

**Anritsu** envision : ensure

# USB Power Sensor

## MA24106A

50 MHz to 6 GHz



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**Introduction**

The 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. This makes the MA24106A ideal for measuring average power of CW, multi-tone, and modulated RF waveforms such as 3G, 4G, and OFDM.

The MA24106A measures true RMS power regardless of the type or bandwidth of the input signal.

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**Features**

- True RMS detection over a 63 dB dynamic range enables accurate CW and modulated power measurements
- Ready for use in a wide variety of applications, including installation and maintenance of base stations, testing of 3G and 4G products, cell phones, and general purpose RF devices
- High damage power levels and ESD protection 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
- Light weight, economical, and easy to use with a desktop or laptop PC
- One year calibration cycle and worldwide service centers ensure reduced downtime
- Compatible with most Anritsu RF and microwave handheld analyzers  
(In some cases, the high accuracy power meter software option (Option 19 is required)
- Complimentary PowerXpert™ PC application for easy sensor control and data analysis

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**Definitions**

All specifications and characteristics apply under the following conditions, unless otherwise stated:

Warm-Up Time	After 20 minutes of warm-up time, where the instrument is left in the on state. One-hour warm up with no operation when measured with 128 averages for one hour keeping temperature within $\pm 1$ °C.
Uncertainty	Expanded uncertainty with K=2 for absolute power measurements on CW signal at 0 dBm calibration level from 50 MHz to 6 GHz. Expanded uncertainty with K=2 after zero operation when measured with 128 averages for 5 minutes. In high aperture time mode, noise is 1.3 nW and 0.3 $\mu$ W in Range 1 and Range 2 respectively.
Calibration Cycle	Recommended calibration cycle is 12 months. All specifications subject to change without notice. For the most current data sheet, please visit the Anritsu web site: <a href="http://www.anritsu.com">www.anritsu.com</a> .

## General Specifications

<b>Sensor</b>		
Frequency Range	50 MHz to 6 GHz	
Dynamic Range	-40 dBm to +23 dBm	
Input Return Loss	> 26 dB (50 MHz to < 2 GHz) > 20 dB (2 GHz to 6 GHz)	
Measurement Ranges	Range 1, -40 dBm to -5 dBm Range 2, -5 dBm to +23 dBm	
Signal Channel Bandwidth	100 Hz, typical	
<b>Measurement Uncertainty</b>		
Linearity	$\pm 0.13$ dB (power level < +18 dBm) $\pm 0.18$ dB (power level $\geq$ +18 dBm)	
Calibration Factor <sup>1</sup>	$\pm 0.035$ dB	
Noise <sup>2</sup>	< 2.5 nW (-40 dBm to -5 dBm) < 0.6 $\mu$ W (-5 dBm to +23 dBm)	
Zero Set	< 10 nW (-40 dBm to -5 dBm) < 1.7 $\mu$ W (-5 dBm to +23 dBm)	
Zero Drift <sup>3</sup>	< 3.0 nW (-40 dBm to -5 dBm) < 0.5 $\mu$ W (-5 dBm to +23 dBm) <sub>r</sub>	
Temperature Compensation <sup>4</sup>	$\pm 0.06$ dB (at 0 °C to 50 °C)	
Effect of Digital Modulation <sup>4</sup>	$\pm 0.02$ dB (power level < +18 dBm) $\pm 0.10$ dB (power level $\geq$ +18 dBm)	
<b>System</b>		
Measurand	True-RMS / Average power	
Measurement Resolution	0.01 dB	
Offset Range	$\pm 100$ dB	
Averaging Range	1 to 256	
Measurement Speed	10 measurements per second, typical (one measurement per second, typical in high aperture time mode.)	
Range	Auto-ranging between Range 1 and Range 2	
Interface	USB 2.0	
Host Operating System (PowerXpert application compatibility)	Microsoft® Windows® 7, Windows Vista, Windows XP, Windows 2000, Windows 8, and Windows 10	
Micro Processor	Intel® Pentium® III with 1 GB RAM or Intel® Pentium® IV with 512 MB RAM, or equivalent (Intel® Pentium® IV with 1 GB RAM recommended)	
Supporting Software	Microsoft® .NET 3.5	
Disc Space	100 MB hard-disk free space	
Display	Display resolution 1024 × 768	
USB Port	USB 2.0 full-speed (compatible with USB 1.0 and 1.1) interface	
<b>General</b>		
Current (via host USB Mini-B)	100 mA (typical) at 5 V (150 mA maximum)	
Maximum DC Voltage at RF Port	$\pm 25$ V	
Maximum CW Power	+ 33 dBm	
Size	60.4 mm x 22.2 mm x 84.2 mm typical (2.37 in x 0.87 in x 3.31 in) (Not including N connector.)	
Weight	180 grams typical (6.4 oz)	
<b>Regulatory Compliance</b>		
European Union	EMC 2014/30/EU, EN 61326:2013, CISPR 11/EN 55011, IEC/EN 61000-4-2/3/4/5/6/8/11 Low Voltage Directive 2014/35/EU Safety EN 61010-1:2010 RoHS Directive 2011/65/EU	
Australia and New Zealand	RCM AS/NZS 4417:2012	
South Korea	KCC-REM-A21-0004	
<b>Environmental</b>		
(Tests were performed per MIL-PRF-28800F (Class 3))		
Operating Temperature	0 °C to 50 °C	
Storage Temperature	-51 °C to 71 °C	
Maximum Relative Humidity	45% relative humidity at 55 °C (non-condensing) 75% relative humidity at 40 °C (non-condensing) 95% relative humidity at 30 °C (non-condensing)	
Mechanical Shock	30 g <sub>n</sub> half-sine, 11 ms duration	
Vibration	Sinusoidal: 5-55 Hz, 3 g max Random: 10-500 Hz, power spectral density 0.03 g <sup>2</sup> /Hz	

- Expanded uncertainty with K=2 for absolute power measurements on CW signal at 0 dBm calibration level from 50 MHz to 6 GHz.
- Expanded uncertainty with K=2 after zero operation when measured with 128 averages for 5 minutes. In high aperture time mode, noise is 1.3 nW and 0.3  $\mu$ W in range 1 and range 2 respectively.
- After one hour warm-up and zero operation. Measured with 128 averages for one hour keeping the temperature within  $\pm 1$  °C.
- Measurement error with reference to a CW signal of equal power and frequency at 25 °C

## Model

Part Number	Description
MA24106A	True-RMS USB Power Sensor, 50 MHz to 6 GHz

## Included Accessories

Part Number	Description
2000-1566-R	1.8 meters USB A to Mini-B cable
10585-00021	Quick Start Guide

## Available Options

Part Number	Description
MA24106A-097	Option 97, Accredited Calibration to ISO17025 and ANSI/NCSL Z540. Test report and uncertainty data included.
MA24106A-098	Option 98, Standard calibration to ISO17025 and ANSI/NCSL Z540.
MA24106A-099	Option 99, Premium calibration to ISO17025 and ANSI/NCSL Z540. Test report and uncertainty data included.

Optional Accessories

Calibration Torque Wrenches

Part Number	Description
2000-1593-R	3 meters USB A to Mini-B cable
2000-1594-R	5 meters USB A to Mini-B cable
01-200	Calibrated torque wrench for N connector
01-204	Calibrated torque wrench for K and V connectors

Power Attenuators (Recommended for cable and antenna line sweep applications only. Not recommended for low PIM.)

Part Number	Description
3-1010-123	N(m) to N(f), DC to 8.5 GHz, 30 dB, 50 W, 50 Ω
3-1010-124	N(m) to N(f), DC to 8.5 GHz, 40 dB, 100 W, 50 Ω
3-1010-122	N(m) to N(f), DC to 12.4 GHz, 20 dB, 5 W, 50 Ω
42N50-20	N(m) to N(f), DC to 18 GHz, 20 dB, 5 W, 50 Ω
42N50-30	N(m) to N(f), DC to 18 GHz, 30 dB, 50 W, 50 Ω

Precision Coaxial Adapters



Part Number	Description
510-90	N(m) to 7/16 DIN(f), DC to 3.3 GHz
510-91	N(f) to 7/16 DIN(f), DC to 3.3 GHz
510-92	N(m) to 7/16 DIN(m), DC to 3.3 GHz
510-93	N(f) to 7/16 DIN(m), DC to 3.3 GHz
33NFN50B	N(f) to N(f), DC to 18 GHz
33NNF50B	N(m) to N(f), DC to 18 GHz
33NN50B	N(m) to N(m), DC to 18 GHz
34AN50	GPC-7 to N(m), DC to 18 GHz
34ANF50	GPC-7 to N(f), DC to 18 GHz
34NFK50	N(f) to K(m), DC to 18 GHz
34NFKF50	N(f) to K(f), DC to 18 GHz
34NK50	N(m) to K(m), DC to 18 GHz
34NKF50	N(m) to K(f), DC to 18 GHz

Sensor Calibration Utility

Part Number	Description
2300-528	MA24106A CalXpert™

## Training at Anritsu

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