CrystaLatch™
4x4 Non-Blocking Switch Module

Bidirectional

(Protected by U.S. patents 7224860，6757101，6577430 and pending patents)

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The CrystaLatch™ (CL) type 4x4 fiber optic switch connects optical channels by redirecting any incoming optical signal into any selected output fiber. This is achieved using patented non-mechanical configurations and activated via an electrical control signal. It is a truly non-blocking switching matrix. Latching operation preserves the selected optical path after the drive signal has been removed. The all solid state CL 4x4 fiber optic switch features low insertion loss, high extinction ratio, high channel isolation, and extremely high reliability and repeatability.

It is designed to meet the most demanding switching requirements of continuous operation without failure, longevity, operation under shock /vibration environment and large temperature variations, and fast response time. Comes with computer interface and software.

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

Features

- Non-Blocking
- High Speed
- High Reliability
- Fail-Safe Latching
- Low Insertion Loss
- Rugged
- Compact
- Direct Low Voltage Drive

Applications

- Optical Signal Routing
- Network Protection
- Signal Monitoring
- Instrumentation

Specifications

Parameter	Min	Typical	Max	Unit
Operation Wavelength [1]	1520	1550	1580	nm
	1295	1310	1325	nm
Insertion Loss [2]		1.5	2.8	dB
Cross Talk	30			dB
Optical Switching Speed (Rise, Fall)	5		10	μs
Repetition Rate		2K		Hz
Durability	10^{15}			cycle
Polarization Dependent Loss		0.1	0.3	dB
Polarization Mode Dispersion			0.2	ps
Return Loss [2]	50			dB
Operating Temperature	0		55 [4]	°C
Storage Temperature	-40		85	°C
Optical Power Handling [3]		200	300	mW
Fiber Type	Corning SMF28			

Notes:

[1]. L band version available, please call

[2]. Measured without connectors

[3]. High power version available

[4]. Wide temperature range of version is available in the premium version, where some performances may be degraded. Please check the order information.

RoHS COMPLIANT

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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Mechanical Dimensions (mm)

Box: 230 x 145 x 54 mm

Driving kit with variety of control interface, such as USB, RJ45, RS232 with Windows™ GUI, is available.

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

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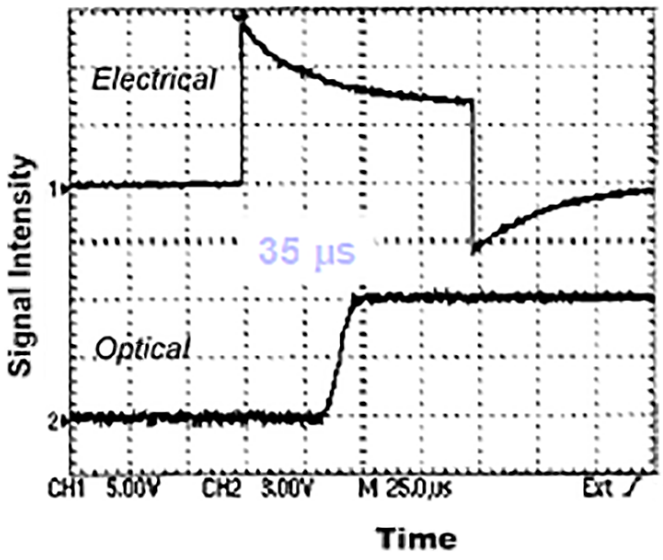
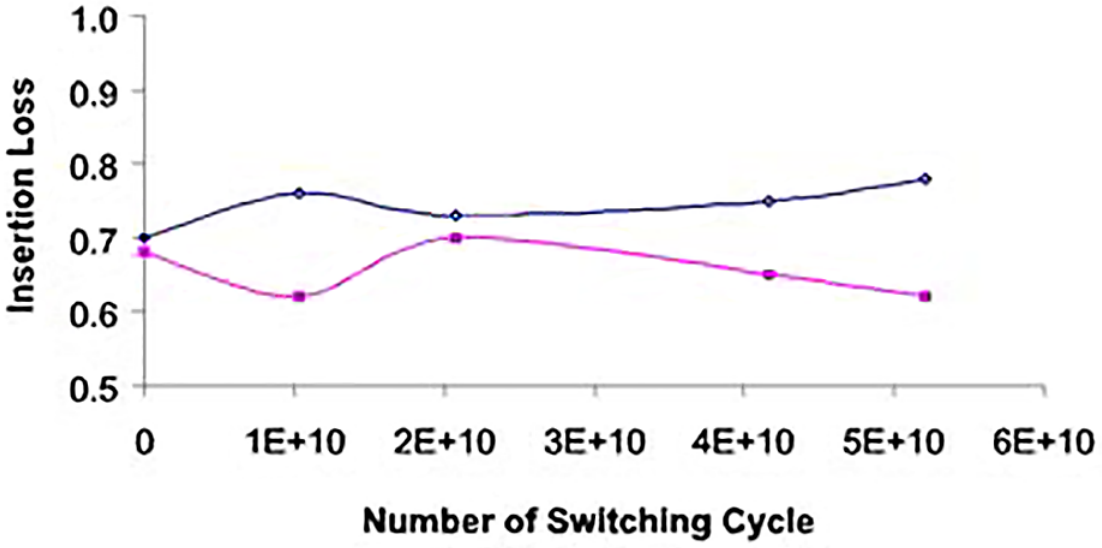
Typical Switching Response



Typical Loss Change of 1x2 vs Switching Numbers



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Ordering Information (Part Number)

	☐☐	☐	☐	☐	☐	☐	☐	☐
Prefix	**Type**	**Wavelength**	**Optical Power**	**Package** [1][3]	**Fiber Type**	**Fiber Cover**	**Fiber Length**	**Connector** [2]
CLSW-	4x4 = 44 4x2 = 42 4x3 = 43 3x3 = 33	1310 = 3 1550 = 5 1600 = 6	Regular = 1 5W = 2	Component = 1 With Driver = 2 Box/Driver = 3 -5~+70°C = S -40~+85°C = A -40~+70°C = B -20~+85°C = C	SMF-28 = 1 PM1550 = 2 Special = 0	Bare fiber = 1 900μm 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/PC = 7 Duplex LC/PC = 8 LC/APC = A LC/UPC = U Special = 0

[1]. All high lighten versions are premium with driver in box or rack, which will have the higher cost and longer lead time.

[2]. 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.

[3]. The component format is designed for OEM integration. For laboratory and university use, only the benchtop protected version has one year warranty.

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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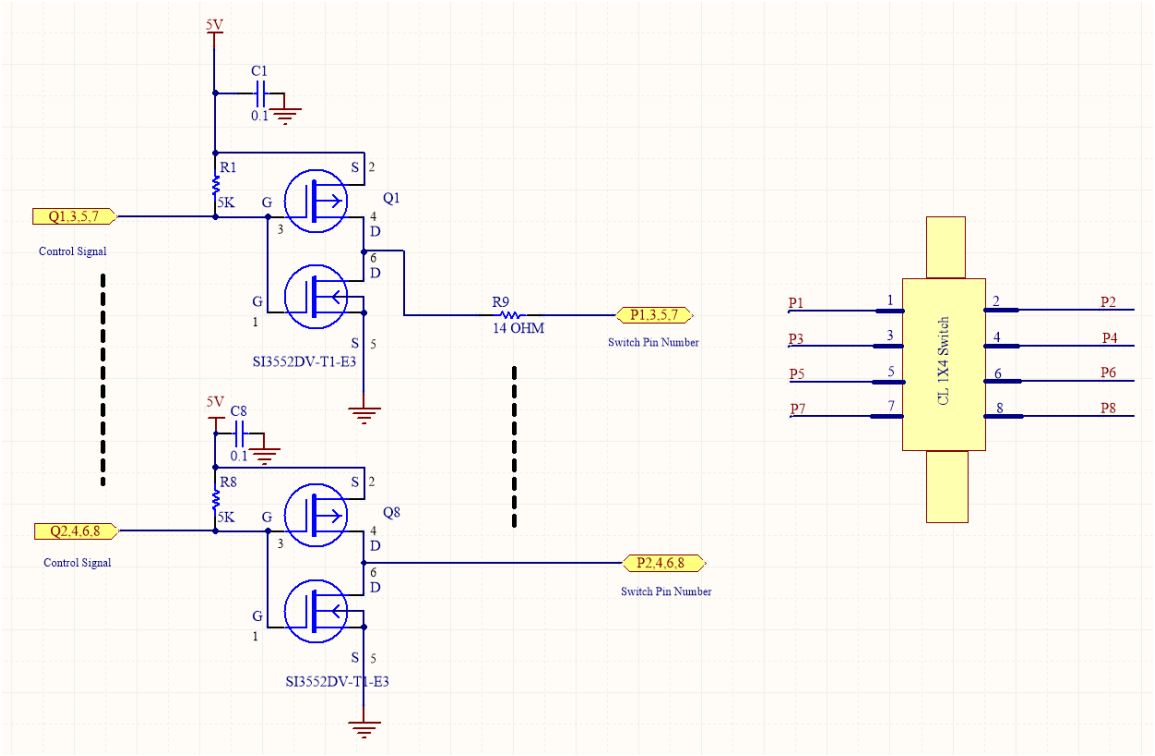
Driver Design Example for 1x4

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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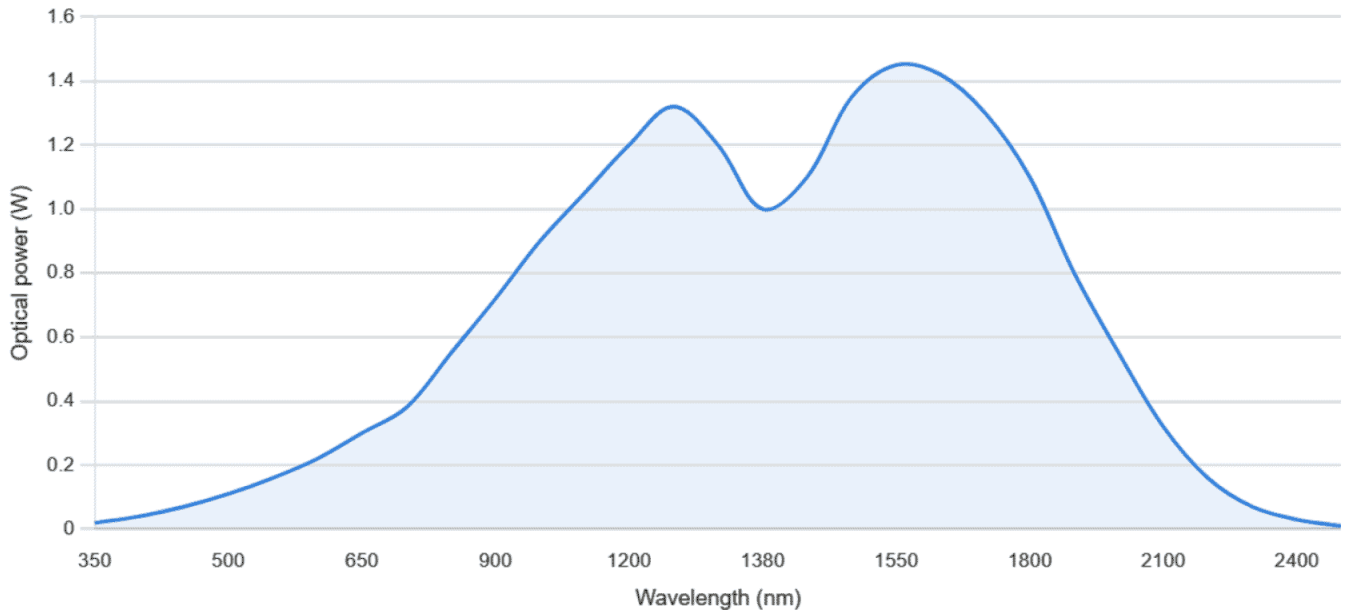
Regular Single Mode / Polarization Maintaining Fiber Optical Power Handing vs Wavelength



Single mode fiber optical power is limited by nonlinear effects in addition to absorption that increase loss and generate heat. The curve shows the approximate safe CW power envelope for standard single-mode fiber. Actual limits depend on fiber design, core size, length, and laser characteristics. Specialty fibers can significantly increase the power limit.

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