

# NanoSpeed™ Fiber Optical Resonant Phase Modulator

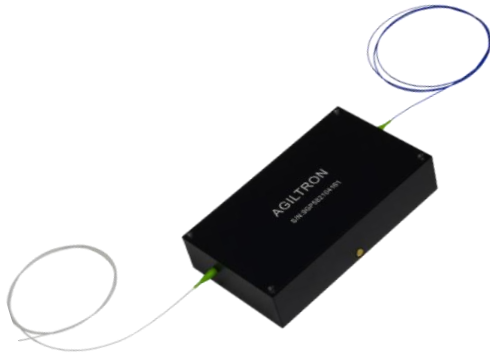


(5MHz, High Power, Bidirectional)

(Protected by U.S. patents 7224860, 6757101, 6577430 and pending patents)

DATASHEET

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## Applications

- Laser Systems
- Reconfigurable Optics
- Instrumentations

## Features

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

The NS Series fiber optic resonance modulator features fast repetition at a fixed resonance frequency of about 5 MHz, low optical loss, and high optical power handling. This is achieved using a patented electro-optical configuration with a built-in high Q resonant circuit. The devices use special electro-optical crystals of high stability that increase power handling and reduce drift/darkening. It has two fiber ports and comes with a 12V power supply. Operation is simply powering it up.

The NS fiber optic devices meet the most demanding switching requirements of continuous operations over 25 years and non-mechanical ultra-high reliability.

## Specifications

Parameter		Min	Typical	Max	Unit
Insertion Loss <sup>[1]</sup>	1900-2200nm		1.3	1.9	dB
	1260~1650nm		1	1.5	
	960~1100nm		1.5	2	
	780-960nm		1.7	2.2	
Phase Modulation <sup>[2]</sup>		0		180	degree
Durability		10 <sup>14</sup>			cycles
PDL (SMF Switch only)			0.15	0.3	dB
PMD (SMF Switch only)			0.1	0.3	ps
ER (PMF Switch only)		18	25		dB
IL Temperature Dependency			0.25	1.5	dB
Return Loss		45	50	60	dB
Repetition Rate			20	100	MHz
Optic power	Normal power version		300		mW
Handling <sup>[4]</sup>	High power version			5	W
Operating Temperature	Standard	-5		75	°C
	Large range version	-30		85	
Storage Temperature		-40		100	°C

### Notes:

- [1]. Measured without connectors.  
Wavelength <850nm or >1700nm is available only in the special version with a long lead time.
- [2] Cross talk is measured at 100kHz, which may be degraded at a higher repeat rate.
- [3] It is defined as the rising or fall time between 10% and 90% of optical intensities.
- [4] Defined at 1310nm/1550nm. For the shorter wavelength, the handling power may be reduced, please contact us for more information. High power version is available by incorporating fiber core enlargement (expensive).

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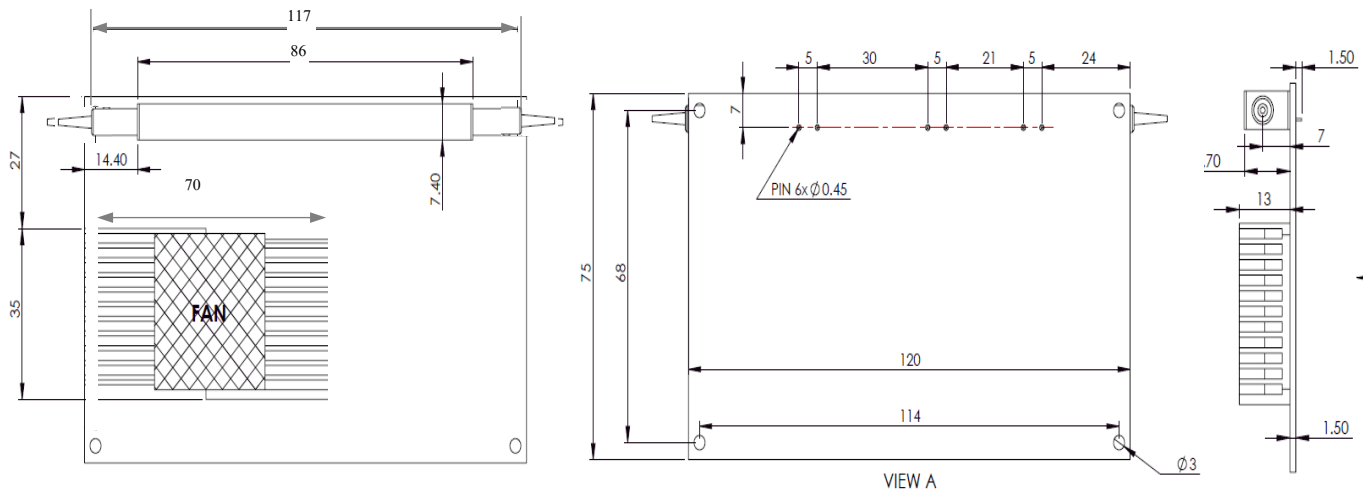


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### Electrical Information

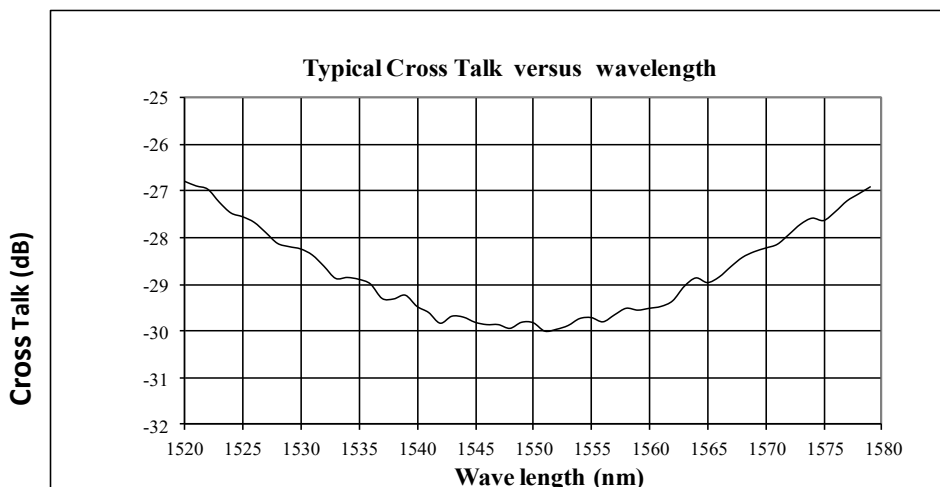
- Self-contained tuned to the resonance
- Power Input: 12V Wall pluggable (110-240 AVC)

### Mechanical Dimensions (mm)



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

### Typical Bandwidth Measurement



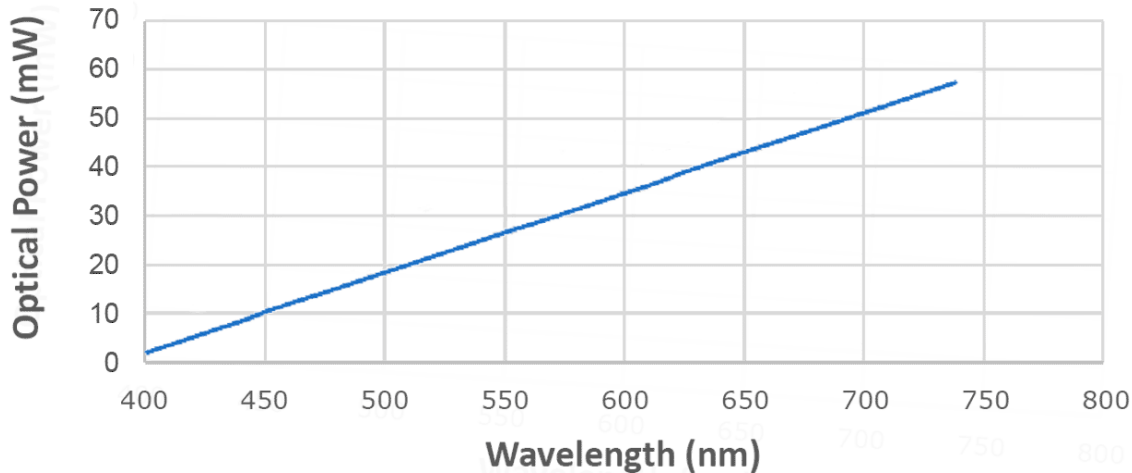
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### Optical Power Handling vs Wavelength for Standard SM Fibers



### Ordering Information (Part Number)

Prefix	Type	Wavelength	Power Handling <sup>[1]</sup>	Repetition Rate	Fiber Type	Fiber Cover	Fiber Length	Connector <sup>[2][3]</sup>
NSRP-	1x1 = 1	1060 = 1	Regular = 1	1MHz = 01	SMF-28 = 1	Bare fiber = 1	0.25m = 1	None = 1
	1x2 = 2	2000 = 2	500mw = 2	2MHz = 02	HI1060 = 2	900um tube = 3	0.5m = 2	FC/PC = 2
	2x2 = 3	1310 = 3	5W = 5	5MHz = 05 Special = 00	HI780 = 3	Special = 0	1.0 m = 3 Special = 0	FC/APC = 3
		1550 = 5	PM1550 = 5		SC/PC = 4			
		1625 = 6		PM850 = 8	SC/APC = 5			
		780 = 7		PM980 = 9	ST/PC = 6			
		850 = 8		Special = 0	LC/PC = 7			
		650 = E			LC/APC = 8			
		Special = 0			Special = 0			

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

[2]: Please contact the sale about the high power connector for the NPHW version.

Regular fiber connector has PER ~22dB. Connector with PER >27 dB is available using special process

[3]. The connector cannot be installed directly onto bare fiber, as it is prone to damage during shipping. However, the connector can be assembled on bare fiber if a 3 cm protective loose tube is added for reinforcement. The customer can remove this protective tube after testing. The optical power handling of a standard connector is less than 0.5 W for SM28 fiber and decreases further with smaller core fibers.