1.3 8540C System Specifications

1.3.1 Power Meter

Frequency Range:	10 MHz to 40 GHz[1]
Power Range:	-70 dBm to +47 dBm (100 pW to 50 Watt)[1]
Single Sensor Dynamic Range:	
CW Power Sensors:	90 dB[1]
Peak Power Sensors:	40 dB Peak, 50 dB CW
Modulation Sensors:	87 dB CW; 80 dB MAP/PAP; 60 dB BAP
Display Resolution:	User-selective from 1 dB to 0.001 dB in Log mode and from 1 to 4 digits of display resolution in Linear mode.

1.3.2 Accuracy

Calibrator	Power Sweep calibration signal to dynamically linearize the sensors
Frequency:	50 MHz nominal
Settability:	The 1 mW (0.0dBm) level in the Power Sweep Calibrator is factory set to ±0.7% traceable to National Institute of Standards and Technology. Measure with 15 seconds of setting calibrator to 0.0 dBm.
0.0dBm Accuracy:	±1.2% worst case for one year over a temperature range of 5 to 35 °C
Connector:	Type N, 50 Ω
VSWR:	<1.05 (Return Loss >33 dB)
System Linearity at 50 MHz for Standard Sensors:	±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
Temperature Coefficient of Linearity:	<0.3%/ °C temperature change following Power Sweep Calibration. 24-hour warm-up required.
Zeroing Accuracy (CW (Standard Sensors):	
Zero Set	<±50 pW[2] <±100 pW with 80400A and 80600A Series Modulation Power Sensors
Zero Drift	<±100 pW during 1 hour [2, 3] <±200 pW with 80400A and 80600A Series Sensors
Noise	<±50 pW measured over any 1 minute interval. Three standard deviations.[2] <±100 pW with 80400A and 80600A Series Sensors

Notes:

1. Depending on sensor used (see Power Sensor details in Appendix B).
2. Specifications applies at -50 dBm for 803XXA Standard sensors. When measuring power levels Po other than -50 dBm, divide noise and zero specifications by $(10^{-Po/10})/(10^{-5})$. For other 80300 Series CW Sensors, specification applies at 20 dB above the minimum specified reading level. For Peak Sensors, see Appendix B and the 80350A Series Peak Power Sensor Data Sheet. Specified performance applies with Maximum averaging and 24 hour warm-up remperature vision <3 °C.

3. Zero Drift Measurement
   a. Set the meters Average to 512. Perform Calibration. Connect a 50-ohm load to the sensor after Calibration and Zero meter.
   b. Temperarure stabilize at 25 °C for 24 hours.
   c. After the 24 hour stabilization at 25 °C, perform a Zero Drift test.
   d. Zero meter and take an initial measurement reading.
   e. Take one reading every 10 minutes until the one hour period elapses.
   f. Plot the 6 readings, Zero Drift should be ±100pW.

1.3.3 Uncertainty Due to Instrument Linearity & Zero Set vs. Noise

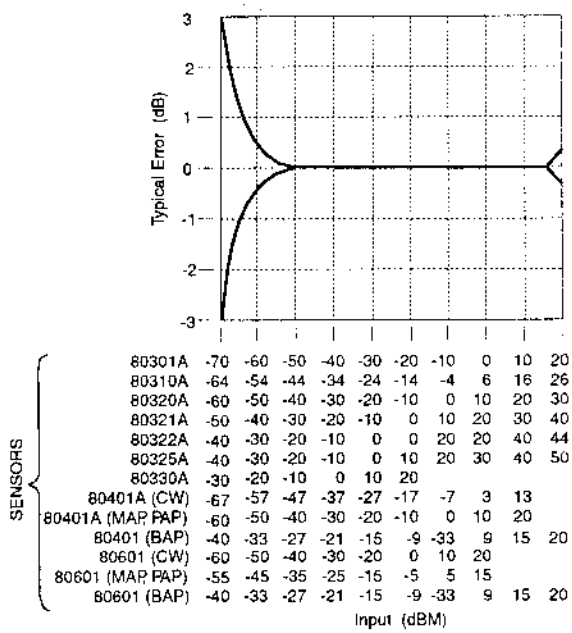

Figure 1-2: Uncertainty Due to Linearity & Zero Set

1.3.4 Measurement Rates

Measurement speed increases significantly using the 8540C data storage capabilities. Storing data in the power meter's memory for later downloading to your controller reduces GPIB protocol overhead. Up to 128,000 readings can be buffered. Table 1-1 illustrates typical maximum measurement rates for different measurement collection modes. The rate of measurement depends on several factors including the controller speed and the number of averages. The Fast Buffered Mode speed does not include bus communication time.

Table 1-1: Collection Modes Measurement Rates

Measurement Collection Mode	Readings per Second (CW Measurement)	Readings per Second (MAP, PAP, BAP Measurement)
Normal (TR3), Continuous Single Readings	>30	15
Swift Mode, Continuous or Buffered, Bus/TTL triggered	>175	N/A
Swift Mode, Continuous or Buffered, Free-run triggered	>200	N/A
Fast Buffered Mode, Buffered Data, Time Interval = 0	2600	N/A
Fast Modulated Mode, Continuous Single Readings	N/A	30

Individual data points are read immediately after measurement in the Normal mode. The Normal mode and the Swift mode both slow down at low power levels (<-37 dBm for Standard Sensors) to average the effects of noise. The Swift mode allows triggering of individual data points and can store the data in the 8540C memory. The Fast Buffered mode also buffers measurement data. Measurement timing of individual data points is controlled by setting the time interval (1 to 5000 ms) between the data points following a trigger.

1.3.5 Remote Operation

GPIB Interface:	All front panel operations and some GPIB-only operations to be remotely programmed in IEEE 488.2 or IEC-625 formats.
Interrupts:	SRQs are generated for the following conditions: Power Up, Front Panel key actuation, Operation Complete and Illegal Command and instrument self-test error.

1.3.6 Fast Buffered Mode Controls

Trigger Source:	TTL or GPIB
Data Buffer Control:	Pre- or Post-measurement data is collected immediately either before or after receipt of the TTL or GPIB trigger.
Time Interval:	TIME ### - controls time interval in milliseconds between measurements. Accurate to 5%, typical.

1.3.7 Meter Function

Averaging:	User-selectable auto-averaging or manual, 1 to 512 readings. Automatic noise compression in auto averaging mode.
dB Rel and Offset:	Allows both relative readings and offset readings. Power Display can be offset by -99.999 dB to +99.999 dB to account for external loss/ gain.
Configuration Storage Registers:	Allows up to 20 front panel setups plus a last instrument state at power-down to be stored and recalled from non-volatile memory.
Power Requirements and Display Configuration:	Any two of the following channel configurations simultaneously: A, B, A/B, B/A, A-B, B-A, DLY$_A$, DLY$_B$ (provided that neither sensor is being used for MAP, BAP, PAP or BAP measurements).

1.3.8 Remote Inputs/Outputs

V_{PROP}F Input (BNC):	Corrects power readings for sensor frequency response using sweeper voltage output. Input resistance = 50K. Does not operate in the fast measurement collection modes (normal mode only).
Analog Output (BNC):	Provides an output voltage of 0 to 10V from either Channel A or Channel B in either Log or Lin units. Does not operate in the swift and fast measurement buffered modes.
Blanking Output (BNC):	TTL high during power meter zero. Can be used to shut off RF output during sensor zero.
Trigger Input (BNC):	Accepts a TTL trigger input signal for swift and fast measurement buffered modes.
GPIB Interface:	Interfaces power meter to controller, IEEE 488.2 and IEC-625 remote programming.

1.3.9 General Specifications

Temperature Range:	
Operating:	0 to 50 °C (32 to 122 °F)
Storage:	-40° to 70 °C (-40° to 158 °F)
Power Requirements:	100/120/220/240Vac ±10%, 48 to 440 Hz, 20 VA 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 (10 lbs)

1.3.10 Accessories Included

1 ea 8540C Operation Manual (P/N 31470)

1 ea Power Cord

1 ea Detachable Sensor Cable (for Model 8541C)
or
2 ea Detachable Sensor Cables (for Model 8542C)

1.3.11 Options

Refer to Appendix C for a full descriptions of options.

OPTION 01: Rack Mount Kit.

OPTION 02: Add 256K buffer for Fast Buffered Power Readings. Stores 128,000 readings.

OPTION 03: 8541C Rear Panel Connections (Sensor & Calibrator - Deletes front panel connections)

OPTION 04: 8542C Rear Panel Connections (Sensor & Calibrator - Deletes front panel connections)

OPTION 05: Soft Carrying Case

OPTION 06: Second Analog Output on 8542C (-10 V to +10 V)

OPTION 07: Side Mounted Carrying Handle

OPTION 08: Transit Case (includes Soft Carrying Case)

OPTION 09: Dual Rack Mount Kit (with assembly instructions)

OPTION 10: Dual Rack Mount Kit (factory assembled)

OPTION 11: Time Gating Measurement

OPTION 13: 8541C Rear Panel Connection (Sensor only - Deletes front panel sensor connection)

OPTION 14: 8542C Rear Panel Connections (Sensor only - Deletes front panel sensor connections)

1.3.12 Power Sensors

See Appendix B for power sensor selection, specifications and calibration data.