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Simbol Test Systems is the one-stop shop for all your fiber optic test equipment and measurement needs. As we are exclusively focused on e-commerce and international distribution of photonic products since 2000, our customers rely on the **AssetRelay** catalog to find our stock listings of thousands of used and refurbished popular test equipment. They know they can get repair, customization and calibration services from our laboratory for their own fiber optic instruments from all renowned brand manufacturers.

If you wish to buy or sell an Anritsu MS9710x family OSA, visit our catalog here to see our current stock.

Anritsu MS9710C Optical Spectrum Analyzer (OSA) Calibration and Repair Services

With more than 20 years of expertise in repair of OSA, Tunable Lasers, Wavemeters and more, the quality of our services is renowned amongst the service centers community and highly appreciated by our partners and customers. We developed custom software allowing us to perform automatic calibration tests through most of the range of the OSAs. Don't settle for a two-page summary assessment to trust that your OSA is operating on the full range; our report contains the complete table of all results, confirming it has **really** been tested.

Anritsu Optical Spectrum Analyzer (OSA) Repair and Calibration Services

The AnritsuMS9710C OSA goes through a premium calibration to ensure it meets or exceeds manufacturers published specifications. The equipment is shipped with a comprehensive 3-page calibration report including before-and-after data, a calibration sticker and its own dated calibration certificate. A report from other labs with less data points reflects a not completely calibrated unit.

The MS9710C OSA is known to suffer some encoder defects that are not possible to fix due to shortage of the custom part that was made especially for Anritsu. If your unit does not pass calibration, we will quote for its repair and recalibration assuming we can perform the needed repair.

List of specifications calibrated

- Optical Alignment
- Wavelength Calibration with Internal Cell
- Wavelength Accuracy cal external source
- Wavelength Resolution Accuracy
- Wavelength Linearity
- Dynamic Range
- Level Accuracy
- Level Flatness
- Return Loss
- Power Linearity
- Stability (Wavelength and Power)
- Polarization Dependency
- Reference Output Power

Traceability: Instrumentation used during this calibration is traceable to N.I.S.T (National Institute of Standards and Technology) or C.N.R.C. (Canadian National Research Council).

Product Brochure

MS9710C

Optical Spectrum Analyzer

600 to 1750 nm

Compact High Performance

■ Wavelength accuracy of ±20 pm (WDM-band)
■ Dynamic range of 42 dB (0.2 nm from peak wavelength), 70 dB (1 nm from peak wavelength)
■ Resolution (FWHM) of 0.05 nm max.
■ WDM measurement of wavelength, level, and SNR for up to 300 channels
■ –90 dBm optical reception sensitivity

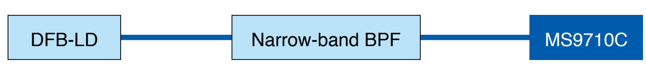
The MS9710C is a diffraction-grating spectrum analyzer for analyzing optical spectra in the 600 to 1750 nm wavelength band. In addition to uses such as measurement of LD and LED spectra, it has functions for measuring the transmission characteristics of passive elements such as optical isolators, as well as NF/Gain of optical fiber amplifier systems.
In addition to its basic features, the superior stability and reliability of the diffraction grating (patent pending) offer the severe level and wavelength specifications particularly in the WDM band.
This analyzer has the dynamic range, reception sensitivity and sweep speed requested by users, backed by Anritsu's high-level technology. The high sensitivity meets the exacting demands placed on today's measuring instruments. In particular, the excellent wavelength and level specifications fully meet the dense WDM requirements (1520 to 1620 nm).
The MS9710C Optical Spectrum Analyzer is the successor to the popular MS9710B but with improved functions and higher performance. The specifications have been upgraded for the important 1.55 μm band for WDM communications and have also been optimised to include the new requirements for the L-band (1570 to 1620 nm) use. In addition to the high reliability and excellent basic performance, this analyzer has a full range of application functions to support accurate measurement in the fastest possible time.

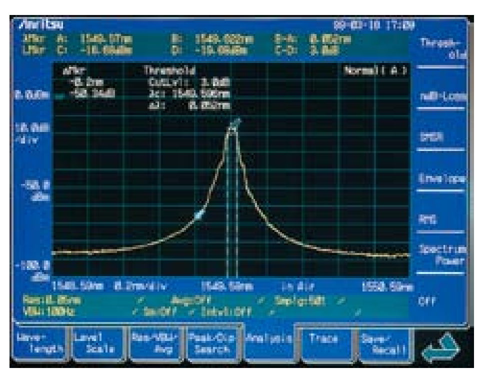
70 dB dynamic range

The dynamic range at 0.2 nm from the peak wavelength is better than 42 dB and is a high 58 dB min. at 0.4 nm from the peak, permitting high-accuracy measurement of DWDM systems with a 50 GHz (0.4 nm) channel spacing. The analyzer demonstrates its excellence in SNR measurement of WDM light sources, as well as in evaluation of narrow-band optical band pass filters.

Distance from peak wavelength	0.2 nm	0.4 nm	1 nm
Normal dynamic range mode	42 dB (45 dB typical)	58 dB	62 dB
High dynamic range mode	42 dB (45 dB typical)	60 dB	70 dB

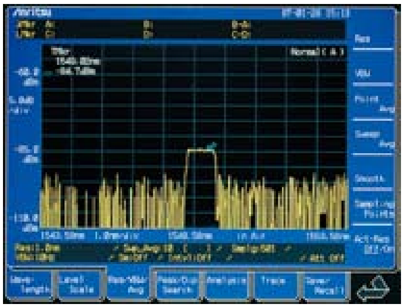
High-dynamic range measurement example with DFB-LD spectrum passed via narrow-band Band-Pass Filter (BPF).





–90 dBm guaranteed optical reception sensitivity

The MS9710C has achieved an improved S/N over a wide range by countering the effects of noise and stray light. The RMS noise level at wavelengths from 1250 to 1600 nm is –90 dBm max. The screen display below is the waveform obtained when measuring a 1550 nm DFB-LD optical source with a power level of –85 dBm; only 25 seconds are required for one sweep.
The S/N ratio can be improved using sweep averaging.



Waveform after 10 averages

Relying on WDM transmission

As a result of the need for increased transmission capacity, R&D into large-capacity transmission techniques is becoming more active and Wavelength Division Multiplexing (WDM) is now in use. This WDM transmission technology requires quantitative measurement of the signal quality and wavelength transmission characteristics of each channel.
Measuring instruments for this purpose require highly accurate wavelength and level measurements. Furthermore, accurate measurement of fiber-amplifier NF requires extremely good polarization dependant loss characteristics and level linearity specifications.
The MS9710C design achieves excellent wavelength and level specifications for this purpose in the 1520 to 1620 nm wavelength band and also in the extended band (L-band) to 1620 nm. In particular, the wavelength accuracy can be calibrated automatically using an optional internal reference wavelength light source; the post-calibration accuracy is better than ±20 pm.

Specifications for WDM application

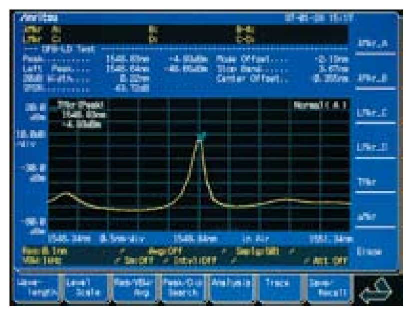
Mainframe, Option	MS9710C	With Option 15*2
Wavelength accuracy*1	±20 pm (1530 to 1570 nm) ±50 pm (1520 to 1600 nm)	±20 pm (1520 to 1620 nm)
Wavelength resolution	50 pm (FWHM of internal optical BPF)	
Resolution accuracy	≤±3 % (1530 to 1570 nm, resolution: 0.2 nm)	≤±3 % (1520 to 1620 nm, resolution: 0.2 nm)
Level flatness to wavelength	±0.1 dB (1530 to 1570 nm) ±0.3 dB (1520 to 1620 nm)	±0.1 dB (1520 to 1620 nm)
	Resolution: 0.5 nm, ATT: off	
Polarization dependency	±0.05 dB (1550/1600 nm)	
Level linearity	±0.05 dB (1550 nm)	±0.05 dB (1550/1600 nm)
	–50 to 0 dBm (ATT: off) –30 to +20 dBm (ATT: on)	

∗1: After calibration with optical reference wavelength light sourceS
∗2: L-band enhancement

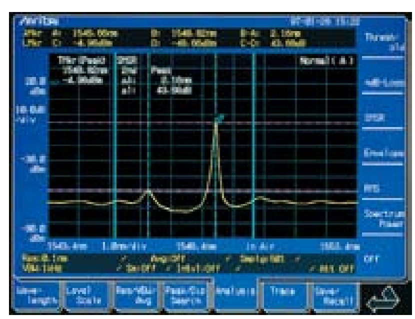
Full function lineup

In addition to its excellent basic functions, the MS9710C comes with a full lineup of other useful functions summarized in the following table.

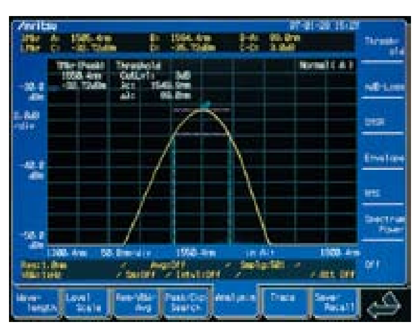
Device analysis	For analyzing and evaluating waveforms of optical devices (DFB-LDs, FP-LDs, LEDs)
Waveform analysis	For waveform analysis by RMS and threshold methods; SMSR, half-width evaluation, WDM waveform analysis
Application measurement	EDFA NF and gain measurement, polarization mode dispersion measurement (See 'applications' section.)
Modulation, pulsed light measurement	Max. frequency range (VBW) = 1 MHz (See 'applications' section.)
Markers	Multimarkers: Marker function for max. 300 points (See 'applications' section.) Zone markers: For waveform analysis within zone Peak/dip search:Searches for a peak or dip
Power monitor	Also functions an optical power meter
Vacuum wavelength display	Converts displayed wavelength to value in vacuum
External interfaces	GPIB, RS-232C, VGA monitor output



DFB-LD waveform analysis

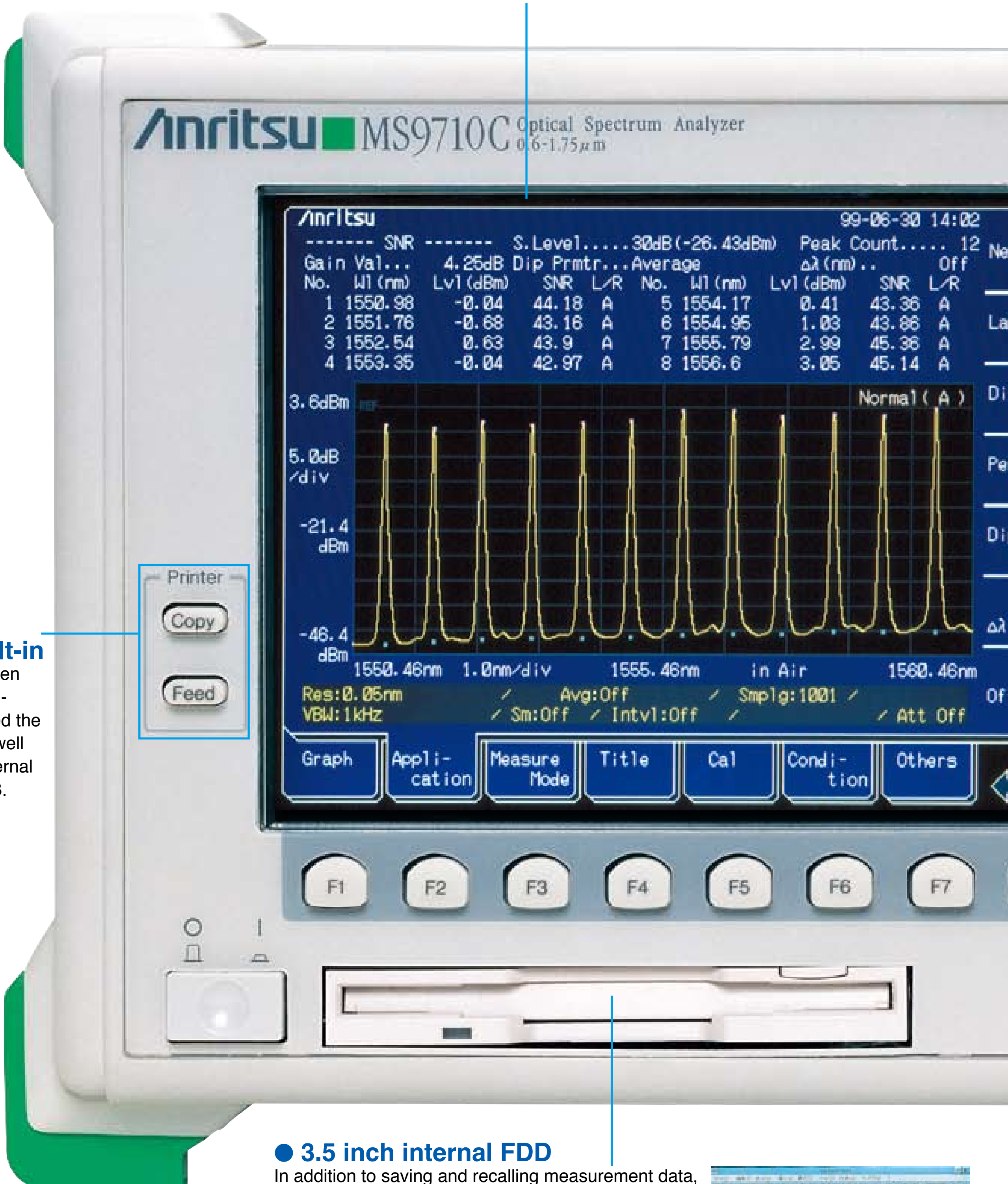


Waveform analysis using zone marker



Half-width measurement by threshold method

● Easy-to-read color TFT-LCD



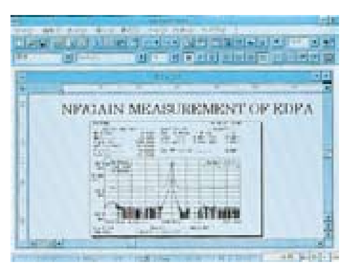
Pictures actual size

● Thermal printer built-in

The MS9710C screen display can be hard-copied at high speed the internal printer, as well as output to an external printer via the GPIB.

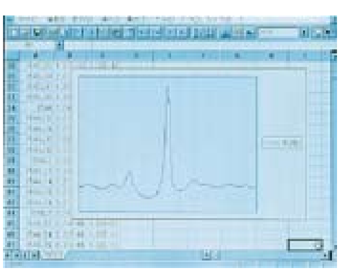
● 3.5 inch internal FDD

In addition to saving and recalling measurement data, etc., waveforms saved to floppy disk can be easily and directly read by a personal computer.
The PC screen shown on the right is displaying an image of the MS9710C screen saved to floppy disk. Screen images can be saved to FD media and output as Windows® bitmap-format files. In addition, since the data can be output in text-file format, it can be manipulated easily using spreadsheet software.



● **Basic measurement direct keys**

Frequently-used functions can be set directly with these hard keys. Even a novice can perform basic measurements easily using these keys.



● **Cleanable optical input connector**

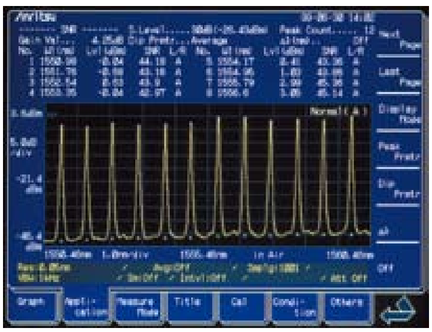
Five connector types can be used: FC/PC, DIN, ST, SC, HMS-10/A. (optical return loss of 35 dB min.) The input connector can be removed and refitted easily for fast cleaning.

Option is installed.

Applications for Every Need

Spectrum analysis for WDM communication systems

The wavelength, level, and SNR of up to 300 WDM channels can be analyzed.
A new noise level left/right average function (shown below) has been added to SNR measurement. In addition, the noise level is normalized to a per nm figure. Accurate SNR measurement can be achieved due to the high resolution accuracy of the MS9710C.



The measurement results described above can be switched to a table display that can be saved and recalled in text format. Both the wavelength and frequency are shown in the table.

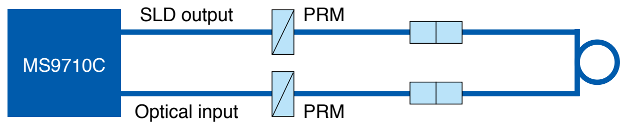
Polarization mode dispersion

An important factor determining the upper limit of the transmission bit rate is the polarization mode dispersion (PMD). PMD is measured in the time and wavelength domains. The MS9710C can be used in the fixed analyzer method to perform simple and automated measurement in the wavelength domain and immediately computes the PMD by processing data from the measured waveform. The wavelength difference ($\lambda_2 - \lambda_1$) between the peak wavelength (λ_1) and the wavelength of the Nth peak (λ_2) are read directly and the PMD is calculated from the following equation.

$$PMD = K\frac{N-1}{C} \times \frac{\lambda_1 \times \lambda_2}{\Delta\lambda}$$

where: K is the mode coupling factor and C is the speed of light (m/s).

It is possible to measure the PMD (Polarization Mode Dispersion)



PRM: Polarization rotation module

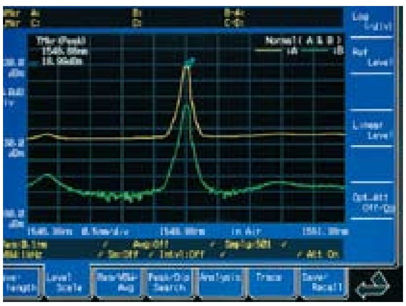
The diagram below shows PMD measurement of a 1 m PANDA fiber.

NF measurement of fiber amplifier (EDFA)

NF measurement by the optical method using an optical spectrum analyzer measures the light input to and output from the EDFA. NF is determined by the beat noise between the opti-cal signal and the Amplified Spontaneous Emission (ASE) from the EDFA as well as by the beat noise between the ASE.
Since the MS9710C measures the ASE level with very high accuracy, three methods can be used to measure NF: 1. Pulse measurement (JIS: under discussion), 2. Level calibration using fitting, and 3. Polarization nulling. Moreover, measurement can be performed with the required dynamic range, level linearity and polarization dependency.

Built-in attenuator for high-power optical sources

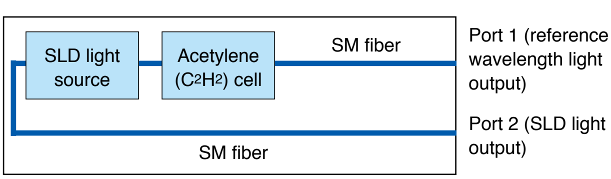
When the built-in attenuator is switched ‘ON’, optical inputs of up to +23 dB can be measured. And since the attenuation is automatically corrected internally, there is no need for the user to re-calibrate the measurement. The screen display below shows the measurement of a +20 dBm optical spectrum amplified by an EDFA.



Convenient light source option, including reference wavelength light source for better accuracy

Any one of the Wavelength reference & SLD light source (Option 13), SLD light source (Option 14), Wavelength reference light source (Option 05), and White light source (Option 02) can be installed in the MS9710C.

The block diagram of the SLD light source & Reference wavelength light source option is shown below. This option has two separate output ports: Port 1 for wavelength calibration, and the Port 2 for measuring transmission characteristics. When the MS9710C is calibrated automatically by inputting the reference wavelength light source, post-calibration wavelength accuracy in the 1520 to 1620 nm range is better than ±20 pm (Option 15). This is very useful in precision absolute measurement of the wavelengths of light sources used in WDM systems.



Block diagram of SLD light source & reference wavelength light

The following diagram shows the spectrum of the SLD light source output from Port 2.

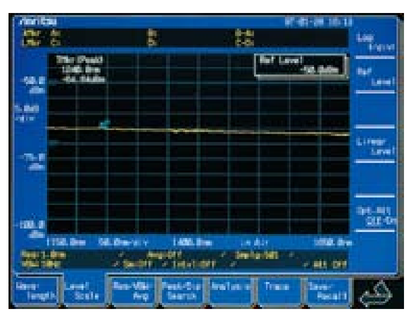
When this light source is used instead of the earlier white light source for measurement of the wavelength transmission characteristics of optical receiver elements, it is possible to achieve a 20 dB wider dynamic range.

Spectrum of SLD light

The following figure is a measurement example of the transmission characteristics an optical band pass filter using the SLD light source.

Measurement of optical band pass filter

If this dynamic range is not required, a lower-cost white light source can be installed instead. The following figure shows the spectrum of the white light source using SM fiber (for GI fiber, refer to the specifications of Option 02).



Spectrum of white light source

Note: The optical input section of the MS9710C is designed for connecting signal mode fibers. There is the MS9780A Optical Spectrum Analyzer which have the optical input section designed for connecting multi-mode fibers (62.5/125 μm).

Measurement of modulated and pulsed light

The synchronization signal for the modulated/pulsed light being measured is input to the external trigger connector on the rear panel. With this analyzer, the data can be controlled by this sync signal. As a result, the spectrum of the modulated or pulsed light can be measured accurately without data loss.
The waveform in the diagram below shows measurement of an optical pulse (OTDR light source) with a pulse width of 1 μs and a duty of 1%.
For accurate spectrum measurement, the VBW must be set to a wider bandwidth than the modulation frequency of the measured light. The maximum settable VBW in the MS9710C is 1 MHz. (Refer to the specifications for the relationship between VBW, received light sensitivity and sweep time.)

VGA output connector

A VGA output connector is provided on the rear panel of the MS9710C for displaying the measurement screen on an external monitor.

Specifications

Main frame, option		MS9710C	With Option 15 (L-band enhancement)
Applicable optical fiber		10/125 μm SM fiber (ITU-T G.652)	
Optical connector*1		User replaceable (FC, SC, ST, DIN, HMS-10/A), factory option (E2000, FC-APC, SC-APC, HRL-10)	
Wave-length	Measurement range	600 to 1750 nm	
	Accuracy	±20 pm (1530 to 1570 nm)*2, ±50 pm (1520 to 1600 nm)*2	±20 pm (1520 to 1620 nm)*2
		±200 pm (1530 to 1570 nm)*3, ±300 pm (600 to 1750 nm)*3	
	Stability	±5 pm	
	Linearity	±20 pm (1530 to 1570 nm)	
	Resolution	0.05, 0.07, 0.1, 0.2, 0.5, 1.0 nm (RBW: 3 dB optical filter; transmission bandwidth)	
	Read resolution	5 pm	
	Resolution*4	≤±2.2 % (1530 to 1570 nm, resolution: 0.5 nm) ≤±3 % (1530 to 1570 nm, resolution: 0.2 nm) ≤±7 % (1530 to 1570 nm, resolution: 0.1 nm) ≤±4 % (1520 to 1530 nm, 1570 to 1620 nm, resolution: 0.5 nm) ≤±5 % (1520 to 1530 nm, 1570 to 1620 nm, resolution: 0.2 nm) ≤±10 % (1520 to 1530 nm, 1570 to 1620 nm, resolution: 0.1 nm)	≤±2.2 % (1520 to 1620 nm, resolution: 0.5 nm) ≤±3 % (1520 to 1620 nm, resolution: 0.2 nm) ≤±7 % (1520 to 1620 nm, resolution: 0.1 nm)
		≤±7 % (600 to 1520 nm, 1620 to 1750 nm, resolution: 0.5 nm) ≤±15 % (600 to 1520 nm, 1620 to 1750 nm, resolution: 0.2 nm) ≤±30 % (600 to 1520 nm, 1620 to 1750 nm, resolution: 0.1 nm)	
Level	Measurement range	–65 to +10 dBm (600 to 1000 nm, 0 to +30˚C, optical ATT: off) –85 to +10 dBm (1000 to 1250 nm, 0 to +30˚C, optical ATT: off) –90 to +10 dBm (1250 to 1600 nm, 0 to +30˚C, optical ATT: off) –75 to +10 dBm (1600 to 1700 nm, 0 to +30˚C, optical ATT: off) –55 to +10 dBm (1700 to 1750 nm, 0 to +30˚C, optical ATT: off) –60 to +10 dBm (600 to 1000 nm, +30 to +50˚C, optical ATT: off) –80 to +10 dBm (1000 to 1250 nm, +30 to +50˚C, optical ATT: off) –85 to +10 dBm (1250 to 1600 nm, +30 to +50˚C, optical ATT: off) –70 to +10 dBm (1600 to 1700 nm, +30 to +50˚C, optical ATT: off) –50 to +10 dBm (1700 to 1750 nm, +30 to +50˚C, optical ATT: off) –70 to +23 dBm (1100 to 1600 nm, 0 to +30˚C, optical ATT: on) –65 to +23 dBm (1100 to 1600 nm, +30 to +50˚C, optical ATT: on) [Resolution: ≥0.07 nm, VBW: 10 Hz, sweep average: 10 times]	
	Accuracy	±0.4 dB (1300/1550 nm, input: –23 dBm, resolution: ≥0.1 nm)	
	Stability	±0.02 dB (1 min, resolution: ≥0.1 nm, input: –23 dBm, no polarization fluctuation)	
	Flatness	±0.1 dB (1530 to 1570 nm, resolution: 0.5 nm, optical ATT: off) ±0.3 dB (1520 to 1620 nm, resolution: 0.5 nm, optical ATT: off)	±0.1 dB (1520 to 1620 nm, resolution: 0.5 nm, optical ATT: off)
	Linearity	±0.05 dB (1550 nm, –50 to 0 dBm, optical ATT: off) ±0.05 dB (1550 nm, –30 to +20 dBm, optical ATT: on)	±0.05 dB (1550/1600 nm, –50 to 0 dBm, optical ATT: off) ±0.05 dB (1550/1600 nm, –30 to +20 dBm, optical ATT: on)
Polarization dependency		±0.05 dB (1550/1600 nm), ±0.1 dB (1300 nm) *Setting resolution: ≥0.5 nm	
Dynamic range*5		High-dynamic range mode (20˚ to 30˚C): 70 dB (1 nm from peak wavelength), 60 dB (0.4 nm from peak wavelength), 42 dB (0.2 nm from peak wavelength) Normal mode (20˚ to 30˚C): 62 dB (1 nm from peak wavelength), 58 dB (0.4 nm from peak wavelength), 42 dB (0.2 nm from peak wavelength)	
Optical return loss		≥35 dB (1300/1550 nm)	
Sweep		Sweep width: 0, 0.2 to 1200 nm Sweep speed (typical)*6: 0.5 s (normal dynamic mode, sweep width: 500 nm, VBW: 10 kHz, center wavelength: 1200 nm, sweep start to stop, no optical input, sampling point: 501)	
Display		6.4 inch, color TFT-LCD	
Memory		A/B (2 trace), 3.5 inch FDD (for MS-DOS® format)	
Printer		Internal (thermal type)	
Interface		GPIB, RS-232C, VGA output	
Operating conditions		Operating temperature: 0˚ to +50˚C (FDD: +5˚ to +50˚C), storage temperature: –20˚ to +60˚C, Relative humidity: ≤90% (no condensation, FDD: 20 to 80%) Shock: 30 G, 11 ms pulse, half sine	
Power		85 to 132 Vac/170 to 250 Vac, 47.5 to 63 Hz, 150 VA (max.)	
Dimensions and mass		320 (W) x 177 (H) x 350 (D) mm, ≤16.5 kg	
EMC*7		EN61326, EN61000-3-2	
LVD		EN61010-1	

*1: One of these connector is attached. Please specify when ordering.
*2: After Wl cal (ref) at wavelength reference optical light source (Option 05/13)
*3: After Wl cal (Ext) at DFB-LD and soon external optical light source
*4: Actual screen resolution, 0˚ to 30˚C
*5: Setting resolution: 0.05 nm, wavelength: 1550 nm, optical attenuator: off
*6: Typical value for reference; not guaranteed specification
*7: Electromagnetic compatibility

White light source (Option 02)

Optical output	≥–59 dBm/nm (multimode fiber input)*1
Wavelength range	900 to 1600 nm
Operating temperature	18˚ to 28˚C

*1: –65 dBm (typ) measured with MS9710C (at 1 nm wavelength resolution) which has single-mode fiber at the input.

Wavelength reference & SLD light source (Option 13)

Wavelength range	1450 to 1650 nm
Output level	>–40 dBm/nm (1550 nm ±10 nm) >–60 dBm/nm (1450 to 1650 nm)
Output level stability*1	±0.04 dB (MS9710C setting resolution: 1 nm, no polarization change, constant temperature, measured for 20 min at 1550 nm)
Spectrum half width	>70 nm (typical: 90 nm)
Optical connector	User replaceable type (FC, SC, ST, DIN, HMS-10/A)
Operating temperature	0˚ to 40˚C
Wavelength reference	1530 nm band Acetylene

*1: Measured after one hour warm-up

SLD light source (Option 14)

Wavelength range	1450 to 1650 nm
Output level	>–40 dBm/nm (1550 nm ±10 nm) >–60 dBm/nm (1450 to 1650 nm)
Output level stability*1	±0.04 dB (MS9710C setting resolution: 1 nm, no polarization change, constant temperature, measured for 20 min at 1550 nm)
Spectrum half width	>70 nm (typical: 90 nm)
Optical connector	User replaceable type (FC, SC, ST, DIN, HMS-10/A)
Operating temperature	0˚ to 40˚C

*1: Measured after one hour warm-up

Wavelength reference light source (Option 05)

Wavelength reference	1530 nm band Acetylene

VBW, sweep speed, minimum light reception sensitivity*1

VBW	10 Hz	100 Hz	1 kHz	10 kHz	100 kHz	1 MHz
Sweep speed (typ)	30 s	5 s	0.5 s	0.5 s	0.5 s	0.5 s
Minimum light reception sensitivity*2	–90 dBm	–80 dBm	–70 dBm	–60 dBm	–50 dBm	–40 dBm

*1: Data for reference; not guaranteed specifications
*2: RMS noise level (1250 to 1600 nm)

Note: Warm-up the MS9710C for about 5 min. to ensure stable operation. The above specifications were obtained 2 hours after power-on.

Ordering Information

Please specify model/order number, name, and quantity when ordering.

Model/Order No.	Name	
	Main frame	
MS9710C	Optical Spectrum Analyzer	
	Standard accessories	
	Optical connector adapter*1:	1 pc
	Power cord, 2.5 m:	1 pc
Z0312	Printer paper:	2 rolls
W1579AE	MS9710C operation manual:	1 copy
W1580AE	Remote control operation manual:	1 copy
MX971003S	LabVIEW® driver (RS-232C):	1 pc
MX971003G	LabVIEW® driver (GPIB):	1 pc
B0329G	Front cover:	1 pc
	Options	
MS9710C-02	White light source*2	
MS9710C-05	Wavelength reference light source*2	
MS9710C-13	Wavelength reference & SLD light source*2	
MS9710C-14	SLD light source*2	
MS9710C-15	L-band enhancement	
MS9710C-25	FC-APC connector*3	
MS9710C-26	SC-APC connector*3	
MS9710C-27	E2000 connector*3	
MS9710C-31	EC (Radial) connector*3	
MS9710C-37	FC connector*4	
MS9710C-38	ST connector*4	
MS9710C-39	DIN connector*4	
MS9710C-40	SC connector*4	
MS9710C-43	HMS-10/A connector*4	
MS9710C-47	HRL-10 connector*3	
	Application parts	
J0654A	RS-232C cable (9P-9P)	
J0655A	RS-232C cable (9P-25P)	
J0007	GPIB cable, 1 m	
J0617B	Replaceable optical connector (FC)	
J0618D	Replaceable optical connector (ST)	
J0618E	Replaceable optical connector (DIN)	
J0618F	Replaceable optical connector (HMS-10/A)	
J0619B	Replaceable optical connector (SC)	
J0635B	FC-PC • FC-PC 2M-SM (FC-PC optical fiber cord, 2 m, SM)	
Z0282	Ferrule cleaner	
Z0283	Replacement reel for ferrule cleaner (for Z0282)	
Z0284	Cleaner for optical adapter (stick type)	
B0330C	Tilt stand	

*1: Specify the connector to be supplied as the standard connector when ordering the above options. If the connector is not specified, the FC connector (MS9710C-37) is supplied as standard.
*2: Factory options; Two units cannot be installed simultaneously.
Exchangeable-type optical connectors (FC, SC, ST, DIN, HMS-10/A) are supplied when specified at ordering. One conversion cord is supplied for connecting other optical connectors to the FC connector.
*3: Factory option
*4: User replaceable

Specifications are subject to change without notice.

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