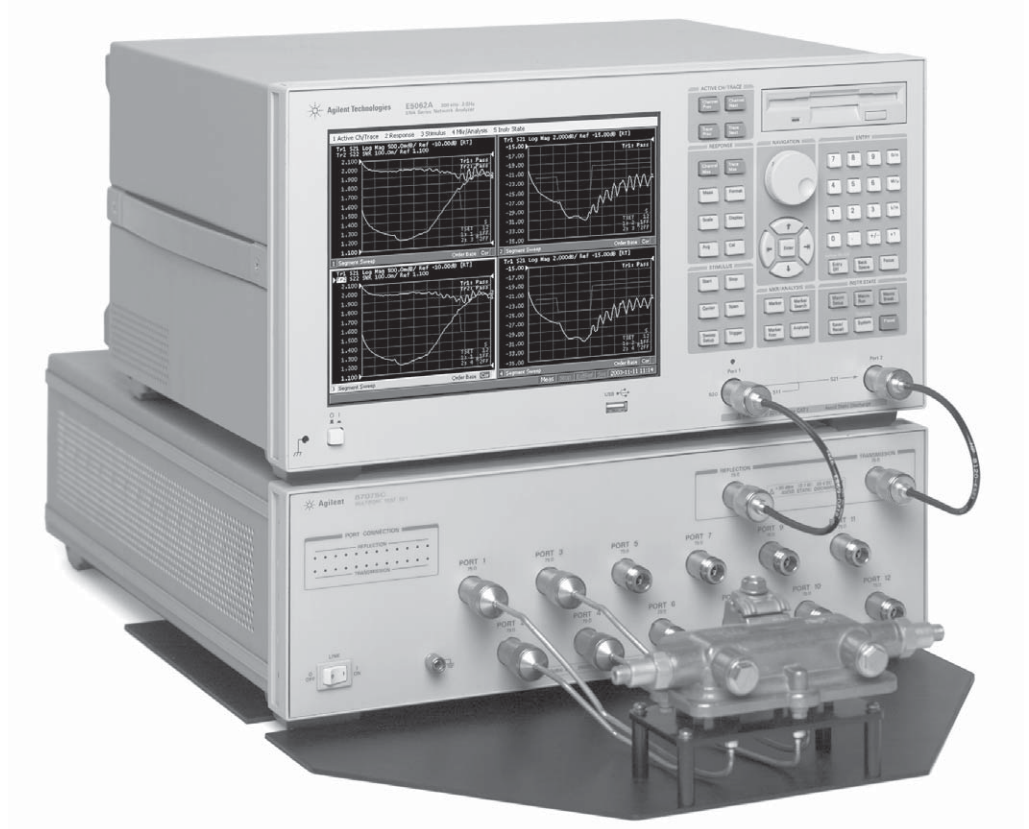# Agilent 87075C
75 Ohm Multiport Test Sets
for use with Agilent E5061A
ENA-L Network Analyzers

Technical Overview
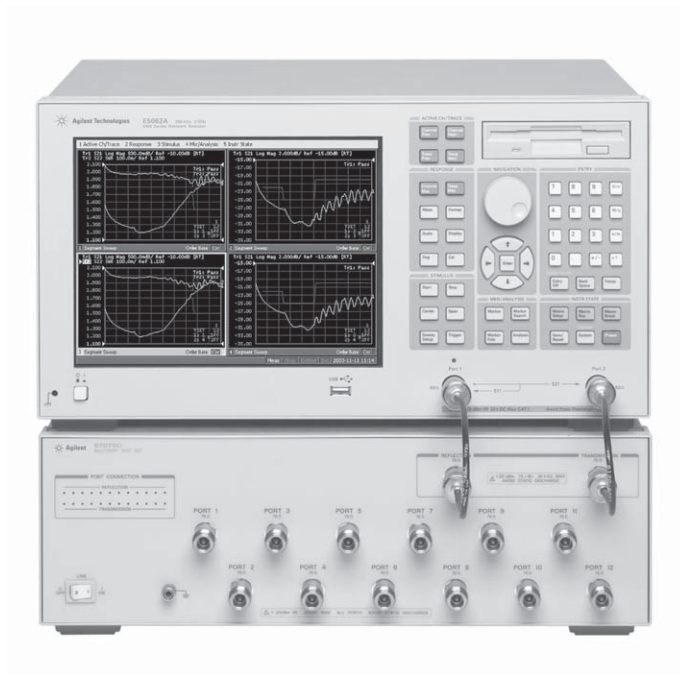
Focus on testing, not reconnecting!

Maximize production throughput of cable-TV multiport devices
with Agilent Technologies new multiport test system

Agilent Technologies

Boost Production Throughput of Multiport Devices

A complete multiport test system

The Agilent Technologies 87075C multiport test sets are designed to work with E5061A ENA-L RF network analyzers to provide complete measurement systems for 75 ohm multiport devices.

These test systems offer fast measurement speed, high accuracy, and productivity features that will maximize your production throughput—all at an affordable price!

They feature:

- specified performance to 1.3 GHz
- solid-state switches for fast, repeatable, and reliable switching between measurement paths
- 6 or 12 test ports to best match your devices and applications

There's no need to worry about the expense and space of an external computer, or the extra cost and time for developing calibration and control software. With an ENA-L analyzer, you can control the calibration and switching of the test system right from the front panel.

Fully characterize your devices with a single connection

To simplify your high-volume tuning and testing of multiport devices, use a multiport test set between your device-under-test (DUT) and a standard two-port network analyzer. A single connection to each port of the DUT allows complete testing of all transmission paths and port reflection characteristics. Agilent multiport test systems eliminate time-consuming reconnections to the DUT, keeping your production costs down and your volumes up. By reducing the number of RF connections, you also:

- lower the risk of misconnections
- reduce operator fatigue
- minimize wear on cables, fixtures, connectors, and the DUT

A Multiport Test System Designated for Cable-TV Designed Manufacturing

Increase production volume of taps and splitters

Use an 87075C-based multiport test system and a quick-connect test fixture for high-volume testing of cable-TV multi-taps and signal splitters. You can easily measure the frequency response and return loss of all ports, plus the isolation between ports.
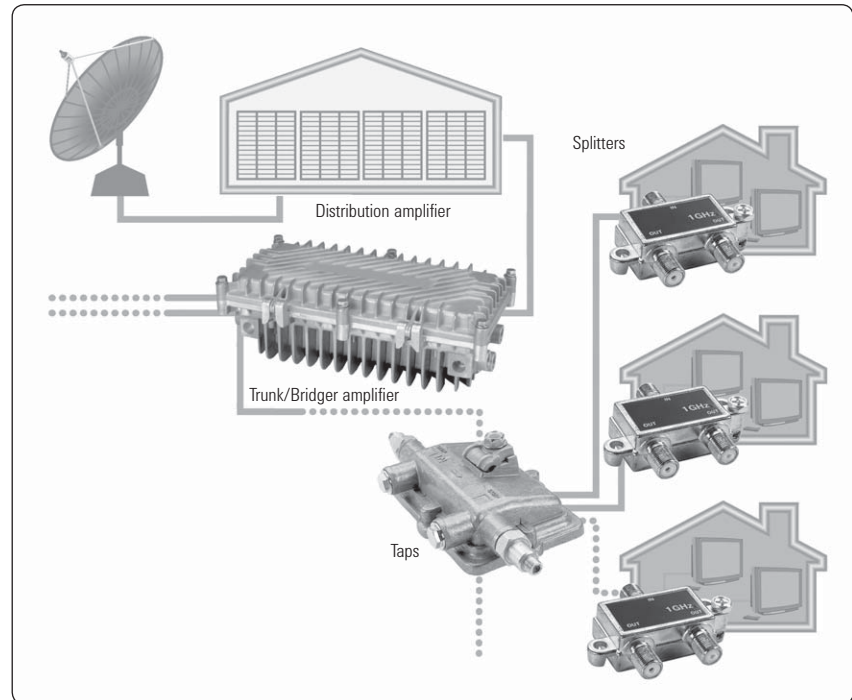

Figure 1. This schematic of a cable-TV distribution system shows some of the devices that can be easily measured with an 87075C multiport test set and an ENA-L network analyzer.

Optimize manufacturing of distribution, trunk, and bridger amplifiers

Amplifier measurements like forward and return-path frequency response, gain, slope, return loss, and port-to-port isolation are quickly and easily performed with an 87075C-based multiport test system. Use the built-in marker functions to automatically measure gain, slope, and flatness with the push of a single softkey.

Test one device while connecting another

Increase the efficiency of a test station by using an 87075C multiport test set to multiplex two test setups with one network analyzer. For example, two four-way multi-tap test fixtures can be connected to a twelve-port test set. While one fixture is unloading and loading, the network analyzer can measure a device in the other fixture—and vice versa. This technique works well when part-handling and connection time is similar to measurement time. You can effectively double the overall throughput and efficiency of your network analyzer.

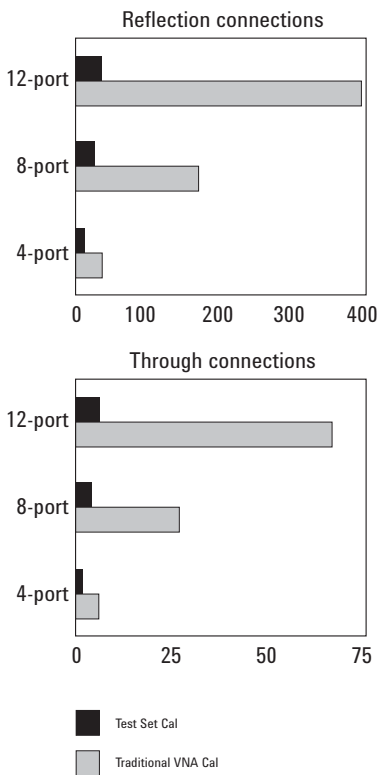# Innovative New Calibration Techniques Save Time and Increase Accuracy

Reflection connections

12-port
8-port
4-port

0   100   200   300   400

Through connections

12-port
8-port
4-port

0   25   50   75

■ Test Set Cal

▢ Traditional VNA Cal

Figure 2. Test Set Cal reduces the number of connections required to calibrate all possible measurement paths.

Test Set Cal eliminates redundant connection of calibration standards

Calibrating a multiport test set using two-port error correction and a traditional network analyzer requires a unique instrument state for each measurement path, forcing many redundant connections of calibration standards. As the number of ports increases, so does the number of connections required to calibrate all possible measurement paths. Full calibration of the Agilent 87075C multiport test system is quick and simple when performing a Test Set Cal:

- connect short, open, and load standards only once to each measurement port
- minimize the number of through standards required during calibration

SelfCal reduces the effects of test-system drift

SelfCal is an internally automated calibration technique that uses solid-state switches to measure calibration standards located inside the test set. SelfCal executes automatically in just a few seconds (at an interval you define), so the impact to your test process is minimal.

Use SelfCal to:

- re-calibrate your multiport test system, returning it to the same measurement accuracy achieved immediately after performing a Test Set Cal
- reduce the effects of test-system drift, improving overall measurement accuracy between Test Set Cals

Since SelfCal does not correct for drift associated with interconnect elements between the test set and your DUT, it is essential to use high-quality test cables, adapters, and fixtures to ensure the best measurement accuracy.

Decrease calibration times and increase production throughput

With SelfCal, a Test Set Cal needs to be performed only about once per month, unlike other test systems that typically require calibration once or twice a day. So you'll spend more time measuring devices and less time measuring calibration standards. Instead of starting each shift with an hour-long calibration, SelfCal executes automatically as often as necessary (typically once an hour), taking just a few minutes per shift for calibration.

Using Test Set Cal and SelfCal, you can:

- easily reduce your overall calibration times by a factor of twenty or more
- increase the amount of time a test station can be used for measuring devices— typically, by three days per month

Improve measurement accuracy with two-port calibration

When using an 87075C multiport with an E5061A with Option 275, Test Set Cal and SelfCal support full two-port calibrations. Two-port error correction greatly improves the effective load match of the test system, providing excellent measurement accuracy.

Powerful Features You Need to Reduce Test Time

Multi-channel measurement display capability speeds your multiport evaluation

Display up to four traces per measurement channel and evaluate all four S-parameters of a two-port device at the same time. Each of the ENA-L's four measurement channels can have independent measurement settings such as frequency range and 87075C setting, enabling you to compare traces with different measurement conditions. In total, the ENA-L allows you to display and analyze 16 traces of 4 measurement paths simultaneously!
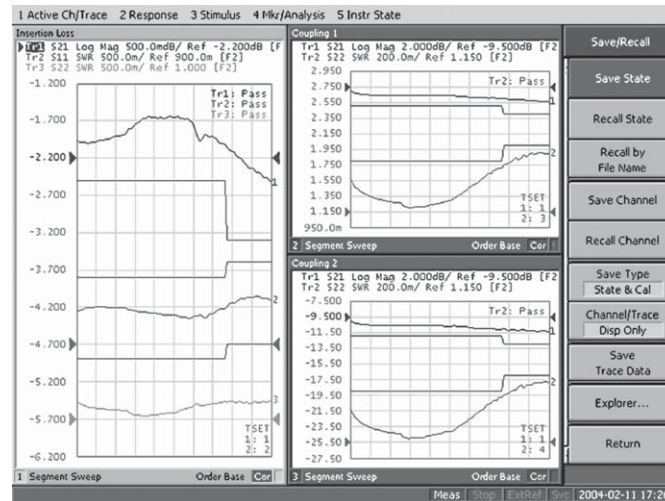

Figure 3. Display insertion loss and two coupling parameters of a CATV tap simultaneously

Optional Electronic Calibration (ECal) drastically simplifies calibration

Unlike the traditional mechanical calibration technique, Agilent's ECal modules only require one set of connections to perform full two-port calibration (controlled through the front panel USB port). The ENA-L controls the ECal module to perform the entire calibration to provide:

• Faster calibration and reduced complexity
• Reduced chance of operator error
• Reduced wear on connectors

Figure 4. Controlled through the front panel USB port, and requiring only one set of connections, ECal simplifies the process for non-technical operators.

Limit-line testing facilitates consistent test results

Eliminate the guesswork and facilitate pass/fail judgement with limit-line testing to increase the reliability and productivity of your test processes. Limit-line conditions can be easily defined by editing the spreadsheet on the analyzer's display.
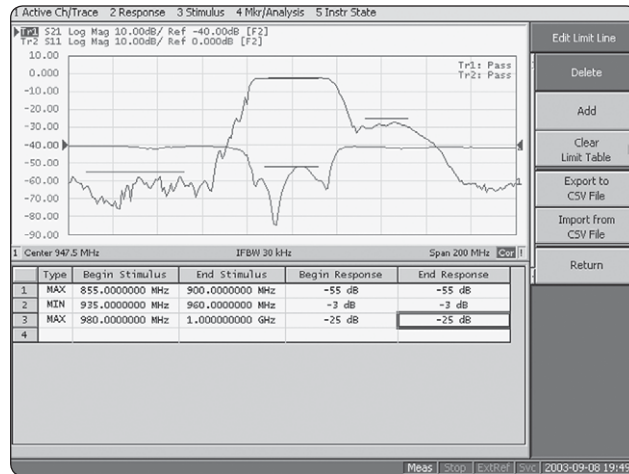

Figure 5. Easily define limit-line test conditions with Windows-style interface.

Tailor Measurements to Your Specific Applications

Customize ENA-L with VBA

VBA simplifies complicated multiport measurements
ENA-L's built-in VBA programming function allows you to automate measurement procedures and easily create a graphic user interface, tailored for your measurement needs. A test program can be developed with the built-in editor or on an external PC with Visual Basic® (VB).
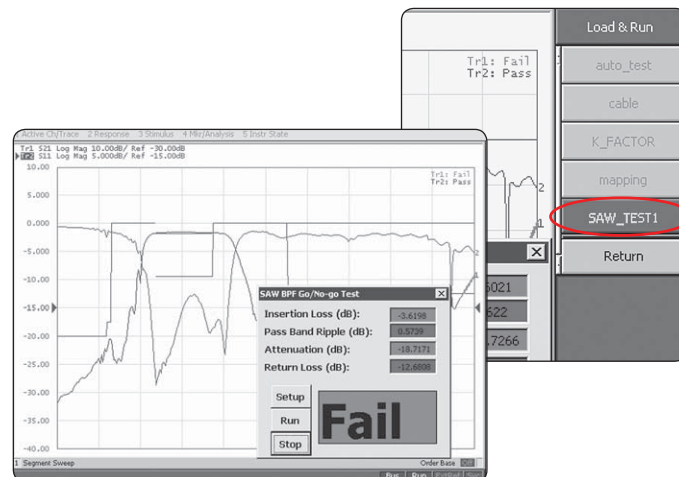

Figure 6. The VBA launcher function allows you to execute a program with a single softkey

Agilent 87075C Specifications and Characteristics[1]

Frequency range	3 MHz to 1300 MHz
Connector type	Type-N Female, 75 Ohm
Maximum test port power	
Measurement level	+16 dBm
Damage level	+20 dBm
Port-to-port isolation	60 dB
Port-to-port insertion loss	
Reflection to port n	6 dB
Port n to transmission	7 dB
Multiport test set residuals	
Source match	12 dB
Load match, test port unselected	20 dB
Load match, test port selected	15 dB
Port switching time	1 second
Test set settling time	10 msec
Line power	
Frequency	50/60 Hz
Voltage	100/120/220/240 Vac
Cabinet dimensions	132.8 mm H x 425 mm W x 495 mm D
Weight	
Net	7.7 kg
Shipping	11.3 kg

1. This part provides several types of performance information:

Specifications describe the test set's warranted performance over a temperature range of 20° C to 30° C, unless otherwise stated.

Supplemental Characteristics (indicated by italics) are typical, but nonguaranteed parameters, intended to provide useful information in using the product.

The following conditions must be met for the test set to meet its specifications:

• The test set must be used with an Agilent E5061A or E5062A, 8713C or 8714C network analyzer version 4.5 or later.
• The analyzer must have had its performance verified within the last year.
• Both instruments must be warmed up for at least 30 minutes after turn-on.
• A valid test-set calibration must have been performed on the system within the last 30 days using valid standards.
• A SelfCal must have been performed by the system within the last 60 minutes.

Environmental characteristics

General conditions	ESD (electrostatic discharge) must be eliminated by use of static-safe work procedures and an antistatic bench mat.
Operating temperature	0° to 55° C
Altitude	up to 4,600 meters (15,000 ft)
Non-operating storage conditions	
Storage Temperature	−40° C to +70° C

Ordering Information

Agilent 87075C multiport test set includes:
Power cord, test-set calibration disk as well as:
87075-60026	Interconnect cable (reflection port)
87075-60028	Interconnect cable (transmission port)
8120-6818	Parallel port interface cable

Standard options
(Must order one of the following options with 87075C)
Option 006	Six-port system
Option 012	Twelve-port system

Other options
Option 1CM	Rack-mount kit includes:
87075-60027	Interconnect cable (reflection port)
87075-60029	Interconnect cable (transmission port)

(These cables are shipped with Option 1CM only. Use these cables if you are rack-mounting your system, or if the bottom feet of the analyzer have been removed)
Option UK6	Commercial calibration certificate with data

Also available (order separately)
Cables
8120-6448	Economy 75 ohm Type-N to Type-N cable (M-M)
11857B	Precision 75 ohm Type-N cable set
11857F	75 ohm Type-N to Type-F cable set

Precision adapters
85039-60010	Type-N (M) to Type-F (M)
85039-60011*	Type-N (F) to Type-F (M)
85039-60013*	Type-N (M) to Type-F (F)
85039-60014	Type-N (F) to Type-F (F)
85039-60002*	Type-F (F) to Type-F (F)
85039-60006*	Type-F (M) to Type-F (M)
85039-60012	Type-F (M) to Type-F (F)

included in 85039B

Commercial adapters
1250-2350	Type-F (F) to Type-F (F)
1250-2369	Type-N (M) to Type-F (M)
1250-2368	Type-N (F) to Type-F (M)

Calibration kits
85039B	75 ohm Type-F calibration kit
Option 00M	Male standards only
Option 00F	Female standards only
85036B	75 ohm Type-N calibration kit
85036E	Economy 75-ohm Type-N calibration kit
85096C	Type-N 75 ohm RF Electronic calibration (ECal) module
85099C	Type-F 75 ohm RF Electronic calibration (ECal) module

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