

# OSA20

## OPTICAL SPECTRUM ANALYZER



The OSA20 is a fast optical spectrum analyzer based on diffraction grating and designed for both R&D and production environments

### KEY FEATURES

Spectral range: 1250–1700 nm [240 - 176 THz]

Resolution bandwidth: 20 pm [2.5 GHz]

Sweep speed: 2000 nm/s

Wavelength accuracy:  $\pm 10$  pm [1.25 GHz]

Built-in calibration source

Intuitive user interface

12-inch touchscreen

Remote operation: Ethernet, GPIB, USB-B

8 application-oriented analysis modes

Full suite of analysis tools

The OSA20 is the most practical, high performance optical spectrum analyzer (OSA) on the market today. It is the fastest OSA based on diffraction grating that operates in the 1250 to 1700 nm range. Designed around the renowned filter technology, the OSA20 provides a fast, accurate, high dynamic range scan, eliminating compromises of conventional instruments. It is also the first OSA of its type to incorporate a touch sensitive display with multitouch gesture control.

## FAST

The OSA20 is the fastest OSA of its kind with a maximum sweep speed of 2000 nm/s. It uses a fixed monochromator bandwidth of 20 pm and a fixed sampling resolution of 2 pm for all scans. This means every measurement is taken at the highest resolution and the highest accuracy. Sweep speed is determined solely by the choice of the sensitivity level.

The sweep speed defines the sweep time over a user defined span whereas the sweep rate defines the complete sweep cycle over this span. Typical sweep data for a sensitivity level of -60 dBm at center wavelength of 1475 nm (without analysis) is provided below.

SWEEP SPEED			
Sweep/Span at -60 dBm	Sweep time	Sweep rate	# points
Sweep cycle / 1 nm	1.6 ms	110 ms	501
Sweep cycle / 10 nm	14.2 ms	142 ms	5001
Sweep cycle / 100 nm	131 ms	300 ms	50,001
Sweep cycle / 450 nm	640 ms	890 ms	225,001

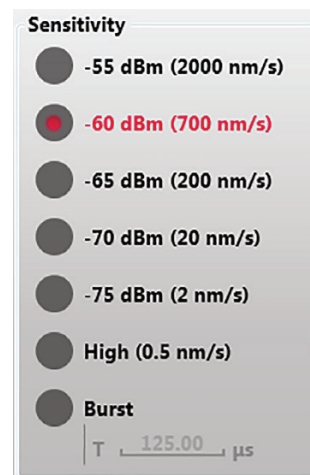


Figure 1. Sweep speed

The burst sensitivity is adapted to burst signals and dedicated to GPON measurements. The duty cycle must be in the range 2-100% with a period between 124 and 2001  $\mu$ s.

## ACCURATE

### Wavelength

The opto-mechanic design of the OSA20 guarantees excellent wavelength repeatability and uniform performance over the full wavelength range from 1250 to 1700 nm. Combined with an internal acetylene gas cell, this provides unparalleled wavelength accuracy.

- › Absolute wavelength accuracy:
  - ›  $\pm 10$  pm over 1500-1640 nm
  - ›  $\pm 25$  pm over 1250-1700 nm
- › Wavelength repeatability:  $\pm 2$  pm

### Monochromator

EXFO filter technology is used to create a monochromator with extremely sharp edges and an extremely low level of stray light. These are key parameters to obtain highly resolved measurements in combination with a high dynamic range. The dynamic range in the vicinity of the filter curve is commonly called optical rejection ratio (ORR).

- › ORR  $\geq 55$  dB beyond  $\pm 0.1$  nm from the peak
- › Stray light suppression ratio  $\geq 73$  dB

In addition to the native bandwidth of around 20 pm, the spectral resolution bandwidth is adjustable. You can select the desired spectral resolution bandwidth:

- › From 50 to 2000 pm with a 1 pm step on the abscissa in nm
- › From 6 to 400 GHz with a 0.1 GHz step on the abscissa in THz

### Optical power

The monochromator optics is achromatic, enabling accurate power measurements over the full wavelength range.

Level/Wavelength Flatness:

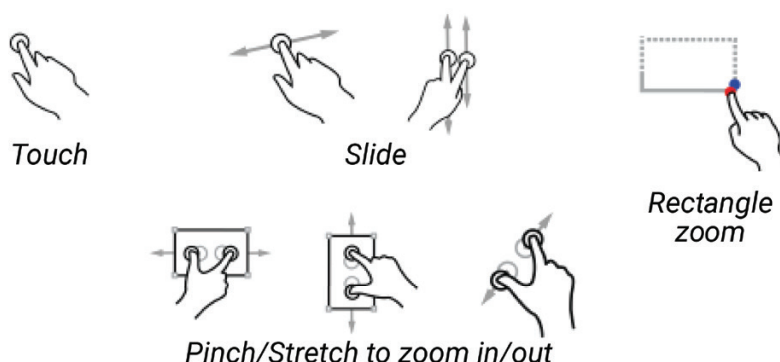
- ›  $\pm 0.15$  dB over 1500-1640 nm
- ›  $\pm 0.25$  dB over 1250-1700 nm

## EASY TO USE

### Multitouch gesture control

The OSA20 is operated through its 12 inch capacitive touchscreen with multitouch gesture control, an industry first. This allows very fast navigation as well as intuitive scrolling and zooming.

Keyboard and mouse control are also available through the USB interfaces.



## EFFICIENT ANALYSIS

### Built-in analysis modes

The OSA20 integrates one general operation mode and various built-in application-oriented analysis modes. Each mode has a full suite of analysis tools.

#### OSA – Optical Spectrum Analyzer (general)

General operation mode containing most of the analysis tools available on the OSA20.

#### WDM – Wavelength Division Multiplexing

This mode is for transmission system analysis: characterization of WDM signals such as Coarse WDM, Dense WDM and ROADMs.

#### MML – Multimode Laser

Characterization of Multiple-Longitudinal Model lasers, such as Fabry-Perot laser diodes.

#### RLT – Recirculating Loop Transmission

This mode is a special version of WDM that takes into account long distance transmission system analysis with a recirculating loop.

#### OFA – Optical Fiber Amplifier

Characterization of Optical Fiber Amplifiers such as Erbium Doped Fiber Amplifier.

#### SML – Single Mode Laser

Characterization of single mode lasers such as distributed feedback Bragg laser diodes and external cavity lasers.

#### BBS – Broadband Source

Characterization of Broad Band Sources such as Semiconductor, Raman or Fiber Optical Amplifiers and superluminescent or Edge-Emitting LED.

#### PCT – Passive Component Tester

Characterization of passive components such as optical filters, isolators or fibers.

## FUNCTIONS

Scan measurement	Autoset, Single, Continuous Manual or Triggered scan Sensitivity from -75 dBm to -55 dBm, with an additional sensitivity level dedicated to burst signals Adjustable resolution bandwidth
Traces	8 traces Traces types: Store, Live, Average, Rolling Average, Hold Min/Max, Calculate (+ and - lin and - log) Commands: save, load, copy, paste, display/hide
Analysis parameters	Auto analysis, noise level, analysis on a selected area of the graph
Analysis tools	Peak Trough Search, Spectral Width, xdB Width, $\lambda$ mean, $\lambda$ peak, $\lambda$ center and $\sigma$ , FWHM, Side Modes Spacing, Notch Width, SMSR, OSNR, Ripple, Optical Power, Peak Power Density, Channel Detection, Loss Measurements, Pass Band Test, Stop Band Test
Graph display	4 markers Multiple zoom commands and graphical display items
Data handling	Saving/loading: settings, analysis results, screenshots Commands: save, load, copy, paste 2 GB storage on internal drive
Other	Autocalibration, remote control

## MODERN INTERFACE

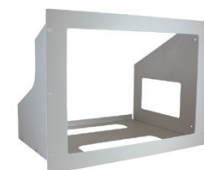
The connectors are located on the right panel of the instrument for easy access.

- › To connect devices such as keyboard and mouse, a USB key or disk to export your measurement results, or an external multi-touch screen:  
2 USB 3.0-A ports and 4 USB 2.0-A ports (2 on the front panel)
- › To remotely control the instrument: 1 USB 2.0-B port, 1 GPIB port and 2 Ethernet ports
- › To connect an external screen: you can choose from HDMI, DVI or VGA
- › To synchronize scans with a signal: Trigger In and Out connectors

### Rackmount kit

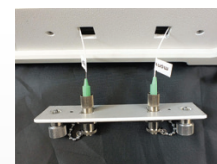
EXFO has designed a special rackmount that enables integrating the OSA20 into a test system for manufacturing. It is a self-supporting assembly of 19 inch width and 8U height.

The kit can be ordered in addition to the OSA20.



### Connector cleaning

To maintain the lowest losses and easy maintenance, optical connectors are mounted on a plate that you can unscrew to clean them easily, as shown in the illustration.



## SPECIFICATIONS

Wavelength	Spectral range	1250-1700 nm / 239.834-176.349 THz
	Span range	0.5 nm to full range (450 nm)
	Linearity $2\sigma^a$	$\pm 6$ pm over 1500-1640 nm, $\pm 20$ pm over full range
	Accuracy $2\sigma^a$	$\pm 10$ pm over 1500-1640 nm, $\pm 25$ pm over full range
	Repeatability $2\sigma$	$\pm 2$ pm / 0.25 GHz at 1550 nm
	Sampling resolution	2 pm / 0.25 GHz at 1550 nm
	Sampling points	251 (span of 0.5 nm) to 225,001 (span of 450 nm)
	Reference	Built-in ELED (safety class 1) + Acetylene cell (user calibration by patchcord)
Monochromator	Resolution bandwidth <sup>b, c, d</sup>	20 pm native (20 pm = 2.5 GHz), adjustable over 50–2000 pm with 1 pm step
	Dynamic range (ORR) <sup>e</sup>	$\geq 30$ dB ( $> 35$ dB typ.) beyond $\pm 50$ pm from peak $\geq 50$ dB ( $> 55$ dB typ.) beyond $\pm 100$ pm from peak $\geq 60$ dB ( $> 63$ dB typ.) beyond $\pm 200$ pm from peak
	Stray light suppression ratio <sup>f</sup>	$\geq 73$ dB
Optical power	Input power per channel	$\leq 20$ dBm
	Total safe power	$\leq 25$ dBm
	single scan	High (0.5 nm/s): $< -76$ dBm ( $-78$ dBm typ.)
	Level sensitivity <sup>g</sup> with averaging (Avg Nb of scans) <sup>h</sup>	High (0.5 nm/s): $-80$ dBm (Avg 3), $-85$ dBm (Avg 30), $-90$ dBm (Avg 380) $-75$ dBm (2 nm/s): $-80$ dBm (Avg 7), $-85$ dBm (Avg 70), $-90$ dBm (Avg 800)
	Absolute level accuracy <sup>a, i</sup>	$\pm 0.4$ dB at 1310 nm and 1550 nm
	Level linearity <sup>j</sup>	$\pm 0.07$ dB over the full range (input level $-50$ to $+3$ dBm)
	Level/wavelength flatness <sup>k</sup>	$\pm 0.15$ dB over 1500-1640 nm, $\pm 0.25$ dB over 1260-1680 nm
	Level sampling	$\pm 0.01$ dB over $-60$ to $+20$ dBm
Sweep speed	Sensitivity <sup>g</sup>	$-55$ dBm at 2000 nm/s to $-75$ dBm at 2 nm/s
	Sweep cycle/100 nm <sup>l</sup>	300 ms typ.
	Sampling rate	1 MHz typ.
Optical interfaces	Optical input	SMF-28 type fiber
	Calibration output	Wavelength reference (see above)
	Connector of input and output	FC/APC or FC/PC or SC/APC or SC/PC
	Return loss	$> 38$ dB ( $> 42$ dB typ.) at 1310 nm and at 1550 nm (APC connector)

## Notes

- a. After user calibration performed after 1 hour warm-up time.
- b. Native 17-24 pm over 1500-1620 nm (except in  $-55$  dBm sensitivity), 17-26 pm over 1250-1700 nm.
- c. Adjustable resolution bandwidth is calculated from the native bandwidth.
- d. Adjustable over 6-400 GHz with 0.1 GHz step on the abscissa in THz.
- e. HeNe laser at 1523 nm with  $\pm 2$  nm span.
- f. Laser at 1523 nm with  $\pm 50$  nm span, excluding  $\pm 2$  nm around peak.
- g. Noise level of 99 % of all data points over 1520-1620 nm.
- h. Typical values.
- i. Over 18-28°C all sensitivity settings except  $\pm 0.6$  dB in  $-55$  dBm and burst sensitivities.
- j. Measured at 1310 nm and 1500 nm, except  $\pm 0.3$  dB in  $-55$  dBm and burst sensitivities.
- k. Except  $\pm 0.35$  dB in  $-55$  dBm and burst sensitivities, except for water absorption lines, over 18°C-28°C all sensitivity settings.
- l. Sweep cycle / 100 nm at  $-60$  dBm sensitivity at center wavelength of 1475 nm.

## GENERAL SPECIFICATIONS

Environmental	Operating temperature	5 °C to 35 °C (41 °F to 95 °F)
	Performance guaranteed temperature	18 °C to 28 °C (64 °F to 82 °F)
	Storage temperature	-10 °C to 50 °C (14 °F to 122 °F)
	Humidity	80 % RH, non condensing
Physical and electrical	Dimensions (W x H x D)	413 mm x 314 mm x 385 mm (16 ¼ po x 12 □ po x 15 □ po)
	Weight	15 kg (33 lb)
	Power supply	48 V DC input, ≤ 75 VA (adapter 100-240 V AC, 50-60 Hz to 48 V DC provided)
	Screen	12 inch capacitive touchscreen (res. 1024 x 768)
External devices	Screen	VGA Port (x1), DVI-D Port (x1), HDMI (x1)
	Others (e.g., mouse, hard disk)	USB 2.0-A (x4), USB 3.0-A (x2)
Remote interface	Ethernet (2x RJ45)	1 Gbit/s max.
	GPIB (1x IEEE 488)	7.2 Mbit/s max.
	USB (1x USB 2.0-B)	115 kbit/s max.
Triggers	In	Start scan (BNC, 5 V TTL), Gate in RLT mode
	Out	Pulse on a user-defined span (BNC, 5 V TTL)
Data storage	Internal	18 GB
	External	FAT32, NTFS
	File types	csv, binary, jpg, png

## ORDERING INFORMATION

OSA20-XX

## Connector

50 = FC/PC  
54 = SC/PC  
58 = FC/APC  
88 = SC/APC

Example: OSA20-58

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