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Publication	Former P/N, Revision & Date	Updated P/N, Revision & Date
Series 58542 VXIbus Operation & Maintenance Manual Universal Power Meters Operation Manual	21555, Rev. D3, April 2002	21555, Rev. E, September 2002

Publication Update Requirements				
Change Originator			Replace Old Page(s)/ Add New Page(s)	Remarks
ECO	CAR	QIR		
ECO 8307			Replace old first 2 pages of Front Matter with new.	Update to front matter for new revision identification.
			Replace entirety of Appendix B. with new.	Update caused by CAR.

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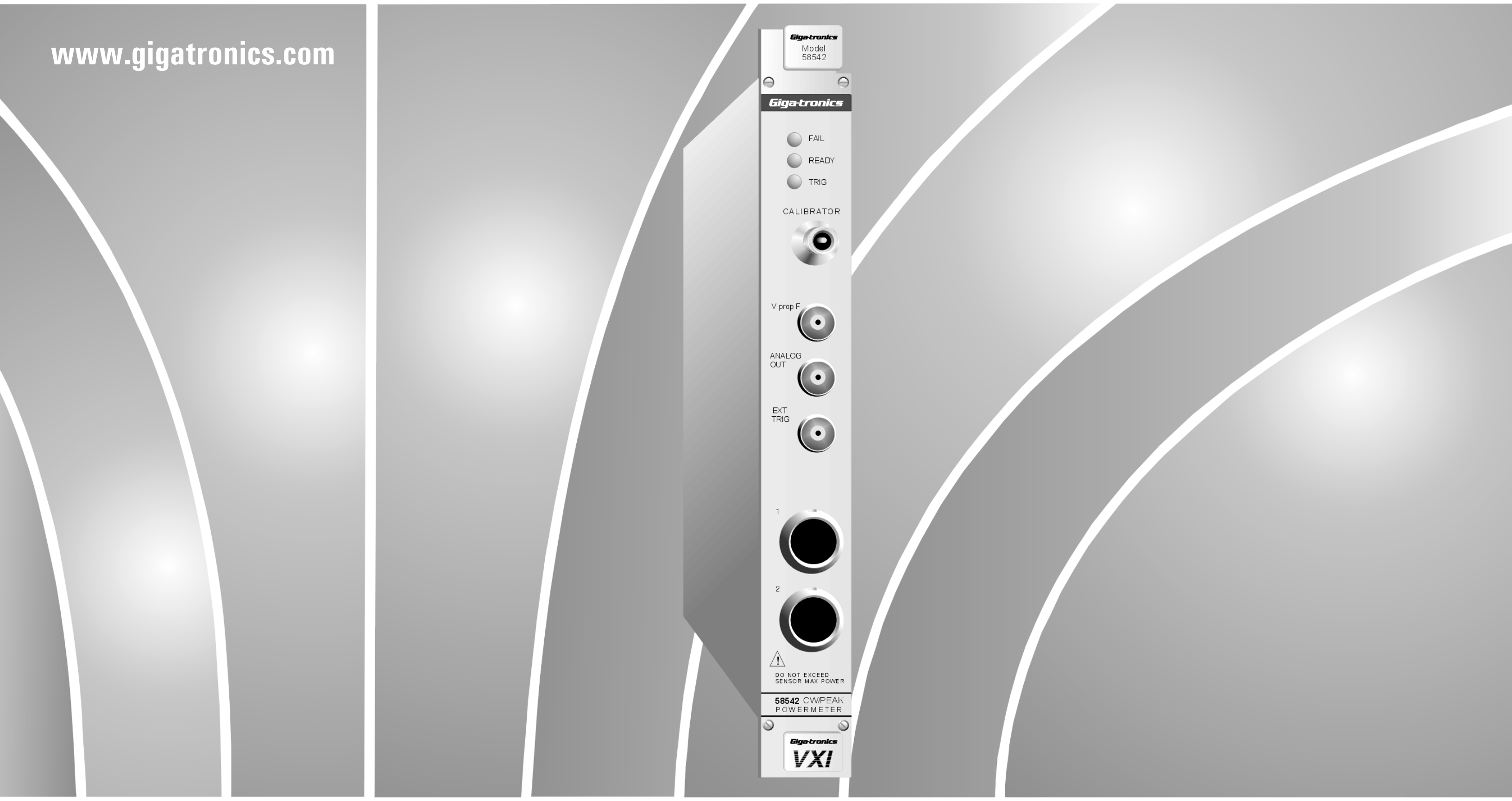

58542 VXIbus Universal Power Meter

Operation & Maintenance Manual

Publication 21555, Rev. E, September 2002

Registered 04 June 1996 ❖ Amended 10 September 2001
CE
Certified Product
ISO 9001
Certified Process
Registrar: BSI, Certification FM 34226

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Giga-tronics 58542 is warranted against defective materials and workmanship for one year from the shipment date. Giga-tronics will at its option repair or replace products that are proven defective during the warranty period. This warranty DOES NOT cover damage resulting from improper use, nor workmanship other than Giga-tronics service. There is no implied warranty of fitness for a particular purpose, nor is Giga-tronics liable for any consequential damages. Specification and price change privileges are reserved by Giga-tronics.

Giga-tronics

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DECLARATION OF CONFORMITY

Application of Council Directive(s)

Standard(s) to which Conformity is Declared:

89/336/EEC and 73/23/EEC	EMC Directive and Low Voltage Directive
EN61010-1 (1993)	Electrical Safety
EN61326-1 (1997)	EMC – Emissions & Immunity

Manufacturer's Name:
Giga-tronics Incorporated

Manufacturer's Address:
4650 Norris Canyon Road
San Ramon, California 94583
U.S.A.

Type of Equipment:
Universal Power Meter

Model Series Number:
58540

Model Number in Series:
58542

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) and Standard(s).

Steve Gredell (Full Name) — (Signature) — Acting Director of Quality Assurance (Position)

San Ramon, California (Place) — August 2, 2002 (Date)

QUF06010 8/2/02

B

Power Sensors

B.1 Introduction

This appendix contains the selection, specifications and calibration data for power sensors used with Giga-tronics power meters. This appendix is divided into the following major sections:

- Power Sensor Selection
- Power Sensor Calibration

B.2 Power Sensor Selection

Standard Series 803XXA Sensors measure CW signals from -70 to +20 dBm; and the Series 804XXA Sensors measure modulated or CW signals from -67 to +20 dBm; the 58542 VXIbus Universal Power Meter also use Peak Power Sensors for measuring radar and digital modulation signals.

Giga-tronics True RMS sensors are recommended for applications such as measuring quadrature modulated signals, multi-tone receiver intermodulation distortion power, noise power, or the compression power of an amplifier. These sensors include a pad to attenuate the signal to the RMS region of the diode's response. This corresponds to the -70 dBm to -20 dBm linear operating region of Standard CW Sensors. The pad improves the input VSWR to ≤1.15 at 18 GHz.

High Power (1, 5, 25 and 50 Watt) and Low VSWR sensors are also available for use with the power meter.

Table B-1 lists the Giga-tronics power sensors used with the power meters. Refer to applicable notes on page B-5. See Figures B-1 for modulation-induced measurement uncertainty.

If the Series 80350A Sensors will be used with a 8542 (dual channel) Universal Power Meter, the 8542 must be configured to code 06 or higher or an asterisk (*) must be appended to the code number. The code number is printed next to the serial number on a label affixed to the instrument's rear panel.

B.2.1 Modulation Power Sensors

Table B-1: Power Sensor Selection Guide

Model	Freq. Range/ Power Range	Max. Power	Power Linearity[4] (Freq > 8 GHz)	RF Conn.	Length	Dia.	Wgt.	VSWR
Modulation Sensors (-70 to +20 dBm)								
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	114.5mm (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				APC-7 50Ω				
80410A	10 MHz to 18 GHz -64 to +26 dBm, CW	+29 dBm (800 mW)	-61 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 1.23:12 - 18 GHz
80420A	10 MHz to 18 GHz -60 to +30 dBm	+30 dBm (1 W)	-57 to -10 dBm ±0.00 dB -10 to +30 dBm ±0.05 dB/10 dB					1.11:0.01 - 2 GHz 1.12:2 - 12 GHz 1.18:12 - 18 GHz
80421A	10 MHz to 18 GHz -50 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
80422A	10 MHz to 18 GHz -40 to +44 dBm	+44 dBm (25 W)	-37 to +10 dBm ±0.00 dB +10 to +44 dBm ±0.05 dB/10 dB		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
80425A	10 MHz to 18 GHz -40 to +47 dBm	+47 dBm (50 W)	-34 to +10 dBm ±0.00 dB +10 to +47 dBm ±0.05 dB/10 dB					1.25:0.01 - 6 GHz 1.35:6 - 12.4 GHz 1.45:12.4 - 18 GHz
Standard CW 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 1.29:12.4 - 18 GHz
80302A				APC-7 50Ω				
80303A	10 MHz to 26.5 GHz -70 to +20 dBm		-70 to +20 dBm ±0.00 dB -20 to +20 dBm ±0.1 dB/10 dB	Type K(m)1 50Ω				1.12:0.01 - 2 GHz 1.22:2 - 12.4 GHz 1.38:12.4 - 18 GHz 1.43:18 - 26.5 GHz 1.92:26.5 - 40 GHz
80304A	10 MHz to 40 GHz -70 to 0 dBm		-70 to -20 dBm ±0.00 dB -20 to 0 dBm ±0.2 dB/10 dB					

Table B-1: Power Sensor Selection Guide (Continued)

Model	Freq. Range/ Power Range	Max. Power	Power Linearity[4] (Freq > 8 GHz)	RF Conn.	Length	Dia.	Wgt.	VSWR
Low VSWR CW 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] 50W	127mm (5.0 in)	32 mm (1.25 in)	0.23 kg (0.5lb)	1.13:0.01 - 2 GHz 1.15:2 - 12 GHz 1.23:12 - 18 GHz 1.29:18 - 26.5 GHz 1.50:26.5 - 40 GHz
80313A	10 MHz to 26.5 GHz -64 to +26 dBm		-64 to -14 dBm ±0.00 dB -14 to + 26 dBm ±0.1 dB/10 dB					
80314A	10 MHz to 40 GHz -64 to +6 dBm		-64 to -14 dBm ±0.00 dB -14 to + 6 dBm ±0.2 dB/10 dB					
1W CW 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 1.18:12 - 18 GHz 1.22:18 - 26.5 GHz 1.36:26.5 - 40 GHz
80323A	10 MHz to 26.5 GHz -60 to +30 dBm		-60 to -10 dBm ±0.00 dB -10 to +30 dBm ±0.1 dB/10 dB					
80324A	10 MHz to 40 GHz -60 to +10 dBm		-60 to -10 dBm ±0.00 dB -10 to +10 dBm ±0.2 dB/10 dB					
5W CW 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 - 2 GHz 1.25:6 - 12.4 GHz 1.35:12.4 - 18 GHz
25W CW 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 - 2 GHz 1.30:6 - 12.4 GHz 1.40:12.4 - 18 GHz
50W CW 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	230mm (9.0 in)	104 mm (4.1 in)	0.3 kg (0.6 lb)	1.25:0.01 - 2 GHz 1.35:6 - 12.4 GHz 1.45:12.4 - 18 GHz

Table B-1: Power Sensor Selection Guide (Continued)

Model	Freq. Range/ Power Range	Max. Power	Power Linearity[4] (Freq > 8 GHz)	RF Conn.	Length	Dia.	Wgt.	VSWR
True RMS Sensors (-30 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	152.5 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
80340 Series Peak Power Sensors (-30 to +20 dBm)								
80340A	50 MHz to 18 GHz	+23 dBm (200 mW)	-30 to -20 dBm ±0.13 dB 0 to +20 dBm	Type N(m)[1] 50Ω	146 mm (5.75 in)	37 mm (1.44 in)	0.3 kg (0.6lb)	1.12:0.01 - 2 GHz 1.22:2 - 12.4 GHz 1.37:12.4 - 18 GHz
80343A 80344A	50 MHz to 26.5 GHz 50 MHz to 40 GHz		±0.13 dB ±0.01 dB/dB	Type K(m)[1] 50Ω				1.50:18 - 26.5 GHz 1.92:26.5 - 40 GHz

Notes:

1. The K connector is electrically and mechanically compatible with the APC-3.5 and SMA 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. Peak operating range above CW maximum range is limited to <10% duty cycle.
6. Includes uncertainty of reference standard and transfer uncertainty. Directly traceable to NIST.
7. Square root of sum of the individual uncertainties squared (RSS).
8. Cal Factor numbers allow for 3% repeatability when connecting attenuator to sensor, and 3% for attenuator measurement uncertainty and mismatch of sensor/pad combination. Attenuator frequency response is added to the Sensor Cal Factors which are stored in the sensor's EEPROM.

Table B-2: Power Sensor Cal Factor Uncertainties

Freq. (GHz)		Sum of Uncertainties (%)[6]						Probable Uncertainties (%)[7]					
Lower	Upper	80301A 80302A 80340 80401A 80402 80303 80304 80343 80344	80310A 80313A 80314A	80320A 80323A 80324A	80321A[8] 80322A[8] 80325A[8]	80330A 80333A 80334A	80301 80302 80340 80401A 80402 80303 80304 80343 80344	80310A 80313A 80314A	80320A 80323A 80324A	80321A[8] 80322A[8] 80325A[8]	80330A 80333A 80334A	80321A[8] 80322A[8] 80325A[8]	80330A[8] 80333A[8] 80334A[8]
0.1	1	1.61	3.06	2.98	2.96	7.61	2.95	1.04	1.64	1.58	1.58	4.54	1.58
1	2	1.95	3.51	3.58	3.57	7.95	3.55	1.20	1.73	1.73	1.73	4.67	1.73
2	4	2.44	4.42	4.33	4.29	8.44	4.27	1.33	1.93	1.91	1.91	4.89	1.90
4	6	2.67	4.74	4.67	4.63	8.67	4.60	1.41	2.03	2.02	2.01	5.01	2.01
6	8	2.86	4.94	4.87	4.82	8.86	4.80	1.52	2.08	2.07	2.06	5.12	2.06
8	12.4	3.59	6.04	5.95	5.90	9.59	5.87	1.92	2.55	2.54	2.53	5.56	2.53
12.4	18	4.09	6.86	6.76	6.69	10.09	6.64	2.11	2.83	2.80	2.79	5.89	2.78
18	26.5	––	9.27	9.43	9.28	––	9.21	––	3.63	3.68	3.62	––	3.59
26.5	40	––	15.19	14.20	13.86	––	13.66	––	6.05	5.54	5.39	––	5.30

Notes:

1. The K connector is electrically and mechanically compatible with the APC-3.5 and SMA 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. Peak operating range above CW maximum range is limited to <10% duty cycle.
6. Includes uncertainty of reference standard and transfer uncertainty. Directly traceable to NIST.
7. Square root of sum of the individual uncertainties squared (RSS).
8. Cal Factor numbers allow for 3% repeatability when connecting attenuator to sensor, and 3% for attenuator measurement uncertainty and mismatch of sensor/pad combination. Attenuator frequency response is added to the Sensor Cal Factors which are stored in the sensor's EEPROM.

B.2.2 Modulation Sensor Specifications

Table B-3: Modulation Sensor Specifications

Sensor Measurement Capabilities		
Signal Type	**Test Conditions**	**Typical Error[1]**
CW	Power level -67 to +20 dBm	none
Single Carrier with AM	Power level -67 to +20 dBm, f_m < 40 kHz Power level -67 to -20 dBm, f_m > 40 kHz Power level -20 to +20 dBm, f_m > 40 kHz	none none see note[2]
Two-Tone	Power level -67 to +20 dBm, max carrier separation < 40 kHz Power level -67 to -20 dBm, max carrier separation > 40 kHz Power level -20 to +20 dBm, max carrier separation > 40 kHz	none none see note[2]
Multi-Carrier	Power level -67 to +10 dBm, max carrier separation < 40 kHz, ten carriers Power level -67 to -30 dBm, max carrier separation > 40 kHz, ten carriers Power level -30 to +10 dBm, max carrier separation > 40 kHz, ten carriers	none none see note[2]
Pulse Modulation	MAP or PAP mode, power level -67 to +20 dBm, pulse width > 200 µs MAP or PAP mode, power level -67 to -20 dBm, pulse width < 200 µs BAP mode, power level -40 to +20 dBm, pulse width > 200 µs BAP mode, power level -40 to -20 dBm, pulse width < 200 µs	none see note[2] none see note[2,3]
Burst with Modulation	MAP or PAP mode, power level -67 to +20 dBm, pulse width > 200 µs, $f_{m<}$ 40 kHz MAP or PAP mode, power level -67 to +20 dBm, pulse width < 200 µs, $f_{m>}$ 40 kHz MAP or PAP mode, power level -67 to -20 dBm, pulse width < 200 µs BAP mode, power level -40 to +20 dBm, pulse width > 200 µs, $f_{m<}$ 40 kHz BAP mode, power level -40 to +20 dBm, pulse width < 200 µs, $f_{m>}$ 40 kHz BAP mode, power level -40 to -20 dBm, pulse width < 200 µs	none see note[2] see note[2] none see note[2,3] see note[2,3]

Notes:

1. Error is in addition to sensor linearity and zero set accuracy.
2. See Figure B-1 for modulation-related uncertainty.
3. The BAP mode does not function at input levels below -40 dBm.
4. The power levels quoted in the table are for Model 80401A. For other modulation sensors, add the values listed below to all power levels shown Table B-3:

   For 80410A, add 6 dB.
   For 80420A, add 10 dB.
   For 80421A, add 20 dB.
   For 80422A, add 30 dB.
   For 80425A, add 33 dB.

Modulation-Induced Measurement Uncertainty for the 80401A Sensor

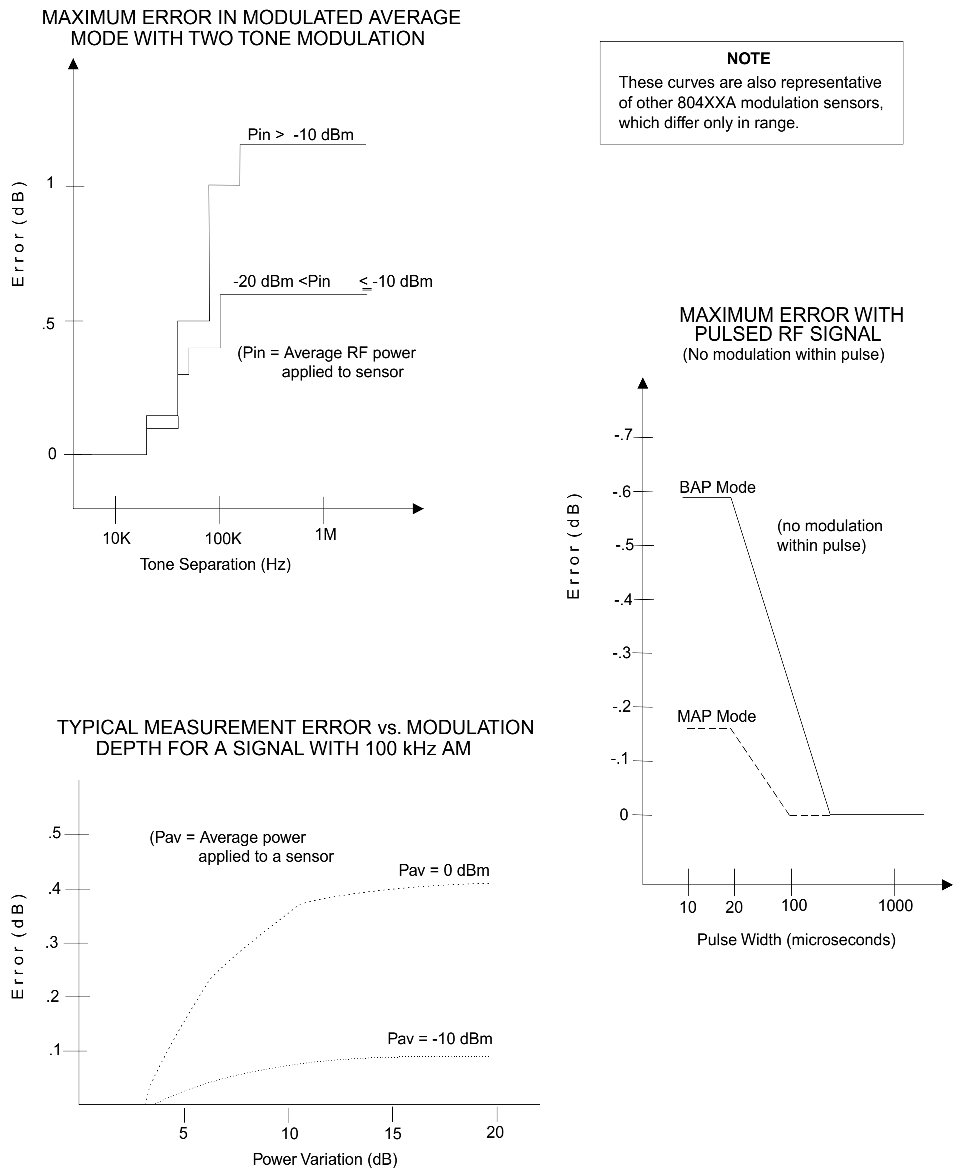


Figure B-1: 80401A Modulation-Related Uncertainty

B.2.2.1 BAP Mode Limitations

The minimum input level is -40 dBm (average); the minimum pulse repetition frequency is 20 Hz. If the input signal does not meet these minima, **BURST AVG** LED will flash to indicate that the input is not suitable for BAP measurement. The power meter will continue to read the input but the BAP measurement algorithms will not be able to synchronize to the modulation of the input; the input will be measured as if the power meter were in MAP mode. In addition, some measurement inaccuracy will result if the instantaneous power within the pulse falls below -43 dBm; however, this condition will not cause LED to flash.

B.2.3 Peak Power Sensors

Table B-4: 8035XA Peak Power Sensor Selection Guide

Peak Power Sensors								
Model	**Freq. Range/ Power Range**	**Max. Power**	**Power Linearity[4]**	**RF Conn.**	**Dimensions**		**Wgt.**	**VSWR**
					Length	**Dia.**		
Standard Peak Power Sensors								
80350A	45 MHz to 18 GHz -20 to +20 dBm, Peak -30 to +20 dBm, CW		-30 to -20 dBm ±0.00 dB -20 to +20 dBm ±0.05 dB/10 dB	Type N(m) 50Ω				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)	1.12:0.045 - 2 GHz 1.22:2 - 12.4 GHz 1.37:12.4 -18 GHz 1.50:18 - 26.5 GHz
80354A	45 MHz to 40 GHz -20 to +0.0 dBm, Peak -30 to +0.0 dBm, CW		-30 to -20 dBm ±0.00 dB -20 to 0.0 dBm ±0.2 dB/10dB					1.12:0.045 - 2 GHz 1.22:2 - 12.4 GHz 1.37:12.4 -18 GHz 1.50:18 - 26.5 GHz 1.92:26.5 - 40 GHz
5W Peak Power Sensor [2,5]								
80351A	45 MHz to 18 GHz 0.0 to +40 dBm, Peak -10 to +37 dBm, CW	CW: +37 dBm (5 W Avg.) 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
25W Peak Power Sensor [3,5]								
80352A	45 MHz to 18 GHz +10 to +50 dBm, Peak 0.0 to +44 dBm, CW	CW: +44 dBm (25 W Avg.) 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
50W Peak Power Sensor[3,5]								
80355A	45 MHz to 18 GHz +10 to +50 dBm, Peak 0.0 to +47 dBm, CW	CW: +47 dBm (50 W Avg.) 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

Notes:

1. The K connector is electrically and mechanically compatible with the APC-3.5 and SMA connectors.
2. Power coefficient equals <0.01 dB/Watt (AVG).
3. Power coefficient equals <0.015 dB/Watt (AVG).
4. For frequencies above 8 GHz, add power linearity to system linearity.
5. Peak operating range above CW maximum range is limited to <10% duty cycle.

Table B-5: Peak Power Sensor Cal Factor Uncertainties

Freq. (GHz)		Sum of Uncertainties (%)[1]					Probable Uncertainties (%)[2]		
Lower	Upper	80350A	80353A 80354A	80351A[3]	80352A[3]	80355A[3]	80350A	80353A 80354A	80351A[3] 80352A[3] 80355A[3]
0.1	1	1.61	3.06	9.09	9.51	10.16	1.04	1.64	4.92
1	2	1.95	3.51	9.43	9.85	10.50	1.20	1.73	5.04
2	4	2.44	4.42	13.10	13.57	14.52	1.33	1.93	7.09
4	6	2.67	4.74	13.33	13.80	14.75	1.41	2.03	7.17
6	8	2.86	4.94	13.52	13.99	14.94	1.52	2.08	7.25
8	12.4	3.59	6.04	14.25	14.72	15.67	1.92	2.55	7.56
12.4	18	4.09	6.86	19.52	20.97	21.94	2.11	2.83	12.37
18	26.5	——	9.27	——	——	——	——	3.63	——
26.5	40	——	15.19	——	——	——	——	6.05	——

Notes:

1. Includes uncertainty of reference standard and transfer uncertainty. Directly traceable to NIST.
2. Square root of sum of the individual uncertainties squared (RSS).
3. Cal Factor numbers allow for 3% repeatability when connecting attenuator to sensor, and 3% for attenuator measurement uncertainty and mismatch of sensor/pad combination. Attenuator frequency response is added to the Sensor Cal Factors which are stored in the sensor's EEPROM.

For additional specifications, see the Series 80350A (P/N 21568) publication and data sheet.

B.2.4 Directional Bridges

The 80500 CW Directional Bridges are designed specifically for use with Giga-tronics power meters to measure the Return Loss/SWR of a test device. Each bridge includes an EEPROM which has been programmed with Identification Data for that bridge.

Table B-6: Directional Bridge Selection Guide

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

The Selection Guide in Table B-6 shows primary specifications. Additional specifications are:

Bridge Frequency Response

Return loss measurements using the 8541/8542 power meter can be frequency compensated using the standard *Open/Short* supplied with the bridge.

Insertion Loss

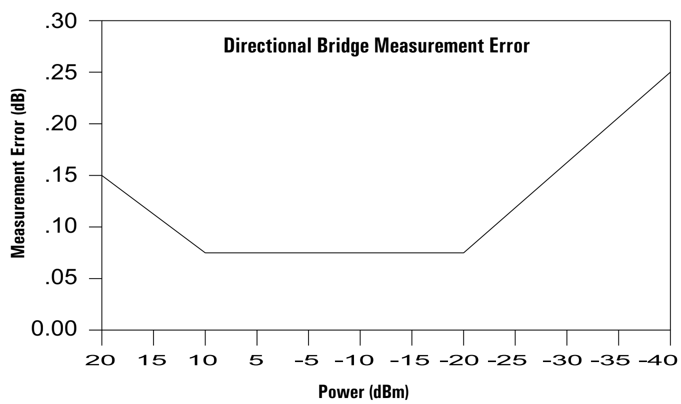
6.5 dB, nominal, from input port to test port

Maximum Input Power

+27 dBm (0.5 W)

Directional Bridge Linearity Plus Zero Set & Noise vs. Input Power (50 MHz, 25 °C ±5 °C)

See Table below



Dimensions

80501	76 x 50 x 28 mm (3 x 2 x 1-1/8 in.)
80502	76 x 50 x 28 mm (3 x 2 x 1-1/8 in.)
80503	19 x 38 x 29 mm (3/4 x 1-1/2 x 2-1/8 in.)
80504	19 x 38 x 29 mm (3/4 x 1-1/2 x 2-1/8 in.)

Weight

80501	340 g (12 oz.)
80502	340 g (12 oz.)
80503	198 (7 oz.)
80504	198 (7 oz.)

Directional Bridge Accessories

An Open/Short is included for establishing the 0 dB return loss reference during path calibration.

B.3 Power Sensor Calibration

This procedure is for calibrating a power sensor by remote control with a 58542 VXIbus Universal Power Meter over the IEEE 488 interface bus. This procedure writes the cal factors to the sensor EEPROM.

Power sensors have built-in EEPROM data that manage the cal factors by a set of frequencies entered during calibration of the sensor at the factory. The user can program additional cal factors with special data for user-specific frequencies. A cal factor expressed in dB is programmed for each factory-calibrated frequency. The calibration process compares the measurement to the frequency standard and applies the cal factor to offset frequency deviations.

B.3.1 Equipment Required

58542 VXIbus Universal Power Meter • GPIB Controller • Power Sensor

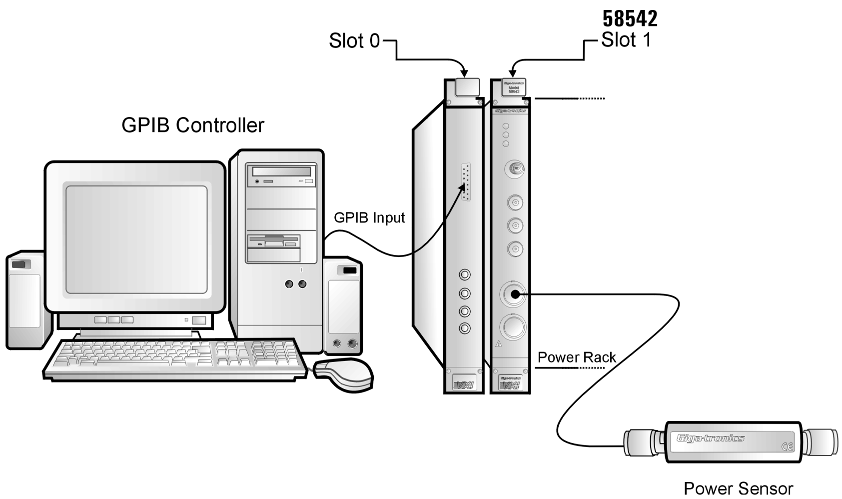


Figure B-1: Power Sensor Calibration Setup

B.3.2 Procedure

Connect the power sensor to Channel 1 or 2 on the 58542 front panel and perform the following steps. In this procedure, bold letters are commands; the query form of a command has a question mark (?) at the end of the command. This form returns the data in the EEPROM.

1. **DIAG:SENS1 (or 2):EEPROM:READ**

   Read sensor 1 (or 2) EEPROM data into the 58542 editor buffer.

   Example: OUTPUT@ PWR_MTR; DIAG:SENS1:EEPROM:READ

2. (Optional) **DIAG:SENS< 1 OR 2>:EEPROM:CALFR?**

    a.) Query sensor 1 (or 2) standard cal factor start frequency, number of standard frequencies and number of special frequencies.

    b.) Read the standard cal from the input buffer and extract the start frequency and number of standard frequencies.

    c.) Calculate and set the frequencies of the cal factor table.

3. **DIAG:SENS< 1 or 2>:EEPROM:CALFST?**

    a.) Query sensor 1 (or 2) standard cat factor table.

    b.) Read the standard cal from the input buffer and extract the standard cal factor; e.g., INPUT (GPIB address).

    c.) DIAG:SENS<1 OR 2>:EEPROM:CALFST*space*"0.02, 0.03,0.04,0.05,0.06,0.07,0.08,0.09,0.10,0.11,0.12,0.13,0.14,0.15,0.16,0.17,0.18" form to write to editor buffer.

    d.) Set the sensor standard cal factor table.

    e.) Make changes from the table and put them back into the table.

    f.) After all changes are made, put the table back into the input buffer.

4. **DIAG:SENS< 1 or 2>:EEPROM:WRITE 0**

    a.) Write sensor 1 (or 2) EEPROM data into the 58542 buffer. If no password has been set up, use 0 for a password.

    b.) Restore the input buffer from step 3.d above to the EEPROM buffer (e.g., OUTPUT [GPIB] address, input buffer).

    c.) Write sensor 1 (or 2) editor buffer data into the EEPROM with the password number, e.g., OUTPUT (GPIB address, DIAG:SENS1 (OR 2):EEPROM:WRITE 0).

    d.) Editing the EEPROM routine is complete.

Sensor EEPROM Code Sequence Writing:

(The following program example is written in Microsoft® Visual Basic using National Instruments® VISA Instrument calls)

```
Private Sub cmdWriteNewData_Click()
   'Write new calibration data to sensor for form

   cmdWriteNewData.Caption = "Writing"

   wrt = "DIAG:SENS" + SensNum + ":EEPROM:TYPE " + space$(1) _
      + Chr$(34) + txtModelNum.Text + "," + txtSerNum.Text + "," + _
      txtCalLoc.Text + "," + MinVal + "," + HourVal + "," + DayVal + _
      "," + MonthVal + "," + YearVal + "," + PWDVal + Chr$(34)

   stat = viWrite(MVISAaddress, wrt, Len(wrt), retCnt)

   SensorWrite 'Call Write new type data

   wrt = "DIAG:SENS" + SensNum + ":EEPROM:CALFR" + space$(1) + _
      Chr$(34) + "2.000e9,1.000e9,17,1" + Chr$(34) 'txtCalFreq.Text

   stat = viWrite(MVISAaddress, wrt, Len(wrt), retCnt)

   SensorWrite 'Call Write new range data

   wrt = "DIAG:SENS" + SensNum + ":EEPROM:CALFST" + space$(1) _
      + Chr$(34) + Str(txtCF1) + "," + Str(txtCF2) + "," _
      + Str(txtCF3) + "," + Str(txtCF4) + "," + Str(txtCF5) + _
      "," + Str(txtCF6) + "," + Str(txtCF7) + "," + Str(txtCF8) _
      + "," + Str(txtCF9) + "," + Str(txtCF10) + "," + _
      Str(txtCF11) + "," + Str(txtCF12) + "," + Str(txtCF13) + _
      "," + Str(txtCF14) + "," + Str(txtCF15) + "," + Str(txtCF16) _
      + "," + Str(txtCF17) + Chr$(34)

   stat = viWrite(MVISAaddress, wrt, Len(wrt), retCnt)

   SensorWrite 'Call Write new cal factor data

   stat = viClear(MVISAaddress)
   rd = ""
   Beep

   cmdWriteNewData.Caption = "Write New Information"
End Sub

Public Sub SensorWrite()
   wrt = "DIAG:SENS" + SensNum + ":EEPROM:WRIT 0"

   stat = viWrite(MVISAaddress, wrt, Len(wrt), retCnt)

   Sleep (5000) 'Wait five seconds

End Sub
```