

POWER METERS

ML2430A series



The ML2430A Series Power Meters combine the advantages of thermal meter accuracy, diode meter speed and peak power meter display graphics. The result is a single instrument that samples at more than 35k per second and achieves 90 dB dynamic range with a single sensor.

The ML2430A Series includes graphics display capability as a standard feature. The ruggedized housing and optional high-capacity NiMH battery bring laboratory quality accuracy to field service applications.

Performance

• Speed and dynamic range

The 90 dB range MA2470A Series Power Sensors' high sensitivity reaches stable power readings to -70 dBm. 35 kHz sample rates profile cellular, PCS and other pulsed signals to 0.1 μ sec resolution. Modern connector technology achieves industry leading return loss for improved accuracy through 50 GHz. The 87 dB range MA2440A Series High Accuracy Sensors further improve return loss performance by adding a matching circuit to the MA2470A Series' front



New power sensor technology achieves industry leading measurement linearity and high sensitivity.

end.

• Fast thermal sensors

Anritsu's latest semiconductor processing technology produces thermal power sensors with speed increased by an order of magnitude. Improvements in connector technology reduce measurement mismatch uncertainty through 50 GHz to levels previously attained only to 20 GHz. The fabrication technique as well as the ML2430A's sampling and DSP technology optimize measuring speed to 4 ms rise and fall times.

• GPIB speed

Industry leading speed is achieved under a variety of operating conditions including averaging settings, sensor control settings, triggering conditions, operating mode, sensor type, and GPIB interface manufacturer. The ML2430A series offers the ability to measure and transfer a high speed burst of 200 data points using profile operating mode with sampling rates of 35k per second.

• GPIB emulation

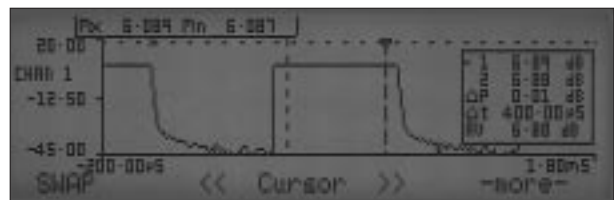
With 99.9% emulation of older meters, the ML2430A series improves ATE system productivity. Typical test system speed improvement is 2 to 10 times faster system speed depending upon the number of measurements taken during the test, the minimal use of wait statements within the code, and the meter model emulated.

• Triggering controls

What use is high speed without triggering and sample controls? Data acquisition event arming and triggering functions traditionally found on expensive peak power meters are standard in the ML2430A series. Triggering delay and the sample integration time per reading can be directly controlled by the operator. Trigger sources include, continuous, internal, external TTL, and manual. Thus, data acquisition can be optimally controlled for synchronization with other test equipment.

• Burst profile graphics display

The ML2430A features random repetitive sampling for high resolution of fast signals. A time domain graphic display profiles pulsed signals over a power range of -40 dBm to +20 dBm. 35 kHz sampling speed produces clear power profiles of cellular and PCS signals including TDMA, PHS, GSM, and DCS-1800. Pulse top power is easily and repeatably measured using between cursor averaging. Measure pulse-top power over >80 dB dynamic range in readout mode at



GPIB speeds >200 readings per second.

• Power vs. time graphics display

One of the most common power meter ATE program types is a plot of RF power versus some stimulus. The power versus time mode is a strip chart style display for monitoring gain and output power variations over time/temperature, supply voltage or a component tolerance. In service applications, power versus time mode speeds trouble shooting of unusual conditions such as intermittent switches or abnormal power control in a mobile telephone. The power versus time mode provides a clear strip chart display of RF power variation.

• Parallel printer connector

Many deskjet series printers can be connected directly to the ML2430A for fast documentation of performance on the bench or in the field. Meter calibration, triggering and averaging settings are listed with the display printout. Thus, evidence of DUT (device under test) anomalies can be duplicated quickly, allowing engineers to fix problems with minimal time investment.

• 90 dB dynamic range

Typical communications industry ATE systems operate over a 60 to 80 dB dynamic range. The MA2470A series' 90 dB dynamic range replaces two 50 dB sensors. Further an RF switch is no longer needed for the two sensors. This reduces software control complexity and further speeds test execution.

• Sensor EEPROM

All MA2400A series sensors are equipped with internal EEPROMs for storage of calibration factor data vs. frequency. This allows the power meter to interpolate and correct readings automatically, improving accuracy and convenience.

• High reliability

Rugged poly-carbonate chassis design handles drop shocks and rough field treatment. No vent holes are present, thus the meter is splash resistant. A front cover panel and softcase are optional for further environmental protection. Power sensors are also ruggedized for rough handling.

• Improved accuracy

Mismatch uncertainty is typically the largest source of error. The MA2400A series Power Sensors offer a typical 5 to 6 dB improvement in sensor return loss, typically cutting mismatch uncertainty in half. The MA2440A series High Accuracy Sensors incorporate a matching pad which further improves return loss by 5 to 6 dB - again halving mismatch uncertainty.

• Offset table for path loss correction

Compensating for the true frequency response of attenuators, couplers, cables, switches and other test setup devices improves measurement accuracy. For this reason, the ML2430A series can apply an offset table of attenuation-versus-frequency in addition to the traditional fixed dB offset capability. When a power sensor connection is preceded with a new 1N series wideband power limiter, the offset table compensates for frequency response. Thus, the combination achieves an accurate, "burnout-proof" sensor.

• Softkey menu control

Softkey menus simplify instrument control by making the user interface easier to understand. The numerical keypad simplifies the operator interface.

• Battery

The optional NiMH "Smart" battery supports high charge density for a typical 8 hour day of operation. Accurate fuel gauging, <2 hour fast charge cycling, and the elimination of NiCd style memory effect further enhances the convenience of this battery technology.

• Voltmeter

The ML2430A series also supports high speed voltage measurement. A rear panel BNC measures voltage or operates as V/GHz input supporting automated sensor calibration factor correction.

Specifications

Frequency range*1		10 MHz to 110 GHz
Power sensors		Meter specifications apply to MA2400A series Power Sensors. Compatible with Anritsu MA and MP series sensors.
Sensor dynamic range		MA2420A series Fast Thermal Sensors: 50 dB MA2440A series High Accuracy Power Sensors: 87 dB CW, 57 dB Peak MA2470A series Power Sensors: 90 dB CW, 60 dB Peak
Power measurement range		-70 to +47 dBm (0.1 nW to 50 W), sensor/attenuator dependent. Use couplers for higher power levels.
Voltage measurement range		0.00 to 20.00 V, nominal
Display range		-99.999 to +99.999 dB
Display resolution		Selectable from 0.1 dB 0.001 dB limited to 0.01 dB in graphical display modes; Linear power units, 3 to 6 digit, 1 - 3 digits selectable to right of decimal nW - W; Voltage, 1 - 2 digits selectable to right of decimal.
Offset range		-99.999 to +99.999 dB. Fixed value or frequency dependent table.
Display units		dBm, dB, dBr, dBmV, dBVr, W, %, Volts
Instrumentation accuracy		<0.5%
Zero set and drift		<0.5% MA2420A; <0.5% MA2470A series and MA2440A series. Percent of full scale in most sensitive range, measured over one hour with maximum averaging after one hour warm up at constant temperature.
Noise		<0.5% of full scale in most sensitive range, measured over a one minute interval with maximum averaging, two standard deviations at constant temperature after one hour warm up, typical. MA2470A series, 20 pW typical.
1.00 mW power reference		Frequency: 50 MHz nominal Output level: 1.00 mW, $\pm 1.2\%$ /year, $\pm 0.9\%$ RSS, NIST Traceable Maximum input: +20 dBm continuous or peak, ± 50 V dc VSWR: <1.04 Connector: Type N precision female
Sensor/channel control	Operating modes	Readout, dual channel. RF power or voltage. Power versus time: Single channel graphic of readout data over adjustable time interval. RF power or voltage Profile: Single channel RF peak power graphic display for analysis of repetitive pulse or transient waveforms
	Range hold	Current range or selectable 1 through 5.
	Averaging	Auto-averaging: Moving average increases averaging at low power ranges. Averaging types: Auto, Manual (Moving, Repeat) Manual average range: 1, 2, 4, ..., 512 Low-level averaging: Low, Medium, and High settings apply post-average low pass filter to improve visibility at high display resolution settings.
	Limit lines	Variable high and low limits with audible, rear panel TTL output, and/or visible Pass/Fail alarm indication. Failure indication can be set to latch until cleared so that a transient failure can be easily noticed.
	Cursors	Two manually adjustable cursors with power, delta cursor power, between cursor power average, and delta time readout display. Delta t resolution: 0.5% of display period or 100 ns
Triggering	Trigger sources	Internal, External TTL, GPIB, Manual, Continuous
	Delay range	0.0 to 1000.0 Milliseconds
	Delay resolution	0.5% of display period or 100 ns
	Internal trigger range	-25.0 to +20.0 dBm MA2470A series Sensors.
	Internal trigger level accuracy	1.0 dB, typical
	External trigger range	TTL rising or falling edge trigger. BNC input
	Manual trigger	Front panel softkey

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System configuration	Display	LCD graphic display with dual channel readout mode and dual peak meters. Backlight and adjustable contrast standard.
	Save/Recall	Offset table memory: Five 200 point storage locations of power level and frequency pairs. A table can be subtracted from measurements and recalled for parallel printer output or download to controller. Setup memory: 10 storage registers plus RESET default settings Offset table record length: 200 points maximum.
	Secure mode	Erases memory information upon power ON. Default condition is secure mode OFF.
	Rear panel inputs/outputs	Operating modes Voltage: Display voltage reading on selected channel Voltage proportional to frequency for sensor calibration factor compensation Blanking input: TTL levels only. Selectable positive or negative polarity. Input range: 0 to 20 V Resolution: 0.5 mV Control: Adjustable voltage to frequency relationship
		Operating modes Analog out: Selectable channel adjusted for calibration factors and other power reading correction settings. Pass/Fail: Selectable TTL High or Low Channel output: Uncalibrated, real time analog. AC modulation output: Output 1 only. Dwell output: Output 2 only Output range: -5.0 to 5.0 V Resolution: 0.1 mV
		Trigger input Operating modes: External TTL or RF Blanking.
		GPIB interface IEEE-488.2 and IEC-625 Implements: AH1, SH1, T6, LE0, SR1, RL1, PP0, DC1, DT1, C0 and E1
		RS-232 Supports software download and remote monitoring.
		Parallel printer output Compatible with Deskjet 540 and 310 models. Other 500 series and 300 series and later are typically compatible. See manual for DIP switch settings.
General specifications	General	MIL-T28800E, Type 3, class 5, Style E
	Display	Flat panel monochrome LCD graphic with backlight
	Operating temperature range	0.0 to +50°C.
	Storage temperature range	-40 to +95°C
	Moisture	Splash and rain resistant, 95% humidity non-condensing.
	Power requirements	AC: 90 to 250 Vac, 47 to 440 Hz, 40 VA maximum DC: 12 to 24 Vdc, Reverse protected to -40. Maximum input 30 V. Battery: >6 hr usable with 3000 mAh battery
	Replaceable battery (Option)	3000 mAh NI-Mh (DR-36 series)
	EMI	Complies with EN 55011 GRP1: 1991 CLASS A; 50082-1: 1992
	Warranty	1 year, additional available
	Dimensions	8.39 inches (213 mm) wide, 3.46 inches (88 mm) high, 9.84 inches (250 mm) deep
	Mass	<6.6 lbs (<3 kg)
Accessories furnished		Operation and programming manual Sensor cable 1.5 m: One per input Power cord mains plug matches destination requirements.

*1: Sensor dependent