

Agilent 8702E Lightwave Component Analyzer System Configuration Guide

**300 kHz to 3 or 6 GHz modulation frequency
850 nm, 1300 nm, or 1550 nm wavelengths**

The Agilent 8702 is part of a family of compatible products. For flexibility in specifying a solution that meets your exact measurement needs, a system may be ordered as multiple line items. This guide should be used with the Agilent 8702 product overview (#5988-1845EN) and technical specifications (#5988-4308EN) which has a detailed description of the items listed. For ordering information on other Agilent lightwave products and accessories go to <http://www.agilent.com/comms/lightwave>.

System Configuration Summary

This summary lists the main components required to form basic measurement systems. Options or peripherals may be added to provide enhanced capability. This configuration guide provides descriptions of product options and compatible accessories.

50 ohm Measurements

- ☐ **8702E** Lightwave Component Analyzer
- ☐ **8340X** Lightwave Source
- ☐ **8341X** Lightwave Receiver
- ☐ **Agilent Part Number 1250-1746** 7 mm to 3.5 mm (m) adapter (2) (not required if ordering Agilent 85033D)
- ☐ **85033D** 3.5 mm Calibration Kit (required for Response & Match calibration)

75 ohm Measurements

- ☐ **8702E** Lightwave Component Analyzer
 - ☐ **Option 8702E-075** 75 ohm impedance
- ☐ **8340X** Lightwave Source
- ☐ **8341X** Lightwave Receiver
- ☐ **11857B** 75 ohm type-N Test Port Cables
- ☐ **11852B** 50 to 75 ohm Minimum Loss Pad (2)
 - ☐ **Option 11852B-004** Type N connectors, 50 ohm (m), 75 ohm (f)
- ☐ **Agilent Part Number 1250-1562** type-N to SMA (m) adapters (2)

System with user-selected test set

- ☐ **8702E** Lightwave Component Analyzer
 - ☐ **Option 8702E-011** Delete Built-in Test Set
- ☐ **85047A** 6 GHz S-parameter Test Set
- ☐ **or 85046A** 3 GHz S-parameter Test Set
- ☐ **or 11889A** RF Interface Kit (Response & Match calibration requires an S-parameter test set.)
- ☐ **8340X** Lightwave Source
- ☐ **8341X** Lightwave Receiver
- ☐ **Agilent Part Number 1250-1746** 7 mm to 3.5 mm (m) adapters (2) (not required if ordering Agilent 85033D or 11889A)
- ☐ **85033D** 3.5 mm Calibration Kit (required for Response & Match calibration)



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Recommended Configuration Examples

The following table is meant to assist you with the task of selecting a lightwave component analysis system that is complete and meets your measurement requirements. A complete system consists of a network analyzer, lightwave source, lightwave receiver, cables, fiber, and adapters. A calibration kit and lightwave coupler may be added for specific measurement requirements which are explained in the notes following the table.

Device Under Test	Item	Flattest Uncorrected Frequency Response	Highest Dynamic Range
1300 nm	Source ¹	Agilent 83402C	
	Receiver ¹	Agilent 83411C	Agilent 83410C ² (3 GHz) Agilent 83411D (6 GHz)
1550 nm	Source ¹	Agilent 83403C	
	Receiver ¹	Agilent 83411C	Agilent 83411D
850 nm	Source ¹	User supplied source required	
	Receiver ¹	Agilent 83412B	
50 ohm	Network Analyzer	Agilent 8702E (option 8702E-006 must be ordered if 6 GHz operation is required.)	
	Cables	An RF cable with sma connectors is supplied with each source and receiver.	
	Adapters ³	Agilent Part Number 1250-1746 (2) 7 mm to 3.5 mm (m)	
	Cal Kit ⁴	Agilent 85033D	
75 ohm	Network Analyzer	Agilent 8702E Option 8702E-075	
	Cables	Agilent 11857B	
	Adapters	Agilent 11852B Option 11852B-004 (2) Agilent Part Number 1250-1562 (2)	
	Cal Kit ⁴	Agilent 85036B	
Reflections	Lightwave Coupler ⁵	Agilent 11890A	

¹ Sources, Receivers and Lightwave Couplers must be ordered with an optical connector option. See pages 4 and 5.

² Lowest noise receiver.

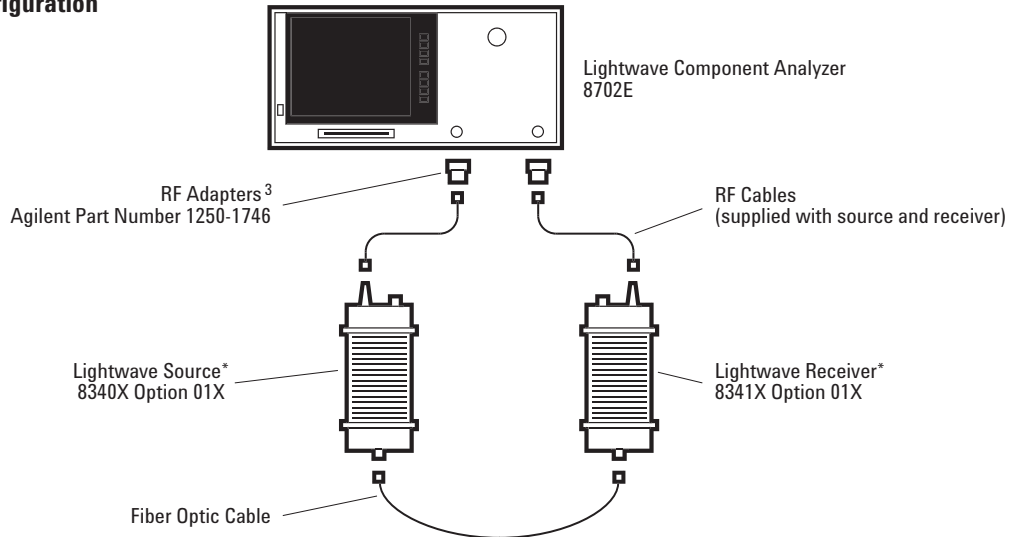
³ These adapters are included in the Agilent 85033D calibration kit and do not need to be ordered separately.

⁴ A calibration kit is recommended when making measurements on E/E devices, when the match of an O/E or E/O electrical port is to be measured, and when the highest accuracy is required. Accuracy can be improved by as much as 0.25 to 0.8 dB with a Response & Match calibration. This technique requires an RF cal kit.

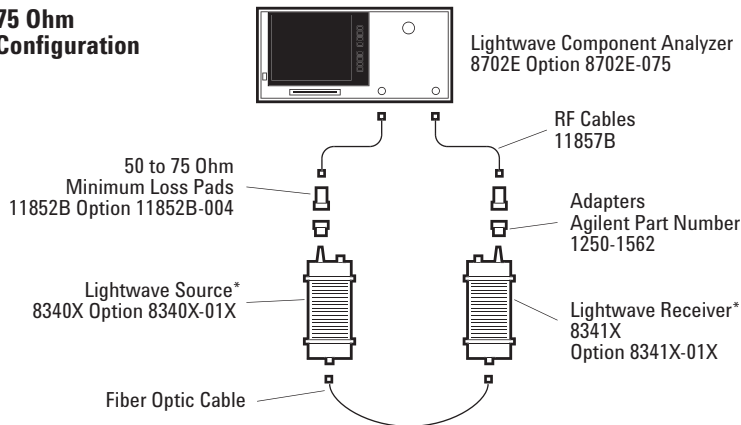
⁵ A lightwave coupler is needed only for optical reflection measurements.

Agilent 8702E Product Family Measurement Configurations

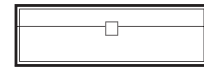
50 Ohm Configuration



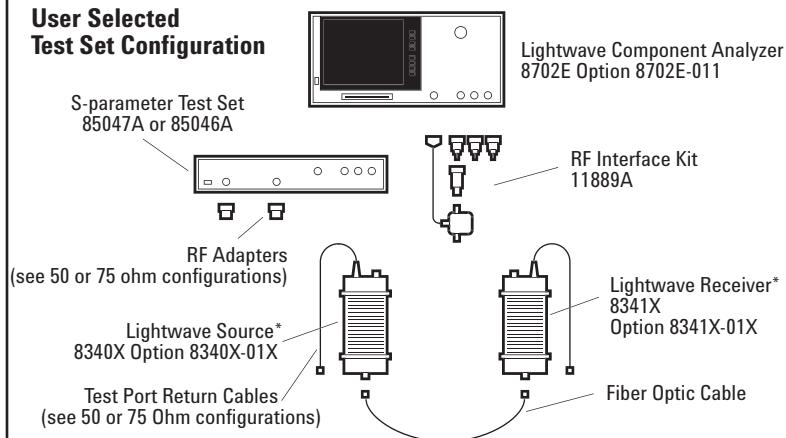
75 Ohm Configuration



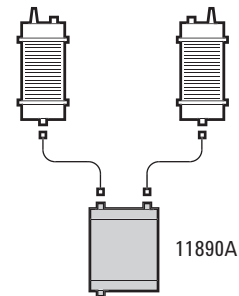
Agilent 85033D Calibration Kit
removes electrical mismatch errors
from measurements



User Selected Test Set Configuration



Lightwave Coupler
for optical reflection measurements
(SMF only)



* Additional optical connector adapters can be ordered as Agilent 81000XX.

Ordering Information

Agilent 8702E Lightwave Component Analyzer (30 kHz to 3 or 6 GHz systems)

☐ **Agilent 8702E Lightwave Component Analyzer**

Integrated network analyzer with built-in color display, S-parameter test set, disk drive, 30 kHz to 3 GHz synthesized source, and time domain capability. A standard (50 ohm) 8702E has two 7 mm test ports. An operating and programming manual set is included with each instrument. Also includes the Agilent N1031A BenchLink Lightwave software (see Peripherals on Page 10).

- ☐ **Option 8702E-002** Harmonic Measurement Capability
For measuring swept second and third harmonic responses. Option 006 extends harmonic measurement capability to 6 GHz.
- ☐ **Option 8702E-006** 6 GHz Frequency Extension
Provides source and receiver operation to 6 GHz.
Do not order option 8702E-006 with option 8702E-075.
- ☐ **Option 8702E-011** Delete Built-in Test Set
Removes test set components and allows direct access to the R, A, and B receiver inputs. Source start frequency is limited to 300 kHz. Order if an external S-parameter test set or an RF interface kit is to be substituted for the internal test set. Do not order Option 011 with Option 075.
- ☐ **Option 8702E-075** 75 Ohm Impedance
Replaces the standard 50 ohm test set with a 75 ohm test set. Test ports are 75 ohm type-N connectors. Do not order option 8702E-075 with option 8702E-006 or option 8702E-011.
- ☐ **Option 8702E-110** Delete Time Domain Capability
Removes capability to view reflection and transmission responses in time or distance domain.
- ☐ **Option 8702E-1D5** High Stability Frequency Reference
Provides improved frequency accuracy over time and with temperature variation.
- ☐ **Option 8702E-1CM** Rack Mount Kit (without instrument handles)
- ☐ **Option 8702E-1CP** Rack Mount Kit (with instrument handles)
- ☐ **Option 8702E-UK6** Commercial Calibration Certificate with Test Data

Lightwave Sources

Sources come with a module base assembly, an RF cable with male and female SMA connectors, a DC power cable, and a calibration data disk. All lightwave sources must be ordered with one of the following connector options:

- ☐ **81000 AI** Diamond HMS-10 Connector
- ☐ **Option 012** FC/PC Connector
- ☐ **81000 SI** DIN 47256 Connector
- ☐ **81000 VI** ST Connector
- ☐ **81000 KI** SC Connector

- ☐ **83402C** Lightwave Source
300 kHz to 6 GHz, 1300 nm, SMF, 9/125 μ m, isolated DFB laser
- ☐ **83403C** Lightwave Source
300 kHz to 6 GHz, 1550 nm, SMF, 9/125 μ m, isolated DFB laser

Lightwave Receivers

Receivers come with a module base assembly, an RF cable with male and female SMA connectors, a DC power cable, and a calibration data disk. All lightwave receivers must be ordered with one of the following connector options:

- ☐ **81000 AI** Diamond HMS-10 Connector
- ☐ **Option 012** FC/PC Connector
- ☐ **81000 SI** DIN 47256 Connector
- ☐ **81000 VI** ST Connector
- ☐ **81000 KI** SC Connector

- ☐ **83410C** Lightwave Receiver
300 kHz to 3 GHz, 1300 and 1550 nm, SMF, 9/125 μ m and MMF, 62.5/125 μ m, amplified
- ☐ **83411C** Lightwave Receiver
300 kHz to 6 GHz, 1300 and 1550 nm, SMF, 9/125 μ m
- ☐ **83411D** Lightwave Receiver
300 kHz to 6 GHz, 1300 and 1550 nm, SMF, 9/125 μ m, amplified
- ☐ **83412B** Lightwave Receiver
300 kHz to 3 GHz, 850 nm, MMF, 62.5/125 μ m, amplified

Lightwave Directional Couplers

- ☐ **11890A** Lightwave Directional Coupler
820 to 1570 nm, SMF, 9/125 μ m

One of the following connector options must be specified for the lightwave directional coupler.

- ☐ **81000 AI** Diamond HMS-10 Connector
- ☐ **81000 FI** FC/PC Connector
- ☐ **81000 SI** DIN 47256 Connector
- ☐ **81000 VI** ST Connector
- ☐ **81000 KI** SC Connector

Polarization Controller

- ☐ **11896A** Polarization Controller
Fiber based, 1250 to 1600 nm wavelength range, <2 dB insertion loss, ± 0.002 dB variation paddle position.

The standard product includes FC/PC optical connectors. To receive alternate optical connectors, order the appropriate connector option.

- ☐ **81000 AI** Diamond HMS-10 Connector
- ☐ **81000 SI** DIN 47256 Connector
- ☐ **81000 VI** ST Connector
- ☐ **81000 KI** SC Connector
- ☐ **11896A-025** Pigtailed (1m) with FC/PC Connectors

Connector Adapters

Used to transform the lightwave source, receiver, and coupler to the connector of interest.

- ☐ **81000AI** Diamond HMS-10
- ☐ **81000FI** FC/PC
- ☐ **81000KI** SC
- ☐ **81000SI** DIN 47256
- ☐ **81000VI** ST
- ☐ **81000HI** E-2000

Accessories are available in these connector types: 3.5 mm, 7 mm, type-N, and type-F. If you will test E/E, E/O, or

Electrical Accessories

O/E devices and want to perform a Response & Match calibration to achieve the highest measurement accuracy, a set of test port cables and a cal kit should be added. Test port cables are used to connect to the device under test. Calibration kits include standards such as open/short circuits and loads, that are measured by the component analyzer for increased measurement accuracy.

For 50 ohm Device Measurements

Test Port Cables

❑ **11857D** 50 ohm 7 mm Test Port Return Cables

A pair of 610 mm (24 in.) cables, for use with the standard Agilent 8702E lightwave component analyzer or the 85046A and 85047A test sets. 8702E measurement characteristics were determined using a system with Agilent 11857D test port cables.

Calibration Kits

Choose a kit for each connector type to be used.

❑ **85033D** 3.5 mm Calibration Kit

Contains fixed loads, open and short circuits, and 7 mm to 3.5 mm adapters for both connector sexes for use with 7 mm test port cables.

❑ **85032B** 50 ohm Type-N Calibration Kit

Contains fixed loads, open and short circuits, and 7 mm to type-N adapters for both connector sexes for use with 7 mm test port cables.

❑ **85031B** 7 mm Calibration Kit

Contains fixed loads, and open/short circuit.

Adapters

❑ **11853A** 50 Ohm Type-N Accessory Kit

Contains type-N male to type-N male adapters, type-N female to type-N female adapters, and type-N male and female shorts.

❑ **11854A** 50 Ohm BNC Accessory Kit

Contains type-N to BNC adapters for both connector sexes and a BNC male short.

For 75 ohm Device Measurements

Test Port Cables

❑ **11857B** 75 Ohm Type-N Test Port Cables

A pair of 610 mm (24 in.) cables, for use with the 8702E Option 8702E-075 or the 85046B S-parameter test set.

Calibration Kits

❑ **85036B** 75 Ohm Type-N Calibration Kit

Contains 75 ohm fixed loads, open/short circuits, and adapters.

❑ **85039B Option 85039B-00F** Type-F Calibration Kit

Contains type-F male fixed load, open and short circuits, type-F female to type-F female adapters, and 75 ohm type-N to type-F adapters.

Minimum Loss Pads and Adapters

❑ **11852B** 50 to 75 Ohm Minimum Loss Pad

300 kHz to 2 GHz. Adapts from 50 ohm type-N female to 75 ohm type-N male. Nominal insertion loss is 5.7 dB.

❑ **Option 11852B-004** Provides 50 ohm type-N male and 75 ohm type-N female connectors.

❑ **11855A** 75 Ohm Type-N Accessory Kit

Contains 75 ohm type-N male to type-N male adapters, type-N female to type-N female adapters, type-N male and female shorts, and type-N male termination.

❑ **11856A** 75 Ohm BNC Accessory Kit

Contains 75 ohm type-N to 75 ohm BNC adapters for both connector sexes, a BNC male short, and BNC male termination.

Test Sets and Interface Kit (For Use with the Agilent 8702E Option 8702E-011)

A standard or option 8702E-075 Agilent 8702E includes a built-in test set. For an 8702E option 8702E-011, you will also need to add a test set or RF interface kit. An RF interface kit provides the capability to measure transmission and reflection characteristics of a two-port device in the forward direction. S-parameter test sets can measure the characteristics of a two-port device in either direction with a single connection.

For 50 ohm Device Measurements

☐ **11889A** RF Interface Kit

Used with a lightwave component analyzer, lightwave source and receiver to establish proper operation. Not required when system is used with an S-parameter test set. Contains a power splitter (Agilent 11667B), 20 dB attenuator (Agilent 8493A Option 8493A-020), a custom RF cable with one Type N (m) and one SMA (m) connector, three Type N (m) to 3.5 mm (m) adapters (1250-1743), one SMA (f-f) adapter (1250-1158), one SMA (m-m) adapter (1250-1159), and three SMA (m-f) adapters (1250-1249).

☐ **85046A** 50 ohm S-parameter Test Set

300 kHz to 3 GHz. Includes a test set interconnect cable and four RF cables to connect to the 8702E Option 8702E-011. Requires two Agilent 1250-1746 7 mm to 3.5 mm (m) adapters to connect to the lightwave source and receiver.

☐ **Option 85046A-009** Substitute Mechanical Transfer Switch

☐ **Option 85046A-913** Rack Mount Kit, instruments with handles

☐ **85047A** 50 ohm S-parameter Test Set

300 kHz to 6 GHz. Includes a test set interconnect cable and four RF cables to connect to the Agilent 8702E Option 8702E-011. Requires 8702E Option 006 for 6 GHz operation. Requires two Agilent 1250-1746 7 mm to 3.5 mm (m) adapters to connect to the lightwave source and receiver.

☐ **Option 85047A-009** Substitute Mechanical Transfer Switch

☐ **Option 85047A-913** Rack Mount Kit, instruments with handles

For 75 ohm Device Measurements

☐ **85046B** 75 ohm S-Parameter Test Set

300 kHz to 2 GHz. Requires the Agilent 11857B 75 ohm test port return cables. Includes a test set interconnect cable and four RF cables to connect to the 8702E Option 8702E-011.

☐ **Option 85046B-009** Substitute Mechanical Transfer Switch

☐ **Option 85046B-913** Rack Mount Kit, instruments with handles

Verification Kit

☐ **85029B** 7 mm Verification Kit

Includes attenuators and mismatch attenuator with data on a 3.5 inch disk for use in confirming accuracy enhanced system measurement performance, traceable to national standards. Test procedure is provided in the service manual. For use with a standard Agilent 8702E, or with systems including an 8702E Option 8702E-011 and an Agilent 85044A, 85046A, or 85047A test set. The Agilent 85031B 7 mm calibration kit and 11857D test port cables are also required.

Other Accessories

Probe Power Supply

□ 11899A Probe Power Supply

Used to provide power to the lightwave source or receiver when probe power is not available.

Probe

□ 85024A High Frequency Probe

Provides high impedance in-circuit test capability from 300 kHz to 3 GHz.

Amplifier

□ 8347A RF Power Amplifier

Used to set leveled output power or increase system dynamic range from 100 kHz to 3 GHz.

Power Meters

For accurate control of leveled test port power. Requires an Agilent 8480 series power sensor and an GPIB cable for connection to the 8702E.

□ E4418B Single Channel Power Meter

□ E4419B Dual Channel Power Meter

Retrofit Kits

These kits are used to add additional capability to the Agilent 8702E.

□ 8753EU Option 8753EU-002 Harmonic Measurement Capability Upgrade Kit

For an existing 8702E that does not have option 8702E-002 harmonic measurement capability, the 8753EU option 8753EU-002 is an upgrade kit that will add harmonic measurement capability for measuring second and third harmonic responses. Includes installation at a local Agilent service center. The serial number of the 8702E to be retrofitted must be specified when ordering this upgrade kit. Option 8753EU-002 with option 8753EU-006 extends harmonic capability to 6 GHz.

□ 8753EU Option 8753EU-006 6 GHz Operating Frequency Upgrade Kit

For an existing 8702E that does not have option 8753EU-006, the 8753EU option 8753EU-006 upgrade kit will add operation to 6 GHz frequency. Includes installation at a local Agilent service center. The serial number of the 8702E to be retrofitted must be specified when ordering this upgrade kit. This upgrade kit is not compatible with an 8702E with either option 8702E-011 or 8702E-075.

□ 8753EU Option 8753EU-010 Time Domain Upgrade Kit

For an existing 8702E that does not have time domain capability, the 8753EU option 8753EU-010 upgrade kit will add time domain capability to the 8702E. The serial number of the 8702E to be retrofitted must be specified when ordering this upgrade kit.

Keyboard

A keyboard with a mini-DIN cable and mini-DIN to DIN adapter can be connected to the 8702E's DIN interface to form a remote input capability to provide a quicker, more convenient way to enter titles, labels, and file names.

Monitors

Any VGA compatible monitor.

Printers

Measurement results can be printed from printers with GP-IB, parallel, or serial interfaces. For a list of compatible printers, consult our printer compatibility guide Web page at www.agilent.com/find/pcg The 8702E lightwave component analyzer is compatible with the same printers as the 8753E network analyzer.

Disk Drive

Measurement data, instrument states, calibration data, and test sequences may be stored directly to the built-in disk drive without the aid of a computer.

Interface Cables

Choose the appropriate cables to connect each peripheral to the network analyzer.

□ 10833A GPIB Cable, 1.0 m (3.3 ft.)

□ 10833B GPIB Cable, 2.0 m (6.6 ft.)

□ 10833D GPIB Cable, 0.5 m (1.6 ft.)

Software

The Agilent N1031A BenchLink Lightwave software is included with the standard Agilent 8702E. This software makes possible screen image capture, trace data capture and instrument state save and restore.

BenchLink Lightwave is a 32-bit product that operates and is supported on the following platforms:

- Windows® 95
- Windows® 98
- Windows NT® 4.0
- Windows NT® 5.0

It does not work with Windows® 3.X or prior versions of Windows®.

Minimum PC System Requirements

Intel Pentium® (or compatible) 90 MHz processor

32 Mbyte RAM memory

15 Mbyte disk space

VGA graphics (SVGA or better recommended)

CD ROM drive

Microsoft compatible mouse

The following PC-to-instrument interfaces are supported by the Agilent N1031A product on the indicated platforms:

Supported Interfaces	95	98	NT 4	NT 5
Agilent				
82335A/B	•			
82340A	•	•	•	•
82341B			•	•
82341C	•	•	•	•
82341D	•	•		
82350A	•	•	•	•
National Instruments				
National PCI-GPIB	•	•	•	•
National PCI-GPIB+			•	•
National PCMCIA-GPIB	•	•	•	•
National PCMCIA-GPIB+	•	•		
National AT-GPIB/TNT(pnp)	•	•	•	•
National AT-GPIB/TNT+(pnp)	•	•	•	•
National AT-GPIB	•	•	•	•
National AT-GPIB/TNT	•	•		
National EISA-GPIB	•	•		
RS-232	•	•	•	•

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Agilent Technologies aims to maximize the value you receive, while minimizing your risk and problems. We strive to ensure that you get the test and measurement capabilities you paid for and obtain the support you need. Our extensive support resources and services can help you choose the right Agilent products for your applications and apply them successfully. Every instrument and system we sell has a global warranty. Support is available for at least five years beyond the production life of the product. Two concepts underlie Agilent's overall support policy: "Our Promise" and "Your Advantage."

Our Promise

Our Promise means your Agilent test and measurement equipment will meet its advertised performance and functionality. When you are choosing new equipment, we will help you with product information, including realistic performance specifications and practical recommendations from experienced test engineers. When you use Agilent equipment, we can verify that it works properly, help with product operation, and provide basic measurement assistance for the use of specified capabilities, at no extra cost upon request. Many self-help tools are available.

Your Advantage

Your Advantage means that Agilent offers a wide range of additional expert test and measurement services, which you can purchase according to your unique technical and business needs. Solve problems efficiently and gain a competitive edge by contracting with us for calibration, extra-cost upgrades, out-of-warranty repairs, and on-site education and training, as well as design, system integration, project management, and other professional engineering services. Experienced Agilent engineers and technicians worldwide can help you maximize your productivity, optimize the return on investment of your Agilent instruments and systems, and obtain dependable measurement accuracy for the life of those products.

By internet, phone, or fax, get assistance with all your test & measurement needs.

Online assistance:
www.agilent.com/comms/lightwave

Phone or Fax
United States:
(tel) 1 800 452 4844

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Printed in USA May 24, 2002
5988-4182EN



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