Model 58542 VXIbus Universal Power Meter

UNIVERSAL POWER MEASUREMENT

Introducing the 58542 Universal Power Meter. The lastest member of the Spanawave family of innovative VXIbus microwave test and measurement solutions.

Now, for the very first time, you can get NIST traceable, lab grade CW and peak power measurements quickly and accurately from a single-slot VXIbus module.

POWER MEASUREMENTS INSTANTLY

The Spanawave 58542 is the fastest VXI power meter available.

Measurement speeds exceed 150 readings per second, and our exclusive Burst Mode captures more than 5,000 readings in the same tick of a clock. In fact, the 58542 is so fast you can measure the power level of many swept signals, giving you the capability of a scalar analyzer without the addtional cost.

Because the 58542 supports the scpi command language—the standard for VXI computer controlled testing.

Think about what all this will do for your ATE productivity as well as for your company's bottom line.

FAST, EASY PEAK POWER MEASUREMENT

The 58542 is the only VXI meter that lets you measure peak power directly. And it's as simple as attaching a peak power sensor.

There are no time-consuming, unreliable duty cycle corrections. View the pulsed signal's amplitude profile on a scope and see the exact power measurement point on the pulse.

THE SECRET IS THE SENSORS

The Spanawave 58542 Universal Power Meter delivers incredible performance by taking full advantage of the speed and dynamic range of diode sensors.

Spanawave has solved the challenge that previously limited diode sensors to the "square law" region—below -20 dBm—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 linearity.

You get thermistor linearity, plus diode speed and dynamic range, for measuring signals

accurately over a full 90 dB power range.

And for incredible versatility, we offer a full range of CW and Peak sensor tailored to your spsecific needs. Our sensors cover frequency ranges from 10 MHz to 40 GHz with up to 90 dB dynamic range. There are 1 to 50 Watt high power sensors, too.

Use our diode-based True RMS sensors to accurately measure quadrature modulated signals, intermodulation distortion power and 1 dB gain compression. Use our Low VSWR sensor for unequalled CW measurement accuracy. Or connect a Precision Return Loss Bridge and measure Return Loss or VSWR using only a single channel.

TWO CHANNEL OPERATION

The 58542 provides two channel operation, so you can see readings from both channels simultaneously.

Use one channel for CW and the other for peak measurements, and see both readings at the same time.

Or read one channel in dB and the other in mW for measuring gain and output power simultaneously.

With all you've got to do, imagine the ti you'll save.

Accuracy Audit

Assume the power meter is being used to measure the output power at 10 GHz from a source with a VSWR=1.5:1. Displayed power level is -25 dBm. Noise and mismatch calculations assume Standard CW Power Sensors.

	RSS	Worst Case
System Linearity at 50 MHz	0.5%	0.5%
Power Linearity at -25 dBm and 10 GHz	0.000%	0.000%
Calibrator Uncertainty at 50 MHz	1.2%	1.2%
Calibrator/Sensor Mismatch at 50 MHz	0.3%	0.3%
Calibration Factor Uncertainty at 10 GHz	1.9%	3.6%
Zero Error	0.0016%	0.0016%
Noise	0.0016%	0.0016%
Mismatch (Sensor/Source)	4.0%	4.0%
Total	4.62%	9.6%

Spanawave 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

Spanawave 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

Spanawave 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
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.

Spanawave 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

Sensor Calibration Factor Uncertainties

Frequency (GHz)		Root Sum of Squares (RSS) Uncertainties(%) [8]					
			80303A				
		80301A	80304A	80310A	80320A	80321A[9]	80330A
		80302A	80353A	80313A	80323A	80322A[9]	80333A
Lower	Upper	80350A	80354A	80314A	80324A	80325A[9]	80334A
0.01	1	1.04	1.64	1.58	1.58	4.54	1.58
1	2	1.20	1.73	1.73	1.73	4.67	1.73
2	4	1.33	1.93	1.91	1.91	4.89	1.90
4	6	1.41	2.03	2.02	2.01	5.01	2.01
6	8	1.52	2.08	2.07	2.06	5.12	2.06
8	12.4	1.92	2.55	2.54	2.53	5.56	2.53
12.4	18	2.11	2.83	2.80	2.79	5.89	2.78
18	26.5	—	3.63	3.68	3.62	—	3.59
26.5	40	—	6.05	5.54	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 Series Power Sensors. Typical performance, (shown in *italics*), is non-warranted.

METER

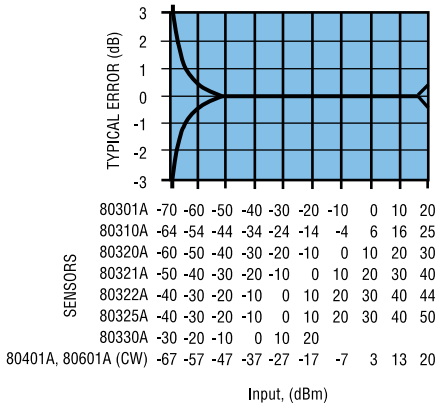
Frequency Range: 10 MHz to 40 GHz [10]
Power Range: -70 dBm to +47 dBm (100 pW to 50 Watt) [10]
Single Sensor Dynamic Range:

CW Power Sensors:	90 dB [10]
Peak Power Sensors:	40 dB, Peak
	50 dB, CW

ACCURACY

Calibrator: Power Sweep calibration signal to dynamically linearize the sensors.
Frequency: 50 MHz, nominal.
Settability: The 1 mW (0.0 dBm) level in the Power Sweep Calibrator is factory set to ±0.7% traceable to the NIST.
0.0 dBm Accuracy: ±1.2% worst case for one year, over temperature range of 5 to 35°C.
Connector: Type N(f) connector, 50 Ω.
VSWR: <1.05 (Return Loss >33 dB).

System Linearity at 50 MHz for Standard CW Sensors:
±0.02 dB over any 20 dB range from -70 to +16 dBm.
±0.02 dB + (+0, -0.05 dB/dB) from +16 to +20 dBm.
±0.04 dB from -70 to +16 dBm.



Graph shows linearity plus zero set and noise vs. input power.

Zeroing Accuracy: (Standard CW Sensors)
Zero Set: <±*50 pW* [11]
Zero Drift: <±*100 pW* during 1 hour [11]
Noise Uncertainty: <±*50 pW* measured over a 1 minute interval. [11]

MEASUREMENT SPEED

Measurement speed increases significantly using data storage capabilities. Storing data in the power meter's memory for later down loading to your controller reduces word serial protocol and protocol conversion overhead. Up to 128,000 readings can be buffered. The table below illustrates typical maximum measurement rates for 80300 Series Peak Power Sensors. Measurement rate depends on several factors including controller speed and number of averages. Burst Mode speed shown does not include bus communication time.

Normal Mode	Swift Mode	Burst Mode
Non-Buffered	Buffered Data	Buffered Data
55 rdgs/s	150 rdgs/s	5100 rdgs/s

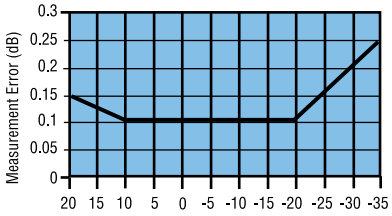
Data is read immediately after measurement in Normal Mode. Swift Mode allows triggering of individual data points, and stores the data in the 58542's memory. Burst Mode also buffers measurement data. Triggering is controlled by setting the time interval between measurements.

FRONT PANEL CONNECTIONS

Analog Output: Provides an output voltage configurable in either Lin or Log units. Normal Mode.
Trigger Input: Used to connect EXT trigger. Swift and Burst Modes
Voltage proportional to Frequency: Allows automated Cal Factor correction. Input the analog VpropF signal level from the microwave source. Normal Mode.

RETURN LOSS BRIDGES

Return Loss Bridge Frequency Response:
Use the standard "Open/Short" supplied with the bridge to frequency compensate 58542 return loss and VSWR measurements.
Bridge Insertion Loss: 6.5 dB, nominal, from input port to test port.



Graph shows Bridge Linearity of the 58542.

GENERAL SPECIFICATIONS

Temperature Range:
Operating: 0 to 50°C (+32 to +122°F)
Storage: -40 to 70°C (-40 to +158°F)
Power Requirements:
+5 VDC @ 800 mA
+24 VDC @ 250 mA
-24 VDC @ 250 mA
Physical Characteristics:
Dimensions:
C-size, single slot VXI standard
30 mm (1.2 in) wide, 234 mm (9.2 in) high, 340 mm (13.4 in) deep.
Weight: 2.5 kg (5.5 lbs)

ORDERING INFORMATION

ACCESSORIES

One Operation and Maintenance Manual and two detachable sensor cables are included.

OPTIONS

02 Add 128K buffer for fast measurements. Stores 128K single channel readings or 64K each dual channel.

[10] Depending on sensor used. [11] MAP (Modulated Average Power), PAP (Pulse Average Power), BAP (Burst Average Power).

Specifications subject to change without notice.

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