LASER COMPONENTS®

NanoSpeed™
Fiber Optical Polarization Switch
(Low-Loss, Bidirectional)

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

DATASHEET

The NaonSpeed™ Series polarization switch can quickly switch the incoming SOP between two orthogonal polarization states (SOPs). This is achieved using patented non-mechanical configurations with solid-state all-crystal designs, which eliminates the need for mechanical movement and organic materials and activated via an electrical control signal. The NS fiber optic switch is a fast switch device featuring very low loss, fast response, ultra-high reliability and high optical power handling. The input is PM fiber. The output could be either PM or SM fiber. For PM fiber, the polarizations is aligned with slow axis. The switch is intrinsically bidirectional and selectable for polarization-independent or polarization-maintain by the fiber type.

Agiltron's SWDR driver is highly recommended to this polarization switch, by which the switch can be driven by a 5V TTL signal through SMA input and a 12V power supply (wall pluggable).

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.

Features

- High Reliability
- High Speed
- Low loss
- Compact

Applications

- Sensor
- Data process
- Instrumentation

Specifications

Parameter		Min	Typical	Max	Unit
Insertion Loss [1]	1900~2200nm		1.2	1.8	dB
	1260~1650nm		0.6	1.0	dB
	960~1100nm		0.8	1.3	dB
	780~960nm		1.2	1.5	dB
IL Temperature Dependency		20	0.25	0.5	dB
Durability		10^{14}			cycles
Return Loss			50		dB
Polarization Rotation				90	Degree
SOP Tolerance		18	± 2.5	± 4.5	Degree
Extinction Ratio [2]			0.25		dB
Response Time (Rise, Fall)		50		300	ns
Repeat Rate			100	500	kHz
Optic Power Handling [3]	Normal power switches		300	500	mW
	High power switches			10	W
Operating Temperature [4]	Standard	-5		75	°C
Storage Temperature		-40		100	°C

[1] Measured without connectors. Wavelength < 850nm or > 1700nm is available only in the special version with a long lead time.
[2] ± 25nm, Input is PM fiber.
[3] Defined at 1310nm/1550nm. For the shorter wavelength, the handling power may be reduced, please contact us for more information.
[4] wider temperature range can be customized. Please contact us.

Rev 06/13/23

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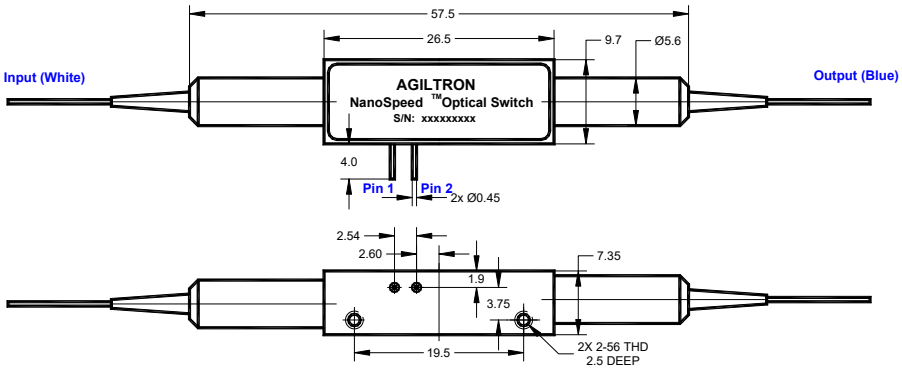
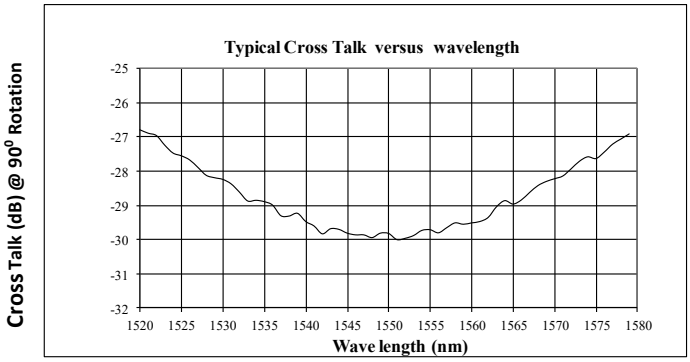
Mechanical Dimensions (Unit: mm)



[1] Package is for λ ≤ 1650nm
[2] Call us for λ > 1650nm

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

Typical Wavelength Dependence @ 1550nm



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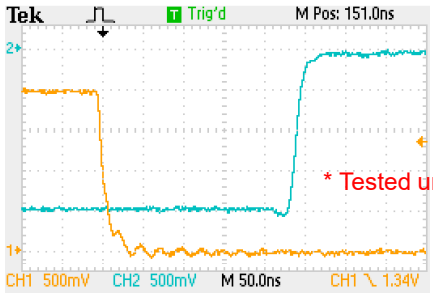
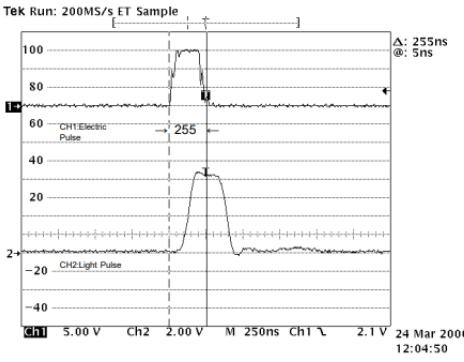
Fast Speed and Repetition Measurements



Optical:

Electrical:

* Tested under ultra-fast switch driver



Ordering Information

	☐	☐☐	☐	☐	☐	☐	☐	☐
Prefix	**Configuration**	**Wavelength [1]**	**Power**	**Input Fiber**	**Output Fiber**	**Fiber Jacket**	**Fiber Length**	**Connector**
NSPS-	Standard = 1 Special = 0	1060 = 01 2000 = 02 1310 = 03 1550 = 05 1625 = 06 780 = 07 850 = 08 980 = 09 650 = 0E Special = 00	Standard = 1 1W = 2 5W = 3 10W = 4	PM1550 = 5 PM980 = 9 PM850 = 8 SMF28 = 1 HI1060 = 6 HI780 = 7 Special = 0	PM1550 = 5 PM980 = 9 PM850 = 8 SMF28 = 1 HI1060 = 6 HI780 = 7 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 LC/APC=8 E2000 APC=9 Special=0

[1]. Wavelength <850nm or > 1700nm is only available in the special version with a long lead time.

NOTE:

- PM1550 fiber works well for 1310nm

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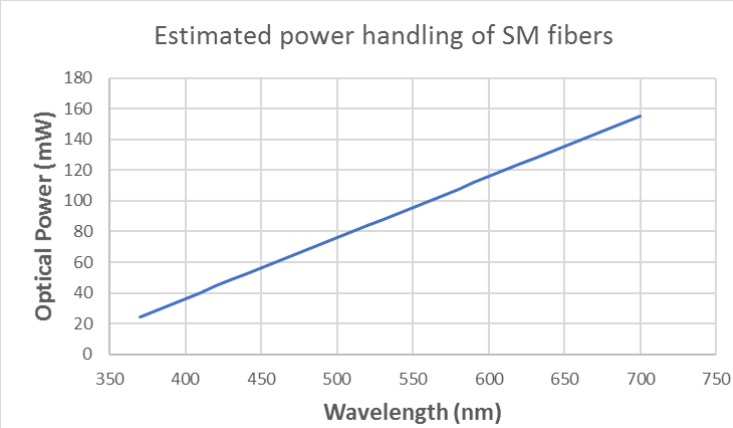
Optical Power Handling vs Wavelength For Single-Mode Fibers



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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 ^{0}C. The extinction or cross-talk value is affected by many EO material characters, including temperature-dependent birefringence, Vp, 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.

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