

OPTICAL POWER METER
ML9001A
 0.38 to 1.8 μm



A Variety of Optical Sensors such as Si, Ge and InGaAs



The ML9001A is a single-channel digital-display optical power meter. It ensures accuracy and linearity over a wide wavelength range and greatly improves measurement reliability. It also has an improved basic performance. For example, measurements can be made over the wide level range from -100 to +20 dBm because internal reflection in the power sensors has been suppressed. The ML9001A also has many new functions that make it easier to use than other power meters. It can be used for all optical power measurements such as optical fiber loss measurement and optical device performance evaluation.

Features

• **Enables high-accuracy measurement**

The ML9001A accurately and automatically calibrates all the power sensors within the specified wavelength range and ensures a ±5% accuracy at -23 dBm. It also has a ±0.15 dB linearity (-23 dBm reference value). The ML9001A extends the guaranteed accuracy range of the measured values and enables high-accuracy measurement.

• **One power sensor for repeater maintenance and long-distance fiber loss measurement**

The MA9612A Optical Power Sensor has ultra-high sensitivity. Its measurement level range is -100 to ±3 dBm in the 1.3 μm band and it can sense either continuous light or modulated light. A single MA9612A can measure the near-end and far-end outputs of a repeater as well as measure long-distance fiber losses.

• **Interchangeable optical connectors**

The optical connectors of all the power sensors accept adapters. This system allows the optical connectors to be interchanged so the ML9001A can be quickly used with various optical connectors. Since the internal coating of the optical power sensors suppresses reflected light, measurement errors are reduced in beam measurement (with or without an optical fiber).

• **Reduced measurement time**

The ML9001A has a much better response speed and stability than conventional optical power meters. With GPIB, it can measure at 30 ms/point so the measurement time can be reduced to less than 50% of conventional automatic measurement.

Specifications

• **ML9001A Optical Power Meter**

Indicator

Display	4 digit, W, W _(REL) , dBm, dB _(REL) selectable
Calibration coefficient	Adjustable
Recorder output	1 V/full-scale, linear output
Range select	Manual selection and automatic ranging
Measurement mode	Continuous and modulated light*1
Wavelength sensitivity correction	Automatic correction in 1 nm steps
Data memory	Max. 1000 data via GPIB
Dimensions and mass	213 (W) x 88 (H) x 250 (D) mm, ≤4 kg

Sensor

Model	MA9411A	MA9611A	MA9612A
Wavelength range	0.38 to 1.15 μm		0.75 to 1.7 μm
Element	Si photodiode		InGaAs photodiode
Active area diameter	9.5 mm		–
Input type	Direct to photodiode		Connector*2
Dimensions and mass	40 (W) x 32 (H) x 62/73 (D) mm, ≤ 400 g	40 (W) x 32 (H) x 65 (D) mm, ≤ 400 g	61 (W) x 42 (H) x 110 (D) mm, ≤ 800 g

Model	MA9711A/A1	MA9712A	MA9714B
Wavelength range	0.75 to 1.8 μm		
Element	Ge photodiode	Cooled-Ge photodiode	
Active area diameter	5 mm		–
Input type	Direct to photodiode		Connector*3
Dimensions and mass	40 (W) x 32 (H) x 62/73 (D) mm, ≤ 400 g	42 (W) x 47 (H) x 110 (D) mm, ≤ 500 g	47 (W) x 61 (H) x 128 (D) mm, ≤ 800 g

Overall

Model	MA9411A	MA9611A	MA9612A	
Optical power measurement range	Continuous light	–70 to +10 dBm*4 (0.1 nW to 10 mW)	–70 to +3 dBm*5 (0.1 nW to 2 mW)	–100 to +3 dBm*5 (0.1 pW to 2 mW)
	Modulated light	–70 to +7 dBm*6 (0.1 nW to 5 mW)	–80 to 0 dBm*7 (10 pW to 1 mW)	–90 to 0 dBm*7 (1 pW to 1 mW)
Measurement accuracy	Absolute accuracy (–23 dBm)	$\pm 5\%^8$ (0.5 to 0.95 μm)		
	Linearity continuous light: 23°C, –23 dBm as reference	± 0.15 dB*10 (± 0.45 dB for –70 to –60 dBm)	± 0.15 dB*10 (± 0.45 dB for –70 to –60 dBm)	± 0.15 dB*10 (± 0.45 dB for –90 to –80 dBm)
Resolution	W, W (REL) display: 0.1 to 1%, dBm display: 0.01 dB, dB (REL) display: 0.001 dB			
Power	100/115/120/200/220 Vac $\pm 1\%$, 240 Vac $\pm 4\%$, 50/60/400 Hz, ≤ 40 VA			
Operating temperature	0 to +50°C			
EMC*11	EN61326: 1997/A2: 2001 (Class A), EN61000-3-2: 2000 (Class A), EN61326: 1997/A2: 2001 (Annex A)			
LVD	EN61010-1: 2001 (Pollution Degree 2)			

Model	MA9711A/A1	MA9712A	MA9714B	
Optical power measurement range	Continuous light	–40 to +10 dBm*5 (0.1 μW to 10 mW)	–60 to +10 dBm*5 (1 nW to 10 mW)	–47 to +23 dBm*12 (20 nW to 200 mW)
	Modulated light	–60 to +7 dBm*7 (1 nW to 5 mW)	–70 to +7 dBm*7 (0.1 nW to 5 mW)	–57 to +20 dBm*13 (2 nW to 100 mW)
Measurement accuracy	Absolute accuracy (–23 dBm)	$\pm 5\%^9$ (0.95 to 1.5 μm)		
	Linearity continuous light: 23°C, –23 dBm as reference	± 0.15 dB*10 (± 0.45 dB for –40 to –30 dBm)	± 0.15 dB*10 (± 0.45 dB for –60 to –50 dBm)	$\pm 4.5\%$ (1.55 μm)*14 $\pm 5\%$ (0.95 to 1.6 μm)*15
Resolution	W, W (REL) display: 0.1 to 1%, dBm display: 0.01 dB, dB (REL) display: 0.001 dB			
Power	100/115/120/200/220 Vac $\pm 1\%$, 240 Vac $\pm 4\%$, 50/60/400 Hz, ≤ 40 VA			
Operating temperature	0 to +50°C			
EMC*11	EN61326: 1997/A2: 2001 (Class A), EN61000-3-2: 2000 (Class A), EN61326: 1997/A2: 2001 (Annex A)			
LVD	EN61010-1: 2001 (Pollution Degree 2)			

*1: Twelve modulation frequencies including 270 Hz and 1 kHz

*2: FC-type connector standard

*3: Only for PC type SM fiber (10/125 μm , NA 0.1)

*4: At 0.85 μm

*5: At 1.3 μm

*6: At 0.85 μm , 270 Hz

*7: At 1.3 μm , 270 Hz

*8: For wavelengths other than 0.85 μm , specified at 23° $\pm 5^\circ\text{C}$

*9: For wavelengths other than 1.3 μm , specified at 23° $\pm 5^\circ\text{C}$

*10: At 23° $\pm 5^\circ\text{C}$

*11: Electromagnetic compatibility

*12: At 1.55 μm

*13: At 1.55 μm , 270 Hz

*14: At 1.55 μm , 0 dBm

*15: At 0 dBm

*16: Reference = 0 dBm

Note:

When an optical fiber is used, performance is guaranteed for a fiber core diameter of up to 62.5 μm and an NA of up to 0.29.

When any other fiber is used, a measurement error may occur.

• Optical connector options

Option No.	Optical connector
32	MU
33	LC
37	FC
38	ST
39	DIN
40	SC
41*1	TOCP172
42	HFS-13A
43	HMS-10/A

*1: For MA9411A

Ordering information

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

Model/order No.	Name
ML9001A	Main frame Optical Power Meter
J0313	Standard accessories (for ML9001A) Sensor connecting cord A, 2 m (for MA9612A/9712A/9714B): 1 pc
J0314	Sensor connecting cord B, 2 m (for MA9411A, MA9611A and MA9711A/A1): 1 pc
F0004	Power cord, 2.5 m: 1 pc
F0007	Fuse, 0.4 A (T400MA250V): 2 pcs
W0420AE	Fuse, 0.8 A (T800MA250V): 2 pcs ML9001A operation manual: 1 copy
MA9411A*1	Optical power sensors Optical Power Sensor
MA9611A	Optical Power Sensor (with MA9005A connector adapter)
MA9612A	Optical Power Sensor (with J0480A connector adapter)
MA9711A/A1*1	Optical Power Sensor
MA9712A	Optical Power Sensor
MA9714B*2	Optical Power Sensor
MA9001B*3	Optional accessories Connector Adapter (FC type, for MA9411A/MA9711A)
J0480B*3	Connector adapter (FC type, for MA9612A)
MA9005A*3	Connector Adapter (FC type, for MA9611A)
MP92B*3	Connector Adapter (FC type, for MA9712A)
MA9013A*3	Fiber Adapter (with FC type plug, for fibers with 125 μm clad dia., 0.25 to 1.0 mm jacket dia.)
MP916A	Fiber Adapter (for MA9002A and MP94A, for plastic fiber with 1 mm dia.)
MP93A	Fiber Adapter (≤150 μm clad dia., 0.8 to 1.0 mm jacket dia.)
MP94A	Adapter (for MA9712A, used with MP93A)
MA9002A	Adapter (for MA9411A/MA9711A, used with MP93A)
MA9805A	Optical Attenuator (for MA9411A, 10 dB)
MA9306A	Optical Attenuator (for MA9711A, 10 dB)
J0007	GPIB cable, 1 m
J0008	GPIB cable, 2 m
B0186	Front cover
J0617B*4	Replaceable optical connector (FC)
J0618D*4	Replaceable optical connector (ST)
J0618E*4	Replaceable optical connector (DIN)
J0618F*4	Replaceable optical connector (HMS-10/A)
J0619B*4	Replaceable optical connector (SC)
J0741A	Replaceable ferrule (for MA9714B)
Z0282	Ferrule cleaner (Cletop A type, 1 pc)
Z0283	Tape for ferrule cleaner (6 pcs/set, for Z0282)
Z0284	Cleaner for optical adapter (stick-type, 200 pcs/set)

*1: MA9711A1 is lateral input sensors.

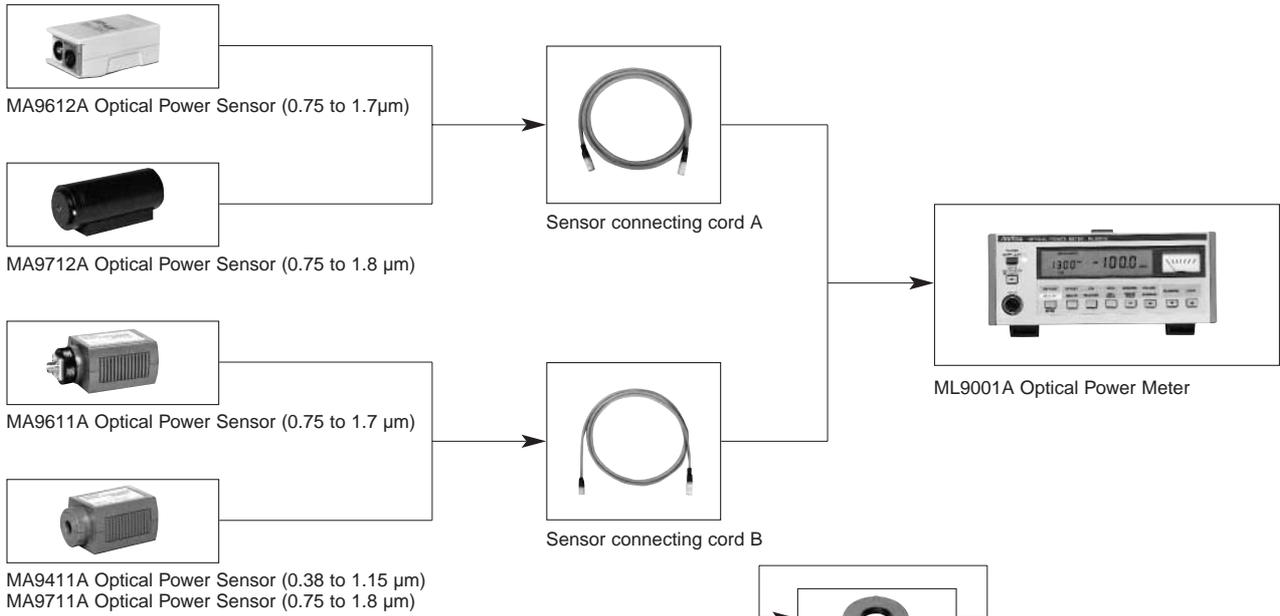
*2: Specify one of FC, ST, DIN, SC or HMS-10A.

When the connector type is not specified, FC is supplied.

*3: The optical connector of the standard product is FC. Please specify the option numbers along with model names shown in the tables, if you need a different optical connector.

*4: For MA9714B

ML9001A with sensor



Adapters (option)

