

High Power Inline Variable Fiber Attenuator 0.1-10dB USB/RS232

(up to 100W high power, all fiber types,) Bidirectional



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Features

- Lossless
- Broadband
- High Power
- All Fiber Types
- Up To 20W

Applications

- Instrument
- Laboratory
- High Power Fiber
- Lasers



This all-fiber variable optical attenuator (VOA) provides near-lossless transmission in its open (transparent) state while enabling electrically controlled attenuation up to 10 dB and handling optical power levels as high as 10 W. It operates by applying precise bending stress to the fiber using a motorized mechanism, allowing controlled attenuation without significantly degrading signal quality, and is designed to maintain a high polarization extinction ratio even under stress. The device offers ultra-broadband performance that preserves the fiber's intrinsic transmission characteristics and is compatible with various fiber types. It is typically used in feedback control systems with an output tap monitor for precise power regulation, and because generated heat is transferred to the metal base, it must be mounted on an appropriate heat sink for safe and stable operation. A small core fiber may only achieve attenuation of less than 5dB.

Specifications

Parameter	Min	Typical	Max	Unit
Wavelength	300		5000	nm
Insertion Loss ^[1]	0.00	0.01	0.1	dB
Attenuation Resolution		Continuous		dB
Attenuation Range ^[2]	0		12	dB
Polarization Dependent Loss		0.02	0.1	dB
Stability ^[3]		2		dB
Return Loss	60			dB
Response Time			300	ms
Power Handling			10	W
DC Power Voltage		12		V
Power Consumption		0.5		W
Operating Temperature	-10		70	°C
Storage Temperature	-40		85	°C

Notes:

- [1]. Excluding connectors. Each connector add 0.3dB loss and 2dB ER reduction for PM fiber
[2]. SM 9/125 fiber. Other type fiber may differ
[3]. Measured at 5dB attenuation, low attenuation is more stable

Note: The specifications provided are for general applications with a cost-effective approach. If you need to narrow or expand the tolerance, coverage, limit, or qualifications, please [click this link](#):

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Rev 06/12/26

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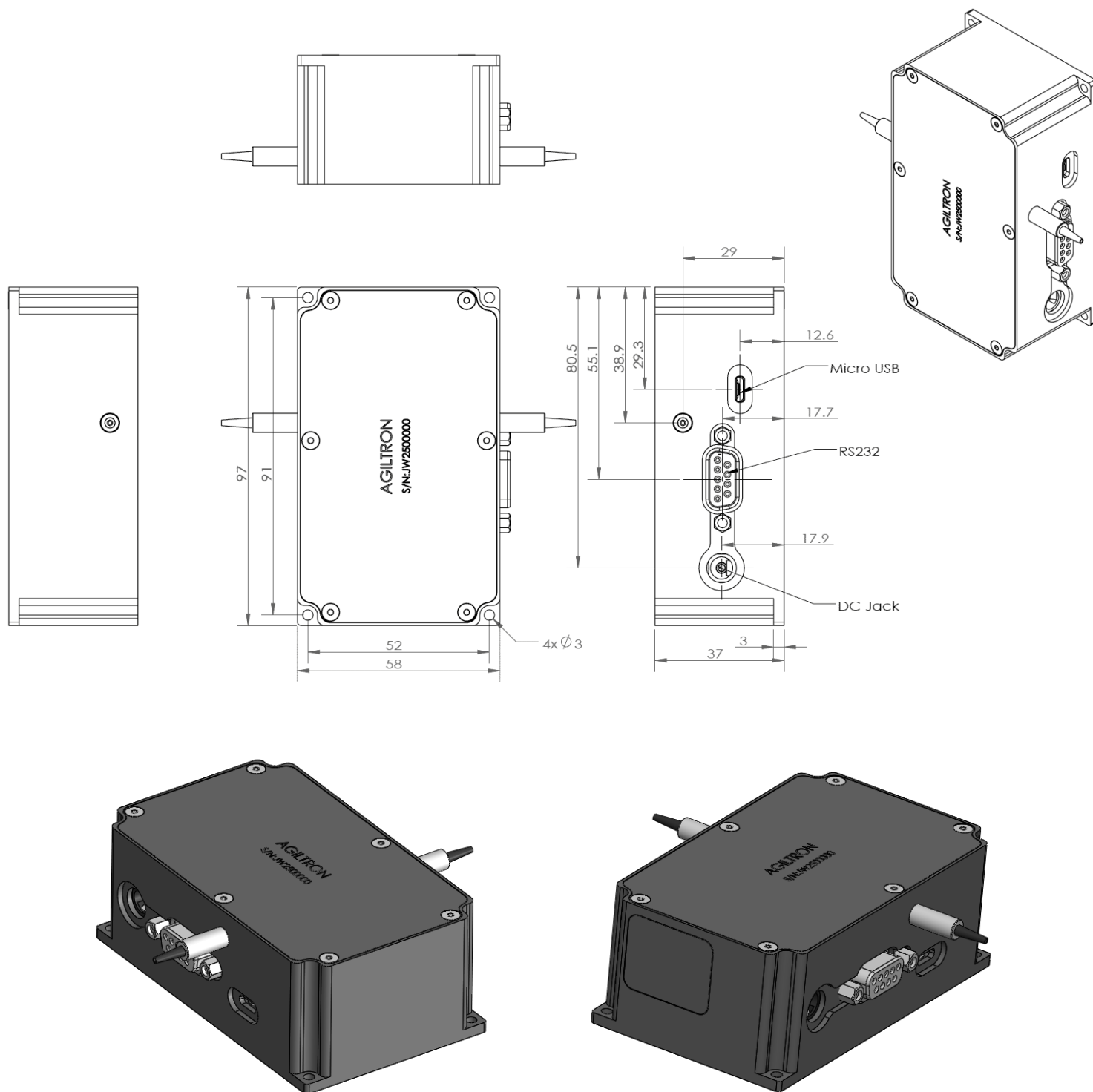
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Mechanical Dimensions (mm)



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Ordering Information (Part Number)

	11	1	☐	☐	☐	☐	☐
Prefix	Configuration	Type	Test Wavelength ^[1]	Fiber Type	Fiber Cover	Fiber Length	Connector ^{[2][3]}
HPVO-		Normally Open = 1	450 = 4 532 = 5 630 = 6 780 = 7 850 = 8 980 = 9 1060 = 1 1310 = 3 1550 = C 2000 = 2 Special = 0	Select from the table below	900um tube = 3 3mm tube = 4 Special = 0	0.25m = 1 0.5m = 2 1.0m = 3 Special = 0	None = 1 FC/PC = 2 FC/APC = 3 SC/PC = 4 SC/APC = 5 ST/PC = 6 LC/UPC = 7 Special=0

[1]. The device is ultra-broadband, limited by the fiber transmission.

[2]. High power connector need order specially about \$420 each

Regular fiber connector has PER ~22dB. Connector with PER >27 dB is available using special process

[3]. The default connector configuration uses fiber with 0.9 mm buffer protection. The connector cannot be installed directly onto bare fiber because the bare fiber is prone to damage during shipping. However, the connector can be assembled on bare fiber if a 3 cm protective loose tube is added for reinforcement. The customer may remove this protective tube after testing. The optical power handling of a standard connector is less than 0.5 W for SMF-28 fiber and decreases further for smaller-core fibers.

Fiber Type Selection Table:

01	SMF-28	34	PM1550	71	50/125
02		35	PM1950	72	62.5/125
03		36	PM1310	73	105/125
04		37		74	
05	SM1950	38		75	
06		39		76	
07	780HP	40	PM850		
08	SM800	41	PM980		
09		42			
10	Hi1060	43			
11		44			
12		45			
13		46			

Application Notes

Fiber Core Alignment

Note that the minimum attenuation for these devices depends on excellent core-to-core alignment when the connectors are mated. This is crucial for shorter wavelengths with smaller fiber core diameters that can increase the loss of many decibels above the specification if they are not perfectly aligned. Different vendors' connectors may not mate well with each other, especially for angled APC.

Fiber Cleanliness

Fibers with smaller core diameters (<5 μm) must be kept extremely clean, contamination at fiber-fiber interfaces, combined with the high optical power density, can lead to significant optical damage. This type of damage usually requires re-polishing or replacement of the connector.

Maximum Optical Input Power

Due to their small fiber core diameters for short wavelength and high photon energies, the damage thresholds for device is substantially reduced than the common 1550nm fiber. To avoid damage to the exposed fiber end faces and internal components, the optical input power should never exceed 20 mW for wavelengths shorter 650nm. We produce a special version to increase the how handling by expanding the core side at the fiber ends.

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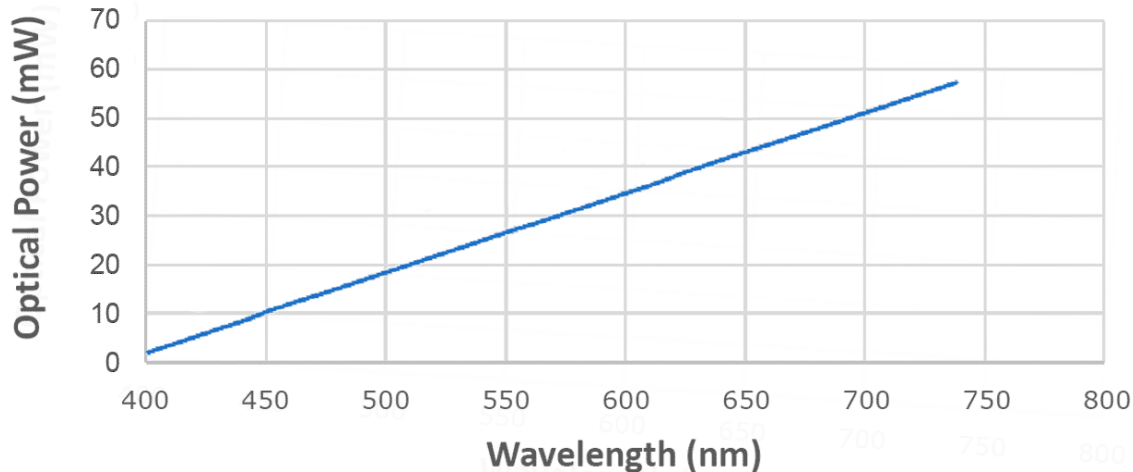
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Optical Power Handling vs Wavelength for Standard SM Fibers



Operation Instructions – Plug and Play

1. Connect the optical fibers.
2. Connect the included power supply.
3. Connect the device to a computer using the provided interface cable.
4. Load the GUI software onto the computer using the supplied memory disk.
5. Launch the GUI; the device will operate according to specifications.

Command List

Control via UART command (in HEX):

The baud rate setting is 115200-N-8-1.

1. Set Attenuation DB num:
0x01 0x12 <DB higher byte> <DB lower byte>
Return: None
Example: 0x01 0x12 0x03 0xE8 -> set device to -10.00 DB
2. Check Current Attenuation Level DB num:
0x01 0x1A 0x00 0x00
Return <Current DB higher byte> <Current DB Lower byte>
Example: 0x01 0x1A 0x00 0x00 RTN: 0x03 0xE8 -> The current DB is set to -10.00 DB
3. Check The Communication with The HPVO:
Explain: This command can be used to check whether the correct COM port is used.
0x01 0x02 0x00 0x00
Return 0x41 0x30

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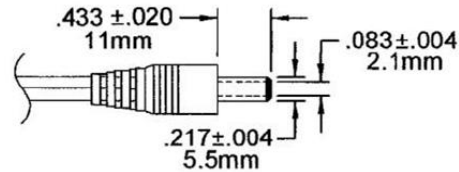
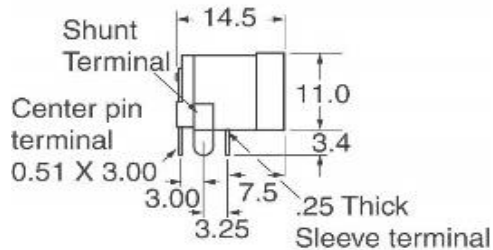
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Power Connector

Power Barrel Connector Jack 2.00mm ID (0.079"), 5.50mm OD (0.217") Through Hole, Right Angle

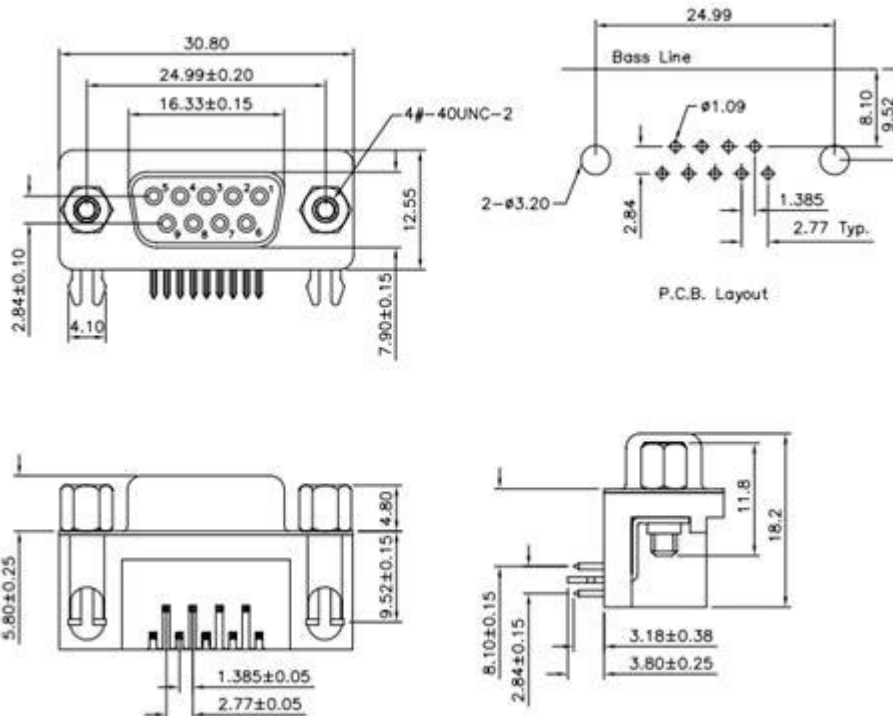


12V Wall Plug DC Power Supply Interface

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RS232 Connector

DB9 (DE-9)



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