the IQS-510 or network according to your preferred configuration. Traces can be saved and recalled in a proprietary format or as an ASCII file for export into Microsoft® Excel or similar programs.

Acquire, visualize and analyze up to four traces simultaneously without any complex menus.



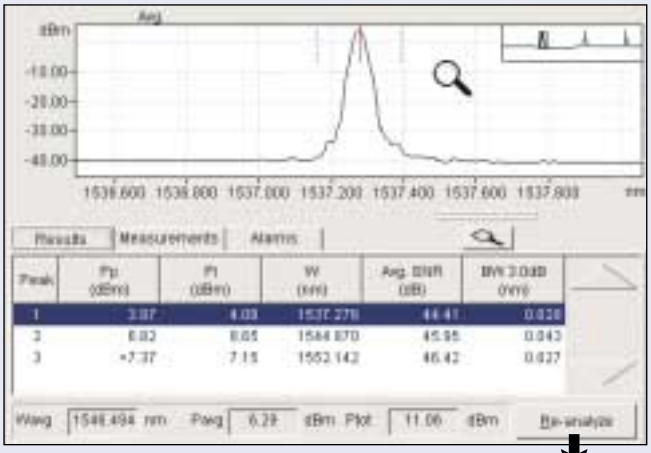
Click on the green button on the right to change the incoming trace location. Display any of the four available traces by clicking on the upper tabs. The fifth trace is the application or automated test tab; in this example, it is set to EDFA test.

Customize a print report by quick configuration of its content.



Customize test reports easily. You can choose to print graph and results only, or produce a more extensive report. Select the items you want to print and in which order.

Re-analyze a trace with different settings (thresholds, noise bandwidth, channel widths) without having to acquire a new trace.



Change your analysis settings to measure bandwidth at a different level or OSNR with a different noise bandwidth or measurement point, without taking a new acquisition.

Specifications[1]

Wavelength		
Range (nm)		950 to 1650
Adjustable span		Full to 1 nm
Data point resolution (pm)		2.5
Resolution bandwidth FWHM[2] (pm)		
	1520 nm to 1610 nm	33
	1280 nm to 1330 nm	50
	960 nm to 990 nm	50
Uncertainty (pm)		
	1500 nm to 1610 nm[3]	± 30
	1310 nm	± 40
	965 nm to 990 nm	± 70
	with user calibration[4]	± 15
Linearity (pm)		
	1520 nm to 1610 nm	< ± 15
	965 nm to 990 nm, typical	± 20
Repeatability[5] (pm)		
	1250 nm to 1650 nm	± 2 (Δ = 4)
	950 nm to 1250 nm	± 5 (Δ = 10)
Sweep		
Number of data points		401 to 40001
Sweep time[6] (s)		< 0.85
Power		
Range[7] (dBm)		+15 to −75
	typical	+18 to −75
Maximum safe power[8] (dBm)	typical	25
Absolute uncertainty[9] (dB)		
	1550 nm	± 0.4
	1310 nm	± 0.45
	980 nm	± 0.8
Linearity[10] (dB)		± 0.1
Spectral uniformity (dB)		
	1520 nm to 1610 nm	± 0.13
Repeatability[5] (dB)		
	1520 nm to 1610 nm	± 0.03 (Δ = 0.06)
	950 nm to 1650 nm	± 0.05 (Δ = 0.10)
PDL[11] (dB)	typical	± 0.07
	maximum	± 0.15
Noise-equivalent bandwidth uncertainty (%) (1500 nm to 1610 nm), typical		± 6
Return loss[12] (dB)		> 35
Optical rejection (dBc)		
At 1550 nm		
at 0.8 nm from peak		55
at 0.4 nm from peak		50
at 0.2 nm from peak		45
at 0.1 nm from peak		35
At 1310 nm		
at 0.2 nm from peak		35
At 980 nm		
at 0.4 nm from peak		40
Others		
Trace and results storage formats		ASCII, OSA[13]
Remote control	SCPI commands, LabVIEW™ drivers and COM objects	
Communication interfaces	GPIB, RS-232, Ethernet	

General Specifications

Size (H x W x D)	12.5 cm x 11.2 cm x 28.2 cm	(4 15/16 in x 4 7/16 in x 11 1/8 in)
Module weight	3.1 kg	(6.8 lb)
Operating temperature	10 °C to 40 °C	(50 °F to 104 °F)
Storage temperature	-20 °C to 50 °C	(-4 °F to 122 °F)

Notes

1. Unless otherwise specified, specifications are valid at 23 °C ± 2 °C after one-hour warmup period, for singlemode fiber input at measuring wavelength.
2. Characteristics, guaranteed ≤ 37 pm from 1520 nm to 1605 nm.
3. At any temperature stable to ± 2 °C, in the 20 °C to 30 °C range after a referencing procedure without signal.
4. In the same work session, within the 1500 nm to 1610 nm range, with one calibration point. Outside the 1500 nm to 1610 nm range, specification valid within ± 10 nm from calibration point. Multiple user-calibration points typically improve these figures.
5. For 1 min, in Continuous mode.
6. 10 nm range, with 4001 points over a 40 dB range.
7. High-level valid for single, narrow (less than RBW) peak. Low-level specification typically requires averaging four times on lower scale.
8. Characteristic, up to 15 minutes of continuous applied optical power.
9. Reference power of -10 dBm, for FC/UPC connector type. User offset may be required.
10. For a range of +5 dBm to –50 dBm
11. At 1520 nm, 1550 nm and 1600 nm.
12. Guaranteed value at 1550 nm and 980 nm with singlemode fibers, with UPC and APC module connectors.
13. This is an EXFO file format allowing for data analysis and reporting, using the same application software as for data acquisition.

Ordering Information

Module only

IQS-5250B-XX

Connector

EI-EUI-89 = UPC/FC narrow key
EA-EUI-89 = APC/FC narrow key

Example: IQS-5250B-EA-EUI-89

Module with IQS-505P controller

IQS-OSA-XX

Includes:
- GPIB master/slave card
- Ethernet interface card
- 10 GB hard disk space
- CD-ROM
- PCI slots, 2 USB ports
- LabVIEW drivers, COM Librairies

Example: IQS-OSA-EA-EUI-89

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