

Vibration Insensitive MEMS VOA with Input Power Monitor

(Directional and Unidirectional) (patent protection US8666218B2)



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Features

- Integrated
- Low Loss Device
- Custom Tap Ratios Available
- Compact Design

Applications

- Channel Monitoring
- Power Monitoring in Optical Interface Modules
- Gain Monitoring for Amplifier
- DWDM System Monitoring

The MOAP MEMS Variable Optical Attenuator (VOA) uses a vibration-insensitive thermal-MEMS mechanism for reliable operation under shock and high-vibration conditions, engineered for aircraft, shipboard, and other vibration-prone platforms. An optional Input Optical Power Monitor integrates an InGaAs PIN photodiode with the VOA in a single hybrid module, reducing component count, and footprint. The VOA exhibits little wavelength dependence and minimal temperature dependence and drift.

Specifications

Parameter	Min	Typical	Max	Unit
Wavelength	1260		1620	nm
Insertion Loss ^[1]		0.6	0.8	dB
Polarization Dependent Loss ^[2]		0.15	0.8	dB
Wavelength Dependence Loss ^[3]			0.3	dB
Attenuation Range		25	35	dB
Attenuation Resolution		Continuous		
Polarization Mode Dispersion ^[2]	0.005	0.01	0.05	ps
Return Loss	38			dB
Optical Power ^[4]			0.2	W
Response Time	0.2	1	5	ms
TAP ratio	1	3	5	%
Tap Response @ 1550nm	12	15	40	mA/W
Wavelength Dependence Response		0.02	0.03	dB/nm
Polarization Dependence Response ^[2]	0.02	0.10	0.25	dB
Temperature Dependence Response			0.01	dB/°C
Dark Current at 5V bias @ 23°C			1	nA
3dB Bandwidth (cutoff frequency)		10		MHz
Capacitance			6	pF
Power Consumption		130	180	mW
Operating Temperature	-5		75	°C
Storage Temperature	-40		85	°C
Reliability	Telcordia 1209 and 1221			

Note:

- [1]. Without connector and in room temperature.
- [2]. At attenuation equal or less than 20dB
- [3]. At 0dB attenuation and in whole temperature range. Within 30nm Bandwidth.
- [4]. Requires heat sink at the high input power.

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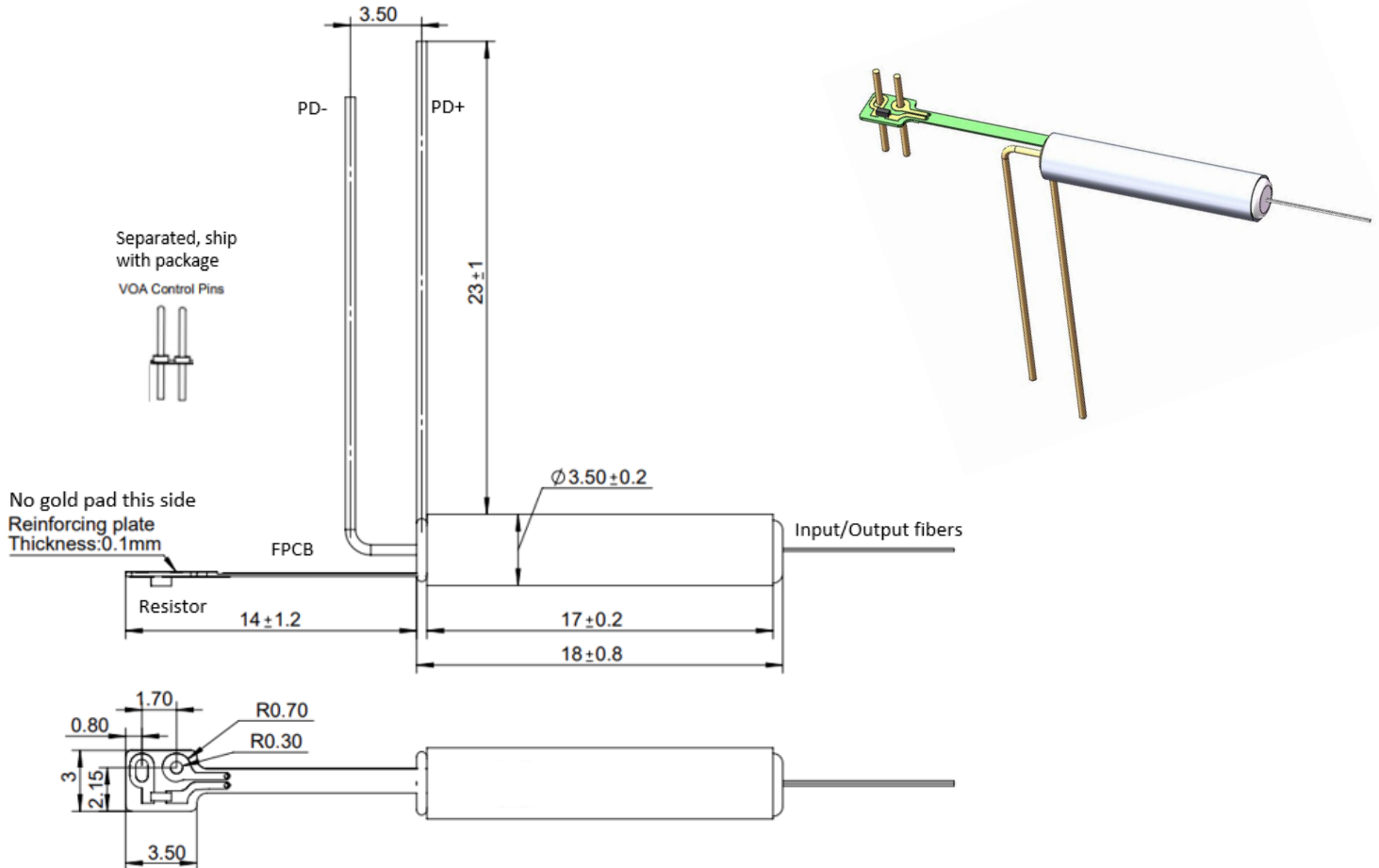
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Mechanical Footprint Dimensions (Unit:mm)



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

Electrical Driving Instruction

Handling and Operating Notes for VOA and Photodiode Connections

- The flexible PCB is for VOA driving. The VOA behaves as a resistive load, has no polarity, and is not sensitive to ESD.
- The maximum control voltage for the VOA is 5 V.

⚠ Applying a voltage higher than 5 V may damage the device.

- The PD+ and PD- pads are for connecting an external photodiode.
- The Tap photodiode is extremely sensitive to electrostatic discharge (ESD).

⚠ Even minor ESD damage may not cause immediate failure, but can lead to gradual performance degradation.

- Always short the PD+ and PD- pins together during handling or transport.
- The black conductive foam covering the photodiode pins must not be removed until final assembly in an ESD-safe environment.

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Ordering Information (Part Number)

	☐	☐	☐	☐	☐	☐	☐	☐
Prefix	Tap Ratio	Wavelength	VOA Off State	Directivity	Fiber Type	Fiber Cover	Fiber Length	Connector ^{[1][2]}
MOAP-	3% = 03 None Tap = 01 Special = 00	C+L = 2 1310 = 3 1550 = 5 1260-1620 = B Special = 0	Transparent = 1 Opaque = 2	No = 1 Yes = 2	SMF-28 = 1 PM1550 = 2 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/PC = 7 LC/APC = 8 Special = 0

[1]. Regular fiber connector has PER ~22dB. Connector with PER >27 dB is available using special process

[2]. The connector cannot be installed directly onto bare fiber, as it 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 can remove this protective tube after testing. The optical power handling of a standard connector is less than 0.5 W for SM28 fiber and decreases further with smaller core fibers.

Note:

"transparent" means no attenuation without applying a controlling voltage, the "opaque" means the highest attenuation without applying a controlling voltage.

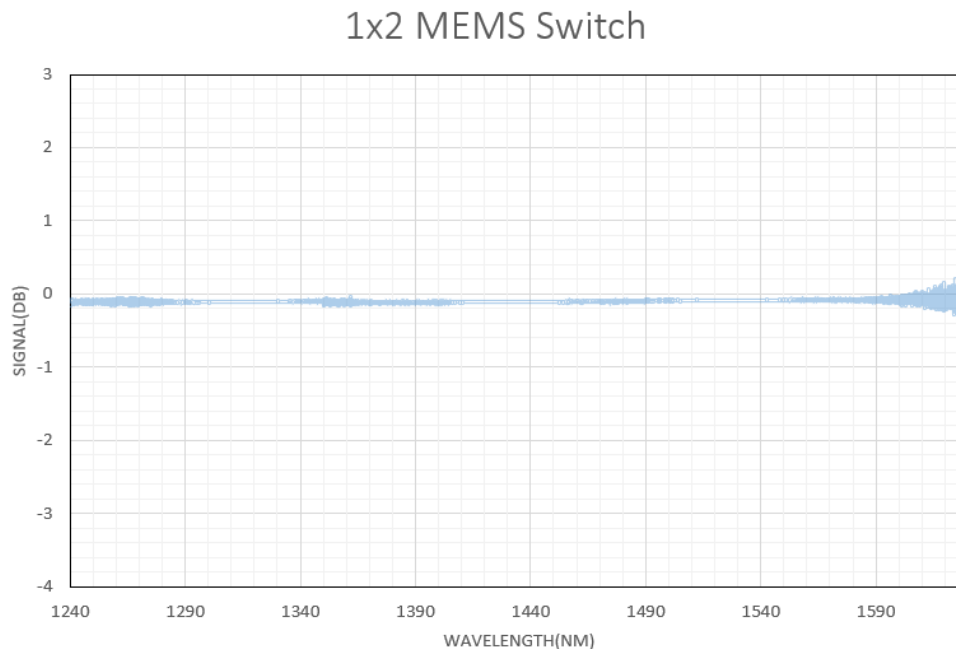
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Typical Insertion Loss vs Wavelength (1240-1630nm)



Response 0~20dB

