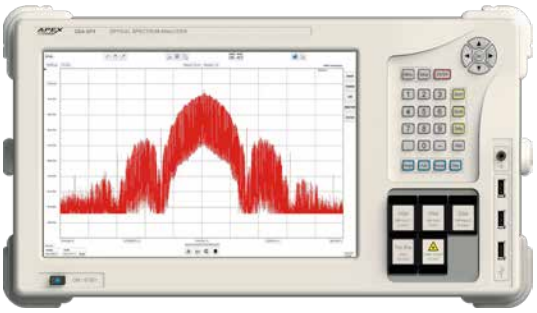
Optical Spectrum Analyzer

OSA-APx Series



High Resolution OSA

500x better resolution than a grating-based OSA
Accurately measure the smallest spectral features

Combines:
- Optical Spectrum Analyzer
- Wavemeter
- Polarimeter
- Component Analyzer

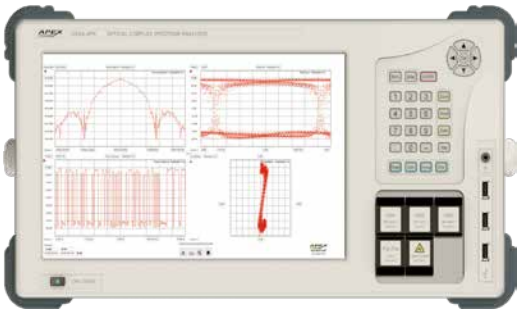
Optical Complex Spectrum Analyzer

OCSA-APx Series

High Resolution OSA + High Bandwidth Optical Modulation Analyzer

All the benefits of the OSA-APx Series plus accurate phase measurements with no symbol rate limitation.

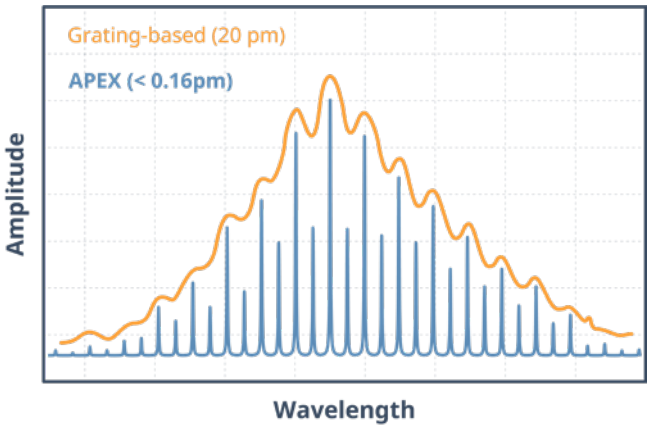
Combines:
- Optical Complex Spectrum Analyzer
- Modulation Analyzer
- Wavemeter
- Polarimeter
- Component Analyzer



OSA/OCSA Advantages

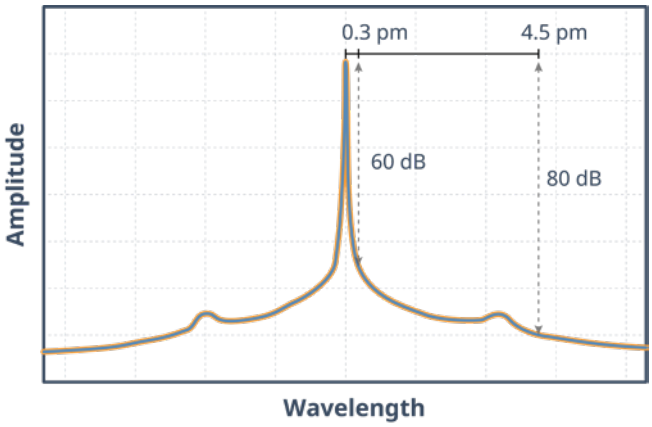
Advantages	Benefits	Features
High Resolution	Most precise analysis of optical signals	> 380x more resolution than best grating-based OSA
High Dynamic Range	Detect and distinguish close-in optical signals	Quasi-rectangular resolution filters 800x better close-in dynamic range than best grating-based OSA
High Wavelength Accuracy	Reliable measurements	Three (3) internal references
Ease of Use	Time-saving	User-friendly interface & Remote control capabilities
Versatility	Cost-effective multi-analysis tool	High-resolution Spectrum Analzer + Up to 4 tunable laser sources + Polarization & Component Analysis + Phase Analysis (OCSA)

Ultra-high Optical Bandwidth Resolution



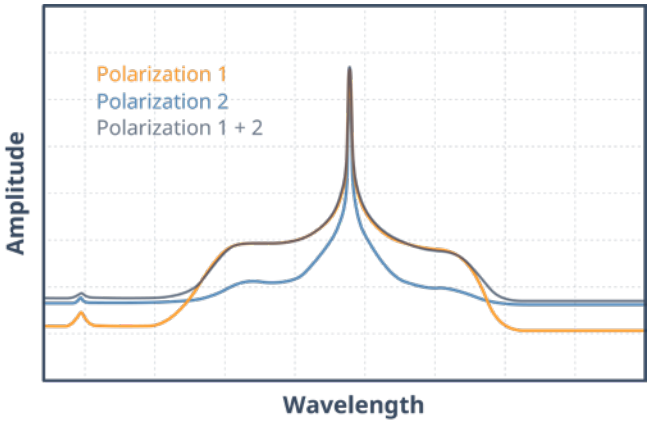
Hundreds of times better resolution than grating-based/monochromator OSA allows to accurately measure the smallest features.

High Close-in Dynamic Range



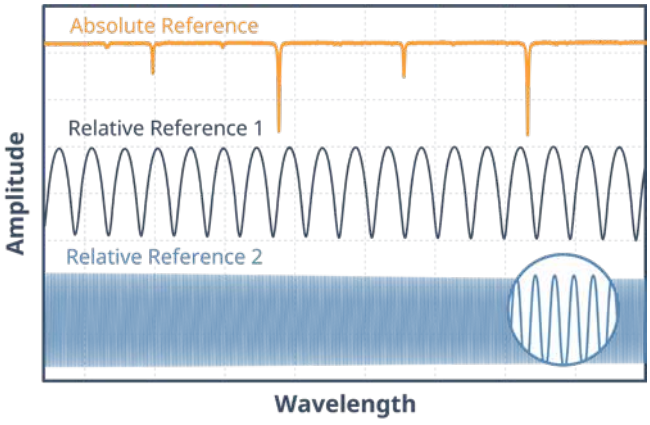
A 83 dB dynamic range to retrieve the weakest optical signals among strong spectral features.

Two Orthogonal Polarization Channels



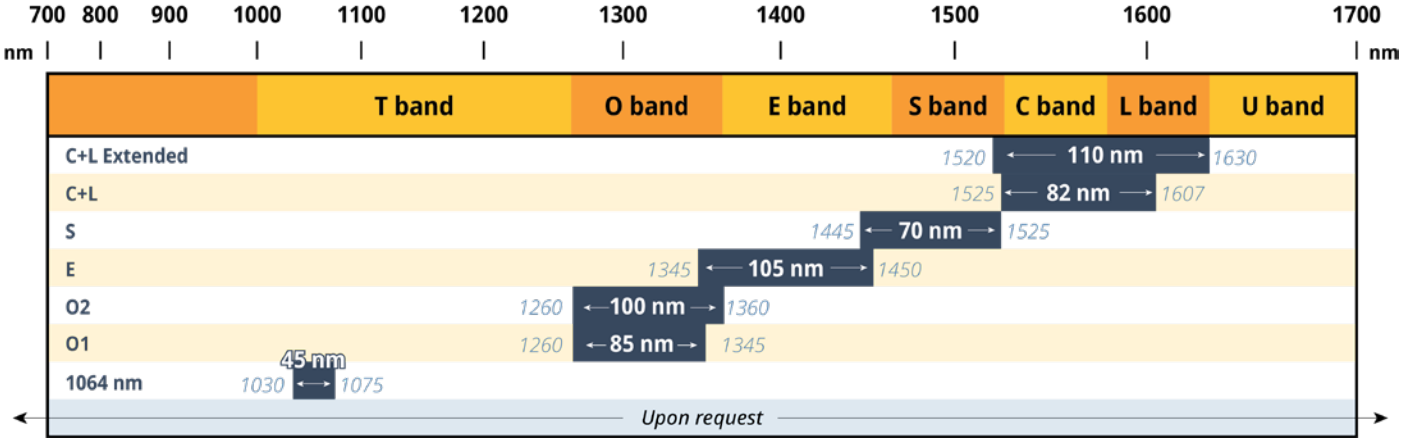
Two polarization channels displayed separetely and simultaneously, or combined for polarization independent measurements.

High Wavelength Accuracy

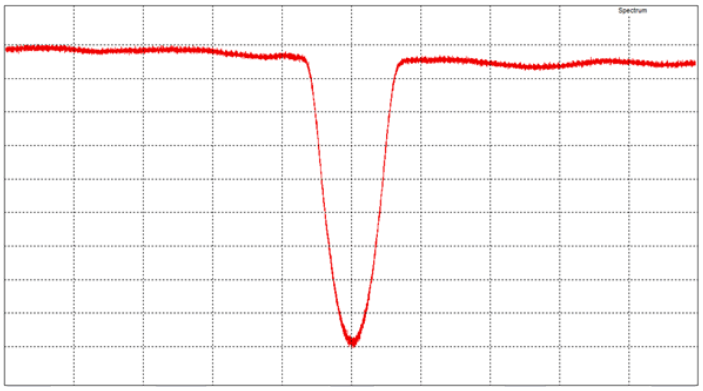


Absolute accuracy of the tunable laser source, maintained using three (3) distinct wavelength references, also allowing the analyzer to be used as a wavelength meter.

Tunable Laser Sources Wavelength Ranges

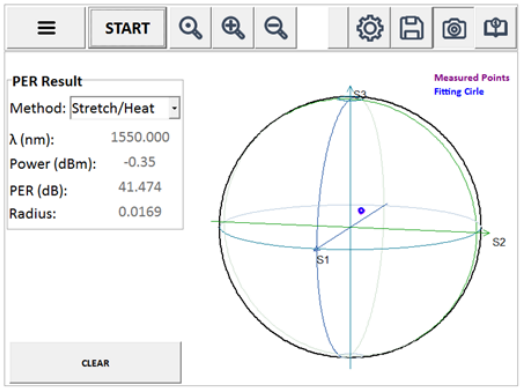


Tunable Laser Source(s) & Tracking Generator



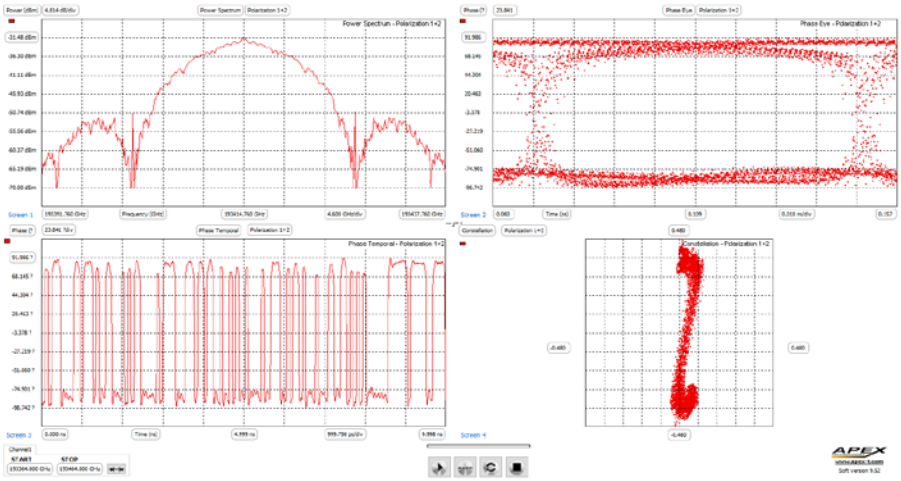
Built-in or external tunable laser with narrow linewidth wide mode-hop-free tuning range lasers, along with the tracking generator option, enable both reflection and transmission analysis of components, with up to 1 MHz resolution and 63 dB of dynamic range.

Polarization Analysis



SOP, DOP, and PER measured with high accuracy and allowing fast sampling rates, over a wide range of input optical power. Information displayed as Jones vectors, Poincare sphere, and Stokes parameters.

Complex Phase Analysis from Time Domain Measurements



Available phase-related analysis:

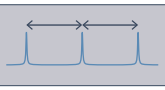
- Intensity and Phase *vs* Frequency
- Intensity, Phase, Alpha Parameter, and Chirp *vs* Time
- Eye Diagram, Constellation
- Group Delay and Chromatic Dispersion
- Complex transfer function of components

OSA/OCSA Common Specifications

	OSA-AP1	OSA-AP5	OSA-AP6
Laser Sources *Bands*	**DFB** *C | L | C+L*	**TLS** *±1064 nm*	**TLS** *O | E | S | C+L | C+L Ext.*
Wavelength Resolution *@ 3 dB*	20 MHz 0.16 pm 140 MHz 1.12 pm	5 MHz 0.02 pm 20 MHz 0.08 pm 100 MHz 0.38 pm 140 MHz 0.53 pm	5 MHz 0.04 pm 20 MHz 0.16 pm 100 MHz 0.80 pm 140 MHz 1.12 pm
Absolute Wavelength Accuracy	+/- 2 pm Typical (+/- 3 pm Max)		
Wavelength Repeatability	< 0.5 pm[1]		
Dynamic Range	86 dB[2]	89 dB[3]	87 dB[3]
Close-in Dynamic Range	> 40 dB @ +/- 1.3 pm > 60 dB @ +/- 8 pm > 80 dB @ +/- 30 pm	> 40 dB @ +/- 0.1 pm > 60 dB @ +/- 0.4 pm > 80 dB @ +/- 6 pm	
Spurious-free Dynamic Range	55 dB Typical (50 dB min)		
Power Level Range	-76 dBm to +10 dBm	-79 dBm to +10 dBm	-77 dBm to +10 dBm
Absolute Power Level Accuracy[4]	+/- 0.3 dB		
Power Level Repeatability[5]	< +/- 0.1 dB		
Sweep Rate	1.2 nm/s	Up to 20 nm/s[6]	
Optical Input Connectors	FC/PC for SM fiber *(other connectors under request)*		
Dimensions (W x H x D)	365 x 242 x 380.1 mm 14.37 x 9.57 x 14.96 in	450 x 250 x 485 mm 17.7 x 9.9 x 19.1 in	
Weight	18 kg (34 lbs)	20 – 28 kg (44 – 62 lbs) *(depending on options)*	
I/O Connectors	Ethernet, GPIB, Electrical trigger input, USB x5, VGA		
Power	115-230 VAC, 50/60 Hz | 350 W		
Environmental Conditions	Operating Temp.: +5 to +35°C | Storage Temp.: -10 to +50°C Humidity: 20 – 80% RH (non-condensing)		

(1) Standard deviation over 20 measurements.
(2) Measured at 20 MHz resolution.
(3) 4 dB less for 2-laser configurations; 8 dB less for 3 & 4-laser configurations.
(4) Typical value @1310 or 1550 nm, with 0 dBm. Monochromatic input signal and resolutions above 5 MHz.
(5) Monochromatic input signal ; standard deviation over 20 measurements. Resolutions above 5 MHz.
(6) Filter resolution 100 MHz.

OCSA Specifications

	OCSA-AP5/AP6
Optical Bandwidth	3 THz
Clock Power	> -17 dBm
Repetition Rate	From 70 MHz to 900 MHz *No upper limitation if modulation applied* [1] 
Maximum Temporal Resolution	325 fs
Measurement Rate	6 nm/s (750 GHz/s)

(1) For faster repetition rates, add external modulation between 70-900 MHz or PPG/AWG with patterns with sufficient length to reduce rate within range (example for 100 GBaud: any pattern between 100 and 1428 bits, including PRBS7/8/9/10.)

OSA/OCSA Options

Options	Parameters	OSA-AP1	OSA-AP5/AP6
Continuous & Step-by-step Optical Tunable Laser Source Output *(OSA-APX-1 / OCSA-APX-1)*	**Output Power**	C band: -3 dBm L band: -4 dBm C+L band: -6 dBm (C) -7 dBm (L)	-4 dBm (1 laser) -7 dBm (2/3 lasers) -11 dBm (4 lasers)
	Spectrum Linewidth	500 kHz typical (Gaussian)	< 133 kHz (Gaussian) < 10 kHz (Lorentzian)
	Side-mode Suppression Ratio (SMSR)	> 50 dBc	> 55 dB / 0.8 pm
	Relative Intensity Noise (RIN)	-158 dB/Hz	
	Wavelength Stability	1 pm @ 15 min. 2 pm @ 1 hour	±1 pm @ 1 hour
	Power Stability	0.07 dB @ 15 min. / 0.09 dB @ 1 hour	
	Fiber + Connector Type	PM + FC/APC	
	Sweep speed	Adjustable from 5 to 200 nm/s	
Optical Tracking Generator Output for Transmission Measurements *(SM: OSA-APX-2-1 / PM OCSA-APX-2-2)*	**Dynamic Range**	55 dB	60 dB
	Resolution	1 MHz	
	Output Type	Choose either SM or PM outputs	
Three (3) Optical Inputs *(OSA-APX-3 / OCSA-APX-3)*	**Input Connectors**	FC/PC for SM fiber input x1 FC/APC for PM fiber inputs x2	
Integrated Polarimeter *(OSA-APX-4 / OCSA-APX-4)*	**Wavelength Range**	1260 to 1610 nm	
	Input Power Range	-60 to +10 dBm	
	Max Sampling Rate	4 KS/s	
	SOP Accuracy	+/- 0.25° (-30 to +2 dBm) < 2° (-60 to +10 dBm)	
	Display modes	Full Poincaré sphere, Jones graph, Stokes Oscilloscope	
	Azimuth Accuracy	+/- 0.25° (-30 to +2 dBm)	
	Ellipticity Accuracy	+/- 0.25° (-30 to +2 dBm)	
	DOP Accuracy	+/- 1% (-35 to +5 dBm)	
	Relative Power Accuracy	+/- 0.2% (-35 to +5 dBm)	
	Absolute Power Accuracy	+/- 0.1% (-35 to +5 dBm)	
Remote Control by GPIB *(OSA-APX-5 / OCSA-APX-5)*	**Ports**	+ GPIB *(Ethernet always included)*	
TLS C+L Extended Upgrade *(OSA-APX-6 / OCSA-APX-6)*	**Wavelength Range**	N/A	1520 to 1630 nm
External Benchtop TLS LO[1] *(OSA-APX-7 / OCSA-APX-7)*	**Peak Output Power**	N/A	10 – 13 dBm
	Max Power Full Span	N/A	7 – 9 dBm
Group Delay & Chromatic Dispersion Analysis *(OCSA-APX-8)*	Enable measurement of phase, group delay and chromatic dispersion of a component, using an external reference signal *(Only applicable to OCSA-AP5 and OCSA-AP6)*		
Additional Filters / Optical Bandwidth Resolutions *(OSA-AP1-X)*	**5 MHz (0.04 pm) and 100 MHz (0.8 pm)**		N/A *(all filters included by default)*

(1) Refer to TLS datasheet for details

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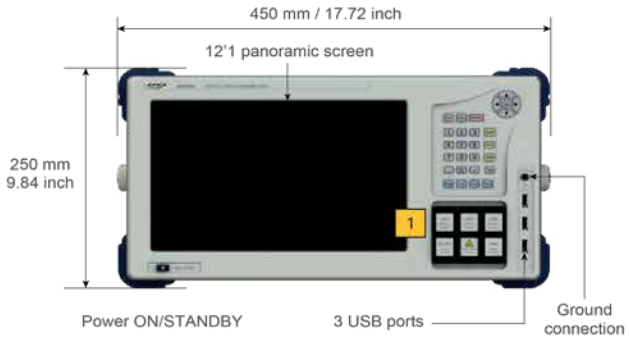

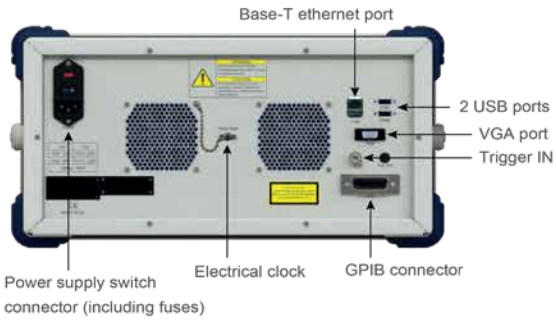

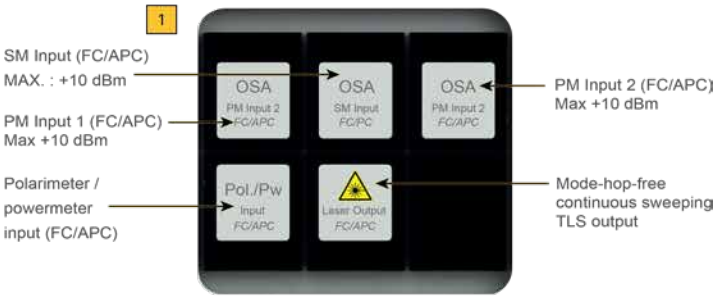

APEX Technologies

9bis, rue ANGIBOUST
91460 MARCOUSSIS
FRANCE
+33 (0)1 69 63 26 30

www.apex-t.com