MEMS Ultra-Mini 1x2, 2x2 Fiber Optical Switch

SM, PM, MM

(Protected by US Patent 10752492B2) Bidirectional

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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 11/12/25

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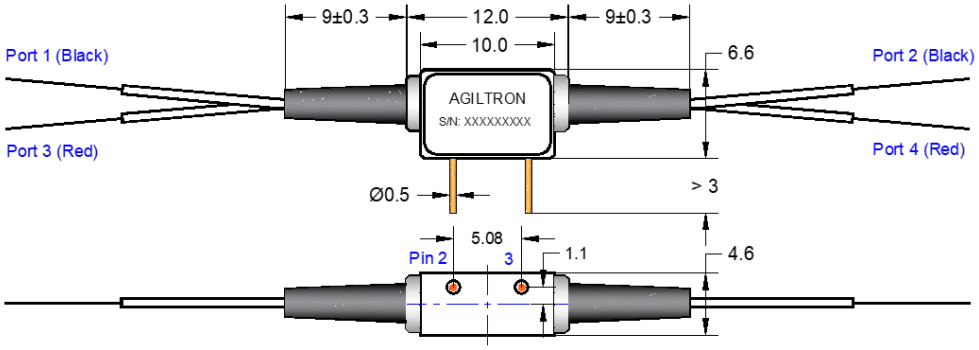
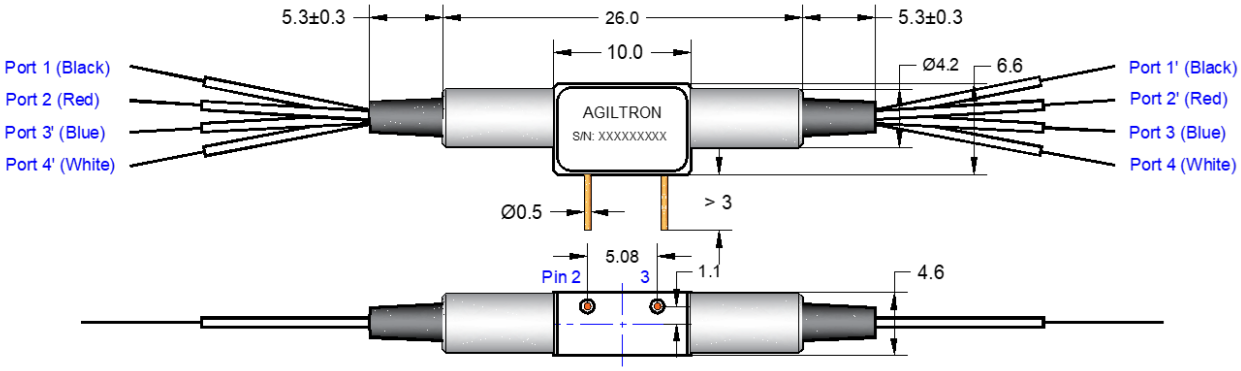
Mechanical Dimension (mm)

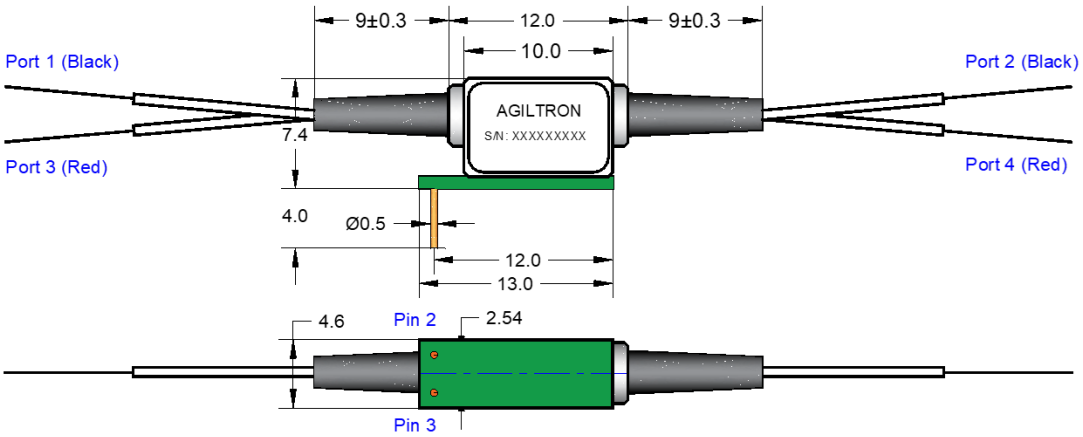
Package 1: For 1 ~ 4 bare fibers and = 2 fibers with 900 um loose tube.



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.

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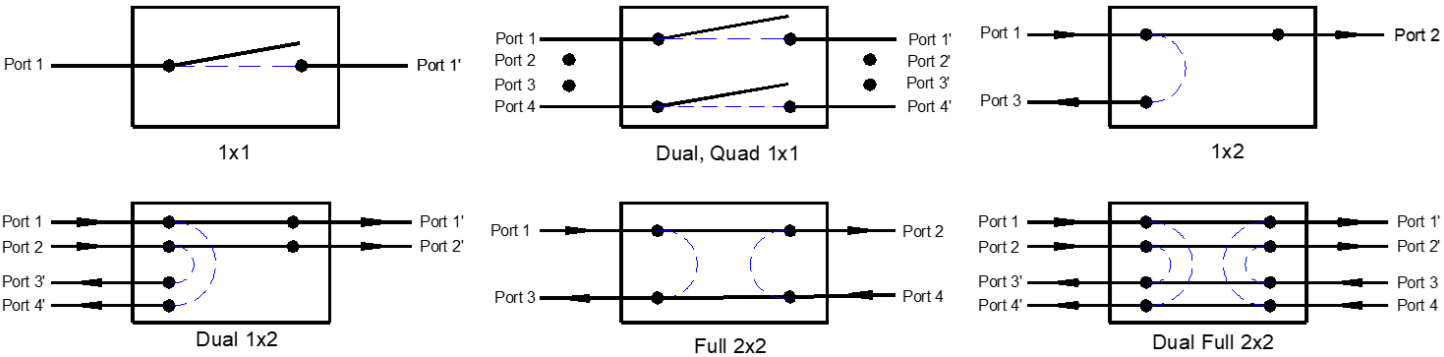
Electrical Driving Requirements

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

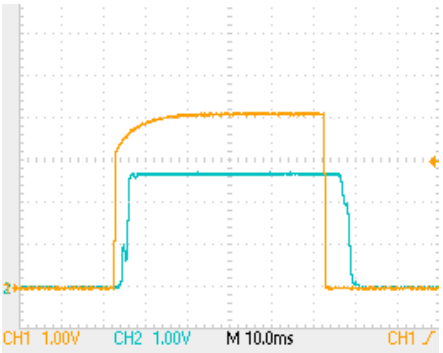
[1]. +V: 4.0 ~ 4.2VDC

Pushbutton/USB Driver

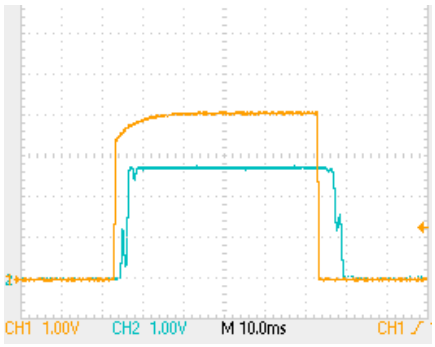
Functional Diagram



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



-40 °C



+70 °C

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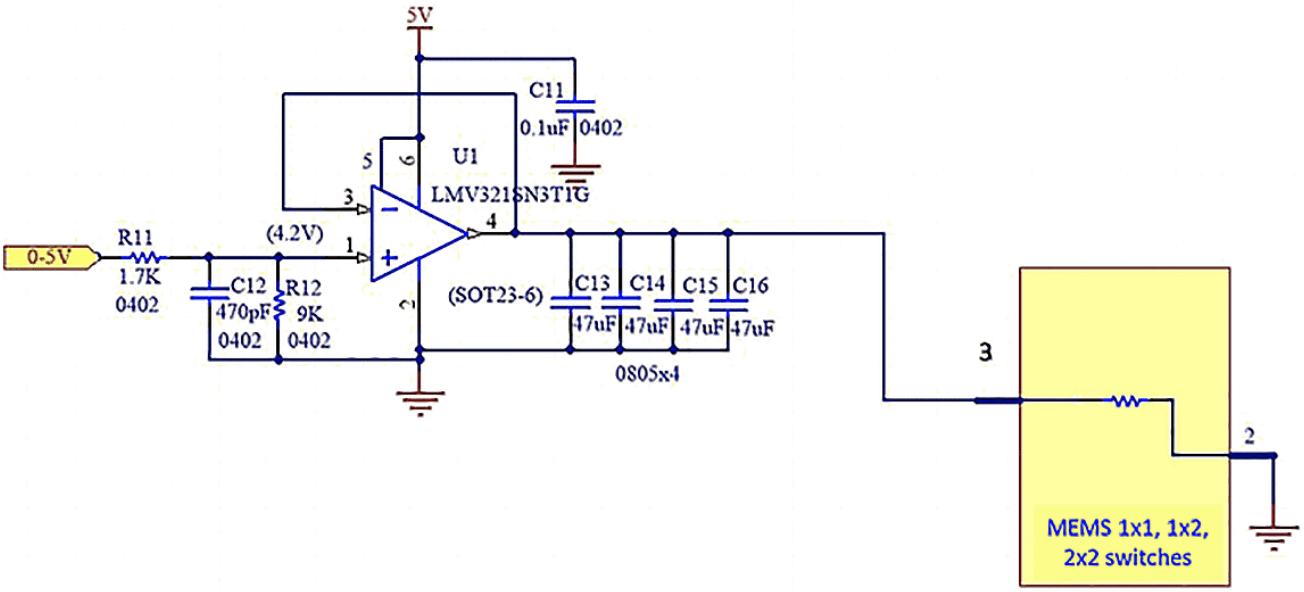
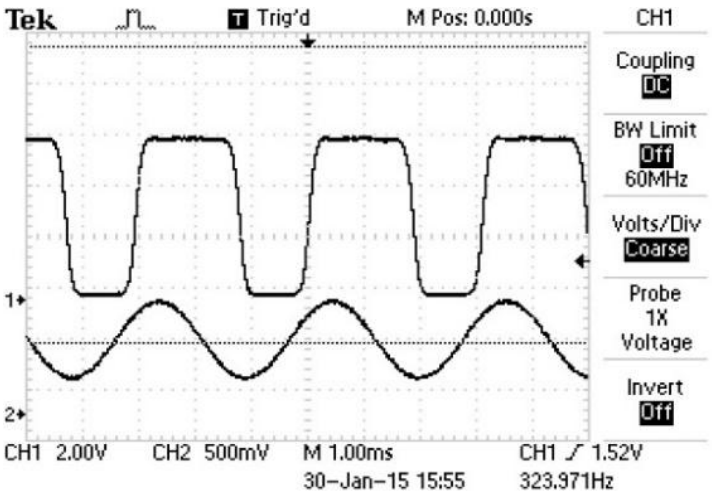
Recommendation Control Circuit



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.



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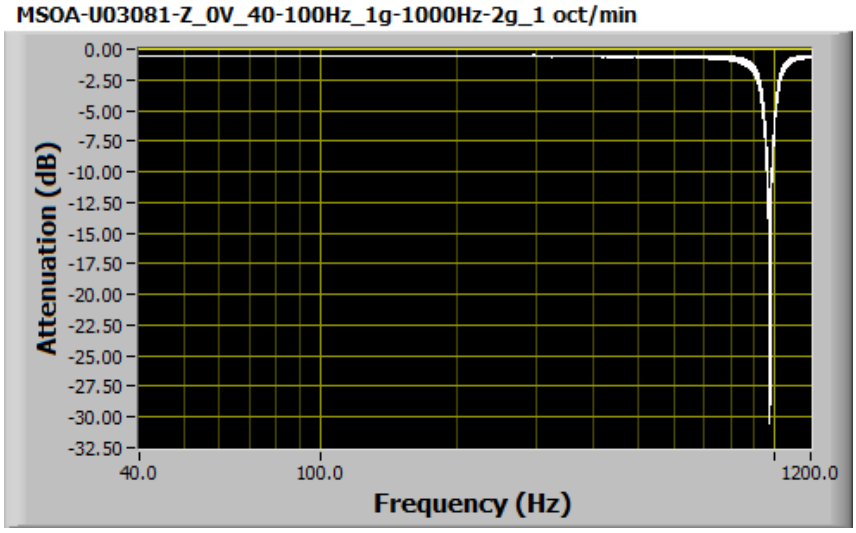
Vibration (40-1200Hz) Test Results

Test condition:

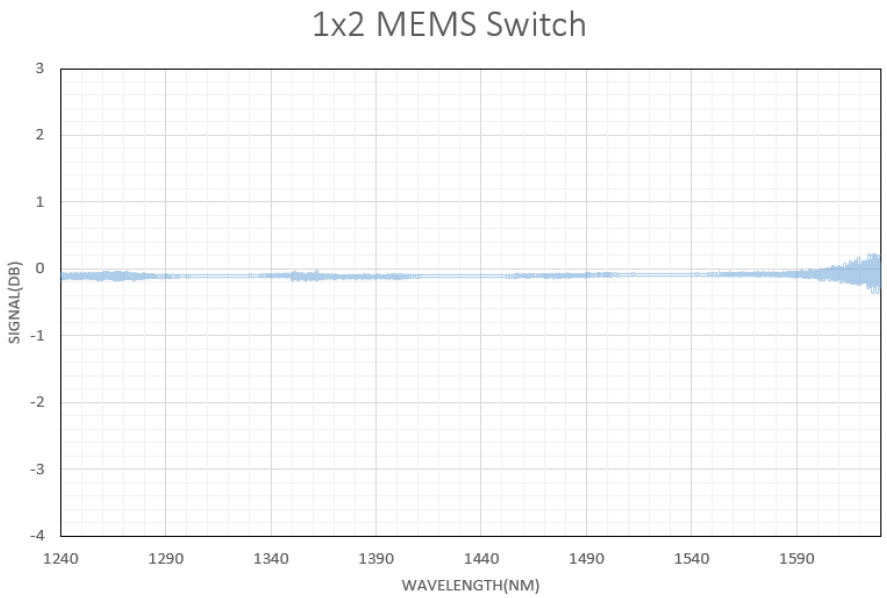
1. Acceleration: 1g from 40Hz to 100Hz, and then from 100Hz to 1200Hz, from 1g to 2g
2. Vibration direction: Z axis of MSOA SN# U03081
3. Measure fiber optical insertion loss change

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)



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Ordering Information (Part Number)

	☐☐	☐	☐	☐	☐	☐	☐	☐
Prefix	**Type**	**Wavelength**	**Configuration**	**Package**	**Fiber Type [11]**	**Fiber Cover**	**Fiber Length**	**Connector[12]**
MISW- [1] **MIDU-** [2] **MIQU-** [3] **MIPM-** [4]	1x1 N/T [5] = 1T 1x1 N/O [6] = 1O 1x2=12 2x2=22 2x1=21 Special=00	1260~1620 nm = B 820~1340 nm = A Special = 0	Standard = 2 Low Loss = 3	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**: MEMS U--MINI 1x1, 1x2, 2x2 **SW**ITCH.

[2]. **MIDU**: MEMS U--MINI **DU**AL 1x1, 1x2, 2x2 Switch.

[3]. **MIQU**: MEMS U--MINI **QU**AD 1x1.

[4]. **MIPM**: MEMS U--MINI 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--MINI Non-Latching 1x1 Switch, **N**ormally **T**ransparent (light pass through without applying a voltage).

[6]. **N/O**: MEMS U--MINI 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.

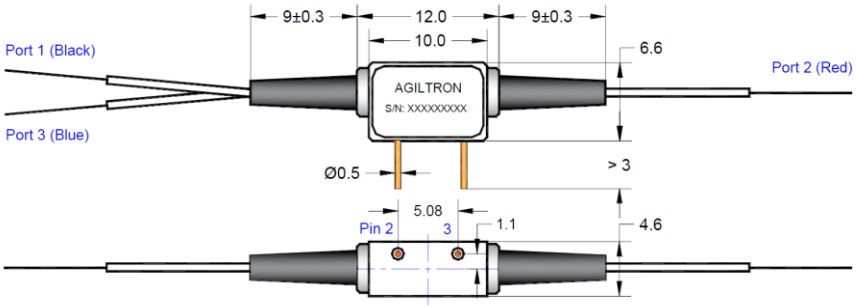
[9]. Package 3 (see Drawing) is for add an Adapting PCB version.

[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

[12]. 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.

Special Part Number MISW-12B2H1131V



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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