
The Anritsu family of power sensors designed to cover a wide range of measurement applications.






## Power Sensors for every application

Anritsu's power sensors have been designed with just one thing in mind: everything. The range of sensors provide frequency coverage to 50 GHz, with dynamic range up to 90 dB, and includes both diode and thermal based technologies.

The Anritsu diode-based sensors offer speed, sensitivity, and dynamic range with designs using half- or full-wave diode rectifiers constructed from zero-bias Schottky diodes. The rectifier output is low-pass filtered, forming an envelope detector. This post-detection bandwidth is sometimes referred to as the video bandwidth and is a measure of how quickly the power sensor can respond to a changing input signal, such as a radar pulse or a multi-carrier OFDM signal.

## Pulse and Wideband Sensors: MA2490/91A and MA2411B

The MA2490A and MA2491A have been designed as dual-purpose, wideband and CW sensors. An FET switch is used to chop the signal from the sensor, to improve stability at low power levels, in CW mode. These sensors have 20 MHz video bandwidth (and 18 ns rise-time in the pulse modulated mode), and can be used to make average and peak power factor measurements on signals with rapid amplitude change, such as those in 3G/4G, WLAN, WiMAX and radar systems.

The MA2411B pulse sensor has been specifically designed for a wide video bandwidth of 50 MHz, providing a fast rise-time of better than 8 ns. This power sensor does not contain a FET switch for low-level CW applications. Use this sensor for the most demanding rising-edge measurements, such as radar and OFDM, multi-carrier signals.

## Standard Diode Sensors: MA2470D

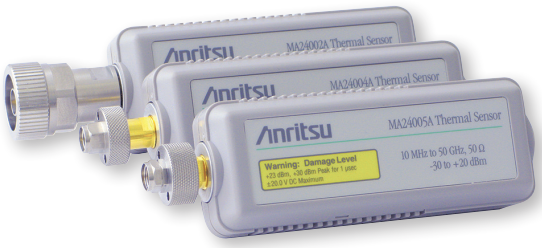
Designed for high dynamic range, high accuracy CW and TDMA measurements, these power sensors have 90 dB dynamic range and linearity better than 1.8%. This makes them the choice for precision measurements. The rise-time of these sensors is fast enough for power measurements on GSM and similar TDMA systems that use GMSK modulation.

## High Accuracy Diode Sensors: MA2440D

With its built in 3 dB attenuator, the MA2440D sensors minimize input VSWR. They are typically used when high measurement accuracy is required over a large dynamic range, for example when measuring amplifiers. High accuracy diode sensors have a dynamic range of 87 dB compared to the 90 dB of standard diode sensors. In all other respects, the performance of the sensors is identical to the standard diode sensor.

## Universal Power Sensors: MA2480D

The MA2480A series are true RMS sensors with a dynamic range of 80 dB. These power sensors are modulation independent and can be used for average power measurements on a wide variety of signals, including multi-tone or W-CDMA signals. The sensor architecture consists of three pairs of diodes, each one configured to work in its square law region over the dynamic range of the sensor. Option 1 provides TDMA measurement capability, calibrating one of the diode pairs for linearity over a wide dynamic range.




## Thermal Power Sensors: MA24000A

The Anritsu MA24000A series thermal sensors provide excellent power measurement accuracy over 50 dB of dynamic range. Thermal sensors use Seebeck elements, where the combined effect of a thermal gradient and charge migration between dissimilar metals gives a true reading of the average power of any incident waveform. Anritsu thermal sensors have class leading SWR and a built

## Sensor EEPROM

The family of Anritsu power sensors store calibration data and model information within internal EEPROMS. User calibration factor tables allow  frequency points or compensation for test system loss, including that from couplers and attenuators.

High Power Applications

Traditional high-power sensors are expensive and have degraded accuracy specifications. Having additional specialized sensors lead to more annual calibrations requiring more down time and expense. Using user calibration factor tables coupled with a precision high power attenuator avoids these problems and eliminates the need for specialized, high-power. Users can easily reduce operating costs and save time:

- Compensation can be made for any precision attenuator or coupler by entering frequency and attenuation values into the user calibration factor table in the internal EEPROM.
- The attenuation device can be semi-permanently attached. The power meter automatically applies compensation during the 0.0 dBm, 50 MHz calibration reference process.
- User calibration factor tables are easily deactivated – allowing the power sensor to be used as a stand-alone device.
- Up to six tables can be stored.

### Sensor and Power Meter Selection

| Sensors | Standard Diode | (High Accuracy) Diode | Universal | Wideband | Pulse | Thermal |
|---|---|---|---|---|---|---|
| | MA2470D Series | MA2440D Series | MA2480D Series | MA249XA Series | MA2411B | MA2400xA |
| Power Measurement | Average (RMS) | Average (RMS) | Average (RMS) | Average (RMS), Peak | Average (RMS), Peak | Average (RMS) |
| Measurement Application (Examples) | CW, GMSK,GFSK, 8PSK | CW, GMSK | CW, GMSK, GFSK, 8PSK, QPSK, QAM | CW, GMSK, 8PSK, QPSK, QAM | Pulse, QAM | Any modulation |
| | TDMA, FDMA, IS136 | TDMA, FDMA | TDMA, FDMA, CDMA, OFDM, Radar | TDMA, FDMA, CDMA, OFDM, Radar | Radar, OFDM | Any access scheme |
| Compatible Power Meters | ML24xxA/B | ML24xxA/B | ML24xxA/B | ML2490A | ML2490A | ML24xxA/B |

# Ordering information

## Power Meter Models

| | |
|---|---|
| ML2495A | Pulse Power Meter, Single Input |
| ML2496A | Pulse Power Meter, Dual Input |
| ML2437A | CW Power Meter, Single Input |
| ML2438A | CW Power Meter, Dual Input |

### ML2490A Series

| | |
|---|---|
| ML2400A-05 | Front Bail Handle |
| ML2490A-06 | Rear Mount Input A on ML2495A |
| ML2490A-07 | Rear Mount Input A and Reference on ML2495A |
| ML2490A-08 | Rear Mount Inputs A, B and Reference on ML2496A |
| ML2490A-09 | Rear Mount Inputs A, B on ML2496A |
| ML2490A-98 | Calibration to Z540, ISO Guide 25 |
| ML2490A-99 | Premium Calibration |
| 113000-00239-ja | Programming Manual: Japanese (soft copy only) |
| 13000-00164 | Maintenance Manual ML2490A (hard copy) |
| 13000-00238 | Operation Manual ML2490A (hard copy) |
| 13000-00238-ja | Operating Manual: Japanese (soft copy only) |
| 13000-00239 | Programming Manual ML2490A (hard copy) |
| 13000-00239-ja | Programming Manual: Japanese (soft copy only) |

Options 5, 2400-82, and 2400-83 are mutually exclusive for any given ML2490A.

Options 6, 7, 8 and 9 are mutually exclusive for any given ML2490A.

### ML2430A Series

| | |
|---|---|
| ML2400A-05 | Front Bail Handle |
| ML2400A-06 | Rear Mount Input A on ML2437A |
| ML2400A-07 | Rear Mount Input A and Reference on ML2437A |
| ML2400A-08 | Rear Mount Inputs A, B and Reference on ML2438A |
| ML2400A-09 | Rear Mount Inputs A and B on ML2438A |
| 2000-1603 | NiMH Battery |
| 2000-996-R | Desktop Battery Charger with Power Supply |
| 2000-1534-R | Desktop Battery Charger (for use in Japan only) |
| 2000-1538-R | 3m Sensor Cable |
| 2000-1539-R | 5m Sensor Cable |
| 2000-1540-R | 10m Sensor Cable |
| 2000-1541-R | 30m Sensor Cable |
| 2000-1542-R | 50m Sensor Cable |
| 2000-1543-R | 100m Sensor Cable |
| 2000-1545 | Bulkhead Adapter |
| 10585-00001 | Operation and Programming Manual ML2437/8A (hard copy) |
| 10585-00001-ja | Operation and Programming Manual: Japanese (soft copy only) |
| 10585-00003 | Maintenance Manual ML2400A Series (hard copy) |
| ML2400A-98 | Calibration to Z540, ISO Guide 25 |
| ML2400A-99 | Premium Calibration |
| ML2400A-30A | Option 30, Operation/Prog Manual (for use in Japan only) |

Options 5, 2400-82, and 2400-83 are mutually exclusive for any given ML2430A unit.

Options 6, 7, 8 and 9 are mutually exclusive for any given ML2430A unit.

## Standard Accessories

PowerMax (ML249xA only)
PowerSuite (ML243xA only)
Power Cord for destination country
One 1.5 m sensor cord per meter input
Operation Manual (soft copy only; hard-copy available for order)
Programming Manual (soft copy only; hard-copy available for order)
Certificate of Calibration (also included with sensors)

## General Options and Accessories

| | |
|---|---|
| 760-209 | Hardside Transit Case |
| D41310 | Soft Carry Case with Shoulder Strap |
| 2400-82 | Rack Mount, single unit |
| 2400-83 | Rack Mount, side-by-side |
| 2000-1535 | Front Panel Cover |
| 2000-1536-R | 0.3m Sensor Cable |
| 2000-1537-R | Spare 1.5m Sensor Cable |
| 2000-1544 | RS232 Bootload Cable |

## Power Sensor Models

| | |
|---|---|
| MA2472D | Standard Diode Sensor (10 MHz to 18 GHz, –70 dBm to 20 dBm) |
| MA2473D | Standard Diode Sensor (10 MHz to 32 GHz, –70 dBm to 20 dBm) |
| MA2474D | Standard Diode Sensor (10 MHz to 40 GHz, –70 dBm to 20 dBm) |
| MA2475D | Standard Diode Sensor (10 MHz to 50 GHz, –70 dBm to 20 dBm) |
| MA2442D | High Accuracy Diode Sensor (10 MHz to 18 GHz, –67 dBm to 20 dBm) |
| MA2444D | High Accuracy Diode Sensor (10 MHz to 40 GHz, –67 dBm to 20 dBm) |
| MA2445D | High Accuracy Diode Sensor (10 MHz to 50 GHz, –67 dBm to 20 dBm) |
| MA2481D | Universal Sensor (10 MHz to 6 GHz, –60 dBm to 20 dBm) |
| MA2482D | Universal Sensor (10 MHz to 18 GHz, –60 dBm to 20 dBm) |
| MA2490A | Wideband Sensor (50 MHz to 8 GHz, –60 dBm to 20 dBm) |
| MA2491A | Wideband Sensor (50 MHz to 18 GHz, –60 dBm to 20 dBm) |
| MA2411B | Pulse Sensor (300 MHz to 40 GHz, –20 dBm to 20 dBm) |
| MA24002A | Thermal Sensor (10 MHz to 18 GHz, –30 dBm to 20 dBm) |
| MA24004A | Thermal Sensor \| (10 MHz to 40 GHz, –30 dBm to 20 dBm) |
| MA24005A | Thermal Sensor (10 MHz to 50 GHz, –30 dBm to 20 dBm) |

See your Anritsu representative or components catalogue for available attenuators, limiters, coaxial adapters, waveguide-to-coaxial adapter, splitters and dividers, loads, bridges, open/shorts, and calibrated torque wrenches.

For complete power meter and sensor specifications; technical datasheet p/n: 11410-00423.

Software upgrades, drivers and application notes can be downloaded from the Anritsu web site at www.anritsu.com