

# MEMS Variable Optical Attenuator (Voltage control)

## Product Description

The MM Series VOA is based on a micro-electro-mechanical mechanism featuring compact design, simple construction, easy direct drive, and excellent optical performance. The MM series VOA is compliant with the Telcordia 1209 and 1221 reliability standards. The MM series VOA is available in either normally-open or normally-closed configurations and with an integrated tap option. The VOA is driven with an electrical voltage; and the attenuation can be continuously adjusted with the applied voltage.



## Performance Specifications

MM Series VOA	Min	Typical	Max	Unit
Wavelength	1310±50 and/or 1480±50 and/or 1550±50			nm
Insertion Loss <sup>1</sup>	0.2	0.4	0.7	dB
Polarization Dependent Loss <sup>2</sup>		0.15	0.4	dB
Wavelength Dependent Loss <sup>2, 4</sup>		0.3	0.6	dB
Temperature Dependent Loss <sup>3</sup>		0.05	0.2	dB
Attenuation Range		25	60	dB
Attenuation Resolution	Continuous			
Polarization Mode Dispersion <sup>2</sup>	0.005	0.01	0.050	ps
Return Loss	50			dB
Response Time	0.5	2.5	5	ms
Operating Temperature	-5		75	°C
Device Resistance <sup>5</sup>	1.5	75	250	Ω
Driving voltage <sup>2, 5</sup>	0.02	3	5	V
Optical Power Handling		300	500	mW
Storage Temperature	-40		85	°C
Reliability	Telcordia 1209 and 1221			
Fiber Type	Corning SMF28			
Package Dimension <sup>6</sup>	18.0xØ6.0			mm

Notes:

1. Without connector and at room temperature
2. At attenuation of 20dB or less
3. At 0 attenuation and at whole temperature range
4. Within 30nm bandwidth
5. Driving voltage adjustable through matching with the resistor
6. Standard package

## Features

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

## Applications

- Power Control
- Power Regulate
- Channel Balance
- Instrumentation



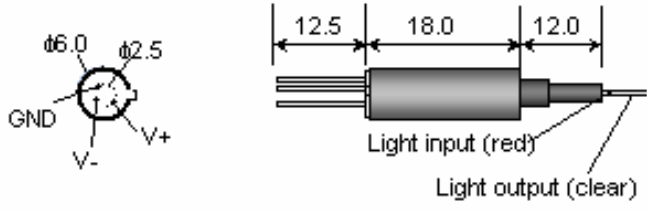
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## Electrical Configurations

Parameter	Typical <sup>7</sup>	Maximum <sup>7</sup>	Unit
Control Voltage	3	5	V
Control Voltage Slope			V/Sec

Note 7: At 20dB attenuation

## Mechanical Footprint Dimensions (mm)



### Standard Package A

## Ordering Information

MMOA-	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Type	Wavelength	Off State	Package	Fiber	Fiber Length	Connector		
Standard voltage control=11	1310=3 1550 = 5 C+L=2 1310&1550= 8 Special = 0	Transparent=1 Opaque = 2	Standard=1 Special=0	SMF-28 =1 Customized=2	Bare fiber=1 900um loose 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 = 7 Special = 0	

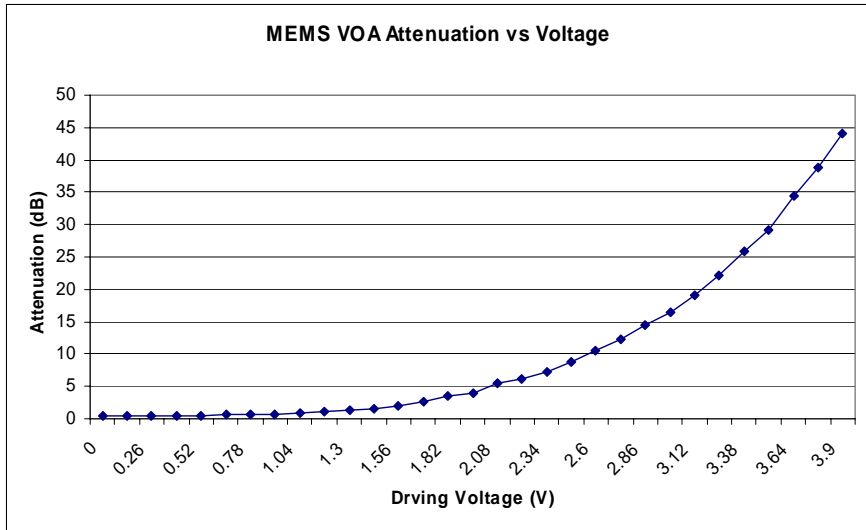


# MEMS VOA Typical Performance Charts (1)

## Features

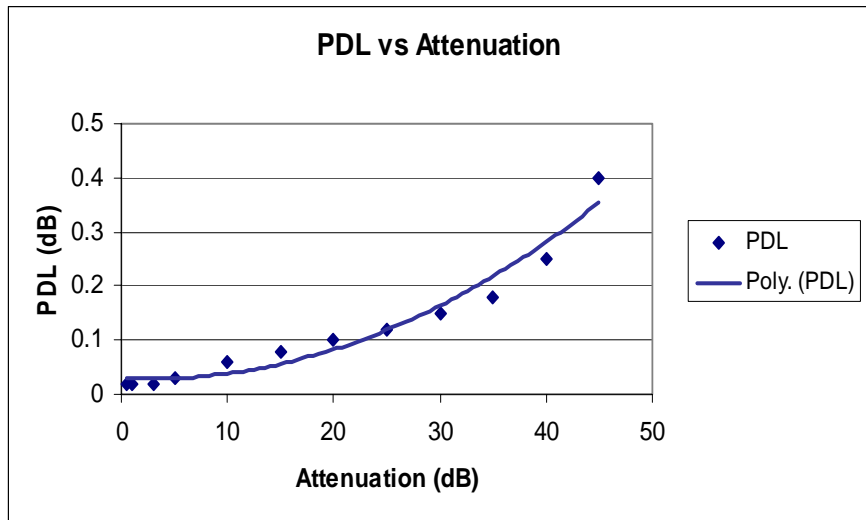
- Compact
- Low Cost
- High Reliability
- Low IL, PDL, WDL & TDL
- Low Power Consumption

## VOA Performance (tested with open-loop)



## Applications

- Power Control
- Power Regulation
- Channel Balance
- Instrumentation

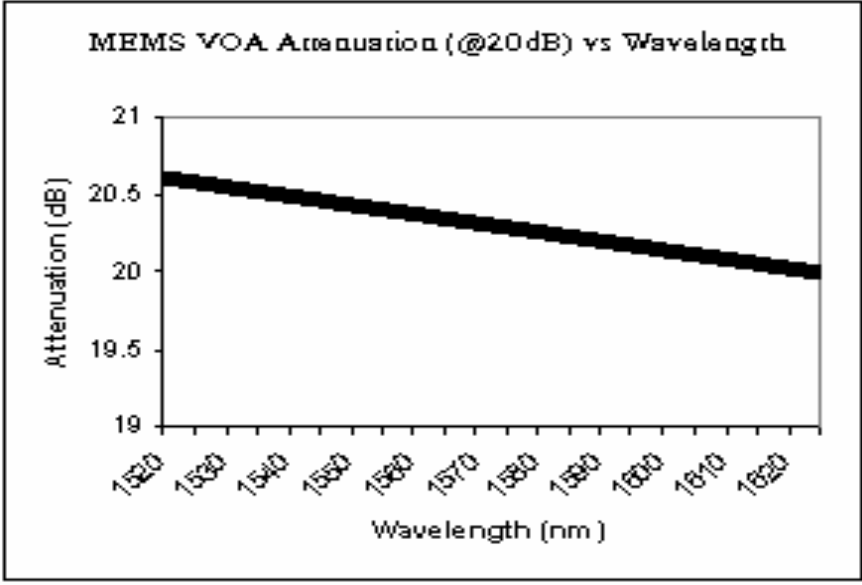


# MEMS VOA Typical Performance Charts (2)

## VOA Performance

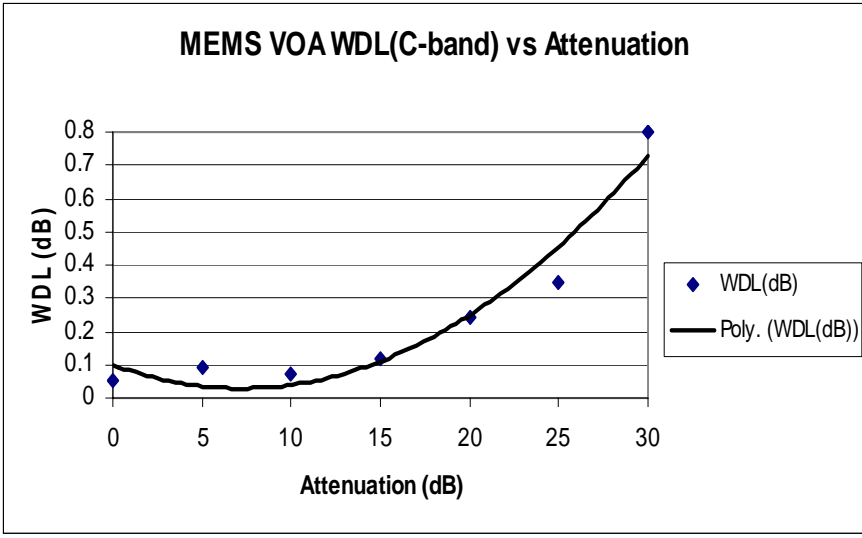
### Features

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



### Applications

- Power Control
- Power Regulation
- Channel Balance
- Instrumentation

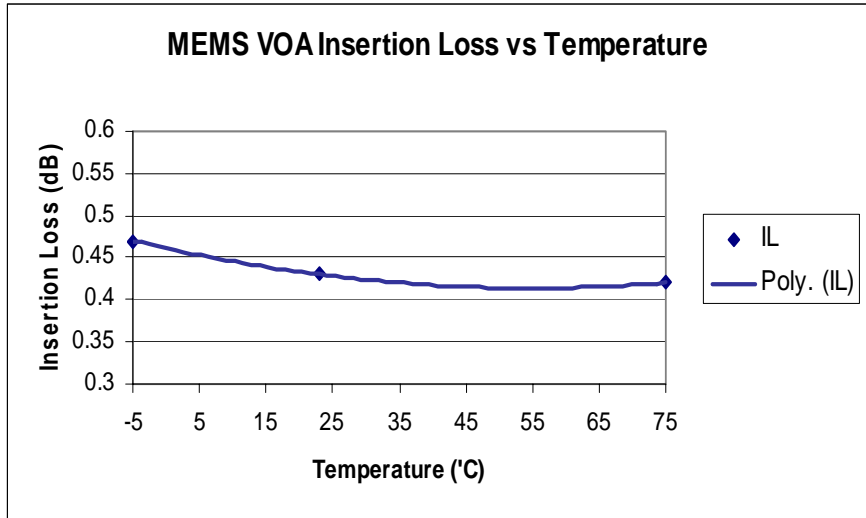


# MEMS VOA Typical Performance Charts (3)

## Features

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

## VOA Performance



## Applications

- Power Control
- Power Regulation
- Channel Balance
- Instrumentation



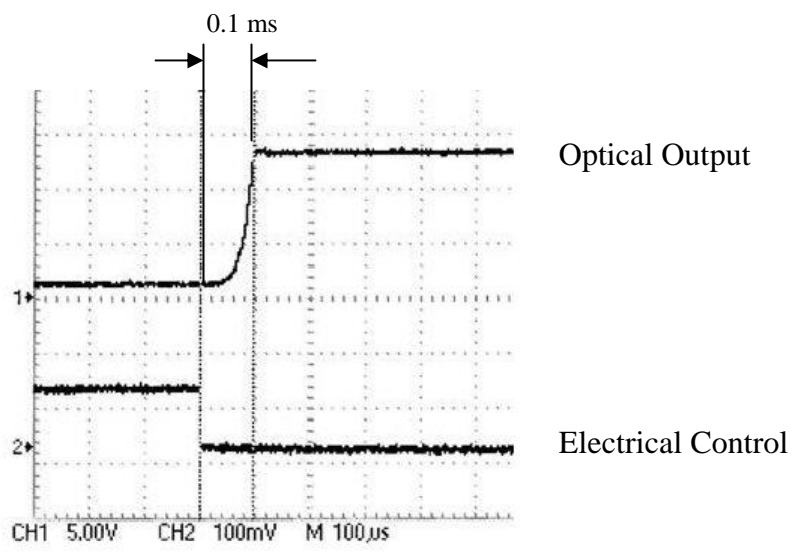
# MEMS VOA Typical Performance Charts (4)

## VOA Responses

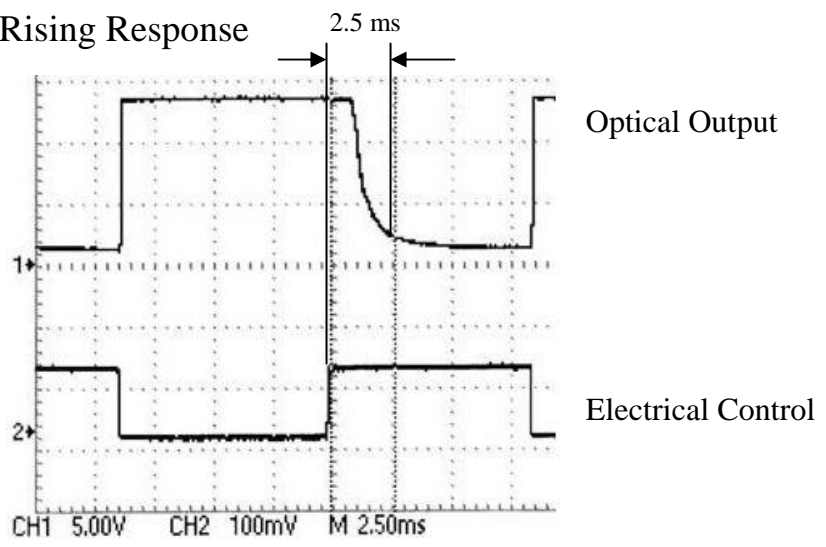
### Features

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

(a) Falling Response



(b) Rising Response



### Applications

- Power Control
- Power Regulation
- Channel Balance
- Instrumentation

