

System Accuracy

Transmission Loss or Gain Measurement Accuracy

Transmission loss or gain measurements are made relative to a 0 dB reference point established at calibration. Transmission measurement uncertainty = dynamic power accuracy + mismatch uncertainty.

Dynamic power accuracy is the measurement uncertainty due to the change in power level between calibration and the measurement. Mismatch uncertainty is the uncertainty due to reflections in the measurement setup. The frequency response errors of the source, detectors, bridge and power splitter are removed via calibration.

Transmission Measurement Uncertainty Examples

Assumptions:

- Measurement frequency = 10 GHz
- DUT input/output SWR = 1.5
- Change in power after calibration <30 dB (+0 to -30 dBm range)

Uncertainty component	HP 85037B precision detector	HP 85025E detector
Dynamic accuracy (±dB)	0.11	0.40
Mismatch (±dB)	0.45	0.33
Uncertainty Total (±dB)	0.56	0.73

HP 85037 Series Precision Detectors (ac/dc)

The HP 85037 series precision detectors are designed specifically for operation with the HP 8757D scalar network analyzer and may be used in either ac or dc detection modes. These dual diode detectors contain internal frequency correction factors in an internal EE PROM (read automatically by the HP 8757D) for improved measurement accuracy versus frequency. When used in conjunction with the HP 8757D's internal power calibrator (Option 002), these detectors provide the maximum

absolute power measurement accuracy. The HP 85037 series detectors are not compatible with the HP 8757E, 8757A, 8756A, or 8755.

Absolute Power Measurement Uncertainty Examples

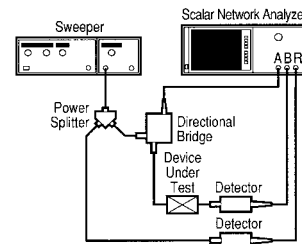
Assumptions:

- Measurement frequency = 10 GHz
- DUT input/output SWR = 1.5
- Measured power = 0 dBm

Uncertainty component	HP 85037B detector	HP 85025E detector
Absolute power accuracy at 50 MHz (±dB)	0.11	0.40
Frequency response (±dB)	0.18	0.50
Mismatch (±dB)	0.18	0.10
Uncertainty Total (±dB)	0.47	1.00

Reflection Measurement Accuracy

Uncertainties due to calibration error and the frequency response of the source, detectors, and bridges are removed via open/short averaging. The remaining uncertainties are primarily the sum of directivity uncertainty, effective source match uncertainty and dynamic power accuracy. See Technical Data Sheet for further information.



Basic scalar coaxial system configured for ratio reflection and transmission measurements.

Precision Detector Summary, HP 85037 Series For use with the HP 8757D in either ac or dc detection modes

Model	Frequency range	Connector type	Dynamic range	Frequency	Return loss	Frequency response	Power (at 50 MHz)	Dynamic accuracy ¹	Absolute accuracy ⁵
HP 85037A ¹	10 MHz to 18 GHz	Type-N (m) 7 mm ²	ac mode	0.01 to 0.04 GHz	10 dB	±0.35 dB	20 dBm	±0.25 dB	±0.25 dB
			+20 to -55 dBm dc mode +20 to -50 dBm	0.04 to 18.0 GHz	20 dB	±0.18 dB	10 dBm -30 dBm -50 dBm	±0.11 dB ±0.11 dB ±0.85 dB	±0.11 dB ±0.11 dB ±0.85 dB
HP 85037B ¹	10 MHz to 26.5 GHz	3.5 mm (m)	ac mode	0.01 to 0.04 GHz	10 dB	±0.35 dB	20 dBm	±0.25 dB	±0.25 dB
			+20 to -55 dBm dc mode	0.04 to 18.0 GHz 18 to 26.5 GHz	20 dB 18 dB	±0.18 dB ±0.22 dB	10 dBm -30 dBm -50 dBm	±0.11 dB ±0.11 dB ±0.85 dB	±0.11 dB ±0.11 dB ±0.85 dB
			+20 to -50 dBm						

HP 85025 and 85026 Series Detectors (ac/dc)

The HP 85025 and 85026 series detectors are designed specifically for operation with the HP 8757 scalar network analyzer and are not compatible with either the HP 8756 or the 8755. The HP 85025/26 detectors detect either a modulated (ac) or an unmodulated (dc) microwave signal.

HP 85025C Detector Adapters

The HP 85025C adapter matches the scalar analyzer display to most standard crystal, silicon and gallium arsenide detectors. This enables the user to operate up to 110 GHz with the HP 8757 and 8756. The HP 85025C detector adapter is designed for use with the HP 8757 only, and can operate in either ac or dc detection modes.

Coaxial Detector Summary, HP 85025 Series For use with the HP 8757 only in either ac or dc detection modes

Model	Frequency range	Connector type	Dynamic range	Frequency	Return loss	Frequency response	Power (at 50 MHz)	Dynamic accuracy ¹	Absolute accuracy ⁵
HP 85025A ³	10 MHz to 18 GHz	Type-N (m) 7 mm ²	ac mode	0.01 to 0.04 GHz	10 dB	±0.8 dB	16 dBm	±0.8 dB	±0.8 dB
			+16 to -55 dBm dc mode +16 to -50 dBm	0.04 to 4 GHz 4 to 18 GHz	20 dB 17 dB	±0.5 dB ±0.5 dB	6 dBm -35 dBm -50 dBm	±0.4 dB ±0.4 dB ±1.3 dB	±0.4 dB ±0.4 dB ±1.3 dB
HP 85025B ³	10 MHz to 26.5 GHz	3.5 mm (m)	ac mode	0.01 to 0.04 GHz	10 dB	±0.8 dB	16 dBm	±0.8 dB	±0.8 dB
			+16 to -55 dBm dc mode	0.04 to 4 GHz 4 to 18 GHz	20 dB 17 dB	±0.5 dB ±0.5 dB	6 dBm -35 dBm	±0.4 dB ±0.4 dB	±0.4 dB ±0.4 dB
			+16 to -50 dBm	18 to 26.5 GHz	12 dB	±2.0 dB	-50 dBm	±1.3 dB	±1.3 dB
HP 85025D ³	10 MHz to 50 GHz	2.4 mm (m)	ac mode	0.01 to 0.1 GHz	10 dB	±0.8 dB	16 dBm	±1.0 dB	±1.0 dB
			+16 to -55 dBm	0.1 to 20 GHz	20 dB	±0.5 dB	6 dBm	±0.4 dB	±0.4 dB
			dc mode	20 to 26.5 GHz	20 dB	±1.0 dB	-35 dBm	±0.4 dB	±0.4 dB
			+16 to -50 dBm	26.5 to 40 GHz 40 to 50 GHz	15 dB 9 dB	±2.5 dB ±3.0 dB	-50 dBm	±1.3 dB	±1.3 dB
HP 85025E ³	10 MHz to 26.5 GHz	3.5 mm (m)	ac mode	0.01 to 0.1 GHz	10 dB	±0.8 dB	16 dBm	±1.0 dB	±1.0 dB
			+16 to -55 dBm	0.1 to 18 GHz	25 dB	±0.5 dB	6 dBm	±0.4 dB	±0.4 dB
			dc mode	18 to 25 GHz	25 dB	±0.5 dB	-35 dBm	±0.4 dB	±0.4 dB
			+16 to -50 dBm	25 to 26.5 GHz	23 dB	±1.4 dB	-50 dBm	±1.3 dB	±1.3 dB

HP 8757D Option 002 Power Calibrator

The HP 8757D's internal power calibrator provides a 50 MHz reference standard for characterizing the absolute power accuracy and dynamic power accuracy of the HP 85037 series precision detectors.

Frequency: 50 MHz ±0.2 MHz

Accuracy at 0 dBm: ±0.05 dB

Linearity: (over any 10 dB range)

±0.08 dB (+20 to +10 dBm)

±0.04 (+10 to -30 dBm)

±0.06 (-30 to -50 dBm)

Waveguide Detectors and Detector Adapters Summary For use with the HP 8757 only in either ac or dc detection modes

Model	Frequency range	Connector type	Dynamic range	Return loss	Frequency response	Dynamic accuracy
HP R85026A ¹	26.5 to 40 GHz	WR-28	+10 to -50 dBm (ac mode) +10 to -45 dBm (dc mode)	12 dB	±1.5 dB	±(0.3 dB + 0.03 dB/dB)
HP Q85026A ¹	33 to 50 GHz	WR-22	+10 to -50 dBm (ac mode) +10 to -45 dBm (dc mode)	12 dB	±2.0 dB	±(0.3 dB + 0.03 dB/dB)
HP U85026A	40 to 60 GHz	WR-19	+10 to -50 dBm (ac mode) +10 to -45 dBm (dc mode)	12 dB	±2.0 dB	±(0.3 dB + 0.03 dB/dB)
HP 85025C Option K57 ²	50 to 75 GHz	WR-15	+10 to -45 dBm (typical)	9.5 dB (typical)	—	—
HP 85025C Option K71 ³	75 to 110 GHz	WR-10	+10 to -45 dBm (typical)	9.5 dB (typical)	—	—
HP 85025C ¹	²	SMA (m)	²	²	²	²

¹The HP 85025 and 85026 series detectors and the HP 85025C detector adapter require HP 8757A firmware revision 2.0 or higher. To upgrade previous revisions, order the HP 11614A firmware enhancement.

²Depends upon the particular detector being used.

³Must be used with the HP 85025C detector adapter.

HP 85027 Series Directional Bridges (ac/dc)

The HP 85027 series directional bridges are designed to operate with either the HP 8757 in ac or dc detection modes or with the HP 8756 or 8755 in ac detection mode. These bridges offer high directivity, excellent test port match, and a measurement range of up to 50 GHz in coax.

Directional Bridge Summary For use with the HP 8757 in ac or dc detection mode or with the 8756 or 8755 in ac detection mode only

Model	Frequency range	Nominal impedance	Connector—input	Connector—test port	Frequency	Directivity (dB)	Frequency	Test port match (SWR)
HP 85027A	10 MHz to 18 GHz	50 Ω	Type-N (f)	7 mm	0.01 to 18 GHz	40 dB	0.01 to 8.4 GHz 8.4 to 12.4 GHz 12.4 to 18 GHz	<1.15 <1.25 <1.43
HP 85027B	10 MHz to 26.5 GHz	50 Ω	3.5 mm (f)	3.5 mm (f)	0.01 to 20 GHz 20 to 26.5 GHz	40 dB 36 dB	0.01 to 8.4 GHz 8.4 to 20 GHz 20 to 26.5 GHz	<1.15 <1.43 <1.78
HP 85027C	10 MHz to 18 GHz	50 Ω	Type-N (f)	Type-N (f)	0.01 to 12.4 GHz 12.4 to 18 GHz	36 dB 34 dB	0.01 to 8.4 GHz 8.4 to 12.4 GHz 12.4 to 18 GHz	<1.15 <1.25 <1.43
HP 85027D	10 MHz to 50 GHz	50 Ω	2.4 mm (f)	2.4 mm (m)	0.01 to 20 GHz 20 to 26.5 GHz 26.5 to 40 GHz 40 to 50 GHz	36 dB 32 dB 30 dB 25 dB	0.01 to 16 GHz 16 to 30 GHz 30 to 40 GHz 40 to 50 GHz	<1.18 <1.27 <1.57 typically <2.00
HP 85027E	10 MHz to 26.5 GHz	50 Ω	3.5 mm (f)	3.5 mm (m)	0.01 to 20 GHz 20 to 26.5 GHz	40 dB 36 dB	0.01 to 8.4 GHz 8.4 to 20 GHz 20 to 26.5 GHz	<1.15 <1.43 <1.78

¹The HP 85037A/B specifications are applicable when used with the HP 8757D scalar network analyzer. The absolute power accuracy and dynamic power accuracy specifications apply after a calibration via the HP 8757D Option 002's internal power calibrator.

²Option 001 changes to a 7-mm connector.

³The HP 85025 and 85026 series detectors and the HP 85025C detector adapter require HP 8757A firmware revision 2.0 or higher. To upgrade previous revisions, order the HP 11614A firmware enhancement.

⁴Dynamic accuracy refers to measurement accuracy as power varies (in dB) from a 0 dBm reference. 25° ±5°C, 50 MHz.

⁵DC mode, 25° ±5°C.