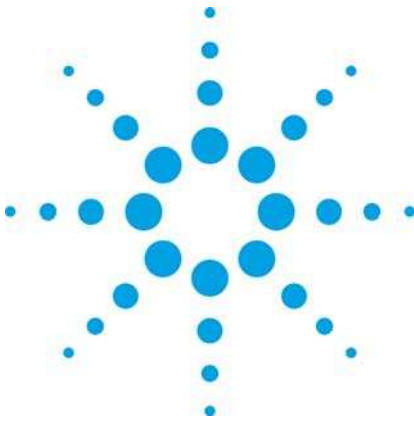


# Agilent Optical Amplifier Test System

## E2156A/E2158A



### Agilent Technologies' Customizable Optical Amplifier Test System.

The Agilent E2156A/E2158A provide fully integrated test systems for optical amplifier (OA) manufacturers. The E2156A/E2158A provide highly accurate measurements on an open, extensible platform that can be customized to meet user-specific needs.

#### Just Enough Test

OA manufacturers can configure the E2156A/E2158A with just the right amount of test capabilities for budget-sensitive applications, and protect their investment by easily upgrading the system to meet new OA test requirements.

Users can work within a familiar software environment to easily change device test sequences, allowing manufacturers to remain cost-competitive

while responding quickly to new technological and market requirements.

Manufacturers can stay cost competitive in the metro market by using our new solution for low-cost test of metro optical amplifiers. This is achieved through low system cost, test throughput optimization and support of low-cost OA technologies, including SOA, EDWA.

#### Key Benefits

The Agilent E2156A/E2158A optical amplifier test systems offer several benefits:

- reduced cost of test with one system that tests all OA technology devices
- versatility with Agilent's large variety of upgrades
- scalability and investment protection allowing users to purchase a minimum amount of test equipment and upgrade as necessary

- flexibility that lets users easily customize their system within an open software environment

The E2156A/E2158A use Agilent's industry leading optical measurement instrumentation. Our standard configuration measures Gain (G), Noise Figure (NF), and other derived parameters. The E2156A system utilizes the interpolation with source subtraction (ISS) test method. The E2158A provides both ISS and TDE with NGP as an option.

#### Manufacturing and R&D Environments

The Agilent E2156A/E2158A are fully automated, integrated turn-key solutions that provide flexibility, accuracy, and repeatability. The Optical Amplifier test system can be used in design verification, production test, or quality assurance and offers unbeatable performance capabilities.



**Agilent Technologies**

## Typical Characteristics

### System Characteristics

- Wavelength Range (system optical path) <sup>1</sup>	- S+C+L bands
- Wavelength Accuracy (measurement)	- 0.010 nm (S+C bands) 0.025 nm (L band)
- Maximum DUT Output Power <sup>2</sup>	- 25 dBm (C+L bands) 22 dBm (S band)
- DUT Output Power Measurement Accuracy <sup>3</sup>	- ± 0.16 dBm

### Measurement Techniques

- E2156A	- ISS only, stepped & swept
- E2158A	- ISS, TDE (to 1MHz), stepped & swept

### Gain and PDG Measurements

- Gain Measurement Accuracy <sup>3</sup>	- ± 0.12 dB
- Gain Measurement Repeatability <sup>3,4</sup>	- <0.02 dB typ.
- System Residual PDG (PDG accuracy)	- ± 0.12 dB typ. E2156A ± 0.18 dB typ. E2158A ± 0.03 dB typ. enhanced (opt 030)

### Noise Figure Measurements

- NF Accuracy (ISS) <sup>3</sup>	- ± 0.3 dB
- NF Accuracy (TDE) <sup>3</sup>	- ± 0.2 dB
- NF Measurement Repeatability <sup>3,4</sup>	- <0.02 dB typ.

### Source Characteristics

- System Loss (E2156A) <sup>5,6,7</sup>	- 5.0 dB nom. (ISS)
- System Loss (E2158A with SRC AOM) <sup>5,6,7</sup>	- 6.9 dB nom (ISS), 15.2 dB nom (TDE)
- DUT Input Power Set Accuracy	- ± 0.1 dBm
- DUT Input Power Set Repeatability <sup>4</sup>	- <0.02 dB typ.
- Minimum WDM Source Channel Spacing	- 100 GHz (ISS), 50 GHz (TDE)

### List of Measurements

- Gain, Gain Flatness	- Total Output Power
- Noise Figure	- ASE Power
- PDG (option 035) <sup>3</sup>	- Signal Input Power
- Transients (option 040)	- Signal Output Power

### Environmental Conditions

- Operating Temperature	- 10 to 35 C°
- Storage Temperature	- 40 to 70 C°
- Humidity	- 80% RH

Specifications exclude DUT connector effects

Unless otherwise specified, S band = 1480-1525nm; C band = 1525-1565nm; L band = 1565-1610nm.

1. Wavelength range of the system optical paths. Requires appropriate sources. For O-band, consult factory.

2. Standard system. For higher output powers, consult factory.

3. Stepped measurements

4. Repeatability: The standard deviation of multiple measurements without disrupting the optical connection

5. System Loss: The loss from the source input switch to the DUT input.

6. Base system without Option 035 and MultiDUT switch. Add 1.4 dB for Opt 035.

7. Maximum DUT Input Power may be calculated as follows:

$$\text{Max DUT Input Power (dBm)} = \text{Source Power (dBm)} - \text{System Loss (dB)}$$

#### TLS example

Using the C+L band TLS (81949A) powered at 1dB below max:

$$\text{Max DUT Input Power (dBm)} = (10-1) \text{ dBm} - \text{System Loss (dB)}$$

$$\text{Max DUT Input Power (dBm)} = 9\text{dBm} - \text{System Loss (dB)}$$

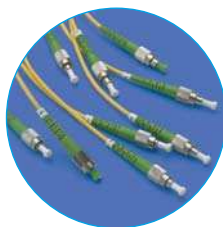
#### WDM example

Using the standard combiner (opt 150), equally spaced DFB lasers (81662A) powered at 1dB below max:

$$\text{Max DUT Input Power (dBm)} =$$

$$(10-1)\text{dBm} + 10 \log (\text{number of DFBs}) - 4.0 \text{ dB max WDM loss} - 1.5\text{dB WDM flatness (dB)} - \text{System Loss (dB)}$$

$$\text{Max DUT Input Power (dBm)} = 3.5\text{dBm} + 10 \log (\text{number of DFBs}) - \text{System Loss (dB)}$$



[www.agilent.com](http://www.agilent.com)

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

**Online assistance:**

[www.agilent.com/find/assist](http://www.agilent.com/find/assist)

**Phone or Fax**

**United States**

(tel) 800 452 4844

**Canada**

(tel) 877 894 4414

(fax) 905 282 6495

**China**

(tel) 800 810 0189

(fax) 800 820 2816

**Europe**

(tel) (31 20) 547 2323

(fax) (31 20) 547 2390

**Japan**

(tel) 426 56 7832

(fax) 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) 0800 047 866

(fax) 0800 286 331

**Other Asia Pacific Countries**

(tel) (65) 6375 8100

(fax) (65) 6836 0252

Email: [tm\\_asia@agilent.com](mailto:tm_asia@agilent.com)

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

Microsoft, Windows, and WIndows NT are U.S. registered trademarks of Microsoft Corp.

**Agilent Email Updates**

[www.agilent.com/find/email\\_updates](http://www.agilent.com/find/email_updates)

Get the latest information on the products and applications you select.

© Agilent Technologies, Inc. 2002

Printed in USA, September 15, 2002

Part number #5988-7760EN