

**MS9740B-009**  
**Multimode fiber interface**  
**(50/62.5 $\mu$ m)**  
**Operation Manual**

**First 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 $\mu$ m)  
Operation Manual

9 April 2019 (First Edition)

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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"> <li>• Supports both single mode (SM) and multimode (MM) fibers (50/125 <math>\mu\text{m}</math>)</li> <li>• High wavelength accuracy of <math>\pm 20</math> <math>\mu\text{m}</math> (WDM wavelength band, when MS9740B-002 Light Source for Wavelength Calibration is installed)</li> <li>• Dynamic range of 42 dB (0.2 nm from peak wavelength) and 70 dB (1 nm from peak wavelength) (in High Dynamic Mode)</li> <li>• High resolution of 0.03 nm (1550 nm band)</li> </ul>	<p>Basic features:</p> <ul style="list-style-type: none"> <li>• Supports both single mode (SM) and multimode (MM) fibers (62.5/125 <math>\mu\text{m}</math>, 50/125 <math>\mu\text{m}</math>)</li> </ul> <p>The NA of multimode fiber for 50/125 <math>\mu\text{m}</math> and 62.5/125 <math>\mu\text{m}</math> 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"> <li>• 60 dB (0.5 nm from peak wavelength) and 70 dB (1 nm from peak wavelength) (in High Dynamic Mode) dynamic range</li> </ul> <p>N/A</p>	
2.1.1	2-2	Table 2.1.1-2	(The following are added.) MS9740B-009 Multimode fiber interface (50/62.5 $\mu\text{m}$ )	
2.7	2-13	<p>The following optical fibers can be used with MS9740B:</p> <ul style="list-style-type: none"> <li>• Single-mode fiber (SM) (core diameter of 5 to 9.5 <math>\mu\text{m}</math>)</li> <li>• Multimode fiber (GI) (core diameter of 50 <math>\mu\text{m}</math>)</li> </ul>	<p>The following optical fibers can be used with MS9740B:</p> <ul style="list-style-type: none"> <li>• Single-mode fiber (SM) (5 to 9.5 <math>\mu\text{m}</math> core diameter)</li> <li>• Multimode fiber (GI) (50 <math>\mu\text{m}</math> core diameter)</li> <li>• Multimode fiber (GI) (62.5 <math>\mu\text{m}</math> core diameter)</li> </ul>	

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

<b>Section</b>	<b>Page</b>	<b>MS9740B</b>	<b>MS9740B-009</b>	<b>Description</b>
2.7	2-13	When using SM fiber, press <b>F1 Measure Mode</b> and set <b>f5 MM Mode</b> to Off. When using GI fiber, press <b>F1 Measure Mode</b> and set <b>f5 MM Mode</b> to On. The performance is limited as follows, depending on the fiber used.	N/A	
2.7	2-13	(1) Limitations on wavelength resolution	N/A	
2.7	2-16	Using Multimode (MM) fiber (50 $\mu$ 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 <b>f1</b> through <b>f7</b> .	2. Enter the resolution using <b>f1</b> through <b>f5</b> .	0.03 nm and 0.05 nm are not available.
4.3	4-8	To set resolution (Res): 1. Press <b>f1 Res</b> . 2. Select the value from <b>f1</b> to <b>f7</b> .	To set resolution (Res): 1. Press <b>f1 Res</b> . 2. Select the value from <b>f1</b> to <b>f5</b> .	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)**

<b>Section</b>	<b>Page</b>	<b>MS9740B</b>	<b>MS9740B-009</b>	<b>Description</b>
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-4	Optical characteristics	Change table in page 4 through 6	
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 7	
F.3	F-5	Table F.3-1, Table F.3-2	Change Table F.3-1 and Table F.3-2 on page 7	

**Table A.1-2 Optical Characteristics\*<sup>1</sup> (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 WI Cal (Ext) execution, ±300 pm (600 to 1750nm) When installing the light source for wavelength calibration (option): Using SM fiber after WI 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* <sup>2</sup>	0.07, 0.1, 0.2, 0.5, 1.0 nm 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\*<sup>1</sup> (MS9740B-009) (Cont'd)**

Item	Specification
<p>Level</p> <p>Measurement Level*<sup>3</sup></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>At resolution of 0.2 nm or more, with -10 dBm input, using SM fiber (master connector) with wavelength of 1310 or 1550 nm and 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\*<sup>1</sup> (MS9740B-009) (Cont'd)**

Item	Specification
Level (Cont'd) Dynamic range* <sup>4</sup> High dynamic range mode  Normal dynamic range mode  Reflection attenuation	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 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 32 dB Using SM fiber with wavelength of 1310 and 1550 nm
Sweep time	0.3 s or less /500 nm * <sup>5,*6</sup> Center wavelength 1200 nm 0.2 s or less /5 nm * <sup>5,*6</sup> Center wavelength 1550 nm, resolution 0.1 nm 0.35 s /30 nm * <sup>7,*8</sup> Typical, center wavelength 1550 nm, resolution 0.1 nm 1.65 s /30 nm * <sup>8,*9</sup> Typical, center wavelength 1550 nm, resolution 0.1 nm

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

\*6: No optical input, and 501 sampling points or under

\*7: At VBW = 1 kHz Fast, from sweep start to stop

\*8: With optical input (Tunable Laser Source, -10 dBm, one wavelength), and 1001 sampling points or under

\*9: 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)**

$\Delta$ 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)**

$\Delta$ 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

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