

# Power Meters and Sensors

ML2430A CW Power Meter

ML2480B Wideband Power Meter

ML2490A Pulse Power Meter

MA2400A/D and MA24000A Power Sensors



# Ideal Solutions for Average, Peak, and Crest Power Measurements

## Anritsu Power Meters and Power Sensors: Accurate, Fast, and Affordable.

Anritsu offers the world's most comprehensive range of power meters. The ML2490A series has the performance required for narrow fast rising-edge pulse power measurements (e.g. radar), while the new ML2480B series is suited for Wide-band power measurements on signals such as W-CDMA, WLAN, and WiMAX.

The ML2430A series of power meters are designed for CW applications, offering a combination of accuracy, speed and flexibility in a low cost package.

With seven different families of Power Sensors (including USB sensor) to choose from, you can trust you'll find the right combination for precision power measurement, whatever your application.



### ML2490A Series

- **High Performance and Precision.** 65 MHz instrument bandwidth, with 1 ns measurement resolution for precise rise time measurements of radar signals or for measuring the latest 4G Orthogonal Frequency Division Multiplex (OFDM) signals.
- **High Speed Sampling.** Up to 1 Gs/s sample rate produces accurate profiles of radar, W-CDMA, WLAN/WiMAX and latest generation cellular systems. Displays peak, average and crest factor of any input signal.
- **Trigger.** Comprehensive facilities offer precise triggering using internal or external sources. Continuous or single shot modes available.
- **Measurement Gates and Markers.** Multiple Gates and Markers for measuring: Peak power, Multi-pulse power, Signal droop, Rise time and Fall time, Pulse width, PRI.
- **External Video (ML2490A / ML2480B).** Provides 1/4 VGA signal to external monitor (CRT and LCD).
- **Ethernet Interface (ML2490A / ML2480B).** 10/100BaseT LAN Interface, allows remote control direct from a PC or Local/Wide-area network using Dynamic (Auto) or Static IP assignment.

# Select the Optimum Power Meter for Your Application



## ML2480B Series

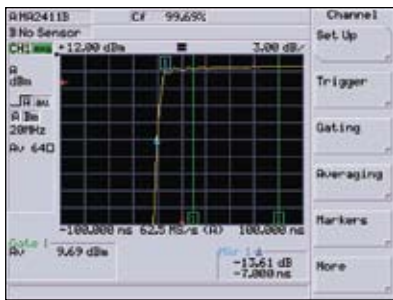
- **20 MHz Instrument Bandwidth.** Designed for accurate peak and average power measurements on 3G (W-CDMA), WLAN and WiMAX technologies.
- **Continuous Wave (CW) Meter Mode.** High accuracy and high dynamic range CW power measurements—the 50 MHz/1 GHz calibrator calibrates all Anritsu sensors. Frequency is automatically selected.
- **Soft Keys.** Menu-driven operation simplifies test procedures.
- **Preset.** Built-in measurement set-ups for widely available wireless systems such as GSM, W-CDMA, WLAN and Bluetooth.
- **External Video (ML2490A / ML2480B).** Provides 1/4 VGA signal to external monitor (CRT and LCD).
- **Ethernet Interface (ML2490A / ML2480B).** 10/100BaseT LAN Interface, allows remote control direct from a PC or Local/Wide-area network using Dynamic (Auto) or Static IP assignment.



## ML2430A Series

- **Fully-Featured General Purpose Power Meter.** Ideal for CW applications, offering a combination of speed, accuracy and flexibility in a low cost package.
- **Designed for Field Applications.** Portable and rugged, splash-resistant chassis design handles the roughest field treatment. Add a front panel cover and soft case for further protection. There is also an optional NiMH battery, providing six hours continuous operation.
- **Graphics Display.** Provides graphical display of pulsed power or TDMA signals, displaying individual time slots. Frame triggering allows the user to measure the average power across a time slot.

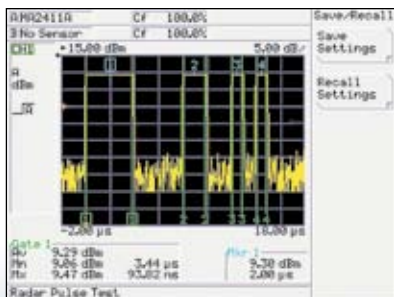
# Ready for the World's Most Demanding Applications



High resolution for observing fast rising-edge signals.



Accurate CW measurements.



Examine pulses in detail and capture the entire pulse train.

## Radar Systems

The high bandwidth and sample rate of the ML2480B and ML2490A provide accurate peak measurements on a variety of radar, radio-navigation and radio-location systems.

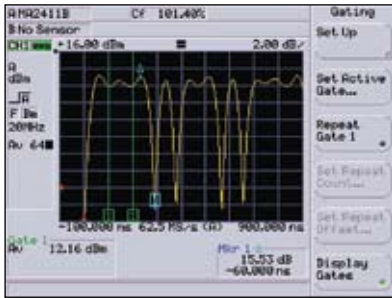
The ML2480B and ML2490A series has a number of features tailored for peak power measurement on pulsed systems. With a typical 8 ns rise time, and a 1ns resolution on the measurement, the ML2490A and MA2411B power sensor have the performance to look at the rising edge of radar signals.

Another benefit of the power meter is that it can be easily set up to trigger on a pulse or sequence of pulses. Users can set up to four independent gates to measure the average, max and min powers on a sequence of pulses. The data for the max and min includes the timestamp and gives the user automatic display of the position and value of the maximum overshoot and minimum undershoot in each pulse.

Here are some more functionality highlights of ML2480B and ML2490A power meters:

- Automatic marker functions provide pulse rise time, fall time, off time and Pulse Repetition Interval. A delta marker can be set up to measure the droop of the pulse top.
- Trigger event display is available as either arrows on the border of the screen or as an adjustable trigger event waveform. All timings for the gates and markers are taken from the trigger event.
- Read true output power – The offset table function corrects the power meter reading when the power meter is being used with a coupler or high power attenuator in a radar test system.

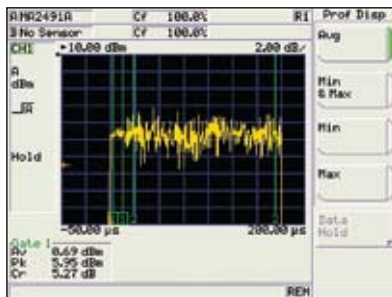
# Measurement Solutions for High-Speed Wireless Systems



Accurately track the signal envelope for average and peak power.



Use readout facility to enhance the display.



Measurement gates and markers for observing precise sections of the signal.

## WLAN / WiMAX Solutions

WLAN and WiMAX technologies are playing an increasingly significant role in the design and installation of high-speed networks. What's more, these transmission technologies have developed faster than the traditional power meter, leaving users with inaccurate power measurements.

The ML2480B and ML2490A series have been designed to meet the challenge of today's fast-paced WLAN and WiMAX technologies. Users can measure the peak power of current and future wideband OFDM systems (such as 802.11a/g and 806.16) and configure the display to measure Average, Peak and Crest Factor.

Dithered sampling ensures accurate measurements on wideband high data rate carriers under continuous transmission.

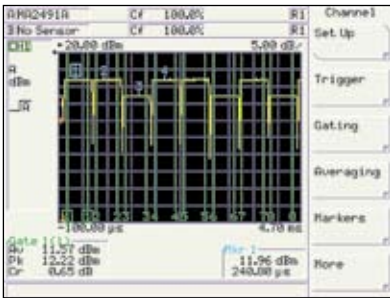
Users will no longer need to manually apply correction for peak power readings because the wide 65 MHz and 20 MHz video bandwidth enables high accuracy peak power measurements on the most demanding power envelope conditions.

Also, the wide bandwidth of the signal channel allows for accurate placement of the measurement gates. Users can hone in their analysis by taking advantage of the multiple gate facility and measuring precise selections of the signal such as the OFDM training sequence at the start of the 802.11g signal and the data payload section.

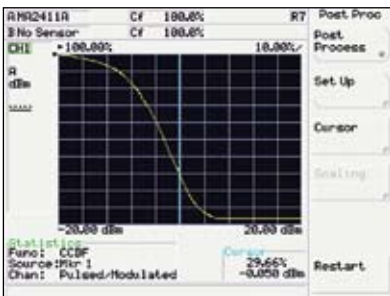
Other functions users can take advantage of:

- A built-in preset to instantly set up and measure continuous OFDM.
- CCDF, CDF and PDF supported statistical functions on the OFDM measurements.

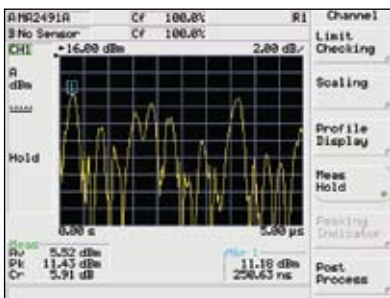
# Making GSM/EDGE/GPRS measurements as easy as 1, 2, 3



EDGE and GPRS measurements made simple.



Built-in Statistical analysis tool.



Determine signal Crest factor with ease.

## GSM/EDGE/GPRS Systems

The straightforward and seamless combination of the graphical display and the measurement gates makes GSM and PCS systems measurements so easy to take, it's elementary.

For GSM systems the power meter is set up to trigger on the GSM pulse. The active gate is set up to measure the power within the 10% to 90% section of the burst profile in order to meet the specified limits. An automatic limit can be used to give a pass or fail indication. The display shows the results from the active gate, indicating the average power within the burst.

GPRS and GSM test modes take advantage of the power meter's multiple gates. Users can repeat a GSM gate pattern up to eight times – allowing the power meter to capture and read back the power from each of the slots – giving up to eight simultaneous measurements.

Making EDGE measurements has never been easier or faster. The power meter's high sample rate leads to improved settling time. And the use of the trigger hold-off facility prevents re-triggering on the symbol transitions. What's more, PHS and IS136 systems can also be measured in this way – just as fast, and just as effective.

## 3G CDMA Systems

Designed to measure the peak power of all the major CDMA systems in the world, the ML2480B and ML2490A series covers all the system bases, including those that use Time Division Duplexing such as TD-SCDMA.

Users can configure the display to measure Average, Peak and Crest Factor during the measurement period for FDD systems. TDD systems can be displayed as a graph profile and the measurement gates can be set to measure and display the Peak and Crest Factor during the data payload transmission.

Statistical functions (CCDF, CDF and PDF) are supported on CDMA measurements to enable the designers of power amplifiers to correctly estimate the margins on the peak power handling capabilities of their design.

The ML2480B and ML2490A series also allow the user to:

- See the actual power envelope variations in the signal via the high-speed profile display.
- Measure gain and output power of the amplifier under CDMA transmission conditions through the ML2488B dual input (in ratio mode).
- Leverage the wide bandwidth of the MA2411B and M2490/91A sensors and the power meter to easily measure multiple channel carriers in an allocated spectrum block.

# The Information You Need, Right Where You Want It

## Amplifier Measurements

Power amplifiers designed for peak applications, whether pulsed or CDMA, cannot operate at full peak power with CW test inputs. The gain and output power can only be measured accurately using a peak power meter under representative conditions.

For the precise characterization of amplifier output power and gain, the ML2438A/88B/96A power meters are true dual channel meters, with two independent signal channels that eliminate multiplexing. Gain and output power are measured simultaneously. And fast responding diode sensors respond immediately to changes in power level to reduce total test time.

With the ML2496A and ML2488B users can also make Power-Added Efficiency (PAE) measurements. The amplifier bias voltage can be entered manually or over GPIB and the bias current can be measured using a current probe connected directly to the power meter.

## Return Loss Measurements

Take advantage of the power meter's dual inputs to measure the return loss of an amplifier under correct operating conditions.

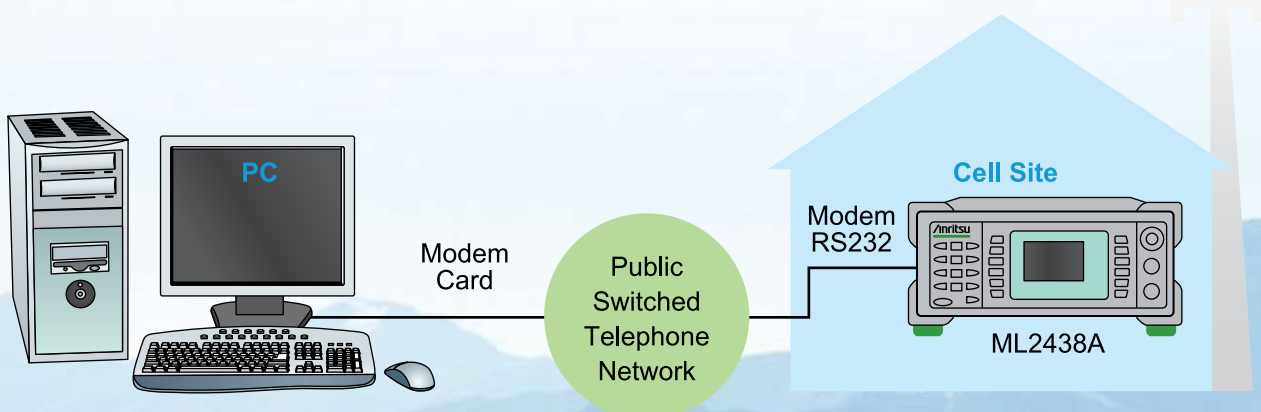
## Frequency Sweep and Power Sweep

The Anritsu ML2400A series of power meters are designed to function with Anritsu MG3690B synthesized generators or sweepers to form an integrated test solution for swept power and frequency measurements.

The MG3690B requires Analog Sweep Option 6 to be fitted for this function.

## Remote Monitoring

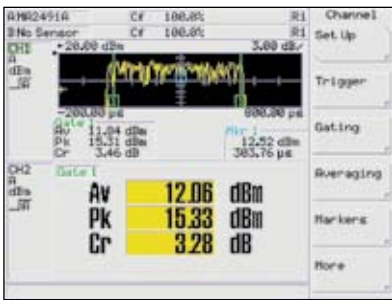
The ML2430A series automatically calls a pre-entered phone number whenever a limits threshold is exceeded. Just set the limit level, enter the phone number and connect a modem.



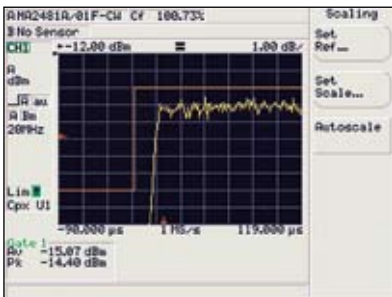
Make house calls without leaving the lab.

The ML2430A's data acquisition settings can also adjust to monitor average power or the burst power of specific timeslots. The RS232 port uses the same commands as the GPIB. Contact your Anritsu representative for PC-compatible software.

# Features Loaded into Every Power Meter



Flexible measurement display.



Time-varying limits, user-defined or Preset.

## Dual Display Channel

Each display channel in the Anritsu ML2480B/90A Power Meter is a measurement set up and can use any selection or combination of the sensor inputs. View one display channel or two. Switch between display channels quickly via the front panel hard 'hot' key. The user can also choose to view the measurement results as a graph profile or numerical readout.

## Sampling Modes

The ML2490A series power meter automatically chooses between continuous (time capture above 3.2  $\mu$ s) or repetitive (50 ns to 3.2  $\mu$ s) sampling to build up the trace to 1 ns settable display resolution. The ML2480B provides up to 62.5 MS/s sampling with resolution of 16 ns. The user may also opt to adjust the sample rate directly.

## Test Limits

- A simple power limit can be set up for many applications to test the upper and/or lower boundaries of the signal.
- A time varying limit line can be set up to for pulsed systems such as radar, TDMA phone systems or WLAN and tests all aspects of the pulse profile.

## Settings Stores

Conveniently recall application-specific measurement set ups.

## Secure Mode

The power meter series have a secure mode for operation in security sensitive environments. On activation, the secure mode wipes all information stored in the non-volatile RAM on power up.

## GPIB

Comprehensive command-set for full functionality over GPIB.

## RS232

For control and firmware updates.

## Analog Voltage Input

Measures voltage or accepts the V/GHz signal from a synthesiser for automated sensor calibration factor correction or Power Added Efficiency (PAE).

## Analog Outputs

Support corrected and scaled measurements or real-time dual channel output. Synthesiser interface controls include zero blanking.

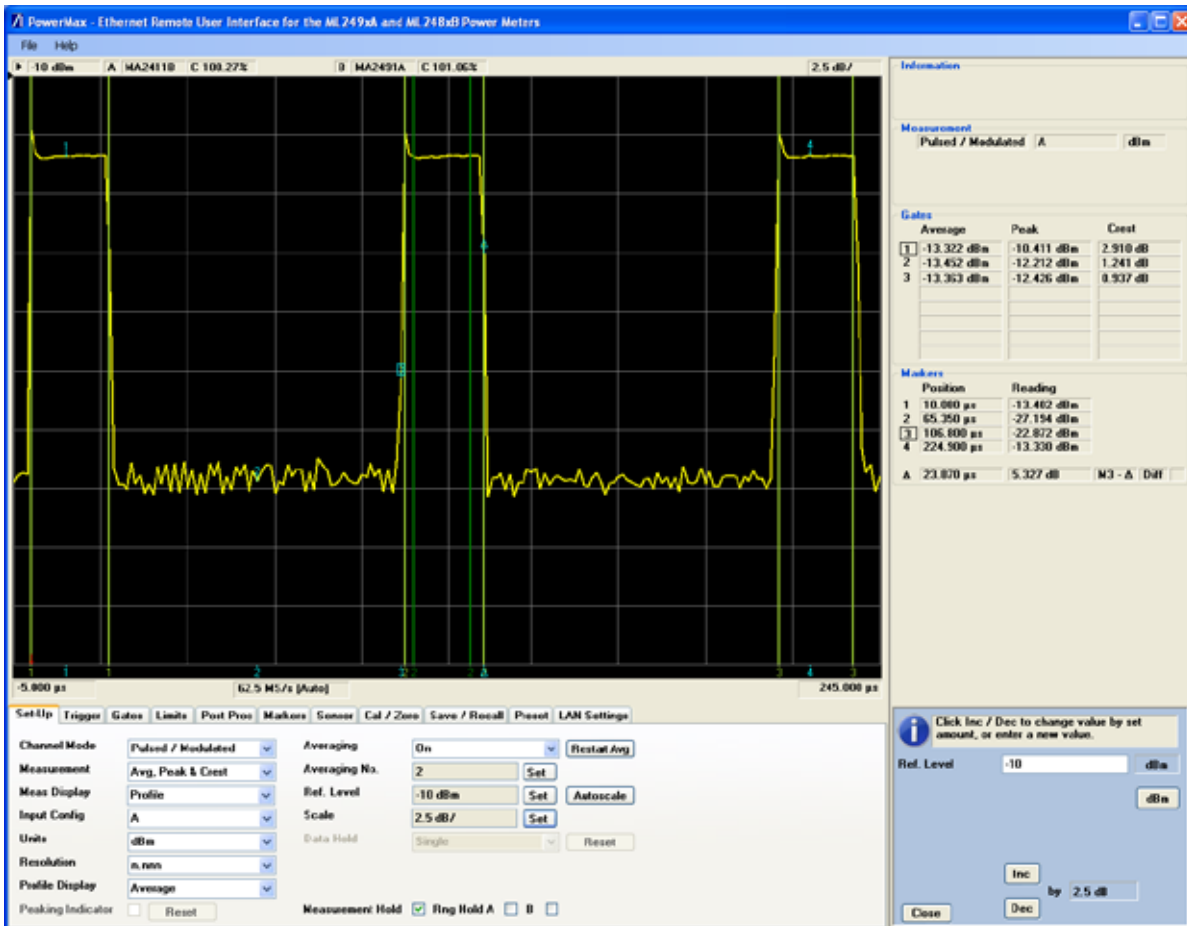


# PowerMax™ – PC remote user interface



PowerMax™ is a free graphical user-interface software, for the ML2490A and ML2480B Power Meter\* series. PowerMax runs on a standard PC running Windows® 95 (or higher), and communicates with the power meter via Ethernet interface.

PowerMax provides an enhanced visualization of instrument display and simplified remote control of the instrument, allowing:



- Continuous view of measurement traces in real-time
- Multiple gates and markers readings displayed at a glance
- Archiving or printing of data and plots for future analysis

For PC requirements, see Technical Datasheet

## PowerSuite™

Free software available for ML243xA power meters, to continuously view measurement traces on the PC in real-time, or archive data and plots for future analysis. PowerSuite runs on a standard PC running Windows® 95 (or higher), via GPIB or RS232.

\*Requires firmware v2.20 or greater.

# Discover a Comprehensive Range of Power Sensors

## Power Sensors for every application

Anritsu's coaxial 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.



Family of power sensors designed to cover a wide range of measurement applications.

The sensors employ diodes and offer greater speed, sensitivity and dynamic range than thermal sensors. The sensors are based on 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, peak and crest measurements on signals with rapid amplitude change such as W-CDMA, WLAN, WiMAX and radar.

The pulse sensor MA2411B has been specifically designed for a wide video bandwidth of 65 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 wideband measurements on 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% making 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.



# Power Sensors for Every Application



## High Accuracy Diode Sensors: MA2440D

With its built in 3 dB attenuator, the MA2440D minimizes input VSWR and are best used where the best 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 can be used for average power measurements on 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 MA2400XA 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 built in EEPROM with calibration factor and linearity correction data. This results in assured accuracy when measuring any signal.

## Sensor EEPROM

All Power Sensors through 50 GHz store calibration data and model information within internal EEPROMS. The user calibration factor tables allow extra frequency points or compensation for couplers and power attenuators.

## High Power Applications

Traditional high power sensors are expensive and have degraded accuracy specifications. What's more, annual calibrations require more time and expense. Using the new User Calibration Factor Tables avoids these problems. They can easily reduce operating costs and save time:

- Any attenuator or coupler can be compensated by entering frequency and attenuation values into 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	USB	Wideband	Pulse	Thermal	Comments
	MA2470D Series	MA2440D Series	MA2480D Series	MA24106A	MA249XA Series	MA2411B	MA2400xA	
Power Measurement	Average (RMS)	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	Any	CW, GMSK, 8PSK, QPSK, QAM	Pulse, QAM	Any	Modulation
	TDMA, FDMA, IS136	TDMA, FDMA	TDMA, FDMA, CDMA, OFDM, Radar	Any	TDMA, FDMA, CDMA, OFDM, Radar	Radar, OFDM	Any	Access Scheme
Compatible Power Meters	ML24xxA/B	ML24xxA/B	ML24xxA/B	Only requires PC with Windows 2000/XP, USB 2.0	ML2480A/B, ML2490A	ML2480A/B, ML2490A	ML24xxA/B	

Choose the right sensor and meter for your measurement application.

# MA24106A USB Power Sensor

MA24106A power sensor is a highly accurate instrument that communicates with a PC using the Universal Serial Bus interface (USB). Its measurement capability mimics a traditional thermal (thermo-electric) power sensor, but has a wider dynamic range. Therefore, the MA24106A is ideal for measuring average (true RMS) power of any signal type or bandwidth, e.g. CW, multi-tone, and modulated RF waveforms such as 3G, 4G, and OFDM.



N connector designed for use with a torque wrench ensures repeatable connections

Sturdy aluminum body with ergonomic design for better grip and feel




Two-color LED reports functional status of the sensor

USB Mini-B Port for PC connectivity

- True RMS detection over a 63 dB dynamic range enables accurate CW and modulated power measurements
- Wide variety of applications including installation & maintenance, manufacturing, R&D.
- High damage power levels (+33 dBm) and ESD protection (3.3 kV) provides ruggedness and reliability
- Low current consumption (100 mA) preserves laptop battery life
- Eliminating the need for a reference calibrator reduces test time and handling in production
- One year calibration cycle and worldwide service centers ensure reduced downtime
- Compatible with Spectrum Master, VNA Master, BTS Master, and Economy Benchtop Spectrum Analyzer (MS271xB).

Advanced features are available in menus

Measurement setup status available on screen

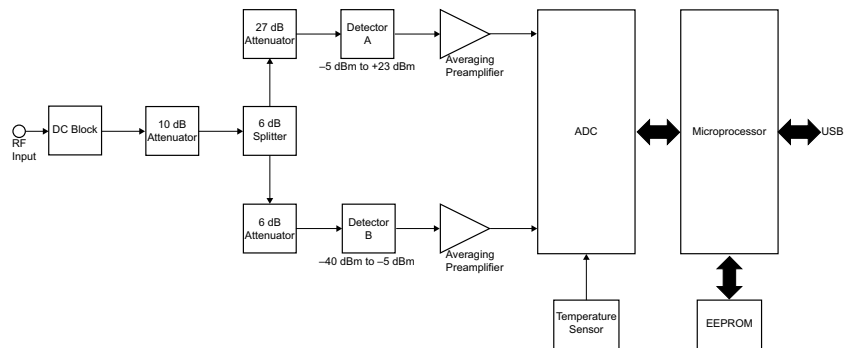


Big display for easy readout

Basic Power Meter functions available on screen

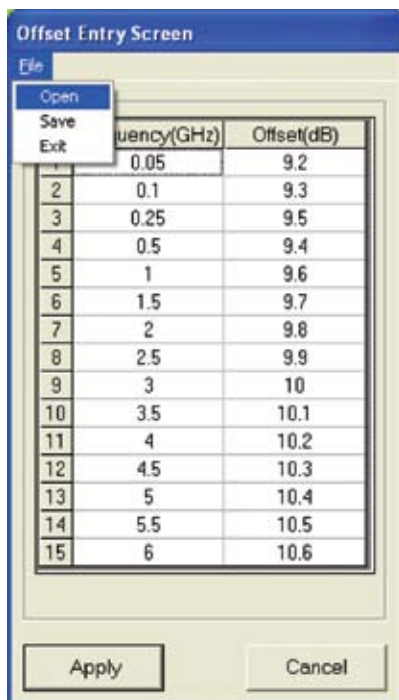
The screenshot shows the Anritsu Power Meter software interface. The main display area is green and shows a large reading of **-0.02 dBm**. Above this reading, it says "Offset 9.6 dB". To the left of the display are buttons for "Zero Sensor", "Hold/Run", "Frequency", and "Power Units". To the right are buttons for "Relative", "Averages", "Fixed Offset", and "Exit". Below the main display, there are fields for "MA24106A", "0611014", "0.05 GHz", "AVG 16", and "OK". There is also an "Apply" button and an "Exit" button at the bottom right.

# MA24106A Architecture



MA24106A Block Diagram

The sensor employs a “dual-path” architecture to achieve 63 dB of dynamic range. Highly accurate modulation measurements are facilitated by keeping the diode detectors in the “square law region” and by choosing the output of the appropriate detector path. A built-in attenuator provides excellent SWR performance thus minimizing mismatch error. The presence of a micro-controller along with signal conditioning circuitry, ADC, and power supply in the sensor makes it a complete miniature power meter. The Anritsu Power Meter application for personal computers running Microsoft® Windows® can be used to control and operate the sensor providing the user with a familiar power meter interface with advanced features.



Compensate for frequency response of RF devices with offset table. Values are easily saved to and recalled from the PC's hard disk.

## Rugged for Field Use

The MA24106A power sensor provides lab performance accuracy in a rugged and portable field solution. Measurement accuracy over a wide temperature range is maintained by internally stored calibration factors with temperature compensation, thus making it perfect for base station installation and maintenance applications. Field and service technicians will appreciate the small size and light weight as they can carry it in their shirt pocket or laptop case. A very easy to use PC application with a large display makes operation straightforward for users with limited training. The high damage level (+33 dBm) and ESD protection (3.3 kV) provides ruggedness to this high performance sensor. Since the MA24106A is a low power device, laptop battery life is preserved.

## Fast and Flexible for Production

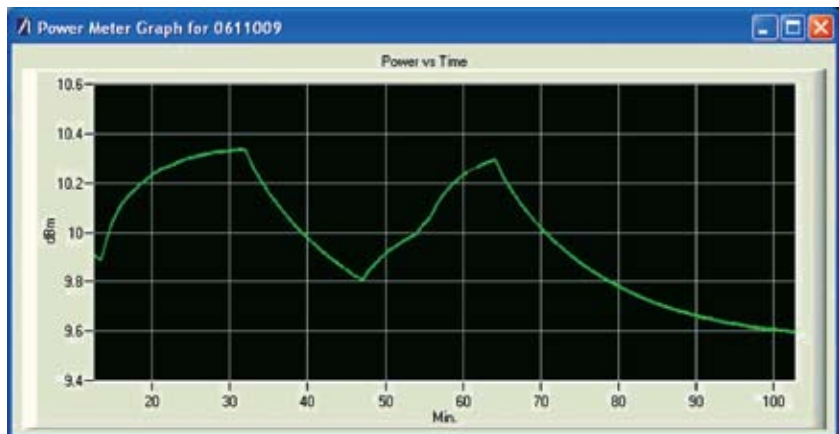
The MA24106A facilitates lab quality measurements on the production floor for a fraction of the cost of traditional power meters. Valuable rack space is saved since the sensor is connected directly to a PC, eliminating the need for a bench top power meter. Sensor speed is optimized for best accuracy and noise performance making it suitable for a wide variety of ATE applications. Multiple sensors can be connected and remotely controlled via a single PC allowing flexibility to match specific measurement needs. The reference calibrator typically needed by power meters has been eliminated, minimizing test station complexity, sensor handling and reducing test times.

The offset table provides the ability to correct for the frequency response of RF devices present between the sensor and the DUT, thus providing better accuracy than just using a fixed offset. A simple interface allows entry of different offset values versus frequency. An unlimited number of offset tables can be stored on a PC's hard disk and easily recalled. The offset table employs linear interpolation to estimate offset correction for frequencies between user specified entries.

# High Accuracy for R&D Use

The MA24106A is an ideal general purpose R&D tool due to its low cost, ability to measure True RMS power on a variety of RF waveforms, wide dynamic range, and power accuracy regardless of modulation bandwidth. Its compact size makes it an alternative to traditional bench top instruments. Accuracy is assured because the calibration data is stored directly in the sensor and all necessary corrections (frequency and temperature) are done internally. The standards used to calibrate this sensor are directly traceable to NIST and periodic calibrations are supported by Anritsu's service centers worldwide.

The Anritsu Power Meter software provides an intuitive interface to control the sensor, with advanced features such as average power versus time display. Multiple instances of the PC application can be started to make measurements using several sensors to support sophisticated test setups.



Power graph shows the effect of turning on and off the cooling fan of a 2 GHz power amplifier.

The power graph plots power with respect to time. It is useful for drift testing, circuit tuning, or circuit monitoring as external stimuli are changed. The graph is continuously updated in real time at ten measurements per second.

Data logging is also available for recording power versus time to a hard disk or other storage media. This is useful for long term drift studies, environmental testing, and trend analysis. A user defined logging interval allows acquisition speed to match test requirements. Data are stored as a comma separated value (.csv) that can be opened in Microsoft® Excel® facilitating custom analysis.

# Ordering Information

## Power Meter Models

ML2495A	Pulse Power Meter, Single Input
ML2496A	Pulse Power Meter, Dual Input
ML2487B	Wideband Power Meter, Single Input
ML2488B	Wideband Power Meter, Dual Input
ML2437A	CW Power Meter, Single Input
ML2438A	CW Power Meter, Dual Input

### ML2490A Series

ML2400A-01	Rack Mount, single unit
ML2400A-03	Rack Mount, side by side
ML2400A-05	Front Bail Handle
ML2490A-06	Rear Mount Input A on ML2495A
ML2490A-07	Rear 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
13000-00238	Extra Operation Manual ML2480B/90A
13000-00239	Extra Programming Manual ML2480B/90A

### ML2480B Series

ML2480B-001	Rack Mounted, right, (for ML248xB models)
ML2480B-003	Rack Mounted, right, dual (for ML248xB models)
ML2480B-005	Front Mounted (for ML248xB models)
ML2480B-006	Rear Mount Input A on ML2487B
ML2480B-007	Rear Input A and Reference on ML2487B
ML2480B-008	Rear Mount Inputs A, B and Reference on ML2488B
ML2480B-009	Rear Mount Inputs A, B on ML2488B
ML2480B-015	Factory Fitted 50 MHz and 1GHz Calibrator (required by MA2411B Sensor)
ML2480B-098	Calibration to Z540, ISO Guide 25
ML2480B-099	Premium Calibration
13000-00238	Extra Operation Manual ML2480B/90A
13000-00239	Extra Programming Manual ML2480B/90A
13000-00174	Extra Operating Manual: Japanese
13000-00175	Extra Programming Manual: Japanese

Options 1, 3, 5 are mutually exclusive for any given ML2480B/90A.

Options 6, 7, 8 and 9 are mutually exclusive for any given ML2480B/90A.

### ML2430A Series

ML2400A-01	Rack Mount, single unit
ML2400A-03	Rack Mount, side-by-side
ML2400A-05	Front Bail Handle
ML2400A-06	Rear Mount Input A on ML2437A
ML2400A-07	Rear 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	Extra Operation and Programming Manual ML2437/8A
10585-00003	Maintenance Manual ML2400A Series
ML2400A-98	Calibration to Z540, ISO Guide 25
ML2400A-99	Premium Calibration
ML2400A-30A	Option 30, Extra Operation/Prog Manual (For use in Japan only)

Options 1 to 5 are mutually exclusive for any given ML2430A unit.

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

Pulse/modulated performance only specified with 1.5M sensor cable length option.  
Software upgrades, Labview drivers and application notes can be downloaded from the Anritsu web site at [www.Anritsu.com](http://www.Anritsu.com)

## Standard Accessories

PowerMax (ML249xA and ML248xB only)
PowerSuite (ML243xA only)
Power Cord for destination country
One 1.5m sensor cord per meter input
Operation Manual
Programming Manual
Certificate of Calibration (also included with sensors)

## General Options and Accessories

760-209	Hardside Transit Case
D41310	Soft Carry Case with Shoulder Strap
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)
MA24106A	True-RMS USB Power Sensor (50 MHz to 6 GHz, -40 dBm to 23 dBm)

## General Options and Accessories (USB Sensor)

2000-1566-R	1.8 meter USB A to Mini-B cable
2000-1593-R	3 meter USB A to Mini-B cable
2000-1594-R	5 meter USB A to Mini-B cable
2300-512	MA24106A Installation CD

## Available Options (USB Sensor)

MA24106A-097	Option 97, Accredited calibration
MA24106A-098	Option 98, Standard calibration to Z540, ISO Guide 25
MA24106A-099	Option 99, Premium calibration

See your Anritsu Representative or Components catalogue for available Attenuators, Limiters, Coaxial adapters, Waveguide-to-Coaxial adapter, Splitters & Dividers, Loads, Bridges, Open/Shorts, and Calibrated Torque wrenches.

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



#### **Anritsu Corporation**

5-1-1 Onna, Atsugi-shi, Kanagawa, 243-8555 Japan  
Phone: +81-46-223-1111  
Fax: +81-46-296-1264

#### **• U.S.A.**

##### **Anritsu Company**

1155 East Collins Boulevard, Suite 100,  
Richardson, Texas 75081 U.S.A.  
Toll Free: 1-800-ANRITSU (267-4878)  
Phone: +1-972-644-1777  
Fax: +1-972-671-1877

#### **• Canada**

##### **Anritsu Electronics Ltd.**

700 Silver Seven Road, Suite 120, Kanata,  
Ontario K2V 1C3, Canada  
Phone: +1-613-591-2003  
Fax: +1-613-591-1006

#### **• Brazil**

##### **Anritsu Eletrônica Ltda.**

Praca Amadeu Amaral, 27-1 Andar  
01327-010 - Paraiso, São Paulo, Brazil  
Phone: +55-11-3283-2511  
Fax: +55-11-3886940

#### **• Mexico**

Anritsu Company, S.A. de C.V.  
Av. Ejército Nacional No. 579 Piso 9, Col. Granada  
11520 México, D.F., México  
Phone: +52-55-1101-2370  
Fax: +52-55-5254-3147

#### **• U.K.**

##### **Anritsu EMEA Ltd.**

200 Capability Green, Luton, Bedfordshire LU1 3LU, U.K.  
Phone: +44-1582-433280  
Fax: +44-1582-731303

#### **• France**

##### **Anritsu S.A.**

16/18 Avenue du Québec-SILIC 720  
91961 COURTABOEUF CEDEX, France  
Phone: +33-1-60-92-15-50  
Fax: +33-1-64-46-10-65

#### **• Germany**

##### **Anritsu GmbH**

Nemetschek Haus, Konrad-Zuse-Platz 1  
81829 München, Germany  
Phone: +49 (0) 89 442308-0  
Fax: +49 (0) 89 442308-55

#### **• Italy**

##### **Anritsu S.p.A.**

Via Elio Vittorini, 129, 00144 Roma, Italy  
Phone: +39-06-509-9711  
Fax: +39-06-502-2425

#### **• Sweden**

##### **Anritsu AB**

Borgafjordsgatan 13, 164 40 Kista, Sweden  
Phone: +46-8-534-707-00  
Fax: +46-8-534-707-30

#### **• Finland**

##### **Anritsu AB**

Teknobulevardi 3-5, FI-01530 Vantaa, Finland  
Phone: +358-20-741-8100  
Fax: +358-20-741-8111

#### **• Denmark**

##### **Anritsu A/S**

Kirkebjerg Allé 90 DK-2605 Brøndby, Denmark  
Phone: +45-72112200  
Fax: +45-72112210

#### **• Spain**

##### **Anritsu EMEA Ltd.**

##### **Oficina de Representación en España**

Edificio Veganova  
Avda de la Vega, nº 1 (edf 8, pl1, of 8)  
28108 ALCOBENDAS - Madrid, Spain  
Phone: +34-914905761  
Fax: +34-914905762

#### **• Russia**

##### **Anritsu EMEA Ltd.**

##### **Representation Office in Russia**

Tverskaya str. 16/2, bld. 1, 7th floor.  
Russia, 125009, Moscow  
Phone: +7-495-363-1694  
Fax: +7-495-935-8962

#### **• United Arab Emirates**

##### **Anritsu EMEA Ltd.**

##### **Dubai Liaison Office**

P O Box 500413 - Dubai Internet City  
Al Thuraya Building, Tower 1, Suite 701, 7th Floor  
Dubai, United Arab Emirates  
Phone: +971-4-3670352  
Fax: +971-4-3688460

#### **• Singapore**

##### **Anritsu Pte. Ltd.**

60 Alexandra Terrace, #02-08, The Comtech (Lobby A)  
Singapore 118502  
Phone: +65-6282-2400  
Fax: +65-6282-2533

#### **• India**

##### **Anritsu Pte. Ltd.**

##### **India Branch Office**

3rd Floor, Shri Lakshminarayan Niwas,  
#2726, 80 ft Road, HAL 3rd Stage, Bangalore - 560 075, India  
Phone: +91-80-4058-1300  
Fax: +91-80-4058-1301

#### **• P. R. China (Hong Kong)**

##### **Anritsu Company Ltd.**

Units 4 & 5, 28th Floor, Greenfield Tower, Concordia Plaza,  
No. 1 Science Museum Road, Tsim Sha Tsui East,  
Kowloon, Hong Kong, P.R. China  
Phone: +852-2301-4980  
Fax: +852-2301-3545

#### **• P. R. China (Beijing)**

##### **Anritsu Company Ltd.**

##### **Beijing Representative Office**

Room 2008, Beijing Fortune Building,  
No. 5, Dong-San-Huan Bei Road,  
Chao-Yang District, Beijing 100004, P.R. China  
Phone: +86-10-6590-9230  
Fax: +82-10-6590-9235

#### **• Korea**

##### **Anritsu Corporation, Ltd.**

8F Hyunjuk Bldg. 832-41, Yeoksam-Dong,  
Kangnam-ku, Seoul, 135-080, Korea  
Phone: +82-2-553-6603  
Fax: +82-2-553-6604

#### **• Australia**

##### **Anritsu Pty Ltd.**

Unit 21/270 Ferntree Gully Road, Notting Hill  
Victoria, 3168, Australia  
Phone: +61-3-9558-8177  
Fax: +61-3-9558-8255

#### **• Taiwan**

##### **Anritsu Company Inc.**

7F, No. 316, Sec. 1, Neihu Rd., Taipei 114, Taiwan  
Phone: +886-2-8751-1816  
Fax: +886-2-8751-1817

*Please Contact:*

