

MEMS Ultra-Mini 1x2 Fiber Optical Switch/VOA >70dB Crosstalk



(Protected by US Patents 10752492, 10730740)

DATASHEET

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Features

- High Reliability
- Direct DC drive
- Ultra Small
- ESD Insensitive

The MEMS Ultra-Mini Fiber Optical 1x2 Switch with high cross talk uses a patented thermal activated micro-mirror, moving-in and -out optical paths, uniquely featuring high stability over a wide temperature range, small size, and exceptionally long operation life. The thermal MEMS is insensitive to moisture and ESD and has no short and long-term drifts, uniquely providing a high-reliability platform for over 25 years of continuous operation. The device also functions as a high-performance variable attenuator in which the output light intensity can be continuously controlled. The Ultra-Mini switches are Telcordia GR1221 qualified.

Agiltron provides driving circuit design and customer integrations. A low cost and convenient USB driver is also available.

This device also features a variable attenuation function, allowing the output power of each fiber port to be independently adjusted by varying the applied switching voltage.

Specifications

Parameter	Min	Typical	Max	Unit
Operation Wavelength		1260 ~ 1610		nm
		820 ~ 1340		
Insertion Loss ^[1]		0.6	1.0	dB
Polarization Extinction Ratio (PM)	18		30	dB
Return Loss ^[1]	50			dB
Cross Talk/On-Off ^[1] (SM, PM)	70	73	90	dB
PDL			0.2	dB
WDL			0.3	dB
TDL			0.3	dB
Switching Time		5	10	ms
Repeatability			± 0.05	dB
Durability	10 ⁹			Cycle
Repetition Rate		10		Hz
Power Consumption (activated)		270		mW
Switching Type		Non-Latching		
Operating Temperature ^[3]	-5		+70	°C
Storage Temperature	-40		+85	°C
Optical Power Handling		300	500	mW
Package Weight		1.9		g

Notes:

- [1]. Excluding connectors.
- [2]. Adjusting driving voltage increase this cross talk by aligning the MEMS mirror blocking position
- [3]. Lower temperature version is available, please call us.

Note: The specifications provided are for general applications with a cost-effective approach. If you need to narrow or expand the tolerance, coverage, limit, or qualifications, please [click this link](#):

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Rev 11/13/24

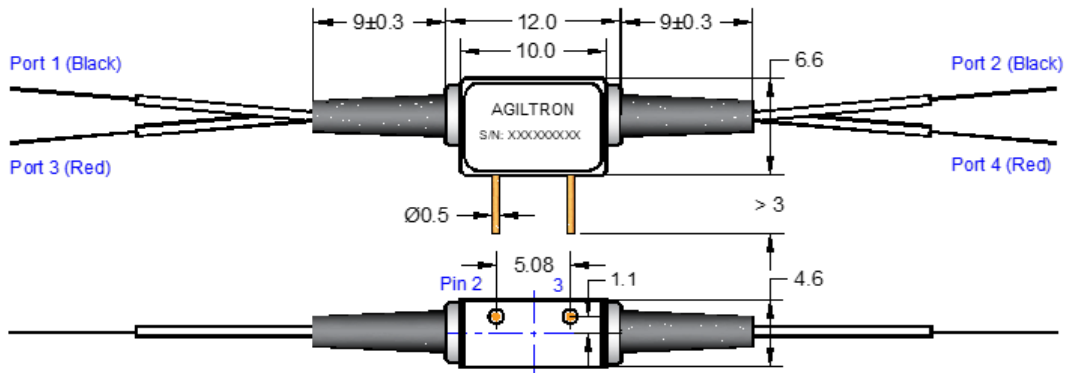
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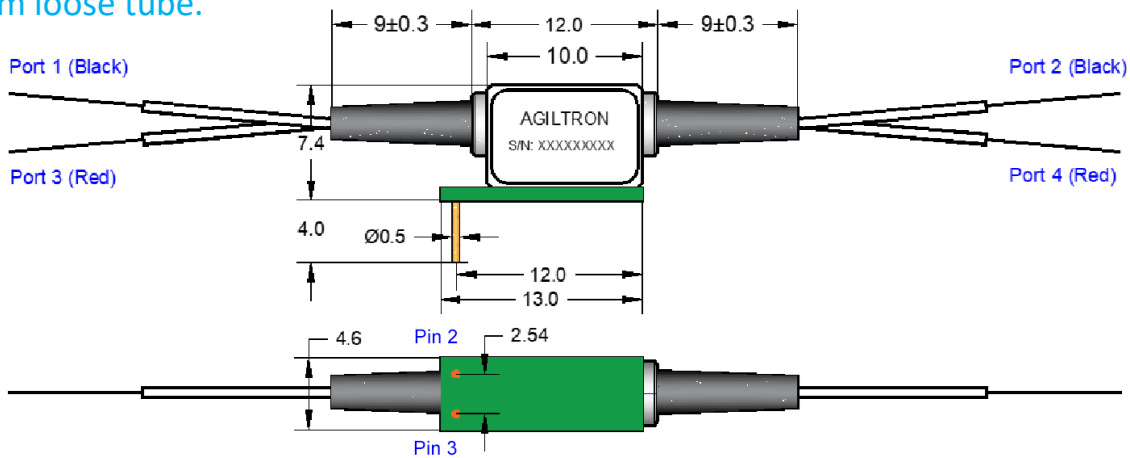
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Mechanical Dimensions (mm)

Package 1: For 1 ~ 4 bare fibers and = 2 fibers with 900 μm loose tube.



Package 3: Add Adapting PCB version, for 1 ~ 4 bare fibers and = 2 fibers with 900 μm loose tube.



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

Electrical Driving Requirements

Status	Optical Path	Pin No.	
	1x2	Pin 2	Pin 3
Status I	Port 1→2	0	+V [1]
Status II	Port 1→3	0	0

[1]. +V: 4 ~ 4.2VDC.

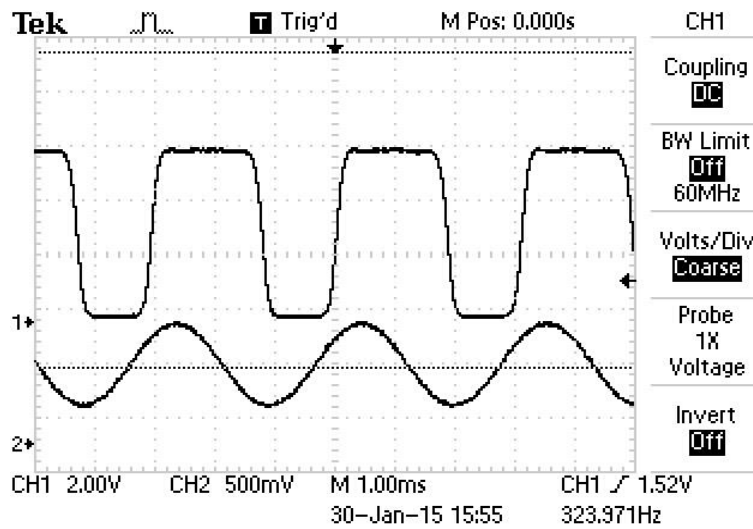
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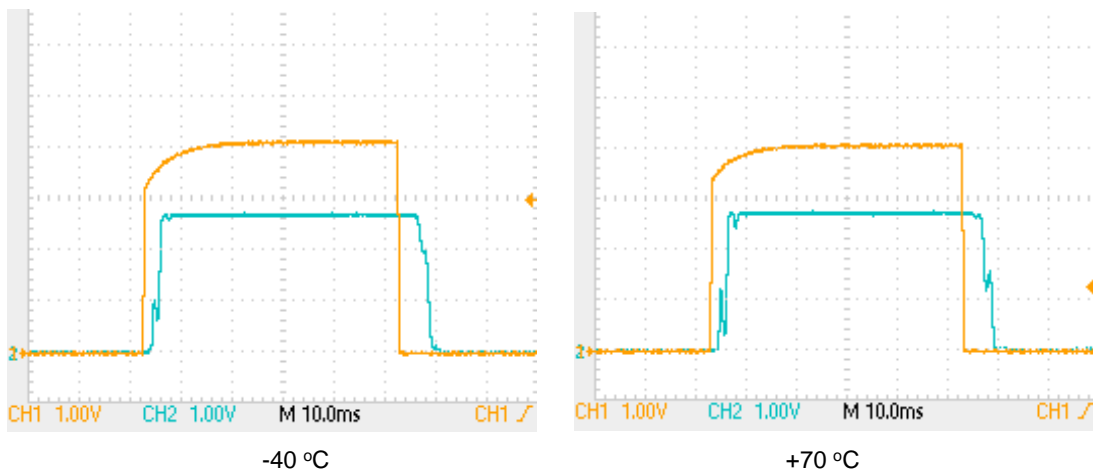
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10⁹ Switching Cycle Test

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



Typical Switching Rise/Fall at -40°C and 70°C

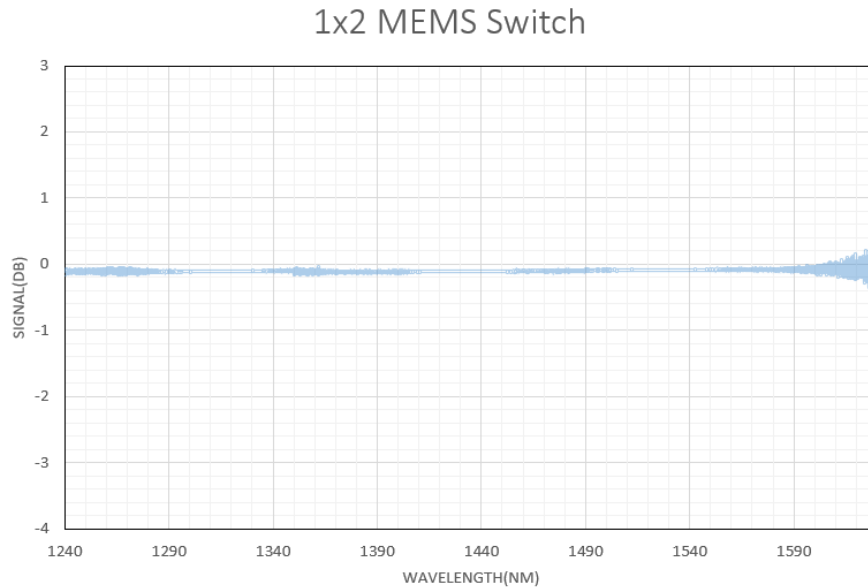


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Typical Insertion Loss vs Wavelength (1240-1630nm)



Vibration (40-1200Hz) Test Results

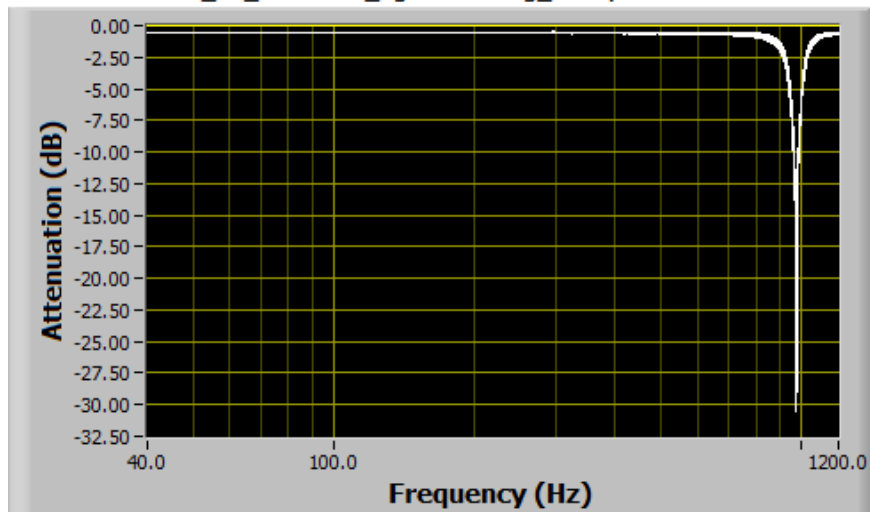
Test condition:

1. Acceleration: 1g from 40Hz to 100Hz, and then from 100Hz to 1200Hz, from 1g to 2g
2. Vibration direction: Z axis of MSOA SN# U03081
3. Measure fiber optical insertion loss change

Results:

1. Resonance frequency: ~976 Hz, max IL change ~30dB
2. IL change <0.1dB for frequency <200Hz, 0.1-0.2dB for frequency 200-500Hz.

MSOA-U03081-Z_0V_40-100Hz_1g-1000Hz-2g_1 oct/min



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Ordering Information

Prefix	Type	Wavelength*	Configuration	Package	Fiber Type	Fiber Cover	Fiber Length	Connector
MIHS- ^[1]	1x1 N/T ^[2] = 1T 1x1 N/O ^[3] = 1O 1x2 = 12 2x1 = 21 Special = 00	1060 nm = 1 850 nm = 8 1310/1550 nm = 9 820~1340 nm = A 1260~1620 nm = B Special = 0	Non-latching = 2 No-latching/ ER30 = 3	Package 1 ^[4] = 1 Package 3 ^[5] = 3 Special = 0	SMF-28 = 1 HI1060 = 2 HI780 = 3 PM1550 = B PM1310 = D PM980 = E PM850 = F Special = 0	Bare fiber = 1 900 um 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 MTP = 9 LC/APC = A LC/UPC = U Special = 0

- [1]. **MIHS**: MEMS U-MINI 1x1, 1x2 High CT>70 dB Switch.
 - [2]. **N/T**: MEMS U--MINI Non-Latching 1x1 Switch, Normally Transparent.
 - [3]. **N/O**: MEMS U--MINI Non-Latching 1x1 Switch, Normally Opaque.
 - [4]. Package 1 (see Drawing) is for 1 ~ 4 bare fibers and ≤ 2 fibers with 900 um loose tube.
 - [5]. Package 3 (see Drawing) is for add an Adapting PCB version.
- * Red: Special Order

Note:
Opaque means the light is blocked when no electrical power is present.

Application Notes

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 handling by expanding the core side at the fiber ends.