NanoSpeed™ Fiber Optical Phase Modulator/Switch

(Bidirectional, Polarization Insensitive, All Wavelengths)

DATASHEET

BUY NOW

The NS Series fiber optical phase modulator/switch is device based on a patented electro-optical configuration, featuring low optical loss and wide temperature operation with built-in compensation. The device is a two port devise that is bidirectional in which the input and output ports are interchangeable. The device dynamically controls the optical phase of the transmitting light, meeting the most demanding requirements of continuous operations over 25 years and non-mechanical ultra-high reliability (passed Telcordia and space qualifications). The switch is intrinsically bidirectional and selectable for polarization-independent or polarization-maintain by the fiber type.

For high frequency resonance configuration, the device has an integrated circuit inside that only require a 5V AC input signal matching the resonance frequency. For lower frequency, this device can be mounted on a specially designed electronic drivers of both analog and digital switching driver using a 5V analog or TTL control signal and a 12V power supply (wall pluggable), respectively.

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
- Phase shift/delay
- Data process
- Instrumentation

Specifications

Parameter		Min	Typical	Max	Unit
Insertion Loss [1]	1900-2200nm		0.8	1.8	dB
	1260~1650nm		0.6	1.0	dB
	960~1100nm		0.8	1.3	dB
	780-960nm		1.2	1.5	dB
	520 – 680nm		1.5	2.3	dB
IL Temperature Dependency		60	0.25	0.5	dB
Durability		10^{14}			cycles
Polarization Dependent Loss (SM version)			0.15	0.3	dB
Polarization Mode Dispersion (SM version)			0.1	0.3	ps
Polarization extinction ratio (PM version)		18			dB
Return Loss		45	50		dB
Phase Change [2]		0		180	Degree
Analog Modulation rate [3]		DC	50	200	kHz
Digital Switching Rate [4]		10	20	100	MHz
Resonance Modulation Rate					
Optic power	Normal power version		300		mW
Handling [5]	High power version			5	W
Operating Temperature	Standard	-5		75	°C
	Special version	-30		85	°C
Storage Temperature		-40		100	°C

Note:
[1] Measured without connectors. Wavelength with red color can be implemented in the special version with a long lead time.
[2] Phase change vs. voltage is linear ideally.
[2] The phase change is proportionally to the 0-5V control signal with NVDR driver
[3] The maximum phase change is set at a predetermined value
[4] Defined at 1310nm/1550nm. For the shorter wavelength, the handling power may be reduced, please contact us for more information.

Rev 06/12/23

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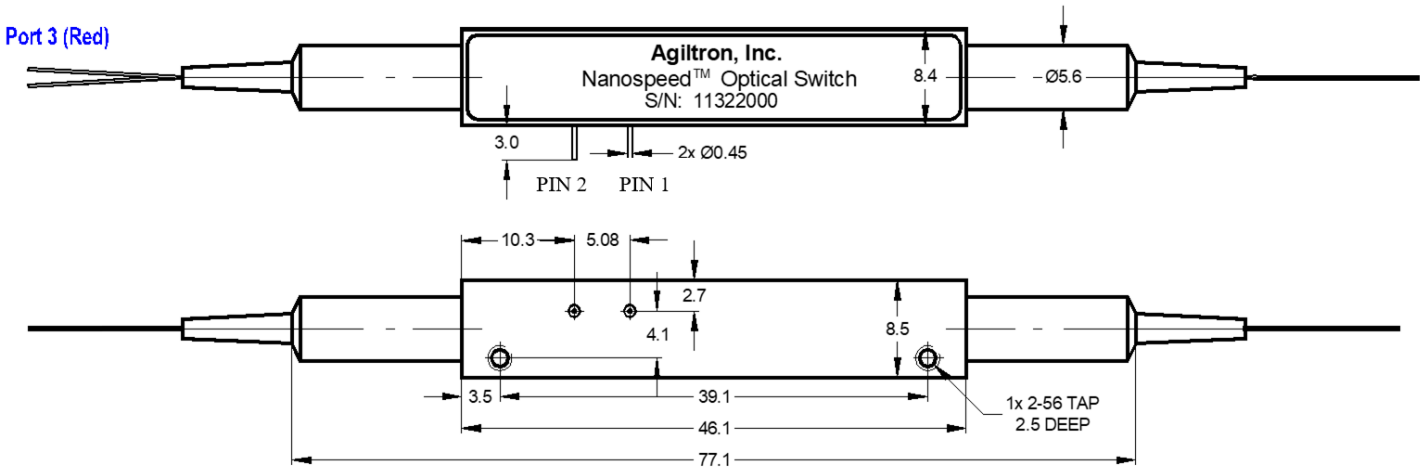
Mechanical Dimensions (Unit: mm) DC-200KHz



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

No-Resonance Driving Board Selection

NS On/Off Switch Drivers DC-1MHz Switch Drivers - Agiltron Inc

NS Analog Modulation Drivers DC-1MHz High Speed Variable Fiber Optical Attenuators (VOAs) - NanoSpeed™ - Agiltron Inc.

Resonance Driving Board (inside the device)

The resonant modulator can be driven by a function generator tuned to the device's resonant frequency.

Ordering Information

	☐☐	☐	☐	☐	☐	☐	☐	☐
Prefix	**Type**	**Wavelength**	**Temperature range**	**Repetition Rate**	**Fiber Type**	**Fiber Cover**	**Fiber Length**	**Connector**
NSPM-	Standard = 11 High Power = 22[1]	1060 = 1 2000 = 2[1] 1310 = 3 1550 = 5 1625 = 6 850 = 8 780 = 7 650 = E 550 = F 400 = G Special = 0	Standard = 1 Large = 2[1]	Digital100kHz=1 Digital200KH =2 Analog100KHz=3 Analog200KHz=4 Resonance1MHz=6 Resonance5MHz=7 Resonance10MHz=8 Resonance20MHz=9 Resonance50MHz=A Resonance80MHz=B Special=0	SMF-28=1 HI1060=2 HI780=3 PM1550=5 PM980=9 Special=0	Bare fiber=1 0.9mm 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]. The special version with a long lead time can be produced to address the request of items with red color

NOTE:

- ❑ PM1550 fiber works well for 1310nm

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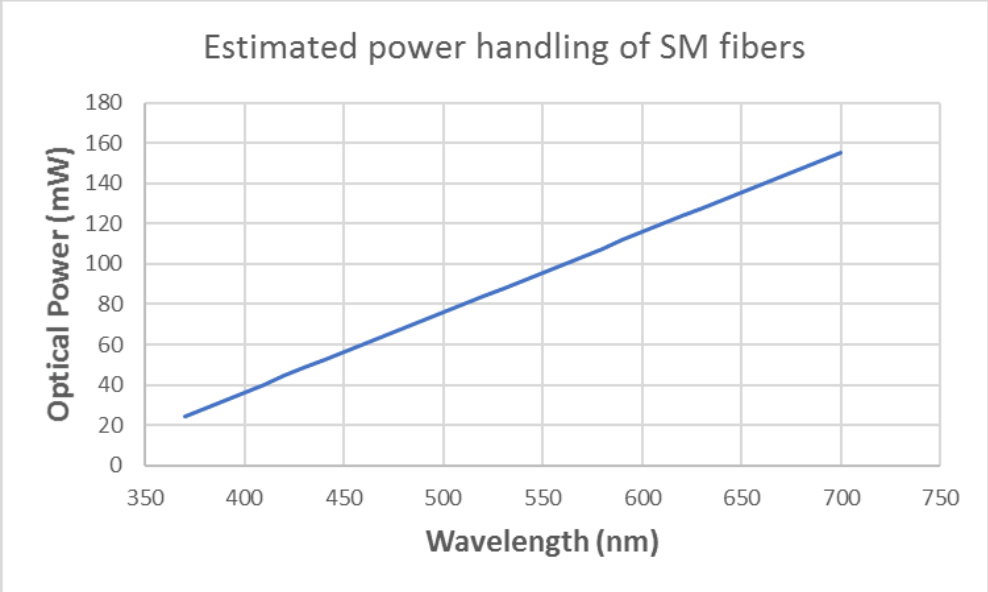
Optical Power Handling vs Wavelength For Single-Mode Fibers



P +1 781-935-1200 E sales@photonwares.com W www.agiltron.com

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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.