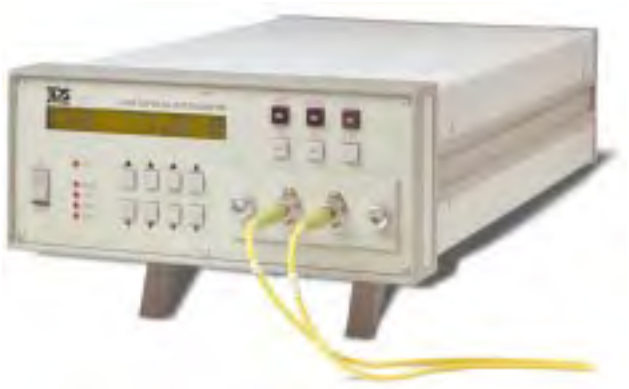
HA9 Series Extended Range Programmable Optical Attenuators



Description

The HA9 Series programmable attenuators give extended attenuation range (100 dB) and high resolution (0.01 dB) for testing power meters and for general test and laboratory work.

The linear design of the HA9 attenuator, combined with built-in calibration and offset functions, allows the user to match the display of the HA9 attenuator to an optical power meter over a wide power range. This combination is very useful in tests requiring control of the absolute optical power into a test device. In addition, a built-in beam blocking switch allows fast access from any attenuation setting to infinite attenuation (blocking attenuation is >110 dB).

The standard operating wavelength range of the HA9 Series attenuators is 1200 to 1700 nm. An optional wavelength range of 750 to 1700 nm with reduced attenuation range is available.

Single-mode HA9 Series attenuators with an analog option are specifically designed for use in demanding applications, such as multichannel AM systems and high bit-rate digital pulse code modulation (PCM) systems. Discrete internal optical reflections are minimized to better than -60 dB, and etalon cavity effects are virtually eliminated.

Optional built-in couplers or switches are available to provide an output tap or to access two inputs or outputs.

Units with front-panel mounted PC or APC universal connector adapters (UCAs) are available. These models support FC/PC, SC/PC, and ST/PC, or FC/APC and SC/APC connector types.

The HA9 Series has a SCPI/HP 8156A compatible command set and can be controlled either from the front panel keypad or by parallel IEEE 488.2 or serial RS232C interfaces and LabVIEW drivers are supplied to facilitate remote control. Software compatibility is maintained with the HP 8157A attenuator. A rear panel 5 V output is available to act as a driver for an external 1x1 (on/off), or 1x2 fiberoptic switch.

The HA9 Series conforms to the European Community directives 89/336/EEC and 73/23/EEC for electromagnetic compatibility and safety.

Key Features

- 0 to 100 dB range
- 0.01 dB resolution and repeatability
- 1200 to 1700 nm or 750 to 1700 nm wavelength ranges
- Single-mode or multimode fiber
- Built-in beam blocking switch
- IEEE 488.2 and RS232C interfaces
- SCPI compatible command set
- UCA option
- Optional couplers or switches
- LabVIEW drivers

Applications

- Testing erbium doped fiber amplifiers (EDFAs)
- Testing and/or calibrating the linearity of power meters
- Measuring bit error rate curves
- Measuring the dynamic range of receivers
- Simulating loss

Specifications

Parameter		Standard	Wide
Wavelength range		1200 to 1700 nm	750 to 1700 nm
Attenuation	range	100 dB	≥60 dB[1]
	resolution	0.01 dB nominal	
	repeatability[2]	±0.005 dB typical, ±0.01 dB maximum	
	change rate	≤2.5 seconds, 0 to 100 dB	≤2.5 seconds, 0 to 60 dB
	accuracy[3]	±0.03 dB typical, ±0.1 dB maximum	
Insertion loss[4,5]	SM	1.2 dB typical, 1.5 dB maximum	≤5.0 dB[6]
	MM, 50/125	≤2.2 dB	≤3.2 dB[6]
	MM, other	≤2.9 dB	≤3.9 dB[6]
Return loss[4,5]	SM	>45 dB	
	SM, analog	>60 dB[7]	
	MM, 50/125	>35 dB	
	MM, other	>30 dB	
Maximum optical input power		200 mW	
Recalibration period (recommended)		2 years	
Polarization dependent loss[4,5]		0.03 dB typical, 0.08 dB maximum	
Beam block attenuation		>110 dB	
Beam block speed		<20 ms	
Input voltage		100 to 240 V AC, 50 to 60 Hz	
Power consumption		80 VA maximum	
Weight		4 kg	
Dimensions	(WxHxD)	21.2 x 8.9 x 35.5 cm	
	19 inch (48.26 cm) rack mounting	2U high, 1/2 rack width, compatible with HP 8156A attenuator	
Operating temperature		0 to 40 °C	
Storage temperature		-40 to 60 °C	
Humidity range		95% up to 40 °C decreasing 5% per °C from 40 to 60 °C	

1. The attenuation range is a continuous function of wavelength.
2. At constant temperature, wavelength, and polarization state after half hour warm-up.
3. With optimization of the calibration wavelength or user slope. If optimization is not performed, accuracy is the greater of ±0.1 dB or ±0.004 dB/dB from 1260 to 1360 nm and from 1450 to 1570 nm. At other wavelengths, the accuracy is the greater of ±0.1 dB or ±0.015 dB/dB if optimization is not performed.
4. Measured at 23 °C with a laser source.
5. Not including connectors, switch, or coupler (if installed).
6. Over 850 to 1600 nm. Insertion loss is typically highest at wavelength extremes.
7. Total of discrete reflections; does not include distributed reflection in fiber.

Ordering Information

Indicate your requirements by selecting one option from each configuration table. Please print the corresponding codes in the available boxes to form your part number. For more information on this or other products and their availability, please contact your local JDS FITEL sales representative or JDS FITEL directly at (613)727-1303, or by fax at (613)727-8284 or via e-mail at sales@jdsfitel.com.

HA9 □ □ +1 □ □ □ □ □

Sample: HA97E+10ASU1

Code	Fiber Type (µm)
1	50/125
2	62.5/125
4	100/140
7	9/125

Code	Wavelength Range
C	750 to 1700 nm
E	1200 to 1700 nm

Code	Built-in Options
0	None
1	50/50 coupler
4	2/98 coupler
5	30/70 coupler
8	1:2 switch
9	10/90 coupler

Code	Return Loss (>)
K	Low (45 dB)
A	Analog (60 dB)

Code	Connector Type
NC	No connector
FP	FC/HPC
FA	FC/APC
SC	SC/HPC
SU	SC/APC
SP	ST/HPC

Code	Port Type
1	Bulkheads on front
2	Bulkheads on back
3	Pigtails on front
4	Pigtails on back
7	UCA bulkheads on front

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