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Programmable Attenuator

The JDS Uniphase Programmable Attenuator is a high-resolution, extended-range, programmable attenuator ideal for testing power meters and for general test and laboratory work. The attenuator has a nominal resolution of 0.01 dB (0.001 dB for the HA1 series) and an extended attenuation range of 100 dB. The standard operating wavelength is 1200-1700 nm (750-1700 nm is available to use with a reduced attenuation range of 60 dB for the HA9W attenuator).

The HA1 attenuator is a single-mode, ultra-high resolution, and programmable attenuator ideal for bit error rate testing and general laboratory work.

The new JDS Uniphase HA2 Programmable Attenuator provides a wavelength dependence of ± 0.05 dB and input power up to 1 W (30 dBm). The HA2 is suitable for a variety of applications including amplifier testing and DWDM system characterization.

HA attenuators are ideal for use in such demanding applications 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 cavity effects are virtually eliminated. All HA attenuators are offered with high return loss and low spectral ripple for CATV AM systems.

The inherently linear design of these attenuators, combined with built-in calibration and offset functions, allows the user to match the display to an optical power meter over a wide power range. This feature is useful in tests requiring control of the absolute optical power source for the test device. The built-in beam blocking switch provides fast access from any attenuation setting to infinite attenuation (> 90 dB).



Key Features & Benefits

100 dB range

0.01 or 0.001 dB resolution

0.01 dB repeatability

Accuracy of ± 0.1 dB

Typical polarization dependent loss (PDL) of 0.03 dB

1200-1700 nm or 750-1700 nm wavelength ranges

Built-in beam block

GPIB and RS232 remote control

Single-mode or multimode fiber

SCPI compatible command set

Optional couplers or switches

High power input of 1000 mW

Wavelength dependence of less than ± 0.05 dB over 1530-1625 nm range

Complies to CE requirements plus UL3101-1 and CAN/CSA-C22.2 No. 1010.1

Applications

Precise optical power control

Power meter linearity calibration

Analog transmission tests

Bit error rate tests

Loss simulation in fiberoptic links EDFA output power characterization

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Front panel access provides the option of increasing functionality through the addition of other devices, such as couplers or switches. The 5 V driver key on the front panel (connected to the 5 V driver on the back) acts as a toggle for an external or internal (if installed) switch.

The HA9 and HA1 attenuators can be fitted with 2/98, 10/90, 30/70, or 50/50 couplers. Optional built-in couplers or switches provide an output tap or access to two inputs or outputs. Both models have a SCPI/HP8156A compatible command set and can be controlled from the front panel keyboard or by the GPIB or RS232 interfaces.

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Specifications

PARAMETER	HIGH RESOLUTION HA1	HIGHLY CONFIGURABLE HA9	WIDE WAVELENGTH RANGE HA9W	FLEXCOR[1] FIBER HA9P	HIGH POWER AND WAVELENGTH FLAT HA2
Operating wavelength range	1200-1700 nm	1200-1700 nm	750-1700 nm	980-1100 nm	1280-1670 nm
Attenuation[2] range	100 dB	100 dB	60 dB	60 dB	50 dB
resolution	0.001 dB	0.01 dB	0.01 dB	0.01 dB	0.01 dB
repeatability[3]	± 0.01 dB	± 0.01 dB	± 0.01 dB	± 0.01 dB	± 0.01 dB
change rate	< 2.5 s	< 2.5 s	< 1.5 s	< 1.5 s	< 1.5 s
	0-100 dB	0-100 dB	0-60 dB	0-60 dB	0-50 dB
accuracy[4]	± 0.1 dB	± 0.1 dB	± 0.1 dB	± 0.1 dB	± 0.1 dB
Insertion loss[5,6,7] single-mode (SM)	< 1.5 dB	< 1.5 dB	< 5.0 dB	NA	< 1.0 dB[8]
multimode (MM), 50/125µm	NA	< 2.2 dB	< 3.2 dB	NA	NA
MM, other	NA	< 2.9 dB	< 3.9 dB	NA	NA
Flexcor[1] 1060	NA	NA	NA	< 2.5 dB	NA
Return loss[5,6] SM	NA	> 45 dB	> 45 dB	NA	NA
SM, analog[8]	> 60 dB	> 60 dB	> 60 dB	NA	> 50 dB
MM, 50/125 µm	NA	> 35 dB	> 35 dB	NA	NA
MM, other	NA	> 30 dB	> 30 dB	NA	NA
Flexcor 1060	NA	NA	NA	> 60 dB	NA
Wavelength dependence[5,10]	NA	NA	NA	NA	± 0.05 dB (0-20 dB attenuation)
(1530-1625 nm)					± 0.10 dB (20-30 dB attenuation)
Maximum optical input power	200 mW	200 mW	200 mW	200 mW	1000 mW
Recalibration period (recommended)	2 years				
Polarization dependent loss[5,6]	0.03 dB typical, 0.08 dB maximum				
Beam block attenuation	> 90 dB				
Input voltage	90-240 V AC, 50-60 Hz				
Power consumption	80 VA maximum				
Dimensions W x H x D	21.2 x 8.9 x 35.5 cm 19-inch (48.26 cm) rack-mounting 2U high				
Weight	4 kg				
Operating temperature	0 to 40 °C				
Storage temperature	- 40 to 60 °C				
Humidity	maximum 90 % up to 40 °C				

1. Flexcor is a trademark of Corning Incorporated
2. The attenuation range is a continuous function of wavelength.
3. At constant temperature, wavelength, and polarization state after half hour warm-up.
4. Up to 60 dB of attenuation for single-mode and 45 dB of attenuation for mulitmode. Maximum specification at calibrated wavelength ±15 nm. Outside these wavelength ranges, the typical accuracy is the greater of ± 0.1 dB or ± 0.003 dB.
5. Measured at 23 °C with a laser source.
6. Not including connectors, switch, or coupler (if installed).
7. Over 850-1600 nm. Insertion loss is typically highest at wavelength extremes.
8. Total of discrete reflections. Does not include distributed reflection in fiber.
9. From 1375-1670 nm, <1.5 dB from 1280 to 1375 nm.
10. Relative to reference 0 dB setting.

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Ordering Information

Sample Order: HA097+28KFA1

HA ☐ ☐ ☐ +2 ☐ ☐ ☐ ☐ ☐

code	model
01	HA1 (high resolution, 1200-1700 nm)
02	HA2 (high power, wavelength flat)
09	HA9 (1200-1700 nm)
9P	HA9P (Flexcor 1060, 980-1100 nm)
9W	HA9W (750-1700 nm)

code	fiber type (µm)
1	50/125 (HA9 and HA9W only)
2	62.5/125 (HA9 and HA9W only)
7	9/125
8	Flexcor 1060 (HA9P only)

code	built-in options
0	None
1	50/50 coupler (HA1 and HA9 only)
4	2/98 coupler (HA1 and HA9 only)
5	30/70 coupler (HA1 and HA9 only)
8	1:2 switch (HA1 and HA9 only)
9	10/90 coupler (HA1 and HA9 only)

code	port type
1	Bulkheads on front
2	Bulkheads on back
3	Pigtails on front
4	Pigtails on back

code	connector type (all ports)
NC	No connector
FP	FC/PC
FA	FC/APC
SC	SC/PC
SU	SC/APC
SP	ST/PC

code	return loss
K	Standard
A	Analog

Indicate your requirements by selecting one option from each configuration table. Print the corresponding codes in the available boxes to form your part number.



If the configurations available do not meet your performance requirements, please contact our global sales and customer service team to discuss the potential for specialized solutions.

1. Flexcor is a registered trademark of Corning Incorporated.
UL is a registered trademark of Underwriters Laboratories Inc.
ST is a registered trademark of Lucent Technologies.

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