

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

(Protected by US Patent 10752492B2)

Product Description

The MEMS Ultra-Mini Series Fiber Optical Switch 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 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.

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



Performance Specifications

MEMS Ultra-Mini Series Switch	Min	Typical	Max	Unit
Operation Wavelength	Single Mode	1260~1610		nm
	Multimode	810~890 and/or 1260/1360		
Insertion Loss ^{[1], [2]}		0.6	1.0 / 1.2 ^[3]	dB
PDL (Single mode)			0.1	dB
Extinction Ratio	PM fiber	18		dB
Return Loss ^[1]	SM, PM	50		dB
	Multimode	35		
Cross Talk ^[1]	SM, PM	50		dB
	Multimode	45		
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 ^[5]		-5	70	°C
Storage Temperature		-40	85	°C
Optical Power Handling		300	500	mW
Package Dimension		10L x 6.6W x 4.6H		mm
Package Weight		1.9		g
Fiber Type ^[4]	Single Mode	SMF-28 or equivalent		
	PM	Panda 250 PM or equivalent		
	Multimode	MM 50/125, MM 62.5/125 or equivalent		

[1]. Excluding connectors.

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

[3]. Dual band, and Dual 1x2, Full 2x2, Dual Full 2x2.

[4]. PM fiber version only in 1x1 and 1x2 configuration.

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

Features

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

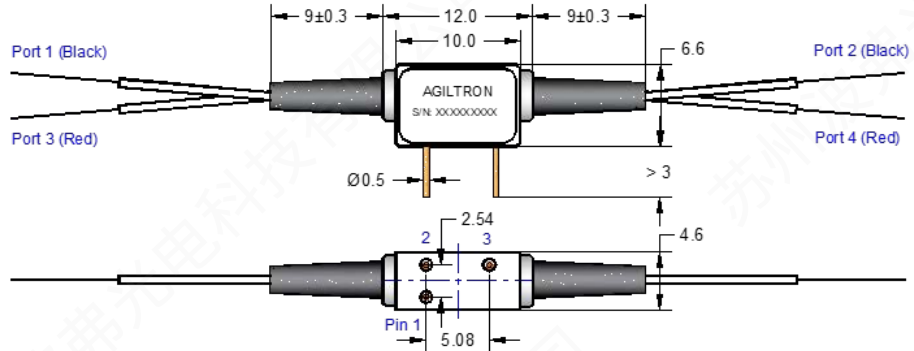


Revised on 7/9/2021

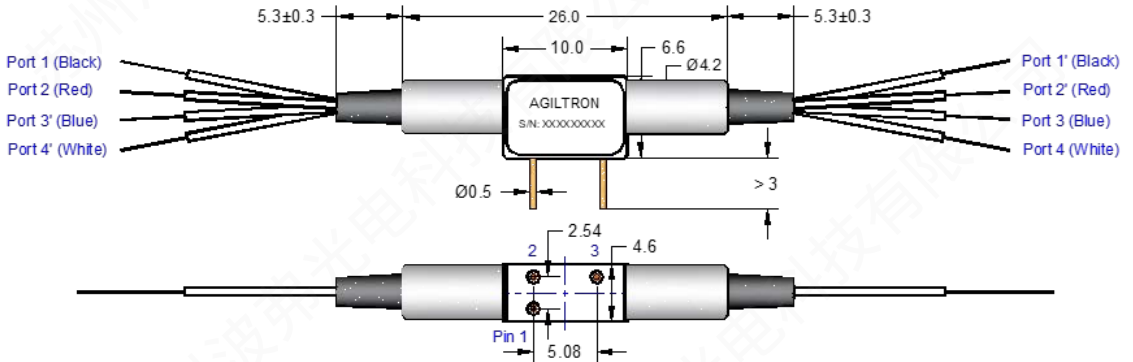
MEMS Ultra-Mini 1x2, 2x2 Fiber Optical Switch

Mechanical Dimension (unit: mm)

Package 1_ [1]. Bare fibers. [2]. 2-fiber with 900 um loose tube.



Package 2 _More than 2-fiber with 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	Dual 1X2	Full 2x2	Dual Full 2x2	Pin 1	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'	NC [1]	0	+V [2]
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'	NC	0	0

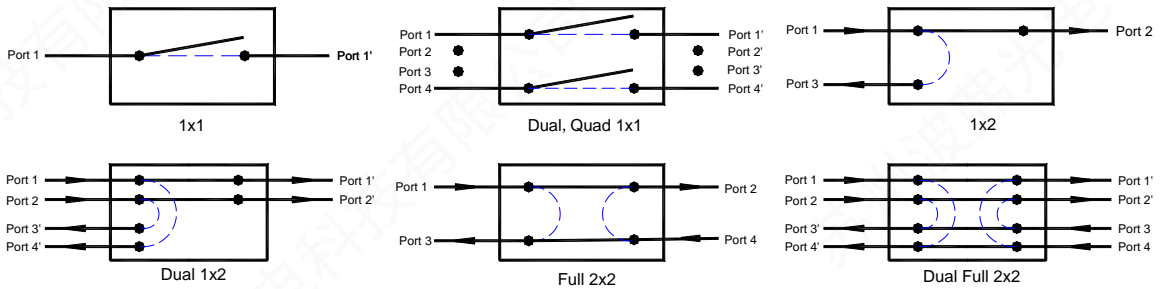
[1]. NC: No electronic connection.

[2]. +V: 3.8~4.5 VDC, Typical is 4.0 VDC.



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

Functional Diagram



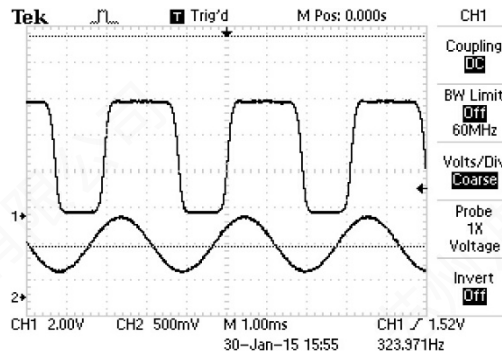
Ordering Information

Type	Wavelength	Switch	Package	Fiber Type	Fiber Length	Connector		
MISW ^[1]	1x1 N/T ^[5] =1T	1260-1620=B	Non-latching=2	Package 1 ^[7]	SMF-28=1	Bare fiber=1	0.25m=1	None=1
MIDU ^[2]	1x1 N/D ^[6] =1D	1060=1		Package 2 ^[8]	MM 50/125=5	900 um tube=3	0.5m=2	FC/PC=2
MIQU ^[3]	1x2=12	1310=3		Special=0	MM 62.5/125=6	Special=0	1.0m=3	FC/APC=3
MIPM ^[4]	2x2=22	1550=5			PM1550/250=B		Special=0	SC/PC=4
	Special=00	850 =8			PM1310/250=D			ST/PC=6
		1310/1550=9			PM980/250=E			LC=7
		850/1310=A			PM850/250=F			Duplex LC=8
		Special=0			Special=0			MTP=9
								Special=0

- [1]. **MISW:** MEMS U--MINI 1x1, 1x2, 2x2 **SWITCH**.
- [2]. **MIDU:** MEMS U--MINI **DUAL** 1x1, 1x2, 2x2 Switch.
- [3]. **MIQU:** MEMS U--MINI **QUAD** 1x1.
- [4]. **MIPM:** MEMS U--MINI 1x1, 1x2 **PM** Switch.
- [5]. **N/T:** MEMS U--MINI Non-Latching 1x1 Switch, **Normally T**ransparente.
- [6]. **N/O:** MEMS U--MINI Non-Latching 1x1 Switch, **Normally O**paque.
- [7]. Package 1: Bare fiber, or 2-fiber with 900 um loose tube.
- [8]. Package 2: more than 2-fiber with 900 um loose tube.

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, etc., all parameters are within our specs.



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

(Protected by US Patents 10752492, 10730740)

Product Description

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.



Performance Specifications

MEMS Ultra-Mini Series Switch	Min	Typical	Max	Unit	
Operation Wavelength		1260~1610		nm	
Insertion Loss ^[1]		0.6	1.0	dB	
PDL (SMF version)			0.1	dB	
Extinction Ratio (PMF version)	18			dB	
Return Loss ^[1]	50			dB	
Cross Talk ^[1]	SM, PM	70	73	90	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		300	500	mW	
Package Dimension		10L x 6.6W x 4.6H		mm	
Package Weight		1.9		g	
Fiber Type	Single Mode	SMF-28 or equivalent			
	PM	Panda 250 PM or equivalent			

[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.

Features

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

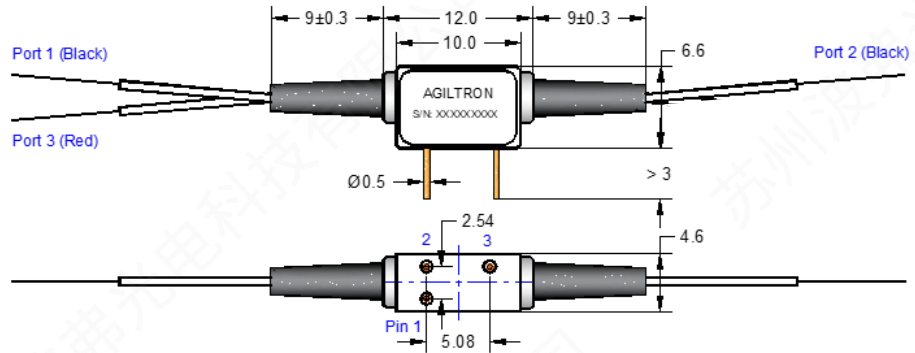


Revised on 9/5/2021

MEMS Ultra-Mini 1x2 Fiber Optical Switch (High Cross Talk)

Mechanical Dimension (unit: mm)

Package 1_ [1]. Bare fibers. [2]. 2-fiber with 900 um 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 1	Pin 2	Pin 3
Status I	Port 1→2	NC ^[1]	0	+V ^[2]
Status II	Port 1→3	NC	0	0

[1]. NC: No electronic connection.

[2]. +V: 3.8~4.5 VDC, Typical is 4.0 VDC.

Ordering Information

MISW-	1	2	H					
Type	Wavelength	Switch	Package	Fiber Type		Fiber Length		Connector
1x2=12 Special=00	1260~1620=B 1060=1 1310=3 1550=5 1310/1550=9 Special=0	Non-latching=2	Large Crosstalk = H	SMF-28=1 PM1550/250=B PM1310/250=D Hi1060=H 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=7 Duplex LC=8 MTP=9 Special=0	



MEMS Ultra-Mini 1x2 Fiber Optical Switch (High Cross Talk)

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, etc., all parameters are within our specs.

