

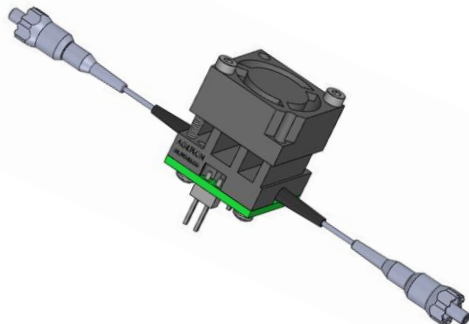
Fiber-Fiber™ MEMS Broadband Optical Attenuator

(Protected by US 11125947 and pending Patents)



DATASHEET

BUY NOW



Features

- Low Insertion Loss
- High Reliability
- Broadband
- High Optical Power

Applications

- Dynamic gain equalization
- Sensor
- Instrumentation

The Fiber-Fiber™ series VOA is based on fiber-to-fiber direct coupling with a micro-electro-mechanical (MEMS) shutter in between. It eliminates the need for lens and optical coating, featuring low loss, ultra-broadband without altering fiber transmission character, high power, compact size, and easy drive. The current MEMS chips accommodate fiber with 3 to 105 μm core diameters. VOAs with fiber of larger diameters can be made with special chip fabrication run with an NRE charge. The Fiber-Fiber™ series VOA is compliant with the Telcordia 1209 and 1221 reliability standards. The VOA is driven by directly applying a low electrical voltage.

The VOA is electrically a resistor load, has no polarity, and is electrostatically insensitive.

Specifications

Parameter	Min	Typical	Max	Unit
Wavelength	380 ^[1]		2000	nm
Band Width	broad same as fiber transmission			
Insertion Loss ^[2]		0.5	1.0	dB
Attenuation Resolution	Continuous			
Attenuation Range ^[3] (Core < 8 μm)	35	40	60	dB
Return Loss	28	30	40	dB
Response Time	5	20	30	ms
Optical Power Handling (CW) ^[6]		300	500	mW
Polarization Extinction Ratio	18	20	30	ms
Driving Voltage (full range) ^[7]		3.5	6	VDC
Power Consumption	0	80 ^[4]	220 ^[5]	mW
Reliability	Telcordia 1209 and 1221			
Operating Temperature	-40 ~ 80			
Storage Temperature	-40 ~ 85			
Fiber Type	50/125, 62.5/125			
Package Dimension	See drawing below			

Notes:

- [1]. Transmission is the same as the fiber without wavelength alternation
- [2]. Measure with CPR<20 laser/LED source and excluding connectors
- [3]. For a larger core, the value is reduced. For Core ~ 105 μm , the max attenuation is about 10dB
- [4]. About 15dB
- [5]. At full attenuation
- [6]. The power handling is related to wavelength: 0.2mW for 380nm, 200mW for 980nm, 500mW for 1060nm
- [7]. The full range voltage is related to the fiber core size, the value for SM28 fiber only

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Rev 05/17/24

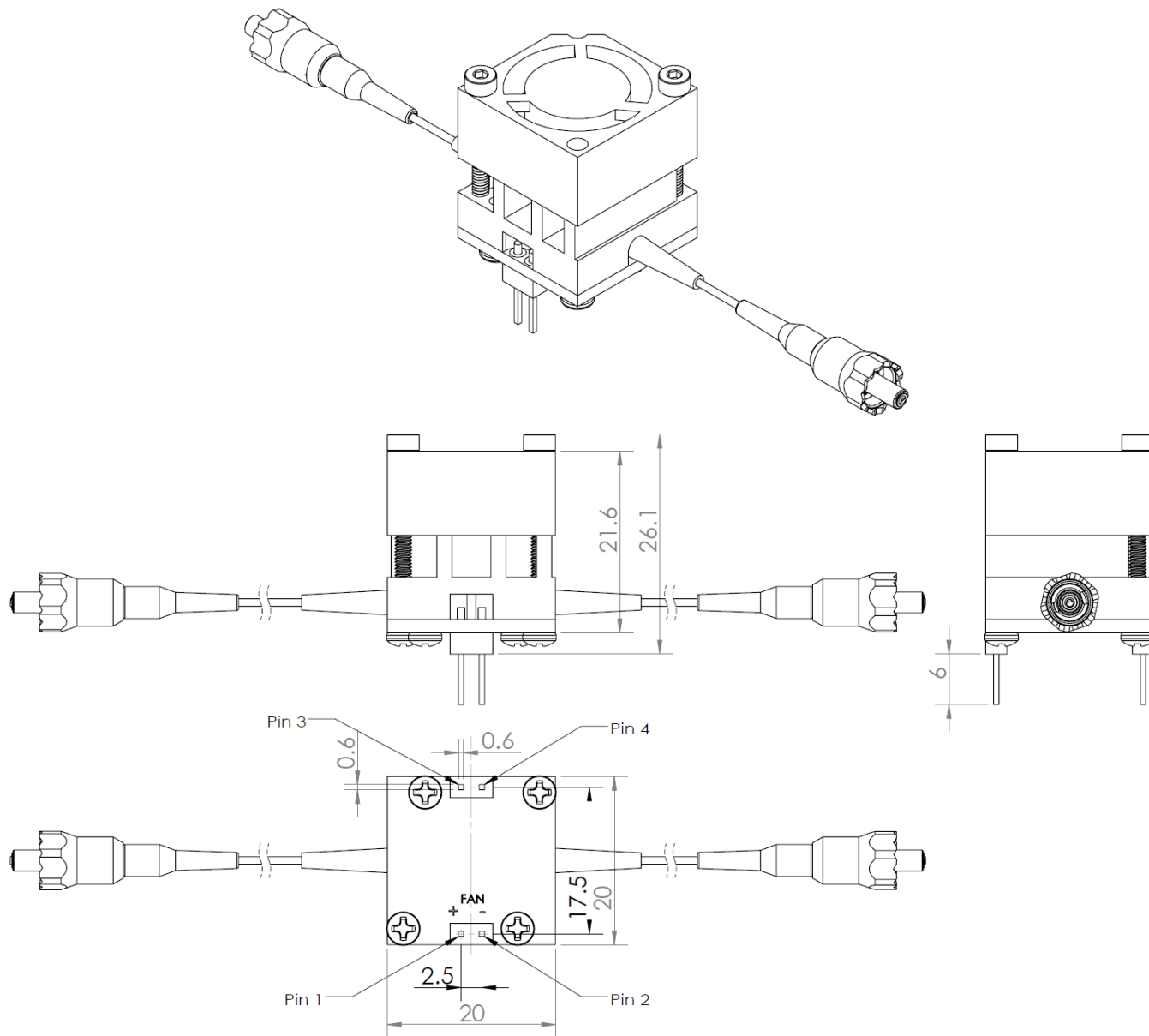
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Mechanical Dimensions-Package



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

Electrical Driving Information

	Pin 1	Pin 2
Fan control	DC 5 V	0 V

FVOA IL control	Pin 3	Pin 4
fiber core $\leq 62.5 \mu\text{m}$	DC 0 ~ 5.5 V	0 V
fiber core 105 μm	DC 0 ~ 14.5 V	0 V

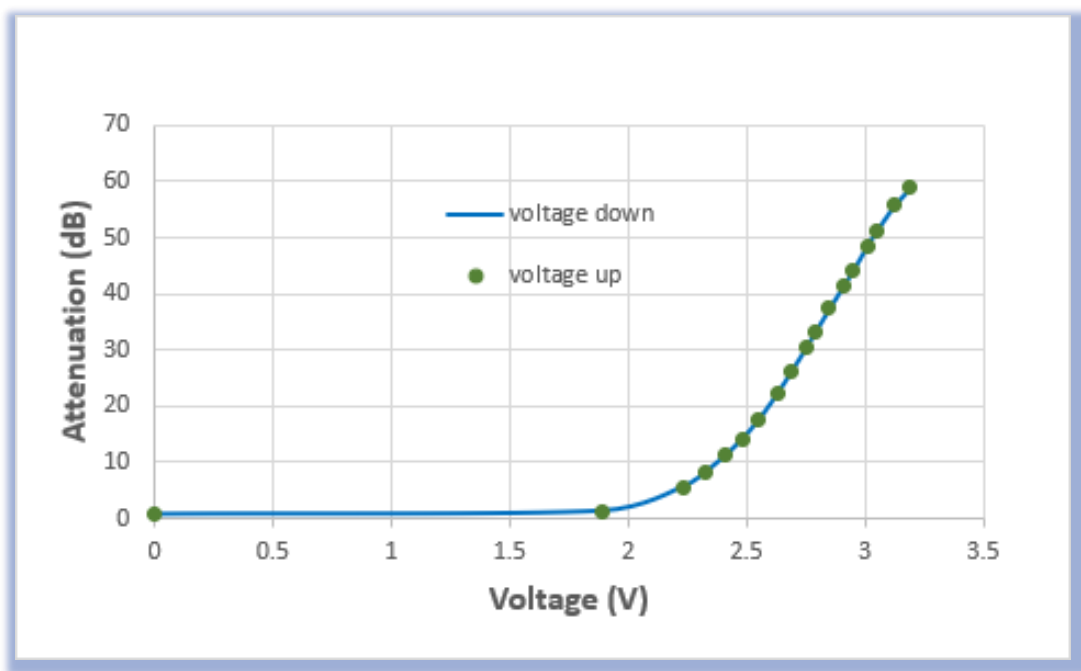
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Typical Response



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Ordering Information

Prefix	Configuration	Type	Test Wavelength	Fiber Type ^[1]	Fiber Cover	Fiber Length	Connector
FVOA-	Standard = 11 Special = 00	Normally Open = 1	488 = 4 532 = 5 630 = 6 780 = 7 850 = 8 980 = 9 1060 = 1 1310 = 3 1550 = C 2000 = 2 Special = 0	Pick from below table	Bare fiber = 1 900um tube = 3 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]. For a larger core, the value of the Attenuation is reduced. For Core ~ 105µm, the max Attenuation is about 10dB

Fiber Type Selection Table:

01	SMF-28	34	PM1550	71	MM 50/125µm
02	SMF-28e	35	PM1950	72	MM 62.5µm
03	Corning XB	36	PM1310	73	105/125µm
04	SM450	37	PM400	74	FG105LCA
05	SM1950	38	PM480	75	FG50LGA
06	SM600	39	PM630	76	STP 50/125
07	Hi780	40	PM850	77	IRZS23
08	SM800	41	PM980	78	IRFS32
09	SM980	42	PM780		
10	Hi1060	43			
11	SM400	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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Fibers with smaller core diameters ($<5\ \mu\text{m}$) 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.

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