8540C Series Universal Power Meter

The Giga-tronics 8540C Series Universal Power Meters combine accuracy, speed, range and measurement capabilities unavailable from any other power meter.

Built-in features such as power sweep calibration and frequency calibration provide an unequalled degree of measurement accuracy.

Only the 8540C Series power meters have the speed and range to meet the throughput demands of high volume manufacturing.

And the meters can measure the CW, peak and true average power of the complex modulated signals used in EW, radar, and communications systems.

TESTING COMMUNICATIONS SYSTEMS

Only the Giga-tronics 8540C Series Universal Power Meters have the extensive measurement capabilities required for today's sophisticated communications applications.

TDMA

The 8540C can automatically measure the average power of pulse modulated signals or pulse signals that are amplitude modulated during the pulse 'on' period — such as TDMA (time division multiple access) signals.

And the exclusive burst start exclude and burst end exclude capabilities of the 8540C allow you to exclude the beginning or end of a burst when measuring the average burst power. Masking the beginning or end of a burst signal, in order to exclude overshoot or other distortions, can be desirable or even required for certain types of measurements.

GSM, NADC AND PDC

The exclusive Time Gating feature of the 8540C lets you program a measurement start time and duration to measure the average power during a specific time slot of a burst signal. This is critical for accurately measuring the average power of GSM, NADC and

The Giga-tronics 8540C Series combines the speed, range, and capabilities needed to test today's sophisticated communications systems.

other formats that must control the power trajectory during a specified portion of the burst.

PHS

PHS (as well as DECT and CT-2) systems use a variation of the TDMA format. Instead of using different frequency channels for the forward and reverse link, these systems use a Time Domain Duplex (TDD) method at the same frequency.

The Time Gating feature of the 8540C can be used in all of the average power measurement modes to accurately measure the average power of the multiplexed time slots.

CDMA

The 8540C has the speed, accuracy and range to accurately measure the power level of CDMA (code division multiple access) signals for open-loop and closed-loop testing.

The wide dynamic range of the 8540C is ideal for open-loop tests, which can require power verification over an 80 dB range. Because the 8540C can achieve fast measurement speeds over the GPIB bus, you can quickly measure power in I dB steps over the 48 dB range required for closed-loop tests.

And no power meter is as accurate as the 8540C over the wide dynamic range needed for CDMA testing.

SPEED TO BURN

Fast responding diode sensors plus innovative digital signal processing deliver high-speed measurements.

Achieve 500 readings per second over GPIB. Or use our exclusive fast buffered mode to further reduce processor overhead and capture up to 4,000 readings per second in CW mode.

The 8540C also responds much faster to power level changes than meters using thermocouple sensors. This adds up to a huge reduction in test time and a significant increase in manufacturing throughput.

PEAK POWER MEASUREMENT

You can also measure the instantaneous peak power level of a pulse modulated signal just by changing sensors. Use the 'sample delay' function of the 8540C to set the desired measurement point on the waveform. An external oscilloscope can be used to view the pulse profile and corresponding measurement point.

The extensive measurement capability of the 8540C is a result of the advanced meter architecture combined with a family of interchangeable sensors. The sensors provide different power measurement functions — CW, peak and modulated — over a wide dynamic range at fast measurement speeds.

Accuracy Audit

The Accuracy Audit table lists the significant uncertainties of an absolute power measurement. The accuracy of the 8540C combined with the 80301A sensor is compared to a typical thermocouple sensor/meter combination at +20 dBm, 0 dBm, and –30 dBm (the dynamic limit of the thermocouple sensor). The uncertainty comparison at –30 dBm illustrates the accuracy advantage of a wide dynamic sensor, even when the full 90 dB dynamic range is not utilized.

+20 dBm Frequency = 1 GHz; Source Match = 1.5:1	8540C with 80301A	Typical Thermocouple Meter/Sensor
Instrumentation Uncertainty	± 5.2%	+ 2.5% – 4.5%
Sensor Power Linearity (>8 GHz)	± 0%	± 0%
Calibrator Uncertainty	± 1.2%	± 1.2%
Calibrator/Sensor Mismatch	± 0.28%	± 0.23%
Calibration Factor Uncertainty	± 1.04%	± 1.6%
Zero Error	± 0.00000005%	± 0.00005%
Noise	± 0.00000005%	± 0.00005%
Mismatch (Sensor/Source)	± 2.25%	± 2.0%
% Total Uncertainty	**± 9.97%**	**+ 7.53 – 9.53%**
dB Total Uncertainty	**± 0.41 dB**	**+ 0.316 – 0.4 dB**

0 dBm Frequency = 1 GHz; Source Match = 1.5:1	8540C with 80301A	Typical Thermocouple Meter/Sensor
Instrumentation Uncertainty	± 0%	± 0.5%
Sensor Power Linearity (>8 GHz)	± 0%	± 0%
Calibrator Uncertainty	± 1.2%	± 1.2%
Calibrator/Sensor Mismatch	± 0.28%	± 0.23%
Calibration Factor Uncertainty	± 1.04%	± 1.6%
Zero Error	± 0.000005%	± 0.005%
Noise	± 0.000005%	± 0.005%
Mismatch (Sensor/Source)	± 2.25%	± 2.0%
% Total Uncertainty	**± 4.77%**	**± 5.54%**
dB Total Uncertainty	**± 0.20 dB**	**± 0.23 dB**

–30 dBm Frequency = 1 GHz; Source Match = 1.5:1	8540C with 80301A	Typical Thermocouple Meter/Sensor
Instrumentation Uncertainty	± 0.925%	± 0.5%
Sensor Power Linearity (>8 GHz)	± 0%	± 0%
Calibrator Uncertainty	± 1.2%	± 1.2%
Calibrator/Sensor Mismatch	± 0.28%	± 0.23%
Calibration Factor Uncertainty	± 1.04%	± 1.6%
Zero Error	± 0.005%	± 5%
Noise	± 0.005%	± 5%
Mismatch (Sensor/Source)	± 2.25%	± 2.0%
% Total Uncertainty	**± 5.71%**	**± 15.53%**
dB Total Uncertainty	**± 0.24 dB**	**± 0.63 dB**

Giga-tronics uses diode sensors exclusively to provide speed, range, capability and accuracy unavailable from any other power meter.

ACCURACY OVER A 90 dB RANGE

Giga-tronics has solved the challenge that previously limited the use of diode sensors to below –20 dBm — the 'square law' region — by utilizing a built-in power sweep calibration system.

The power sweep calibrator uses a 50 MHz amplitude controlled oscillator to step from –30 to +20 dBm in 1 dB increments. Each step is set using an internal thermistor — the standard for accuracy and traceability. You get thermistor accuracy, plus diode speed and dynamic range, for measuring signals accurately over a full 90 dB power range.

THE FASTEST CW MEASUREMENTS

Giga-tronics 80300A Series CW Power Sensors let you measure CW power from10 MHz to 40 GHz at speeds up to 500 readings per second over GPIB.

Measure up to 90 dB with a single sensor, and select from a variety of high power sensors, up to 50 W.

PEAK POWER MEASUREMENTS

Attach a Giga-tronics 80350A Series Peak Power Sensor to an 8540C meter and directly measure the instantaneous peak power level of a pulse modulated signal.

Use the 'sample delay' function to set the desired measurement point on the waveform. An external scope can be used to view the profile and see the exact measurement point on the pulse.

TRUE AVERAGE POWER MEASUREMENTS

The Giga-tronics 80400A Series Modulated Power Sensors let you measure the true average power of amplitude modulated, burst modulated and other complex modulated signals — such as TDMA signals — at modulation bandwidths up to 40 kHz.

When greater bandwidth is needed — for formats such as CDMA and PHS — Giga-tronics 80600A Series Modulated Power Sensors provide bandwidth up to 1.5 MHz to measure the true average power of complex modulated signals.

Giga-tronics 80400A and 80600A Series Modulated Power Sensors can accurately and directly measure signals over a dynamic range up to 87 dB and at power levels up to 50 W.

BUILT-IN FREQUENCY RESPONSE CALIBRATION

Configuring the power meter for measurements is easy with calibration factors programmed into the sensor.

When the measurement frequency is entered, the meter automatically applies the correct calibration factor from the sensor EEPROM. And the meter automatically reads a new set of cal factors whenever a sensor is changed.

This avoids the chance of measurement error from using invalid calibration factors when you change sensors, or from forgetting to enter new calibration factors. You not only avoid measurement errors; you also save yourself test time.

Giga-tronics CW Power Sensor Selection Guide

	Frequency Range/ Power Range	Maximum Power	Power Linearity [4] (Frequency > 8 GHz)	RF Connector	Length	Diameter	Weight	VSWR
200 mW CW Power Sensors								
80301A	10 MHz to 18 GHz –70 to +20 dBm	+23 dBm (200 mW)	–70 to –20 dBm: ±0.00 dB –20 to +20 dBm: ±0.05 dB/10 dB	Type N(m) 50Ω	114.5 mm (4.5 in)	32 mm (1.25 in)	0.18 kg (0.4 lb)	1.12: 0.01 - 2 GHz 1.22: 2 - 12.4 GHz
80302A	10 MHz to 18 GHz –70 to +20 dBm	+23 dBm (200 mW)	–70 to –20 dBm: ±0.00 dB –20 to +20 dBm: ±0.05 dB/10 dB	APC-7 50Ω	114.5 mm (4.5 in)	32 mm (1.25 in)	0.18 kg (0.4 lb)	1.29: 12.4 - 18 GHz
80303A	10 MHz to 26.5 GHz –70 to +20 dBm	+23 dBm (200 mW)	–70 to –20 dBm: ±0.00 dB –20 to +20 dBm: ±0.1 dB/10 dB	Type K(m) [1] 50Ω	114.5 mm (4.5 in)	32 mm (1.25 in)	0.18 kg (0.4 lb)	1.12: 0.01 - 2 GHz 1.22: 2 - 12.4 GHz
80304A	10 MHz to 40 GHz –70 to 0 dBm	+23 dBm (200 mW)	–70 to –20 dBm: ±0.00 dB –20 to 0 dBm: ±0.2 dB/10 dB	Type K(m) [1] 50Ω	114.5 mm (4.5 in)	32 mm (1.25 in)	0.18 kg (0.4 lb)	1.38: 12.4 - 18 GHz 1.43: 18 - 26.5 GHz 1.92: 26.5 - 40 GHz
Low VSWR CW Power Sensors								
80310A	10 MHz to 18 GHz –64 to +26 dBm	+29 dBm (800 mW)	–64 to –14 dBm: ±0.00 dB –14 to +26 dBm: ±0.05 dB/10 dB	Type K(m) [1] 50Ω	127 mm (5.0 in)	32 mm (1.25 in)	0.23 kg (0.5 lb)	1.13: 0.01 - 2 GHz 1.16: 2 - 12 GHz
80313A	10 MHz to 26.5 GHz –64 to +26 dBm	+29 dBm (800 mW)	–64 to –14 dBm: ±0.00 dB –14 to +26 dBm: ±0.1 dB/10 dB					1.23: 12 - 18 GHz 1.29: 18 - 26.5 GHz
80314A	10 MHz to 40 GHz –64 to +6 dBm	+29 dBm (800 mW)	–64 to –14 dBm: ±0.00 dB –14 to +6dBm: ±0.2 dB/10 dB					1.50: 26.5 - 40 GHz
1 W CW Power Sensors								
80320A	10 MHz to 18 GHz –60 to +30 dBm	+30 dBm (1 W)	–60 to –10 dBm:±0.00 dB –10 to +30 dBm: ±0.05 dB/10 dB	Type K(m) [1] 50Ω	127 mm (5.0 in)	32 mm (1.25 in)	0.23 kg (0.5 lb)	1.11: 0.01 - 2 GHz 1.12: 2 - 12 GHz
80323A	10 MHz to 26.5 GHz –60 to +30 dBm	+30 dBm (1 W)	–60 to –10 dBm: ±0.00 dB –10 to +30 dBm: ±0.1 dB/10 dB					1.18: 12 - 18 GHz 1.22: 18 - 26.5 GHz
80324A	10 MHz to 40 GHz –60 to +10 dBm	+30 dBm (1 W)	–60 to –10 dBm: ±0.00 dB –10 to +10 dBm: ±0.2 dB/10 dB					1.36: 26.5 - 40 GHz
5 W CW Power Sensor [2]								
80321A	10 MHz to 18 GHz –50 to +37 dBm	+37 dBm (5 W)	–50 to 0 dBm: ±0.00 dB 0 to +37 dBm: ±0.05 dB/10 dB	Type N(m) 50Ω	150 mm (5.9 in)	32 mm (1.25 in)	0.23 kg (0.5 lb)	1.20: 0.01 - 6 GHz 1.25: 6 - 12.4 GHz 1.35: 12.4 - 18 GHz
25 W CW Power Sensor [3]								
80322A	10 MHz to 18 GHz –40 to +44 dBm	+44 dBm (25 W)	–40 to +10 dBm: ±0.00 dB +10 to +44 dBm: ±0.05 dB/10 dB	Type N(m) 50Ω	230 mm (9.0 in)	104 mm (4.1 in)	0.3 kg (0.6 lb)	1.20: 0.01 - 6 GHz 1.30: 6 - 12.4 GHz 1.40: 12.4 - 18 GHz
50 W CW Power Sensor [3]								
80325A	10 MHz to 18 GHz –40 to +47 dBm	+47 dBm (50 W)	–40 to +10 dBm: ±0.00 dB +10 to +47 dBm: ±0.05 dB/10 dB	Type N(m) 50Ω	230 mm (9.0 in)	104 mm (4.1 in)	0.3 kg (0.6 lb)	1.25: 0.01 - 6 GHz 1.35: 6 - 12.4 GHz 1.45: 12.4 - 18 GHz

Giga-tronics Peak Power Sensor Selection Guide

	Frequency Range/ Power Range	Maximum Power	Power Linearity [4] (Frequency > 8 GHz)	RF Connector	Length	Diameter	Weight	VSWR
200 mW Peak Power Sensors								
80350A	45 MHz to 18 GHz –20 to +20 dBm, Peak –30 to +20 dBm, CW	+23 dBm (200 mW) CW or Peak	–30 to –20 dBm: ±0.00 dB –20 to +20 dBm: ±0.05 dB /10 dB	Type N(m) 50Ω	165 mm (6.5 in)	37 mm (1.25 in)	0.3 kg (0.7 lb)	1.12: 0.045 - 2 GHz 1.22: 2 - 12.4 GHz 1.37: 12.4 - 18 GHz
80353A	45 MHz to 26.5 GHz –20 to +20 dBm, Peak –30 to +20 dBm, CW	+23 dBm (200 mW) CW or Peak	–30 to –20 dBm: ±0.00 dB –20 to +20 dBm: ±0.1 dB /10 dB	Type K(m) [1] 50Ω	165 mm (6.5 in)	37 mm (1.25 in)	0.3 kg (0.7 lb)	1.50: 18 - 26.5 GHz 1.92: 26.5 - 40 GHz
80354A	45 MHz to 40 GHz –20 to +0.0 dBm, Peak –30 to +0.0 dBm, CW	+23 dBm (200 mW) CW or Peak	–30 to –20 dBm: ±0.00 dB –20 to 0.0 dBm: ±0.2 dB /10 dB	Type K(m) [1] 50Ω	165 mm (6.5 in)	37 mm (1.25 in)	0.3 kg (0.7 lb)	
5 W Peak Power Sensor [5, 7]								
80351A	45 MHz to 18 GHz 0 to +40 dBm, Peak –10 to +37 dBm, CW	CW: +37 dBm (5 W Average) Peak: +43 dBm	–10 to +0 dBm: ±0.00 dB +0 to +40 dBm: ±0.05 dB /10 dB	Type N(m) 50Ω	200 mm (7.9 in)	37 mm (1.25 in)	0.3 kg (0.7 lb)	1.15: 0.045 - 4 GHz 1.25: 4 - 12.4 GHz 1.35: 12.4 - 18 GHz
25 W Peak Power Sensor [6, 7]								
80352A	45 MHz to 18 GHz +10 to +50 dBm, Peak 0.0 to +44 dBm, CW	CW: +44 dBm (25 W Average) Peak: +53 dBm	0.0 to +10 dBm: ±0.00 dB +10 to +50 dBm: ±0.05 dB /10 dB	Type N(m) 50Ω	280 mm (11.0 in)	104 mm (4.1 in)	0.3 kg (0.7 lb)	1.20: 0.045 - 6 GHz 1.30: 6 - 12.4 GHz 1.40: 12.4 - 18 GHz
50 W Peak Power Sensor [6, 7]								
80355A	45 MHz to 18 GHz +10 to +50 dBm, Peak 0.0 to +47 dBm, CW	CW: +47 dBm (50 W Average) Peak: +53 dBm	0.0 to +10 dBm: ±0.00 dB +10 to +50 dBm: ±0.05 dB /10 dB	Type N(m) 50Ω	280 mm (11.0 in)	104 mm (4.1 in)	0.3 kg (0.7 lb)	1.25: 0.045 - 6 GHz 1.35: 6 - 12.4 GHz 1.45: 12.4 - 18 GHz

Giga-tronics Bridge Selection Guide

	Frequency Range/ Power Range	Maximum Power	Power Linearity [4] (Frequency > 8 GHz)	Input	Test Port	Directivity	Weight	VSWR
Precision CW Return Loss Bridges								
80501	10 MHz to 18 GHz –35 to +20 dBm	+27 dBm (0.5 W)	–35 to +10 dBm: ±0.1 dB +10 to +20 dBm: ±0.1 dB ±0.005 dB/dB	Type N(f) 50Ω	Type N(f) 50Ω	38 dB	0.340 kg	< 1.17: 0.01 - 8 GHz < 1.27: 8 - 18 GHz
80502	10 MHz to 18 GHz –35 to +20 dBm	+27 dBm (0.5 W)	–35 to +10 dBm: ±0.1 dB +10 to +20 dBm: ±0.1 dB ±0.005 dB/dB	Type N(f) 50Ω	APC-7(f) 50Ω	40 dB	0.340 kg	< 1.13: 0.01 - 8 GHz < 1.22: 8 - 18 GHz
80503	10 MHz to 26.5 GHz –35 to +20 dBm	+27 dBm (0.5 W)	–35 to +10 dBm: ±0.1 dB +10 to +20 dBm: ±0.1 dB ±0.005 dB/dB	SMA(f) 50Ω	SMA(f) 50Ω	35 dB	0.340 kg	< 1.22: 0.01 - 18 GHz < 1.27: 18 - 26.5 GHz
80504	10 MHz to 40 GHz –35 to +20 dBm	+27 dBm (0.5 W)	–35 to +10 dBm: ±0.1 dB +10 to +20 dBm: ±0.1 dB ±0.005 dB/dB	Type K(f) 50Ω	Type K(f) 50Ω	30 dB	0.198 kg	< 1.35: 0.01 - 26.5 GHz < 1.44: 26.5 - 40 GHz

[1] The K connector is electrically and mechanically compatible with the APC-3.5 and SMA connectors. Note: Use a Type N(m) to SMA(f) adapter (part no. 29835) for calibration of power sensors with Type K(m) connectors. [2] Power coefficient equals <0.01 dB/Watt. [3] Power coefficient equals <0.015 dB/Watt. [4] For frequencies above 8 GHz, add power linearity to system linearity. [5] Power coefficient equals <0.01 dB/Watt (Average). [6] Power coefficient equals <0.015 dB/Watt (Average). [7] Peak operating range above CW maximum range is limited to <10% duty cycle. [8] Square root of the sum of the individual uncertainties squared (RSS). [9] Cal Factor numbers allow for 3% repeatability when reconnecting attenuator to sensor and 3% for attenuator measurement uncertainty and mismatch of sensor/pad combination.

Giga-tronics Modulation Power Sensor Selection Guide ($f_m \leq 40$ kHz)

	Frequency Range/ Power Range	Maximum Power	Power Linearity [4] (Frequency > 8 GHz)	RF Connector	Length	Diameter	Weight	VSWR
200 mW Modulation Power Sensors								
80401A	10 MHz to 18 GHz –67 to +20 dBm	+23 dBm (200 mW)	–67 to –20 dBm: ±0.00 dB –20 to +20 dBm: ±0.05 dB/10 dB	Type N(m) 50Ω	114.5 mm (4.5 in)	32 mm (1.25 in)	0.18 kg (0.4 lb)	1.12: 0.01 - 2 GHz 1.22: 2 - 12.4 GHz 1.29: 12.4 - 18 GHz
80402A	10 MHz to 18 GHz –67 to +20 dBm	+23 dBm (200 mW)	–67 to –20 dBm: ±0.00 dB –20 to +20 dBm: ±0.05 dB/10 dB	APC-7 50Ω				
Low VSWR Modulation Power Sensor								
80410A	10 MHz to 18 GHz –64 to +26 dBm	+29 dBm (800 mW)	–64 to –14 dBm: ±0.00 dB –14 to +26 dBm: ±0.05 dB/10 dB	Type K [1](m) 50Ω	127 mm (5.0 in)	32 mm (1.25 in)	0.23 kg (0.5 lb)	1.13: 0.01 - 2 GHz 1.16: 2 - 12 GHz 1.23: 12 - 18 GHz
1 W Modulation Power Sensor								
80420A	10 MHz to 18 GHz –57 to +30 dBm	+30 dBm (1 W)	–57 to–10 dBm: ±0.00 dB –10 to +30 dBm: ±0.05 dB/10 dB	Type K [1](m) 50Ω	127 mm (5.0 in)	32 mm (1.25 in)	0.23 kg (0.5 lb)	1.11: 0.01 - 2 GHz 1.12: 2 - 12 GHz 1.18: 12 - 18 GHz
5 W Modulation Power Sensor [2]								
80421A	10 MHz to 18 GHz –47 to +37 dBm	+37 dBm (5 W)	–47 to 0 dBm: ±0.00 dB 0 to +37 dBm: ±0.05 dB/10 dB	Type N(m) 50Ω	150 mm (5.9 in)	32 mm (1.25 in)	0.23 kg (0.5 lb)	1.20: 0.01 - 6 GHz 1.25: 6 - 12.4 GHz 1.35: 12.4 - 18 GHz
25 W Modulation Power Sensor [3]								
80422A	10 MHz to 18 GHz –37 to +44 dBm	+44 dBm (25 W)	–37 to +10 dBm: ±0.00 dB +10 to +44 dBm: ±0.05 dB/10 dB	Type N(m) 50Ω	230 mm (9.0 in)	104 mm 4.1 in)	0.3 kg (0.6 lb)	1.20: 0.01 - 6 GHz 1.30: 6 - 12.4 GHz 1.40: 12.4 - 18 GHz
50 W Modulation Power Sensor [3]								
80425A	10 MHz to 18 GHz –34 to +47 dBm	+47 dBm (50 W)	–34 to +10 dBm: ±0.00 dB +10 to +47 dBm: ±0.05 dB/10 dB	Type N(m) 50Ω	230 mm (9.0 in)	104 mm (4.1 in)	0.3 kg (0.6 lb)	1.25: 0.01 - 6 GHz 1.35: 6 - 12.4 GHz 1.45: 12.4 - 18 GHz

Giga-tronics Modulation Power Sensor Selection Guide ($f_m \leq 1.5$ MHz)

	Frequency Range/ Power Range	Maximum Power	Power Linearity [4] (Frequency > 8 GHz)	RF Connector	Length	Diameter	Weight	VSWR
200 mW Modulation Power Sensors								
80601A	10 MHz to 18 GHz –67 to +20 dBm, CW	+23 dBm (200 mW)	–67 to –20 dBm: ±0.00 dB –20 to +20 dBm: ±0.05 dB/10 dB	Type N(m) 50Ω	137 mm (5.39 in)	41 mm (1.62 in)	0.23 kg (0.5 lb)	1.12: 0.01 - 2 GHz 1.22: 2 - 12.4 GHz 1.29: 12.4 - 18 GHz
5 W Peak Power Sensor [5,7]								
80621A	10 MHz to 18 GHz –47 to +37 dBm	+37 dBm (5 W)	–47 to 0 dBm: ±0.00 dB 0 to +37 dBm: ±0.05 dB/10 dB	Type N(m) 50Ω	175 mm (6.90 in)	41 mm (1.62 in)	0.28 kg (0.6 lb)	1.20: 0.01 - 6 GHz 1.25: 6 - 12.4 GHz 1.35: 12.4 - 18 GHz

Giga-tronics True RMS Sensors Selection Guide ($f_m > 1.5$ MHz)

	Frequency Range/ Power Range	Maximum Power	Power Linearity [4] (Frequency > 8 GHz)	RF Connector	Length	Diameter	Weight	VSWR
True RMS Sensors (-30 dBm to +20 dBm)								
80330A 80333A 80334A	10 MHz to 18 GHz 10 MHz to 26.5 GHz 10 MHz to 40 GHz	+33 dBm (2 W)	–30 to +20 dBm: ±0.00 dB	Type K(m) [1] 50Ω	152 mm (6.0 in)	32 mm (1.25 in)	0.27 kg (0.6 lb)	1.12: 0.01 - 12 GHz 1.15: 12 - 18 GHz 1.18: 18 - 26.5 GHz 1.29: 26.5 - 40 GHz

Sensor Measurement Capabilities

	Sensor Model			
Signal Type	**80301A**	**80350A**	**80401A**	**80601A**
CW Power Level	–70 to +20 dBm	–30 to 20 dBm	–67 to +20 dBm	–67 to 20 dBm
Amplitude Modulation Rate, Power Range	N/A	N/A	$f_m \leq 40$ kHz, –60 to +20 dBm $f_m > 40$ kHz, –60 to –20 dBm	$f_m \leq 1.5$ MHz, –55 to +20 dBm $f_m > 1.5$ MHz, –55 to –20 dBm
Two-Tone Maximum Separation Between Carriers	N/A	N/A	≤ 40 kHz, –60 to +20 dBm > 40 kHz, –60 to –20 dBm	≤ 1.5 MHz, –55 to +20 dBm > 1.5 MHz, –55 to –20 dBm
Pulse Modulation	N/A	> 350 ns Pulse Width	> 200 µs Pulse Width	> 300 µs Pulse Width
Burst with Modulation	N/A	N/A	$f_m \leq 40$ kHz, > 200 µs Pulse Width; –60 to +20 dBm $f_m > 40$ kHz, > 200 µs Pulse Width; –60 to –20 dBm	$f_m \leq 1.5$ MHz,> 300 µs Pulse Width; –35 to +20 dBm $f_m > 1.5$ MHz, > 300 µs Pulse Width; –35 to –20 dBm

Sensor Calibration Factor Uncertainties

Frequency (GHz)		Root Sum of Squares (RSS) Uncertainties(%) [8]						
		80301A 80302A 80350A 80401A 80402A	80303A 80304A 80353A 80354A	80310A 80313A 80314A 80410A	80320A 80323A 80324A 80420A	80321A[9] 80322A[9] 80325A[9] 80421A[9] 80422A[9] 80425A[9] 80621A[9]	80330A 80333A 80334A	80351A[9] 80352A[9] 80355A[9]
Lower	**Upper**	**80601A**						
0.01	1	1.04	1.64	1.58	1.58	4.54	1.58	4.92
1	2	1.20	1.73	1.73	1.73	4.67	1.73	5.04
2	4	1.33	1.93	1.91	1.91	4.89	1.90	7.09
4	6	1.41	2.03	2.02	2.01	5.01	2.01	7.17
6	8	1.52	2.08	2.07	2.06	5.12	2.06	7.25
8	12.4	1.92	2.55	2.54	2.53	5.56	2.53	7.56
12.4	18	2.11	2.83	2.80	2.79	5.89	2.78	12.37
18	26.5	—	3.63	3.68	3.62	—	3.59	—
26.5	40	—	4.05	4.94	5.39	—	5.30	—

[1] The K connector is electrically and mechanically compatible with the APC-3.5 and SMA connectors. Note: Use a Type N(m) to SMA(f) adapter (part no. 29835) for calibration of power sensors with Type K(m) connectors. [2] Power coefficient equals <0.01 dB/Watt. [3] Power coefficient equals <0.015 dB/Watt. [4] For frequencies above 8 GHz, add power linearity to system linearity. [5] Power coefficient equals <0.01 dB/Watt (Average). [6] Power coefficient equals <0.015 dB/Watt (Average). [7] Peak operating range above CW maximum range is limited to <10% duty cycle. [8] Square root of the sum of the individual uncertainties squared (RSS). [9] Cal Factor numbers allow for 3% repeatability when reconnecting attenuator to sensor and 3% for attenuator measurement uncertainty and mismatch of sensor/pad combination.

Specifications describe the instrument's warranted performance, and apply when using 80300A, 80400A, and 80600A Series sensors.

Typical performance, (shown in *italics*), is non-warranted.

METER

Frequency Range: 10 MHz to 40 GHz [10]

Power Range: -70 dBm to +47 dBm (100 pW to 50 Watt) [10]

Single Sensor Dynamic Range:[10]

CW Power Sensors:	90 dB
Peak Power Sensors:	40 dB, Peak
	50 dB, CW
Modulation Power Sensors:	87 dB, CW
	80 dB, MAP/PAP [11]
	60 dB, BAP [11]

Display Resolution: User selectable from 1 dB to 0.001 dB in Log mode, and from 1 to 4 digits of display resolution in Linear mode.

Meter Functions

Measurement Modes (Sensors): CW (80300A, 80350A, 80400A, 80600A, and Series) Peak (80350A Series) MAP/PAP/BAP [11] (80400A and 80600A Series)

Averaging: User selectable, auto-averaging or manual from 1-512 readings.

dB Rel and Offset: Power display can be offset by -99.999 to +99.999 dB to account for external loss/gain.

Configuration Storage Registers: Allows up to 20 front panel setups.

Power Measurements and Display Configurations: Any two of the following channel configurations, simultaneously: A, B, A/B, B/A, A-B, B-A, DLYA, DLYB

ACCURACY

Calibrator: Power Sweep calibration signal to dynamically linearize the sensors (Type N connector).

Frequency: 50 MHz, nominal

0.0 dBm Accuracy: ±1.2% worst case for one year, over temperature range of 5° to 35°C.

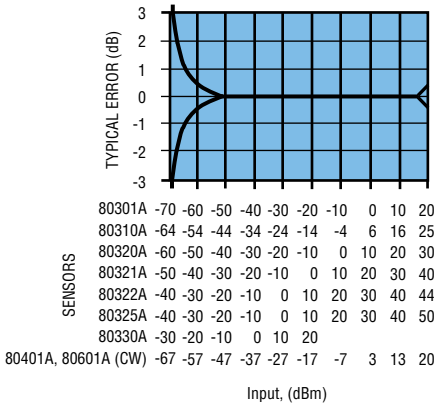
VSWR: <1.05 (Return Loss >33 dB)

Instrumentation, Relative to 0 dBm:

±0.02 dB over any 20 dB range from -70 to +16 dBm.

±0.02 dB + (±0.05 dB/dB) from +16 to +20 dBm.

±0.04 dB from -70 to +16 dBm.



Graph shows linearity plus worst case zero set and noise versus input power

Temperature Coefficient of Linearity: <0.3%/°C temperature change following Power Sweep calibration. 24 hour warm-up required.

Zeroing Accuracy: (CW)

Zero Set: [12] *<±50 pW, <±100 pW* with 80400A and 80600A Series Modulation Power Sensors.

Zero Drift: [12] *<±100 pW* during 1 hour

Noise: *<±50 pW, <±100 pW* with 80400A and 80600A Series Modulation Power Sensors. <±200 pW with 80700A Series Sensors, measureable over any 1 minute interval 3 standard deviations.

REMOTE INPUTS/OUTPUTS

V Prop F Input (BNC): Used to correct power readings for sensor frequency response using source VpropF output. [13]

Analog Output (BNC): Provides an output voltage of 0 to 10V for Channels 1 and 2 in either Lin or Log units. [13] Does not operate in Swift or Buffered modes.

Blanking Output (BNC): TTL High during power meter zero. Can be used to shut off signal generator RF output during sensor zero.

Trigger Input (BNC): TTL trigger input signal for Swift and Fast Buffered modes.

GPIB Interface: IEEE-488 and IEC-625 remote programming

RS232 Interface: Programmable serial interface, DB-9 connector

GENERAL SPECIFICATIONS

Temperature Range:

Operating: 0° to 50°C (+32° to +122°F)

Storage: -40°C to 70°C (-40° to +158°F)

Power Requirements: 100/120/220/240V ±10%, 48 to 440 Hz, 25VA typical

Physical Characteristics:

Dimensions: 215 mm (8.4 in) wide, 89 mm (3.5 in) high, 368 mm (14.5 in) deep

Weight: 4.55 kg (10lbs)

ORDERING INFORMATION

POWER METERS

8541C	Single Input Universal Power Meter (includes 1 sensor cable)
8542C	Dual Input Universal Power Meter (includes 2 sensor cables)

ACCESSORIES

One manual, one power cord, detachable sensor cables.

POWER METER OPTIONS

01	Rack mount kit
02	Add 256K buffer for Fast Buffered Mode Power Readings Stores up to 128,000 readings
03	8541C Rear Panel Sensor and Calibrator Connections
04	8542C Rear Panel Sensor and Calibrator Connections
05	Soft Carry Case
06	Second Analog Output, -10V to +10 V
07	Side Mounted Carrying Handle
08	Transit Case, (Includes Soft Carry Case)
09	Dual Rack Mount Kit (with assembly instructions)
10	Dual Rack Mount Kit (factory assembled)
11	Time Gating

[10] Depending on sensor used. [11] MAP (Modulated Average Power), PAP (Pulse Average Power), BAP (Burst Average Power). [12] Specified performance applies with maximum averaging and 24 hour warm-up at constant temperature. [13] Operates in Normal Mode only.

Specifications subject to change without notice.

GT-152-A

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