

# NanoSpeed™ Cascaded 1x4 Fiberoptic Switch (Bidirectional)

(Protected by U.S. patents 7,403,677B1; 6,757,101B2; and pending patents)

## Product Description

The NS Series 1x4 solid-state fiber optic switch is made of cascaded three 1X2 switches. It connects optical channels by redirecting an incoming optical signal into a selected output optical fiber. This is achieved using patent pending non-mechanical configurations with solid-state all-crystal designs, which eliminates the need for mechanical movement and organic materials. The NS fiber-optic switch is designed to meet the most demanding switching requirements of ultra-high reliability, fast response time, and continuous switching operation. The switch is intrinsically bidirectional and selectable for polarization-independent or polarization-maintain by the fiber type.

Agiltron's PCB driver listed in the web is recommended to operate this device, featuring high efficiency and low cost with 12V DC power and TTL control signals.

The rise/fall time is intrinsically related to the crystal properties, and the repetition rate is associated with the driver. There are poor frequency response sections due to the device resonances. The NS devices are shipped mounted on a tuned driver.

## Performance Specifications

Parameter	Min	Typical	Max	Unit
Central Wavelength	780		2000	nm
Insertion Loss <sup>[1]</sup>	1260-1650nm	1.4	2.0	dB
	960-1260nm	2.0	2.6	dB
	760-960nm	2.2	2.8	dB
Cross Talk <sup>[2]</sup>	20	25		dB
Durability	10 <sup>14</sup>			cycles
Polarization Dependent Loss		0.15	0.35	dB
IL Temperature Dependency		0.25	0.5	dB
Polarization Mode Dispersion		0.1	0.3	ps
Return Loss	45	50		dB
Response Time (Rise, Fall)	30		300	ns
Repetition Rate <sup>[3]</sup>	DC	100		kHz
Operating Temperature	-5		70	°C
Optical Power Handling <sup>[4]</sup>		300		mW
Storage Temperature	-40		85	°C
Package Dimension <sup>2</sup>		184x170		mm

[1] Excluding connectors.

[2]. ±25nm

[3] Standard driver. High repetition rate (up to 300 KHz) is available with special circuit, please call us.

[4] Defined at 1550nm. For the shorter wavelength, the handling power may be reduced. High power version (up to 5W) for 1310nm/1550nm is available; please call us for more information.

## Features

- Solid-State
- High speed
- Ultra-high reliability
- Low insertion loss
- Compact

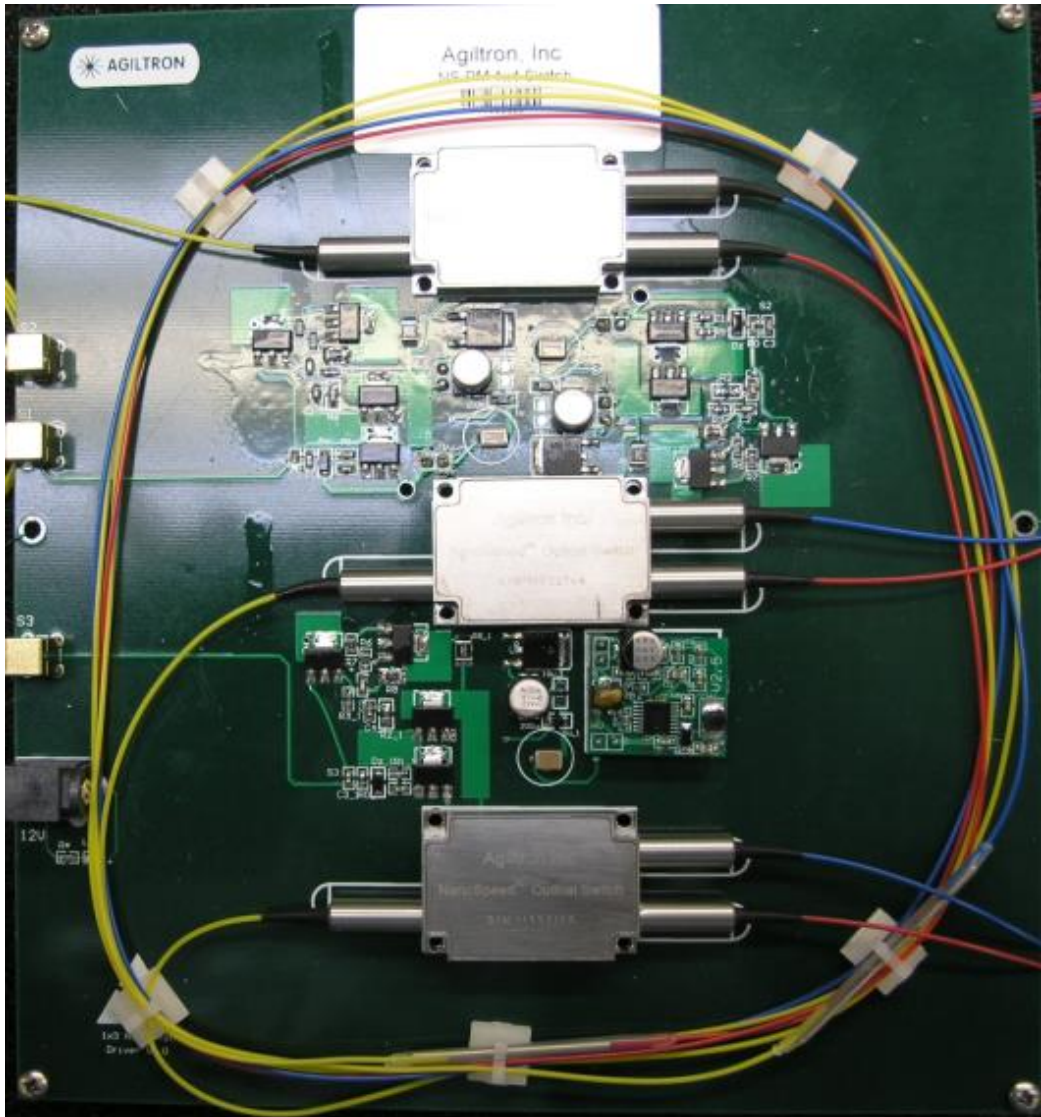
## Applications

- Optical blocking
- Configurable operation
- Instrumentation



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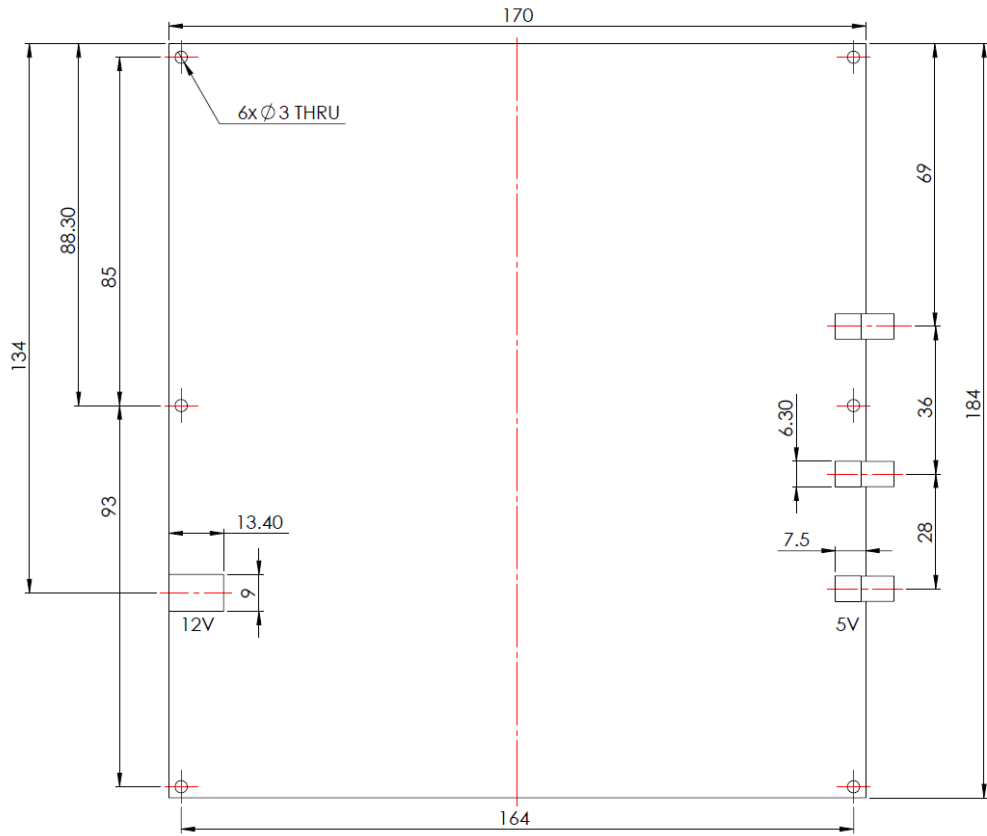
## Assembly on PCB driver



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

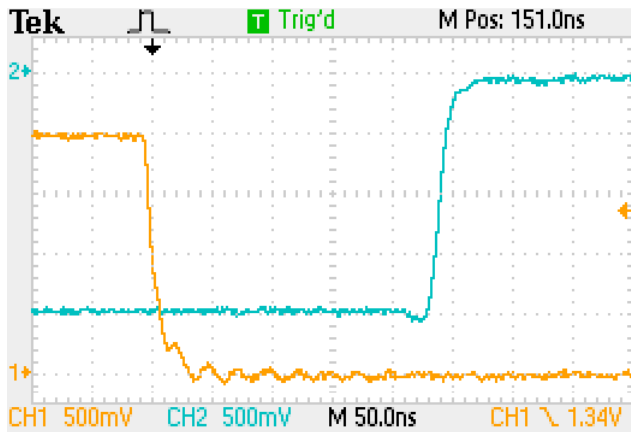
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## Mechanical Drawing



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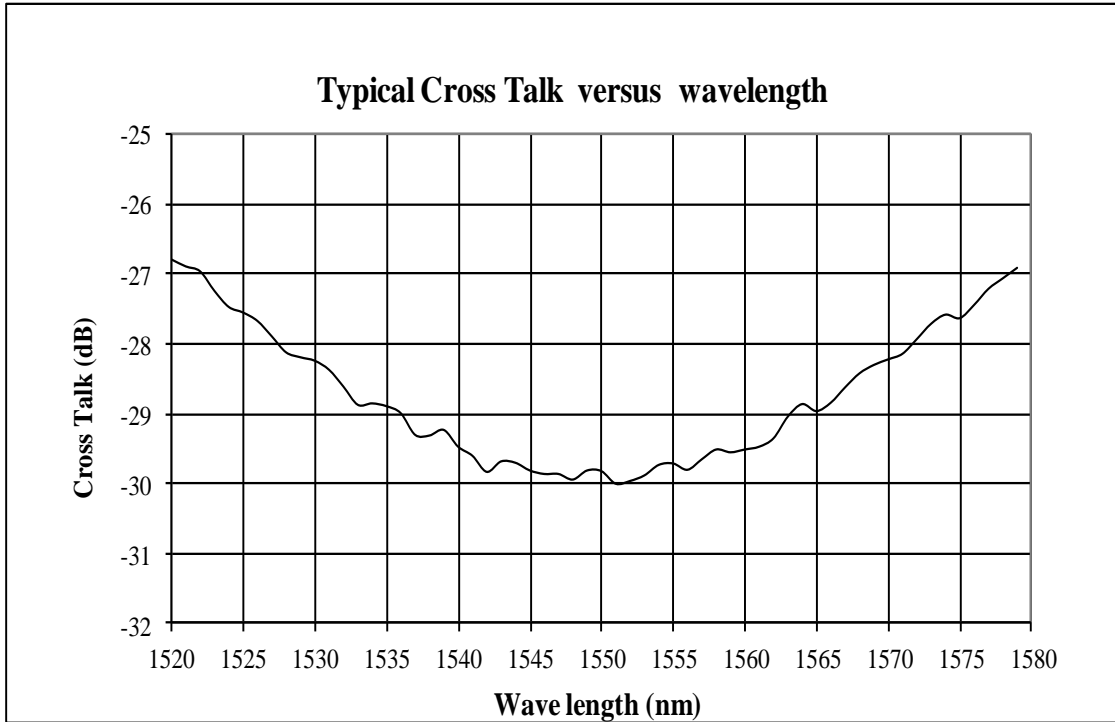
## Typical Speed Response Measurement



Optical: —  
Electrical: —

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## Typical Wavelength Dependence



## Ordering Information

Prefix	Type	Wavelength	Optical Power	Repetition	Fiber Type	Fiber Cover	Fiber Length	Connector
NSSW-	1x4 = 14 1x3 = 13 4x1 = 41 3x1 = 31 Special1* = 4A Special2** = 4B	1060 = 1 L Band = 2 1310 = 3 1550 = 5 1260-1620 = B 960-1200 = C 780 = 7 850 = 8 980 = 9	300mW = 1 5W = 2 Special = 0	100kHz = 1 200kHz = 2 300kHz = 3 Special = 0	SMF-28 = 1 PM1310 = 4 PM1550 = 5 HI1060 = 2 HI780 = 3 Special = 0	Bare fiber = 1 900umtube = 3 Special = 0	0.25m = 1 0.5m = 2 1.0 m = 3 Special = 0	None = 1 FC/PC = 2 FC/APC = 3 LC/PC = 7 LC/APC = 9 E2000 APC = A Special = 0

\* Blocking fast axis for PM fiber only

\*\* Blocking slow axis for PM fiber only

**NOTE:**

- PM1550 fiber works well for 1310nm

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## Q&A

**Q:** Does NS device drift over time and temperature?

**A:** NS devices are based on electro-optical crystal materials that can be influenced to a certain range by the environmental variations. The insertion loss of the device is only affected by the thermal expansion induced miss-alignment. For extended temperature operation, we offer special packaging to -40 -100 °C. The extinction or cross-talk value is affected by many EO material characters, including temperature-dependent birefringence,  $V_p$ , temperature gradient, optical power, at resonance points (electronic). However, the devices are designed to meet the minimum extinction/cross-talk stated on the spec sheets. It is important to avoid a temperature gradient along the device length.

**Q:** What is the actual applying voltage on the device?

**A:** 100 to 400V depending on the version.

**Q:** How does the device work?

**A:** NS devices are not based on Mach-Zander Interference, rather birefringence crystal's nature beam displacement, in which the crystal creates two different paths for beams with different polarization orientations.

**Q:** What is the limitation for faster operation?

**A:** NS devices have been tested to have an optical response of about 300 ps. However, practical implementation limits the response speeds. It is possible to achieve a much faster response when operated at partial extinction value. We also offer resonance devices over 20MHz with low electrical power consumption.

## Operation Manual

1. Connect a control signal to the SMA connector on the PCB.
2. Attach the accompanied power supply (typically a wall-pluggable unit).
3. The device should then function properly.

**Note:** Do not alter device factory settings.