Agilent Technologies

Optical Amplifier Test Solutions

- Fully automated, integrated turn-key solutions that provide flexibility, accuracy, and repeatability
- Fast, accurate test methods
- Modular and scalable test platform
- Use in production test, design verification, or quality assurance

Agilent Technologies

Optical Amplifier Design and Manufacturing Challenge

Do you design or manufacture EDFAs, EDWAs, SOAs or Raman amplifiers? If so, Agilent has a solution for your qualification and testing needs. As optical amplifier performance is increasingly critical to the success of fiber-optic communication systems, designers and manufacturers face the challenge of providing accurate characterization data to ensure overall system performance. Adding in the desire for higher throughput and lower manufacturing costs makes the task an even greater challenge.

Focus on Design and Leave Testing Worries to Agilent

We apply our knowledge and expertise to help you meet your business goals. A leader in test and measurement technology, Agilent builds optical test solutions with high-performance optical instruments. More specific to the optical amplifier industry, Agilent is actively involved with industry and government organizations in defining test methodologies.

Agilent Technologies Optical Amplifier Test Solutions

Agilent offers a fully-integrated turnkey solution for optical amplifier test. No other system on the market provides a complete test set for all Optical Amplifiers and the modularity to allow just enough test for price sensitive manufacturing requirements. Gain, noise figure (NF), polarization dependent gain (PDG), and other derived parameters are measured with a variety of test methods such as interpolation with source subtraction (ISS) and, time domain extinction (TDE). Our systems provide accurate and complete optical amplifier characterization. Agilent drives down test time and manufacturing costs with fast measurement methods and a variety of options.

User-Friendly Software

The optical amplifier test system user interface makes test setup simple. The system prompts the user to connect the optical amplifier and displays the status of the test process. When tests are complete, results are automatically exported to an XML file, which can then be imported to internal applications such as an Excel workbook and charts or to an Access database.

Flexible Test Plans via the Test Executive

Agilent's OA test systems offer test plan flexibility through the use of a test executive (NI TestStand). This gives the engineer flexibility to incorporate custom test steps and embed proprietary factory processes into the test plan.

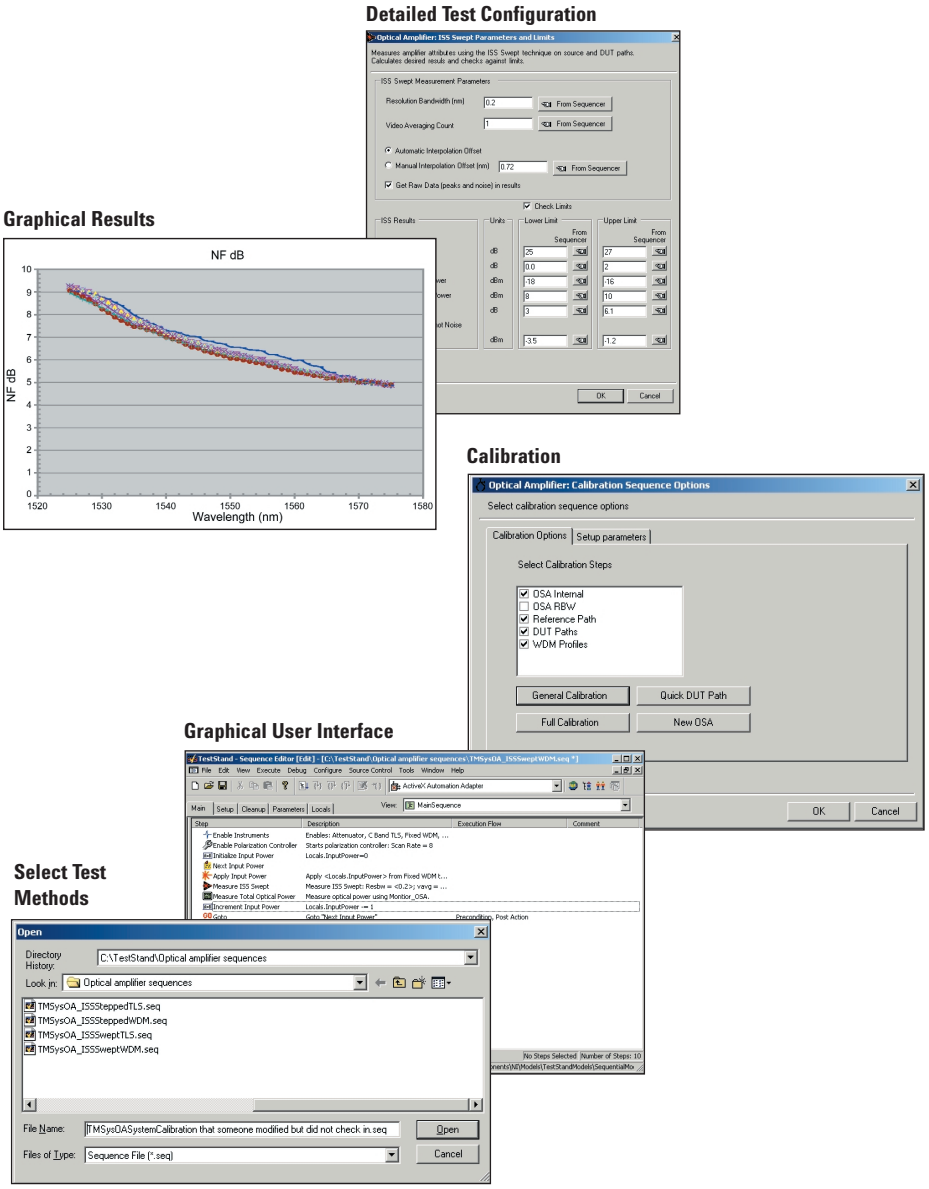
Starting with one of the default test plans included with the system, the engineer can tailor the test sequence to insert new test steps into the test plan. If needed, these steps can be custom written using a variety of languages supported by the test executive (VisualBasic, C#, LabView LabWindows, etc.)

Agilent OA Test Steps

The Agilent OA tests are written to keep the logical steps at a high level. This simplifies the test plan. Each of the test steps has it's own pop-up configuration box, allowing the engineer to enter the desired test conditions and test limits for that step. Examples include:

- Adjust WDM Profile
- Apply Input Power
- ISS Swept
- ISS Stepped
- TDE Swept
- TDE Stepped
- Total Optical Power
- Add/Drop Transient

These test steps perform error checking to the selected limits and return the results to a data output file.



Data Output

The data taken by the Agilent OA test system is output to a local file in an Extensible Markup Language (XML) format. This allows external applications such as an Excel workbook/chart, an Access database, or a program such as Crystal Reports to generate hard copy reports.

Manufacturing and R&D use

Test plans for different models of OA can be created. Test plans can be configured for the lab use as well as for manufacturing test. Test plans may also be shared among multiple test systems.

Simple Test Setup

Automated Calibration

Agilent has succeeded in making calibration hassle-free. Built-in system calibration routines bring critical accuracy and repeatability to optical amplifier measurements. Our calibration routines ensure that your system will have complete spectral correction tables that are necessary to know exactly what is happening at the DUT reference plane. That is, you'll know precisely what is going in and out of the optical amplifier under test.

Agilent's Base Test System

Agilent's OA test systems include high-performance instruments such as:

- Attenuator with power leveling to the DUT
- Optical switches
- Power sensors
- Optical spectrum analyzer

The E2156A includes the capability to characterize optical amplifiers using the ISS method. The E2158A has all of the capabilities of the E2156A and adds the capability to characterize Erbium amplifiers (EDFA & EDWA) using the Time Domain Extinction (TDE) method. Choose the system with the best method(s) for your application or customer requirements.

Source Flexibility

Optical amplifiers generally need to be tested with the appropriate source according to the intended application of the OA. A compact TLS is offered for amplifiers designed for narrow band applications. For optical amplifiers intended to be deployed in WDM environments, a WDM source (consisting of DFBs and a WDM) is offered. Both sources may be included in the system to maximize source flexibility.

Accurate Measurements

Agilent's optical amplifier test solution systems are capable of a broad range of measurements in the C- and L-bands. Ranging from small and large signal gain to amplified spontaneous emission (ASE), the base system has the capability to accurately measure optical amplifier parameters that meet your strict requirements. Agilent-patented WDM polarization scrambling is utilized to minimize measurement uncertainty due to polarization hole burning (PHB). Optional polarization dependent gain (PDG) measurements are obtained using ISS and TDE by utilizing a polarization controller in-line with the input source.

Measurements include:

- Gain
- Polarization Dependent Gain (optional)
- Transient Measurements using WDM source (optional)
- Noise Figure
- Amplified Spontaneous Emission
- Input Power (both signal and total)
- Output Power (both signal and total)
- Gain Flatness

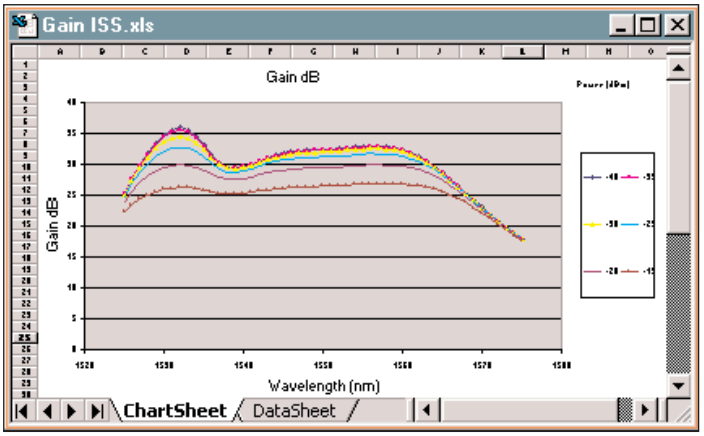
Flexibility with Two Test Methods

Interpolation with Source Subtraction (ISS) – E2156A & E2158A

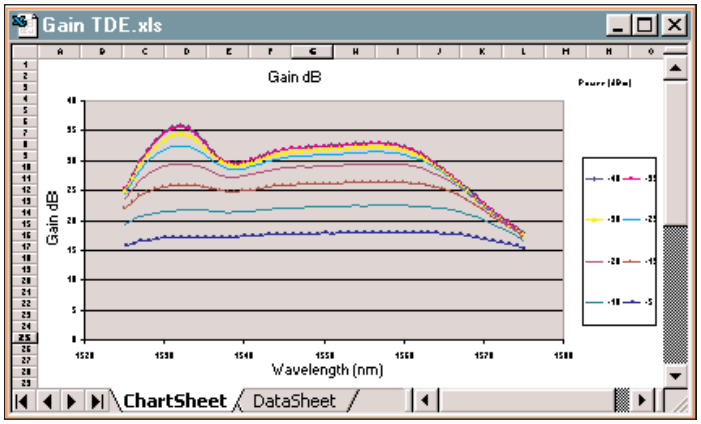
ISS is a non-modulating test method in which light power is measured at each signal wavelength and on each side of the respective signal wavelengths, both at the input and output of the device under test (DUT). Gain is measured at the signal wavelengths. ASE is calculated, rather than measured, by subtracting an idealized output spectrum (gain-times-input spectrum) from the measured output. The result is the broadband ASE noise added to the signal by the amplifier. This method is useful for testing all OA types, including EDFA, EDWA, SOA and Raman amplifiers.

Time Domain Extinction (TDE) – E2158A Only

A fast-modulated signal is measured during “signal on” and “signal off” periods for a measurement of large signal gain and output ASE. High extinction optical modulators enable ASE measurements directly at each of the saturating wavelengths without requiring interpolation. This is called TDE-ZI (zero interpolation)



Interploation with Source Subtraction (ISS)



Time Domain Extinction (TDE)

A Variety of Options to Meet Your Testing Needs

To fit your testing needs and requirements, Agilent offers the following options to be added to the optical amplifier test system. Choose the options that satisfy your testing requirements.

High Power WDM source with Pre-Emphasis:
This option supports accurate ISS and TDE measurements with a WDM source and provides automatic control of the WDM signal levels.

Polarization Controller/PDG:
Adds a polarization controller to enable Polarization Dependent Gain (PDG) measurements and improve measurement accuracy.

Transient Measurements:
Measures transients produced in an EDFA/EDWA when WDM source wavelengths are added or dropped.

Other Available Options (call factory)

Multi-DUT Testing:
This option supports the capability of testing as many as 20 DUTs consecutively!

Pump Current Control:
This option provides control of DUT laser pumps.

DUT Power Supply Control:
This option adds the ability to control two power supply voltages to the base system.

Source Switch:
Enables switching of additional sources, typically for the L-band (WDM and TLS).

System Tailoring

Many times, test systems may require additional capabilities other than what is offered as an option. The Agilent OA test system allows the system to be tailored to meet your specific requirements: whether it be embedding a manufacturing process or performing a special measurement. The following examples demonstrate how the system may be tailored to meet your needs.

Environmental Chamber Control:
Integrate automated control of your environmental chamber into the test plan.

DUT Monitoring:
Measure multiple optical power monitors (either taps or photodiodes) in the device to be tested.

Pump Optimization:
Optimize the performance of the tested device by adjusting the pump powers.

Noise Gain Profile Measurements (NGP):
NGP is an extension of the TDE method described earlier. With this modulated method, the gain measurement made by TDE during the "signal on" period is replaced by the addition of a low level broadband signal (EELED) that is measured during the "signal off" period. This method delivers spectrally continuous measurement results for the amplifier. Since this is a modulated method, it is suitable for use with Erbium amplifiers (EDFA and EDWA).

SOA Measurements:
SOA manufacturers may require additional measurements such as power compression and inter-channel crosstalk.

Micropositioning:
Both SOA and EDWA manufacturers may desire to perform tests at the chip or waveguide level. Agilent has micropositioning platforms that can be integrated with the Optical Amplifier test system in order to improve yield and reduce manufacturing costs.

Noise Figure measurements due to MPI:
Multipath interference (MPI) noise can be a significant component of Raman amplifier noise. This feature captures the effect of MPI noise due to double Rayleigh backscatter within the gain region of the Raman amplifier.

Worldwide Support & Services

Agilent Technologies provides full implementation and installation of your optical amplifier solution. We provide the necessary training to ensure proper use of the system, which allows you to focus on design and manufacturing. All systems come packaged with full documentation including reference guides, maintenance guides, and operator manuals.

Agilent offers worldwide support and maintenance with a one-year warranty period (eligible for upgrade) on all systems.

Call Agilent Today

If cost-effectively testing optical amplifiers is one of your engineering challenges, call Agilent. We can reduce your test cost and increase your throughput by providing a fully automated solution that matches your needs. By letting us provide a solution, your resources are free to focus on amplifier design, product quality, and business objectives. For more details, call us today.

Agilent Technologies Warranty

Agilent hardware products are warranted against defects in materials and workmanship for a period of one year from date of shipment. Some newly manufactured Agilent products may contain remanufactured parts, which are equivalent to new in performance. If you send us a notice of such defects during the warranty period, we will either repair or replace hardware products that prove to be defective.

Agilent software and firmware products that are designated by Agilent for use with a hardware product are warranted for a period of one year from date of shipment to execute their programming instructions when properly installed. If you send us notice of defects in materials or workmanship during the warranty period, we will repair or replace these products, so long as the defect does not result from buyer supplied hardware or interfacing. The warranty period is controlled by the warranty statement included with the product and begins on the date of shipment.

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

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