Fiber-Fiber™
Manual Non-Gap Ultra-Broadband VOA
Bidirectional
(Patent pending)

DATASHEET

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The Fiber-Fiber™ Series Manual Variable Optical Attenuator (VOA) delivers industry-leading performance with ultra-low insertion loss and continuous, perturbation-free light transmission. Its ultra-broadband operation is limited only by the transmission characteristics of the optical fiber, enabling exceptionally wide wavelength coverage. The patented Fiber-Fiber™ technology utilizes direct fiber-to-fiber coupling through a self-aligned MEMS platform. A microscopic gap of less than 5 µm between the fiber end faces is filled with a proprietary non-fluorescent, index-matching liquid, creating a nearly lossless optical path without the need for lenses, collimators, or anti-reflection coatings. This unique architecture virtually eliminates Fresnel reflections and minimizes insertion loss while maintaining excellent optical fidelity. Unlike conventional attenuators, the Fiber-Fiber™ design preserves beam quality and polarization characteristics while providing smooth, continuous attenuation. The result is superior performance for applications that are highly sensitive to optical loss, back reflections, and signal perturbations, including spectroscopy, optical coherence tomography (OCT), interferometry, fiber sensing, and precision measurement systems. The Fiber-Fiber™ platform is compatible with virtually all optical fibers having a standard 125 µm cladding diameter, including single-mode (SM), multimode (MM), polarization-maintaining (PM), bend-insensitive, double-clad, and specialty fibers. The design supports both small-core and large-core fiber configurations, providing exceptional flexibility for research, industrial, medical, and aerospace applications.

Features

- Low Insertion Loss
- High Reliability
- Low Cost
- Low power consumption
- Super compact

Applications

- Dynamic gain equalization
- Variable MUX/DeMUX
- Instrumentation

Specifications

Parameter	Min	Typical	Max	Unit
Wavelength	180 [1]		2000	nm
Band Width		Broad band without coating		
Attenuation Resolution		Continuous		dB
Attenuation Range		60	70	dB
Insertion Loss [1]		0.1	0.4	dB
Return Loss		50	60 [2]	dB
Power Handling		500	1000	mW
Operating Temperature		-40 ~ 70		°C
Storage Temperature		-40 ~ 85		°C

Notes:

[1]. Measure with CPR<14 laser source and excluding connectors

[2]. Single Mode, For Multimode, return loss relates to laser condition

RoHS COMPLIANT

Rev 06/25/26

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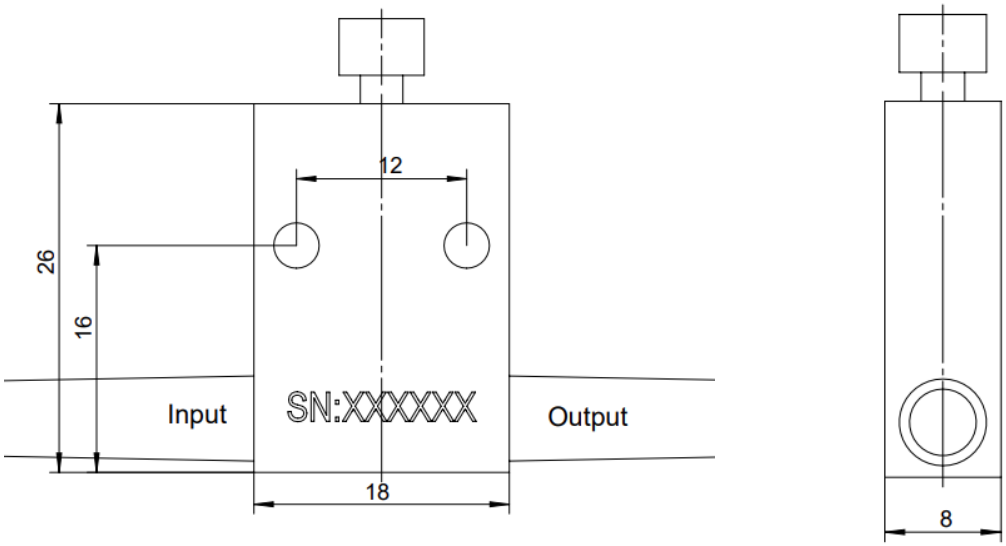
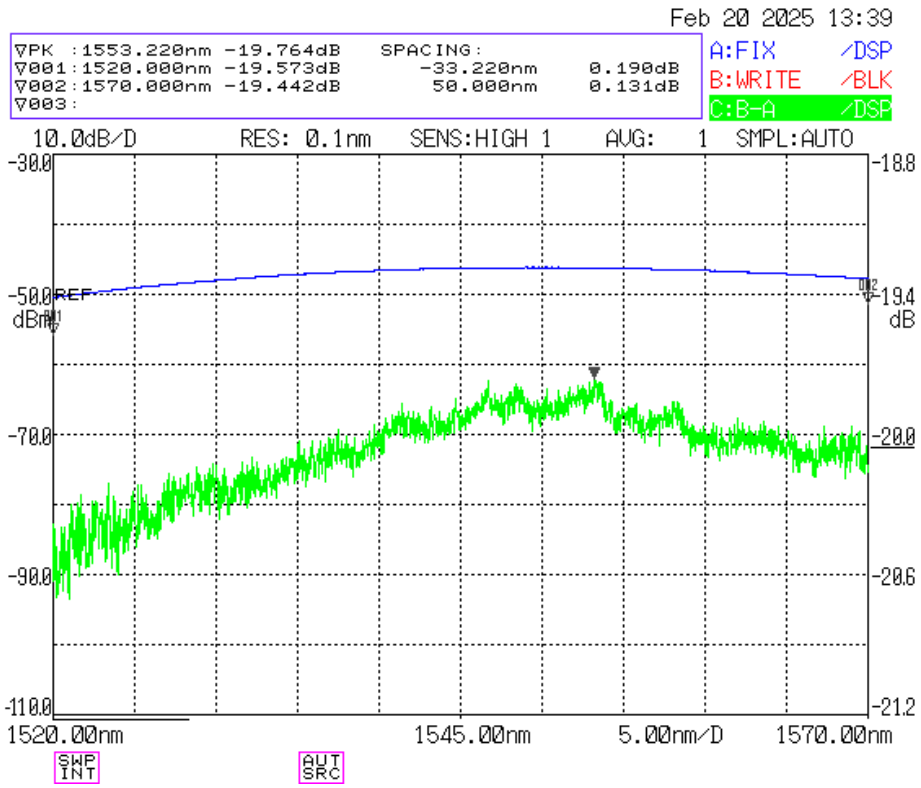
Mechanical Dimensions-Package



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

Typical Wavelength Dependence @20dB Attenuation



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Ordering Information (Part Number)

	FF	1	☐	☐☐	☐	☐	☐
Prefix	**Configuration**	**Type [1]**	**Test Wavelength [2]**	**Fiber Type**	**Fiber Cover**	**Fiber Length**	**Connector [3][4]**
MVOA-	Special = 00 old version 33	Transparent = 1	350 = A 488 = 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/PC = 7 LC/UPC = U Special = 0

[1]. Without adjustment, this device is transparent to the passing light in the normal state.

[2]. The device is ultra-broadband limited by the fiber transmission. However, we only test at one selected wavelength to save cost. If customer needs to test at several wavelengths, the selection is special =0 with added cost.

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

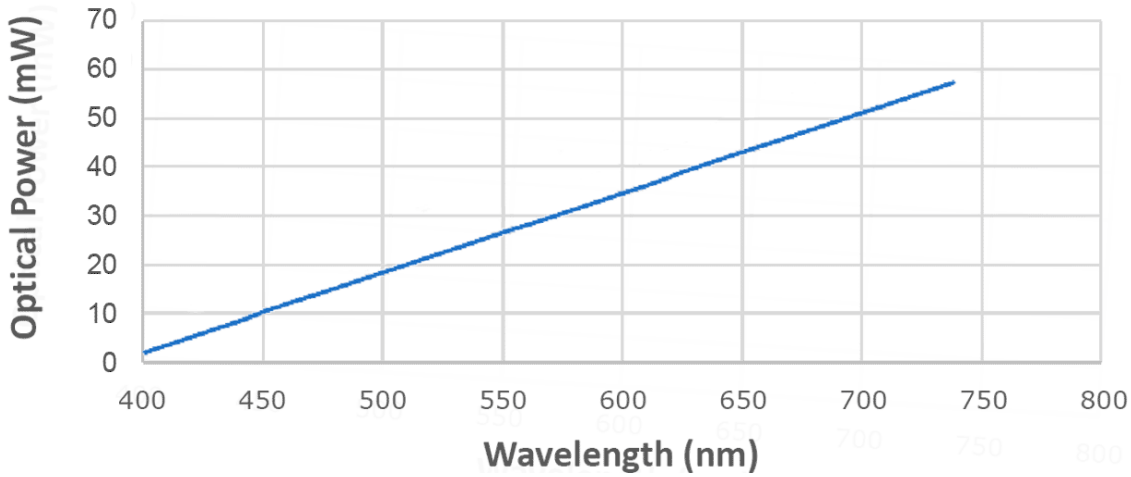
[4]. The default connector configuration uses fiber with 0.9 mm buffer protection. The connector cannot be installed directly onto bare fiber because the bare fiber is prone to damage during shipping. However, the connector can be assembled on bare fiber if a 3 cm protective loose tube is added for reinforcement. 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.

Note:
"**transparent**" means no attenuation without applying a controlling voltage, the "**opaque**" means the highest attenuation without applying a controlling voltage.

Fiber Type Selection Table:

01	**SMF-28**	34	**PM1550**	71	**GIF 50/125 µm**
02	**SMF-28e**	35	**PM1950**	72	**GIF 62.5 µm**
03	**Corning XB**	36	**PM1310**	73	**105/125 µm**
04	**SM450**	37	**PM400**	74	**FG105LCA**
05	**SM1950**	38	**PM480**	75	**FG50LGA**
06	**SM600**	39	**PM630**	76	**FG10LDA**
07	**Hi780**	40	**PM850**		
08	**SM800**	41	**PM980**		
09	**Hi980**	42	**PM780**		
10	**Hi1060**	43	**PM350**		
11		44	**PM405**		
12	**SM400**	45	**PM460**		

Optical Power Handling vs Wavelength for Standard SM Fibers



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.