

# MEMS Variable Optical Attenuator Integrated With Input Tap (voltage control)

patent pending

## Product Description

The MM Series VOA is based on a micro-electro-mechanical mechanism featuring integrated compact design, simple construction, easy direct drive, and excellent optical performance of ultra low insertion loss, low PDL, and broad wavelength operation range. 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 input tap option.

The VOA is driven by applying an electrical voltage



## Performance Specifications

MM Series TVOA	Min	Typical	Max	Unit
Wavelength	1260	1550	1620	nm
Insertion Loss <sup>1</sup>		0.5	0.8	dB
Polarization Dependent Loss <sup>2</sup>		0.15	0.5	dB
Wavelength Dependence Loss <sup>3,4</sup>		0.4	0.7	dB
Attenuation Range	25	30	55	dB
Attenuation Resolution	Continuous			
Extinction Ratio (PM only)	18	23	25	dB
Polarization Mode Dispersion		0.01	0.05	ps
Return Loss	45			dB
Response Time		3	6	ms
Driving Voltage <sup>5</sup>		5	6	V
Device Resistance	81	100		$\Omega$
Optical Power handling		300	500	mW
Tap Response @ 1550nm	12	15	40	mA/W
Tap directivity		N/A or 25		dB
Tap Wavelength Dependence Response <sup>6</sup>	0.010	0.013	0.02	dB/nm
Tap Polarization Dependence Response	0.02	0.10	0.25	dB
Tap Temperature Dependence Response			0.01	dB/°C
Tap Dark Current at 5V bias @ 23°C		0.2	1	nA
Tap Dark Current at 5V bias @ 70°C		30	70	nA
Tap 3dB Bandwidth (cutoff frequency)	10			MHz
Tap Capacitance		12		pF
Operating Temperature	-5		75	°C
Storage Temperature	-40		85	°C
Reliability	Telcordia 1209 and 1221			
Package Dimension	$\Phi 6.1 \times 35.2$			mm

Notes:

1. Without connector and at room temperature
2. At 20dB or less attenuation
3. At 20dB attenuation and at whole temperature range
4. Within 40nm Bandwidth
5. At 20dB attenuation for transparent version, at 0.8dB attenuation for opaque version.
6. This is related to tap ratio. The spec data is regarding 3% tap.

## Features

- VOA + Tap
- Compact Size
- Low Cost
- High Reliability
- Low IL, PDL, WDL and TDL
- Direct Drive

## Applications

- Power Control
- Power Regulation
- Channel Balance
- Instrumentation



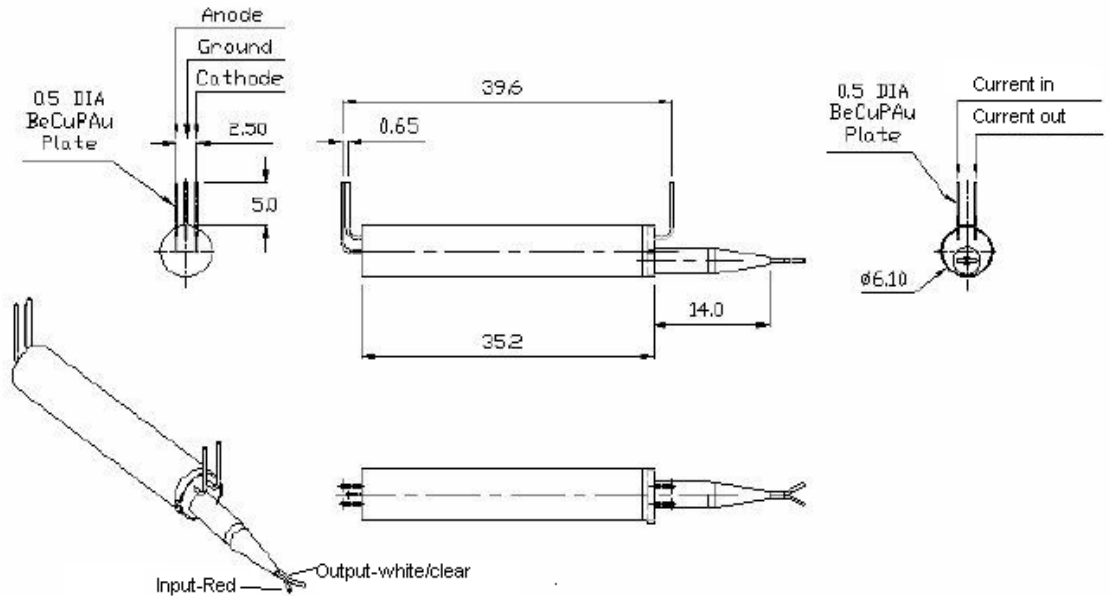
Revision: 060-12  
12-02-11

15 Presidential Way, Woburn MA 01801 Tel: (781) 935-1200 Fax: (781) 935-2040

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## Mechanical Footprint Dimensions (Unit:mm)



## Ordering Information

MMOA-	<input checked="" type="checkbox"/>	<input checked="" 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		
	Input tap voltage control=21	1310 = 3 1550 = 5 C+L=2 1260-1620=8 Special = 0	Transparent=1 Opaque=2	Standard =1 With directivity=2 Special =0	SMF-28 =1 Panda400=4 Panda250=5 Special =0	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 = 7 Special = 0	



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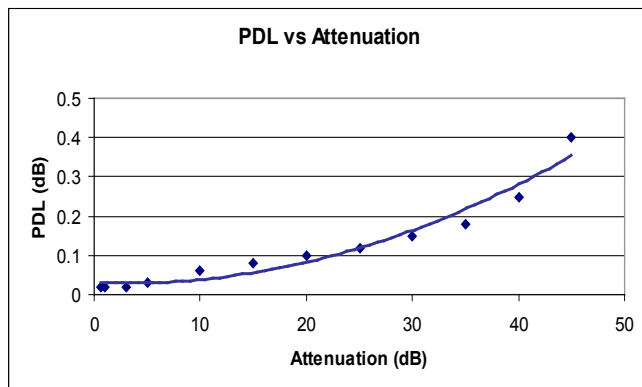
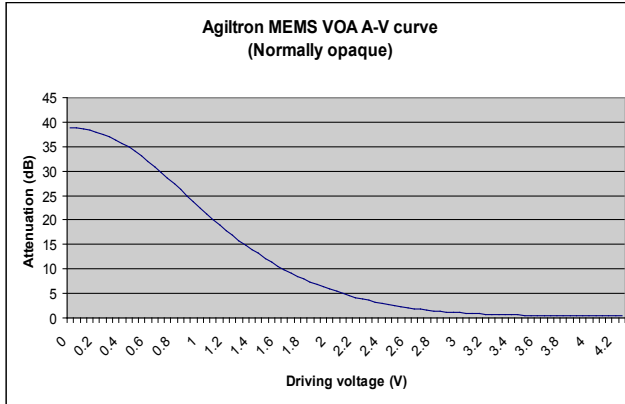
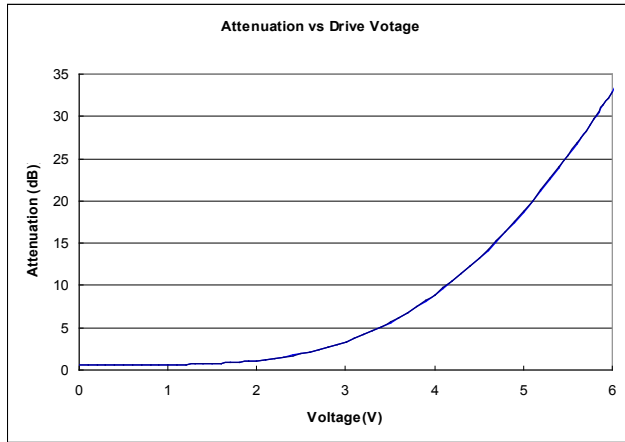
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# MEMS VOA Typical Performance Charts (1)

## VOA Performance (tested with open-loop)

### 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 (2)

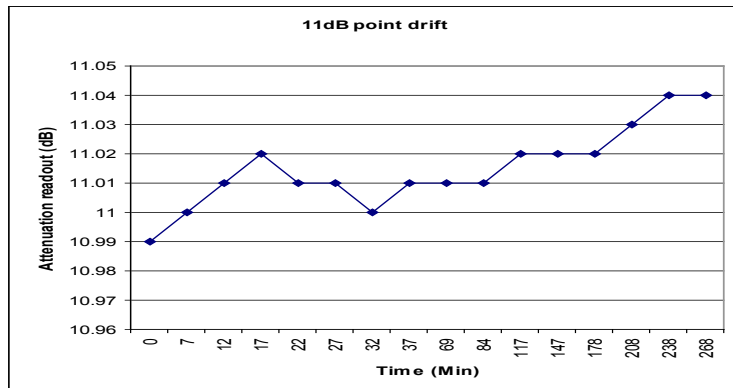
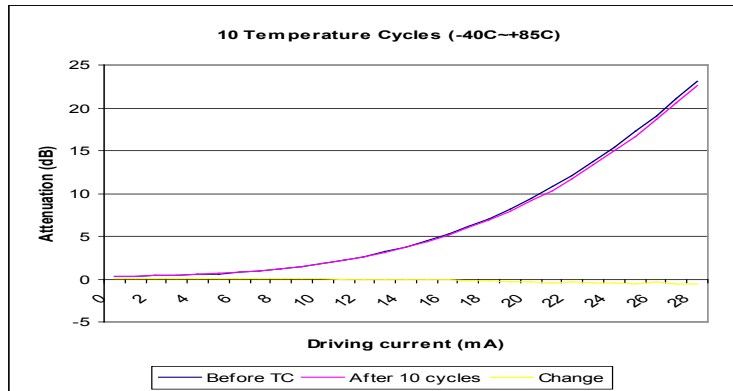
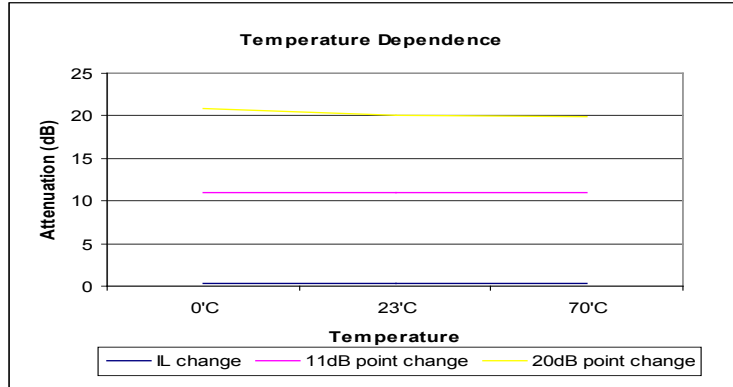
## Features

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

## Applications

- Power Control
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- Instrumentation

### VOA Performance

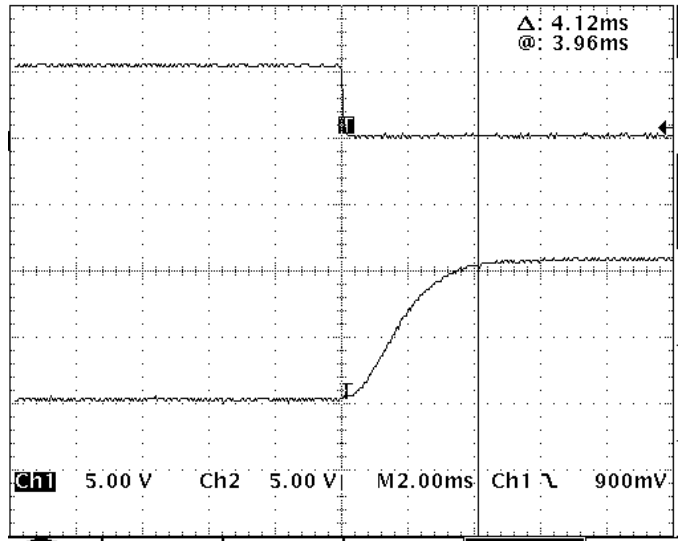
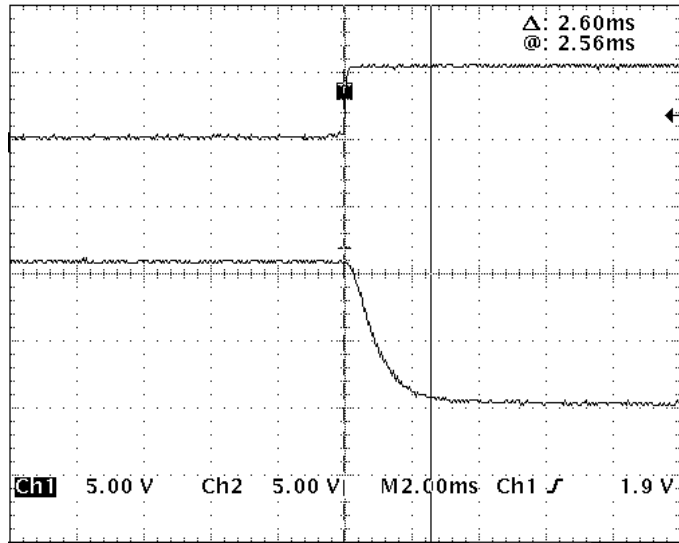


# MEMS VOA Typical Performance Charts (3)

## VOA Performance

### Features

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



### Applications

- Power Control
- Power Regulation
- Channel Balance
- Instrumentation



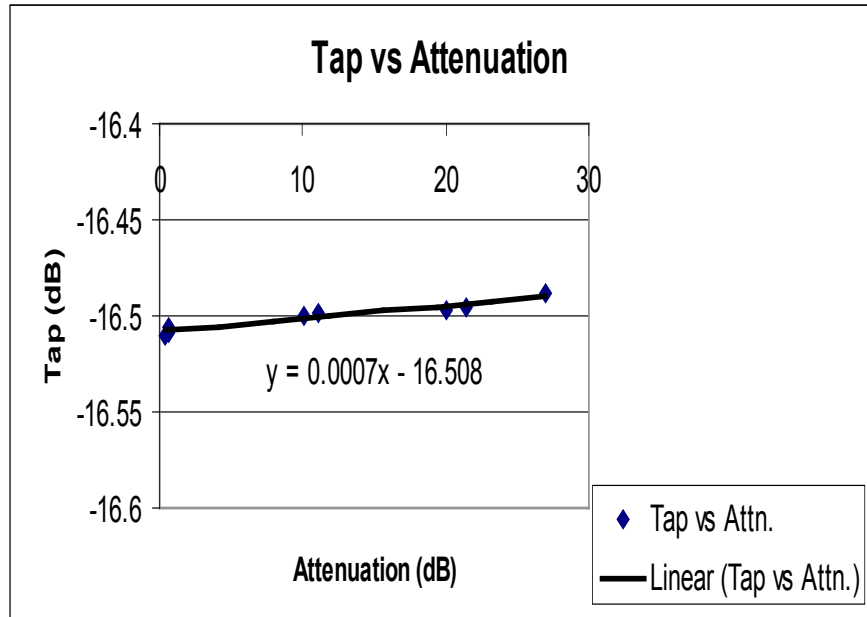
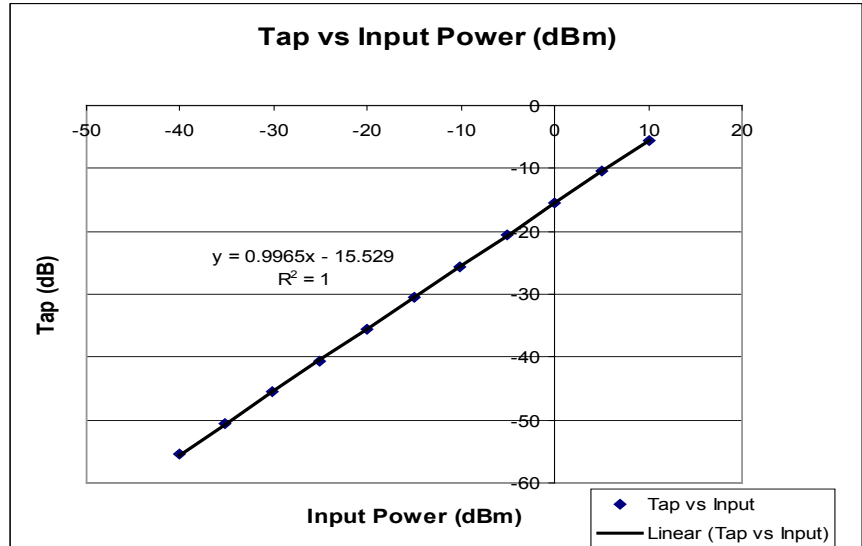
# MEMS VOA Typical Tap Performance Charts (1)

## Features

- VOA + Tap
- Compact
- Low Cost
- High Reliability
- Low IL, PDL, WDL & TDL
- Direct Low Voltage Drive

## Applications

- Power Control
- Power Regulation
- Channel Balance
- Instrumentation



# MEMS VOA Typical Tap Performance Charts (2)

## Features

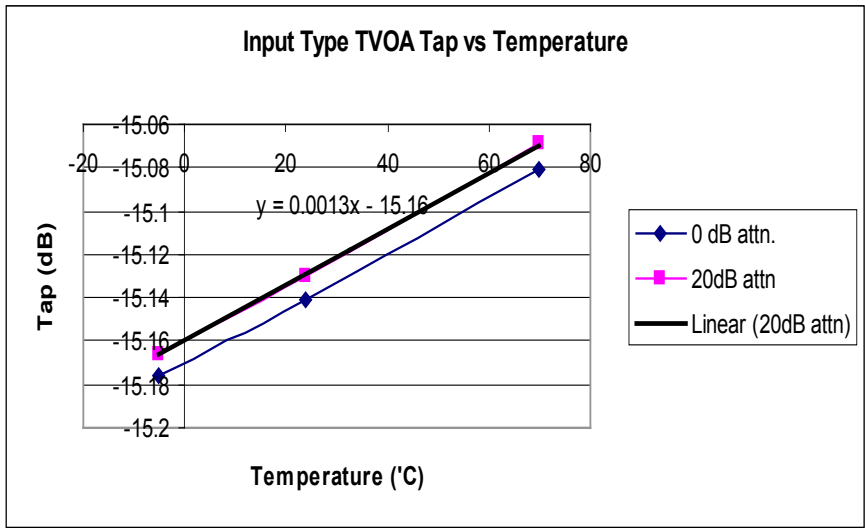
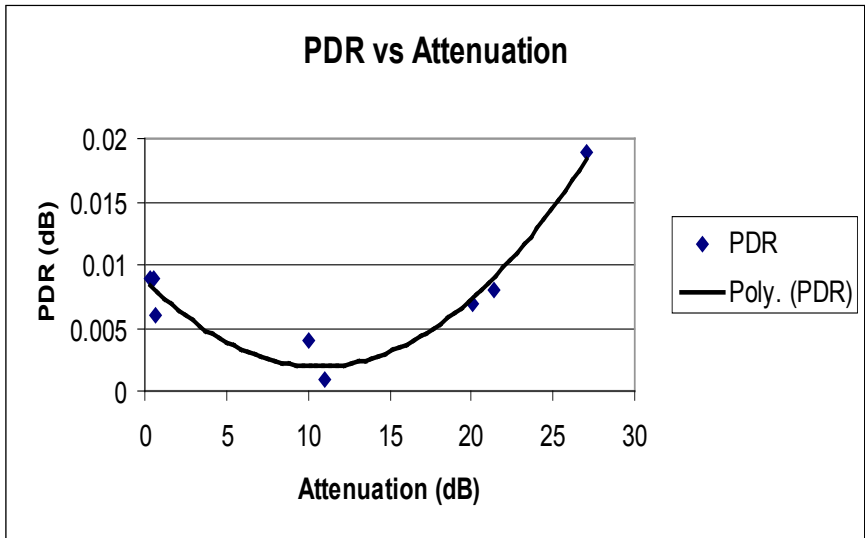
- VOA + Tap
- Compact
- Low Cost
- High Reliability
- Low IL, PDL, WDL & TDL
- Direct Low Voltage Drive

## Applications

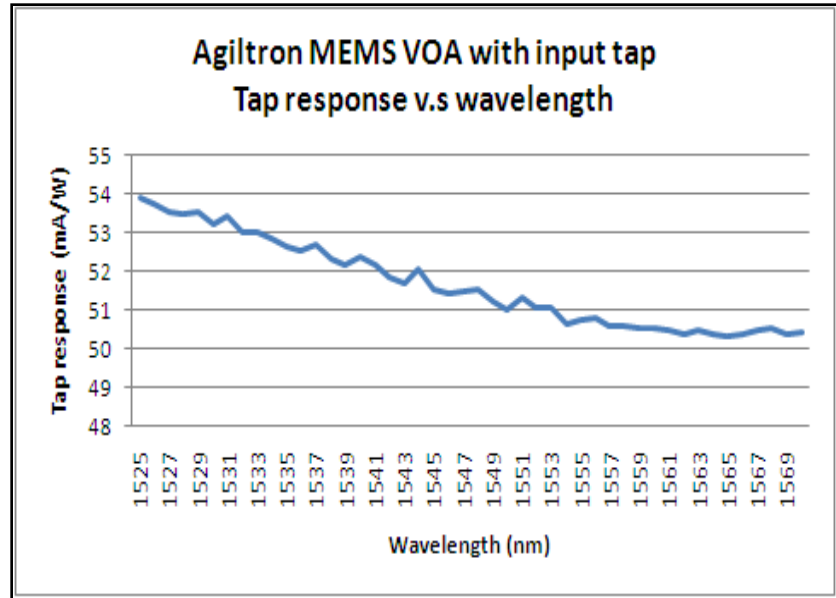
- Power Control
- Power Regulation
- Channel Balance
- Instrumentation



Revision: 060-12



# MEMS VOA Typical Tap Performance Charts (3)



## Features

- VOA + Tap
- Compact
- Low Cost
- High Reliability
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- Direct Low Voltage Drive

## Applications

- Power Control
- Power Regulation
- Channel Balance
- Instrumentation



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