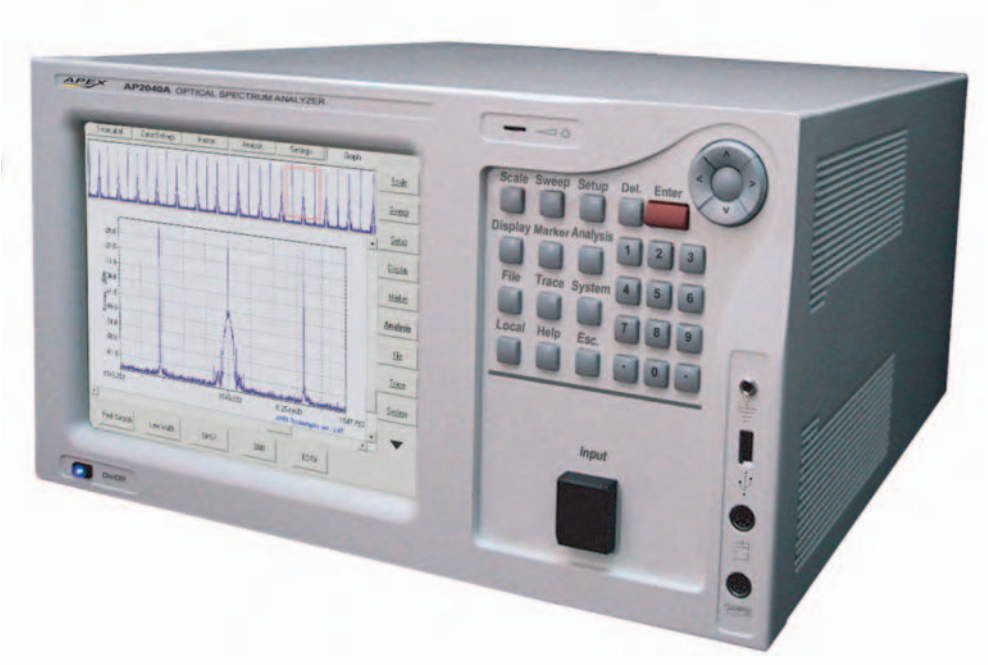
AP2040A series
Optical Spectrum Analyzer

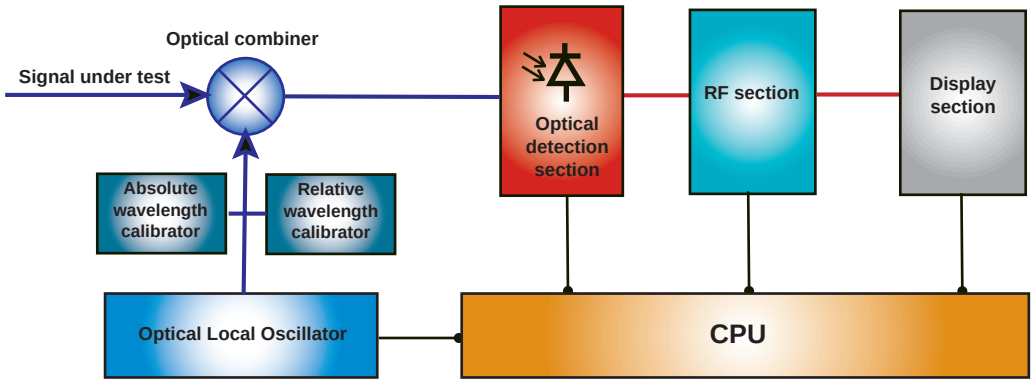


With the AP2040A series Apex Technologies sets a new standard in Optical Spectrum Analysis, its different approach enables it to measures in far greater detail than ever before.

While monochromator based Optical Spectrum Analyzers can achieve a maximum resolution of 10pm, the AP2040A series is based on an intereferometric principle which is able to dramatically increase this resolution by a factor 62, achieving a 0.16pm resolution (20MHz) at an absolute wavelength accuracy of +/-3pm and a close-in dynamic range of 60dB at 10pm.

With a price in the same order as conventional monochromator based OSA's, it makes the AP2040A the first of its kind in the next generation Optical Spectrum Analyzers.

Principle



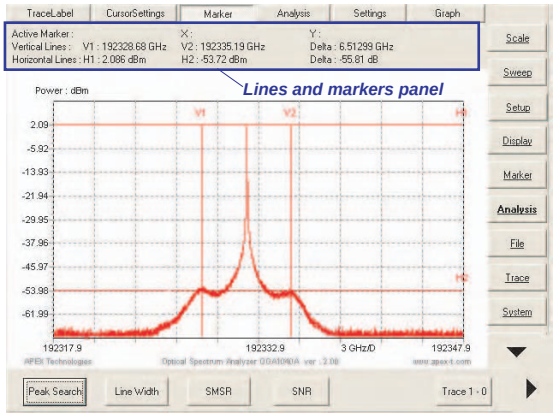
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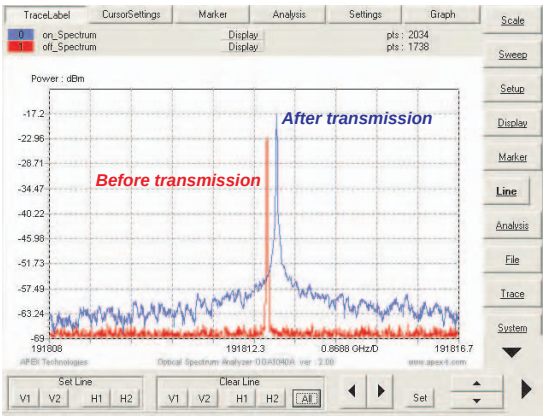
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Measurement examples



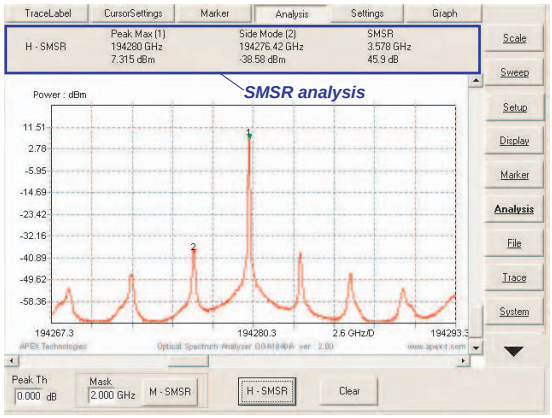
DFB relaxation oscillation :

The AP2040A is the perfect tool for spectrum measurements of active devices; in this example a DFB laser is measured.
Horizontal and Vertical lines can be used to measure the relaxation oscillation resonance of this laser. The measurement results are displayed at the top part of the screen and provides the required information to determine the modulation acceptance level of this laser under test.
The position of the H-V lines can be simply be changed by pointing on the screen or by using a mouse.



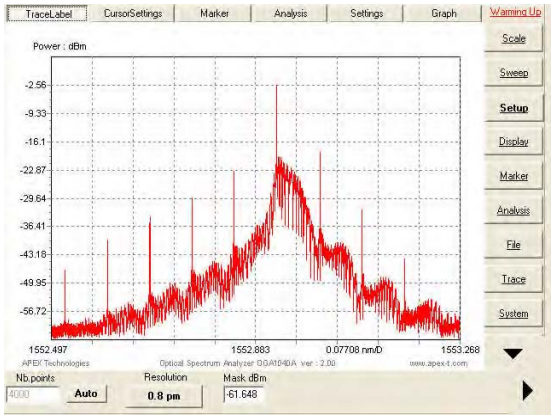
Laser spectrum widening :

In this example a DFB laser has been measured once before and once after transmission.
After measurement both traces are stored into memory of the AP2040A after which the multiple Trace display function is utilized to measure the widening of the optical spectrum. The built-in Linewidth Analysis function automatically characterizes the linewidth of the signal under test.



Side Mode Suppression Ratio of tunable lasers :

Tunable lasers source (TLS) are commonly used in WDM systems but TLS cavity modes generate sidebands and those close to the main peak can have an negative impact on system performance, even more so when the TLS signal is modulated.
With the AP2040A these sidebands can easily be measured with the built-in SMSR function.



Optical modulated signals :

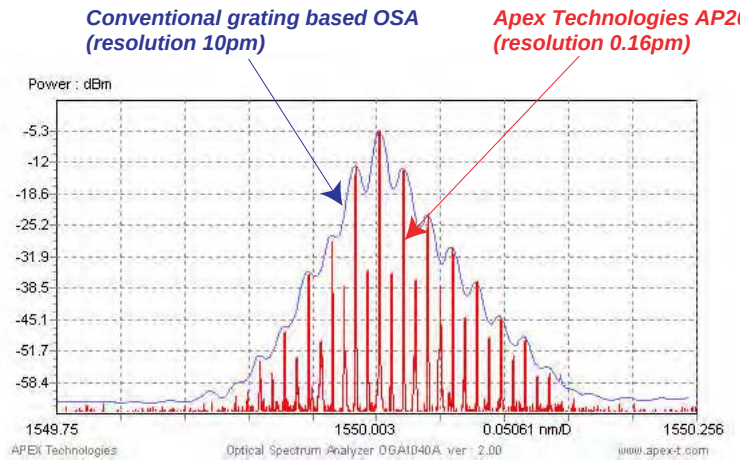
During the recent years there has been fast growing interest in digital optical modulation formatting for optical transmission, where the quality of the optical modulated signal and the data-rates in WDM systems are crucial in its overall system performance.
The AP2040A series provides a highly accurate analysis of the modulated spectrum and provides the necessary details to determine system qualification.
In this example, a 10Gb/s SSB (single side band) modulated signal was measured

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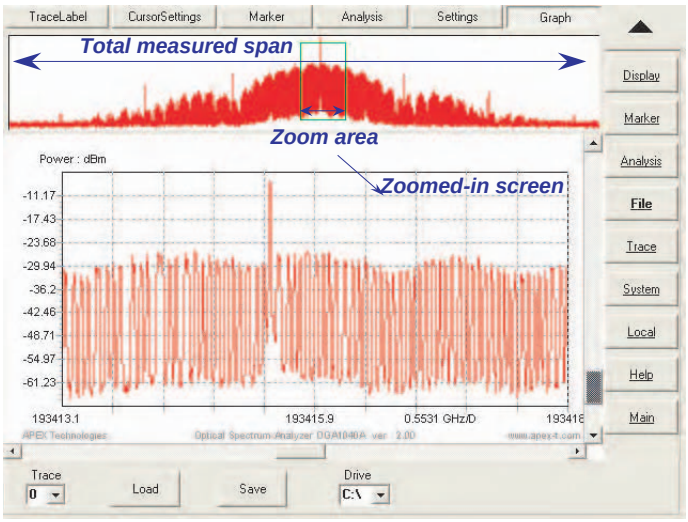
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Measurement examples



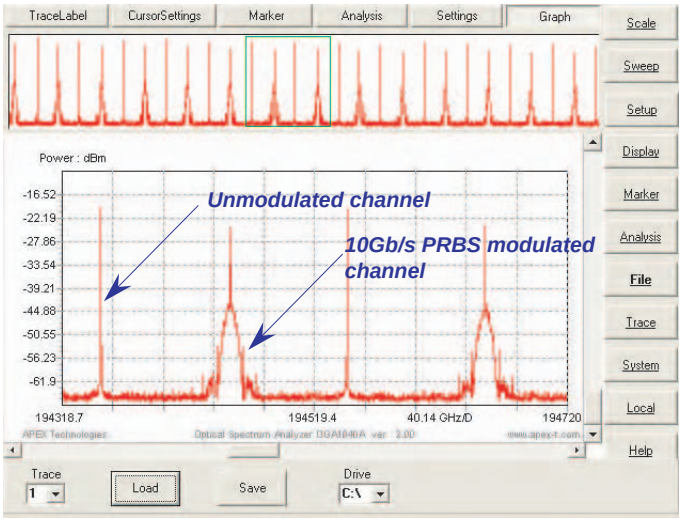
AP2040A comparison with a grating based OSA :

This is a direct comparison between the two different Optical Spectrum Analyzer types measuring a 1.25GHz modulated signal.
The AP2040A clearly shows approx. 62 times more detail than the grating based OSA and leaves any kind of guess work behind.



Zoom function :

This is a 10Gb/s modulated signal (PRBS 2^7-1) measured with the AP2040A.
By utilizing the AP2040A's built-in zoom function, all frequencies generated by the modulation can be made visible and used for analysis.
While the top trace shows the complete span, the larger bottom trace represents the "zoomed-in" area.
The Zoom function can easily be activiated by drawing a rectangle at a specific area on the touch sensitive screen and can be repeated multiple times until the desired details become available.



(C/D)WDM applications:

This is an AP2040A measurement of a 100GHz spaced WDM system carrying modulated and unmodulated signals.
Thanks to the ultra high resolution of the AP2040A, channel and even modulation types can easily be identified; in this particular case the 10Gb/s NRZ modulated signal is clearly recognized.
In D-WDM systems low channel crosstalk is crucial for optimum system performance and can easily be analyzed due to the AP2040A's 0.16pm wavelength resolution, and adjusting channels in the ITU grid is no longer a challenge thanks to the +/-3pm absolute wavelength accuracy of the AP2040A.

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Specifications

	AP2040A	AP2041A	AP2043A
Wavelength measurement range	1520nm to 1567nm	1520nm to 1567nm & 1557nm to 1607nm	1520nm to 1630nm
Wavelength span range	80pm [f] to 47nm	80pm [f] to 87nm	80pm [f] to 110nm
Measurement sampling interval [g]	0.5MHz (0.004pm) Max. (Span (80pm) / Number of measured and displayed points (20,000pts))		
Wavelenght absolute accuracy [a b c]	+/-3pm		
Wavelength resolution (@3db) [d]	20MHz (0.16pm) and 100MHz (0.8pm)		
Measurement level range [a e]	-70dBm to +20dBm		-67dBm to +20dBm
Absolute level accuracy [a b e]	+/-0.3dB		
Level repeatability [a b d e]	+/-0.2dB		
Close-in dynamic range [a b]	>40dB @ +/-2pm 60dB @ +/-10pm		60dB @ +/-1.7pm
Spurious free dynamic [d]	>60dB		>45dB
Sweep time [d e]	5s for 55nm		8s for 110nm
Optical input	FC/PC, SMF-28 fiber		
Tunable laser output	>-5dBm		>-7dBm
Internal absolute WL calibrator	Yes		

Software features	Auto measurement, Zoom function, Zoom to scale, Auto calibration, Peak search, Line width, SMSR, Markers, Horizontal and vertical lines, Peak center, ...
Display	
X scale	Wavelength in nm or Frequency in THz
Y scale	Power in linear or logaritmic mode
Trace	Up to 6 traces
Screen	10.4inch, color TFT, 640x480pixels
Front keyboard	Yes
Touch sensitive screen	Yes
USB connector	1x on front panel, 2x on back panel
Internal memory	More than 1,000 traces
File format	Trace file (.dat, .txt), Setup file, Screen copy (.bmp), Marker table
Mouse and keyboard connections	Yes (PS2 type on front panel)
GPIB	Yes, IEEE-488
Ethernet	Yes (10/100 base T)
Operating temperature	+10°C to +35°C
Power requirements	AC 100 to 120V / 200 to 250V, 50/60Hz
Accessories	Touch sensitive pen

a) At 1550nm
b) At 0dBm
c) After wavelength calibration
d) Typical
e) Resolution 100MHz
f) Minimum span for 20,000pts. Zoom down this value is possible.
g) Resolution 20MHz

Ordering information

AP2040A : C band (1520nm to 1567nm) Optical spectrum analyzer

AP2041A : C band (1520nm to 1567nm) and L band (1557nm to 1607nm) Optical spectrum analyzer

AP2043A : C+L band (1520nm to 1630nm) Optical spectrum analyzer

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