

MEMS 1x4 Mini Latching Series Fiber Optic Switch

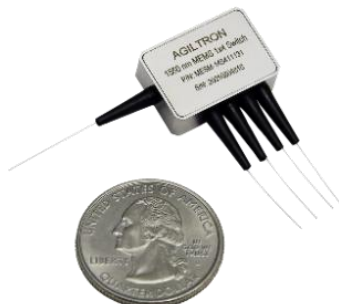
(Bidirectional, SM, PM)

(Protected by U.S. pending patents)



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Applications

- Channel Blocking
- Configurable Add/Drop
- System Monitoring
- Instrumentation

Features

- High reliability
- Intrinsic tolerance to ESD

The MEMS 1x4 Latching Type Series Fiber Optic Switch connects optical channels by redirecting incoming optical signals into selected output fibers. This is achieved using a patent pending MEMS™ configuration and activated via an electrical control signal. It uniquely features rugged thermal activated micro-mirror movement instead of rotation.

This novel design significantly reduces packaging requirement and simplifies driving electronics, offering unprecedented high stability as well as an unmatched low cost.

Specifications

Parameter		Min	Typical	Max	Unit
Operation Wavelength	Single Band	850±40, 1310±40 or 1510±40			nm
	Dual Band	850±40 and 1310±40 1310±40 and 1510±40			
	Broad Band	1260~1620			
Insertion Loss ^[1]			0.6	1.0 (1.2 ^[2])	dB
Wavelength Dependent Loss			0.15	0.3 ^[2]	dB
PDL (SM)				0.1	dB
Extinction Ratio (PM)		18			dB
Cross Talk ^[1]		50			dB
Return Loss ^[1]		50			W
Switching Time			5	10	ms
Repeatability				± 0.05	dB
Repetition Rate				5	Hz
Durability		10 ⁹			cycle
Switching Type		Latching			
Operating Temperature		-5		70	°C
Storage Temperature		-40		85	°C
Optical Power Handling (CW)			300	500	mW
Fiber Type	SM	SMF-28, or equivalent			
	PM	Panda 250, Panda 400 fiber, or equivalent			
	MM	MM 50/125, MM 62.5/125, or equivalent			

Notes:

[1]. Exclude connectors.

[2]. Dual and Broad band.

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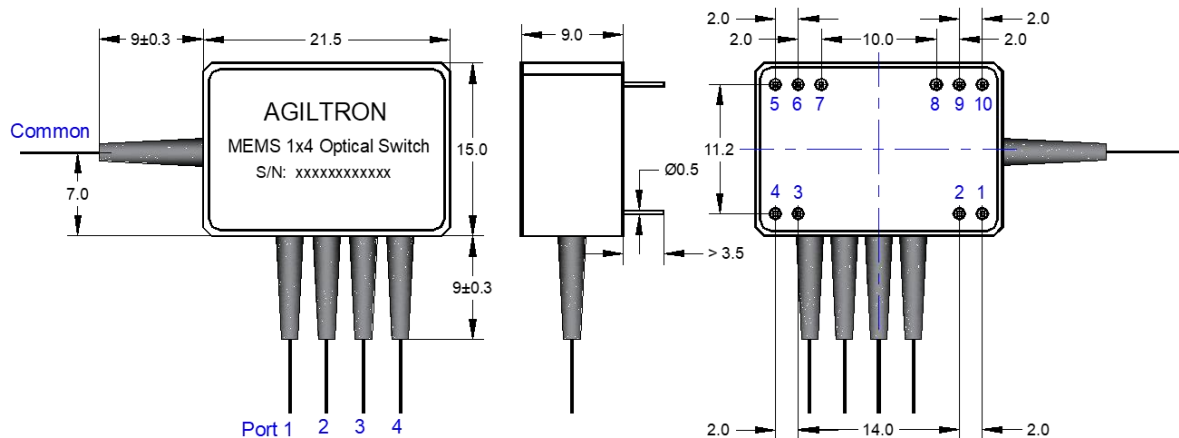
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Mechanical Footprint Dimensions (mm)



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

Electronic Control Requirements

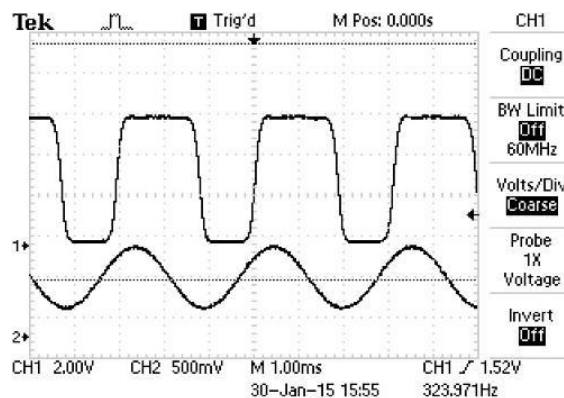
Optical Path	Pin Number									
	1	2	3	4	5	6	7	8	9	10
Com $\leftrightarrow$ Port 1	5 VDC ^[1]	0	0	0	0	0	0	0	0	5V Pulse
Com $\leftrightarrow$ Port 2			0	0	0	0	0	5V Pulse	5V Pulse	0
Com $\leftrightarrow$ Port 3			0	5V Pulse ^[2]	0	5V Pulse	5V Pulse	0	5V Pulse	0
Com $\leftrightarrow$ Port 4			0	0	5V Pulse	0	5V Pulse	0	5V Pulse	0

[1]. 5VDC: 5.0 $\pm$ 0.2 V. Static 3 mA; During Pulse Current is 100 mA. The switch will remain in its previous light path state, if this voltage is removed (latching).

[2]. 5V Pulse: 5.0 $\pm$ 0.2 V. Pulse width is 40 $\pm$ 5 ms.

10⁹ Switching Cycle Test

We have tested MEMS 1x2 switch at the resonant frequency ~300Hz for more than 40 days, as shown in the attachment, which corresponding over 10⁹ switching cycles. The measurements show little changes in Insertion loss, Cross Talk, Return loss ect, all parameters are within our specs.



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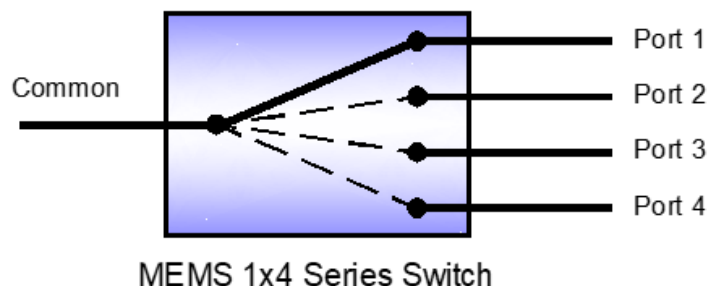
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Functional Diagram



Ordering Information (Part Number)

Prefix	Type	Wavelength	Switch	Package	Fiber Type	Fiber Cover	Fiber Length	Connector ^[3]
MESM- ^[1] MEMP- ^[2]	1x3 = 13 1x4 = 14 Special = 00	1260~1620 = B 1060 = 1 C+L = 2 1310 = 3 1550 = 5 780 = 7 850 = 8 1310/1550 = 9 Special = 0	Latching = 1	Standard = 1	SMF-28 = 1 PM1550 = B PM1310 = 3 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 Duplex LC/PC = 8 LC/APC = A LC/UPC = U Special = 0

[1]. **MESM**: MEMS 1x4 **SM** Mini Switch

[2]. **MEMP**: MEMS 1x4 **PM** Mini Switch

Note:

□ **PM1550** fiber works well for **1310nm**

[3]. 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.

Fiber Core Alignment

Note that the minimum attenuation for these devices depends on excellent core-to-core alignment when the connectors are mated. This is crucial for shorter wavelengths with smaller fiber core diameters that can increase the loss of many decibels above the specification if they are not perfectly aligned. Different vendors' connectors may not mate well with each other, especially for angled APC.

Fiber Cleanliness

Fibers with smaller core diameters (<5 µm) must be kept extremely clean, contamination at fiber-fiber interfaces, combined with the high optical power density, can lead to significant optical damage. This type of damage usually requires re-polishing or replacement of the connector.

Maximum Optical Input Power

Due to their small fiber core diameters for short wavelength and high photon energies, the damage thresholds for device is substantially reduced than the common 1550nm fiber. To avoid damage to the exposed fiber end faces and internal components, the optical input power should never exceed 20 mW for wavelengths shorter 650nm. We produce a special version to increase the how handling by expanding the core side at the fiber ends.

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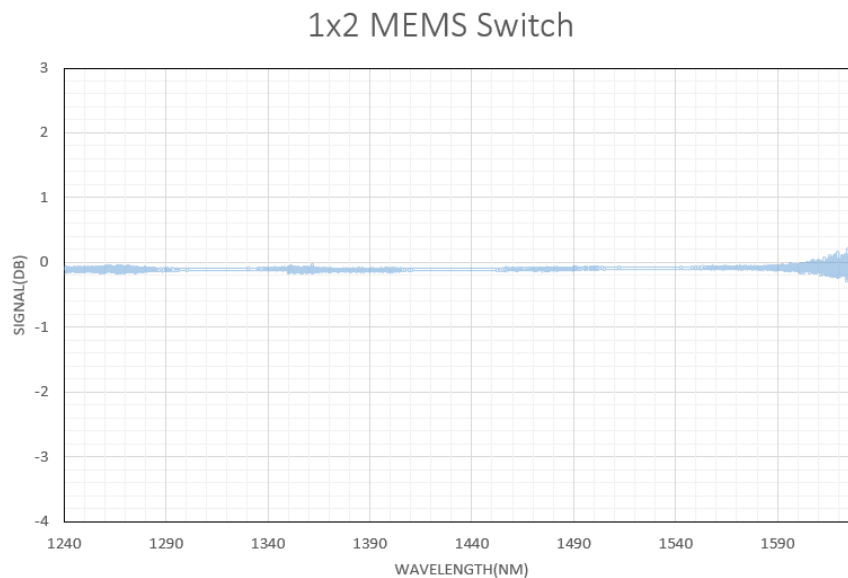
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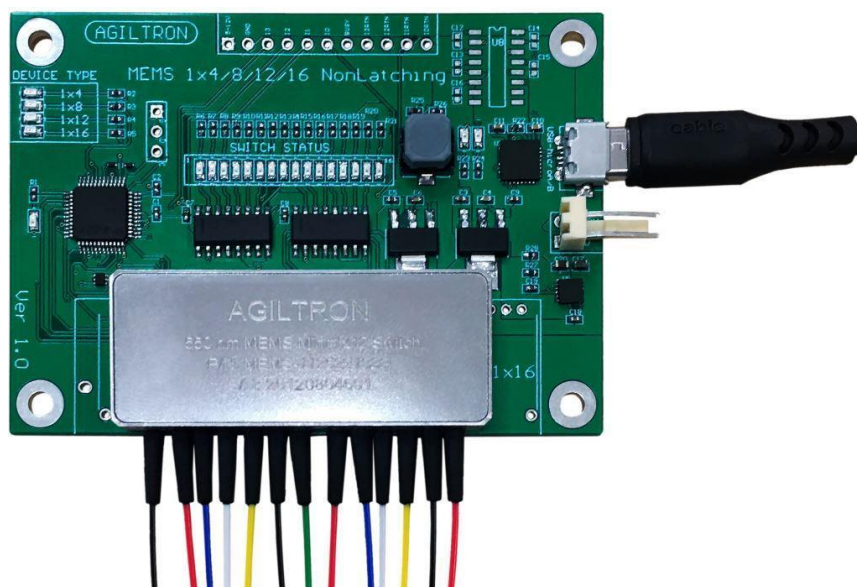
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Typical Insertion Loss vs Wavelength (1240-1630nm)



Demo Driver

USB RS232/GUI, Pushbutton/LED Channel Indicators (\$255)



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