Manual Fiber Attenuator Lossless

continuous fiber of lossless, up to 2W, ultra-broadband, up to 30dB, Bidirectional

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The MVOL series All-Fiber Manual Lossless Variable Optical Attenuator (VOA) provides near-lossless transmission in the open (transparent) state by utilizing a continuous, uninterrupted fiber path. Attenuation is introduced by mechanically inducing controlled bending stress on the fiber, eliminating the need for optical coatings or interfaces. For polarization-maintaining fibers, the polarization extinction ratio (PER) decreases from approximately 30 dB to 13 dB in proportion to the applied attenuation. The MVOL VOA is uniquely suited for high optical power applications and delivers ultra-broadband performance while preserving the fiber's intrinsic transmission characteristics. This all-fiber design is compatible with a wide range of fiber types, making it a versatile solution for both research and field use.

Features

- Lossless
- Broadband
- All Fiber Types

Applications

- Instrument
- Laboratory
- Lasers
- System

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]	10		30	dB
Polarization Dependent Loss (SM)		0.02	0.1	dB
Polarization Extinction Ratio (PM) [3]	13	20	30	
Stability [4]			1	dB
Return Loss	60			dB
Power Handling			3	W
Operating Temperature	-10		70	°C
Storage Temperature	-40		85	°C

Notes:

[1]. Connector Loss: Specifications exclude connector losses. Each connector adds approximately 0.3 dB insertion loss and reduces polarization extinction ratio (PER) by 2 dB for PM fibers.

[2]. Maximum Attenuation Limit: The maximum attenuation of 30 dB applies to SMF-28 (9/125 μm) fiber. Other fiber types may exhibit lower maximum values, though generally greater than 10 dB. Do not exceed 30 dB, as excessive bending may damage the fiber.

[3]. PER decreases proportionally with increased attenuation.

[4]. Measured at 10dB attenuation, low attenuation is more stable

RoHS COMPLIANT

Rev 05/08/26

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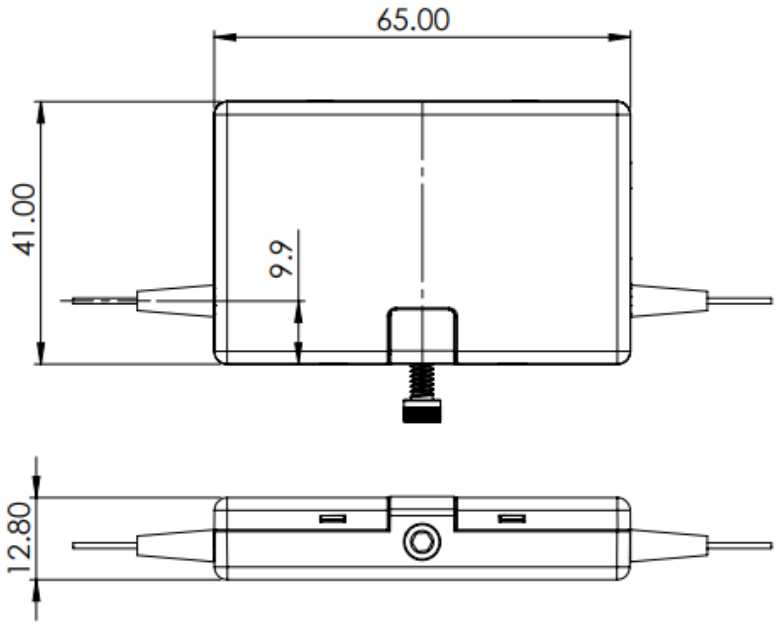
Mechanical Dimensions (mm)



*Product dimensions may change without notice. This is sometimes required for non-standard specifications.

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Ordering Information (Part Number)

	2 2	1	☐	☐☐	☐	☐	☐
Prefix	**Configuration**	**Type**	**Test Wavelength [1]**	**Fiber Type**	**Fiber Cover**	**Fiber Length**	**Connector [2][3]**
MVOL-		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*	Bare fiber = 1 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/PC = 7 LC/APC = A LC/UPC = U Special = 0

[1]. The device is ultra-broadband limited by the fiber transmission. Tests of multiple wavelengths are available at extra cost.

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

[3]. The connector cannot be installed directly onto bare fiber, as it 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 can remove this protective tube after testing. The optical power handling of a standard connector is less than 0.5 W for SM28 fiber and decreases further with smaller core fibers.

Fiber Type Selection Table:

01	**SMF-28**	34	**PM1550**	71	**GIF 50/125 µm**
02		35		72	
03		36		73	
04		37		74	**FG105LCA**
05	**SM1950**	38		75	**FG50LGA**
06	**SM600**	39	**PM630**	76	**STP 50/125**
07	**780HP**	40	**PM850**		
08	**SM800**	41	**PM980**		
09	**SM980**	42	**PM780**		
10	**SM1060**	43			
11		44	**PM405**		
12		45	**PM460**		
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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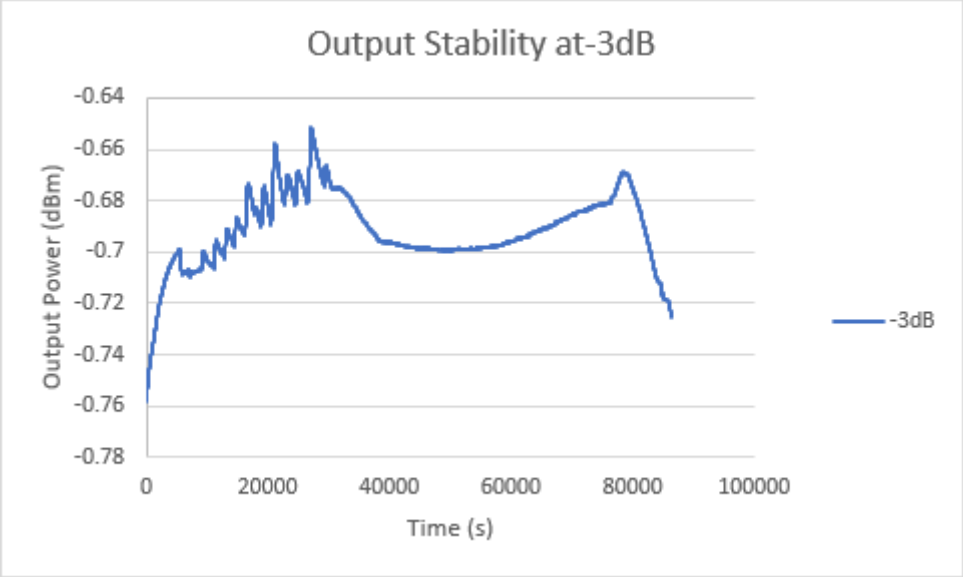
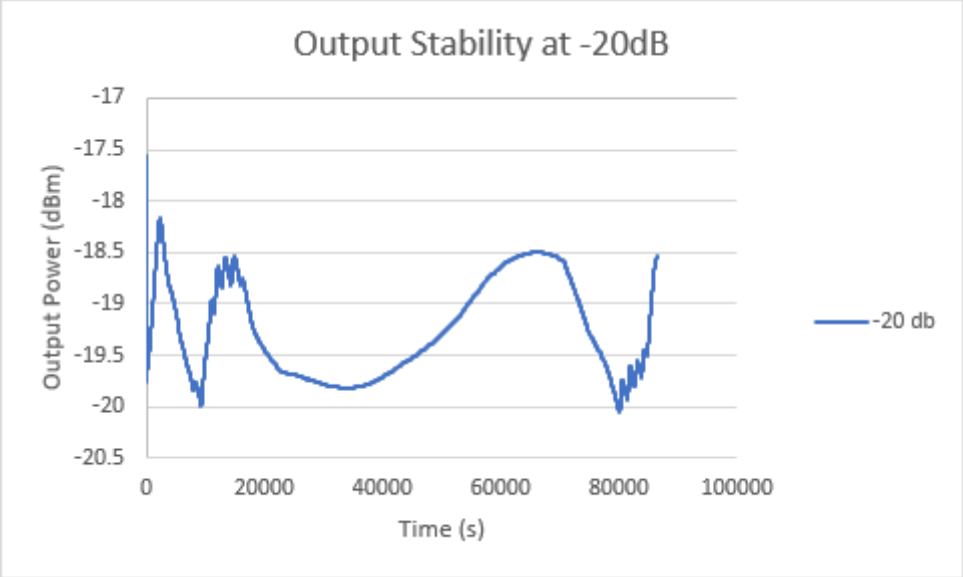
Lossless Manual VOA Stability of 24 Hours





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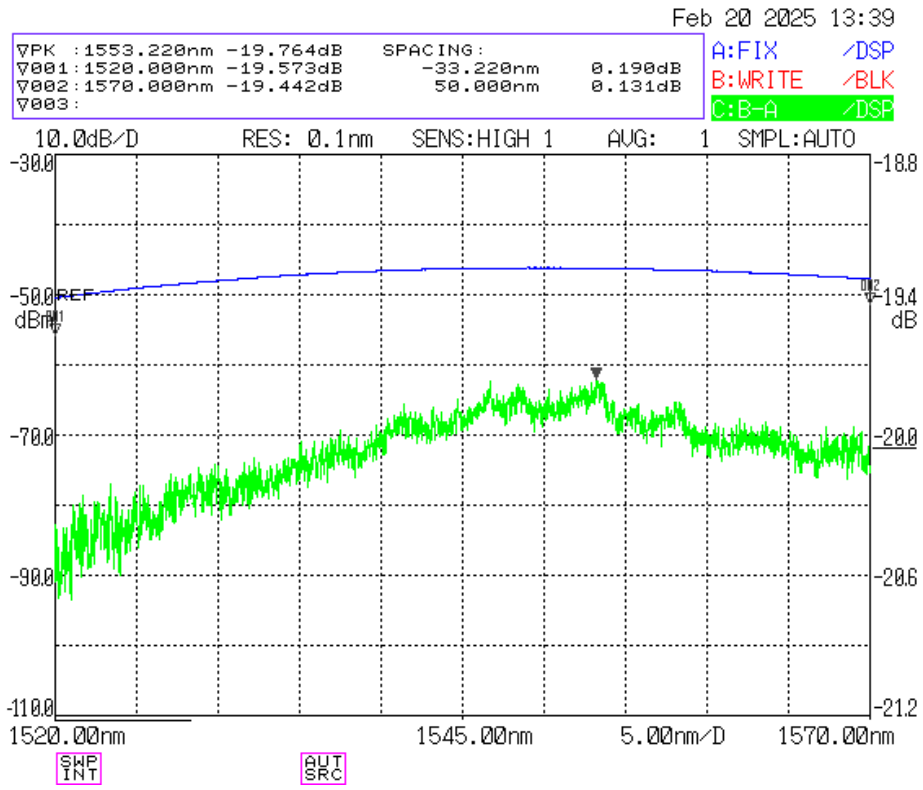
Typical Wavelength Dependence @20dB Attenuation



Optical Power Handling vs Wavelength for Standard SM Fibers