

MEMS Latching Type Series Fiber Optical Switch

(1x2, 2x2, Dual 2x2, Quad 1x1. SM, MM, PM)

(Protected by U.S. patent 8,203,775 and pending patents)



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Features

- High Reliability
- Ultra-Small Size
- 1260 -1610 nm
- SM and PM
- Low Cost
- Intrinsic Tolerance to ESD
- Direct TTL Control

The MEMS Latching type series Fiber Optical Switch provides industrial-leading performance with fast switching speed, latching, low insertion loss, high reliability, and low cost. The switch connects optical channels using a proprietary electric-thermal activated micro-mirror, moving-in and -out optical paths, uniquely featuring high stability without long-term drift, fail-safe latching, and fast setting time. The same format accommodates configurations of 1x1, Dual 1x1, Quad 1x1, 1x2, Dual 1x2, Full 2x2, and Dual Full 2x2 for single mode and multimode fibers. The switches are also available with configurations of 1x1, 1x2 PM.

This series of latching devices is highly recommended for the occasionally switching operation. For frequently switching operation, please use our non-latching version.

Specifications

| Parameter | | Min | Typical | Max | Unit |
|--------------------------------------|-------------|-----------------------------|---------|---------------------------|-------|
| Operation Wavelength | Single Mode | 1260~1610 | | | nm |
| | Multimode | 820~1340 and / or 1260/1360 | | | |
| | PM | 980, 1060, 1310, 1550 | | | |
| Insertion Loss ^{[1], [2]} | | | 0.6 | 1.0 (1.2 ^[3]) | dB |
| Return Loss ^[1] | SM, PM | 50 | | | dB |
| | Multimode | 35 | | | dB |
| Cross Talk/On-Off ^[1] | SM, PM | 50 | | | dB |
| | Multimode | 35 | | | dB |
| PDL | | | | 0.2 | dB |
| WDL | | | | 0.3 | dB |
| TDL | | | | 0.3 | dB |
| Polarization Extinction Ratio (PM) | | 18 | | | dB |
| Switching Time | | | 5 | 10 | ms |
| Repeatability | | | | ± 0.05 | dB |
| Repetition Rate | | | | 5 | Hz |
| Durability | | 10 ⁹ | | | Cycle |
| Switching Type | | Latching Type | | | |
| Operating Temperature ^[4] | | -5 | | 70 | °C |
| Storage Temperature | | -40 | | 85 | °C |
| Optical Power Handling (CW) | | | 300 | 500 | mW |

Notes:

- [1]. Excluding connectors.
- [2]. Multimode IL measure @ Light Source CPR <13dB.
- [3]. Dual band, and Dual 1x2, Full 2x2, Dual Full 2x2.
- [4]. For wide operating temperature, please contact us.

Note: The specifications provided are for general applications with a cost-effective approach. If you need to narrow or expand the tolerance, coverage, limit, or qualifications, please [\[click this link\]](#):

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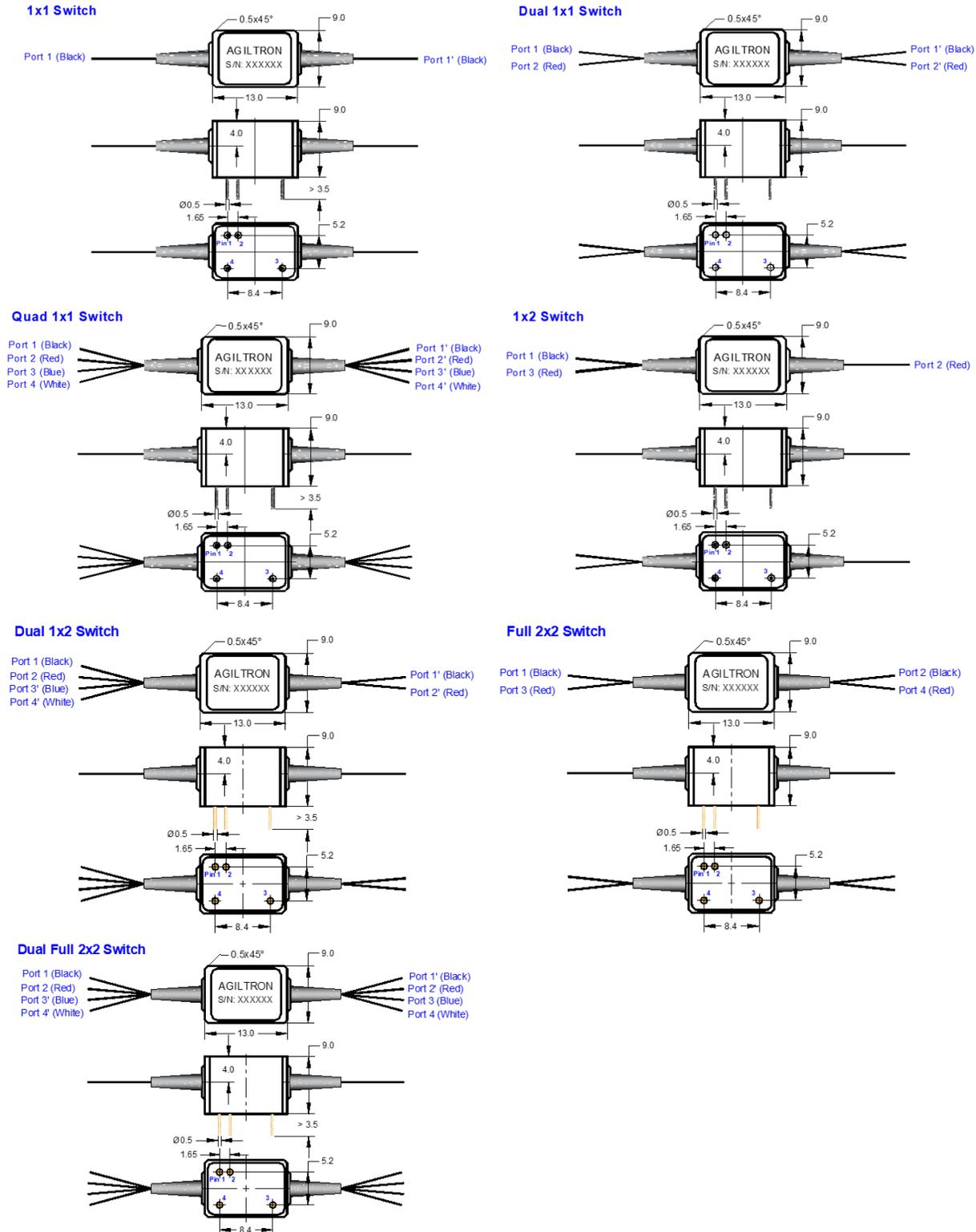
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Mechanical Dimensions (mm) (Package for bare fiber with robber boot)



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

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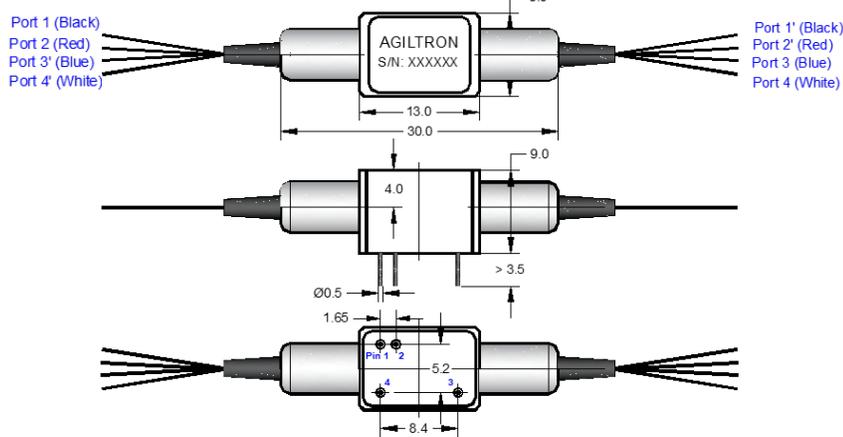


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Mechanical Dimensions (mm)

Package of Quad 1x1, Dual 1x2, Dual Full 2x2 Switch with 900 μm loose tube

Dual Full 2x2 Switch with 900 μm loose tube



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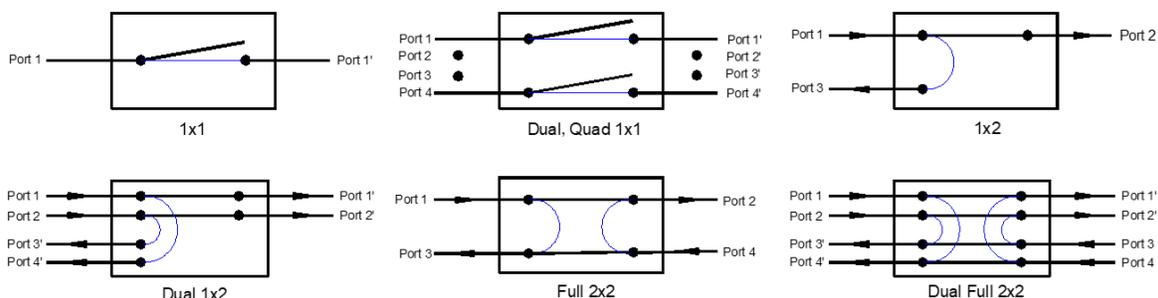
Electrical Driving Requirements

| Status | Optical Path | | | | | | | Pin No. | | | |
|-----------|--------------|------------------------|--|----------|------------------------|----------------------|--|----------------------|-------|-------------------------|----------|
| | 1x1 | Dual 1x1 | Quad 1x1 | 1x2 | Dual 1x2 | Full 2x2 | Dual Full 2x2 | Pin 1 | Pin 2 | Pin 3 | Pin 4 |
| Status I | Port 1→1' | Port 1→1' Port 2→2' | Port 1→1' Port 2→2' Port 3→3' Port 4→4' | 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' | 5 VDC ^[1] | 0 | 5V Pulse ^[2] | 0 |
| Status II | Dark | Dark | Dark | 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 | 5V Pulse |

[1]. 5VDC: 5.0 ± 0.2 V. Static 3 mA; During Pulse Current is 100mA. The switch will remain in its previous light path state, if this voltage is removed (latching).

[2]. 5V Pulse: 5.0 ± 0.2 V. Pulse width is 40 ± 5 ms.

Functional Diagram



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Ordering Information

| Prefix | Type | Wavelength | Configuration | Package | Fiber Type | Fiber Cover | Fiber Length | Connector |
|----------------------|---------------|---------------|---------------|--------------|-----------------|----------------------|--------------|------------------|
| MESW- ^[1] | 1x1 = 11 | 1260~1620 = B | Latching = 1 | Standard = 3 | SMF-28 = 1 | Bare fiber = 1 | 0.25m = 1 | None = 1 |
| MEDU- ^[2] | 1x2 = 12 | 1060 = 1 | | | MM 50/125 = 5 | 900um loose tube = 3 | 0.5m = 2 | FC/PC = 2 |
| MEQU- ^[3] | Full 2x2 = 22 | 780 = 7 | | | MM 62.5/125 = 6 | Special = 0 | 1.0m = 3 | FC/APC = 3 |
| MEPM- ^[4] | Special = 00 | 850 = 8 | | | PM1550 = B | | Special = 0 | SC/PC = 4 |
| | | 1310/1550 = 9 | | | Special = 0 | | | SC/APC = 5 |
| | | 820~1340 = A | | | | | | ST/PC = 6 |
| | | 1550 = 5 | | | | | | LC/PC = 7 |
| | | Special = 0 | | | | | | Duplex LC/PC = 8 |
| | | | | | | | | LC/APC = A |
| | | | | | | | | LC/UPC = U |
| | | | | | | | | Special = 0 |

[1]. **MESW**: MEMS 1x1, 1x2, 2x2 **SWITCH**.

[2]. **MEDU**: MEMS **DUAL** 1x1, 1x2, 2x2 Switch.

[3]. **MEQU**: MEMS **QUAD** 1x1 Switch.

[4]. **MEPM**: MEMS 1x1, 1x2 **PM** Switch.

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.

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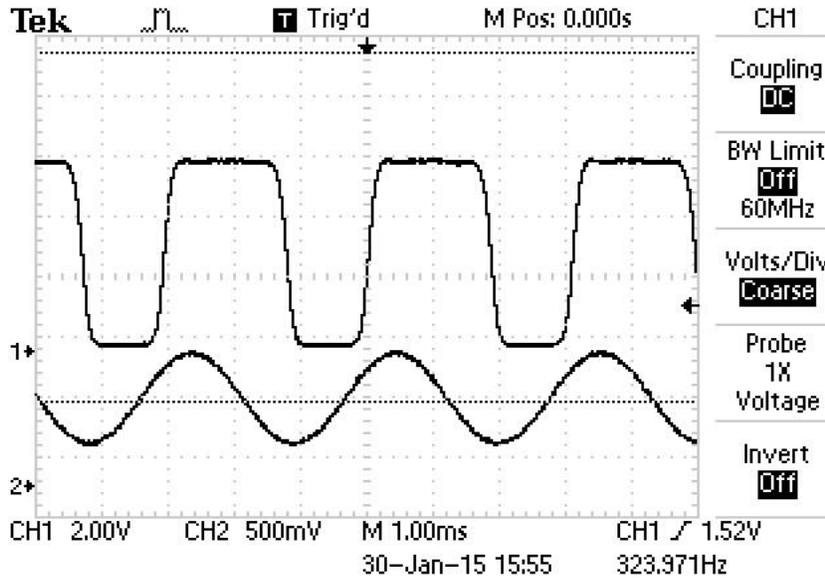
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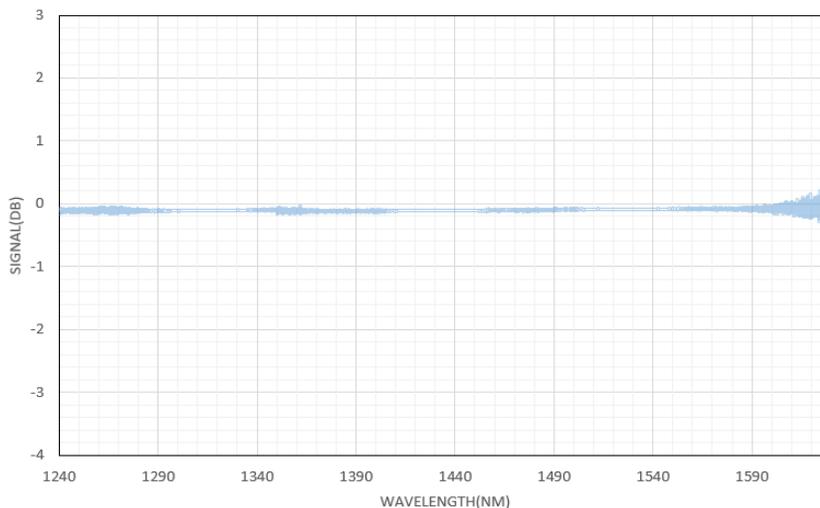
10⁹ Switching Cycle Test

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.



Typical Insertion Loss vs Wavelength (1240-1630nm)

1x2 MEMS Switch



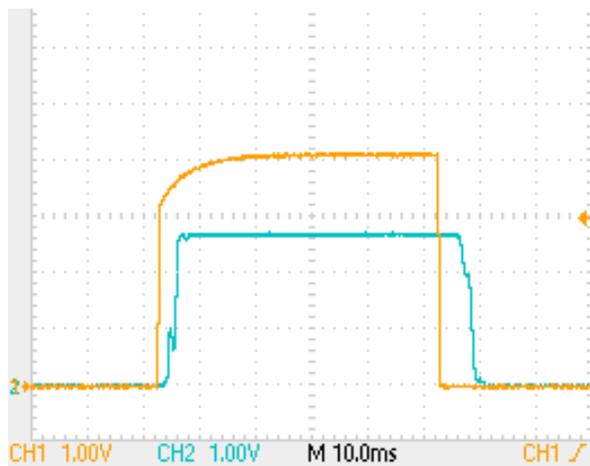
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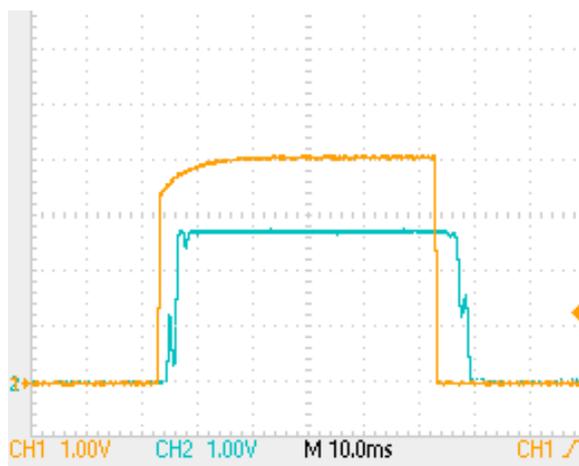


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Typical Switching Rise/Fall at -40°C and 70°C



-40 °C



+70 °C