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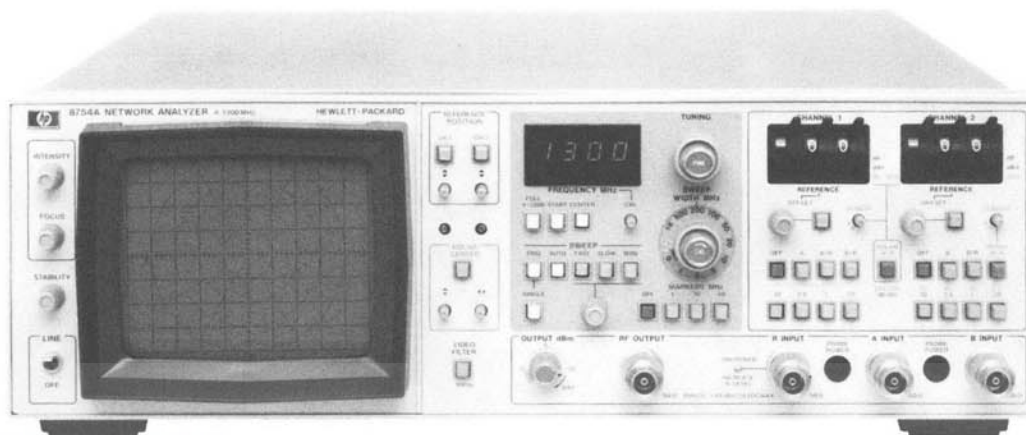


NETWORK ANALYZERS

RF Network Analyzer, 4 MHz to 1300 MHz (optional to 2600 MHz)

Model 8754A

- Integrated source, receiver, and display
- H26 option covers 4 to 2600 MHz
- Three inputs, two measurement channels
- 80 dB dynamic range



HP 8754A

Description

The HP 8754A is a complete stimulus/response test system which combines a 4-1300 MHz swept source, three-input narrowband, tuned receiver, and both rectilinear and polar displays in a compact package. The convenient built-in source incorporates digital display of the start or center frequency, the ability to sweep all or any portion of the 4-1300 MHz range, and crystal markers at 1, 10, or 50 MHz intervals to enable accurate frequency calibration and measurement. The receiver provides 80 dB dynamic range in two independent measurement channels to allow simultaneous measurement of any two transmission or reflection parameters using a single test setup. Measurements of absolute power, magnitude ratio, phase angle, and reflection coefficient (or return loss) are displayed on the fully calibrated CRT with resolutions up to 0.25 dB and 2.5 degrees per major division. With these features the HP 8754A offers a new level of operating convenience and technical performance to swept magnitude and phase measurements in laboratory, production, and field testing applications at an economical price.

A comprehensive line of 50-ohm and 75-ohm test sets allow you to tailor your test setup for a specific measurement using the minimum of equipment, or to provide the maximum in versatility for a wide range of applications. Signal separation devices include the HP 11850 Power Splitter for precision transmission measurements, the HP 8502 Transmission/Reflection Test Set for simultaneous transmission and reflection measurements, the HP 8748A S-Parameter Test Set to measure both forward and reverse S-Parameters. Also available for in-circuit testing is the HP 1121A AC Probe (probe power is supplied directly from the front panel of the HP 8754A). Matched cable sets, precision adapters, and transistor fixtures provide convenient, reliable connections to the test device. Adding the HP 8750A Storage Normalizer provides flicker-free rectilinear displays regardless of sweep rate. The HP 8750A will automatically store and subtract out the frequency response of a test set or cable if necessary, eliminating the need to use a grease pencil when making normalized measurements. For applications that require exceptional frequency accuracy and stability, the HP 8754A may be used with external sources such as the HP 8660, 8662A, 8663A or 8640 Signal Generators.

Coverage to 2600 MHz

The HP 8754A Option H26 provides an economical solution for magnitude and phase measurements to 2600 MHz. Frequency coverage to 2600 MHz is obtained by adding an external frequency doubler (supplied with Option H26) to the RF source output and engaging the "DOUBLER" pushbutton on the front panel. The external frequency doubler doubles the RF output frequency while the

"DOUBLER" pushbutton changes the phase lock circuitry that enables the receiver to lock onto and track signals up to 2600 MHz. In this doubled mode of operation it is necessary to multiply the indicated frequency settings by two for a proper reading. The frequency span between the 1, 10 and 50 MHz crystal markers is also doubled but their excellent accuracy and stability are unaffected. The performance of the source and doubler combination is specified from 100 MHz to 2600 MHz although it is usable down to 8 MHz.

A comprehensive line of 50-ohm 2600 MHz test sets and accessories allow you to tailor your test setup for a specific measurement. For the maximum in versatility, use the HP 8748A Option H26 S-Parameter Test Set which allows characterization of forward and reverse S-Parameters without physically reversing the device. Other test sets include the HP 8502A Option H26 Transmission/Reflection Test Set for simultaneous transmission and reflection measurements and the HP 11850A Option H26 Power Splitter for transmission measurements. Matched cable sets, adapters and transistor fixtures with coverage up to 2600 MHz are also available for connections to test devices.

HP 8754A Network Analyzer Specifications

Frequency range: 4 to 1300 MHz. Option H26 coverage is 4 to 2600 MHz; 4 to 1300 MHz in normal mode, 100 to 2600 MHz in doubled mode (usable down to 8 MHz).

Sweep modes: linear full sweep (4 to 1300 MHz or 8 to 2600 MHz in doubled mode) and calibrated sweep widths with variable start or center frequency.

Sweep widths: selectable sweep width ranges from 1 to 1000 MHz (2 to 2000 MHz with Option H26) in a 1, 2, 5 sequence, plus CW. A vernier allows continuous adjustment of sweep width within each range and calibration to internal crystal makers.

Spectral Purity (+10 dBm RF output level)

Residual FM (swept and CW): ≤ 7 kHz rms (10 kHz bandwidth).

Harmonics: -28 dBc.

Output power range: 0 to +13 dBm typical, ± 0.5 dB flatness. Option H26 100 to 2600 MHz: (measured at the output of the doubler with +10 dBm at the input, frequency doubler has approx. 14 dB of conversion loss).

Residual FM (swept or CW): ≤ 14 kHz rms (10 kHz bandwidth).

Harmonics: Second typically -15 dBc, Third typically -25 dBc.

Output power range: 0 to +13 dBm typical, ± 0.5 dB flatness.

Receiver

Frequency: 4 MHz to 1300 MHz. Option H26 ("DOUBLER" pushbutton engaged): 8 to 2600 MHz.

Input channel: two test inputs (A and B) and one reference (R) input.

Input connectors: type-N Female, 50 ohms nominal impedance.

Input port match: ≥ 20 dB Return Loss (1.22 SWR).

Option H26:

1300 to 2000 MHz: ≥ 13 dB Return Loss (1.58 SWR).

2000 to 2600 MHz: ≥ 9 dB Return Loss (2.10 SWR).

Maximum input level: 0 dBm at R, A, B inputs.

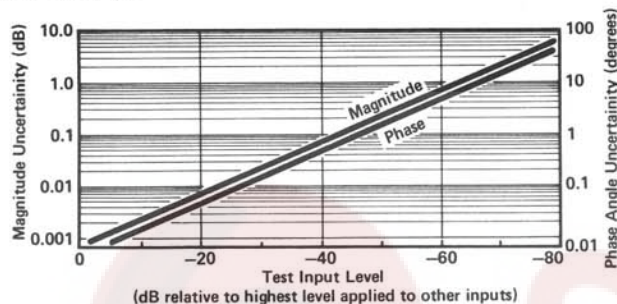
Damage level: +20 dBm (50 Vdc).

Noise level: < -80 dBm at A and B inputs.

Minimum R input level: -40 dBm (≥ -40 dBm required to operate R input phase-lock).

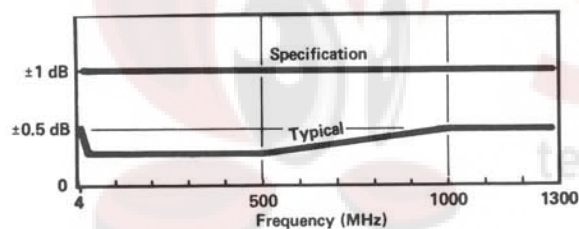
Crosstalk between channels: > 83 dB.

Error Limits:



Magnitude frequency response (flatness)

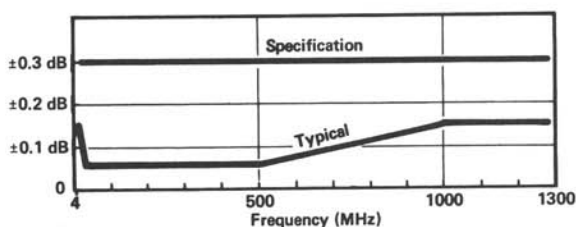
Absolute (A,B): $\leq \pm 1$ dB.



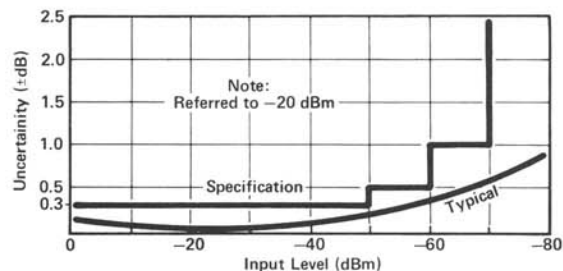
Ratio (A/R, B/R): $\leq +0.3$ dB.

Option H26: 8 to 2000 MHz: $\leq \pm 0.7$ dB.

8 to 2600 MHz: $\leq \pm 1.3$ dB.



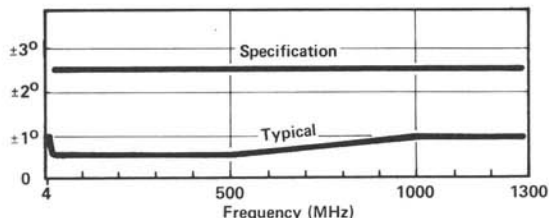
Magnitude dynamic accuracy: ± 0.3 dB from 0 to -50 dBm, ± 0.5 dB from -50 to -60 dBm, ± 1 dB from -60 to -70 dBm, ± 2.5 dB from -70 to -80 dBm.



Magnitude reference offset range: ± 199 dB in 1 dB steps. Vernier provides variable offset for calibration.

Absolute power measurements (A, B, and R): typically ± 0.5 dBm at 0 dBm, 50 MHz input.

Phase frequency response: $\pm 2.5^\circ$ (typically $\pm 1^\circ$); Option H26 1300-2600 MHz, $\pm 5^\circ$.



Phase range: $\pm 180^\circ$.

Phase dynamic accuracy: $\pm 2^\circ$ from 0 to -50 dBm, $\pm 4^\circ$ from -50 to -70 dBm.

Phase reference offset range: $\pm 199^\circ$ in 1° steps. Vernier provides variable offset for calibration.

Electrical length adjustment range: typically 0 to 16 cm length for transmission phase; typically 0 to 8 cm reference plane extension for reflection measurements. Option H26 (to 2600 MHz) typically up to 8 cm for transmission phase; up to 4 cm for reflection.

Display

Measurement functions: CRT displays either polar trace or Channel 1 and Channel 2 rectilinear traces.

Reference position: independent reference lines for Channel 1 and Channel 2 and polar center can be set to any position for calibration.

Video filter: typically 100 Hz (10 kHz without filter).

Graticule size: rectilinear 10 cm by 8 cm; polar 8 cm in diameter.

Smith chart overlays: 2, 1, 0.2 and 0.1 full scale (furnished).

CRT photography: Tektronix C-5B Oscilloscope Camera is recommended (UV illumination will not excite P39 CRT phosphor for graticule exposure).

Resolution: 10, 2.5, 1, 0.25 dB magnitude per major division. 90, 45, 10, 2.5 degrees phase per major division.

Accuracy: $\pm 2\%$ ± 0.05 division for rectilinear trace. Within 2.5 mm for polar trace.

General

Sweep output: -5 V to $+5$ V.

External sweep inputs: 0 to 10 V nominal.

X-Y Recorder/External CRT Output

Horizontal and vertical: 0.1 V/div.

Penlift/blanking: $+5$ V Blanking and Penlift.

External marker input: typically -13 dBm RF signal produce a marker at the frequency of the RF signal.

Magnitude/phase output: -10 mV/degree and -100 mV/dB.

Probe power: Two $+15$ Vdc and -12.6 Vdc.

Storage-Normalizer interfaces: directly compatible with the HP 8750A Storage-Normalizer. HP 8501A Storage-Normalizer requires a single internal adjustment for compatibility.

Programming connector: outputs include magnitude/phase and sweep outputs and inputs described above as well as measurement mode selection by TTL levels or contact closures.

External source: the HP 8754A sweep-out voltage is provided to frequency modulate (sweep) an external signal generator for narrow-band measurement applications. A sweep input is provided to synchronize the CRT display for use with an externally swept source (HP 8620 and 8350 series).

Temperature

Operating: 0° to 55° C except where noted.

Storage: -40° C to $+75^\circ$ C.

EMI: VDE 0871/0875 and CISPR publication 11.

Safety: conforms to the requirements of IEC 348.

Power: selection of 100, 120, 220 and 240 V $\pm 5\%$ -10% . 48 to 66 Hz, 20 VA max.

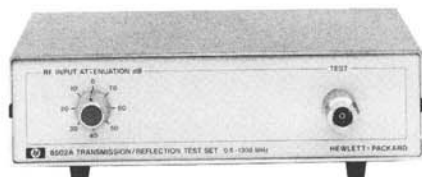
Size: 425.5 mm W x 133 mm H x 505 mm D (16 $\frac{3}{4}$ " x 5 $\frac{1}{4}$ " x 19 $\frac{7}{8}$ ").

Weight: net, 16.8 kg (37 lb); shipping, 19 kg (42 lb).

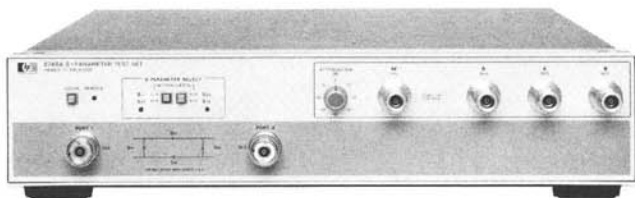
552 NETWORK ANALYZERS

RF Network Analyzer

Model 8754A (cont.)



HP 8502A



HP 8748A



HP 11850A



HP 11851A

HP 8748A 50 Ohm S-Parameter Test Set Specifications

Frequency Range: 4 to 1300 MHz. Option H26: 4 to 2600 MHz.

Directivity: ≥ 40 dB.

Option H26: 4 to 1300 MHz, ≥ 35 dB.

1300 to 1600 MHz, ≥ 30 dB.

Frequency Response¹:

Transmission (S_{21}, S_{12}): ± 1 dB, $\pm 8^\circ$.

Option H26 (2600 MHz frequency range):

4 to 1300 MHz: ± 1 dB, $\pm 8^\circ$.

1300 to 2600 MHz: ± 1.5 dB, $\pm 15^\circ$.

Reflection (S_{11}, S_{22}): ± 2 dB, $\pm 15^\circ$.

Option H26 (2600 MHz frequency range):

4 to 1300 MHz: ± 2 dB, $\pm 15^\circ$.

1300 to 2600 MHz: ± 3 dB, $\pm 20^\circ$.

Port Match²:

Test Port 1 and 2: ≥ 26 dB Return Loss (≤ 1.11 SWR).

Test Port 1 and 2 open/short ratio: ± 0.75 dB and $\pm 6^\circ$ from 4 to 1000 MHz, ± 0.9 dB and $\pm 7.5^\circ$ from 1000 to 1300 MHz.

Option H26:

Test Port 1 and 2:

4 to 1300 MHz, 22 dB Return Loss.

1300 to 2600 MHz, 17 dB Return Loss.

Test Port 1 and 2 open/short ratio:

4 to 1300 MHz: ± 1.2 dB, $\pm 10^\circ$.

1300 to 2600 MHz: ± 1.5 dB, $\pm 15^\circ$.

Insertion Loss:

Input to Test Port 1 or 2: 13 dB nominal.

Input to Port A, B or R: 19 dB nominal.

Option H26: same

Maximum Operating Level: +20 dBm.

RF Attenuator Range: 0 to 70 dB in 10 dB steps.

Test Port Connectors: APC-7.

DC Bias Input Range: ± 30 Vdc, ± 200 mA.

Includes: cables for connection to HP 8754 and Reference Plane Extension Cable Kit.

Recommended Accessory: HP 11857A Test Port Extension Cables, HP 11608A Transistor Fixture, or HP 11600B, 11602B Transistor Fixtures.

Power: 20Vdc, supplied from HP 8754 via interface cable (included).

Size: 432mmW x 90mmH x 495mmD (17" x 3½" x 19½").

Weight: net, 9.1 kg (20 lb); shipping, 11.3 kg (25 lb).

HP 8502A 50 Ohm Transmission/Reflection Test Set

HP 8502B 75 Ohm Transmission/Reflection Test Set

General: the HP 8502 contains a power splitter and directional bridge that permits simultaneous transmission and reflection measurements.

Detailed specifications on the HP 8502A and 8502B appear on page 558. The HP 8502A Option H26 is intended as an accessory to the HP 8754A Option H26 and allows 50 ohm transmission/reflection measurements up to 2600 MHz. For interconnections from the HP 8502 to the HP 8754A use the HP 11851A RF Cable Set. The major specifications of the HP 8502A option H26 are:

Frequency Range: 4 to 2600 MHz.

Directivity:

4 to 1300 MHz: ≥ 35 dB.

1300 to 2600 MHz: ≥ 30 dB.

Frequency Response:

Transmission:

4 to 1300 MHz: ≤ 0.9 dB, $\leq \pm 10^\circ$.

1300 to 2600 MHz: $\leq \pm 1.5$ dB, $\leq \pm 15^\circ$.

Reflection:

4 to 1300 MHz: $\leq \pm 1.8$ dB, $\leq \pm 10^\circ$.

1300 to 2600 MHz: $\leq \pm 3.0$ dB, $\leq \pm 15^\circ$.

Port Match:

Test Ports:

4 to 1300 MHz: ≥ 22 dB Return Loss (≤ 1.17 SWR).

1300 to 2600 MHz: ≥ 17 dB Return Loss (≤ 1.33 SWR).

Test Port Open/Short Ratio:

4 to 1300 MHz: $\leq \pm 1.2$ dB, $\leq \pm 10^\circ$.

1300 to 2600 MHz: $\leq \pm 1.5$ dB, $\leq \pm 15^\circ$.

Reference and Reflection Port:

4 to 1300 MHz: ≥ 22 dB (≤ 1.17 SWR).

1300 to 2600 MHz: ≥ 17 dB (≤ 1.33 SWR).

Input Port

4 to 1300 MHz: ≥ 20 dB (≤ 1.22 SWR).

1300 to 2600 MHz: ≥ 12 dB (≤ 1.67 SWR).

HP 11850A 50 Ω Three-Way Power Splitter

HP 11850B 75 Ω Three-Way Power Splitter

General: one output port provides the reference output and the other two output ports can be used for independent transmission measurements. Use the HP 11851A RF Cable Set for interconnections. Detailed specifications on page 558.

HP 11851A RF Cable Set

General: three 61 cm (24 in.) 50 Ω cables, phase matched to $\pm 4^\circ$ and one 86 cm (34 in.) 50 Ω cable. Used with HP 8502A/B and 11850A/B. Detailed specifications on page 559.

HP 11857A APC-7 Test Port Extension Cables

General: two precision 50 Ω cables phase matched to $\pm 2^\circ$ to connect text device between HP 8748A test ports. Detailed specifications on page 559.

Transistor Fixtures

General: three transistor fixtures can be used with the HP 8748A. The HP 11600B and 11602B require use of the HP 11858A Transistor Fixture Adapter. The HP 11608A transistor fixture connects directly to the HP 8748A. Detailed specifications on pages 572 and 574.

Adapter Kits

General: the HP 11853A, 11854A, 11855A, and 11856A accessory kits are available to provide precision Type N and BNC adapters and calibration standards for use with the HP 11850A/B, 8502A/B, and 8748A test setups. Detailed specifications on page 559.

¹ $^\circ$ degrees, specified as deviation from linear phase.

² Effective port match for ratio measurements.

Ordering Information

	Price
HP 8754A Network Analyzer	\$15,540
Opt H26: 4-2600 MHz	add \$1,830
Opt 908: Rack Flange Kit	add \$25
Opt 910: Extra Manual	\$80
Opt 913: Rack Mount Kit	add \$35
HP 11850A 50 Ω Three-Way Power Splitter	\$805
Opt H26: 4-2600 MHz (50 Ω)	add \$100
HP 11850B 75 Ω Three-Way Power Splitter	\$1,405
HP 8502A 50 Ω Transmission/Reflection Test Set	\$3,010
Opt H26: 4-2600 MHz (50 Ω)	add \$505
HP 8502B 75 Ω Transmission/Reflection Test Set	\$3,410
HP 11851A RF Cable Set	\$955
HP 11857A Test Port Extension Cables	\$1,005
HP 8748A 50 Ω S-Parameter Test Set	\$8,175
Opt 907: Front Handle Kit	add \$28
Opt 908: Rack Flange Kit	add \$17
Opt 909: Rack Mount Flange/Front Handle Kit	add \$55
Opt H26: 4-2600 MHz (50 Ω)	add \$1,955