

# NanoSpeed™ Cascaded 1x4 Fiberoptic Switch



(Bidirectional)

DATASHEET

BUY NOW



## Features

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

## Applications

- Optical blocking
- Configurable operation
- Instrumentation

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 on 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.

The NS series switches respond to a control signal with any arbitrary timing with frequency from DC up to MHz. The switch is usually mounted on a tuned driver prior to shipping. The electrical power consumption is related to the repetition rate the switch is operated.

## 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>	Single stage	20	25	dB
	Dual stage	30	35	dB
Durability	10 <sup>14</sup>			cycles
PDL for SMF version		0.2	0.4	dB
PER for PMF version	18	22		
IL Temperature Dependency		0.3	0.5	dB
Polarization Mode Dispersion (SMF version)		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

### Notes:

[1] Defined for single stage version (NSSW) w/o connector. Add 0.6dB more for dual-stage (NSDW) version.

[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 will be reduced. High power version (up to 5W) for 1310nm/1550nm is available; please call us for more information.

**Legal notices:** All product information is believed to be accurate and is subject to change without notice. Information contained herein shall legally bind Agiltron only if it is specifically incorporated into the terms and conditions of a sales agreement. Some specific combinations of options may not be available. The user assumes all risks and liability whatsoever in connection with the use of a product or its application.

Rev 08/10/23

© Photonwares Corporation

+1 781-935-1200

[sales@photonwares.com](mailto:sales@photonwares.com)

[www.agiltron.com](http://www.agiltron.com)

Information contained herein is deemed to be reliable and accurate as of the issue date. Photonwares reserves the right to change the design or specifications at any time without notice. Agiltron is a registered trademark of Photonwares Corporation in the U.S. and other countries.

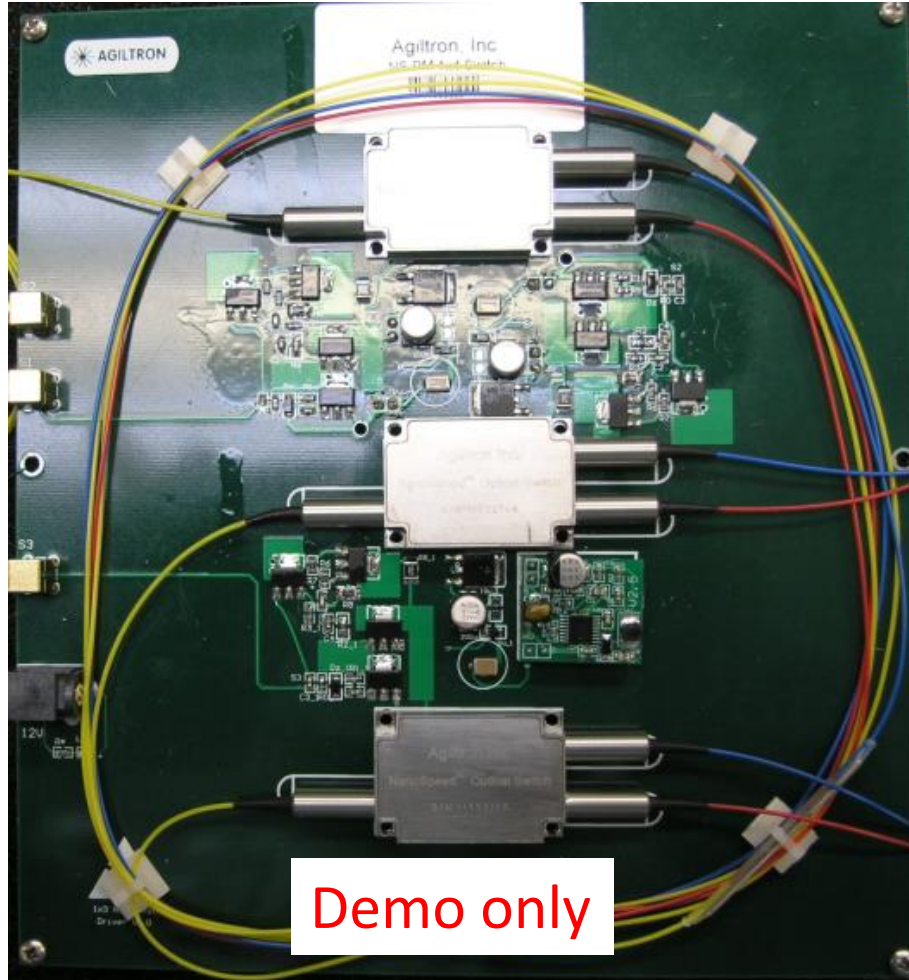
# NanoSpeed™ Cascaded 1x4 Fiberoptic Switch



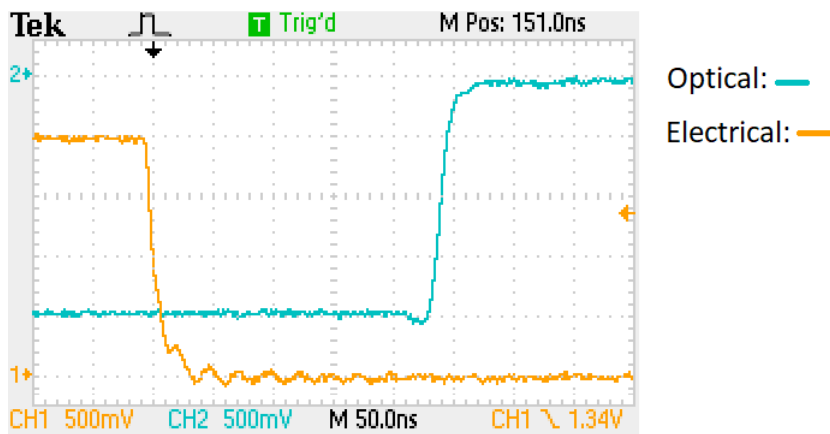
(Bidirectional)

## DATASHEET

### Schematic Assembly on PCB driver



### Typical Speed Response Measurement



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

# NanoSpeed™ Cascaded 1x4 Fiberoptic Switch

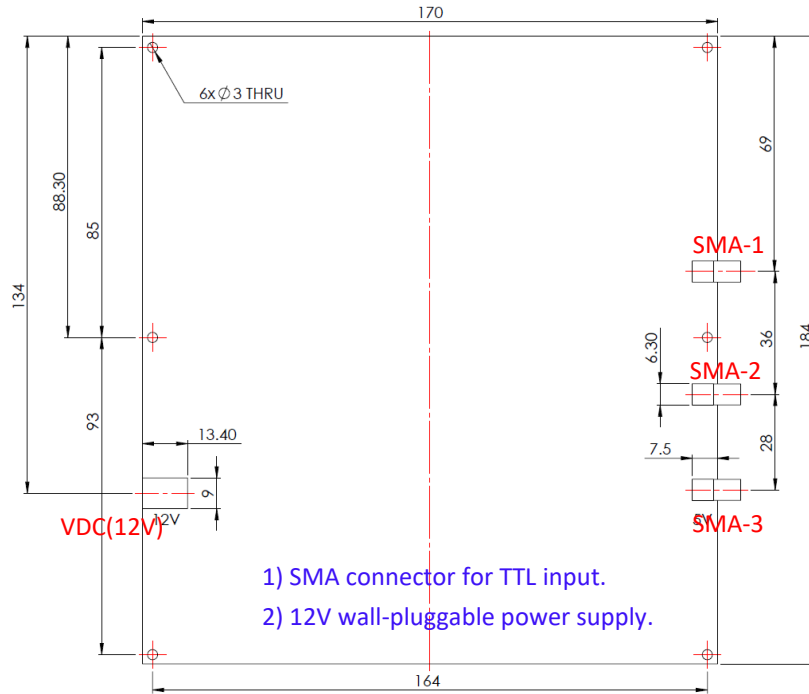


(Bidirectional)

## DATASHEET

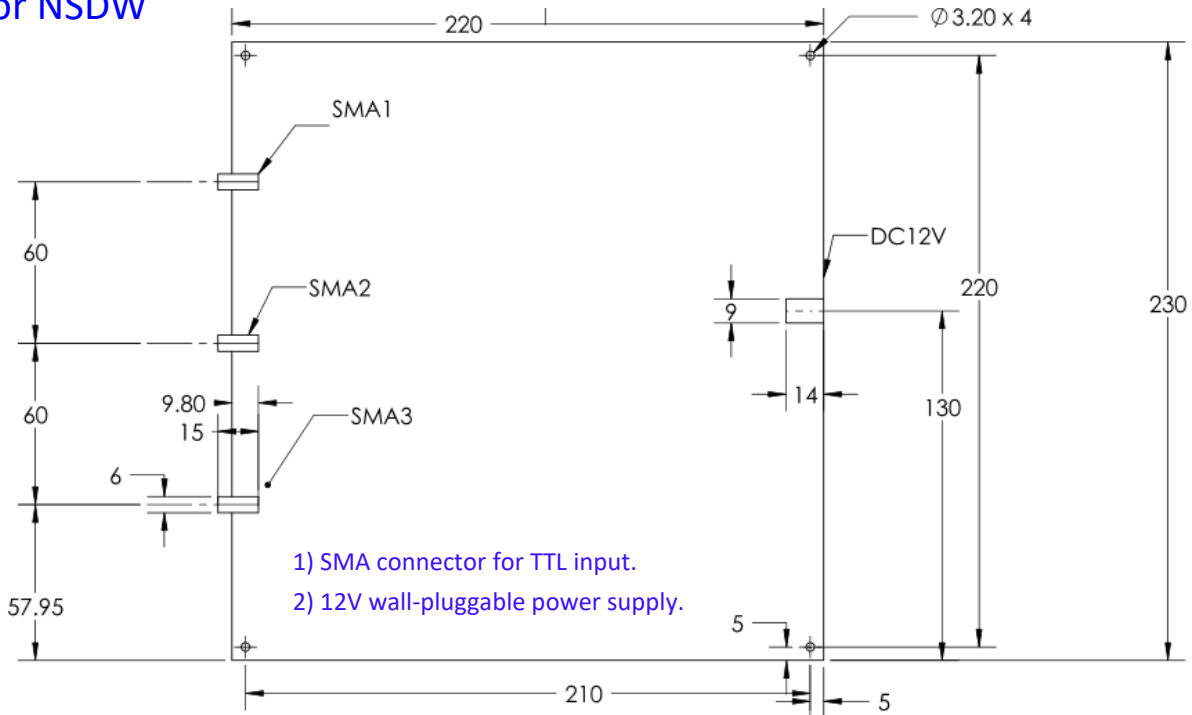
### Mechanical Drawing of 100kHz Driver (mm)

#### Driver for NSSW



- 1) SMA connector for TTL input.
- 2) 12V wall-pluggable power supply.

#### Driver for NSDW



- 1) SMA connector for TTL input.
- 2) 12V wall-pluggable power supply.

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

# NanoSpeed™ Cascaded 1x4 Fiberoptic Switch



(Bidirectional)

## DATASHEET

### Electric Driving Table

Driving Table (TTL control)

Optical Path	SMA-1	SMA-2	SMA-3
Input Port -> Port 1	0V	0V	0V
Input Port -> Port 2	0V	H	0V
Input Port -> Port 3	H	0V	0V
Input Port -> Port 4	H	0V	H

Note:  $3.0V \leq H \leq 5.0V$

### Ordering Information

Prefix	Type <sup>[3]</sup>	Wavelength	Optical Power <sup>[6]</sup>	Max Repetition	Fiber Type	Fiber Cover	Fiber Length	Connector	Package
<b>NSSW</b> - <sup>[1]</sup>	SMF-1x4 = 14	1060 = 1	300mW = 1	100kHz driver = 1	SMF-28 = 1	Bare fiber = 1	0.25m = 1	None = 1	PCB = 1
<b>NSDW</b> - <sup>[2]</sup>	SMF-1x3 = 13	L Band = 2	2W = 2	300kHz driver = 3	PM1310 = 4	900um loose tube = 3	0.5m = 2	FC/PC = 2	1U Rack = 2
	PMF-1x4 <sup>[4]</sup> = 4A	1310 = 3	Special = 0	Special = 0	PM1550 = 5	Special = 0	1.0 m = 3	FC/APC = 3	
	PMF-1x4 <sup>[5]</sup> = 4B	1550 = 5			HI1060 = 2		Special = 0	LC/PC = 7	
	PMF-1x3 <sup>[4]</sup> = 3A	780 = 7			HI780 = 3			LC/APC = 9	
	PMF-1x3 <sup>[5]</sup> = 3B	850 = 8			Special = 0			E2000 APC = A	
		980 = 9						Special = 0	
		Special = 0							

[1]. **NSSW** – **NS** type of **Single stage sWitch**

[2]. **NSDW** – **NS** type of **Dual stage sWitch**

[3]. **SMF**: single mode fiber; **PMF**: polarization maintain fiber.

[4]. Blocking fast axis for PM fiber version in 1x3 or 1x4.

[5]. Blocking slow axis for PM fiber version in 1x3 or 1x4

[6]. Defined at 1550nm. Optical power handling will be reduced significantly @ wavelength <1100nm

#### NOTE:

- PM1550** fiber works well for **1310nm**

#### 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 handling by expanding the core side at the fiber ends.

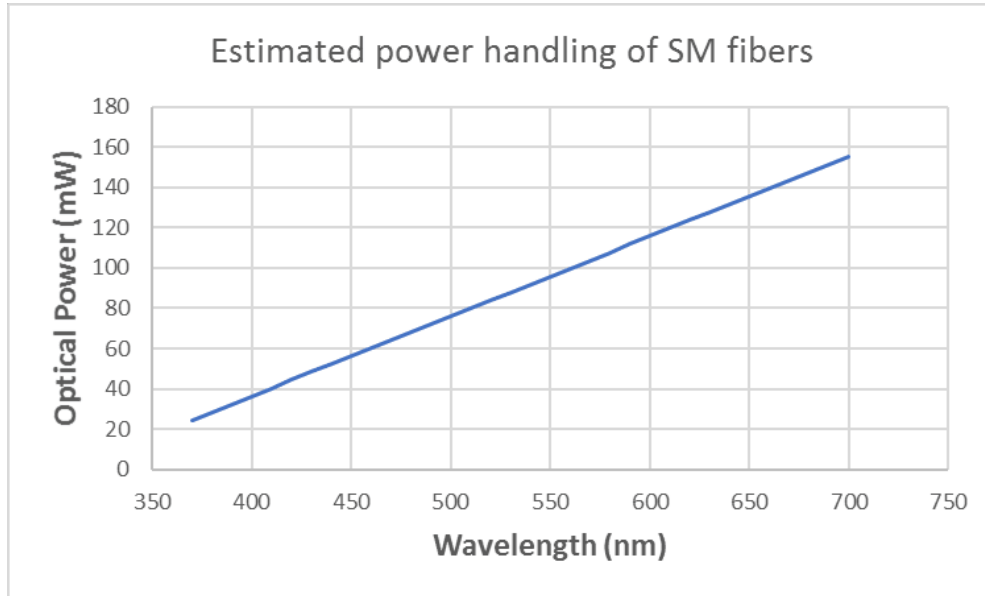
# NanoSpeed™ Cascaded 1x4 Fiberoptic Switch



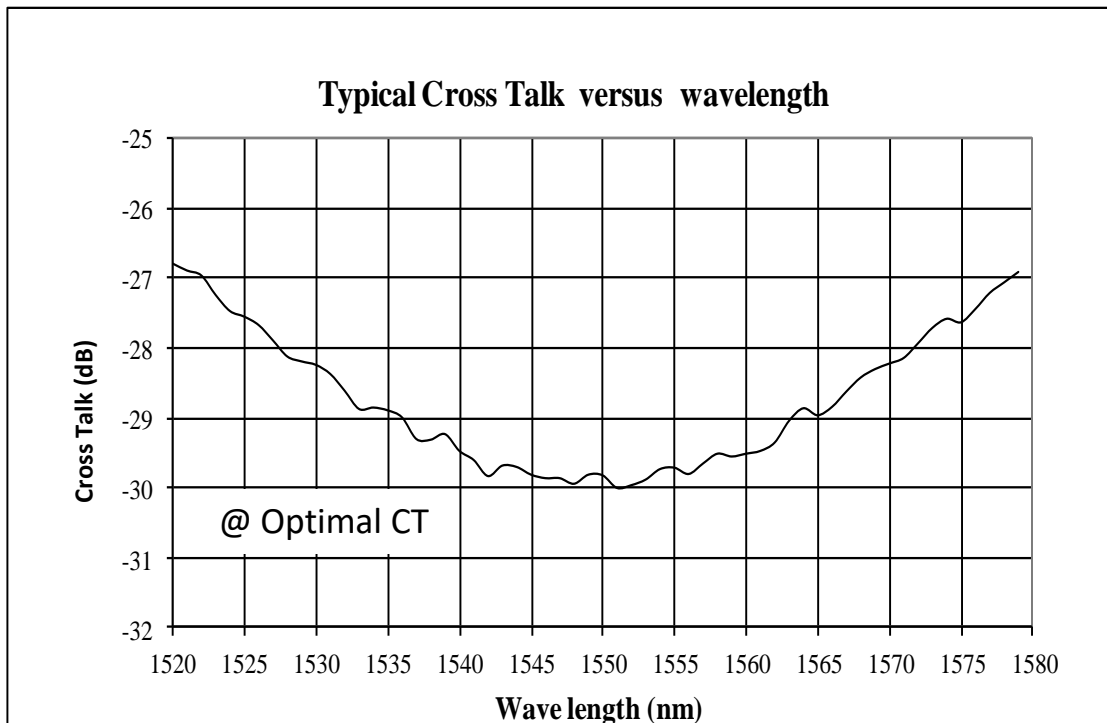
(Bidirectional)

## DATASHEET

### Optical Power Handling vs Wavelength For Single-Mode Fibers



### Typical Wavelength Dependence



# NanoSpeed™ Cascaded 1x4 Fiberoptic Switch



(Bidirectional)

## DATASHEET

### Q & A

**Q:** Does NS series of 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.