

# NanoSpeed™ 2X2 Series Fiber Optical Switch (SM, PM, Bidirectional)

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

## Product Description

The NS Series 2x2 solid-state fiber optic switch connects optical channels by redirecting an incoming optical signal into a selected output optical fiber. This is achieved using patented non-mechanical configurations with unique electro-optical design, 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 NS Series switch is controlled by 5V TTL signals with a specially designed electronic driver having performance optimized for various repetition rate.



## Features

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

## Performance Specifications

NanoSpeed Series 2x2 Switch		Min	Typical	Max	Unit
Insertion Loss <sup>[1]</sup>	1260-1650nm		0.8	1.2	dB
	960-1260nm		1.0	1.3	
Cross Talk <sup>[2]</sup>		20	25	35	dB
Durability		10 <sup>14</sup>			cycles
PDL (SMF Switch only)			0.15	0.3	dB
ER (PMF Switch only)		18	25		dB
IL Temperature Dependency			0.25	0.5	dB
Return Loss		45	50	60	dB
Response Time (Rise, Fall)				300	ns
Fiber Type	SMF-28, Panda PM, or equivalent				
Driver Repeat Rate	100kHz driver	DC	100		kHz
	500kHz driver	DC	500		kHz
Optic power Handling <sup>[3]</sup>			300		mW
Operating Temperature		-5		70	°C
Storage Temperature		-40		85	°C

[1] Measured without connectors. For other wavelength, please contact us.

[2] Cross talk is measured at 100kHz, which may be degraded at the high repeat rate.

[3] Defined at 1310nm/1550nm.

## Applications

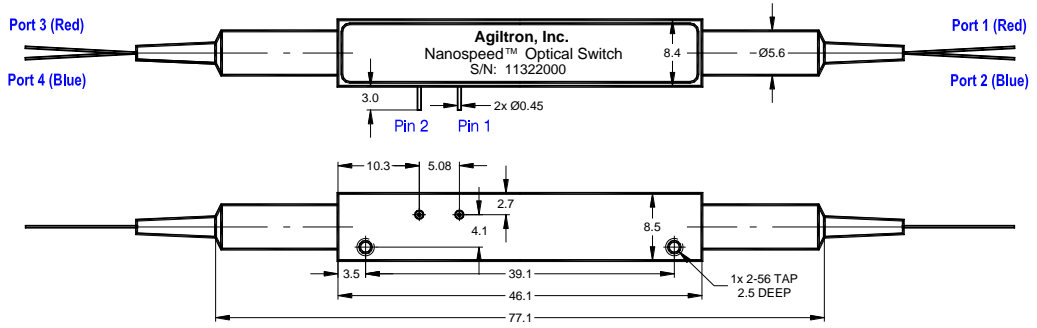
- Optical blocking
- Configurable operation
- Instrumentation

# NanoSpeed™ 2X2

## Series Fiber Optical Switch

(SM, PM, Bidirectional)

### Mechanical Dimensions (Unit: mm)



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

### Optical Path Driving Table

Optical Path	TTL Signal
Port 1→Port 3, Port 2→Port 4	L (< 0.8V)
Port 1→Port 4, Port 2→Port 3	H (> 3.5V)

### Driving Board Selection

Maximum Repetition Rate	Part Number (P/N)
100kHz	SWDR-11a261111
500kHz	SWDR-11a291111

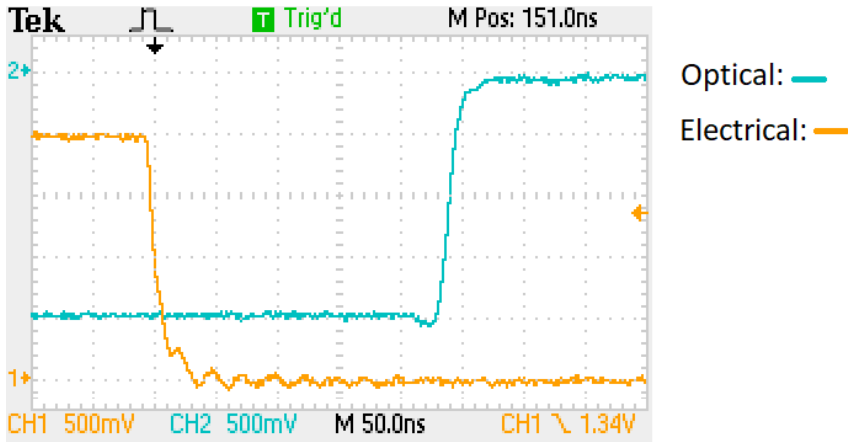
\* Note: For customers that prefer to design their own driving circuit, they are responsible for the optical performance. For more technical information, please contact us.

# NanoSpeed™ 2X2

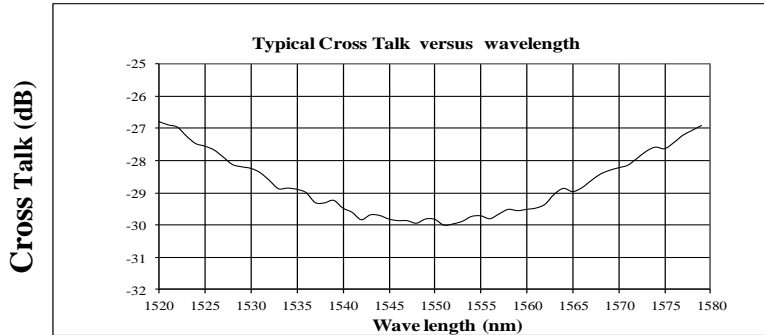
## Series Fiber Optical Switch

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### Typical Speed Response Measurement



### Typical Bandwidth Measurement



### Ordering Information

NSSW -	2 2	<input type="checkbox"/>	1	1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Type	Wavelength	Configuration	Package	Fiber Type	Fiber Length	Connector	
	2x 2=22	1060nm=1 1310nm=3 1410nm=4 1550nm=5 Special=0	Single stage = 1	Standard = 1	SMF-28=1 HI1060=2 PM1550=5 PM980 = 9 Special=0	Bare fiber=1 900um tube=3 Special=0	0.25m=1 0.5m=2 1.0 m=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=8 LC/APC=9 Special=0

[1]. For shorter wavelength, please refer to Premium NS switches.

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## Series Fiber Optical Switch

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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.