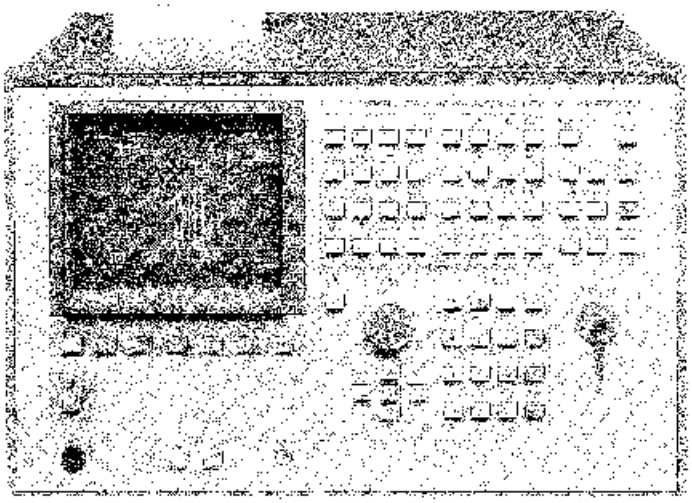
OPTICAL SPECTRUM ANALYZER

MS9001B/B1 MS9002A/C

0.6 to 1.75 μm 0.35 to 1.1 μm



The MS9001B/B1 and MS9002A/C are the latest multifunctional optical spectrum analyzers with high-speed and accurate measurement capabilities. The MS9001B/B1 is best for optical communication wavelengths and the MS9002A/C is best for wavelengths including visible light. The MS9001B/B1 covers wavelengths up to 1.75 μm and can be used to measure 1.55 μm band light-emitting elements developed for long-distance optical communications as well as the loss characteristics of optical parts and materials using white light sources (MG922A).

The diffraction gratings used in other spectrum analyzers have polarization characteristics. Therefore, the measured level of a polarized light source such as an LD is not stable and the level accuracy cannot be guaranteed.

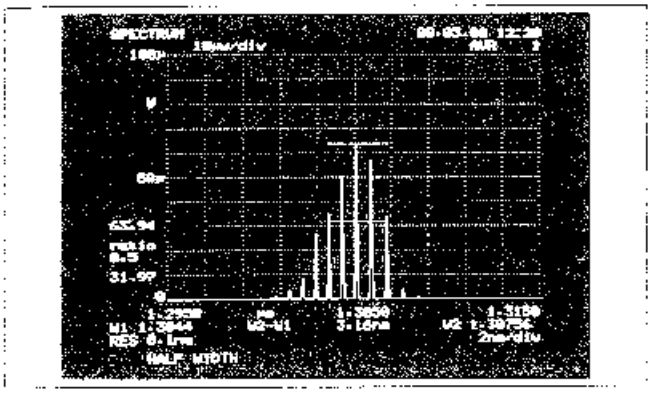
The MS9002A scrambles the S and P polarization components at the light receiving section to guarantee the level accuracy and compensates each of them. However, the MS9002C does not separate the polarized wave, so the level accuracy is not guaranteed for. The sensitivity is improved and the measurement time is shorter when low-level light is measured. Consequently, if a light source such as an LD has polarization characteristics and the level accuracy must be guaranteed, the MS9002A must be used, but if a light source has no polarization characteristics such as an LED, and loss characteristics must be measured and high sensitivity is required, the MS9002C is best.

Features

- **High-speed sweep**
  A 16-bit CPU permits a 0.3-second (0 to 2 ns sweep width) high speed sweep.
  Spectra stability and mode-hopping of light-emitting elements can be measured quickly.
- **Guaranteed level measurement accuracy**
  The absolute optical level is guaranteed to be accurate within ±2 dB by using a dispersion spectroscopic method in the light receiving section that is not affected by polarization changes even in single-mode fibers (except MS9002C).
- **Guaranteed wide dynamic range (stray light level)**
  The 45 and 50 dB dynamic ranges of the MS9001B and MS9001B1 respectively, have been achieved by using a spectroscope that has less stray light. This permits accurate measurement of DFB laser side modes.
- **Various functions**
  These spectrum analyzers have various operation functions, such as the peak-center function in which the spectrum peak is moved to the center of the screen, peak level function in which the level scale is set to the optimum value, and peak search function in which the wavelength and level of the spectrum peak value are read.
- **Instant measurement hard-copies**
  The built-in thermal printer hard copies waveforms from the screen on the spot.

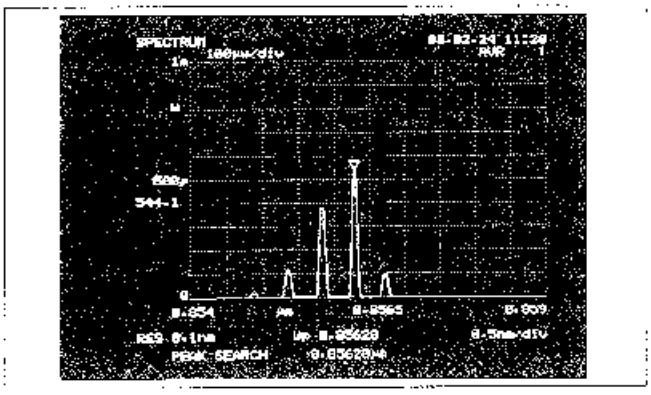
● Half-width automatic reading function

A marker indicates the spectral half width and the numeric value of the width is displayed on the CRT when the half-width key is pressed.



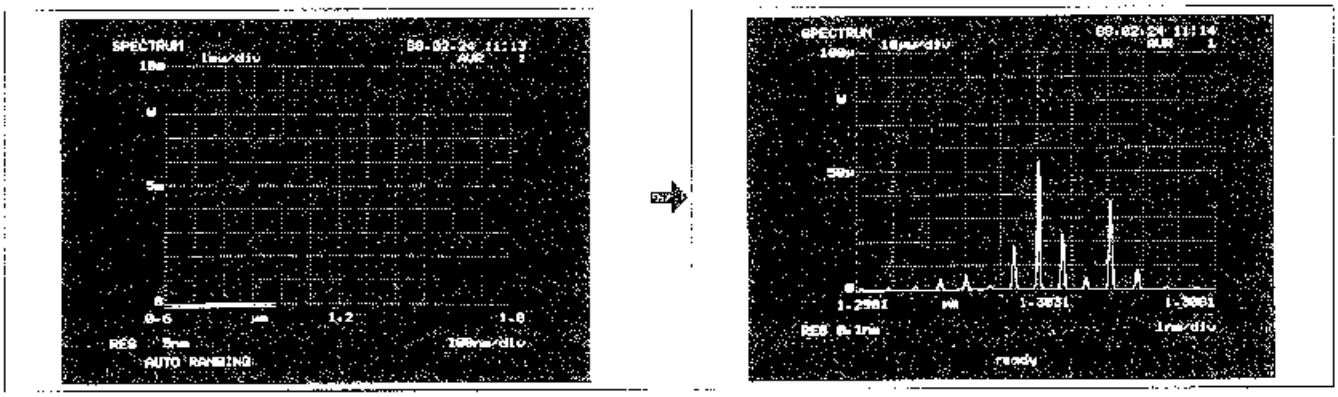
● Peak search function

A marker indicates the measured spectrum peak and the numerical and wavelength values are displayed on the CRT.



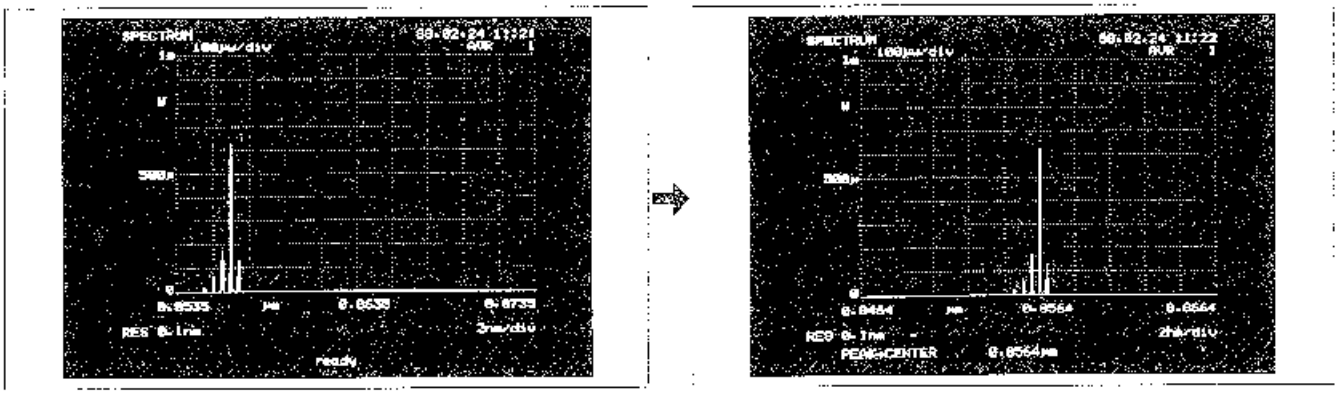
● Spectrum auto ranging function

When the spectrum auto ranging key is pressed, this function repeats automatic measurements until the optimum measurement conditions are satisfied. The results are then displayed on the CRT.



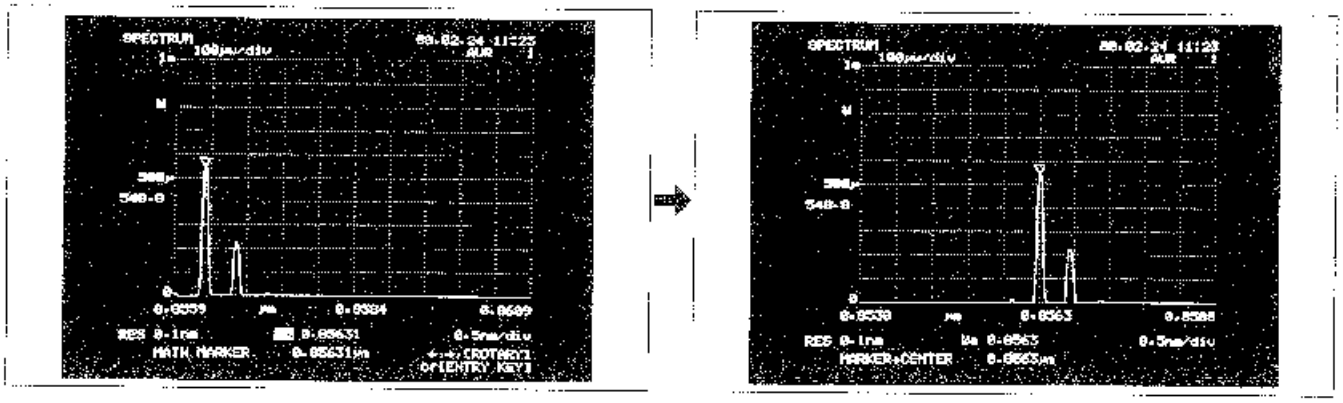
● Peak center function

This function sets the measured spectrum peak wavelength to the central wavelength and shifts the peak to the center of the CRT.



• Marker center function

This function sets the wavelength of the point selected by the main marker (▼) set on the measured spectrum to the central wavelength and shifts the point to the center of the CRT.



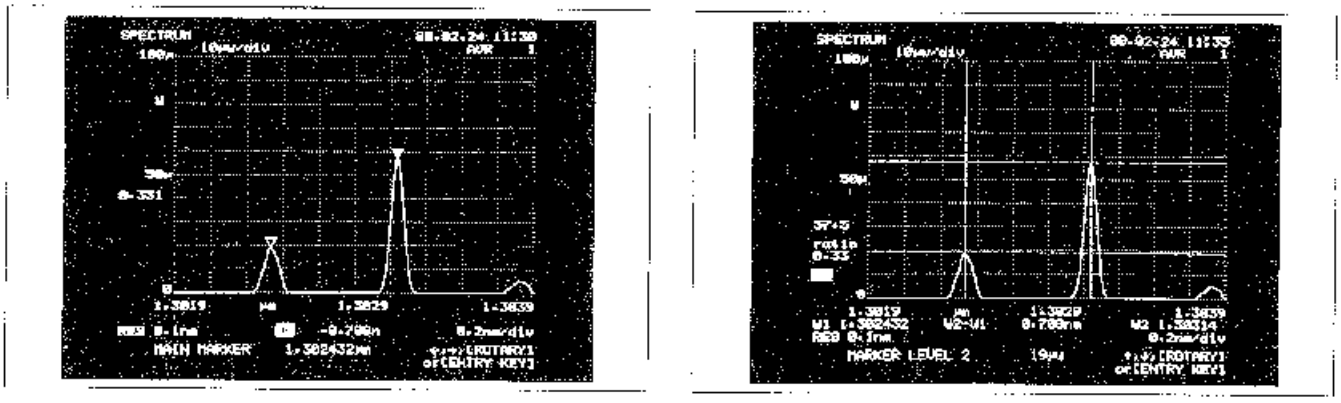
• Main (▽) and zero (▼) markers

Wavelength analysis has been enhanced by the addition of main and zero markers.

For example, when the zero marker is used, level and wavelength differences between peaks are indicated numerically.

• Wavelength and level markers

When the wavelength markers are used, the wavelengths and their difference are displayed on the CRT. For level markers, levels and their difference or ratio are indicated.



Spectrum Analyzers (Optical Type)

Model	MS9001B	MS9001B
Wavelength range	0.6 to 1.75 µm	
Level measuring range	−70 to +10 dBm (0.2 to 1.6 mW), −65 to +10 dBm (0.6 to 1.7 µm)	−60 to +10 dBm (1.5 to 1.75 µm)
Measuring level accuracy[1]	±2 dB (at 0.85, 1.31, 1.55 µm)	
Linearity	±0.5 dB (±20 dB), ±1 dB (60 dB)	
Polarization	±0.5 dB (at 1.31/1.55 µm)	
Level scale	0.2 to 10 dB/div and LINEAR	
Dynamic range (background light level)[2]	≧55 dB (level difference between peak level and ±1 nm from peak level) ≧45 dB (level difference between peak level and ±10 nm from peak level)	≧40 dB (level difference between peak level and ±1 nm from peak level) ≧50 dB (level difference between peak level and −5 nm from peak level)
Wavelength read out resolution	2 nm	
Wavelength accuracy	±1 nm (±0.5 nm (25°C))	
Resolution bandwidth	0.1 to 5 nm	
Wavelength sweep width	0 to 100 nm/div	
Sweep time[4]	<0.2 s (sweep width: ≦2 nm), ≦1 s (sweep width: <50 nm) <3 s (sweep width: <200 nm), ≦7 s (sweep width: ≦1200 nm)	
Processing functions	Automatic setting for optimum measurement, subtraction, averaging, peak search, peak to center, spectrum roll-width, wavelength calibration, dB display, time display, memory backup, direct plotting	
Temperature, rated range of use	10° to 40°C	
Dimensions and weight	286H × 426W × 450D mm, <30 kg	

[1] Levels at resolution bandwidths excepting 0.5 and 0.2 nm
[2] At −30 dBm resolution bandwidth 0.2 nm or more (SM fiber)
[3] At −10 dBm at 1.31 µm with 0.1 nm resolution (SM fiber)
[4] Averaging times: 1 measuring ranges: ≧ −30 dBm (1 µW)

Spectrum Analyzers (Optical Type)

Model	MS9002A	MS9002C
Wavelength range	0.35 to 1.1 µm	
Level measuring range	−70 to +10 dBm (0.2 to 1.0 mW)[1] −65 to +10 dBm (0.2 to 1.0 µW)[1] −60 to +10 dBm (0.85 to 1.31 µW)[1]	−70 to +10 dBm (0.2 to 1.0 mW)[2] 65 to +10 dBm (0.37 to 1.0 µW)[2] 60 to +10 dBm (0.85 to 0.83 µW)[2]
Measuring level accuracy[3]	±2 dB (at 0.456/0.678/0.78 µm)	
Linearity[3]	±0.5 dB/10 dB, ±1 dB/20 dB, ±3 dB/60 dB	
Level scale	0.2 to 10 dB/div and LINEAR	
Dynamic range (Background light level)	≧55 dB[4], ≧45 dB[5]	
Wavelength read out resolution	2 nm	
Wavelength accuracy	±1 nm, ±0.5 nm (25° ±5°C)	
Resolution bandwidth	0.1 to 5 nm	
Wavelength sweep width	0 to 100 nm/div	
Sweep time	≦0.5 s (sweep width: ≦2 nm)[6] <1 s (sweep width: ≦100 nm)[6] ≦3 s (sweep width: ≦500 nm)[6] ≦5 s (sweep width: <800 nm)[6]	≦0.5 s (sweep width: ≦2 nm)[6] ≦1 s (sweep width: ≦100 nm)[6] <3 s (sweep width: ≦500 nm)[6] ≦5 s (sweep width: ≦800 nm)[6]
Processing functions	Automatic setting for optimum measurement, subtraction, averaging, peak search, peak-to-center, spectrum roll-width, wavelength calibration, dB display, time display, memory backup, direct plotting	
Temperature, rated range of use	10° to 40°C	
Dimensions and weight	286H × 426W × 450D mm, <30 kg	

[1] Levels per resolution bandwidth, excepting 0.5 and 0.2 nm (25° ±5°C, within 10 dB range of lower measurable level)
[2] 25° ±5°C (excepting 0.1 and 0.2 nm)
[3] At −30 dBm resolution bandwidth 0.2 to 5 nm (SM fiber)
[4] At ≧ −3 dB of lower measurable level (MS9002A), or ≧10 dB of lower measurable level (MS9002C)
[5] Level difference between peak level measured at 0.456 or 0.6328 µm and level ±1 nm from peak level with 0.1 nm resolution (SM fiber)
[6] Level difference between peak level measured at 0.456 or 0.6328 µm and level ±1 nm from peak level with 0.1 nm resolution (SM fiber)
[7] Averaging times: 1 measuring ranges: ≧ −60 dBm (1 µW)
[8] Averaging times: 1