

MS9740B-009
Multimode fiber interface
(50/62.5 μ m)
Operation Manual

Second Edition

- For safety and warning information, please read this manual before attempting to use the equipment.
- Additional safety and warning information is provided within the MS9740B Optical Spectrum Analyzer Operation Manual. Please also refer to it before using the equipment.
- Keep this manual with the equipment.

ANRITSU CORPORATION

MS9740B-009
Multimode fiber interface (50/62.5 μ m)
Operation Manual

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The operational instructions of this manual may be changed without prior notice.
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Manual Change

The MS9740B-009 is a modified option of the MS9740B.

The following table shows the differences between the MS9740B-009 and the MS9740B.

Refer to the *MS9740B Optical Spectrum Analyzer Operation Manual* (W3998AE) for further information.

Manual Change from MS9740B Optical Spectrum Analyzer Operation Manual

Section	Page	MS9740B	MS9740B-009	Description
1.1.2	1-4	<p>Basic features:</p> <ul style="list-style-type: none"> Supports both single mode (SM) and multimode (MM) fibers (50/125 μm) High wavelength accuracy of ± 20 μm (WDM wavelength band, when MS9740B-002 Light Source for Wavelength Calibration is installed) Dynamic range of 42 dB (0.2 nm from peak wavelength) and 70 dB (1 nm from peak wavelength) (in High Dynamic Mode) High resolution of 0.03 nm (1550 nm band) 	<p>Basic features:</p> <ul style="list-style-type: none"> Supports both single mode (SM) and multimode (MM) fibers (62.5/125 μm, 50/125 μm) <p>The NA of multimode fiber for 50/125 μm and 62.5/125 μm is 0.2 and 0.275, respectively. However, the acceptable NA is 0.1 under the limitations of the spectroscopy.</p> <p>N/A</p> <ul style="list-style-type: none"> 60 dB (0.5 nm from peak wavelength) and 70 dB (1 nm from peak wavelength) (in High Dynamic Mode) dynamic range <p>N/A</p>	
2.1.1	2-2	Table 2.1.1-2	<p>(The following are added.)</p> <p>MS9740B-009</p> <p>Multimode fiber interface (50/62.5μm)</p>	
2.7	2-14	<p>The following optical fibers can be used with MS9740B:</p> <ul style="list-style-type: none"> Single-mode fiber (SM) (core diameter of 5 to 9.5 μm) Multimode fiber (GI) (core diameter of 50 μm) 	<p>The following optical fibers can be used with MS9740B:</p> <ul style="list-style-type: none"> Single-mode fiber (SM) (5 to 9.5 μm core diameter) Multimode fiber (GI) (50 μm core diameter) Multimode fiber (GI) (62.5 μm core diameter) 	

Manual Change from MS9740B Optical Spectrum Analyzer Operation Manual (Cont'd)

Section	Page	MS9740B	MS9740B-009	Description
2.7	2-14	When using SM fiber, press F1 Measure Mode and set f5 MM Mode to Off. When using GI fiber, press F1 Measure Mode and set f5 MM Mode to On. The performance is limited as follows, depending on the fiber used.	N/A	
2.7	2-14	(1) Limitations on wavelength resolution	N/A	
2.7	2-17	Using Multimode (MM) fiber (50 μ m core diameter)	N/A	
3.1.3	3-9	3.1.3 Calibrating Resolution	N/A	
3.5.2	3-14	2. Enter the resolution using f1 through f7 .	2. Enter the resolution using f1 through f5 .	0.03 nm and 0.05 nm are not available.
4.3	4-8	To set resolution (Res): 1. Press f1 Res . 2. Select the value from f1 to f7 .	To set resolution (Res): 1. Press f1 Res . 2. Select the value from f1 to f5 .	0.03 nm and 0.05 nm are not available.
4.7	4-27	The spectrum measurement modes are listed below. • Multi-mode fiber mode (MM Mode)	N/A	Multi-mode fiber mode is deleted.
4.7	4-27	Figure 4.7-1 Multi mode fiber measurement indication	N/A	"MM Mode On" is not displayed.
4.7	4-29	To set Multimode Fiber Mode (MM mode)	N/A	The operation of the MM mode is invalid.
4.7	4-30	To release MM Mode	N/A	The operation of the MM mode is invalid.

Manual Change from MS9740B Optical Spectrum Analyzer Operation Manual (Cont'd)

Section	Page	MS9740B	MS9740B-009	Description
A.1	A-1	Configuration -Option- MS9740B-001/101/201 GPIB Interface MS9740B-002/102/202 Light Source for Wavelength Calibration	Configuration -Option- MS9740B-001/101/201 GPIB Interface MS9740B-002/102/202 Light Source for Wavelength Calibration MS9740B-009 Multimode fiber interface (50/62.5µm)	
A.1	A-2 to A-5	Optical characteristics	Change table in page 4 through 7	
A.2	A-8		(The following are added.) W3995AE MS9740B-009 Multimode fiber interface (50/62.5µm) Operation Manual (Manual Change)	Printed, English
F.2	F-4	Table F.2-1	Change Table F.2-1 on page 8	
F.3	F-5	Table F.3-1, Table F.3-2	Change Table F.3-1 and Table F.3-2 on page 8	

Table A.1-2 Optical Characteristics*1 (MS9740B-009)

Item	Specification
Optical characteristics	Optical fiber: SM (ITU-T G.652), GI (50/125 μm), GI (62.5/125 μm) PC Connector Reflection attenuation 40 dB or more for SM (ITU-T G.652) and GI (50/125 μm) Reflection attenuation 38 dB or more for GI (62.5/125 μm) SM/GI fiber described below means this specified fiber.
Wavelength Wavelength range Wavelength sweep width Wavelength accuracy Wavelength stability	600 nm to 1750 nm 0.2 nm to 1200 nm, 0 nm Using SM fiber, GI fiber (50/125 μm or 62.5/125 μm) after Wl Cal (Ext) execution, ±300 pm (600 to 1750nm) When installing the light source for wavelength calibration (option): Using SM fiber after Wl Cal (Ref) Resolution 0.07 nm to 0.2 nm: ±50.0 pm (1530 to 1570 nm) Resolution 0.5, 1.0 nm: ±100 pm (1530 to 1570 nm) ±5 pm or less Using SM fiber with half-width of center wavelength and 11 pt smoothing during 1-minute period
Resolution Setting resolution Resolution accuracy*2	0.07, 0.1, 0.2, 0.5, 1.0 nm (RBW 3 dB optical filter: transmission bandwidth) Using SM fiber after Res-Cal at 633, 1310, and 1550 nm ±30% (Resolution 0.1 nm) ±15% (Resolution 0.2 nm) ±7% (Resolution 0.5 nm)

*1: After warming up for at least 2 hours after power-on (the Repeat sweeping performed at Span 100 nm or more and VBW 10 kHz or more during the warm-up operation) and performing automatic adjustment of optical axis, with wavelength calibration (hereafter, WI Cal), and constant temperature

*2: Resolution accuracy in center wavelength for the actual resolution value displayed on the screen.

Table A.1-2 Optical Characteristics*1 (MS9740B-009) (Cont'd)

Item	Specification
<p>Level</p> <p>Measurement Level*3</p> <p>Measurement level accuracy</p> <p>Measurement level stability</p> <p>Level Linearity</p>	<p>When optical attenuation is Off:</p> <p>5 to 30°C</p> <p>-65 to +10 dBm (600 to 1000 nm)</p> <p>-85 to +10 dBm (1000 to 1250 nm)</p> <p>-90 to +10 dBm (1250 to 1600 nm)</p> <p>-75 to +10 dBm (1600 to 1700 nm)</p> <p>-55 to +10 dBm (1700 to 1750 nm)</p> <p>30 to 45°C</p> <p>-60 to +10 dBm (600 to 1000 nm)</p> <p>-80 to +10 dBm (1000 to 1250 nm)</p> <p>-85 to +10 dBm (1250 to 1600 nm)</p> <p>-70 to +10 dBm (1600 to 1700 nm)</p> <p>-50 to +10 dBm (1700 to 1750 nm)</p> <p>When optical attenuation is On:</p> <p>5 to 30°C</p> <p>-70 to +23 dBm (1100 to 1600 nm)</p> <p>30 to 45°C</p> <p>-65 to +23 dBm (1100 to 1600 nm)</p> <p>±0.6 dB</p> <p>Wavelength: 1310 nm, 1550 nm, Input: -10 dBm, Resolution: 0.2 nm to 1.0 nm, using SM fiber, using Anritsu's reference single mode fiber with FC/UPC connector, 23 ±5 °C</p> <p>±0.1 dB</p> <p>During 1-minute period at resolution of 0.2 nm or more, with -23 dBm input, using SM fiber with wavelength of 1550 nm, no change in polarization</p> <p>When optical attenuation is Off: ±0.1 dB</p> <p>Using SM fiber with wavelength of 1550 nm at -50 to 0 dBm</p> <p>When optical attenuation = On: ±0.1 dB</p> <p>Using SM fiber with wavelength of 1550 nm at -30 to +20 dBm</p>

*3: VBW = 10 Hz, Sweep average = 10, Resolution = 0.07 nm or more (when using SM fiber)

Table A.1-2 Optical Characteristics*1 (MS9740B-009) (Cont'd)

Item	Specification
Level (Cont'd)	
Dynamic range*4	
High dynamic range mode	70 dB At ±1 nm from peak wavelength, 20 to 30°C
	60 dB At ±0.5 nm from peak wavelength, 20 to 30°C
	65 dB At ±1 nm from peak wavelength, 5 to 45°C
	55 dB At ±0.5 nm from peak wavelength, 5 to 45°C
Normal dynamic range mode	62 dB At ±1 nm from peak wavelength, 20 to 30°C
	58 dB At ±0.5 nm from peak wavelength, 20 to 30°C
	57 dB At ±1 nm from peak wavelength, 5 to 45°C
	53 dB At ±0.5 nm from peak wavelength, 5 to 45°C
Reflection attenuation	32 dB Using SM fiber with wavelength of 1310 and 1550 nm
SMSR reproducibility (Pulsed light measurement option (020/320))	±1.8 dB*5

*4: With optical attenuator Off, at setting resolution of 0.07 nm and wavelength of 1550 nm and temperature of 20 to 30°C, excluding diffraction of other order of diffraction (when using SM fiber)

*5: 10 dBm input at peak power, DFB-LD, Wavelength: 1550 nm, SMSR ≤ 45 dB, No fluctuations in polarization, Used fiber: SM, Pulse conditions: Repetition frequency ≥ 5 kHz and Duty ratio ≥ 1%, Pulse Mode: On, VBW=1 kHz, Resolution: 0.1 nm, Span ≤ 10 nm, Number of sampling points: 501, 23±5 °C

Table A.1-2 Optical Characteristics*1 (MS9740B-009) (Cont'd)

Item	Specification
Sweep time	0.3 s or less /500 nm *6,*7 Center wavelength 1200 nm 0.2 s or less /5 nm *6,*7 Center wavelength 1550 nm, resolution 0.1 nm 0.35 s /30 nm *8,*9 Typical, center wavelength 1550 nm, resolution 0.1 nm 1.65 s /30 nm *9,*10 Typical, center wavelength 1550 nm, resolution 0.1 nm

*6: At VBW = 10 kHz, normal dynamic range mode, from sweep start to stop

*7: No optical input, and 501 sampling points or under

*8: At VBW = 1 kHz Fast, from sweep start to stop

*9: With optical input (Tunable Laser Source, -10 dBm, one wavelength), and 1001 sampling points or under

*10: At VBW = 200 Hz Fast, from sweep start to stop

Table F.2-1 Level Accuracy (When installing MS9740B-009)

Setting Resolution: nm

Light Source Wavelength	Power Meter Display Value	Measurement Value	Minimum value	Result	Maximum value
nm	dBm	dBm	-0.6 dB	dB	+0.6 dB
nm	dBm	dBm	-0.6 dB	dB	+0.6 dB

Table F.3-1 Normal Dynamic Range Mode (When installing MS9740B-009, 20 to 30°C)

Δ Marker Setting Wavelength	Measurement Value	Minimum Value	Result	Measurement Uncertainty
+0.5 nm	dB	58 dB	dB	1 dB
+1.0 nm	dB	62 dB	dB	1 dB
-0.5 nm	dB	58 dB	dB	1 dB
-1.0 nm	dB	62 dB	dB	1 dB

Table F.3-2 High Dynamic Range Mode (When installing MS9740B-009, 20 to 30°C)

Δ Marker Setting Wavelength	Measurement Value	Minimum Value	Result	Measurement Uncertainty
+0.5 nm	dB	60 dB	dB	1 dB
+1.0 nm	dB	70 dB	dB	1 dB
-0.5 nm	dB	60 dB	dB	1 dB
-1.0 nm	dB	70 dB	dB	1 dB