

# OSA20 – Optical Spectrum Analyzer

Spectral Range: 1250–1700 nm

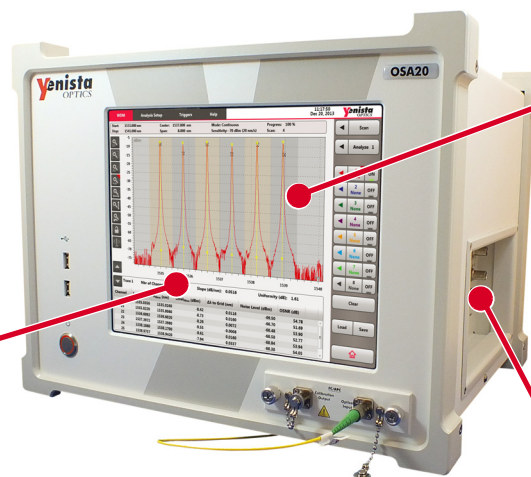
Resolution Bandwidth: 20 pm

## Fast & Accurate

- ▶ Sweep Speed: 2000 nm/s
- ▶ Wavelength Accuracy:  $\pm 10$  pm

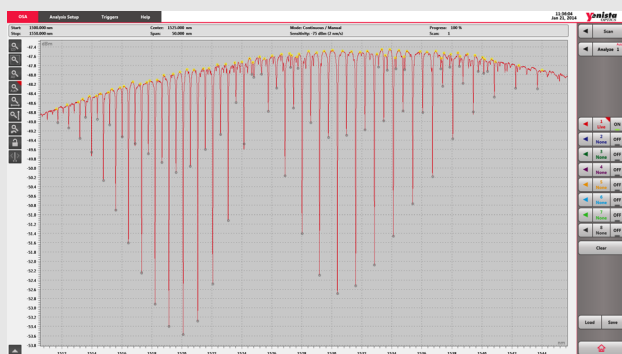
## Easy to Use

12 inch  
Touch-screen



Intuitive User  
Interface

## Efficient Analysis



Gas Cell Analysis

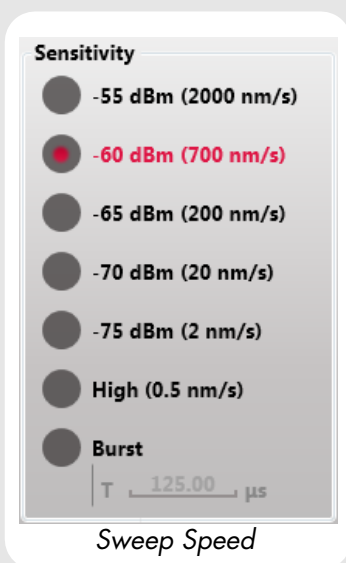
## Modern Interfaces

- ▶ Remote operation:  
Ethernet, GPIB, USB-B
- ▶ External Screen:  
HDMI, DVI, VGA
- ▶ External Devices:  
USB 2.0-A, USB 3.0-A

**Yenista's** OSA20 is the most practical, high performance Optical Spectrum Analyzer on the market today. It is the fastest diffraction-grating based instrument operating from 1250 to 1700 nm. Designed around **Yenista's** renowned filter technology, the OSA20 provides a fast, accurate, high dynamic range scan, eliminating compromises of conventional instruments. It is also the first instrument of its type to incorporate a touch sensitive display with multi-touch 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 / Span @ -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

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 μs.

## Easy to Use

### Multi-touch Gesture Control

The OSA20 is operated through its 12 inch capacitive touch screen with multi-touch gesture control, an industry first. This allows very fast navigation, scrolling and zooming in an intuitive manner.

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

## 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

**Yenista's** renowned 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**

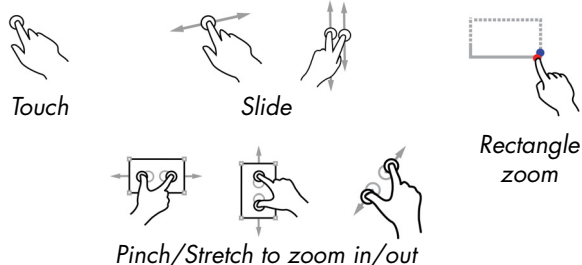
In addition to the native bandwidth of 20 pm, the spectral resolution bandwidth is adjustable. You can select the desired spectral resolution bandwidth:

- **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



# Efficient Analysis

## Built-in Analysis Modes

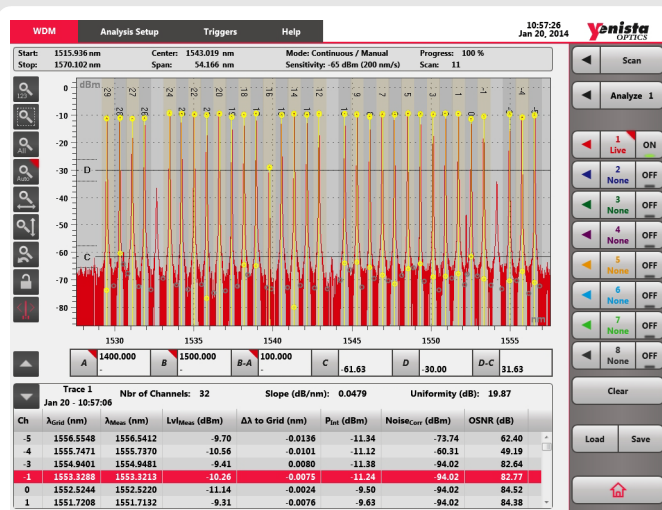
The OSA20 integrates one general operation mode and various built-in application-oriented analysis modes. Each mode has a full suite of analysis tools.

### 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 ROADM.



WDM Analysis Mode Window

### MML – Multimode Laser

Characterization of multi-mode laser sources 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	<ul style="list-style-type: none"> <li>• Auto set, Single, Continuous</li> <li>• Manual or Triggered scan</li> <li>• Sensitivity from -75dBm to -55 dBm, with an additional sensitivity level dedicated to Burst signals</li> <li>• Adjustable resolution bandwidth</li> </ul>
Traces	<ul style="list-style-type: none"> <li>• 8 traces</li> <li>• Traces types: Store, Live, Average, Rolling Average, Hold Min/Max, Calculate (+ and - lin and - log)</li> <li>• Commands: save, load, copy, paste, display/hide</li> </ul>
Analysis parameters	Auto analysis, noise level, analysis on a selected area of the graph
Analysis tools	Peak Trough Search, Spectral Width, xdB Width, $\lambda_{\text{mean}}$ , $\lambda_{\text{peak}}$ , $\lambda_{\text{center}}$ 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	<ul style="list-style-type: none"> <li>• 4 markers</li> <li>• Multiple zoom commands and graphical display items</li> </ul>
Data Handling	<ul style="list-style-type: none"> <li>• Saving/loading: settings, analysis results, screenshots</li> <li>• Commands: save, load, copy, paste</li> <li>• 2 GB storage on internal drive</li> </ul>
Other	Auto-calibration, remote control

## Modern Interfaces

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

## Connector Cleaning



Optical Connectors

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

<b>Wavelength</b>	Spectral Range		1250–1700 nm
	Span Range		0.5 nm to full range (450 nm)
	Linearity*1		±6 pm over 1500–1640 nm, ±20 pm over full range
	Accuracy*1		±10 pm over 1500–1640 nm, ±25 pm over full range
	Repeatability		±2 pm
	Sampling Resolution		2 pm
	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 patch cord)
<b>Monochromator</b>	Resolution Bandwidth*2*3*4		20 pm native, adjustable over 50–2000 pm with 1 pm step
	Dynamic Range (ORR)*5		≥ 30 dB (> 35 dB typ.) beyond ±50 pm from peak ≥ 50 dB (> 55 dB typ.) beyond ±100 pm from peak ≥ 60 dB (> 63 dB typ.) beyond ±200 pm from peak
	Stray Light Suppression Ratio*6		≥ 73 dB
<b>Optical Power</b>	Input Power per Channel		≤ 20 dBm
	Total Safe Power		≤ 25 dBm
	Level Sensitivity*7	single scan	High (0.5 nm/s): < -76 dBm (-78 dBm typ.)
		with averaging (Avg Nb of scans)*8	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*1*9		±0.4 dB at 1310 nm and 1550 nm
	Level Linearity*10		±0.07 dB over the full range (input level -50 to +3 dBm)
	Level/Wavelength Flatness*11		±0.15 dB over 1500–1640 nm, ±0.25 dB over 1260–1680 nm
	Level Sampling		±0.01 dB over -60 to +20 dBm
<b>Sweep Speed</b>	Sensitivity*7		-55 dBm at 2000 nm/s to -75 dBm at 2 nm/s
	Sweep Cycle/100 nm*12		300 ms typ.
	Sampling Rate		1 MHz typ.
<b>Optical Interfaces</b>	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)
<b>Environmental</b>	Operating Temperature		+5 °C to +35 °C, +41 °F to +95 °F
	Performance Guaranteed Temp		+18 °C to +28 °C, +64.4 °F to +82.4 °F
	Storage Temperature		-10 °C to +50 °C, +14 °F to +122 °F
	Humidity		80 % RH, non condensing
<b>Physical &amp; Electrical</b>	Dimensions & Weight		W 413 x H 314 x D 385 mm, 15 kg
	Power Supply		48 V DC input, ≤ 75 VA (adapter 100–240 V AC, 50–60 Hz to 48 V DC provided)
<b>Display</b>	Screen		12 inch capacitive touch-screen (res. 1024 x 768)
<b>External Devices</b>	Screen		VGA Port (x1), DVI-D Port (x1), HDMI (x1)
	Others (mouse, hard disk, ...)		USB 2.0-A (x4), USB 3.0-A (x2)
<b>Remote Interfaces</b>	Ethernet (2x RJ45)		1 Gb/s max.
	GPIB (1x IEEE 488)		7.2 Mb/s max.
	USB (1x USB 2.0-B)		115 kb/s max.
<b>Triggers</b>	In		Start scan (BNC, 5 V TTL), Gate in RLT mode
	Out		Pulse on a user-defined span (BNC, 5 V TTL)
<b>Data Storage</b>	Internal		2 GB
	External		FAT32, NTFS
	File Types		csv, binary, jpg, png

\*1: After user calibration performed after 1 hour warm-up time.

\*2: Native 17–22 pm over 1500–1620 nm, 17–24 pm over 1250–1700 nm.

\*3: Adjustable resolution bandwidth is calculated from the native bandwidth.

\*4: Adjustable over 6–400 GHz with 0.1 GHz step on the abscissa in THz.

\*5: Laser at 1523 nm with ±1 nm span.

\*6: Averaging of 10 scans, laser at 1523 nm with ±50 nm span.

\*7: Noise level of 99 % of all data points over 1520–1620 nm.

\*8: Typical values.

\*9: Over 18–28°C all sensitivity settings except ±0.6 dB in -55 dBm and Burst sensitivities.

\*10: Measured @ 1310 nm & 1500 nm, except ±0.3 dB in -55 dBm and Burst sensitivities.

\*11: Except ±0.35 dB in -55 dBm and Burst sensitivities, except for water absorption lines, over 18–28°C all sensitivity settings.

\*12: Sweep cycle /100 nm at -60 dBm sensitivity at center wavelength of 1475 nm.



### Contacts

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