



MEMS 1x12 Fiber Optical Switch/VOA

(Bidirectional, SM, PM, 1260-1620 nm)

(Protected by US Patent 10752492B2)

Product Description

The MEMS 1x12 Series Fiber Optical Switch uses a patented thermal activated micro-mirror, moving-in and -out optical paths to direct an incoming light into a selected output fiber without hitting other ports, by which the degradation of multi-fiber collimator due to the laser steering in long period is entirely eliminated. It uniquely offers unprecedented high stability over a wide temperature range, compact size, exceptionally long operation life, insensitive to moisture and ESD, no long-term drifts, and high-reliability for over 25 years of continuous operation. The switches are Telcordia GR1221 qualified.

The device can also simultaneously functions as a variable attenuator in which the output light intensity is partially coupled into a selected fiber port, while the rest of light is isolated from other ports. The device is conveniently controlled by directly applying a voltage to a selected mirror actuator.



Performance Specifications

MEMS 1x12 Series Switch	Min	Typical	Max	Unit
	1260		1620	nm
Insertion Loss ^{[1] [2]}		1.0	2.0	dB
Wavelength Dependent Loss		0.2	0.3	dB
Polarization Dependent Loss (SM)			0.15	dB
Extinction Ratio (PM)	18	25		dB
Return Loss ^{[1] [2]}	50			dB
Cross Talk ^{[1] [2]}	50			dB
Repeatability			±0.05	dB
Switching Time		10		ms
Durability	10 ¹¹			Cycle
Switching Type		Non-Latching		
Operating Temperature	-5		70	°C
Storage Temperature	-40		85	°C
Optical Power Handling ^[3] (CW)		300	500	mW
Fiber Type	SM	SMF-28 fiber or equivalent		
	PM	Panda 250, 400 fiber or equivalent		

[1]. Within operating temperature and SOP.

[2]. Excluding connectors.

[3]. Continuous operation, for pulse operation call.



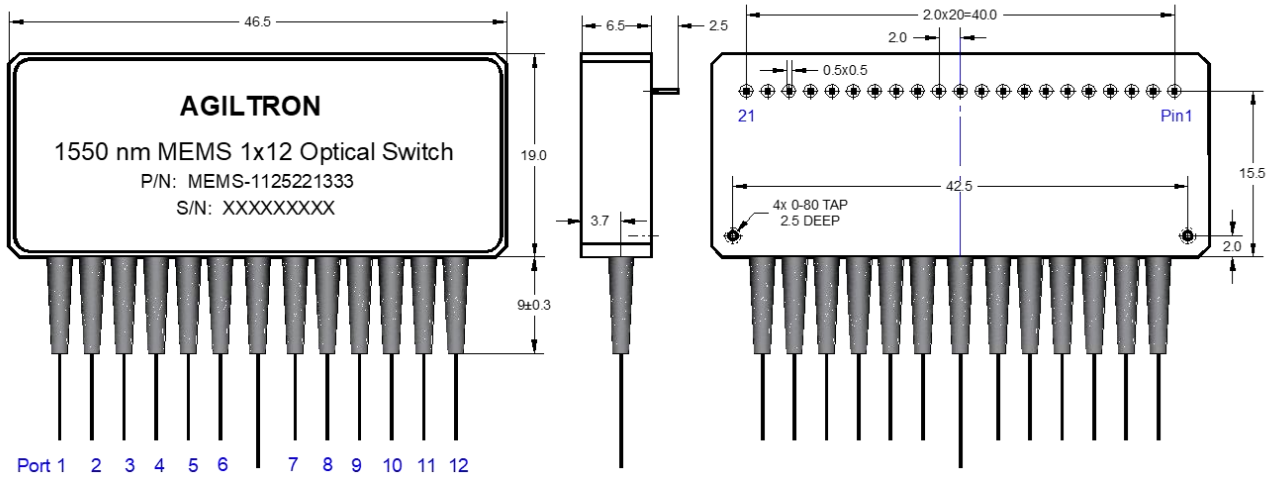
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(Click here for latest revision)

15 Presidential Way, Woburn, MA 01801 Tel: (781) 935-1200 Fax: (781) 935-2040
www.agiltron.com

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Mechanical Dimensions (mm)



Port Color	Green	Black	Red	Blue	White	Yellow
Port #	Common	1, 6, 11	2, 7, 12	3, 8	4, 9	5, 10

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

Electrical Driving Requirements

Only one mirror needs to be activated for all configurations, consuming < 170 mW electrical power.

MEMS 1x12 Non-Latching Switch Driving Table

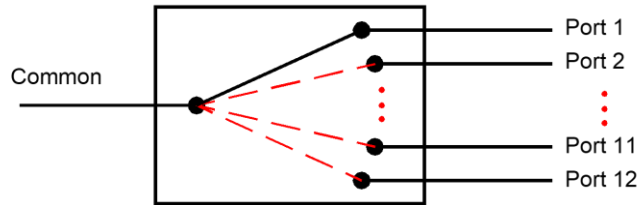
Optical Path	Control Signal Applied on Pin #																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
C ↔ P1	+V	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NC
C ↔ P2	0		+V	0		0	0		0	0		0	0								
C ↔ P3	0		0	+V		0	0		0	0		0	0								
C ↔ P4	0		0	0		+V	0		0	0		0	0								
C ↔ P5	0		0	0		0	+V		0	0		0	0								
C ↔ P6	0		0	0		0	0		0	+V		0	0								
C ↔ P7	0		0	0		0	0		0	0		+V	0								
C ↔ P8	0		0	0		0	0		0	0		+V	0								
C ↔ P9	0		0	0		0	0		0	0		+V	0								
C ↔ P10	0		0	0		0	0		0	0		+V	0								
C ↔ P11	0		0	0		0	0		0	0		+V	0								
C ↔ P12	0		0	0		0	0		0	0		+V	0								

Note : [1].C: Common port. P1: Port 1. [2].+V: 3.8 ~ 4.5 VDC, Typical is 4.0 VDC. [3].NC: No electronic connection.

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Functional Diagram



MEMS 1x12 Switch

Ordering Information (Part Number)

Prefix	Type	Wavelength	Switch	Version	Fiber Type	Fiber Cover	Fiber Length	Connector [1]
MEMS- [1] MEMP- [2]	1x9=109 1x10=110 1x11=111 1x12=112 Special=00 0	1260-1620=B C+L=2 1310=3 1550=5 1310 & 1550=9 Special=0	2 Non-Latching=2	□ Standard=1 Default = D Special=0	□ SMF-28=1 PM1550=B PM1400=C 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 LC=7 Duplex LC=8 Special=0

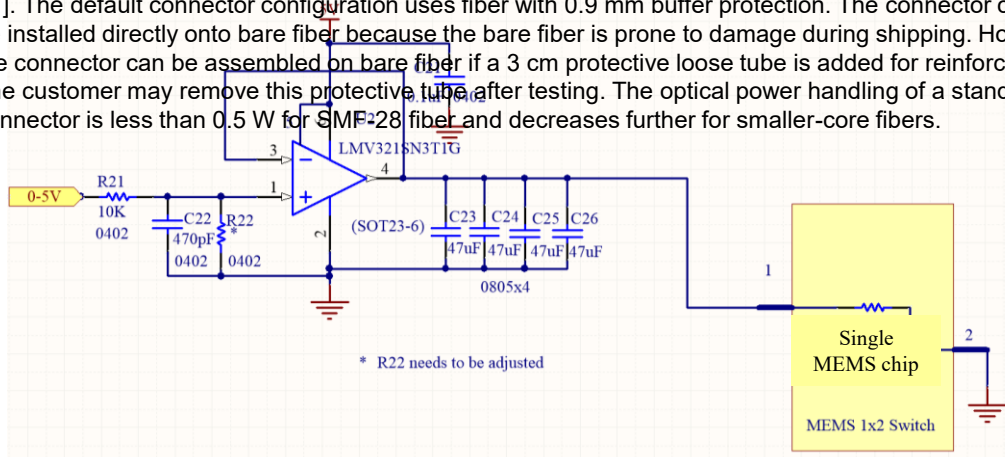
[1]. MEMS: MEMS 1x12 Mini Single Mode Switch.

[2]. MEMP: MEMP 1x12 Mini PM Switch.

Recommendation Control Circuit

In order to minimize the overshooting and oscillation in optics, the following circuit is recommended for driving signal on PIN.

•[1]. The default connector configuration uses fiber with 0.9 mm buffer protection. The connector cannot be installed directly onto bare fiber because the bare fiber 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 may remove this protective tube after testing. The optical power handling of a standard connector is less than 0.5 W for SMF-28 fiber and decreases further for smaller-core fibers.

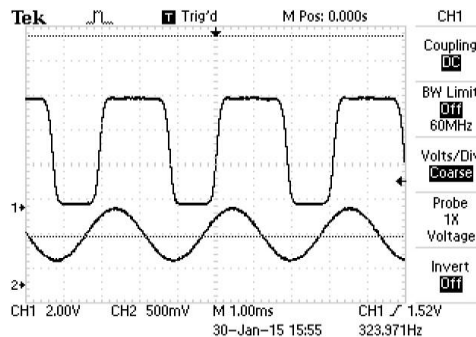


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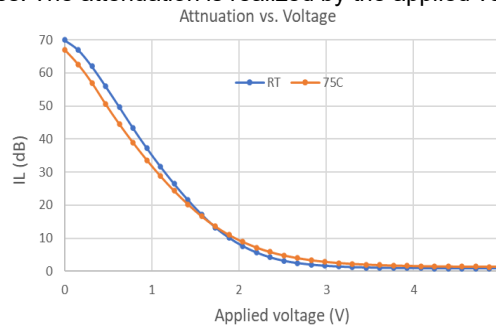
10⁹ Switching Cycle Test

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



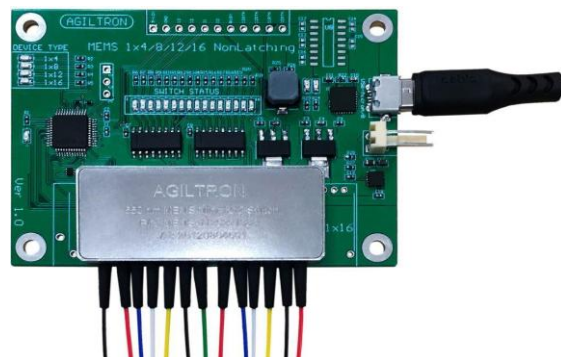
VOA Capability on Port

The attenuation in each channel can be implemented in this MEMS switch without scarifying the switch performances. The attenuation is realized by the applied voltage, as shown in the following figure (typical).



Demo Driver

USB RS232/GUI, Pushbutton/LED Channel Indicators
Applicable to Non-latching MEMS-1x4, 1x8, 1x12 and 1x16 (\$255)



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