



Features

- High Repeatability
- Low Power
- Small

The VOAM Series MEMS Fiber Optical Variable Attenuators (VOAs) use an electrostatically actuated rotating mirror and are specially packaged for reliable operation in high-vibration environments and space applications, delivering excellent repeatability, fast response, low power consumption, and cost-effective performance. Optical attenuation is controlled by a 0–6 V drive voltage applied to a single pin, with the device automatically returning to its default state when power is removed. The VOAM features a polarity-independent capacitive electrical interface, supports direct PCB mounting, and operates bidirectionally. These VOAs are RoHS compliant and meet Telcordia GR-1221 requirements, with a premium grade available that offers insertion loss below 0.5 dB. Agiltron also offers custom designs and modular assemblies to support specific control, packaging, and system-integration requirements.

Specifications

Parameter		Min	Typical	Max	Unit
Operation Wavelength	Single Mode	780		2200	nm
	Multimode	810-890	1260-1360	1500-1600	
Insertion Loss ^{[1], [2]}			0.5	1.0	dB
PDL (SM)				0.3	dB
Repeatability (0-30, @15dB)			0.1	0.2	dB
Wavelength Dependent Loss (@20dB)		0.6	0.8	1.5	dB
Extinction Ratio (PM fiber)		18		30 ^[3]	dB
Repeatability (@10dB, 0-60 °C)	Uncompensated		0.3	0.5	dB
	Compensated		0.1	0.2	
Return Loss	SM, PM	50			dB
	MM	35			
Attenuation	SM, PM	45	50	60	dB
	MM	30		55	dB
Driving Voltage	SM, PM	0	6	10	V
	MM	0	9	10	
Response Time			0.5		ms
Repetition Rate			50	100	Hz
Durability			10 ¹²		Cycle
Power Consumption				20	μW
Power Consumption (at maximum)				0.2	mW
ESD				500	V
Operating Temperature ^[4]		-10		70	°C
Storage Temperature		-40		85	°C
Optical Power Handling ^[5]			300	500	mW

Notes:

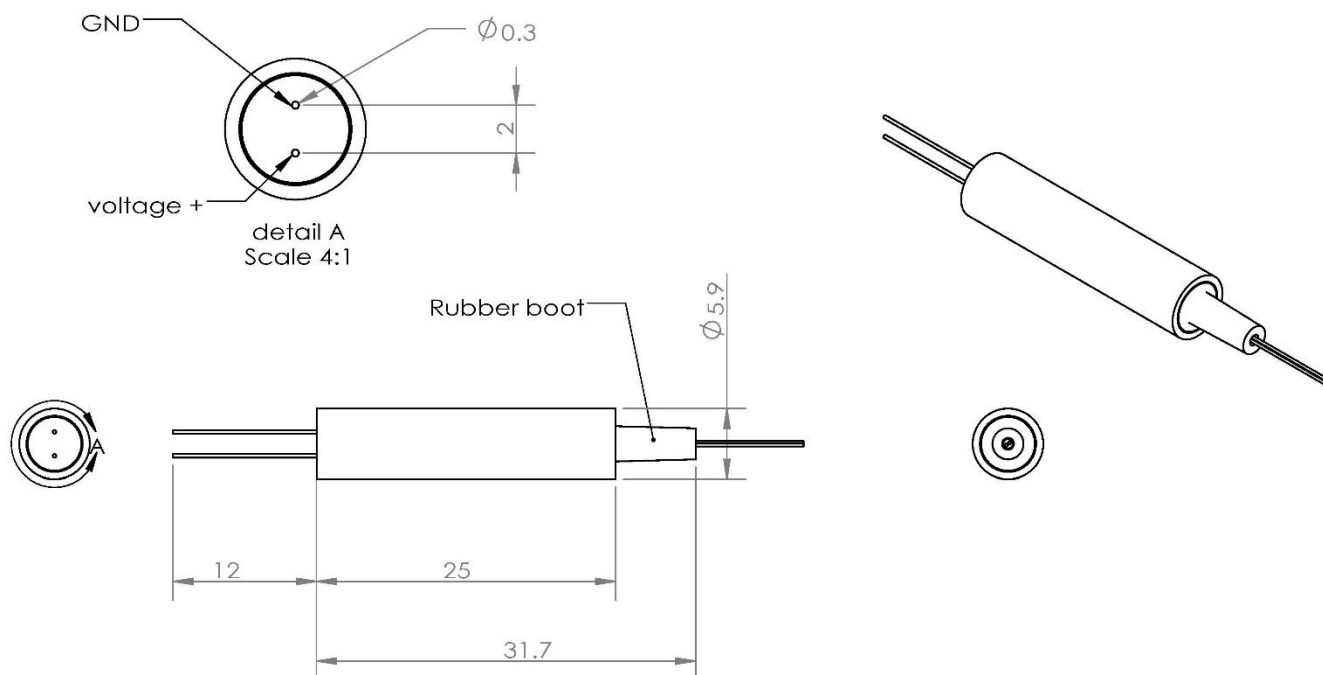
- [1]. Excluding connectors. Each connector adds 0.3dB @1550nm. Wavelength shorter and longer will increase loss.
- [2]. Multimode IL measured @ Light Source CPR < 14dB
- [3]. 30dB PER is available with special order
- [4]. Lower temperature version is available, please call us
- [5]. The power handling is inversely proportional to fiber core size. 300mW for 1230-1630nm SM.

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Mechanical Dimensions (mm)



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

Electrical Driving Requirements

- 1) Capacitive load device, no polarity. Applying a voltage between Pin1 and Pin2
- 2) The maximum rating voltage is 12V
- 3) The ground pin is optional and can be cut off

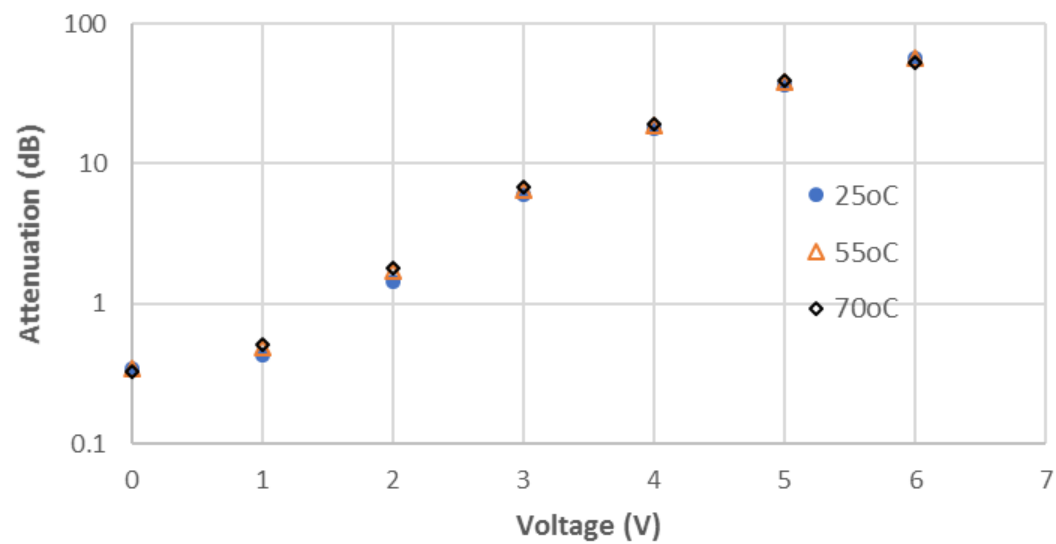
MEMS

Vibration Insensitive Fiber Optical Variable Attenuator

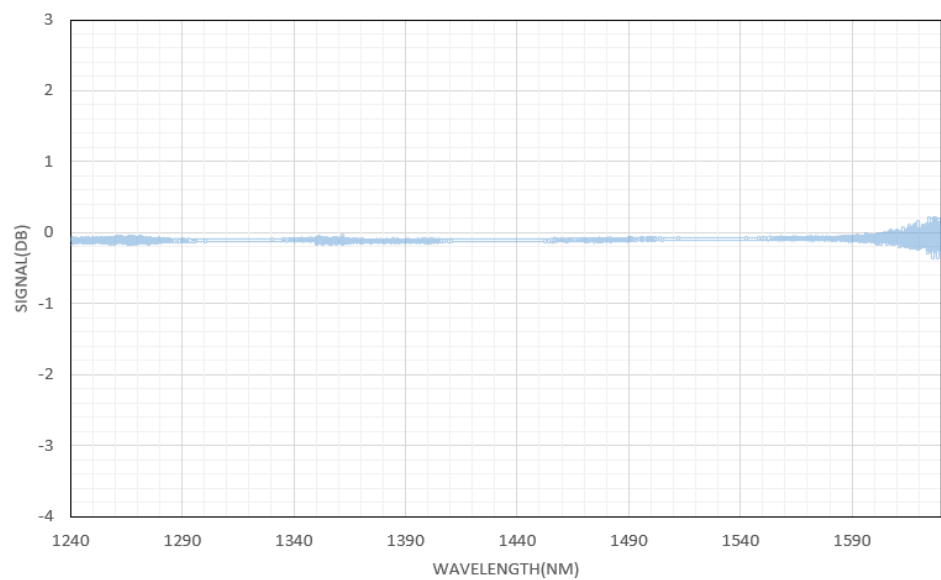
(2D, 850nm, 1260-1630nm, 500mW)

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Typical Attenuation vs. Voltage at 25°C, 55°C, 70°C



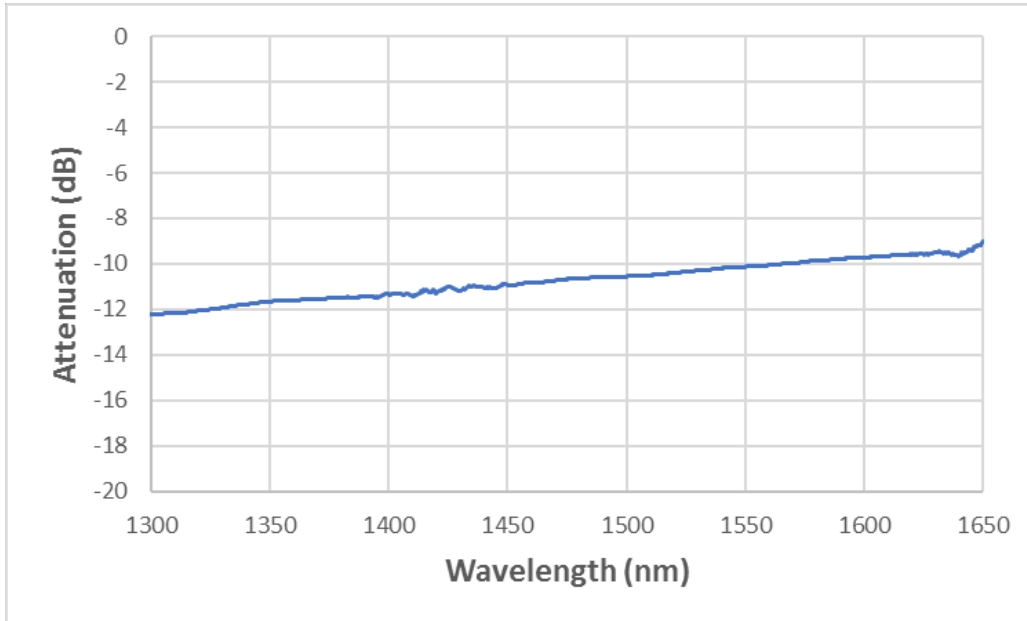
Typical Insertion Loss vs Wavelength (1240-1630nm)



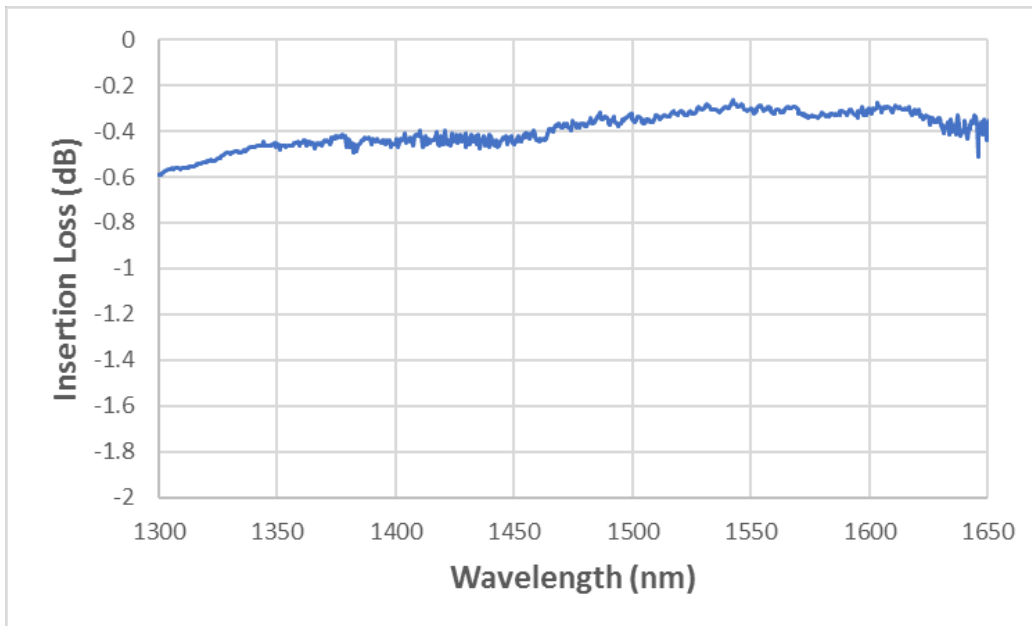
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Wavelength Dependence 10 dB



Wavelength Dependence 0.5 dB



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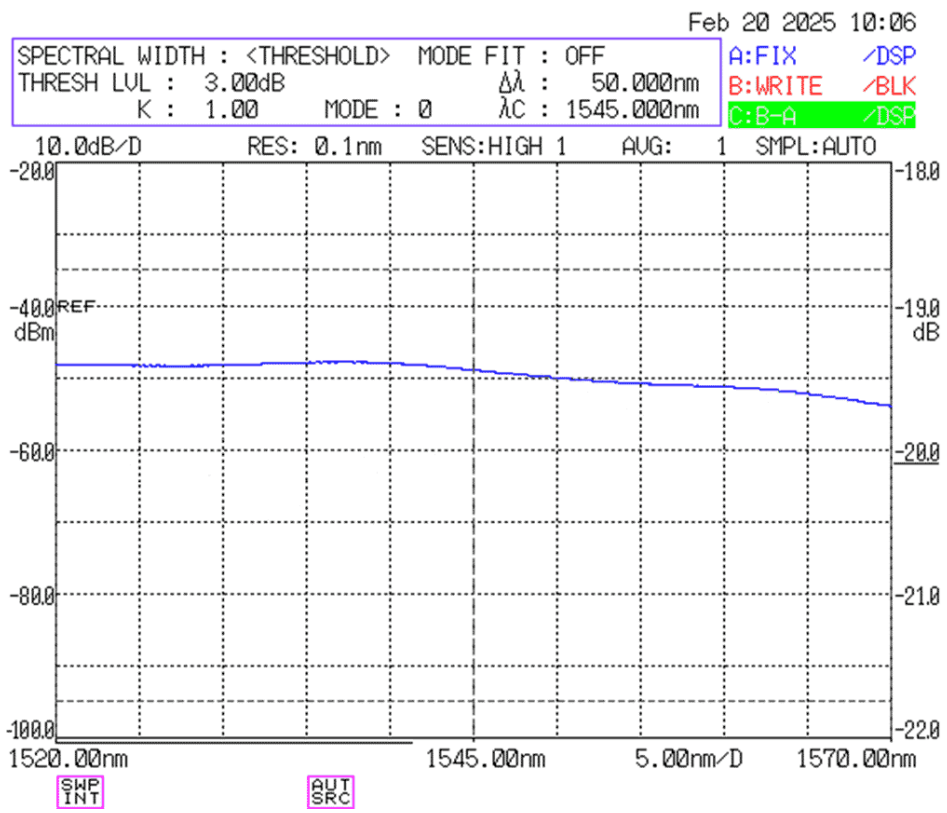
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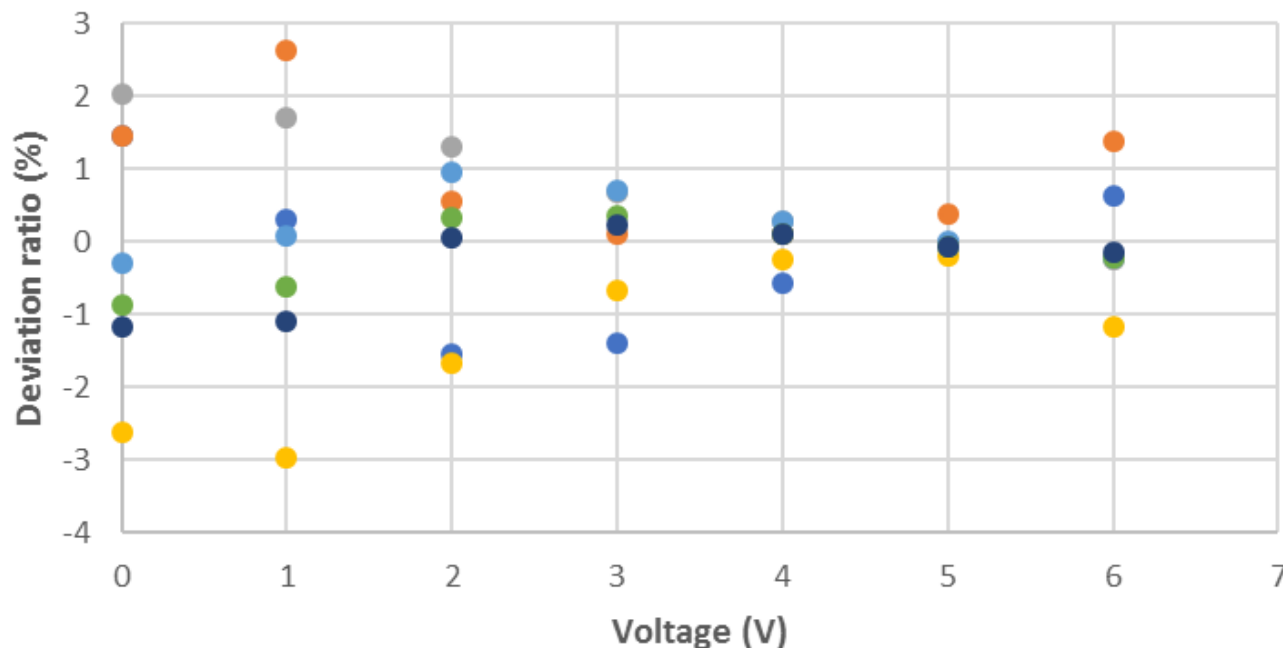
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Typical Wavelength Dependence @20dB Attenuation



Typical Repeatability -Attenuation vs Applying Voltage Over 5days (5 colors)



Ordering Information (Part Number)

	☐	☐	1	☐	☐	☐	☐	☐	☐
Prefix	Non-Power State *	Wavelength **	Package	Attenuation	PER	Fiber Type	Fiber Cover	Fiber Length	Connector ^[1]
VOAV-	Transparent = T Opaque = O	1260~1620 = B 980-1250 = J 770-1100 = C 620-850 = D 600-780 = E 488-635 = G 460-600 = F 850/1310 = A Special = 0	Standard = 1	50dB = 1 65dB = 2	Regular = 1 25dB = 2 28dB = 3	SMF-28 = 1 PM1550 = B PM1310 = 3 PM980 = E PM780 = F PM850 = K PM630 = I PM460 = J MM 50/125 = 5 MM 62.5/125 = 6 SM450 = M SM460 = H SM600 = N SM630 = G 780HP = P HI1060 = L	Bare fiber = 1 0.9mm tube = 3 Special = 0	0.5m = 2 1.0m = 3 Special = 0	None = 1 FC/PC = 2 FC/APC = 3 SC/PC = 4 SC/APC = 5 LC/PC = 7 LC/APC = A LC/UPC = U Special = 0

[1]. 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

** B, 3, 5 are the same device measured at different wavelengths. For B, it is typically measured at 1550nm; other wavelength measurements cost more. 8 and A are the same device measured at different wavelengths.

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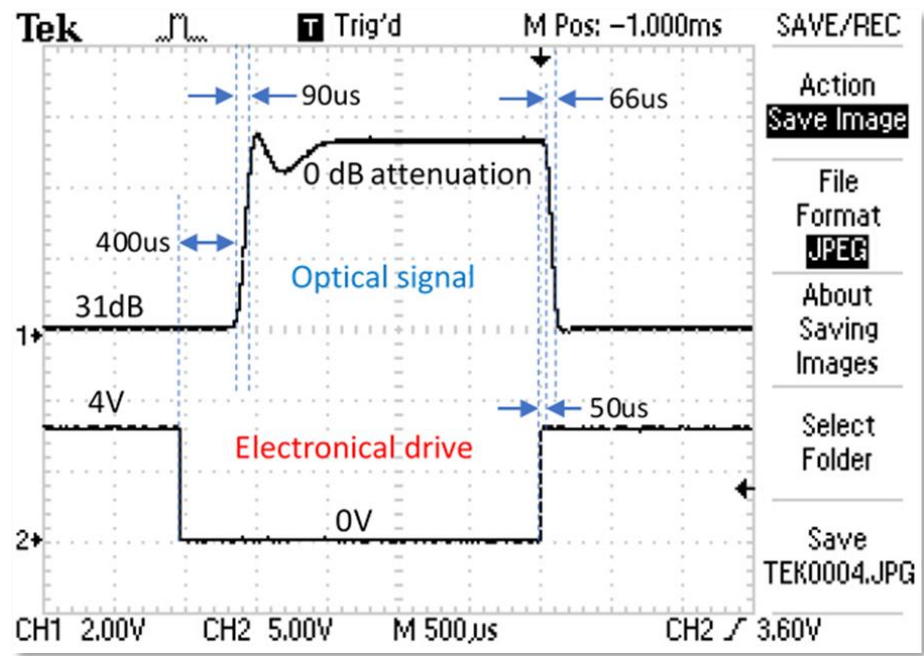
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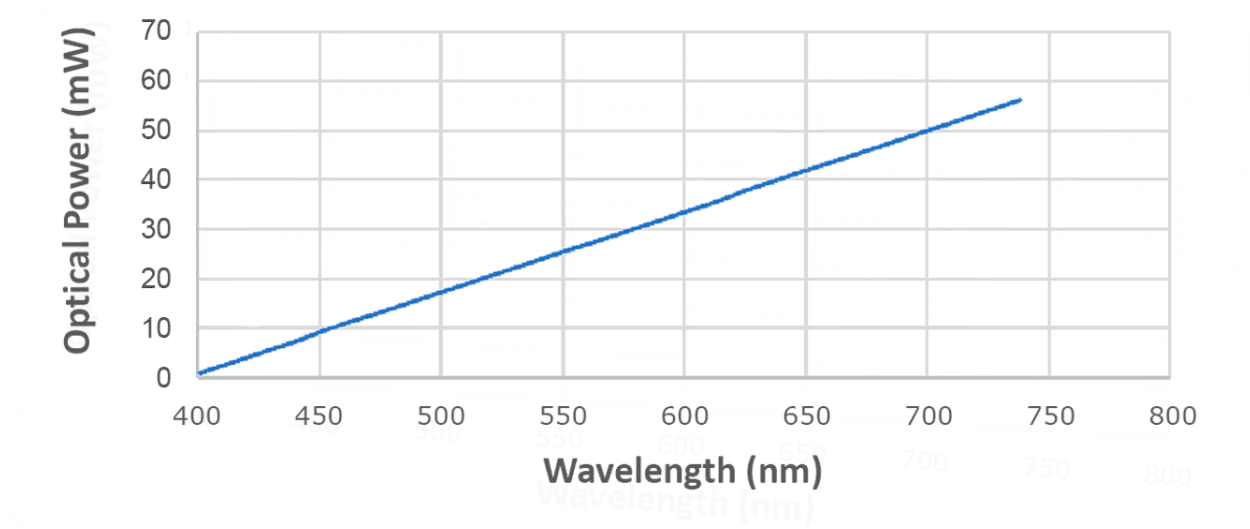


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Typical Electrical to Optical Response



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.

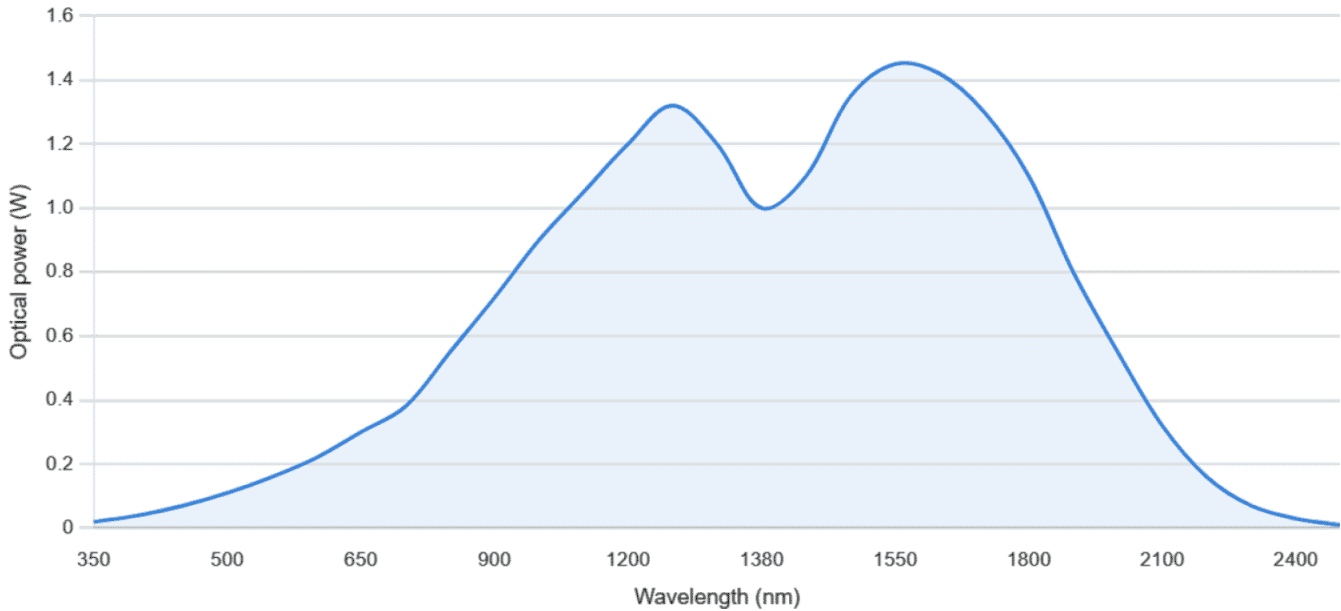
Fiber Cleanliness

Fibers with smaller core diameters ($<5\text{ }\mu\text{m}$) 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.

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 handling by expanding the core side at the fiber ends.

Regular Single Mode / Polarization Maintaining Fiber Optical Power Handling vs Wavelength



Single mode fiber optical power is limited by nonlinear effects in addition to absorption that increase loss and generate heat. The curve shows the approximate safe CW power envelope for standard single-mode fiber. Actual limits depend on fiber design, core size, length, and laser characteristics. Specialty fibers can significantly increase the power limit.