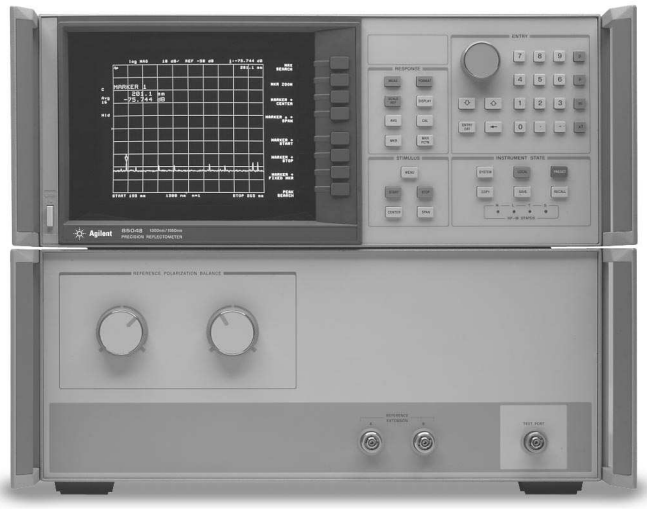
Agilent 8504B Precision Reflectometer

0 to 80 dB return loss
25 micron resolution
1300 and 1550 nm

Product Overview



Lightwave component return loss measurements

Agilent Technologies

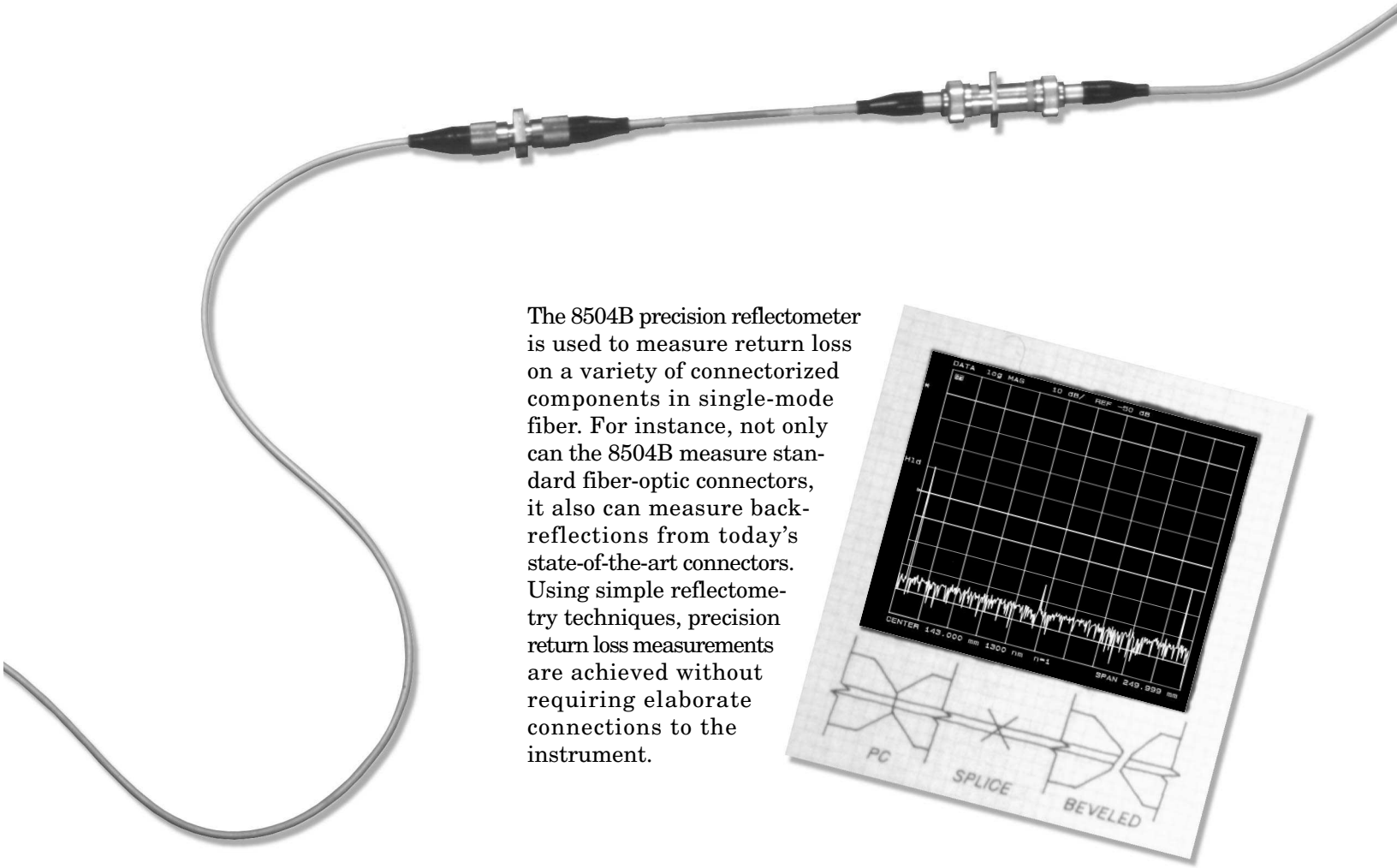
Crucial return loss measurements

Agilent 8504B Precision Reflectometer

Complex lightwave systems place stringent requirements on the amount of light that can be reflected off individual components. As systems become more sophisticated, even very small amounts of reflected light can cause a system or a component to fail specifications. The ability to accurately measure optical return loss is crucial in the development and testing of many components used in lightwave systems.

High levels of measurement sensitivity

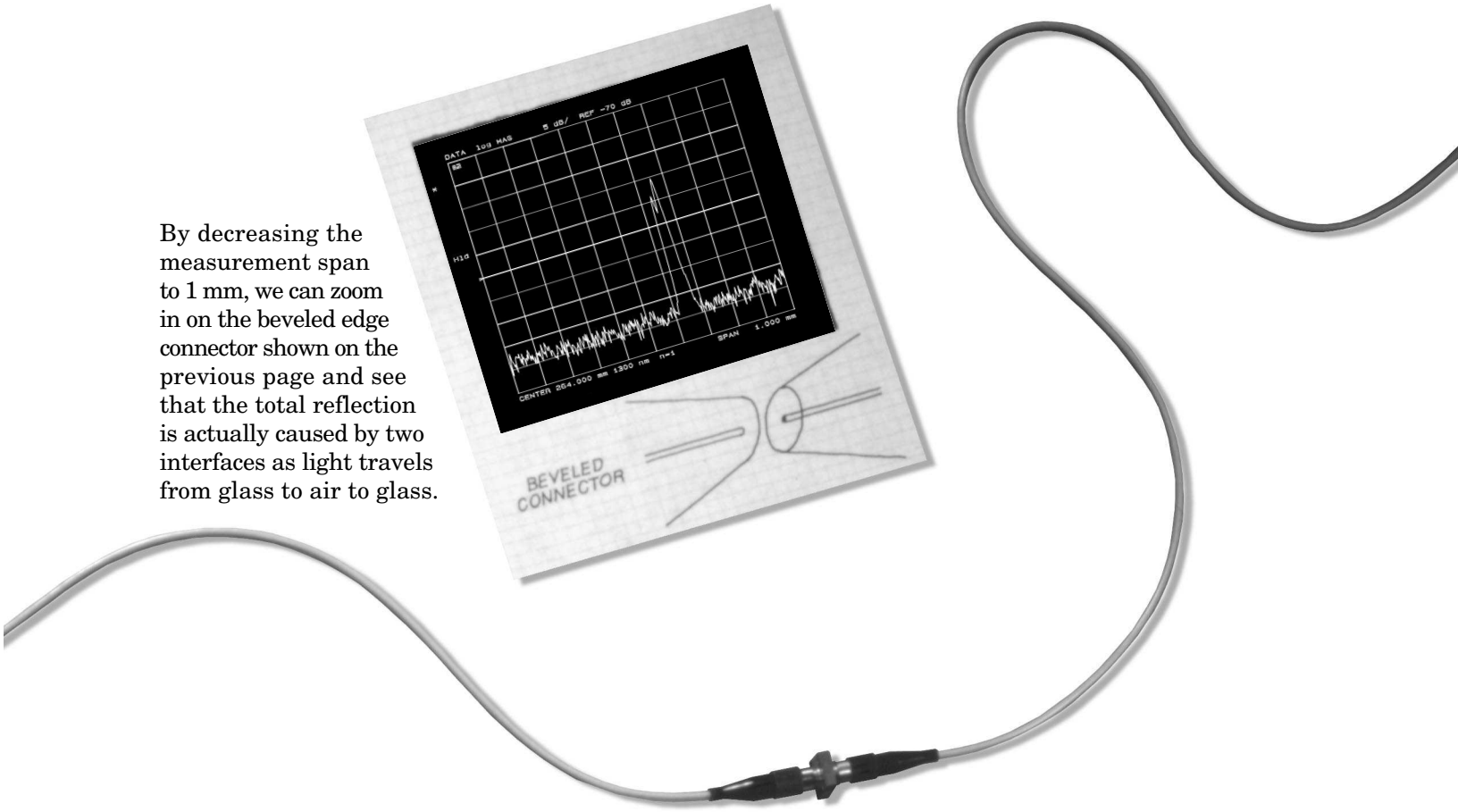
The Agilent 8504B provides high levels of measurement capability, allowing you to see reflections that were difficult if not impossible to measure before. With over 80 dB of measurement dynamic range, the 8504B is a valuable tool wherever very sensitive measurements of return loss are required.



The 8504B precision reflectometer is used to measure return loss on a variety of connectorized components in single-mode fiber. For instance, not only can the 8504B measure standard fiber-optic connectors, it also can measure back-reflections from today's state-of-the-art connectors. Using simple reflectometry techniques, precision return loss measurements are achieved without requiring elaborate connections to the instrument.

High spatial-resolution reflectometry

By decreasing the measurement span to 1 mm, we can zoom in on the beveled edge connector shown on the previous page and see that the total reflection is actually caused by two interfaces as light travels from glass to air to glass.



Isolate reflections with previously unachievable resolution

High-performance optical assemblies often have several interfaces, each a potential reflection. In order to improve or troubleshoot such a component, the magnitude and location of each reflection must be determined.

High levels of spatial ("two-event") resolution

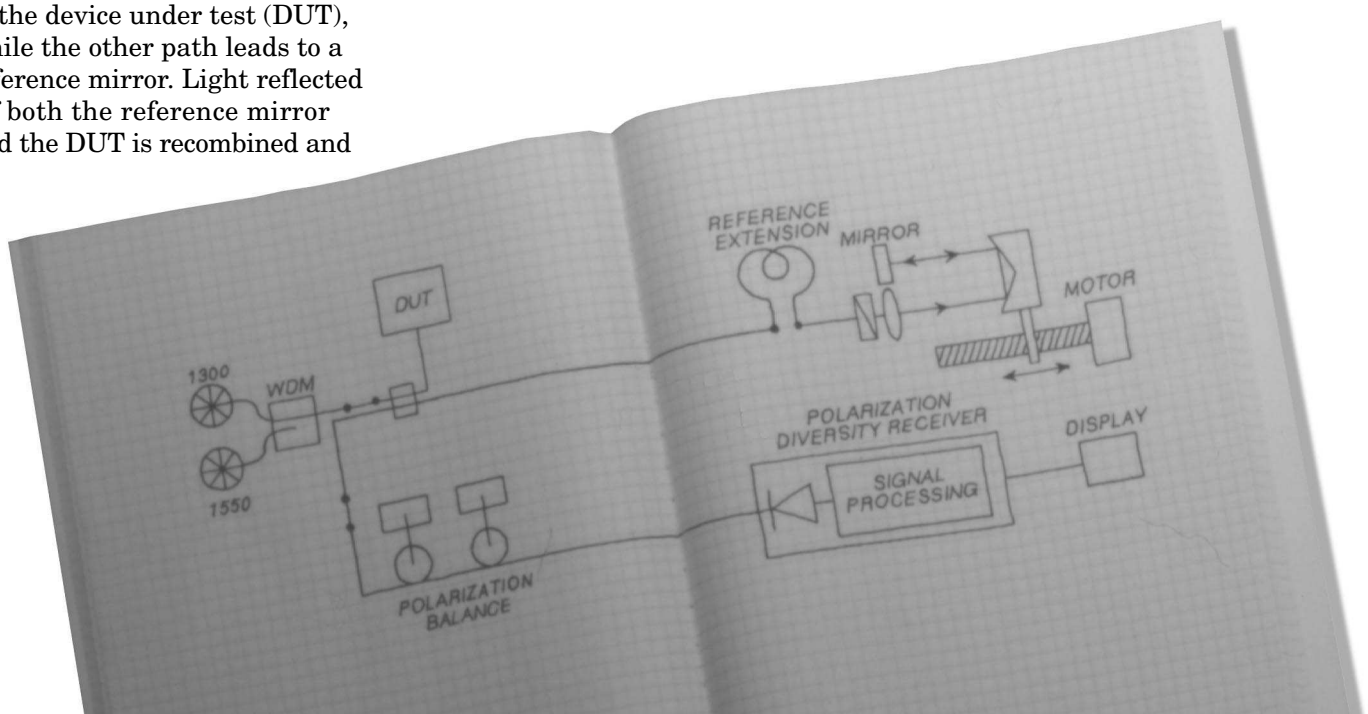
In addition to high dynamic range, the 8504B also provides dramatic improvements in spatial resolution (the ability to resolve closely spaced reflections). Individual reflections spaced by less than 25 microns (equivalent air distance) can be isolated and distinctly identified.

Power meter solutions provide convenient methods to measure the total return loss of a component. The 8504B allows you to actually "look inside" your components and determine the location and magnitude of each individual reflection.

Measurements are made in a matter of seconds. The span over which measurements are made can be as small as 1 mm or as wide as 400 mm (air). Measurements beyond 400 mm are made by simply adding an appropriate length of extension cable (8504B-001) in the instrument reference path.

The measurement concept

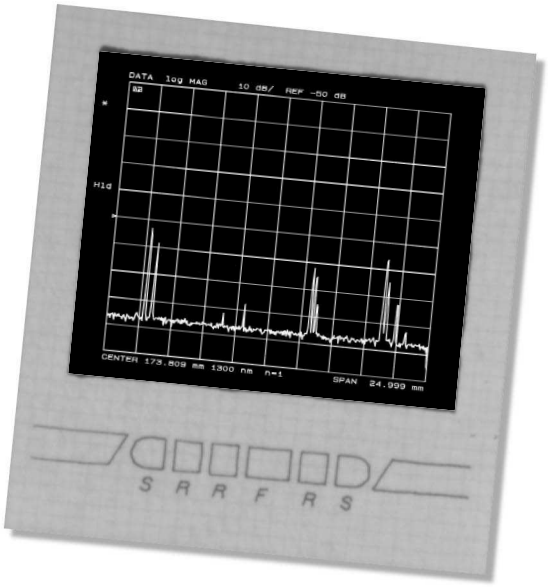
The 8504B Precision Reflectometer is based upon a Michelson interferometer and utilizes the techniques of “white light” interferometry. A 1300 or 1550 nm low-coherence light source is sent to a power splitter. One path leads to the device under test (DUT), while the other path leads to a reference mirror. Light reflected off both the reference mirror and the DUT is recombined and detected. If the path length from the source to the reflection in the DUT is the same as from the source to the mirror, a coherent interference signal appears at the detector. By moving the position of the reference mirror, the instrument can then “scan” the test device for reflections over a 400 mm range. The short coherence length of the source leads to very high resolution measurements. The location of the 400 mm measurement range can be offset by extending the length of the path to the mirror with the optional extension cables.

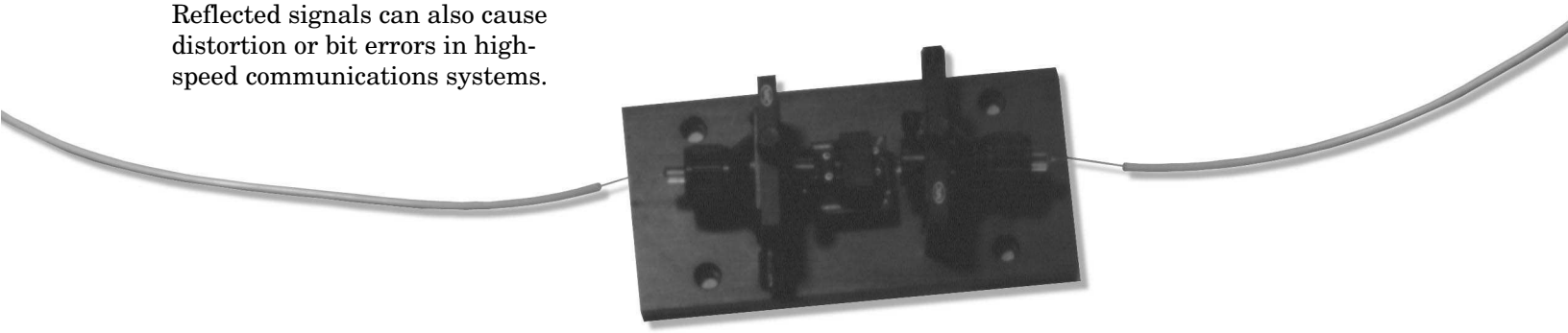


Applications

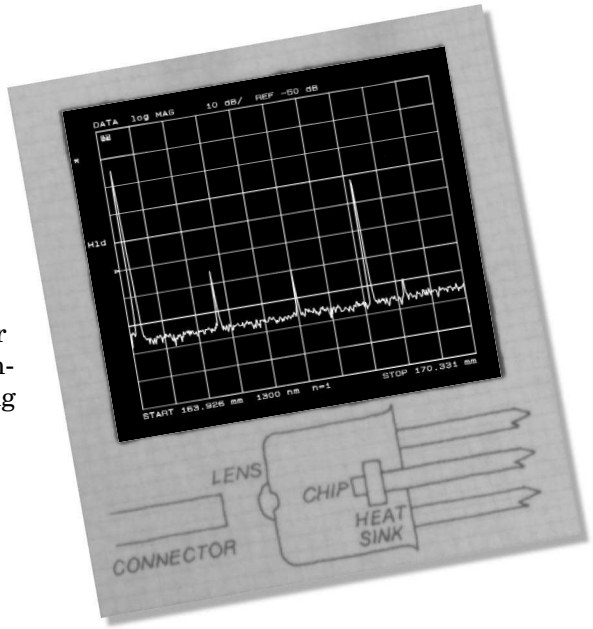
The 8504B precision reflectometer serves as a powerful tool in the development and testing of systems and components. Accurate characterization of reflections is extremely important for a variety of high-performance lightwave systems and components. The relative intensity noise (RIN) and modulation bandwidth of DFB and other narrow linewidth lasers can be greatly affected by even very small amounts of backreflected light. Reflected signals can also cause distortion or bit errors in high-speed communications systems.

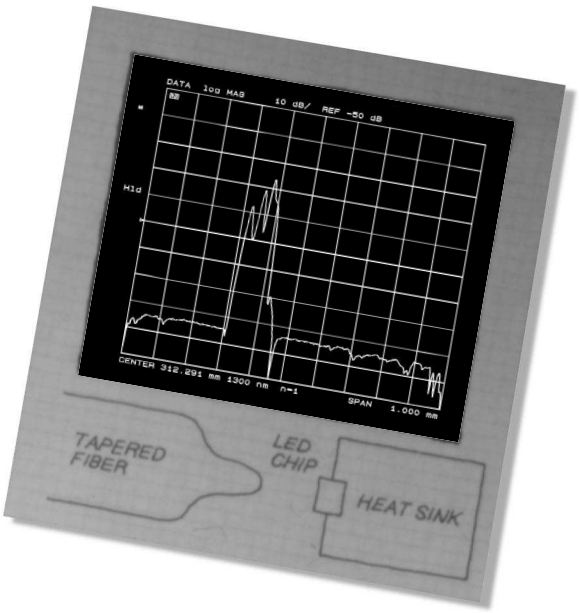
An isolator, often used to reduce the reflections seen by a DFB laser, can itself be a source of reflections. This isolator is a complex structure. Each of the elements' contribution to the total return loss can be easily determined.





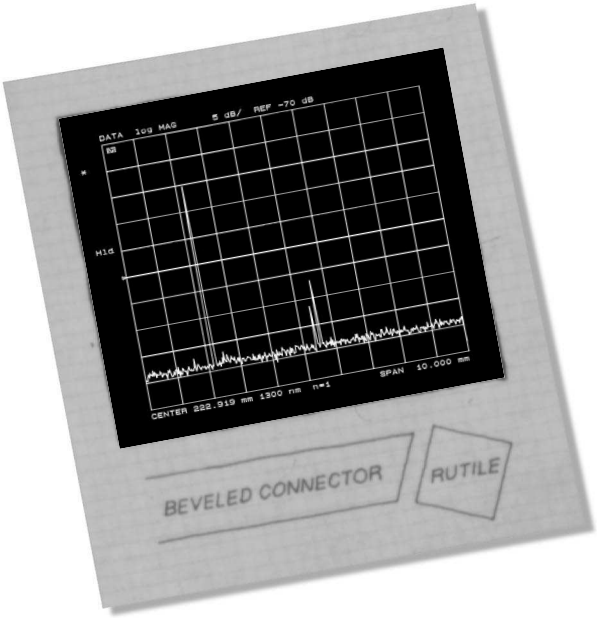
The total return loss of this photodiode assembly is due to several different interfaces. The 8504B precision reflectometer shows the return loss of each of the photodiode's elements. Designers no longer need to guess where to concentrate their efforts in improving the product.





Return loss is also an important parameter for lightwave sources. Light reflected from components beyond the laser or LED source can be re-reflected off of the source leading to distorion in analog communications systems and bit errors in digital systems.

This edge-emitting LED source has several reflecting interfaces that contribute to its overall return loss. The 8504B can identify the magnitude and location of each reflection in a matter of seconds.



Measuring the relative locations of reflections can provide a simple method for determining the thickness or group index of optical materials. In this example a 1.25 mm rutile, a birefringent crystal, is measured. The group index for both the ordinary and extraordinary rays can be determined as there are effectively two reflections off the back face.

Technical Data

Specifications

Specifications describe the instrument's warranted performance for the temperature range of 20 to 30° C after a 2 hour warm-up and relative humidity of <95% non-condensing. The measurement temperature should not drift more than ±3° from the calibration temperature. Distance specifications are in "air", fiber or glass values are in parentheses.

Return Loss Range:	
1300 nm	10 to 80 dB
1550 nm[1]	10 to 80 dB
Return Loss Accuracy:	±2.0 dB
Two-Event Spatial Resolution:	
1300 nm	25 (17) um
1550 nm	65 (44) um
Two-Event Spatial Accuracy:	
1 to 10 mm	±2 % of span
10 to 400 mm	±1 % of span

Spurious Response	Relative Distance from Largest Reflection			
(dB below the largest reflection):	–20 to –10 mm	–10 to 0 mm	0 to +10 mm	+10 to +20 mm
1300 nm	–55 dB	–45 dB	–65 dB	–65 dB
1550 nm	–62 dB	–62 dB	–62 dB	–62 dB

Dimensions:	370 mm (H) x 460 mm (W) x 570 mm (D)
Weight:	35 kg

[1] Mirror position 0 to 100 mm

Supplemental Characteristics

Supplemental Characteristics describe useful, non-warranted performance parameters.

Compatible Fiber:	9/125 um
Sweep Speed:	18 mm/sec
Measurement Span[2]:	1 to 400 (270) mm
Source Characteristics:	
Peak Wavelength	1308 nm ±30 nm 1550 nm ±30 nm
Spectral Width (–3 dB)	55 nm
Average Power[3]	–17 dBm

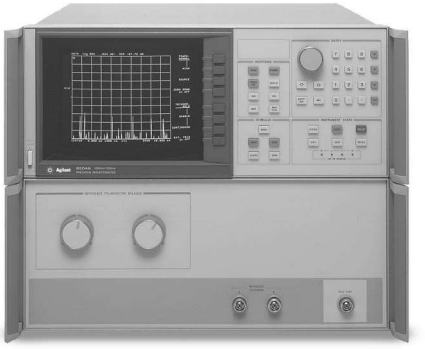
[2] Measurement span can be offset using fiber extension cables provided in option 001

[3] At instrument front panel

Ordering Information

Agilent 8504B Precision Reflectometer

Includes both 1300 and 1550 nm measurement capability, a calibration standard, FC/PC front panel adapters, one pair of 1 meter fiber optic cables.



Accessories

8504B-001	Accessory Kit Includes a cable tray, six pairs of fiber optic cable (0.5 meters to 1.75 meters), and FC/PC barrel.
8504B-1CM	Rack Mount Kit (no handles)
8504B-1CN	Handle Kit
8504B-7CP	Rack Mount Kit with handles
8504B-UK6	Calibration Certificate

Agilent Technologies' Test and Measurement Support, Services, and Assistance

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

Agilent Email Updates
www.agilent.com/find/emailupdates
Get the latest information on the products and applications you select.

Phone or Fax

United States:
(tel) 1 800 452 4844

Canada:
(tel) 1 877 894 4414
(fax) (905) 282 6495

China:
(tel) 800-810-0189
(fax) 1-0800-650-0121

Europe:
(tel) (31 20) 547 2323
(fax) (31 20) 547 2390

Japan:
(tel) (81) 426 56 7832
(fax) (81) 426 56 7840

Korea:
(tel) (82-2) 2004-5004
(fax)(82-2) 2004-5115

Latin America:
(tel) (305) 269 7500
(fax) (305) 269 7599

Taiwan:
(tel) 080-004-7866
(fax) (886-2) 2545-6723

Other Asia Pacific Countries:
(tel) (65) 375-8100
(fax) (65) 836-0252
Email: tm_asia@agilent.com

Product specifications and descriptions in this document subject to change without notice.

Printed in USA April 25, 2002
5988-2275EN

Agilent Technologies