

## MICROWAVE COMPONENTS



### POWER SENSORS MA2400A/B Series

10 MHz to 50 GHz



The MA2400A/B Series Power Sensors consist of MA247XA Series Power Sensors, MA246XA/B Series Power Sensors, MA248XA Series Universal Power Sensors, MA242XA/B Series Thermal Power Sensors, and MA244XA Series High Accuracy Power Sensors. These units are broadband microwave measurement components. All models except the MA246XA/B Series Power Sensors, are used with the ML2430A Series Power Meters. The MA246XA/B Series Power Sensors are used only with the ML2400A Series Power Meter.

#### Features

- 10 MHz to 50 GHz range
- N, K, and V type RF connectors
- 90 dB dynamic range provides stable power readings to -70 dBm
- MA244XA Series High Accuracy Power Sensors contain an additional matching circuit to improve return loss performance
- MA242XA/B Series Thermal Power Sensors provide measuring speeds to 4 ms rise and fall times in addition to exceptional return loss performance
- MA246XB power sensors have fast 1 millisecond rise and fall times needed for CDMA measurements
- MA248XA Universal sensors measure average power of modulated signals such as W-CDMA, multi-tone, etc.
- All MA2400A/B Series Power Sensors contain internal EEPROMs for storage of calibration data as a function of frequency, power, and temperature. This allows the power meter to interpolate and correct readings automatically

#### Fast thermal sensors

Anritsu's thermal sensors provide excellent power measurement accuracy over 50 dB of dynamic range with more speed than any other thermal sensor available (see fig. 1). Thermal sensors use Seebeck elements where the combined effect of a thermal gradient and charge migration between dissimilar metals gives a true reading of average power on 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. Anritsu's fast thermal power sensors improve sensor rise time and fall time to less than 4.0ms— an order of magnitude faster than previous thermal sensors. Settled power measurements are now 10 times faster; that means reduced test time.

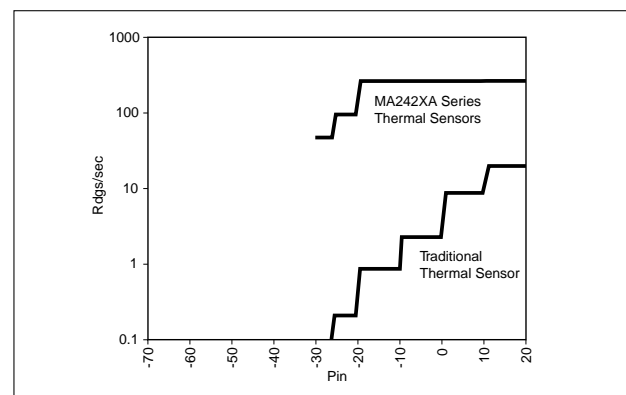


Fig. 1 Fast Thermal Sensors

#### Standard diode sensors

Diode sensors have greater speed, sensitivity and dynamic range than thermal sensors (see fig. 2). All Anritsu diode sensors use a dual diode architecture that gives improved sensitivity and dynamic range over single diode architectures. The MA2470A Series Power Sensors 90 dB dynamic range is both fast and accurate. Linearity is better than 1.8%, typically < 1.0% through 18 GHz.

MA2470A power sensors offer an ideal combination of speed and dynamic range for general purpose power measurements. A single sensor replaces the two sensors that were previously required with sensors limited to 50 dB dynamic range.

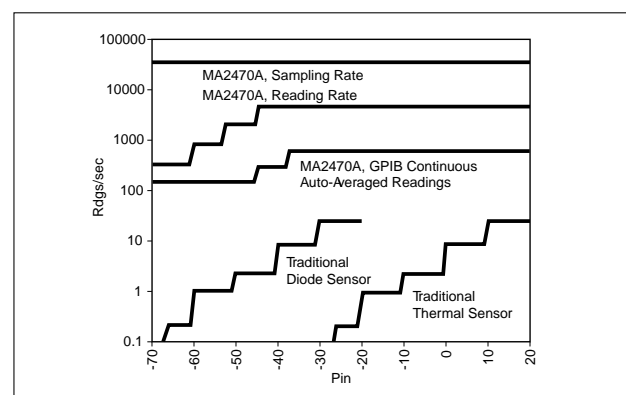


Fig. 2 Standard Diode Sensors

## High accuracy diode sensors

The Anritsu MA2440A series high-accuracy diode sensors have a built in 3 dB attenuator to minimize input SWR. They are 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.

## Fast diode sensors

The MA2460A fast diode sensors from Anritsu have a rise time of 0.6  $\mu$ s. This, together with a sensor video bandwidth of 1.25 MHz, makes them the ideal solution for power measurements on N-CDMA (IS-95) signals. The MA2460 sensors must be used with the ML2407/08A power meter. This combination of meter and sensor provides fast signal processing and sampling speeds. Average power, peak power and crest factor on N-CDMA signals can be measured and displayed. The MA2460 are dual diode sensors that deliver a greater-than 80 dB dynamic range, which makes them suitable for both open- and closed-loop power-control testing. The sensors internal AC detection circuitry gives a guaranteed noise floor of -60 dBm with typical performance to -70 dBm, even when measuring CDMA signals.

Pulses down to 1  $\mu$ s can also be captured and displayed, thanks to the sensor rise time of 0.6  $\mu$ s. In profile mode the ML2407A meter can be used to measure average power across narrow pulses, an increasingly common test method for amplifiers in digitally modulated systems.

## Universal power sensors

The new MA2480A series Universal Power Sensors will measure any modulated or multi-tone signal, thanks to a patented sensor architecture with three diode pairs (see fig. 3). Universal power sensors deliver over 80 dB of dynamic range with speed and accuracy. Average power measurements on WCDMA signals can now be made without the need for special power meters. Universal sensors are also ideal for power measurements on other digitally modulated carriers such as HDTV, DAB or QAM modulated radio links.

Universal power sensors are also ideal for applications where multiple signals are present, such as intermodulation measurements and satellite multi carrier power loading measurements.

Anritsu universal power sensors have a unique additional capability for performing as a standard diode sensor for CW measurements. In this mode the fast response of diode sensors is maintained across the full dynamic range of the sensor, meaning that for the majority of users it is the only sensor that they will ever need – a truly Universal Power Sensor.

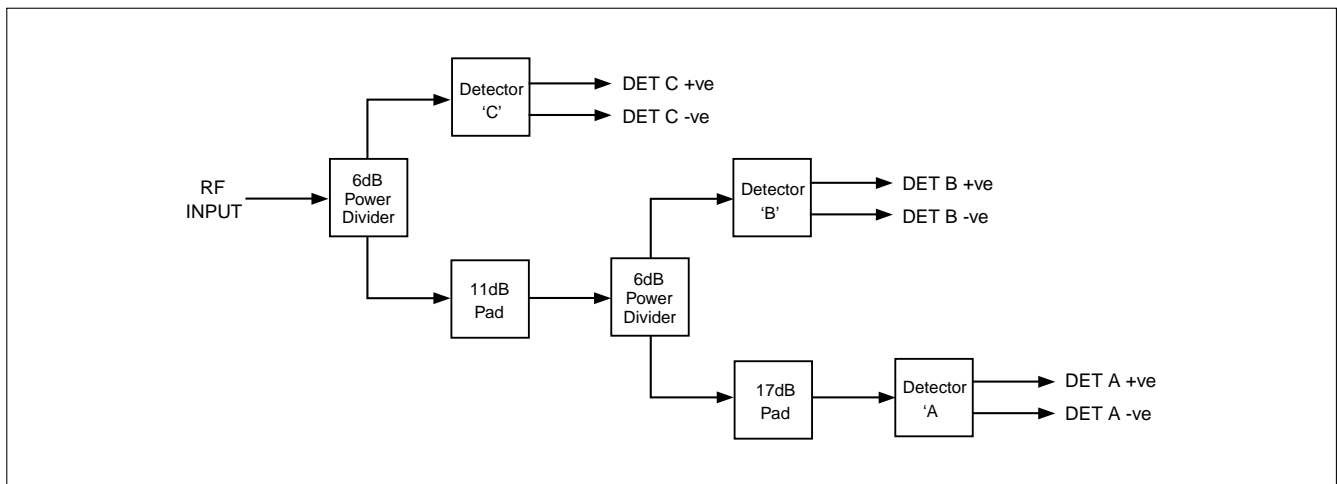


Fig. 3 Universal Power Sensor

## Specifications

Model	Frequency range	Dynamic range (dBm)	SWR	Rise time*1 (ms)	Sensor linearity	RF connector*2
<b>Standard diode sensors</b>						
MA2472B	10 MHz - 18 GHz	-70 to +20	<1.17; 10 - 150 MHz (MA2472B only) <1.90; 10 - 50 MHz <1.17; 50 - 150 MHz <1.12; 0.15 - 2 GHz <1.22; 2 - 12.4 GHz <1.25; 12.4 - 18 GHz <1.35; 18 - 32 GHz <1.50; 32 - 40 GHz <1.63; 40 - 50 GHz	<0.004	1.8%, <18 GHz 2.5%, <40 GHz 3.5%, <50 GHz	N (m)
MA2473A	10 MHz - 32 GHz					K (m)
MA2474A	10 MHz - 40 GHz					K (m)
MA2475A	10 MHz - 50 GHz					V (m)
<b>Fast thermal sensors</b>						
MA2421B	0.1 MHz - 18 GHz	-30 to +20	<1.10; 0.1 MHz - 2 GHz <1.15; 2 - 12.4 GHz <1.20; 12.4 - 18 GHz <1.90; 10 - 50 MHz <1.17; 50 - 150 MHz <1.10; 0.15 - 2 GHz <1.15; 2 - 12.4 GHz <1.20; 12.4 - 18 GHz <1.25; 18 - 32 GHz <1.30; 32 - 40 GHz <1.40; 40 - 50 GHz	<4.0	1.3%, <18 GHz 1.5%, <40 GHz 1.8%, <50 GHz	N (m)
MA2422B	10 MHz - 18 GHz					N (m)
MA2423B	10 MHz - 32 GHz					K (m)
MA2424B	10 MHz - 40 GHz					K (m)
MA2425B	10 MHz - 50 GHz					V (m)
<b>High accuracy diode sensors</b>						
MA2442B	10 MHz - 18 GHz	-67 to +20	<1.17; 10 -150 MHz (MA2442B only) <1.90; 10 - 50 MHz <1.17; 50 - 150 MHz <1.08; 0.15 - 2 GHz <1.16; 2 - 12.4 GHz <1.21; 12.4 - 18 GHz <1.29; 18 - 32 GHz <1.44; 32 - 40 GHz <1.50; 40 - 50 GHz	<0.004	1.8%, <18 GHz 2.5%, <40 GHz 3.5%, <50 GHz	N (m)
MA2444A	10 MHz - 40 GHz					K (m)
MA2445A	10 MHz - 50 GHz					V (m)
<b>Fast diode sensors</b>						
MA2468A*3	10 MHz - 6 GHz	-60 to +20	<1.90; 10 - 50 MHz <1.17; 50 - 150 MHz <1.12; 0.15 - 2 GHz <1.22; 2 - 12.4 GHz <1.25; 12.4 - 18 GHz	<0.0006	1.8%	N (m)
MA2469B*3	10 MHz - 18 GHz					
<b>Universal power sensors</b>						
MA2481B	10 MHz - 6 GHz	-60 to +20	< 1.17; 10 - 150 MHz < 1.12; 0.15 - 2 GHz < 1.22; 2 - 12.4 GHz < 1.25; 12.4 - 18 GHz	<0.004 (with option 1 only)	10 MHz to 6GHz 3% -60 to +20 dBm 6 to 18 GHz 3% -60 to 0 dBm 3.5% 0 to +20 dBm (1.8% CW with option 1)	N (m)
MA2482A	10 MHz - 18 GHz					
MA2480/01	Adds fast CW mode to Universal Power Sensors for high speed measurements of CW signal plus TDMA and pulse measurements.					

\*1: 0.0 dBm, room temperature.

\*2: Each MA2400A/B series sensor incorporates precision RF connectors with hexagon coupling nut for attachment by industry standard torque wrench.

\*3: MA2460A/B Fast Diode Sensors must be used with ML2407/08A Power Meters for NCDMA and Fast Pulse measurements.

Temperature range: +25°C ±5°C

## Ordering information

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

Model/Order No.	Name
MA2421A MA2422B MA2423B MA2424B MA2425B	<b>Thermal Sensor</b> 0.1 MHz to 18 GHz 10 MHz to 18 GHz 10 MHz to 32 GHz 10 MHz to 40 GHz 10 MHz to 50 GHz
MA2442A MA2444A MA2445A	<b>High Accuracy Sensor</b> 10 MHz to 18 GHz 10 MHz to 40 GHz 10 MHz to 50 GHz
MA2468A MA2469B	<b>Fast Diode Sensor</b> 10 MHz to 6 GHz 10 MHz to 18 GHz

Model/Order No.	Name
MA2472A MA2473A MA2474A MA2475A MA2481B MA2482A MA2480/01 MA2400/98 MA2400/99 MA2497A MA2499B	<b>Power Sensor</b> 10 MHz to 18 GHz 10 MHz to 32 GHz 10 MHz to 40 GHz 10 MHz to 50 GHz Universal Power Sensor, 10 MHz to 6 GHz Universal Power Sensor, 10 MHz to 18 GHz Option 1, Universal Power Sensor CW Option Z540/Guide 25 Calibration Premium Calibration Agilent (HP) Sensor adapter Anritsu Sensor 10 to 12 pin Adapter