

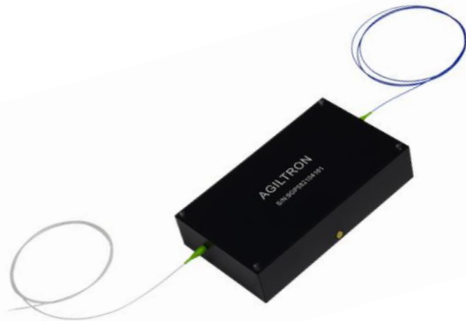
# NanoSpeed™ Fiber Optical Resonant Modulator 5MHz

(Bidirectional)



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## Features

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

## Applications

- Laser Systems
- Reconfigurable Optics
- Instrumentations

This NS Series fiber optic modulator features a fixed 5MHz modulation. The waveform is in sine format. This is achieved using a patented electro-optical configuration and operating at a fixed frequency with a built-in high Q resonant circuit. Unlike other modulators, we use special electro-optical crystals of high stability that increase power handling and reduce drift/darkening. The NS fiber optic switches meet the most demanding switching requirements of continuous operations over 25 years and non-mechanical ultra-high reliability. The switch is intrinsically bidirectional and selectable for polarization-independent or polarization-maintain by the fiber type.

The modulation turns on by plugging in the accompanying DC power supply. No adjustment is required.

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 before shipping. The electrical power consumption is related to the repetition rate at which the switch is operated.

The dual-stage configuration increases the extinction ratio or cross-talk value.

## Specifications

Parameter	Min	Typical	Max	Unit
Insertion Loss <sup>[1]</sup>	1900-2200nm	1.3	1.9	dB
	1260~1650nm	1	1.5	dB
	960~1100nm	1.5	2	dB
	780-960nm	1.7	2.2	dB
Cross Talk <sup>[2]</sup>	18	20	35	dB
Durability	10 <sup>14</sup>			cycles
PDL (SMF Switch only)		0.15	0.3	dB
PMD (SMF Switch only)		0.1	0.3	ps
IL Temperature Dependency		0.25	1.5	dB
Return Loss	45	50	60	dB
Repetition Rate		20	100	MHz
Optic Power Handling <sup>[4]</sup>	Normal power version	0.3	20	W
	High power version		5	W
Operating Temperature	Standard	-5	75	°C
	Large range version	-30	85	°C
Storage Temperature	-40		100	°C

### Notes:

[1] Measured without connectors. Each connector adds about 0.2 to 0.3dB.

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

[2] ± 25nm, Cross talk is measured at 100kHz, which may be degraded at the 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 available by incorporating fiber core enlargement (expensive).

**Warning:** This is an OEM module designed for system integration. Do not touch the PCB by hand. The electrical static can kill the chips even without a power plug-in. Unpleasant electrical shock may also be felt. For laboratory use, please buy a Turnkey system.

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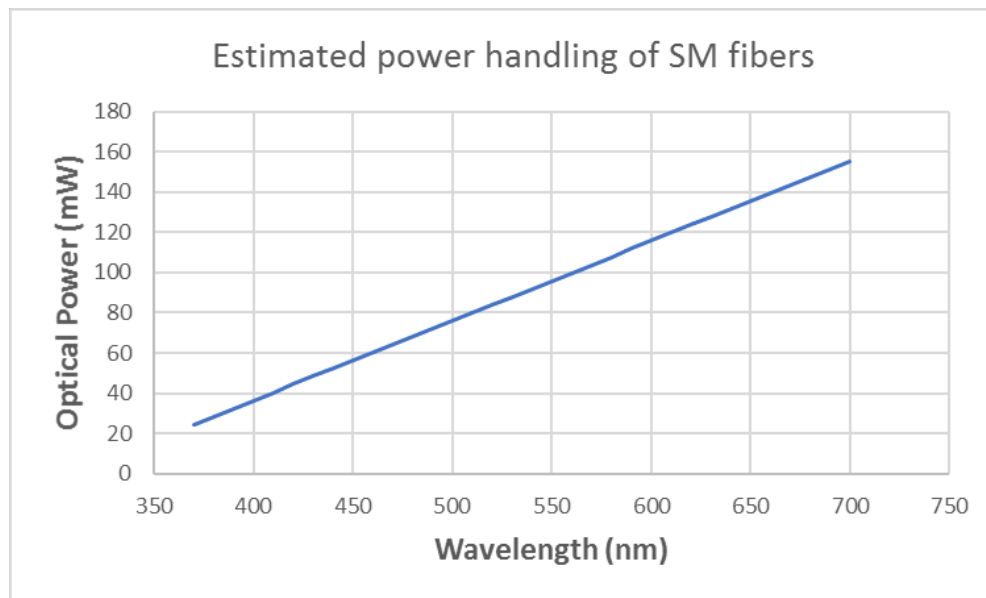
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### Optical Power Handling vs Wavelength For Single-Mode Fibers



### Typical Bandwidth Measurement

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### Ordering Information

Prefix	Type	Wavelength	Power Handling <sup>[1]</sup>	Repetition Rate	Fiber Type	Fiber Cover	Fiber Length	Connector <sup>[2]</sup>	Benchtop
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>NSRM-</b>	1x1 = 1	1060 = 1 2000 = 2 1310 = 3 1550 = 5 1625 = 6 780 = 7 850 = 8 650 = E Special = 0	Regular = 1 500mw = 2 5W = 5 10W = A 15W = C 20W = D Special = 0	5MHz = 05 Special = 00	SMF-28 = 1 HI1060 = 2 HI780 = 3 PM1550 = 5 PM850 = 8 PM980 = 9 Special = 0	Bare fiber = 1 900um tube = 3 Special = 0	0.25m = 1 0.5m = 2 1.0m = 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 LC/UPC = U Special = 0	None = 1 Benchtop = B

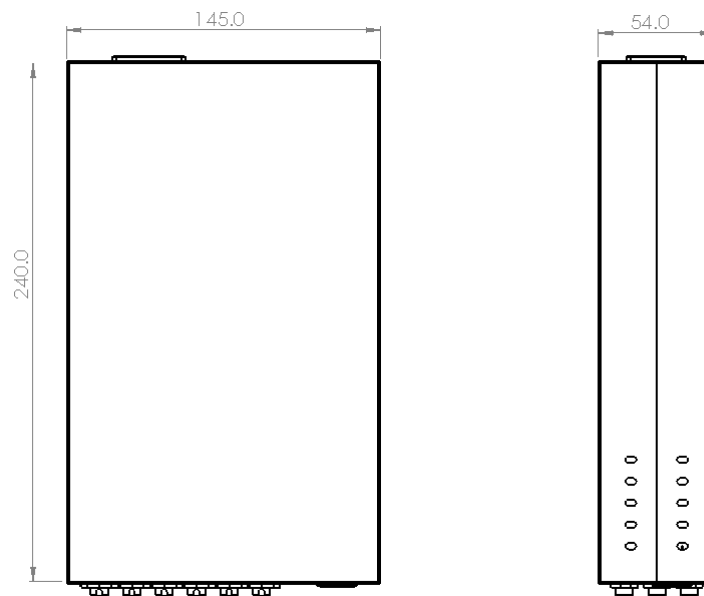
[1]: Wavelength < 850nm or > 1700nm is available only in the special version with a long lead time

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

**Note:**

- PM1550** fiber works well for **1310nm**
- Opaque** – light is blocked without applying a voltage
- Transparent** – light goes through without applying a voltage

### Benchtop Box Mechanical Dimension



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

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## Application Notes

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### 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  $\mu\text{m}$ ) 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.

## Operation Manual

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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.