HP 8712ET
HP 8712ES
HP 8714ET
HP 8714ES

NEW

- 300 kHz to 1.3 GHz (HP 8712ET/ES) or 3 GHz (HP 8714ET/ES)
- Narrowband and broadband detection
- 100 dB dynamic range
- Real-time sweep speeds (50 ms/sweep)
- Integrated T/R or S-parameter test set
- Synthesized source with 1-Hz resolution
- Standard LAN interface
- Standard internal HP Instrument BASIC (IBASIC)
- Standard 2, 6, and 12-port switching test sets available
- Optional fault-location and SRL measurements

RF Economy Network Analyzers

NEW HP-IB

Now with S-Parameter Capability

The HP 8712E and 8714E family of RF economy network analyzers provide speed, accuracy and automation features in a compact, integrated instrument for high-volume RF component manufacturing, inspection and maintenance. The addition of S-parameter measurement capability to this product family brings new levels of accuracy, convenience and affordability for testing both forward and reverse characteristics of components.

Family Features

An integrated synthesized source and a choice of transmission/reflection analyzers (ET models) or S-parameter analyzers (ES models) allow you to choose the optimum level of performance versus cost for your applications. All these analyzers provide fast, complete swept-frequency and swept-power characterization of RF components with a single connection. The internal synthesized source provides a fast (50 ms/sweep), stable (1-Hz resolution) stimulus for accurate measurements on a variety of RF components.

For linear and nonlinear characterization of components, these instruments have sensitive receivers with both narrowband and broadband detection. Broadband detection allows characterization of frequency-translation devices (for measuring mixer conversion loss, for example), while narrowband detection provides more than 100 dB of dynamic range for testing high-rejection, narrowband devices such as mobile-communications channel filters. Power sweeps enable testing of amplifier gain compression and AM-to-PM conversion. A built-in DOS-compatible 3.5-inch disk drive allows unlimited storage of instrument states, calibration and measurement data, and graphical screen dumps in bit-mapped or vector formats.

The instruments are equipped with a large, 9-inch monochrome display. For enhanced viewing, any VGA-compatible color monitor can easily be connected, giving operators a clear, full-color view of display information such as trace data, limit lines, pass/fail indicators and markers. This is especially useful when the instrument cannot be located near the operator. Display formats include linear and log magnitude, group delay, phase, SWR, polar, Smith chart, and real and imaginary.

Designed for Manufacturing

The HP RF economy network analyzers are optimized for high-volume manufacturing, with the speed and automation features and low cost to help reduce test times, increase throughput and lower your overall cost per component. One important feature for manufacturers is the standard TCP/IP-compliant Ethertwist LAN interface. This interface makes the simultaneous distribution of new test programs, test parameters, limit lines and custom interfaces to all the instruments on your production lines fast and reliable. With LAN capability, both R&D and manufacturing departments can readily share and analyze data, such as examining pass/fail trends by material and lot number, reviewing operator productivity or identifying test stations that require calibration. All this helps you improve the quality of your processes and components, and helps you achieve an accurate overview of production efficiency, inventory turns and cost per test.

With the standard Instrument BASIC programming language (IBASIC), custom test applications and user interfaces can easily be created, including graphical setup diagrams, user prompts, special softkey labels and much more. IBASIC can be used to provide bar-code-reading capability, which lets you efficiently track and document individual device performance along with operator and test station identification. For simpler applications, IBASIC can be used as a keystroke recorder, allowing you to easily automate manual measurements without programming expertise. IBASIC can also control other test instruments via the LAN, HP-IB, serial or parallel interfaces.

Many manufacturing tests can be accomplished by merely recalling the appropriate instrument state, eliminating the need to change measurement parameters manually. Literally hundreds of instrument states can be programmed for a variety of uses. With HP's "fast-recall" feature, any one of seven instrument states can be quickly recalled with a single softkey, or with an optional foot switch for hands-free switching during alignment or assembly operations. Instrument states can include user-defined limit lines that let you easily and consistently compare measured data to test limits, which provides automated pass/fail testing. The pass/fail results are displayed clearly on the instrument screen or external monitor to minimize operator errors or misinterpretation. Automated pass/fail testing eliminates the guesswork from your test processes and helps ensure that your components are aligned and tested to the same specifications at all test stations.

ET Models

The HP 8712ET and HP 8714ET feature built-in transmission/reflection test sets with a full range of magnitude and phase measurements. Two independent channels can measure and display two device parameters, such as transmission and reflection response, in a variety of formats including complex impedance, SWR, and delay, on rectangular, polar or Smith-chart displays. These analyzers also employ advanced vector-error-correction techniques to enhance measurement accuracy. The HP 8712ET has a frequency range of 300 kHz to 1.3 GHz, while the HP 8714ET has a frequency range of 300 kHz to 3 GHz.

For a wider range of output power levels to test active devices and components, Option 1E1 adds a 60-dB step attenuator, which extends the lowest power-level setting to -60 dBm. Both 50-ohm and 75-ohm versions are available.

ES Models

The HP 8712ES and HP 8714ES feature S-parameter test sets with full two-port vector-error correction, providing complete and accurate measurements of device S-parameters. Two independent channels can measure and display two parameters such as S21 (transmission) and S11 (reflection) in a variety of formats including delay and SWR, on rectangular, polar or Smith-chart displays. The HP 8712ES has a frequency range of 300 kHz to 1.3 GHz, while the HP 8714ES has a frequency range of 300 kHz to 3 GHz.

The ES models contain a 60-dB source attenuator as a standard feature, giving 70 dB of power-level control for testing active and passive devices. Both 50-ohm and 75-ohm versions are available.

Comprehensive, Fast Cable Test

When cable does not meet specifications, it is an expensive problem for manufacturers, installers, and maintainers. Option 100 fully tests cables that may have been invisibly damaged through shipment and verifies manufacturer's data.

Option 100 is easy to use and lowers your cost per test with faster, less error-prone measurements of loss, impedance, structural return loss (SRL), and fault location.

SRL is the ratio of incident to the reflected signal, giving the reflection coefficient referenced to the cable's impedance. Periodic disturbances that can cause SRL are usually created by manufacturing or reel-handling incidents. Too small by themselves to cause problems, reflections from each incident can sum coherently. This causes significant reflections at a frequency with a wavelength corresponding to the disturbance spacing, times two. Option 100 also gives you the capability to utilize a known short cable length and determine velocity factor and cable loss per 100 feet. Option 100's multibump correction automatically compensates for multiple reflections from cable faults or connectors that cause inaccurate measurement of subsequent faults.

HP offers optional 50- and 75-ohm 10-, 15- and 30-foot low-loss, phase-stable cables, and a complete selection of calibration kits.

HP 87075C Multiport Test Set

The HP 87075C multiport test set allows the complete characterization of multiport devices with a two-port network analyzer. The HP 87075C has a frequency range of 300 kHz to 1.3 GHz and operates with 75-ohm HP 8712ET, 8712ES, 8714ET, and 8714ES network analyzers. Three options allow you to choose the number of ports that best fit your needs—either 2, 6, or 12 ports.

The test set provides switching capability for the measurement ports, and tests all desired signal paths, with only one connection to the device-under-test. Now multiport-device manufacturers can decrease tune and test time, reduce operator fatigue and misconnection rates, and reduce the wear on cables, fixtures and connectors.

In addition to basic switching capability, the HP 87075C gives you specified performance at the test port. The test set is shipped with a factory-complete installation (default) calibration, which includes calibration of all measurement ports. You can use this default calibration, or complete your own installation calibration.

In between "installation" calibrations, the instrument can quickly "on-line" calibrate (SelfCal) the measurement ports using internal transfer standards. The network analyzer's firmware automatically controls the SelfCal process. SelfCal quickly brings the system to the same accuracy level as the installation calibration. The SelfCal capability can reduce calibration times by a factor of 20.

HP 8712ET
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Calibration Kits

Accuracy enhancement removes systematic errors by measuring known devices (standards) over the frequency range of interest. Kits for the RF economy network analyzer family contain standards to characterize these errors.

HP 85032E 50 Ω Type-N Economy Calibration Kit

The HP 85032E contains 50 Ω type-N standards to calibrate network analyzers to measure devices with 50 Ω type-N connectors. Standards include a fixed termination, open circuit, and short circuit.

HP 85033D 3.5-mm Calibration Kit

The HP 85033D contains 50 Ω 3.5-mm standards to calibrate network analyzers to measure devices with 50 Ω 3.5-mm connectors. Standards include a fixed termination, open circuit, and short circuit.

HP 85036E 75 Ω Type-N Economy Calibration Kit

The HP 85036E contains 75 Ω type-N standards to calibrate network analyzers to measure devices with 75 Ω type-N connectors. Standards include a fixed termination, open circuit, and short circuit.

HP 85039B 75 Ω Type-F Calibration Kit

The HP 85039B contains 75 Ω type-F standards, both male and female, to calibrate network analyzers for measurements of common broadband and CATV components with 75 Ω type-F connectors. Standards include a fixed load, open circuit, and short circuit. The following adapters are also included: type-F (f-f), type-F (m-m), type-N (f) to type-F (m) and type-N (m) to type-F (f). A complete male set of standards (fixed-load, open, short) and (m-m) adapter can be ordered as HP 85039B Option 00M, and a complete female set as HP 85039B Option 00F.

Additional type-F adapters available: type-F (m) to type-N (m) (85039-60010), type-F (m) to type-F (f) (85039-60012), and type-F (f) to type-N (f) (85039-60014).

Key Literature

RF Economy Network Analyzers Technical Specifications, p/n 5967-6314E
RF Economy Network Analyzers Configuration Guide, p/n 5967-6315E
RF Economy Network Analyzers Brochure, p/n 5967-6316E
HP 87075C Multiport Test Set Product Overview, p/n 5965-8165E

Specifications Summary

Source Characteristics
Frequency Range
HP 8712ET/ES: 300 kHz to 1.3 GHz
HP 8714ET/ES: 300 kHz to 3 GHz
Frequency Resolution: 1 Hz
Frequency Accuracy: < 5ppm
Harmonics
< 1 MHz
HP 8712ET/ES: < -20 dBc
HP 8714ET/ES: < -30 dBc
> 1 MHz: < -30 dBc

	ET models	ES models
Power Range		
No attenuator, 50 Ω		
< 1 GHz	0 to +16 dBm	--
> 1 GHz	0 to +13 dBm	--
No attenuator, 75 Ω	reduces output by 3 dB	--
With attenuator, 50 Ω		
< 1 GHz	-60 to +11 dBm	-60 to +8 dBm
> 1 GHz	-60 to +8 dBm	-60 to +5 dBm
With attenuator, 75 Ω	reduces output by 3 dB	
Level Accuracy		
No attenuator, 50 Ω	± 1 dB	--
No attenuator, 75 Ω	± 1.5 dB	--
With attenuator, 50 Ω	± 2 dB	± 2 dB
With attenuator, 75 Ω	± 3 dB	± 3 dB

Receiver Characteristics
Minimum Frequency (all models)
Narrowband: 300 kHz
Broadband: 10 MHz
Maximum Frequency
HP 8712ET/ES: 1.3 GHz
HP 8714ET/ES: 3 GHz

	ET models	ES models
Dynamic Range		
Narrowband, 50 Ω	> 100 dB	> 92 dB
Broadband, 50 Ω	> 66 dB	> 58 dB
With 75 Ω option	reduces dynamic range by 3 dB	
Maximum input (0.5 dB compression)		
Narrowband	+20 dBm	+20 dBm
Broadband	+16 dBm	+20 dBm
Input damage level	+20 dBm	+26 dBm

System Specifications
Directivity (corrected): 40 dB
Source Match (corrected): 35 dB
Load Match (corrected, ES models only): 45 dB
Load Match (uncorrected): 16 dB
Forward Sweep (201 points, 1-port/resp cal): 40 ms
Trace Transfer (201 points, real format): 20 ms

Physical Characteristics
Test-port Connectors: 50 Ω or 75 Ω Type-N female
Size: 179 mm H x 425 mm W x 514 mm D (7.0 in x 16.75 in x 20.25 in)
Weight
Net: 20.5 kg (45 lb)
Shipping: 27 kg (59 lb)

Detectors and Bridges

External detectors (50 Ω and 75 Ω) and bridges are available for remote device measurements.

HP 86200B 50 Ω Scalar Detector

An external scalar detector for use when measuring external 50 Ω devices.

HP 86201B 75 Ω Scalar Detector

An external scalar detector for use when measuring external 75 Ω devices.

HP 86205A 50 Ω Bridge

An external directional bridge that offers high directivity and excellent port match and is designed for 50 Ω device measurements.

HP 86207A 75 Ω Bridge

An external directional bridge that offers high directivity and excellent port match and is designed for 75 Ω device measurements.

Upgrade Kits

The following upgrade kits add optional measurement capability to existing HP RF economy network analyzers.

HP 86223B Attenuator Upgrade Kit

Provides the necessary components to retrofit an HP 8712ET or HP 8714ET (RF economy network analyzer) with a 60 dB step attenuator (Option 1E1). Also available as HP p/n 08711-60067.

HP 86228C Fault Location/SRL Upgrade Kit

Does not include transport case.

HP 86226C Firmware Upgrade Kit

Upgrade to the latest revision of firmware.

HP D4950B DIN Keyboard

PC keyboard to enhance editing capability (Option 1CL).

Test Port Cables

Replacement test port cables are available as HP part numbers. One economy cable is standard for the RF economy network analyzers.
HP 8120-6469 Economy Cable; Type-N, 50 Ω (included with RF ENAs)
HP 8120-4781 Precision Cable; Type-N, 50 Ω
HP 8120-6468 Economy Cable; Type-N, 75 Ω (included with RF ENAs, Option 1EC)
HP 8120-2408 Precision Cable; Type-N, 75 Ω

Ordering Information	Price
HP 8712ET Network Analyzer	$10,750
HP 8712ES Network Analyzer	$16,250
HP 8714ET Network Analyzer	$18,250
HP 8714ES Network Analyzer	$24,250
Opt 1EC 75 Ω System Impedance	$0
Opt 1E1 60 dB Attenuator (ET models only)	+$1,020
Opt 1CL DIN Keyboard	+$128
Opt 1CM Rackmount	+$77
Opt 100 Fault Location/SRL	+$1,530
Opt 101 Transportable Operating Case plus Fault Location/SRL	+$2,030
HP 85075C Multiport Test Sets	
Opt 002 2 ports	+$4,000
Opt 004 4 ports	+$8,000
Opt 012 12 ports	+$12,000
HP 86223B Attenuator Upgrade Kit	$1,225
HP 86228C FL/SRL Upgrade Kit	$1,530
HP 86226C Firmware Upgrade Kit	$102
HP D4950B DIN Keyboard	$97
Accessories	
HP 85032E Type-N Calibration Kit, 50 Ω	$678
HP 85036E Type-N Calibration Kit, 75 Ω	$678
HP 85033D 3.5-mm Calibration Kit	$3,060
HP 85039B 75 Ω Type-F Calibration Kit	$3,600
Opt 00F Female Standards Set	–$1,800
Opt 00M Male Standards Set	–$1,800
HP 11853A Type-N Accessory Kit, 50 Ω	$500
HP 11854A BNC Accessory Kit, 50 Ω	$500
HP 11855A Type-N Accessory Kit, 75 Ω	$500
HP 11856A BNC Accessory Kit, 75 Ω	$500
HP 86211A Type-F Accessory Kit, 75 Ω	$311
HP 86200B 50 Ω Scalar Detector	$816
HP 86201B 75 Ω Scalar Detector	$816
HP 86205A 50 Ω Bridge	$1,350
HP 86207A 75 Ω Bridge	$1,350
HP 8120-1839 BNC Test Port Cable, 50 Ω	$25
HP 5063-0061 BNC Test Port Cable, 75 Ω	$48
HP 8120-6469 Economy Type-N Cable, 50 Ω	$105
HP 8120-6468 Economy Type-N Cable, 75 Ω	$135
HP 8120-4781 Precision Type-N Cable, 50 Ω	$235
HP 8120-2408 Precision Type-N Cable, 75 Ω	$650
HP 9211-2656 Transit Case	$650