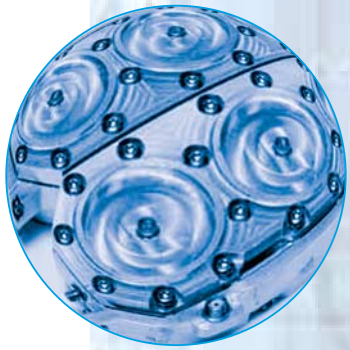
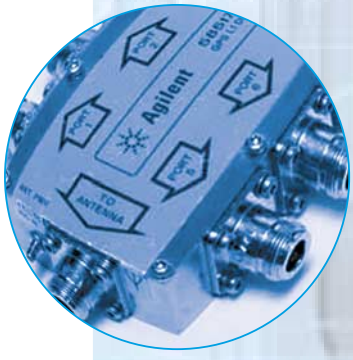
Agilent Test Solutions for Multiport and Balanced Devices



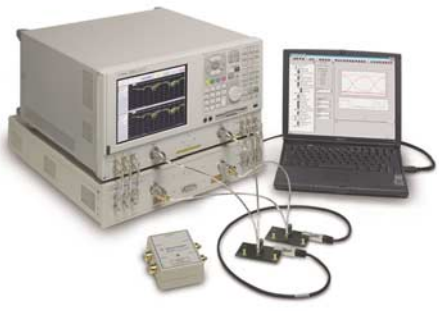


Agilent Technologies

Agilent Vector Network Analyzers for Multiport and Balanced Devices

ENA Series
- One-box integrated solution for three-, four-port, and balanced devices
- Best price performance up to 8.5 GHz
- Highest measurement speed
- Available dedicated multiport test set for up to nine-port devices

PNA Series
- Most flexible solutions with configurable test set, custom multiport test sets, and open Windows® architecture
- Highest performance and accuracy
- Wide frequency coverage up to 50 GHz
- Identical user interface and programming between RF and Microwave models

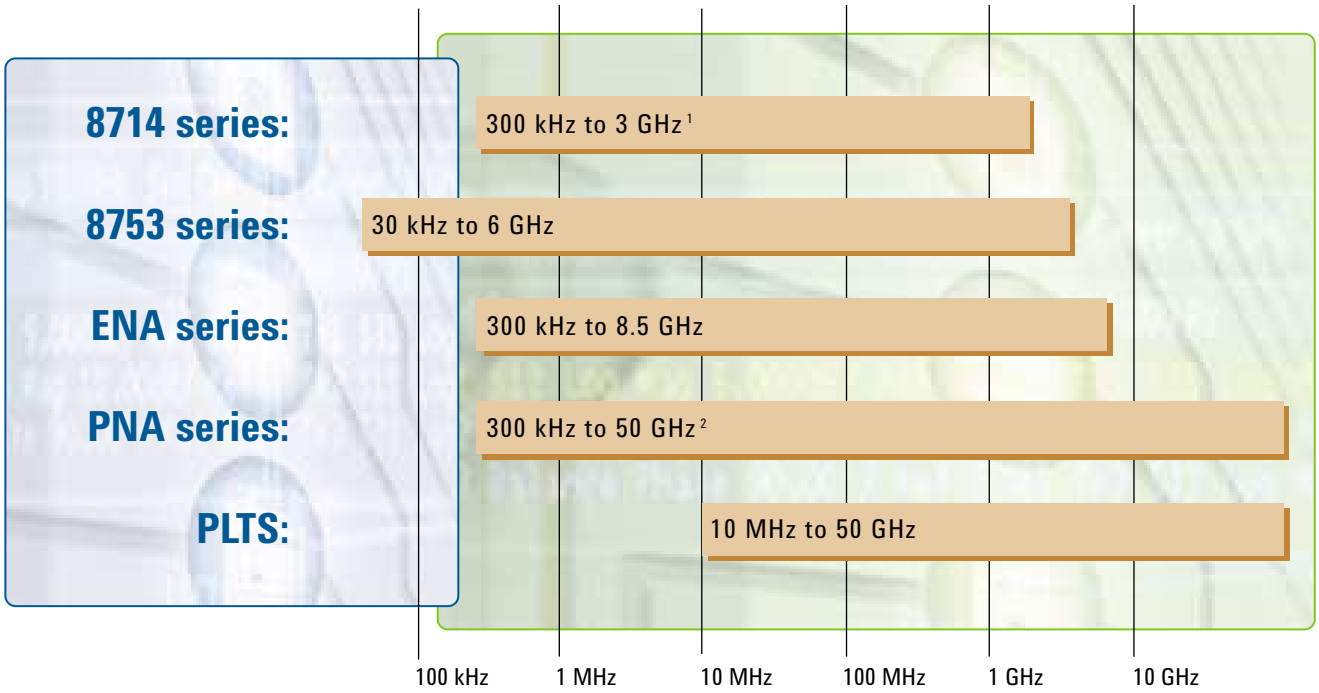


Physical Layer Test Systems (PLTS)
- Single test solution for signal integrity analysis
- Dedicated for differential high-speed digital devices such as transmission lines, connectors, cables, etc.
- Available 80 ps (9 GHz), 36 ps (20 GHz), and 14 ps (50 GHz) systems

8753 and 8714
8753ES with H39 and Option 006
- Unique solution for frequency transition devices up to 6 GHz
- Available mixer measurements and harmonics measurements functions along with three built-in test ports

8714ET/ES with 87050E test set
- Lowest cost solution for multiport measurements up to 3 GHz
- Available four, eight, and twelve-port test sets

Frequency Coverage for Agilent Network Analyzers



1 Specified up to 3 GHz used with 87050A test set and up to 2.2 GHz used with 87050E test set.
2 Available up to 110 GHz for two ports, up to 50 GHz for four port configuration.

ENA Series 2-, 3-, and 4-port RF Network Analyzer

ENA series RF network analyzer with four built-in test ports

New-generation wireless equipment depends on advanced RF components, from duplexers and couplers to differential SAW filters and amplifiers. These components need to be measured efficiently in R&D and production process. Fast and accurate testing is crucial, and Agilent's ENA series network analyzers offer comprehensive measurement capabilities for advanced multiport devices.

Built-in two, three, or four test ports provide simultaneous measurement of all signal paths in components with up to four ports. This advanced architecture minimizes the number of sweeps required for multiport S-parameter measurements and helps increase test throughput.

Built-in balanced measurements, matching-circuit simulation, and port characteristic impedance conversion all enable accurate characterization of most advanced RF components. These test capabilities contribute to shortened time to market and reduced cost of test.

The ENA series holds up to sixteen measurement channels in a single instrument state. Independent frequency list, calibration data, measurement parameters, trace layout, triggering, and limit test are applied in each measurement channel, which acts as if it is an independent network analyzer. This multi-channel capability eliminates recall time for sequencing multiple instrument setup states that are often required for multiport devices used in multi-frequency applications.

E5070B/71B

Features

- Full specified performance from 300 kHz to 3 GHz (E5070B) and 300 kHz to 8.5 GHz (E5071B)
- Built-in 2, 3, and 4 test ports
- Up to Full 4-port calibration
- 122 dB wide dynamic range
- 0.001 dBrms low trace noise
- Fast measurement speed: 9.6 us/point
- Up to 16 measurement channels
- Up to 16 traces per channel
- Real-time balanced measurements
- Flexible matching circuit simulation
- Port characteristic impedance conversion for non-50 ohm device measurements
- Advanced calibration: TRL/LRL cal and mixed-connector cal
- Simulation linkage with Touchstone files (s2p, s3p, and s4p)

The ENA series also accelerates test system development and expands customization capabilities. Built-in Visual Basic® for Applications (VBA) allow you to develop and customize test programs in the ENA series, or import Visual Basic programs from an external PC. A custom user interface using a touch screen (optional) can be created on the 10.4" LCD display.

For more information:
http://www.agilent.com/find/ena

ENA Series with E5091A Multiport Test Set

ENA series RF network analyzer with E5091A multiport test set

Four-port RF ECal with four 3.5 mm connectors

The Agilent E5091A multiport test set, combined with the four-port ENA series network analyzer, is a complete solution for multiport device measurements. The multiport test set is available in seven and nine-port configurations. The system is tailored for testing the antenna switch modules for mobile handsets, particularly those modules with balanced ports, although it can be used in a wide range of multiport measurement applications. The system is well suited for both manufacturing and R&D with exceptionally fast measurement speed and various features that facilitate test automation.

The N4431A four-port electronic calibration (ECal) module is available for efficient multiport calibration. ECal is a precision, single-connection calibration technique for your vector network analyzer. It dramatically reduces operation time and number of connections compared to using a mechanical cal kit to perform a full three- or four-port calibration. With ECal, the operator simply connects the ECal module to the network analyzer and the software controls the rest. Easy to use operation of the multiport system minimizes measurement setup time.

E5091A

Features

- Single connection measurement of up to 9-port devices
- Exceptionally fast measurement speed
- Solid-state switches for fast and reliable measurement
- Built-in balanced measurement to interpret mixed-mode S-parameters
- Easy to use operation with full test set control from ENA series

For more information:
http://www.agilent.com/find/ena

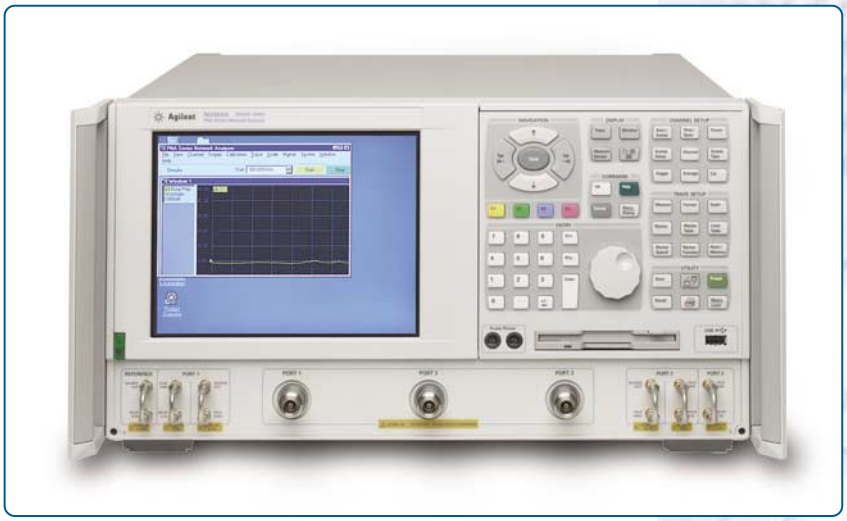
N4431A Four-port RF electronic calibration module

Features

- Fast full 3- or 4-port calibration with a single connection
- NIST traceable accurate calibration
- Reduced connector wear
- USB interface for direct control with PNA and ENA series network analyzers
- Reliable solid-state switching
- Mixed connector option available (3.5 mm, Type-N 50 ohm, and 7-16)

For more information:
http://www.agilent.com/find/ecal

PNA Series 3-port RF Network Analyzer



PNA series RF network analyzer with built-in third test port

Rapid and continuous changes in RF and microwave technology present a growing challenge for designers and manufacturers. The Agilent PNA Series is a measurement platform that meets the challenge with the right combination of fast sweep speeds, wide dynamic range, low trace noise, and flexible connectivity. Test your high-performance components with a fast and accurate network analyzer that meets your measurement need now and well into the future.

The three-port PNA series network analyzer provides frequency coverage from 300 kHz to 3, 6, and 9 GHz, and offers complete characterization of three-port devices quickly and accurately with three-port calibration and an architecture that minimizes the number of sweeps. This three-port analyzer offers the high level of throughput and performances needed to solve today's complex measurement challenges.

N3381A/82A/83A

Features

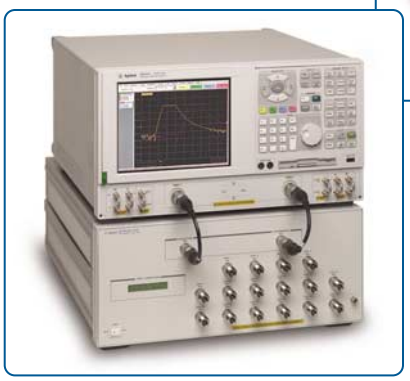
- Full specified performance from 300 kHz to 9 GHz
- Built-in third test port
- Full 3-port calibration
- Advanced calibration including:
  - Guided calibration
  - Electronic calibration (Ecal) provides a precision, single connection, one to four port calibration
  - User defined Ecal
  - Adapter Removal
- De-embedding capability
- Fast measurement speed: 26 µs/point
- 16,001 points per channel
- 32 independent measurement channels
- Wide dynamic range: 143 dB
- Low trace noise: 0.002 dB
- Windows 2000 operating system
- User interface support hardkeys, softkeys, and mouse
- Help system includes full manual, extensive measurement tutorials, and complete programming guide

The PNA series three-port network analyzer offers performance, flexibility, throughput, and connectivity to meet today's measurement requirements and business solutions.

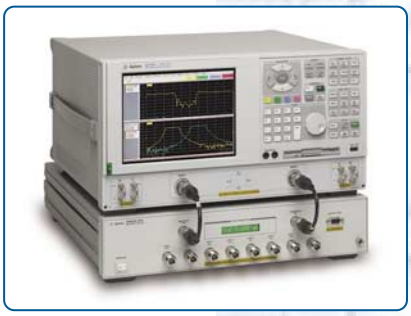
For more information:
http://www.agilent.com/find/pna

PNA Series Customized Multiport Solutions

PNA series network analyzer with Z5623A H39



PNA series network analyzer with 87050A H16



PNA series network analyzer with Z5623A H48

Many of today's wireless communications and broadband components have three or more ports. These components require multiple connections for complete characterization with a network analyzer. However, time-to-market pressures require that today's components be tested quickly while maintaining high levels of accuracy and high repeatability to achieve production volumes.

Network analyzer sweep speed is only one factor that contributes to the overall throughput that can be achieved in measuring multiport components. The overall throughput depends on how quickly the component can be connected and the system can transition from one measurement path to the next and process that data. Multiport test sets dramatically reduce overall tune and test times because the DUT only needs to be connected once to test multiple signal paths. Minimizing the number of connections also reduces operator fatigue and lowers the chance of connection to the wrong port. In addition, fewer connections means less wear on cables, connectors, fixtures and DUTs. A multiport test set is especially valuable in manufacturing applications where the time required for device connection, handling, and/or configuration is significantly greater than the test time. In these situations, a test set provides a solution that supports operators or part-handlers in increasing throughputs.

Agilent provides the highest performing multiport test solutions to meet the demands of the never-ending trend to decrease size through integration in modules and the pressure to increase throughput and lower test cost. A range of solutions is available for many devices from simple duplexers, for both front-end passive and active and wireless infrastructure components, to more complex integrated modules. These solutions optimize key hardware, firmware, and software features, which provide the best accuracy with the convenience of multiport connections and electronic calibration to achieve exceptionally fast measurement speeds.

Z5623A Option H39 or Option H48
87050A Option H16

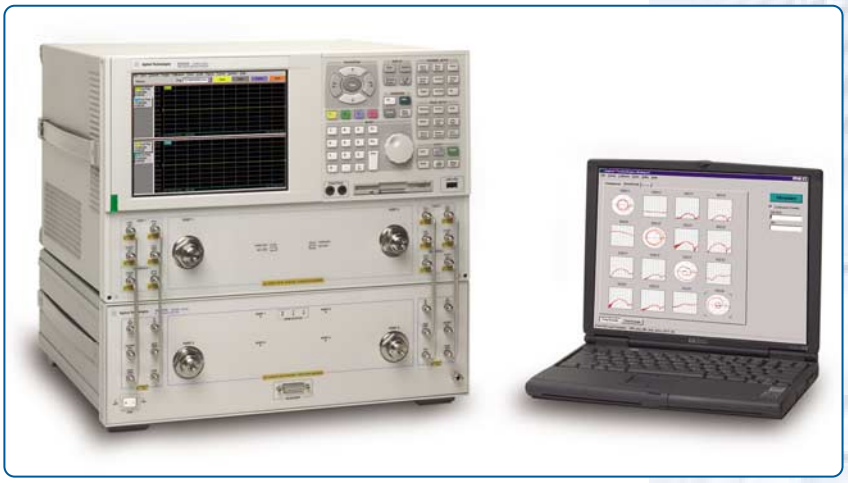
Features

- Multiport configurations optimized for measuring your specific device
- Graphical application interface available to increase productivity by simplifying and speeding instrument calibration and measurement setup
- Exceptionally fast measurement speed
- Solid-state or mechanical switches available for fast, reliable measurement, and best RF performance
- External control lines on test set for DUT control during testing
- Test program runs internally on PNA
- Automation interface provides programmers with a choice of development environments to design custom test executives
- Built-in LAN interface makes it easy to connect to company network

Agilent multiport test sets can be customized to your measurement application with any number of ports, and a variety of connector types and switching arrangements.

For more information:
Contact your local Agilent Field Engineer for customized multiport test solutions or *http://www.agilent.com/find/assist*

PNA Series Microwave Multiport Solutions



Microwave PNA series network analyzer with N4421A 50 GHz test set

While ideal balanced components only respond to or produce differential (out-of-phase) signals, real-world devices also respond to or produce common-mode (in-phase) signals. Agilent's balanced-measurement test systems perform a series of single-ended stimulus/response measurements on all measurement paths of the device under test, and then calculate and display differential mode, common-mode, and mode conversion S-parameters.

Devices such as differential filters and amplifiers, baluns, and balanced transmission lines that were once difficult to measure using conventional two-port measuring systems, can now be completely and accurately tested with Agilent's balanced measurement solutions. With one set of connections you can test either single-ended or linear balanced devices across the full RF and microwave frequency range.

E8362B Option 014 with N4419A (10 MHz[1] to 20 GHz)
E8364B Option 014 with N4421A (10 MHz[1] to 50 GHz)

Features

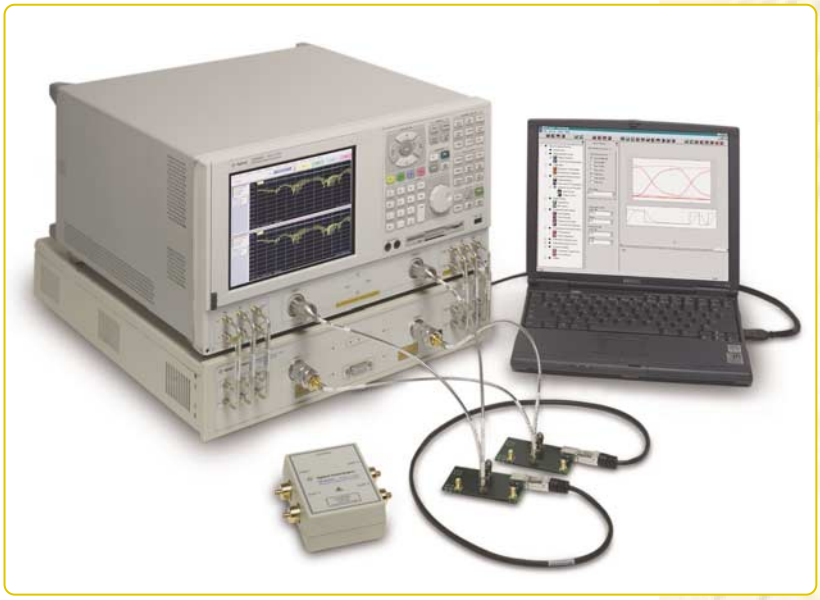
- Fully specified performance from 45 MHz to 20 GHz and 50 GHz
- Full four-port vector error correction
- Displays conventional single-ended and mixed-mode S-parameters
- Capable of re-normalization of test data for non 50 ohm devices
- Time-domain transforms provide additional insights
- Powerful Windows® based software[2] controls system, applies four-port error correction, and calculates parameters
- Eliminates the use of test baluns for complete, accurate characterization

The PNA series with the N4419A/21A is the only solution on the market which enables multiport device measurements above 9 GHz. It provides exceptional measurement speed and performance that enables precise characterization and improved productivity in microwave applications.

For more information:
http://www. agilent.com/find/multiport

1 Typical performance from 10 MHz to 45 MHz.
2 Requires external PC with GPIB card.

Physical Layer Test Systems (PLTS)



Physical layer test system (PLTS)

Physical-layer structures have increasingly become the bottleneck in high-speed digital system performance. As bus speeds, clock speeds, and link speeds all push past the gigabit-per-second mark, digital data no longer looks like simple ones and zeros. In fact, digital data begins to exhibit analog behavior such as reflections from discontinuities, dispersive loss, crosstalk, and EMI radiation and susceptibility. Analog analysis can be the key to solving such digital problems as overshoot, undershoot, ringing, rise-time degradation, pulse droop, dropout, ground bound and eye closure.

As the combination of digital and analog analysis in several modes of operation becomes more important, the need for multiple test solutions becomes difficult to manage. A single test solution that can fully characterize high-speed differential devices while leaving domain and format of the analysis up to the designer becomes the tool of choice. The four-port network analyzer-based Physical Layer Test System (PLTS) does just that.

Designing gigabit-per-second devices will require the combination of time-domain and frequency-domain analysis. The Agilent N1900A series Physical Layer Test System is the premier signal integrity solution for designing and validating high-speed differential interconnects. PLTS combines frequency-domain, time-domain, and eye diagram analysis to provide a comprehensive view of device performance. With a single setup to your device, you can measure all transmission and reflection terms for all possible modes of operation, including single-ended, differential, common, and mixed modes.

N1957A 14 ps (10 MHz to 50 GHz)
E8364B PNA and N4421A Test Set
(4-port/2-channel, 4 receiver)
N1953A 36 ps (10 MHz to 20 GHz)
E8362B PNA and N4419A Test Set
(4-port/2-channel, 4 receiver)
N1948A 80 ps (300 kHz to 9 GHz)
E8358A PNA and N4417A Test Set
(4-port/2-channel, 4-receiver)

Features

- Powerful signal integrity analysis tools include time-domain reflectometry (TDR), time-domain transmission (TDT), frequency-domain, and eye diagram analysis
- Completely characterize the single-ended, differential-mode, common-mode, and mode conversion behavior of your device
- RLCG parameter extraction allows creation of accurate transmission line models for use in simulation programs such as HSPICE®
- High dynamic range provides a view into elusive EMI problems that previously may have gone undetected

Agilent PLTS systems combine a vector network analyzer, an external test set, and software with advanced analysis tools to provide the highest accuracy possible for measuring inactive single-ended or differential physical-layer components such as back-planes, high speed serial cables, interconnects, and packages.

For more information:
http://www.agilent.com/find/plts

8753 and 8714 RF Network Analyzers

8753ES option H39/006

8714ES with 87050E multiport test set

If frequency transition devices such as mixers and up/down converters need to be measured along with duplexers or filters, Agilent 8753ES is an appropriate solution. An 8753ES provides mixer measurements and harmonics measurements (Option 002), while Option H39 adds a third port to a two-port analyzer that enables single connection measurements for all necessary paths of up to three-port devices.

For simple multiport measurements, Agilent 8714 network analyzers with 87050E multiport test set is the lowest cost solution. The test set can be configured as four, eight, or twelve-port and is fully controlled from the analyzer. The SelfCal function automatically recalibrates to test ports and reduces calibration time for multiport device measurements.

8753ES with Option H39 and Option 006

Features

- Three-port solution
- Full two-port vector error correction
- Fully specified performance between all three ports up to 6 GHz
- Fully controllable from familiar 8753 interface
- Solid state switching for fast, repeatable, and reliable switching between measurement paths
- Easily transfer measurement data and images into popular Microsoft® applications with little or no programming using Agilent's IntuiLink connectivity software

For more information:
http://www.agilent.com/find/8753

8714ET/ES with 87050E test set

Features

- Available in 4, 8, or 12 test ports to best match your duplexer needs
- Full two-port vector-error correction
- Test Set Cal easily guides operators through calibration process
- SelfCal automatically recalibrates to test ports
- Calibration and switching controlled from the analyzer front panel without external PC
- Fully specified performance up to 2.2 GHz
- Solid state switching for fast, repeatable, and reliable switching between measurement path
- Connectivity and automation designed for the production environment
  - IBASIC to easily create custom test applications
  - Built in LAN interface makes it easy to connect to factory Ethernet network

For more information:
http://www.agilent.com/find/8714

Test sets (typical performance)

E5091A multiport test set

Designed to work with the ENA Series of network analyzers

Frequency range: 50 MHz to 8.5 GHz
Connectors: Type-N (f)
Impedance: 50 ohm
Switch type: Solid state
Switching speed: 3 ms
I/O control: USB

Option	Designed for:	Ports	Raw (uncorrected) return loss[1]	Raw (uncorrected) insertion loss	Test set type
007	ENA series	7	**Port A,T2,R1+,R1-,R2+,R2-:** 23 dB, 50 to 300 MHz 25 dB, 300 MHz to 1.3 GHz 19 dB, 1.3 to 3 GHz 12 dB, 3 to 6 GHz 11 dB, 6 to 8.5 GHz **Port T1:** 18 dB, 50 to 300 MHz 20 dB, 300 MHz to 1.3 GHz 16 dB, 1.3 to 3 GHz 12 dB, 3 to 6 GHz 9 dB, 6 to 8.5 GHz	**Port A,T2,R1+,R1-,R2+,R2-:** 3 dB, 50 to 300 MHz 3 dB, 300 MHz to 1.3 GHz 4 dB, 1.3 to 3 GHz 5 dB, 3 to 6 GHz 6 dB, 6 to 8.5 GHz **Port T1:** 5 dB, 50 to 300 MHz 5 dB, 300 MHz to 1.3 GHz 7 dB, 1.3 to 3 GHz 8 dB, 3 to 6 GHz 9.5 dB, 6 to 8.5 GHz	All paths except between R1+ and R2+, and R1- and R2-
009	ENA series	9	**Port A,T2,R1+,R1-,R3+,R3-:** 23 dB, 50 to 300 MHz 25 dB, 300 MHz to 1.3 GHz 19 dB, 1.3 to 3 GHz 12 dB, 3 to 6 GHz 11 dB, 6 to 8.5 GHz **Port T1,R2+,R2-:** 18 dB, 50 to 300 MHz 20 dB, 300 MHz to 1.3 GHz 16 dB, 1.3 to 3 GHz 12 dB, 3 to 6 GHz 9 dB, 6 to 8.5 GHz	**Port A,T2,R1+,R1-:** 3 dB, 50 to 300 MHz 3 dB, 300 MHz to 1.3 GHz 4 dB, 1.3 to 3 GHz 5 dB, 3 to 6 GHz 6 dB, 6 to 8.5 GHz **Port T1,R2+,R2-,R3+,R3-:** 5 dB, 50 to 300 MHz 5 dB, 300 MHz to 1.3 GHz 7 dB, 1.3 to 3 GHz 8 dB, 3 to 6 GHz 9.5 dB, 6 to 8.5 GHz	All paths except between R1+, R2+ and R3+, and R1-, R2- and R3-

1 Return loss of test set port not used in measurement path.

87050A Option H test sets[1]

Designed to work with the 875x series of network analyzers.

Frequency range: 30 kHz to 6 GHz
Connectors: Type-N (f)
Impedance: 50 ohm
Switch type: Mechanical[2]
Switching speed: 60 ms
I/O control: GPIB and Parallel

Option	Designed for:[3] (Works with:)	Ports	Raw (uncorrected) return loss	Raw (uncorrected) insertion loss	Test set type
H06	875x (871x) (PNA)	6	≥ 25 dB, 30 kHz to 1.3 GHz	≤ 1 dB, 30 kHz to 1.3 GHz	Full crossbar
H12		12	≥ 16 dB, 1.3 to 3.0 GHz	≤ 1.75 dB, 1.3 to 3.0 GHz	
H16		16	≥ 12 dB, 3.0 to 6.0 GHz	≤ 2.5 dB, 3.0 to 6.0 GHz	
H24		24			

87050A Option K test sets[1]

Designed to work with the 872x series of network analyzers.

Frequency range: 50 MHz to 20 GHz
Connectors: 3.5 mm (f)
Impedance: 50 ohm
Switch type: Mechanical[2]
Switching speed: 60 ms
I/O control: GPIB and Parallel

Option	Designed for:[3] (Works with:)	Ports	Raw (uncorrected) return loss	Raw (uncorrected) insertion loss	Test set type
K06	872x (875x) (PNA)	6	≥ 24 dB, 50 MHz to 1.3 GHz	≤ 2.5 dB, 50 MHz to 6.0 GHz	Full crossbar
K12		12	≥ 20 dB, 1.3 to 3.0 GHz	≤ 3.5 dB, 60 to 12.4 GHz	
K16		16	≥ 14 dB, 3.0 to 6.0 GHz	≤ 4.5 dB, 12.4 to 20 GHz	
K22		22	≥ 12 dB, 6.0 to 12.4 GHz		SCMM[4]
K24		24	≥ 8 dB, 12.4 to 20 GHz		Full crossbar

1 The 87050A family of test sets do not include control interface. Contact your local Agilent Field Engineer for hardware and software control integration solutions.
2 Life time of mechanical switches are specified at 5 million cycles
3 Designed for/(Works with:) Test sets that are used with analyzers other then the ones that they are designed for may require extra cabling or custom designed software controls. See data sheets for particular details.
4 Single connection multiple measurements test set

87050E test sets

Designed to work with the 871x series of network analyzers.
Special calibration features include Test Set Cal to reduce redundant connections during calibration and SelfCal to reduce the effects of test-system drift.

Frequency range: 3 MHz to 2.2 GHz (3 GHz Typ)
Connectors: Type-N (f)
Impedance: 50 ohm
Switch type: Solid state
Switching speed: 60 ms
I/O control: GPIB[1] and Parallel

Option	Designed for:	Ports	System[2] source match	System[2] load match	Test set type
004	871x	4	37 dB, 3 MHz to1.3 GHz	47 dB, 3 MHz to 1.3 GHz	Full crossbar
008		8	35 dB, 1.3 to 2.2 GHz	40 dB, 1.3 to 2.2 GHz	
012		12			
Option	**Designed for:**	**Ports**	**Raw (uncorrected) return loss**	**Raw (uncorrected) insertion loss**	**Test set type**
H08	8753D/E/ET/ES[3]	8	≥ 12 dB, 3 MHz to 2.2 GHz	≤ 7.5 dB, 3 MHz to 1.3 GHz	Full crossbar
H12		12		≤ 9.5 dB, 1.3 to 2.2 GHz	

87075C test sets

Designed to work with the 8712 series of network analyzers.
Special calibration features include Test Set Cal to reduce redundant connections during calibration and SelfCal to reduce the effects of test-system drift.

Frequency range: 3 MHz to 1.3 GHz
Connectors: Type-N (f)
Impedance: 75 ohm
Switch type: Solid state
Switching speed: 60 ms
I/O control: GPIB[1] and Parallel

Option	Designed for: (Works with:)	Ports	Raw (uncorrected) return loss	Raw (uncorrected) insertion loss		Test set type
006	8712ET/ES	6	≥ 15 dB, 3 MHz to 1.3 GHz	Refl. to Port N	Port N to Trans.	Full crossbar
012		12		≤6 dB	≤10 dB	
H08	8753D/E/ET/ES[3]	8				
H12		12				

1 H options add GPIB interface needed for use with 8753x
2 Specified system performance of 8714 with 87050E test set calibrated with 85032B two-port calibration. See data sheet for complete details, literature number 5968-4764E
3 Test Set Cal and SelfCal are not supported.

Z5623A test sets

Designed to work with the PNA series of network analyzers
The graphical multiport application interface is used to set up measurement paths, sequences, and calibration states. The multiport automation interface based on the COM concept is provided allowing external test executive development in a variety of popular languages.

Frequency range:[5] 1 MHz to 9 GHz
Connectors: Type-N (f)
Impedance: 50 ohm **I/O control:** GPIB and parallel

Option	Designed for: (Works with:)	Ports	Switching type/speed	Raw (uncorrected)[6] return loss	Raw (uncorrected) insertion loss	Test set type
H46[1]	PNA Series (8753E/S)[2]	6	Solid state/11ms	≥ 20 dB, 10 MHz to 1.3 GHz ≥ 14 dB, 1.3 to 3.0 GHz ≥ 10 dB, 3.0 to 6.0 GHz ≥ 7.0 dB, 6.0 to 9.0 GHz	≤ 7.0 dB, 10 MHz to 1.3 GHz ≤ 8.0 dB, 1.3 3.0 GHz ≤ 9.5 dB, 3.0 to 6.0 GHz ≤ 11.5 dB, 6.0 9.0 GHz	Triplexer
H48[1]	(871xD/ES)[2]	8	Mechanical/50ms	≥ 26 dB, 1.0 MHz to 1.3 GHz ≥ 24 dB, 1.3 to 3.0 GHz ≥ 16 dB, 3.0 to 6.0 GHz ≥ 14 dB, 6.0 to 9.0 GHz	≤ 1.5 dB, 1.0 MHz to 1.3 GHz ≤ 2.0 dB, 1.3 3.0 GHz ≤ 2.5 dB, 3.0 6.0 GHz ≤ 3.5 dB, 6.0 9.0 GHz	Full crossbar
H39	N3381A/82A/83A	9	Solid state/11ms	> 16 dB, 10 MHz to 1.3 GHz > 14 dB, 1.3 to 3 GHz > 10 dB, 3 to 6 GHz > 13.5 dB, 6 to 9 GHz	> 8 dB, 10MHz to 1.3 GHz > 9 dB, 1.3 to 3 GHz > 10 dB, 3 to 6 GHz > 13.5 dB, 6 to 9 GHz	All paths except between R1+, R2+, and R3+ and R1-, R2-, and R3-

N441x series of balanced measurement test sets[3]

Requires the N1930A Physical Layer Test System software or N4425A Balanced Measurement Software to control the system, apply four-port error correction, and calculate and display parameters.

Switch type: Solid state **Impedance:** 50 ohms

Model Number	Designed for: (Works with:)	Ports	Frequency range	Test port connectors	Test set type
N4415A	8753ES Option 006,014	2[4]	30 kHz to 6 GHz	7 mm	Full crossbar
N4416A	E8357A Option 015	2[4]	300 kHz to 6 GHz	7 mm	
N4417A Option 103	E8358A Option 015	2[4]	300 kHz to 9 GHz	Type-N (f)	
N4417A Option 104	E8803A Option 014	2[4]	300 kHz to 9 GHz	Type-N (f)	
N4418A	8720ES Option H32, H42	2[4]	50 MHz to 20 GHz	3.5 mm (m)	
N4419A	E8362B Option 014, UNL	2[4]	10 MHz to 20 GHz	3.5 mm (m)	
N4421A	E8364B Option 014, 711	2[4]	10 MHz to 50 GHz	2.4 mm (m)	

1 Test set has four external control lines to enable control of module switching during test
2 Additional adapters and RF cables are needed to connect the test set.
3 N441x family of test sets are controlled by an application running on an external PC
4 Test sets connect to network analyzer through front panel jumpers. System uses the two ports of the network analyzer and the two test set ports for four system test ports.
5 The Z5623A H46 frequency range is 10 MHz to 9 GHz.
6 Return loss of test set port not used in measurement path.

Duplexer/Triplexer = Tests normal transmission and receive paths only. Not all port to port path measurements are possible
Full crossbar = Measurements between all ports are possible.

Key Web Resources

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