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POWER METER
ML4803A
100 kHz to 90 GHz

For Measuring Power in Quasi-Millimeter and Millimeter Wave Bands



CE GPIB

The ML4803A consists of an indicator, which displays the detected electric signals as the power, and power sensors, which detect power and convert it to electric signals. Several types of power sensors are provided for accurately measuring power in a frequency range of 100 kHz to 90 GHz. The ML4803A has various functions to meet all power measurement requirements, from low frequency to super-high frequency such as the millimeter waveband.

Features

- **Abundant functions**

(1) Three measurement modes
The ML4803A can measure absolute values in units of "W" or "dBm" in addition to relative values in units of "dB" or "%" . When return loss is measured in absolute value measurement, VSWR can also be displayed.
(2) Automatic sensor sensitivity correction
The sensitivity of coaxial power sensor is corrected automatically by a one-touch operation using the built-in calibration oscillator.

- **Excellent operability and efficient measurement with memory function**

(1) The corrections required in measurements (calibration coefficient, corrected value of attenuation or gain and reference value in relative measurements) can be easily set using the rotary encoder.
(2) Since the amount of correction for 30 points corresponding to measured frequencies can be stored beforehand, it need not be set each time the measured frequency changes. This function improves measurement efficiency.
(3) The amount of correction set is retained even when the power supply is turned off.

- **Three power supplies**

The ML4803A can be operated on AC, DC, or batteries and can therefore be used anywhere.

- **Super-wide coaxial-type amorphous sensors**

(1) Supper-wide band: 100 kHz to 32 GHz
(2) Wide dynamic range: –30 to +20 dBm
(3) Low VSWR and high response speed
(4) 75 Ω power sensor is provided
The amorphous detection element is field-replaceable.

- **Diode sensor suitable for low-level and wide-band measurements**

(1) Wide band: 100 kHz to 26.5 GHz
(2) Low-level measurement: –70 to –20 dBm
(3) Compact and lightweight
(4) 75 Ω power sensor

- **Quasi-millimeter and millimeter waves can also be measured.**

The conventional waveguide-type power sensors can be used by connecting them to the ML4803A using adapter MA4002A/B.

For product ordering information, see pages 4-7.

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Specifications

• ML4803A indicator

Frequency range		100 kHz to 90 GHz
Sensor	Coaxial types	For high level: MA4701A, MA4703A, MA4705A, MA4601A, MA4603A For low level: MA4702A, MA4704A, MA4602A, MA4604A
	For quasi-millimeter and millimeter waves	MP737A, MP738A, MP712A[ ] , MP713A[ ] (used with MA4002A Adapter) MP714A[ ], MP715A[ ], MP716A[ ], MP717A[ ] (used with MA4002B Adapter)
Display		W, dBm, or dB (REL) can be selected. 4-digit digital display (20% over range is equipped) Compact analog indicator is built-in (values cannot be used.)
Calibration coefficient, offset value, and reference level setting		Calibration coefficient: 0 to 10 dB (accuracy: 0.01 dB) Offset value: 0 to ±99.99 dB (accuracy: 0.01 dB) Reference level: –99.99 to +99.99 dBm (accuracy: 0.01 dB)
Power range		MA4701A/4703A/4705A/4601A/4603A full-scale values: –20, –10, 0, +10, +20 dBm (10 µW to 100 mW) MA4702A/4704A/4602A/4604A full-scale values: –60, –50, –40, –30, –20 dBm (1 nW to 10 µW) MP series sensors full-scale values: –20, –10, 0, +10, +20 dBm (10 µW to 100 mW)
Range switching		Automatic or manual (range hold) can be selected. When manual is selected, an arbitrary range can be set unrelated to input levels.
Range display		Selected range (when range is held) is displayed on range lamps 1 to 5. An under range or over range is also displayed.
Accuracy	Accuracy (at indicator)	WATT mode: ±0.5%, dBm mode: ±0.02 dBm, dB (REL) mode: ±0.02 dB
	Zero adjustment	Automatically performed by pressing push-button key
	Zero setting	MA series sensors: ±0.5% of full scale (typical value) at the highest sensitivity range (range 1) MP series sensors: ±1.0% of full scale (typical value) at the highest sensitivity range (range 1)
	Zero shift between each range	MA series sensors: ±0.2% of full scale after zero set at the highest sensitivity range MP series sensors ±0.8% of full scale: Range 2 after zero set at the highest sensitivity range ±0.5% of full scale: Range 3 to 5 after zero set at the highest sensitivity range
Calibration oscillator		50 MHz calibration oscillator is built in. Output connector: N (J) Output power: 1.00 mW (0 dBm) Accuracy: Set to within 0.7% at factory (NIST traceable) ±1.2% worst case for one year
Averaging		4 sample rates can be selected.
RF blanking output		Low-level TTL (0 to +0.25 V) in zero set mode High-level TTL (5 ±0.25 V) when zero set mode is cancelled
Recorder output		DC voltage proportional to indicated value is output (1 V in full-scale display). Output impedance: 1 kΩ, Output connector: BNC
Remote-control		GPIB is standard. Front panel functions other than the power switch can be controlled externally. SH1, AH1, T5, L4, SR1, RL1, PP0, DC1, DT0, C0
Memory function		Up to 30 frequencies, calibration coefficient, offset value, and reference level data combinations can be stored.
Power supply	AC power supply	100 V $^{+10}_{-15}$%, 50/60 Hz, <20 VA
	DC power supply	+7 to +12 V, ≤13 VA
	External battery pack	Continuous operation with MZ5003A Battery Pack: 5 hours
Operating temperature		0° to 50°C
Dimensions and mass		213 (W) x 88 (H) x 250 (D) mm, ≤3 kg
EMC*1		EN55011: 1991, Group 1, Class A EN50082-1: 1992
Safety		EN61010-1: 1993 (Installation Category II, Pollution Degree II)

*1: Electromagnetic Compatibility

• Coaxial-type power sensors

Amorphous power sensor

Model	MA4701A	MA4703A	MA4705A	MA4601A	MA4603A
Frequency range	10 MHz to 18 GHz	50 MHz to 26.5 GHz	50 MHz to 32 GHz	100 kHz to 5.5 GHz	100 kHz to 2 GHz
Nominal impedance	50 Ω				75 Ω
Maximum VSWR	1.4 (10 to 30 MHz) 1.18 (30 to 50 MHz) 1.1 (50 MHz to 2 GHz) 1.18 (2 to 12.4 GHz) 1.28 (12.4 to 18 GHz)	1.15 (50 to 100 MHz) 1.10 (0.1 to 2 GHz) 1.15 (2 to 12.4 GHz) 1.20 (12.4 to 18 GHz) 1.25 (18 to 26.5 GHz)	1.15 (50 to 100 MHz) 1.10 (0.1 to 2 GHz) 1.15 (2 to 12.4 GHz) 1.20 (12.4 to 18 GHz) 1.25 (18 to 26.5 GHz) 1.50 (26.5 to 32 GHz)	1.3 (100 to 300 kHz) 1.2 (0.3 to 1 MHz) 1.1 (1 MHz to 4 GHz) 1.2 (4 to 5.5 GHz)	1.4 (100 to 300 kHz) 1.15 (300 kHz to 2 GHz)
Measured power range	–30 to +20 dBm (1 µW to 100 mW)				
Maximum input power	300 mW in average				
Linearity	±3% in only +10 to +20 dBm range				
Input connector	N	APC-3.5		N	NC
Dimensions and mass	34 (W) x 25 (H) x 98 (L) mm, ≤200 g	34 (W) x 25 (H) x 87 (L) mm, ≤200 g		34 (W) x 25 (H) x 98 (L) mm, ≤200 g	

 For product ordering information, see pages 4-7.

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Diode power sensor

Model	MA4702A	MA4704A	MA4602A	MA4604A
Frequency range	10 MHz to 18 GHz	50 MHz to 26.5 GHz	100 kHz to 5.5 GHz	100 kHz to 2 GHz
Nominal impedance	50 Ω			75 Ω
Maximum VSWR	1.4 (10 to 30 MHz) 1.15 (30 MHz to 4 GHz) 1.2 (4 to 8 GHz) 1.3 (8 to 18 GHz)	1.15 (50 MHz to 4 GHz) 1.2 (4 to 8 GHz) 1.3 (8 to 18 GHz) 1.54 (18 to 26.5 GHz)	1.3 (100 to 300 kHz) 1.15 (300 kHz to 3 GHz) 1.2 (3 to 5.5 GHz)	1.4 (100 to 300 kHz) 1.2 (300 kHz to 2 GHz)
Measured power range	–70 to –20 dBm (0.1 nW to 10 µW)			
Maximum input power	200 mW in average/peak, 0 Vdc			
Linearity	±2% in only –30 to–20 dBm range			
Input connector	N	APC-3.5	N	NC
Dimensions and mass	34 (W) x 25 (H) x 98 (L) mm, ≤200 g	34 (W) x 25 (H) x 87 (L) mm, ≤200 g	34 (W) x 25 (H) x 98 (L) mm, ≤200 g	

• Waveguide sensors
For quasi-millimeter waveband

Model	MP737A	MP738A	MP712A[ ]	MP713A[ ]	MP714A[ ]
Frequency range	17 to 22 GHz	21.7 to 33 GHz	18 to 26.5 GHz	26.5 to 40 GHz	33 to 50 GHz
Maximum VSWR	1.6	1.5	1.6	1.5	
Measured power range	–30 to +20 dBm (1 µW to 100 mW)				
Maximum input power	+22 dBm (160 mW)				
Linearity error	±3% only +10 to +20 dBm range				
Dimensions and mass	52ø x 103L mm, ≤450 g				52ø x 78L mm, ≤700 g
Required adapter type	MA4002A				MA4002B

For millimeter waveband

Model	MP715A[ ]	MP716A[ ]	MP717A[ ]
Frequency range	40 to 60 GHz	50 to 75 GHz	60 to 90 GHz
Maximum VSWR	1.4		
Measured power range	–30 to +20 dBm (1 µW to 100 mW)		
Maximum input power	+22 dBm (160 mW)		
Linearity error	±3% in only +10 to +20 dBm range		
Dimensions and mass	52ø x 78L mm, ≤700 g (including cord)		
Required adapter type	MA4002B		

Please select the type of flanges from the below and put its number in the mark [ ].
Blank: JIS flange, 1: MIL flange, 4: UG flange

Ordering information

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

Model/Order No.	Name	
	Main frame	
ML4803A	Power Meter	
	Standard accessories	
J0370A	Sensor connecting cord, 1.5 m:	1 pc
J0017	Power cord, 2.5 m:	1 pc
F0018	Fuse, 0.5 A:	1 pc
W0081AE	ML4803A operation manual:	1 copy
W0081BE	ML4803A service manual:	1 copy
	Sensors	
MA4601A	Amorphous Power Sensor (coaxial-type)	
MA4603A	Amorphous Power Sensor (coaxial-type)	
MA4701A	Amorphous Power Sensor (coaxial-type)	
MA4703A	Amorphous Power Sensor (coaxial-type)	
MA4705A	Amorphous Power Sensor (coaxial-type)	
MA4602A	Diode Power Sensor (coaxial-type)	
MA4604A	Diode Power Sensor (coaxial-type)	
MA4702A	Diode Power Sensor (coaxial-type)	
MA4704A	Diode Power Sensor (coaxial-type)	
MP712A[ ]	Waveguide Type Sensor*1	
MP713A[ ]	Waveguide Type Sensor*1	
MP714A[ ]	Waveguide Type Sensor*1	
MP715A[ ]	Waveguide Type Sensor*1	
MP716A[ ]	Waveguide Type Sensor*1	
MP717A[ ]	Waveguide Type Sensor*1	
MP737A	Waveguide Type Sensor*1	
MP738A	Waveguide Type Sensor*1	

*1: Refer to the data sheet for ML4803A. Specify waveguide type when ordering.

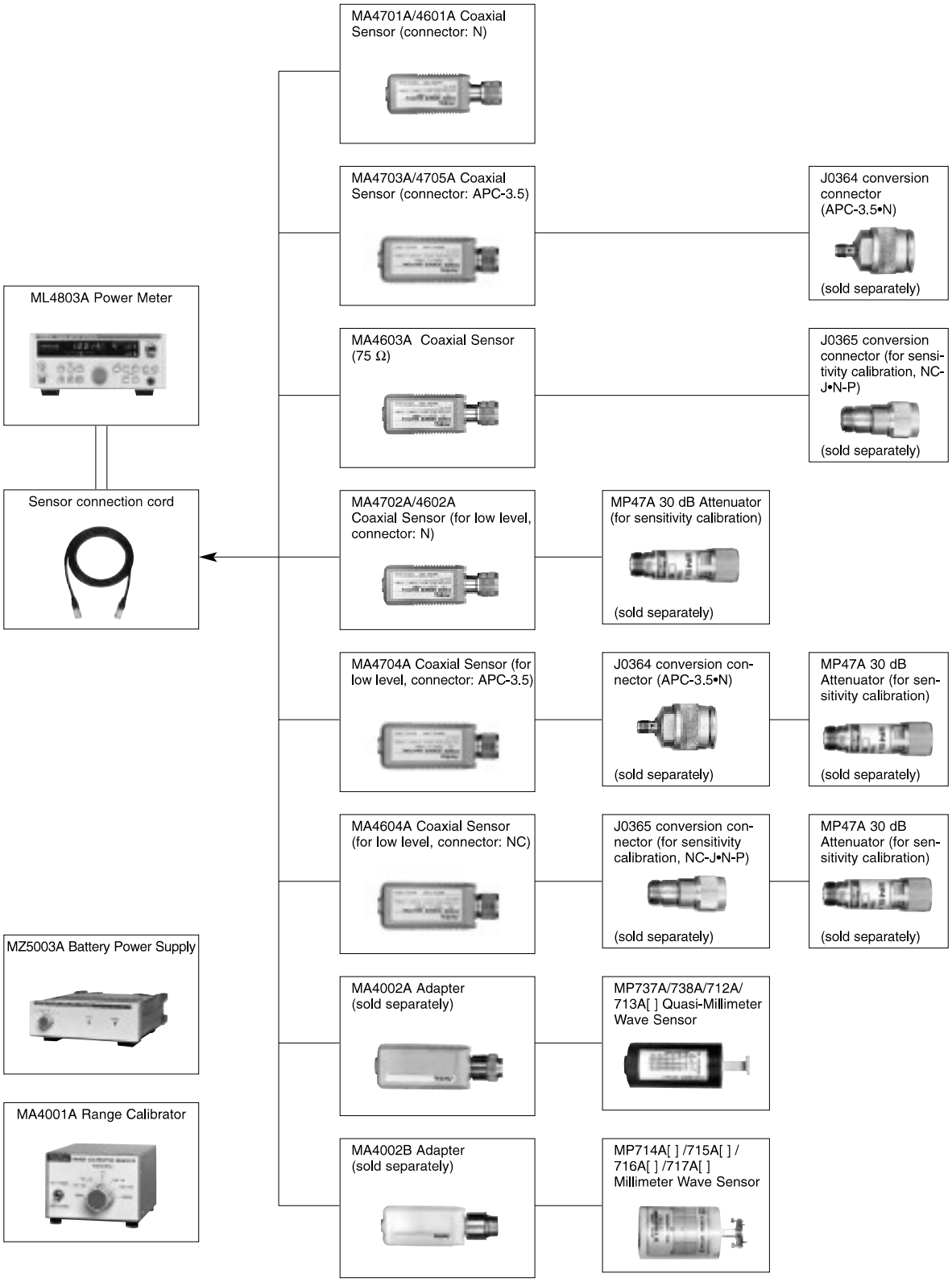
Model/Order No.	Name
	Optional accessories
MA4001A	Range Calibrator (for indicator full-scale calibration)
MA4002A	Sensor Adapter for quasi-millimeter wave (for MP712A/713A/737A/738A)
MA4002B	Sensor Adapter for millimeter wave (for MP714A/715A/716A/717A)
J0364	APC-3.5 to N conversion connector (required for MP4703A/4704A/4705A)
J0365	NC-J•N-P conversion connector for sensitivity calibration (required for MA4603A/4604A)
MP47A	Attenuator for sensitivity calibration (30 dB, required for MA4602A/4604A/4702A/4704A)
MP721D	Fixed Attenuator (20 dB, N-type, 2 W, DC to 12.4 GHz)
J0077	Fixed attenuator (20 dB, N-type, 2 W, DC to 18 GHz)
J0063	Fixed attenuator (30 dB, N-type, 10 W, DC to 12.4 GHz)
J0078	Fixed attenuator (20 dB, N-type, 10 W, DC to 18 GHz)
J0395	Fixed attenuator (30 dB, N-type, 30 W, DC to 8.6 GHz)
J0064A	7 GHz band coaxial waveguide connector (5.8 to 8.2 GHz, N-J to BRJ-7)
J0064B	10 GHz band coaxial waveguide connector (10.0 to 15.0 GHz, N-J to BRJ-120)
J0064C	10 GHz band coaxial waveguide connector (8.2 to 13.0 GHz, N-J to BRJ-10)
J0366	18 GHz band coaxial waveguide connector (17.7 to 21.2 GHz, SMA-J to FUBR180)
J0367	22 GHz band coaxial waveguide connector (18 to 26.5 GHz, APC-3.5-J to UG-5971U)
J0368	30 GHz band coaxial waveguide connector (26.5 to 34 GHz, APC-3.5-J to UG-5991U)
J0632A	18 GHz band coaxial waveguide connector (17.7 to 22 GHz, SMA-J to FUBR180)
J0632B	26 GHz band coaxial waveguide connector (22 to 33 GHz, K-J to FUBR260)
J0633A	Conversion connector (NC-J • BNC75-J)
J0633B	Conversion connector (NC-J • BNC75-P)
J0633C	Conversion connector (NC-P • BNC75-J)
J0633D	Conversion connector (NC-P • BNC75-P)
J0633E	Conversion connector (NC-P • SP3C-J)
J0633F	Conversion connector (NC-J • SP3C-P)
J0633G	Conversion connector (NC-P • SP3C-J)
J0633H	Conversion connector (NC-P • SP3C-P)
J0369	Taper waveguide: WRJ-320 (FUBR320)/WRJ-260 (FUBR260)
B0183	Rack mount kit-1 (for one ML4803A)
B0184	Rack mount kit-2 (for two ML4803A)
B0185	Carrying bag
B0186	Protective front cover
J0370C	Sensor cord, 2.5 m (for extension)
J0370E	Sensor cord, 5 m (for extension)
J0370G	Sensor cord, 10 m (for extension)
MZ5003A	Battery Power Supply (for DC operation)
J0371	DC power cord (for +7 to +12 V power supply)
J0008	GPIB cable, 2 m

For product ordering information, see pages 4-7.

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List of power meter components

When ordering sensors, refer to the following figure to order required components that are sold separately.



 For product ordering information, see pages 4-7.

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