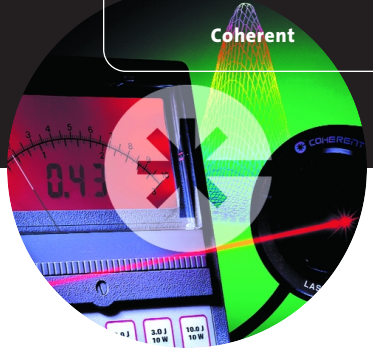


Laser Spectrum Analyzer System

FEATURES

- ***Reliable laser modal analysis from 275 nm to 1625 nm***
- ***Confocal configuration for easy alignment***
- ***Choice of 0.3, 1.5, 7.5 or 30 GHz FSR (Free Spectral Range)***
- ***User-interchangeable mirrors***
- ***New updated controller***

The Coherent Laser Spectrum Analyzer is used to examine the fine details of the line spectra of CW lasers. Such details are usually due to the laser operating in more than one longitudinal or transverse mode of the laser cavity.

The Spectrum Analyzer utilizes a scanning Fabry-Perot interferometer cavity with two concave mirrors. The separation distance between the mirrors is varied slightly using a piezoelectric section of a mirror spacer. A ramp-scan voltage supplied from the Spectrum Analyzer controller drives the piezoelectric. The variation in the mirror spacing changes the cavity resonant spectral frequency. Light is then transmitted though the cavity to a detector when the resonant frequency is equal to the frequency of the laser line spectra. A user-supplied oscilloscope is synchronized to the cavity scan rate to display the detected spectrum of the laser line structure variation with frequency.

The confocal configuration of the two mirrors along with the precision mechanical mount make the Spectrum Analyzer System easy to align and provide an unambiguous set of transmitted spectral maxima and minima.

Laser Spectrum Analyzer System

The Free Spectral Range (FSR) of a spectrum analyzer is the maximum optical spectral span created by the variation of the separation of the two mirrors while the piezoelectric spacer is repeatedly ramped. It is dependent on the mirror mean separation: d, as FSR = C/4d in frequency units.

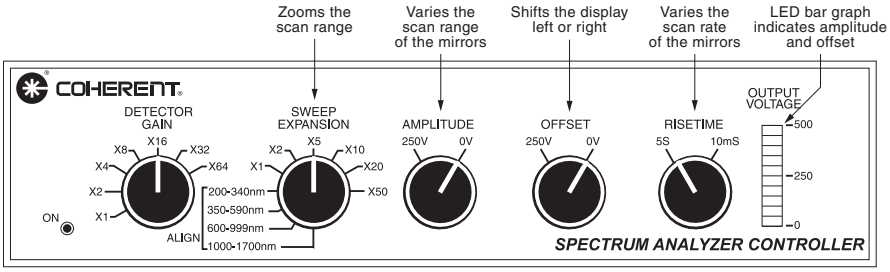
In Coherent Spectrum Analyzers, the mirror pairs and tube-assemblies are chosen to provide a choice of FSR values of 300 MHz and 1.5, 7.5 and 30 GHz. These correspond to wavelength ranges of ~0.0004 nm, 0.002 nm, 0.01 nm and 0.04 nm, respectively, at 635 nm. Clearly, these are ultra-high-resolution instruments.

If the FSR chosen is too small for the line structure to be examined, then there will be a confusion of overlapping spectra on the screen. If the FSR chosen is too large, then the effective resolution will be decreased, since the effective resolving power is the ratio FSR/F, where F is the instrument Finesse (>200 for all systems except those with the 30 GHz FSR assemblies, which have a Finesse of >100). Thus, the resolving power of the four different FSR analyzers varies from ~1 MHz (~0.000001 nm) to ~1 GHz (~ 0.001 nm).

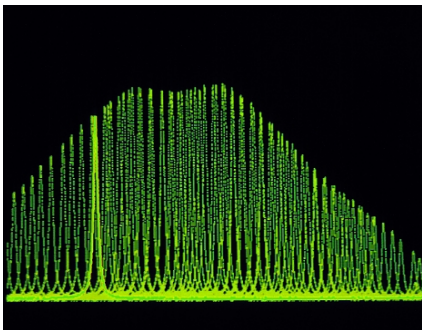
Coherent Spectrum Analyzers are supplied with a lens* that matches the laser beam to the input aperture of the confocal cavity (7.5 mm for the 1.5 GHz; 4.3 mm for the 7.5 GHz; and 2.0 mm for the 30 GHz). The combination of the confocal design, the focusing lens, and the variable-angle mount make operation very easy.

The spectrum analyzer systems consist of a mirror set, spacer-tube and lens assembly*, detector, and adjustable mount. Each system is assembled and tested in the factory, and is supplied with a comprehensive instruction manual. Construction is modular and component parts are available so that the user can replace the mirror set and other subassemblies at any time in order to change the spectral range and/or to operate with a different FSR*.

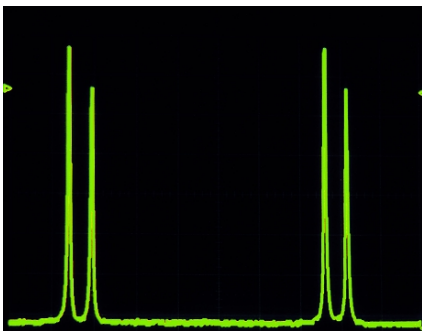
A laser beam can be transmitted straight into the spectrum analyzer, or optional beamsplitters are available for the 1.5, 7.5, and 30 GHz systems to deflect only ~10% of a beam into the analyzer. These beamsplitters (16 mm aperture) attach to the front of the spectrum analyzer and allow 90% of the beam to continue uninterrupted (except for a slight transverse displacement, due to the thickness of the beamsplitter plate).



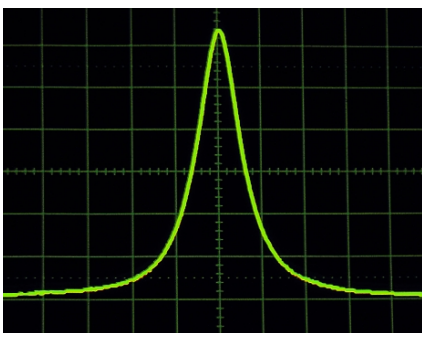
New Spectrum Analyzer Controller – Front Panel



Lasing medium gain curve traced by oscilloscope with Spectrum Analyzer



Two laser modes displayed twice during Spectrum Analyzer scan of ~1.6 FSR



Single mode using Spectrum Analyzer

New Spectrum Analyzer Controller

The Spectrum Analyzer Controller connects between the laser spectrum analyzer and a >20 MHz oscilloscope supplied by the user. The controller provides the required ramp (spectral scan) voltage for the spectrum analyzer (0-250 VDC) and allows full control of the scan time (10 ms to 5 s) and amplitude (spectral range) with front panel controls. A new LED bar graph indicator has been added, and displays the combined Amplitude and Offset.

The controller also provides the required conditioning and signal amplification for the detector, and synchronization of the oscilloscope trace to the detector signal. The new controller features seven selectable detector gain ranges to help maximize signal resolution. A convenient zoom function, which allows 1, 2, 5, 10, 20 and 50x increase of the spectral display resolution, is integrated into the controller. A new alignment feature has been added to allow four different wavelength range selections that can be used as an alignment aid for initial setup, as well as a sweep expansion function for centered zooming of the scan range. The new Spectrum Analyzer Controller is backward compatible with all existing Coherent Model 240 and 216 Spectrum Analyzers. The controller uses a 9 VDC input from a 100-240 VAC external power supply and is supplied with a detachable AC mains cord, manual and cables.

* Except for the 300 MHz system.

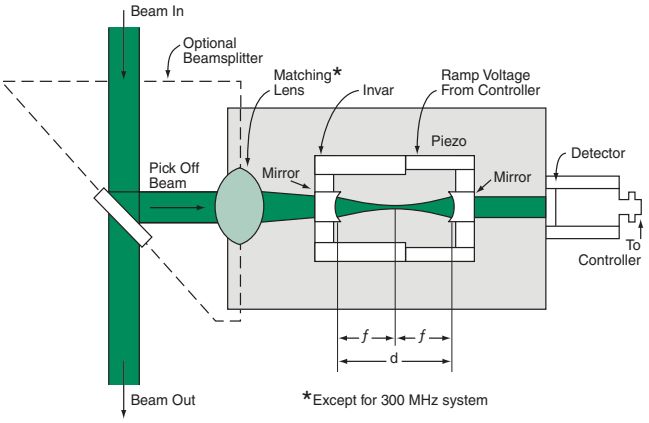
Selecting a Spectrum Analyzer

1 Determine the optimum FSR for your application and go to the appropriate FSR table: 300 MHz, 1.5 GHz, 7.5 GHz or 30 GHz.

2 Select the wavelength or wavelength range to be scanned.

3 Select the appropriate catalog number for a fully assembled and tested spectrum analyzer system (mirror set, tube and lens assembly, detector and mount) or select the catalog numbers for the required component parts.

4 You must also have the controller (1041453) and you may find it convenient to use a beamsplitter.



Schematic View of Coherent Spectrum Analyzer

30 GHz Free Spectral Range Spectrum Analyzer Systems & Components

	Assembled System	Mirror Set Only	Detector	Spacer-tube & Lens Assembly	Mount
Wavelength Range (nm)	Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number
450-550	33-6446	33-6446-001	33-2528	33-2494	33-2544
550-650	33-6438	33-6438-001	33-2528	33-2494	33-2544
650-775	33-6412	33-6412-001	33-2528	33-2494	33-2544
690-830	33-6347	33-6347-001	33-2528	33-2494	33-2544
790-930	33-6339	33-6339-001	33-2528	33-2494	33-2544
900-1070	33-6321	33-6321-001	33-2536	33-2494	33-2544
1000-1100	33-6404	33-6404-001	33-2536	33-2494	33-2544
1250-1400	33-6396	33-6396-001	33-2536	33-2494	33-2544
1450-1625	33-6388	33-6388-001	33-2536	33-2494	33-2544

7.5 GHz Free Spectral Range Spectrum Analyzer Systems & Components

	Assembled System	Mirror Set Only	Detector	Spacer-tube & Lens Assembly	Mount
Wavelength Range (nm)	Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number
275-305	33-6362	33-6362-001	33-2510	33-2486	33-2544
305-337	33-6453	33-6453-001	33-2510	33-2486	33-2544
337-365	33-6594	33-6594-001	33-2510	33-2486	33-2544
365-405	33-6685	33-6685-001	33-2510	33-2486	33-2544
405-450	33-6107	33-6107-001	33-2510	33-2486	33-2544
450-550	33-6677	33-6677-001	33-2528	33-2494	33-2544
550-650	33-6669	33-6669-001	33-2528	33-2494	33-2544
650-775	33-6644	33-6644-001	33-2528	33-2494	33-2544
690-830	33-6586	33-6586-001	33-2528	33-2494	33-2544
790-930	33-6578	33-6578-001	33-2528	33-2494	33-2544
900-1070	33-6560	33-6560-001	33-2536	33-2494	33-2544
1000-1100	33-6636	33-6636-001	33-2536	33-2494	33-2544
1250-1400	33-6628	33-6628-001	33-2536	33-2494	33-2544
1450-1625	33-6610	33-6610-001	33-2536	33-2494	33-2544

1.5 GHz Free Spectral Range Spectrum Analyzer Systems & Components

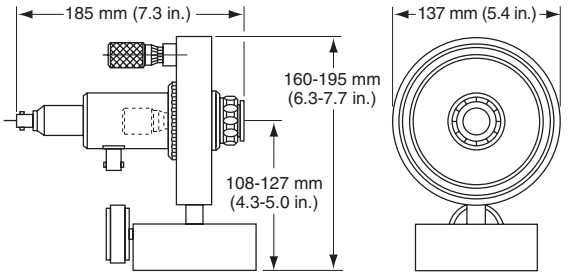
	Assembled System	Mirror Set Only	Detector	Spacer-tube & Lens Assembly	Mount
Wavelength Range (nm)	Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number
275-305	33-6461	33-6461-001	33-2510	33-2486	33-2544
305-337	33-6479	33-6479-001	33-2510	33-2486	33-2544
337-365	33-6487	33-6487-001	33-2510	33-2486	33-2544
365-405	33-6495	33-6495-001	33-2510	33-2486	33-2544
405-450	33-6503	33-6503-001	33-2510	33-2486	33-2544
450-550	33-6206	33-6206-001	33-2528	33-2494	33-2544
550-650	33-6198	33-6198-001	33-2528	33-2494	33-2544
650-775	33-6172	33-6172-001	33-2528	33-2494	33-2544
690-830	33-6131	33-6131-001	33-2528	33-2494	33-2544
790-930	33-6123	33-6123-001	33-2528	33-2494	33-2544
900-1070	33-6115	33-6115-001	33-2536	33-2494	33-2544
1000-1100	33-6164	33-6164-001	33-2536	33-2494	33-2544
1250-1400	33-6156	33-6156-001	33-2536	33-2494	33-2544
1450-1625	33-6149	33-6149-001	33-2536	33-2494	33-2544

300 MHz Free Spectral Range Spectrum Analyzer Systems & Components

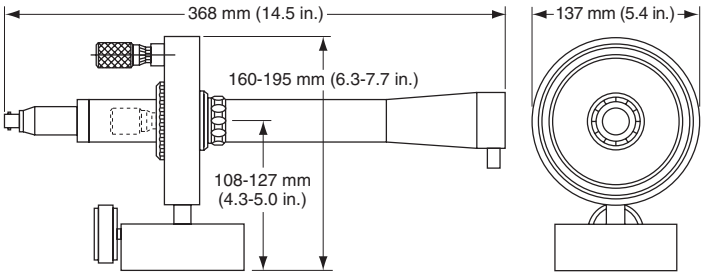
	Assembled System	Mirror Set Only	Detector	Spacer-tube Assembly	Mount
Wavelength Range (nm)	Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number
275-305	33-6511	33-6511-001	33-2510	33-2502	33-2544
305-337	33-6529	33-6529-001	33-2510	33-2502	33-2544
337-365	33-6537	33-6537-001	33-2510	33-2502	33-2544
365-405	33-6545	33-6545-001	33-2510	33-2502	33-2544
405-450	33-6552	33-6552-001	33-2510	33-2502	33-2544
450-550	33-6313	33-6313-001	33-2528	33-2502	33-2544
550-650	33-6305	33-6305-001	33-2528	33-2502	33-2544
650-775	33-6289	33-6289-001	33-2528	33-2502	33-2544
690-830	33-6248	33-6248-001	33-2528	33-2502	33-2544
790-930	33-6230	33-6230-001	33-2528	33-2502	33-2544
900-1070	33-6222	33-6222-001	33-2536	33-2502	33-2544
1000-1100	33-6271	33-6271-001	33-2536	33-2502	33-2544
1250-1400	33-6263	33-6263-001	33-2536	33-2502	33-2544
1450-1625	33-6255	33-6255-001	33-2536	33-2502	33-2544

Laser Spectrum Analyzer System

1.5, 7.5 and 30 GHz Assembled System Drawing



300 MHz Assembled System Drawing



		Laser Spectrum Analyzer System			
Specifications	Free Spectral Range	1.5 GHz	7.5 GHz	30 GHz	300 MHz
	Cavity Type	5 cm confocal	1 cm confocal	1/4 cm confocal	25 cm confocal
	Finesse	>200	>200	>100	>200
	Instrumental Bandwidth	7.5 MHz	37.5 MHz	300 MHz	1.5 MHz
	Aperture	7.5 mm	4.3 mm	2.0 mm	10.0 mm
	Piezoelectric Motion	~4 nm/volt			
	Volts per FSR at 600 nm (nominal)	37.5 volts			
	Maximum Voltage	500 VDC			
	Crystal Capacitance	0.04 µF			
	Maximum Sweep Rate	1-2 msec			
	Scan Non-linearity	2% at 100 VDC			

		Spectrum Analyzer Controller and Optional Beamsplitters
Part Number	1041543	Spectrum Analyzer Controller
	33-2577	Beamsplitter for 1.5, 7.5 and 30 GHz Analyzers, 275-450 nm
	33-2586	Beamsplitter for 1.5, 7.5 and 30 GHz Analyzers, 450-650 nm
	33-2593	Beamsplitter for 300 MHz Analyzers, 275-450 nm
	33-2601	Beamsplitter for 300 MHz Analyzers, 450-650 nm

COHERENT

COHERENT, INC.

2303 Lindbergh Street
Auburn, CA 95602
Phone: 1-800-343-4912
1-530-889-5365
Fax: 1-530-889-5366
Email: tech.sales@CoherentInc.com
Web: **www.CoherentInc.com**

LOCAL OFFICES

UK +44 (0) 1353 658 800
Germany +49 6071 9680
France +33 (1) 60 19 40 40
Italy +39 (02) 34 530 214
Japan +81 (0) 3 5635 8680
China +86 (10) 6493 5054
Benelux +31 (30) 280 6060

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