MEMS Ultra-Mini 1x2, 2x2 Fiber Optical Switch/VOA (SM, PM, MM)

(Protected by US Patent 10752492B2)

DATASHEET

Return to the Webpage

Features

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

The MEMS Ultra-Mini Series Fiber Optical Switch uses a patented thermal activated micro-mirror, moving-in and-out optical paths, uniquely featuring high extinction, high stability over a wide temperature range, and small size. 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 series switches are configured in 1x1, Dual 1x1, Quad 1x1, 1x2, Dual 1x2, Full 2x2, and Dual Full 2x2 with single or multimode fibers. The Ultra-Mini switches are Telcordia GR1221 qualified.

Two pin layouts and 5V are available for retrofit. 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 ~ 1620		nm
			820 ~ 1340		
Insertion Loss [1], [2]		0.5	0.7	1.0	dB
Extinction Ratio	PM version	18			dB
Return Loss [1]	SM, PM	50			dB
	Multimode	35			
Cross Talk [1]	SM, PM	50	60		dB
	Multimode	35	40		dB
PDL				0.2	dB
WDL				0.3	dB
TDL				0.3	dB
Switching Time			5	10	ms
Repeatability				±0.05	dB
Repetition Rate			10		Hz
Durability		10^9			Cycle
Power Consumption (activated)				270	mW
Switching Type			Non-Latching		
Operating Temperature [3]		-5		70	°C
Storage Temperature		-40		85	°C
Optical Power Handling (CW)			300	500	mW
Package Weight			1.9		g

Notes:

[1]. Excluding connectors.

[2]. Multimode IL measured @ Light Source CPR < 14dB.

[3]. Lower temperature version is available, please call us.

Rev 09/24/24

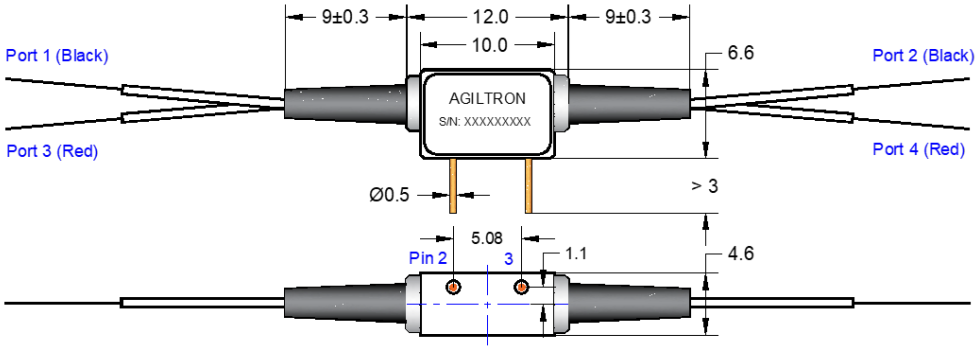
MEMS Ultra-Mini 1x2, 2x2 Fiber Optical Switch/VOA (SM, PM, MM)

(Protected by US Patent 10752492B2)

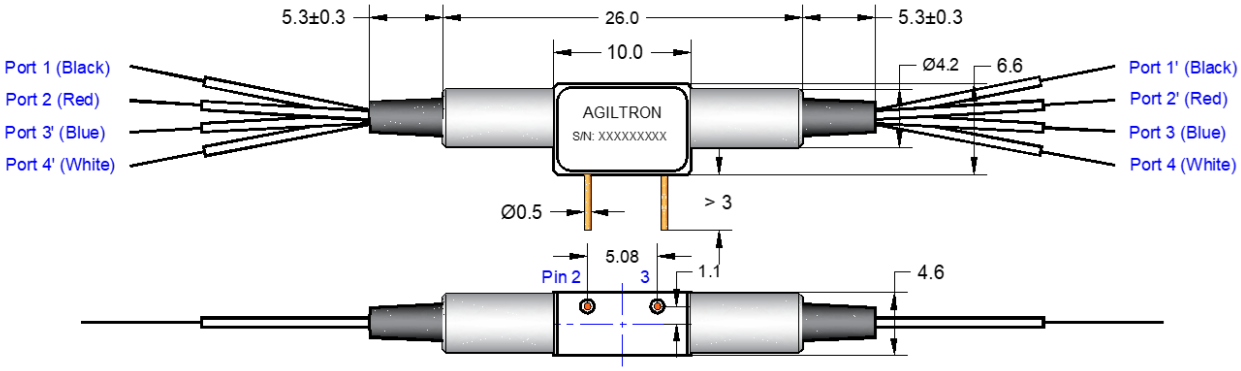
DATASHEET

Mechanical Dimension (mm)

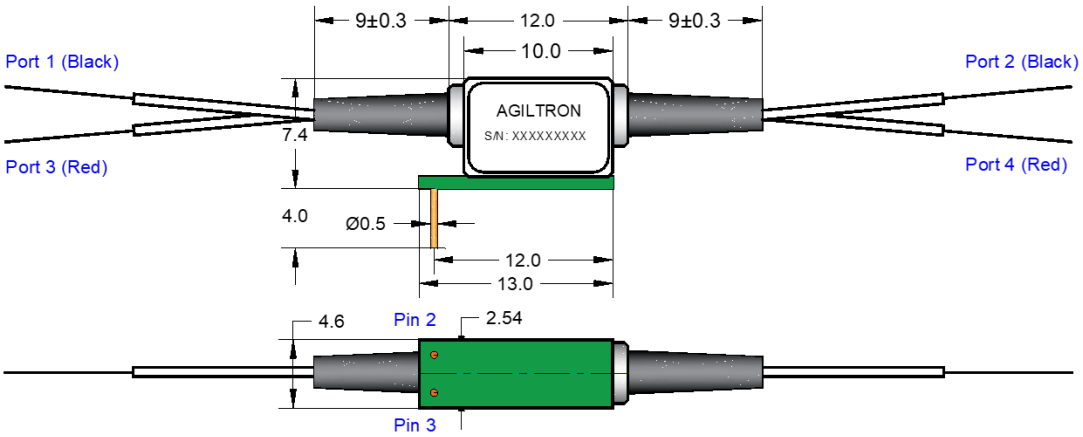
Package 1: For 1 ~ 4 bare fibers and = 2 fibers with 900 um loose tube.



Package 2: For = 3 fibers with 900 um loose tube.



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



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

MEMS Ultra-Mini 1x2, 2x2 Fiber Optical Switch/VOA (SM, PM, MM)

(Protected by US Patent 10752492B2)

DATASHEET

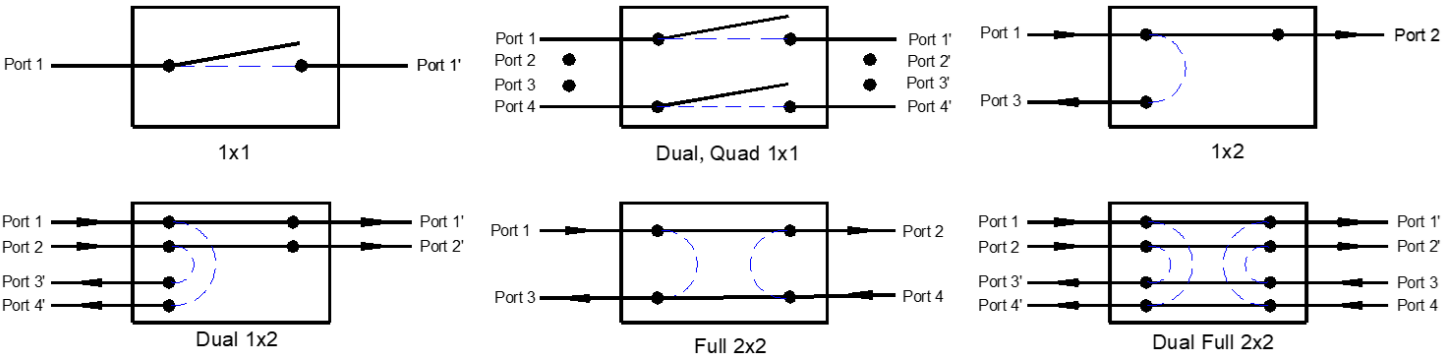
Electrical Driving Requirements

Status	Optical Path				Pin No.	
	1x2	Dual 1X2	Full 2x2	Dual Full 2x2	Pin 2	Pin 3
Status I	Port 1→2	Port 1→1' Port 2→2'	Port 1→2 Port 4→3	Port 1→1', Port 2→2' Port 3→3', Port 4→4'	0	+V [1]
Status II	Port 1→3	Port 1→4' Port 2→3'	Port 1→3 Port 4→2	Port 1→4', Port 2→3' Port 3→2', Port 4→1'	0	0

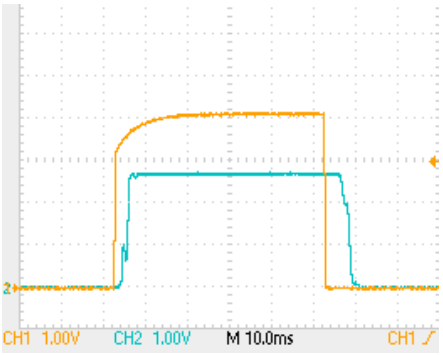
[1]. +V: 4.0 ~ 4.2VDC

Pushbutton/USB Driver

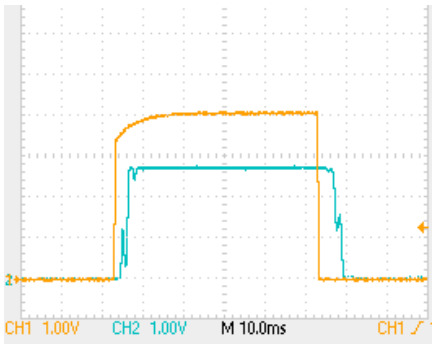
Functional Diagram



Typical Switching Rise/Fall at -40oC and 70oC



-40 °C



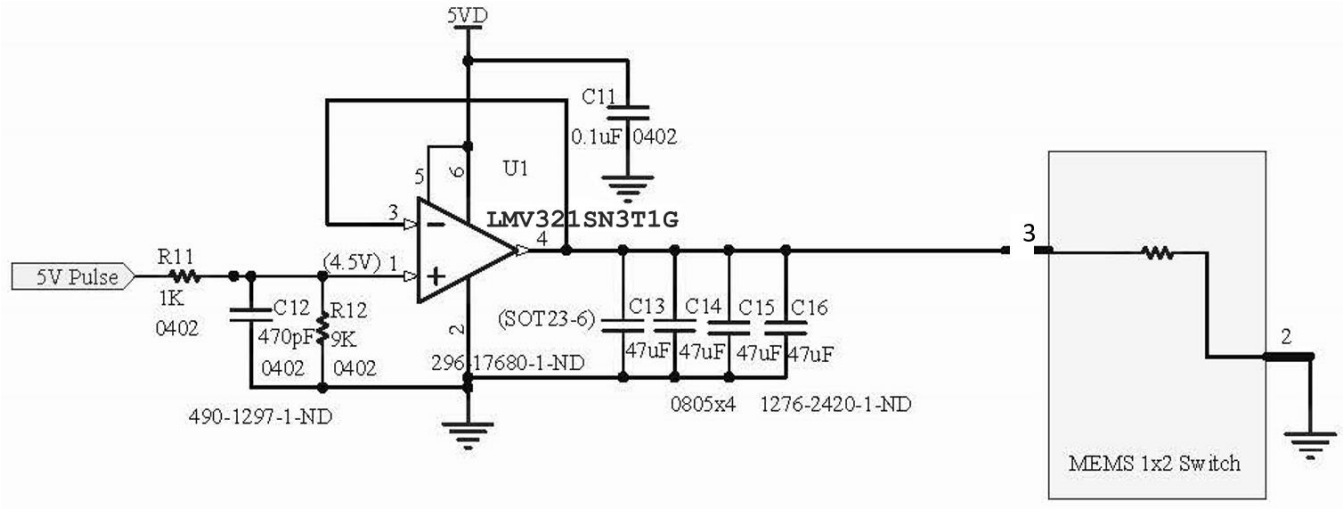
+70 °C

MEMS Ultra-Mini 1x2, 2x2 Fiber Optical Switch/VOA (SM, PM, MM)

(Protected by US Patent 10752492B2)

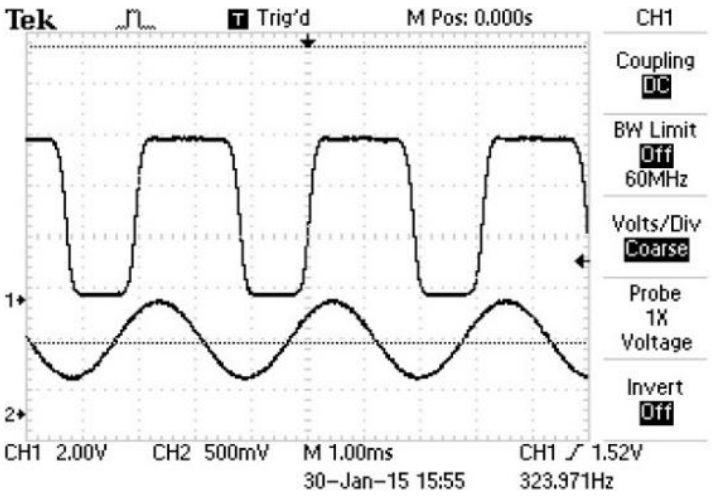
DATASHEET

Driving Circuit Recommendation



10^9 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 10^9 switching cycles. The measurements show little changes in Insertion loss, Cross Talk, Return loss, etc., all parameters are within our specs.



MEMS Ultra-Mini 1x2, 2x2 Fiber Optical Switch/VOA (SM, PM, MM)

(Protected by US Patent 10752492B2)

DATASHEET

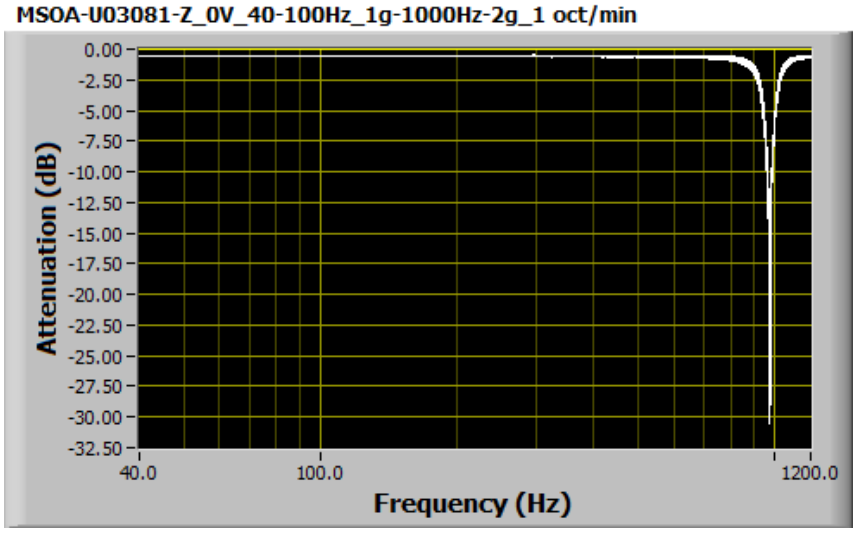
Vibration (40-1200Hz) Test Results

Test condition:

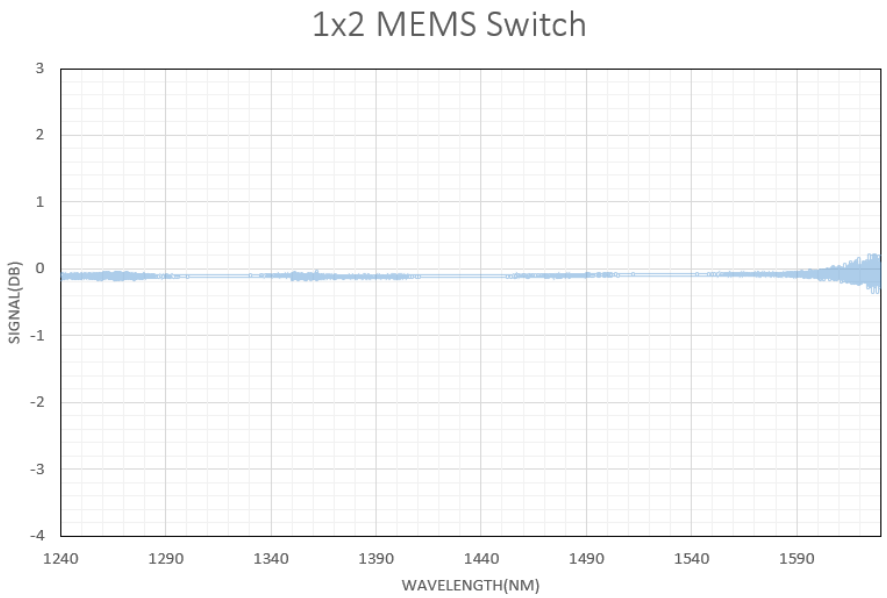
1. Acceleration: 1g from 40Hz to 100Hz, and then from 100Hz to 1200Hz, from 1g to 2g
2. Vibration direction: Z axis of MSOA SN# U03081
3. Measure fiber optical insertion loss change

Results:

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



Typical Insertion Loss vs Wavelength (1240-1630nm)



MEMS Ultra-Mini 1x2, 2x2 Fiber Optical Switch/VOA (SM, PM, MM)

(Protected by US Patent 10752492B2)

DATASHEET

Ordering Information

	☐☐	☐	2	☐	☐	☐	☐	☐
Prefix	**Type**	**Wavelength**	**Switch**	**Package**	**Fiber Type [11]**	**Fiber Cover**	**Fiber Length**	**Connector**
MISW- [1] **MIDU-** [2] **MIQU-** [3] **MIPM-** [4]	1x1 N/T [5] =1T 1x1 N/O [6] =1O 1x2=12 2x1=21 2x2=22 Special=00	1260~1620 nm = B 820~1340 nm = A Special = 0	Non-latching = 2	Package 1 [7] = 1 Package 2 [8] = 2 Package 3 [9] = A Package 4 [10] = B Special = 0	SMF-28 =1 MM 50/125 =5 MM 62.5/125 =6 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]. **MISW**: **M**EMS U--M**I**NI 1x1, 1x2, 2x2 **SW**ITCH.

[2]. **MIDU**: **M**EMS U--M**I**NI **DU**AL 1x1, 1x2, 2x2 Switch.

[3]. **MIQU**: **M**EMS U--M**I**NI **QU**AD 1x1.

[4]. **MIPM**: **M**EMS U--M**I**NI 1x1, 1x2 **PM** Switch.
For PM 2x2 configuration, please select a different version:
https://cdn-agl.agiltron.com/dlc/specs/MEMS%20Full%20Dual%20Full%202x2%20PM%20Non-latching%20Switch.pdf

[5]. **N/T**: MEMS U--M**I**NI Non-Latching 1x1 Switch, **N**ormally **T**ransparent (light pass through without applying a voltage).

[6]. **N/O**: MEMS U--M**I**NI Non-Latching 1x1 Switch, **N**ormally **O**paque. (light blocked without applying a voltage).

[7]. Package 1 (see Drawing) is for 1 ~ 4 bare fibers and ≤ 2 fibers with 900 um loose tube.

[8]. Package 2 (see Drawing) is for ≥ 3 fibers with 900 um loose tube.

[9]. Package 3 (see Drawing) is for add an Adapting PCB version.

[10]. Package 4 is for add Adapting PCB and 5 VDC control version

[11]. PM fiber version only available 1x1 and 1x2 configuration. For 2x2 configuration see a dedicated datasheet

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 how handling by expanding the core side at the fiber ends.