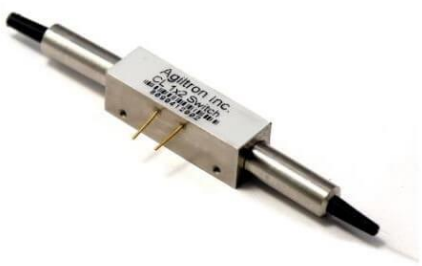
CrystaLatch™ Fiber Optic Polarization Switch

DATASHEET

BUY NOW



The CL Series polarization switch can quickly switch the incoming SOP between two orthogonal polarization states (SOPs). This is achieved using patented non-mechanical configurations and activated via an electrical control signal. Latching operation preserves the selected SOP after the drive signal has been removed. The all solid sate CL polarization fiber optic switch features low insertion loss, high extinction ratio, fast switching, and extremely high reliability and repeatability. The input is PM fiber.

The output could be either PM or SM fiber. For PM fiber, the polarizations is aligned with slow axis. Electronic driver is available for this series of switches.

The magneto-optical crystals used in the CL switches have no fatigue nor drift effect.

Features

- No moving part
- Fast switching
- Low IL
- Miniature Size

Applications

- Test instrument
- Sensor

Specifications

Parameter	Min	Typical	Max	Unit
Operation Wavelength [1]	1520	1550	1580	nm
	1295	1310	1325	
Insertion Loss [2]		0.7	1.0 (1.2 [4])	dB
SOP Tolerance		± 1.0 [1]	± 2.5 [2]	Degree
Return Loss	50	55		dB
PDL (SM Series)		0.1	0.2	dB
Extinction Ratio	18	25		dB
Optical Response (rise, fall)	5		10	µs
Repetition Rate		2K		Hz
Polarization Mode Dispersion		0.1	0.2	ps
Operating Temperature	-5		70	°C
Storage Temperature	-40		85	°C
Optical Power Handling [3]		300	500	mW
			2	W
Durability	10^{15}			cycles

Notes:

[1]. Measured at room temperature

[2]. It may be increased at temperature other than room temperature

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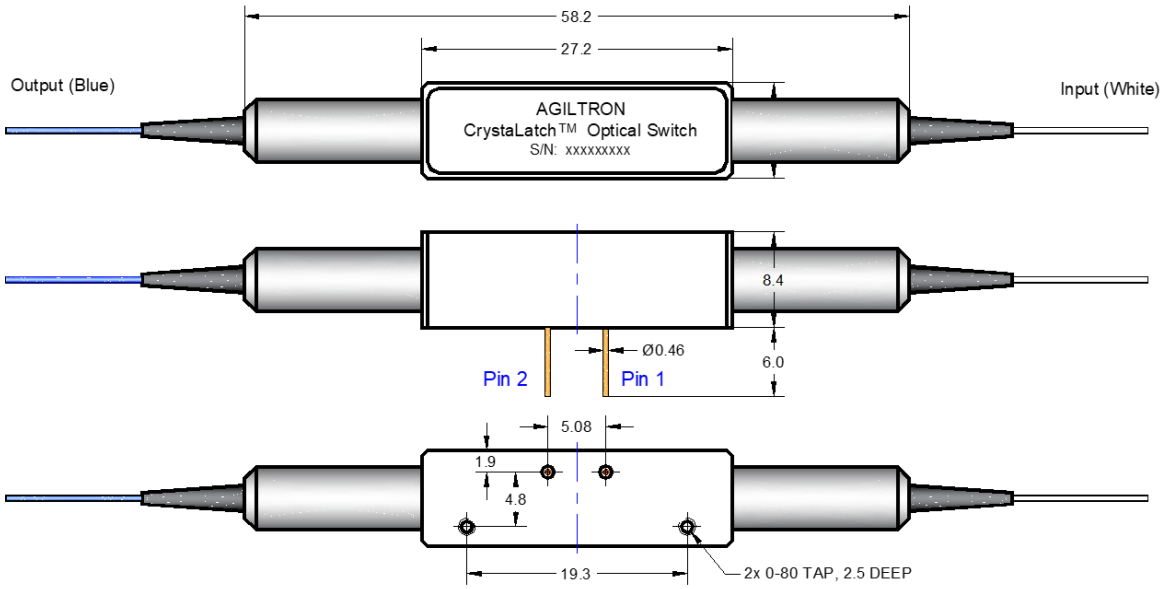
Mechanical Dimensions (Unit: mm)



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

Electrical Driving Information

The polarization switch is actuated by applying a voltage pulse. Applying one polarity pulse, The output light beam polarization is one status. Applying a reversed polarity pulse, The output light beam polarization is rotated by 90 degrees. The status is kept until the next pulse.

Parameter	Minimum	Typical	Maximum	Unit
Drive Voltage [1]	2.3	2.5	2.7 [1]	V
Drive Current	110	140	195	mA
Pulse Duration	0.2	0.3	0.5	ms

[1]. Over this value will damage the device

Note:

The driving voltage value is transient voltage with a full load. The driver circuitry needs to provide sufficient current (~300mA) during the switching. Inside the switch core is an electromagnet with a residual magnetic field. The residual magnetic field will be established when an electrical current flows in one direction through the coil for a sufficiently long period. The residual magnetic field latches the switch state even without applying a voltage (the current flow stopped). Flowing a current in the opposite direction for a sufficient time changes the switch stage by establishing a reversal magnetic field. The coil is forgiving to the driver unless one burns it by applying a higher voltage or a current for too long (day). The switch can also be operated at high repetition rates of kHz, where the residual magnetic field may not be fully established.

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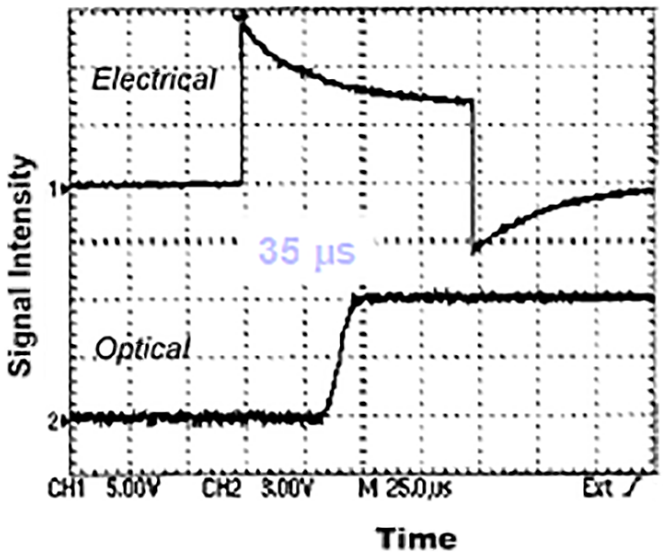
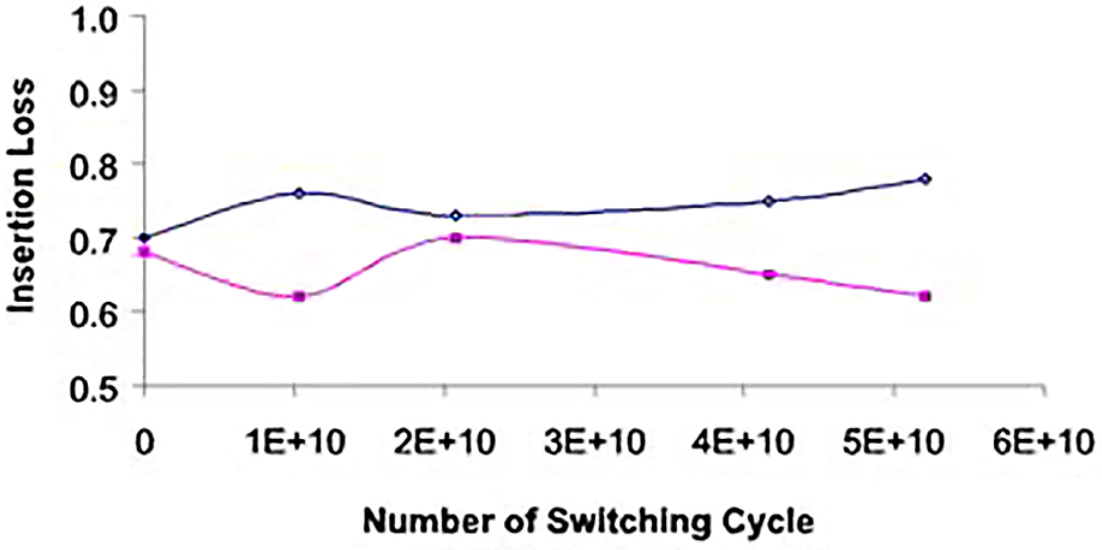
Typical Switching Response



Typical Loss Change of 1x2 vs Switching Numbers



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Ordering Information

	1 1	1	☐	☐	☐	☐	☐	☐
Prefix	**Type**	**Configuration**	**Package**	**Wavelength**	**Input Fiber**	**Output Fiber**	**Fiber Length**	**Connector [9]**
CLPS-			900 µm tube = 1 Bare fiber = 3	1550 nm = 1 1310 nm = 3	PM 1550 = 1 Special = 0	PM 1550 = 1 SMF-28 = 2 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 LC/APC = A LC/UPC = U Special = 0

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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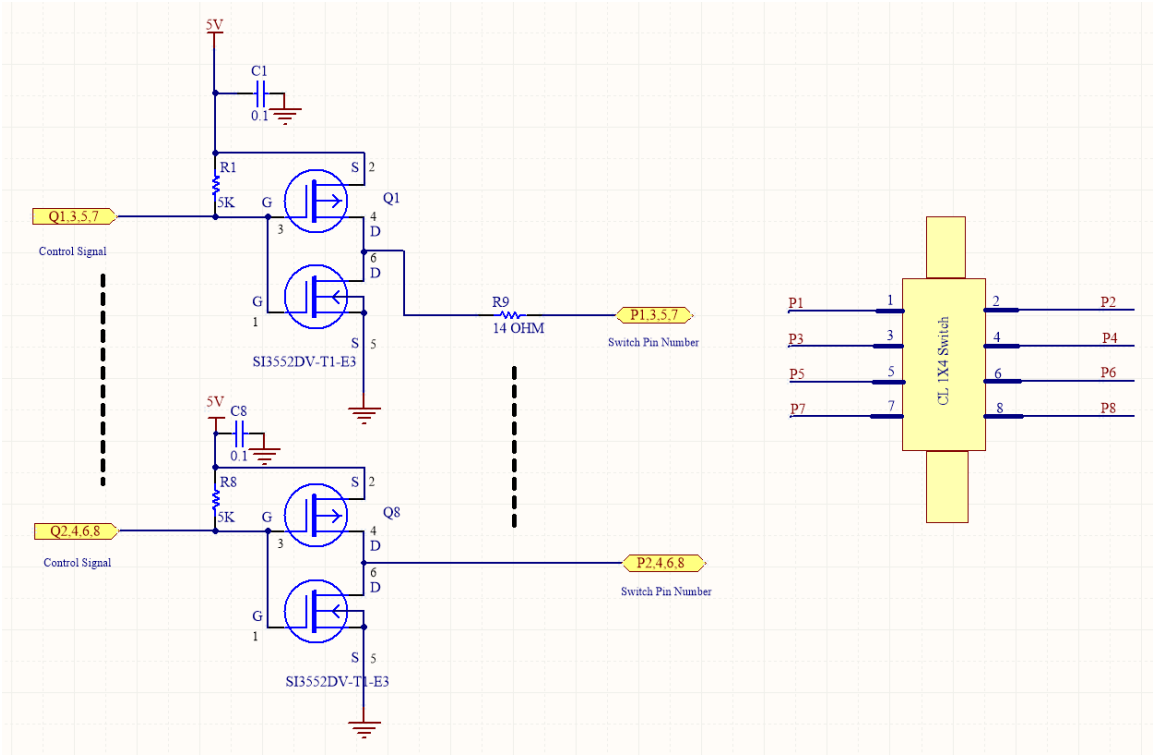
Driver Design Example for 1x4

A recommended +5VDC powered driving circuit is provided. The resistor network R1~R8 is to suppress the driving signal's voltage level to meet the "switch voltage" requirements. In specific applications, users can use lower voltage to eliminate the R1~R8. The Q1~Q8 is the control signal from either a function generator or a microcontroller general purpose I/O. The Q1-Q8 switching speed must meet the specific MOSFET switching requirement and CL 1x4 Switch specific requirement. Usually, the control signal speed is ≤ 2kHz.



Usually, a clean power supply source will be sufficient. However, decoupling capacitors for the transistor supply rail are recommended depending on different applications. Minimum the current loop on the switching circuits will minimize the switching noise. For other layout recommendations, please refer to books or application notes from the IC manufacturer.

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