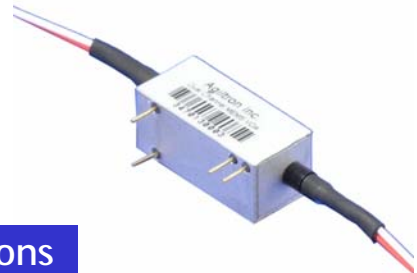


MEMS Variable Optical Attenuator (VOA)

(patents pending)

Product Description

The BM Series VOA is based on a proprietary micro-electro-mechanical mechanism featuring ultra-high reliability, compact design, fiber to fiber directly coupling technology, simple construction, easy drive, and excellent optical performance. The MM series VOA is fully compliant with the Telcordia 1209 and 1221 reliability standards. The MM series VOA is available in either normally-transparent or normally-opaque configurations. The VOA is driven with an electrical current or voltage signal; and the attenuation can be continuously adjusted with the applied signal. The MM series can be repackaged with pin-pin compatibility to most VOAs on the market. Standard package contains one or two VOAs in dimensions of 23.2mmx10.1mmx10.7mm.



Performance Specifications

MM Series VOA	Min	Typical	Max	Unit
Wavelength	600	1310/1550	1650	nm
Insertion Loss ¹	0.3	0.6	0.8	dB
Polarization Dependent Loss ²		0.15	0.35	dB
Wavelength Dependent Loss ^{2, 3}		0.3	0.6	dB
Temperature Dependent Loss		0.05	0.5	dB
Attenuation Range		25	55	dB
Attenuation Resolution		Continuous		
Polarization Mode Dispersion ²		0.01	0.05	ps
Return Loss	50			dB
Response Time		2.5	5	ms
Operating Temperature	-5		75	°C
Power Consumption			20	mW
Optical Power Handling		0.3	0.5	W
Storage Temperature	-40		85	°C
Reliability		Telcordia 1209 and 1221		
Package Dimension ⁷		23.2(L)x10.1(W)x10.7 (H)		mm

Notes:

1. Without connector; <0.3dB loss is also available on request
2. At attenuation of 20dB or less
3. Within 30nm bandwidth

Features

- Broad band
- Low Cost
- High Reliability
- Low IL, PDL, WDL & TDL
- Direct Current Drive
- Low Power Consumption

Applications

- Power Control
- Power Regulate
- Channel Balance
- Instrumentation



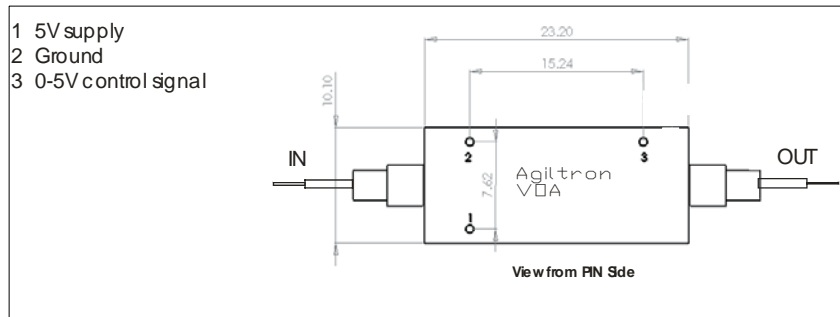
MEMS Variable Optical Attenuator (VOA)

Electrical Configurations

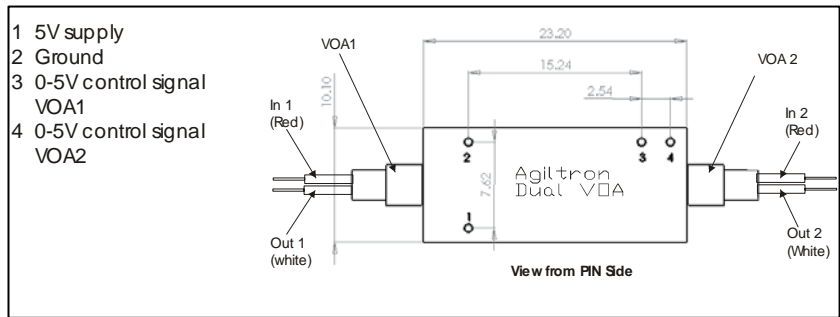
Parameter	Typical	Maximum	Unit
Control Voltage	0-5	5.5	V

Mechanical Footprint Dimensions (mm)

Single VOA



Dual VOA



Ordering Information

BMOA	Type	Wavelength	Off State	Package Type	Fiber Type	Fiber Length	Connector Type	
-	1 channel=10 2 channel=20 Special=00	1300-1600=1 950-1080=2 740-850 =3 Special =0	Transparent = 1 Opaque = 2	Single VOA =1 Dual VOA = 2 Special=0	SMF 28=1 HI1060=2 HI780=3 Special=0	250 μm fiber=1 400 μm fiber=2 900 μm tube=3 Special=0	0.25m= 1 0.5m = 2 1.0 m= 3 Special =0	None = 1 FC/PC = 2 FC/APC = 3 SC/PC = 4 SC/APC = 5 ST/PC = 6 LC = 7 Special = 0



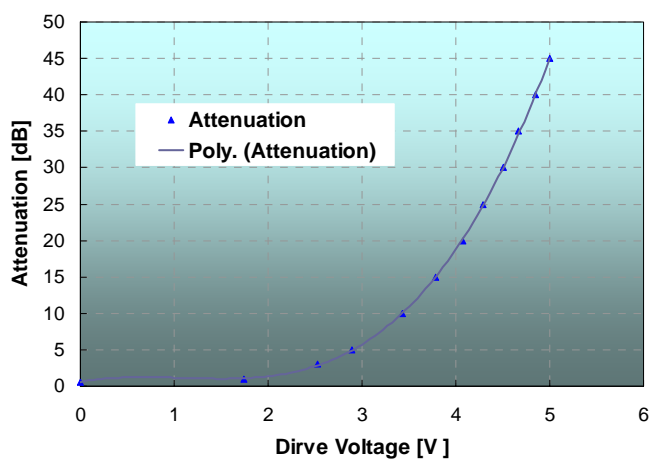
MEMS VOA Typical Performance Charts (1)

Features

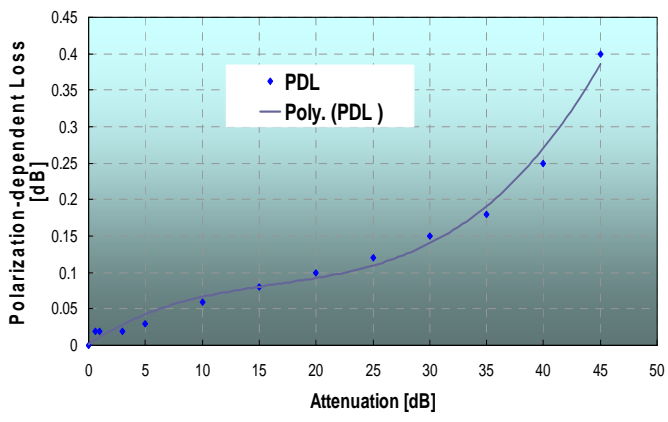
- Compact
- Low Cost
- High Reliability
- Low IL, PDL, WDL & TDL
- Direct Current Drive
- Low Power Consumption

Typical Performance of MEMS VOAs (open loop)

Typical Attenuation Response vs Drive Voltage



Typical PDL Characteristics vs Attenuation



Applications

- Power Control
- Power Regulation
- Channel Balance
- Instrumentation



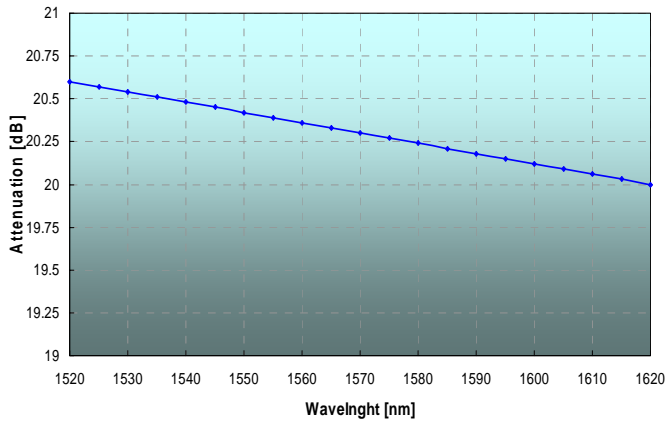
MEMS VOA Typical Performance Charts (2)

Typical Performance of MEMS VOAs (open loop)

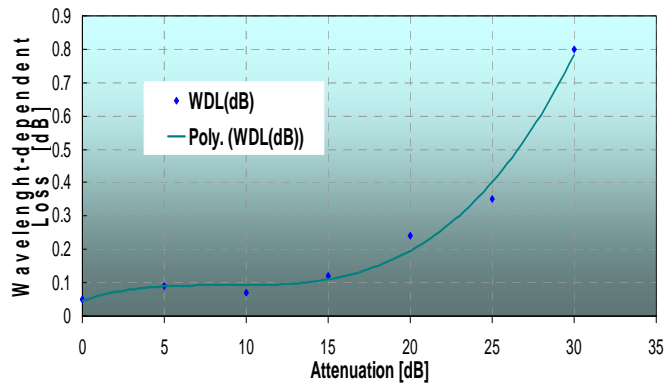
Features

- Compact
- Low Cost
- High Reliability
- Low IL, WDL, PDL & TDL
- Direct Current Drive
- Low Power Consumption

Typical Attenuation Wavelength Dependence of MEMS VOA @ 20 dB



Typical Wavelength-Dependent Loss of MEMS VOA vs Attenuation



Applications

- Power Control
- Power Regulation
- Channel Balance
- Instrumentation

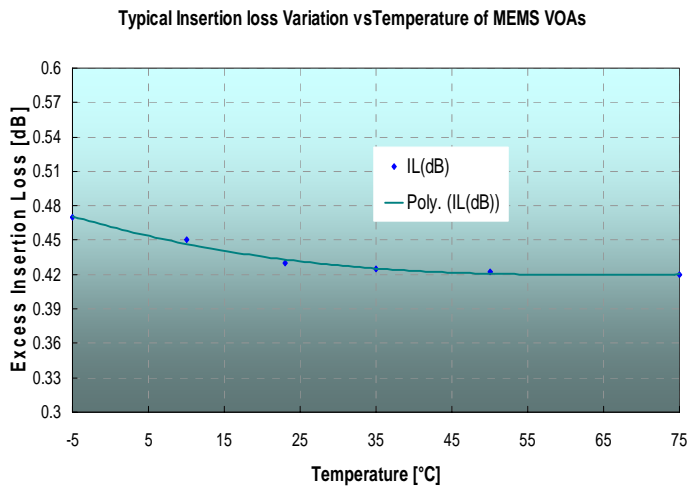


MEMS VOA Typical Performance Charts (3)

Features

- Compact
- Low Cost
- High Reliability
- Low IL, PDL, WDL & TDL
- Direct Current Drive
- Low Power Consumption

Typical Performance of MENS VOAs (open loop)



Applications

- Power Control
- Power Regulation
- Channel Balance
- Instrumentation



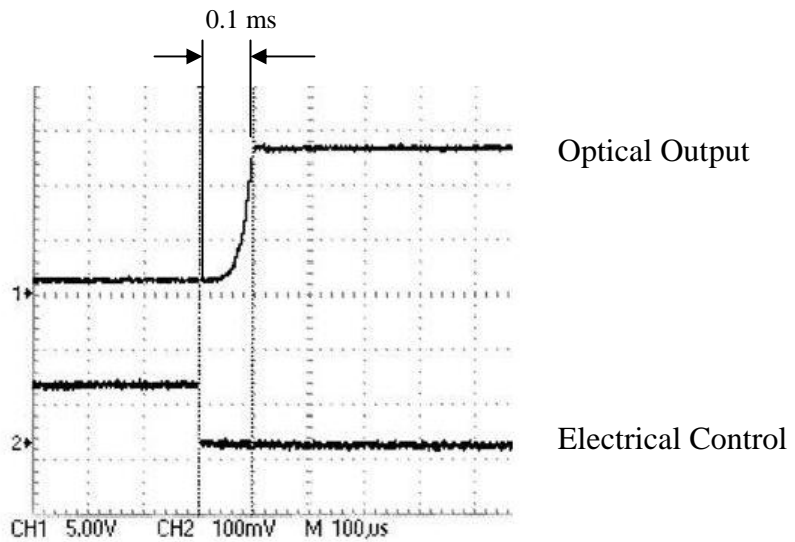
MEMS VOA Typical Performance Charts (4)

VOA Responses (close-loop)

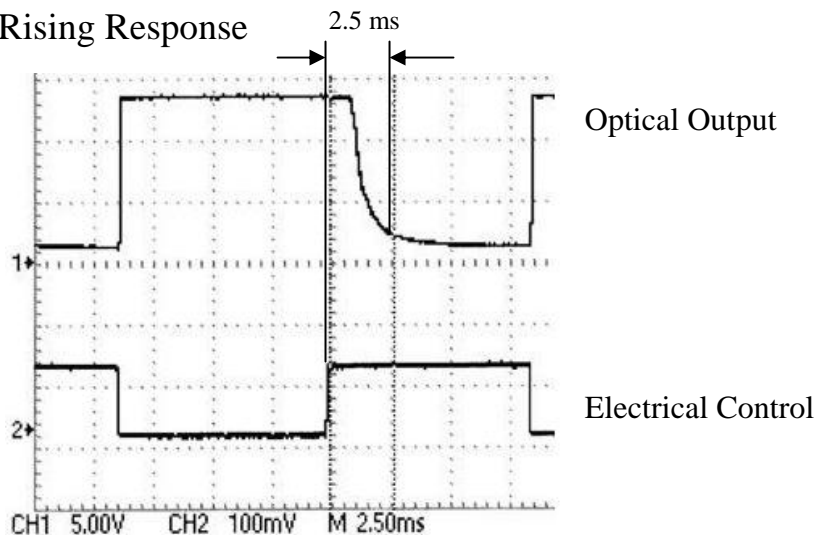
Features

- Compact
- Low Cost
- High Reliability
- Low IL, WDL, PDL & TDL
- Direct Current Drive
- Low Power Consumption

(a) Falling Response



(b) Rising Response



Applications

- Power Control
- Power Regulation
- Channel Balance
- Instrumentation

