

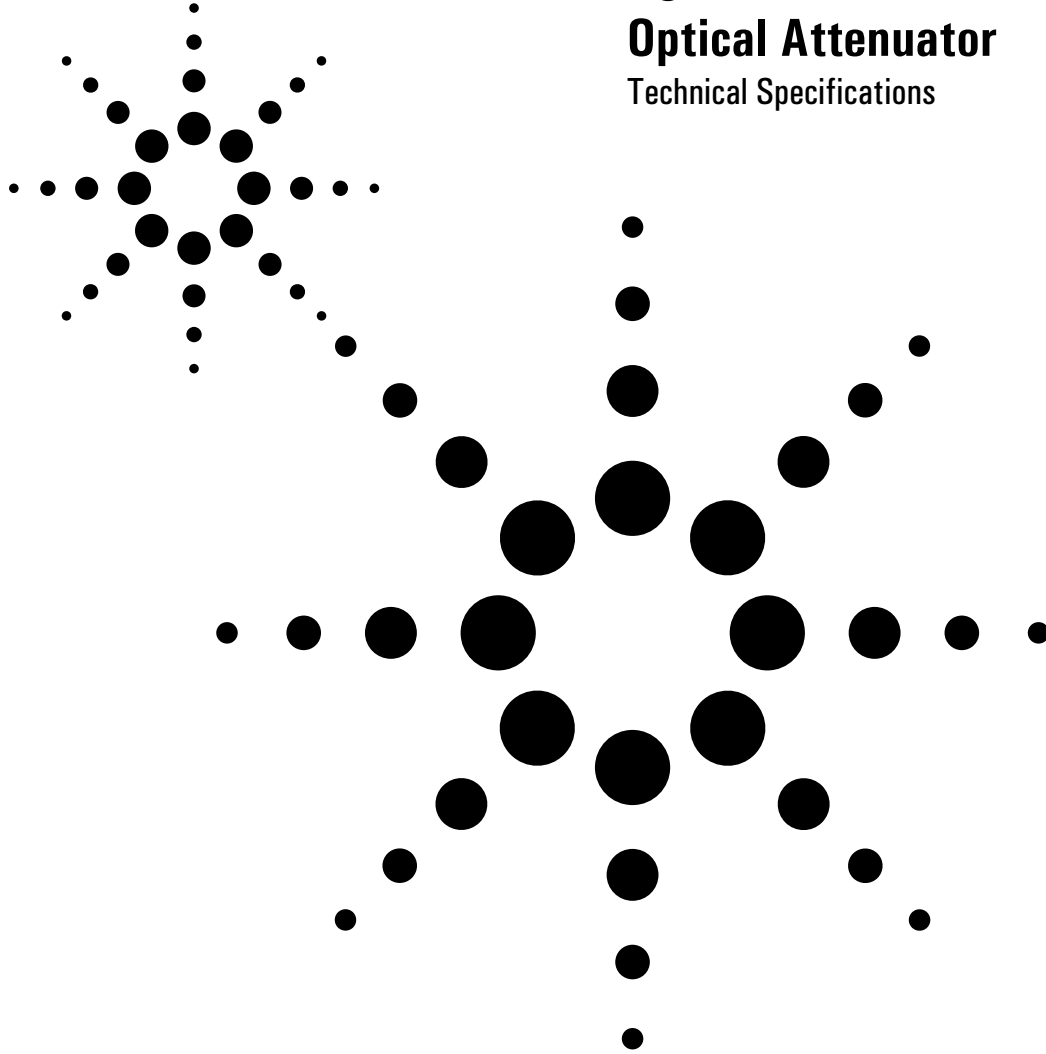


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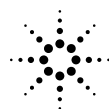
## **Agilent 8156A**

### **Optical Attenuator**

Technical Specifications



The Agilent 8156A is produced to the ISO 9001 international quality system standard as part of Agilent's commitment to continually increasing customer satisfaction through improved quality control.



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Specifications describe the instrument's warranted performance.

They are measured at 1310 nm and 1550 nm using a Fabry Perot laser source, single-mode fiber and Agilent 81000AI or Agilent 81000SI connector interfaces.

### Optical Attenuator Specifications - Standard Options

	Agilent 8156A #100	Agilent 8156A #101	Agilent 8156A #201
<b>Wavelength range</b>	1200 - 1650 nm		
<b>Attenuation range</b>	60 dB (excluding insertion loss)		
<b>Fiber type</b>	9/125 $\mu$ m single-mode		
<b>Connector type</b>	straight contact		angled contact
<b>Return loss<sup>(1)</sup></b>	> 35 dB	> 45 dB	> 60 dB
<b>Insertion loss (typ.)<sup>(2)</sup></b>	4.5 dB	2.5 dB	
<b>Attenuation accuracy (linearity)<sup>(3)</sup> typical</b>	< $\pm 0.2$ dB <sup>(4)</sup> < $\pm 0.1$ dB <sup>(4)</sup>	< $\pm 0.1$ dB < $\pm 0.05$ dB	
<b>Repeatability typical</b>	< $\pm 0.01$ dB < $\pm 0.005$ dB		
<b>Polarization dependent loss (PDL) typical</b>	< 0.15 dB <sub>pp</sub> < 0.075 dB <sub>pp</sub>	< 0.08 dB <sub>pp</sub> < 0.02 dB <sub>pp</sub>	
<b>Polarization mode dispersion (PMD)</b>	4 fs		
<b>Useful back reflection range</b>	9.0 - 35 dB	5.0 - 45 dB	5.0 - 60 dB

<sup>(1)</sup> Typical, depends on performance of external connector.

<sup>(2)</sup> Includes insertion loss of two HMS-10 connectors. Typical variation over temperature range < 0.3 dB<sub>pp</sub>.

<sup>(3)</sup> Measured at constant temperature.

<sup>(4)</sup> With narrow linewidth lasers, such as DFB lasers, power fluctuations up to 0.2 dB<sub>pp</sub> may occur.

### Ordering Information

Two connector interfaces are required for each Agilent 8156A.

**Agilent 8156A** optical attenuator mainframe (non-modular).

#### Options

**100** standard performance version.

**101** high performance version.

**201** high performance, high return loss version.

**202** back reflector kit for option 201 and option 221 (consists of 1 ea Agilent 81000SI, Agilent 81000FI, Agilent 81113PC, Agilent 81000UM, Agilent 81000BR).

**OB2** additional operating manual.

Specifications describe the instrument's warranted performance. They are measured at 1310 nm and 1550 nm using a Fabry Perot laser source, single-mode fiber and Agilent 81000AI or Agilent 81000SI connector interfaces.

### Optical Attenuator Specifications - Monitor Output Options

	Agilent 8156A #121	Agilent 8156A #221
Wavelength range	1200 - 1650 nm	
Attenuation range	60 dB (excluding insertion loss)	
Fiber type	9/125 $\mu$ m single-mode	
Connector type	straight contact	angled contact
Insertion loss (typ.) <sup>(1)</sup>	3.3 dB	3.3 dB
Return loss <sup>(2)</sup>	> 45 dB	> 60 dB
Attenuation accuracy (linearity) <sup>(3)</sup> typical	< $\pm$ 0.1 dB < $\pm$ 0.05 dB	< $\pm$ 0.1 dB < $\pm$ 0.05 dB
Repeatability typical	< $\pm$ 0.01 dB < $\pm$ 0.005 dB	< $\pm$ 0.01 dB < $\pm$ 0.005 dB
Polarization dependent loss (PDL) typical	< 0.1 dB <sub>pp</sub> < 0.03 dB <sub>pp</sub>	< 0.1 dB <sub>pp</sub> < 0.03 dB <sub>pp</sub>
Polarization mode dispersion (PMD)	6 fs	6 fs
Monitor output (typ.)	13 dB tap (1:20)	
Useful back reflection range	6.6 - 45 dB	6.6 - 60 dB

<sup>(1)</sup> Includes insertion loss of two HMS-10 connectors. Typical variation over temperature range < 0.3 dB<sub>pp</sub>.

<sup>(2)</sup> Typical, depends on performance of external connector.

<sup>(3)</sup> Measured at constant temperature.

### Ordering Information

Three connector interfaces are required for each Agilent 8156A.

**Agilent 8156A** optical attenuator mainframe (non-modular).

#### Options

**121** high performance version, monitor output.

**221** high performance, high return loss version, monitor output.

**203** back reflector kit for option 201 and option 221 (consists of 1 ea Agilent 81000SI, Agilent 81000FI, Agilent 81113PC, Agilent 81000UM, Agilent 81000BR).

**OB2** additional operating manual

Specifications describe the instrument's warranted performance. They are measured at 1300 nm using an LED source, multi-mode fiber and Agilent 81000AI connector interface.

### Optical Attenuator Specifications - Multimode Option

	<b>Agilent 8156A #350</b>
<b>Wavelength range</b>	1200 - 1650 nm
<b>Attenuation range</b>	60 dB (excluding insertion loss)
<b>Fiber type</b>	50/125 $\mu$ m multimode
<b>Connector type</b>	straight contact
<b>Insertion loss (typ.)<sup>(1)</sup></b>	3 dB
<b>Return loss<sup>(2)</sup></b>	22 dB
<b>Attenuation accuracy (linearity)<sup>(3)</sup></b>	< $\pm 0.1$ dB
<b>Typical</b>	< $\pm 0.08$ dB
<b>Repeatability</b>	< $\pm 0.01$ dB
<b>Typical</b>	$\pm 0.005$ dB

<sup>(1)</sup> Includes insertion loss of two HMS-10 connectors.

<sup>(2)</sup> Typical, depends on performance of external connector.

<sup>(3)</sup> Measured at constant temperature.

### Ordering Information

Two connector interfaces are required for each Agilent 8156A.

**Agilent 8156A** optical attenuator mainframe (non-modular).

#### Options

**350** 50/125 m multimode option.

**OB2** additional operating manual.

## Supplementary Performance Characteristics

**Minimum Attenuation Step:** 0.001 dB.

**Settling Time:** 20 ms to 400 ms (depending on actual setting).

**Maximum Input Level:** 23 dBm (200 mW).

### Operating Modes

**Attn:** Attenuation is displayed and can be varied.

$\lambda$ : Entering of wavelength for automatic correction of attenuation using typical correction values.

**Cal:** Offset factor to adjust display within 99.99 dB range.

**Disp** → **Cal:** Sets displayed attenuation value to 0.00 dB.

**Sweep:** Manual or automatic up and down sweep of attenuation. Start, stop, stepsize, and dwell time (not in manual mode) can be entered.

**Back Reflect:** For entering desired return loss (back reflection level). Return loss is displayed and can be varied within insertion loss and return loss of connector used. Requires Agilent 81000BR backreflector.

**Enable/Disable:** Optical signal path interrupted with shutter (> 80 dB blocking).

**Store/Recall:** 9 user-selectable parameter settings may be stored and recalled. Recall of default setting.

## General

**Recalibration period:** 1 year.

**Warm-up time:** not required if previously stored within operating temperature range.

**GPIB Capability:** all modes and parameters can be programmed, SCPI command set, Agilent 8157A compatibility mode.

**GPIB Interface Function Code:** SH1, AH1, T6, L4, SR1, RL1, PPO, DC1, DTO, CO.

## Environmental

**Storage temperature:** -40°C to +70°C.

**Operating temperature:** 0°C to +55°C.

**Humidity:** < 95% R.H. from 0°C to +40°C.

**Power:** 100/120/220/240 Vrms, 10%, 90 VA max., 48 – 400 Hz.

**Battery Back-up** (for non-volatile memory): with instrument switched off all current modes and data will be maintained for at least 10 years after delivery.

### Dimensions:

89 mm H, 212.3 mm W, 345 mm D (3.5" x 8.36" x 13.6").

**Weight:** net 5.3 kg (11.7 lbs), shipping 9.6 kg (21.2 lbs).

**Related Literature**

8156A Optical Attenuator  
Configuration Guide  
p/n 5963-3367E

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