MEMS Straight Fiber Optical Variable Attenuator

(Protected by US Patent 10752492B2)

DATASHEET

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The MEMS Straight Series Fiber Optical Variable Attenuator uses a patented thermal activated micro-mirror, moving-in and -out optical paths, uniquely featuring large extinction ratio, high stability over wide temperature range, and very long life cycle. The thermal MEMS is insensitive to moisture and ESD without drift issues, providing a high reliability platform for over 25 years continuous operation. The MEMS Straight Series VOAs are configured in single and dual channels (activated at the same time). The VOAs are bidirectional and are Telcordia standards GR1221 qualified.

Agiltron provides customized design and modular assemblies to meet control and integration applications.

This VOA is designed to be used in a feedback configuration

Features

- High Reliability
- Direct DC drive
- Ultra Small
- ESD Insensitive

Specifications

Parameter		Min	Typical	Max	Unit
Operation Wavelength	Single Mode		1260 ~ 1610		nm
	Multimode	810-890	1260-1360	1500-1600	
Insertion Loss [1], [2]			0.6	1.0 / 1.2 [3]	dB
PDL (SM)				0.1	dB
PMD (SM)		0.0001		0.01	dB
Extinction Ratio	PM fiber	18			dB
Return Loss	SM, PM	50			dB
	MM	35			
Attenuation	SM, PM	55 [4]			dB
	MM	45			dB
Response Time			3	7	ms
Repetition Rate				20	Hz
Wavelength Dependence@20dB				0.5	dB/100nm
Durability		10^{12}			Cycle
Power Consumption (at maximum)				170	mW
Operating Temperature [4]		-5		+70	°C
Storage Temperature		-40		+85	°C
Optical Power Handling (CW)			300	500	mW
Fiber Type	Single Mode	SMF-28 or equivalent			
	PM	Panda 150 PM or equivalent			
	Multimode	MM 50/125, MM 62.5/125 or equivalent			

Notes:
[1]. Excluding connectors.
[2]. Multimode IL measured @ Light Source CPR < 14dB.
[3]. Dual band.
[4]. Lower temperature version is available, please call us

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 02/26/25

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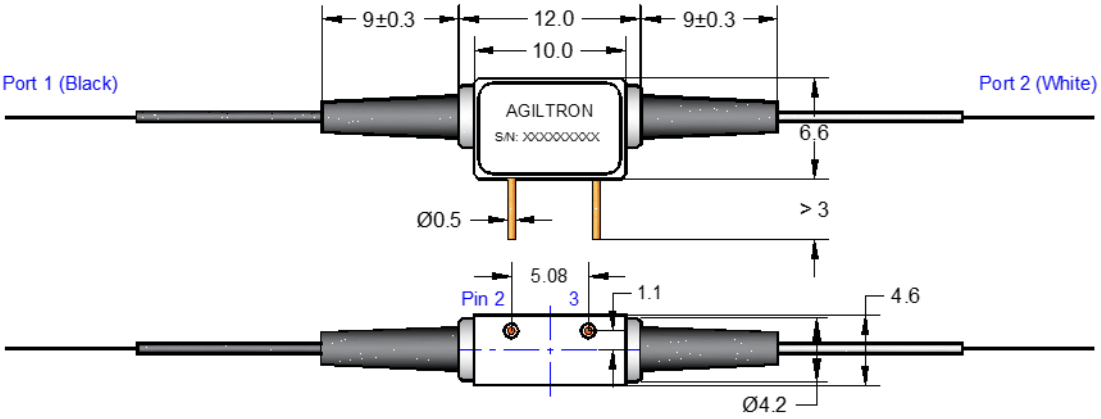
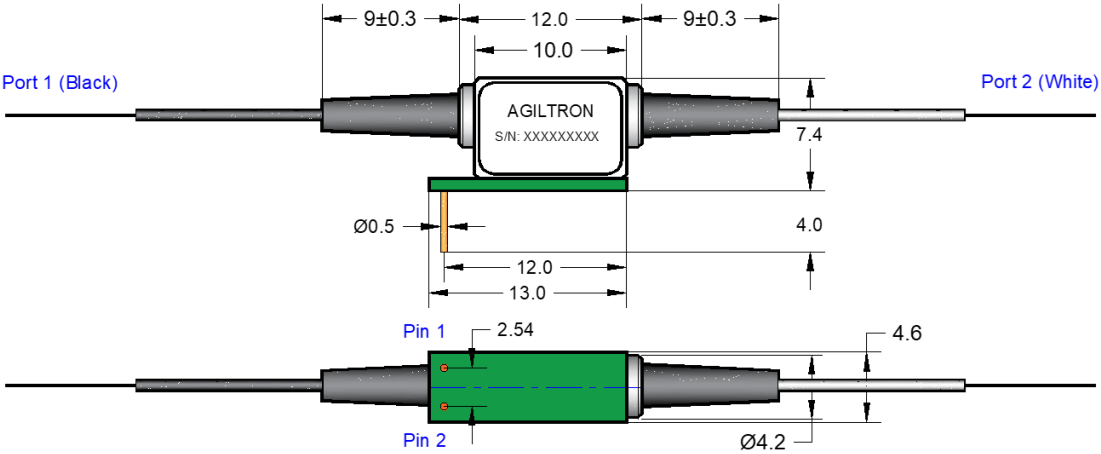
Mechanical Dimension (unit: mm)

Package 1: Standard package



Package D: Add Adapting PCB version



Electrical Driving Requirements

1. Resistance load device, insensitive to ESD.
2. Highly recommend to add 70 ohm resistor in series on Pin 3 in driver to smooth the attenuation slope.
3. **Warning: Damaged if applying voltage over the maximum (even for a short time)**
4. Pin 2 = 0V, Pin 3 = 0~4.5V (maximum)

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

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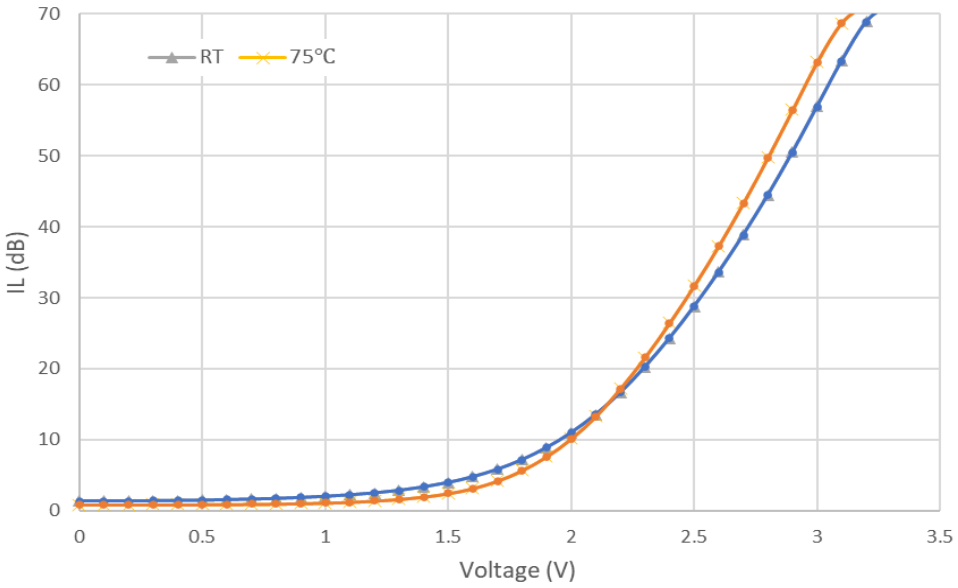
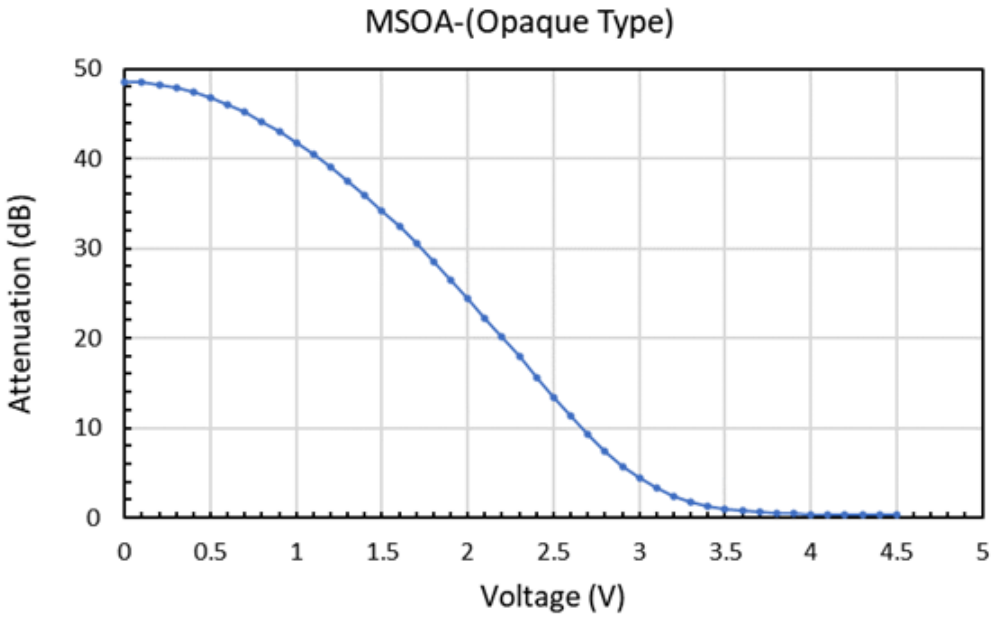
Typical Attenuation vs. Voltage w/ T compensation for Transparent Type



Note: Measured by adding the resistor and temperature compensation on MSOA.

Typical Attenuation vs. Voltage for Opaque Type



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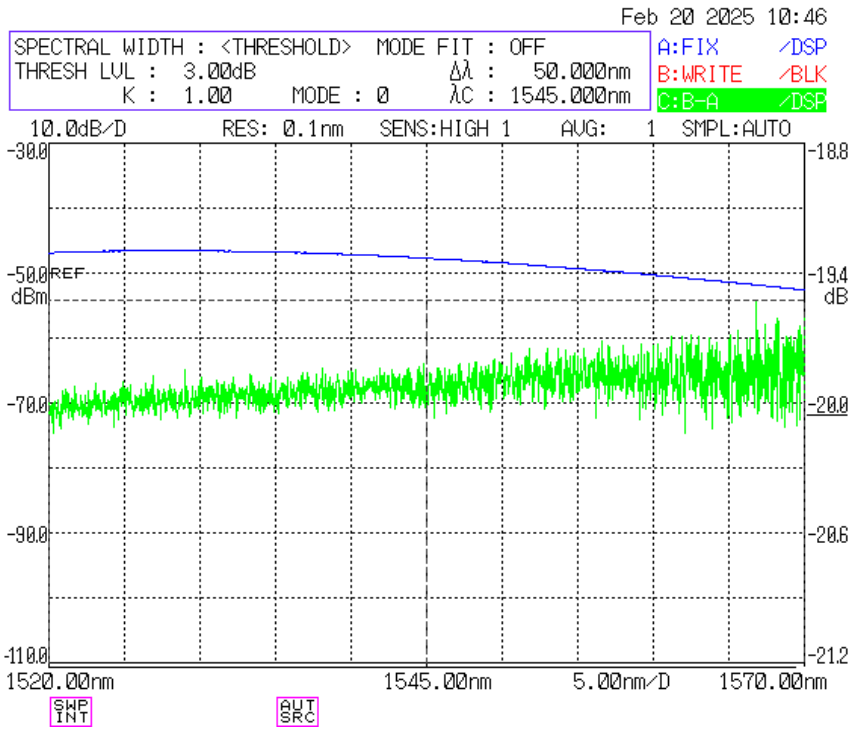
Typical Wavelength Dependence @20dB Attenuation



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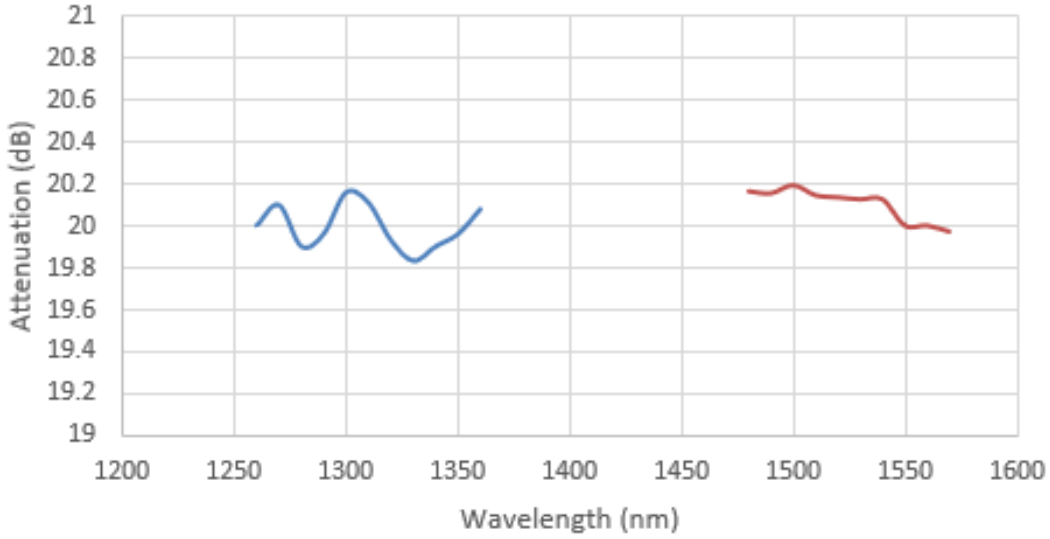
Typical Attenuation vs. Wavelength for WDL at 20 dB



Ordering Information (Part Number)

	☐☐	☐	☐	☐	☐	☐	☐	☐
Prefix	**Non-Power State**	**Wavelength**	**Temperature Range**	**Package**	**Fiber Type**	**Fiber Cover**	**Fiber Length**	**Connector[4]**
MSOA-	Single VOA Transparent = 01 Single VOA Opaque [1] = 02 Dual VOA Transparent = 21 Dual VOA Opaque = 22	1260~1620 = B 1060 = 1 1310 = 3 1550 = 5 850 = 8 850/1310 = A Special = 0	-5 to 75^{0}C = 1 -40 to 75^{0}C = 2 Special = 0	Package 1 [2] = 1 Package D [3] = D Special = 0	SMF-28 = 1 PM1550 = B PM1310 = D PM980 = E PM850 = F MM 50/125 = 5 MM 62.5/125 = 6 Special = 0	Bare fiber = 1 900 µm 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 LC/PC = 7 Special = 0

[1]. Opaque means the light is blocked when no electrical power is present.
[2]. Package 1 (see Drawing) is Standard package.
[3]. Package D (see Drawing) is add Adapting PCB version.
[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.

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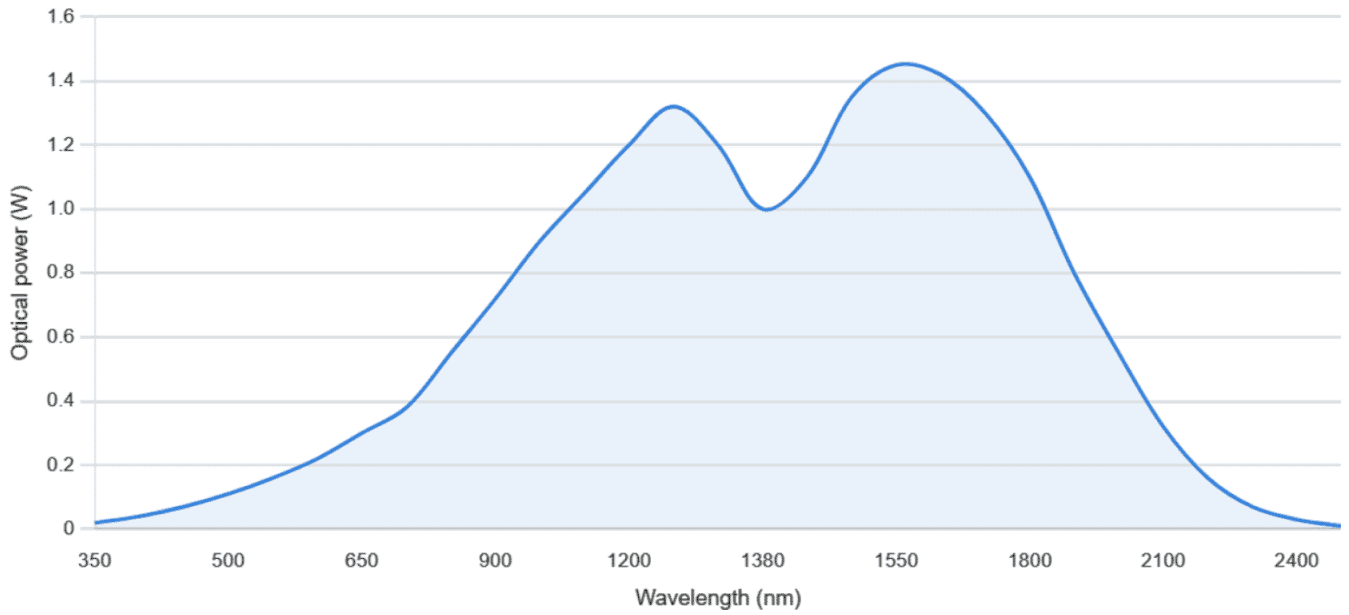
Regular Single Mode / Polarization Maintaining Fiber Optical Power Handing vs Wavelength



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.

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