

# MEMS 1x12 Fiber Optical Switch/VOA

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

(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. 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 function 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 <sup>[1][2]</sup>		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 <sup>[1][2]</sup>	50			dB
Cross Talk <sup>[1][2]</sup>	50			dB
Repeatability			±0.05	dB
Switching Time		10		ms
Durability	10 <sup>11</sup>			Cycle
Switching Type		Non-Latching		
Operating Temperature	-5		70	°C
Storage Temperature	-40		85	°C
Optical Power Handling <sup>[3]</sup>		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.

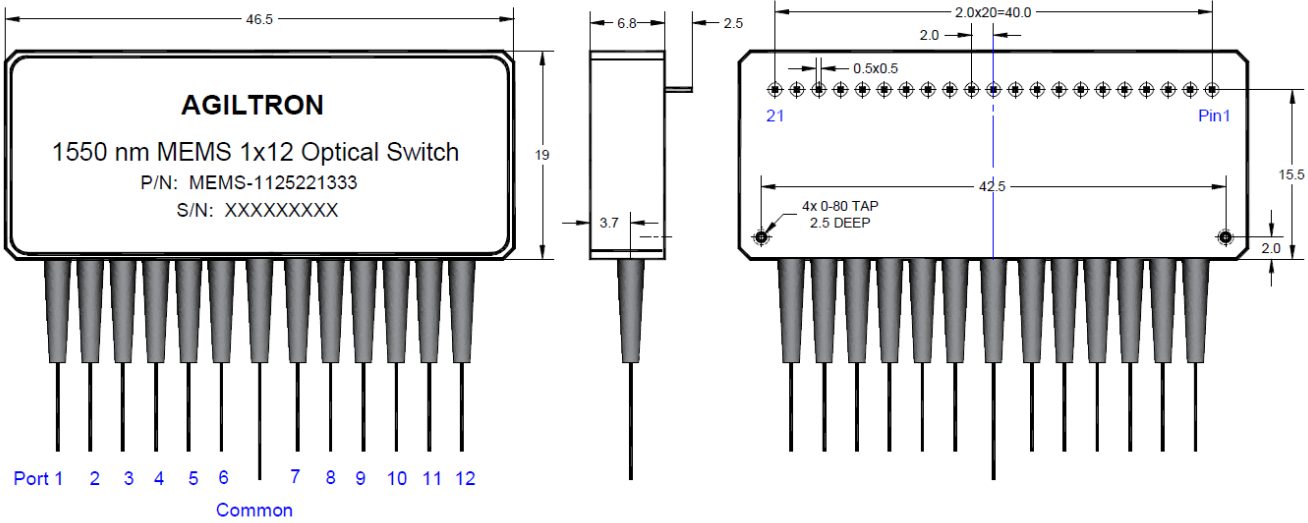
### Applications

- Channel Blocking
- Configurable Add/Drop
- System Monitoring
- Instrumentation



Revision: 1-11-2021

## 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

## Electrical Driving Requirements

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

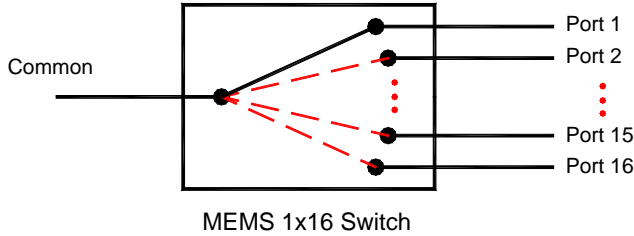
**MEMS 1x12 Non-Latching Switch Driving Table**

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		
C ↔ P2	0		+V	0		0	0		0	0		0	0		0	0		0	0		
C ↔ P3	0		0	+V		0	0		0	0		0	0		0	0		0	0		
C ↔ P4	0		0	0		+V	0		0	0		0	0		0	0		0	0		
C ↔ P5	0		0	0		0	+V		0	0		0	0		0	0		0	0		
C ↔ P6	0		0	0		0	0		+V	0		0	0		0	0		0	0		
C ↔ P7	0	0	0	0	0	0	0	0	0	+V	0	+V	0	0	0	0	0	0	0	0	0
C ↔ P8	0		0	0		0	0		0	+V		0	+V		0	0		0	0		
C ↔ P9	0		0	0		0	0		0	+V		0	0		+V	0		0	0		
C ↔ P10	0		0	0		0	0		0	+V		0	0		0	+V		0	0		
C ↔ P11	0		0	0		0	0		0	+V		0	0		0	0		+V	0		
C ↔ P12	0		0	0		0	0		0	+V		0	0		0	0		0	+V		

**Note :** [1].C: Common port. P1: Port 1. [2].+V: 4 ~ 5 VDC, Typical is 4.5 VDC. [3].NC: No electronic connection.

# MEMS 1x12 Fiber Optic Switch

## Functional Diagram



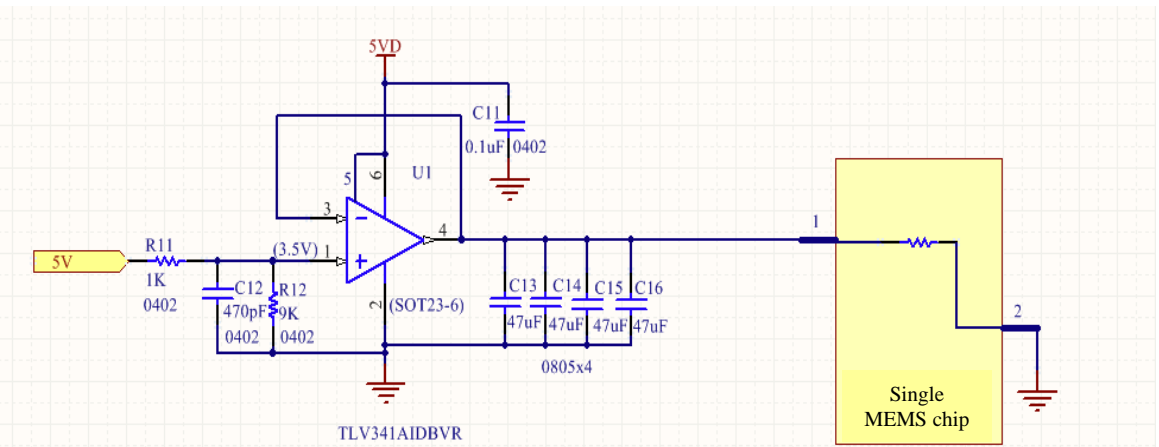
## Ordering Information

Type	Wavelength	Switch	Package	Fiber Type	Fiber Length	Connector
MEMS <sup>[1]</sup> MEPM <sup>[2]</sup>	1260-1620=B C+L=2 1310=3 1550=5 1310 & 1550=9 Special=0	Non-Latching=2	Standard=2 Special=0	SMF-28=1 Panda 400=A Panda 250=B Special=0	Bare fiber=1 900 um tube=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 Special=0

[1]. MEMS: MEMS 1x12 Mini Single Mode Switch.  
 [2]. MEMP: MEMP 1x12 Mini PM Switch.

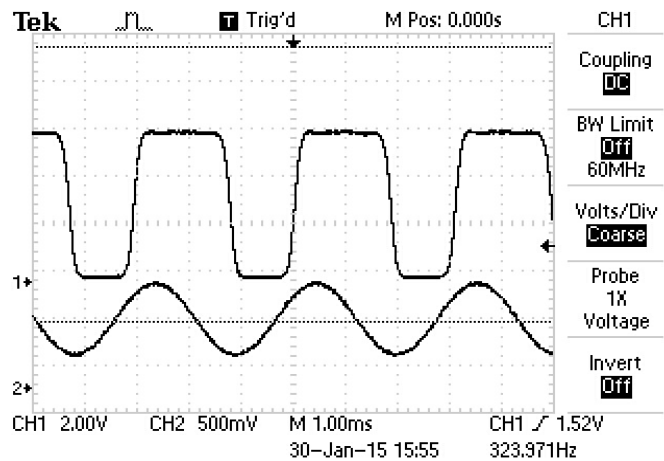
## Recommendation Control Circuit

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



## 10<sup>9</sup> 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<sup>9</sup> 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).

