NanoSpeed™ Fiber Optical Resonant Modulator 5MHz

(Bidirectional)

DATASHEET

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Features

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

Applications

- Laser Systems
- Reconfigurable Optics
- Instrumentations

RoHS COMPLIANT

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.

This plug-and-play module features devices mounted on a driver, and it is shipped with a wall-pluggable power supply.

Specifications

Parameter		Min	Typical	Max	Unit
Insertion Loss [1]	1900-2200nm		1.6	2.8	dB
	1700~2300nm		0.8	1.8	
	1260~1650nm		1	1.5	
	960~1100nm		1.5	2	
	780-960nm		1.7	2.2	
Cross Talk On/Off Ratio [2]		18	20	35	dB
Durability		10^{14}			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 [4]	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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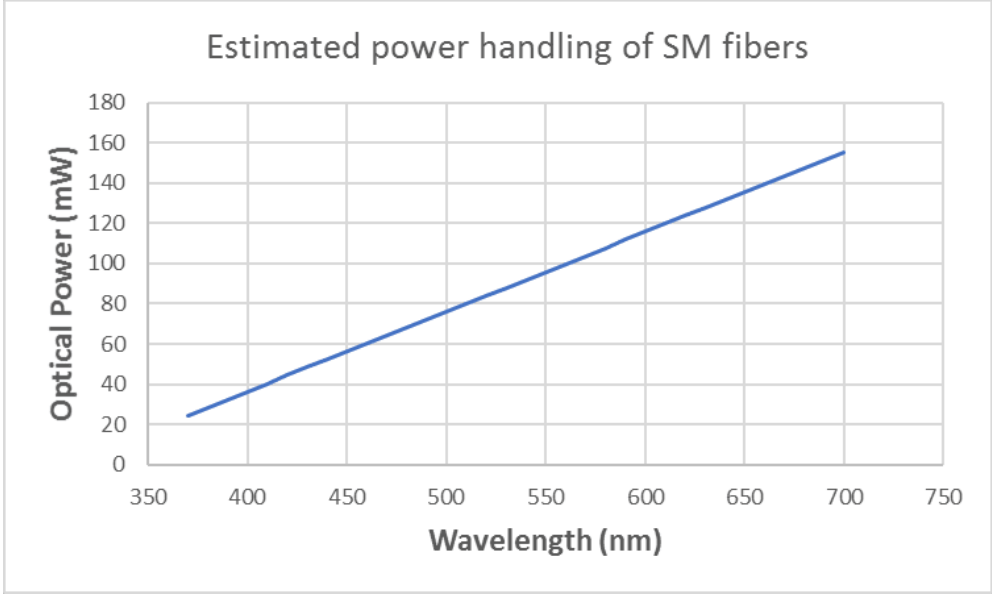
Optical Power Handling vs Wavelength For Single-Mode Fibers



Typical Bandwidth Measurement

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Ordering Information (Part Number)

	☐	☐	☐	0 5	☐	☐	☐	☐	☐
Prefix	**Type**	**Wavelength**	**Power Handling [1]**	**Repetition Rate**	**Fiber Type**	**Fiber Cover**	**Fiber Length**	**Connector [2][3]**	**Benchtop**
NSRM-	1x1 = 1	1060 = 1 2000 = 2 1310 = 3 1550 = 5 1625 = 6 780 = 7 850 = 8 650 = E 1750 = A 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 MM50/125 [4]=M 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.

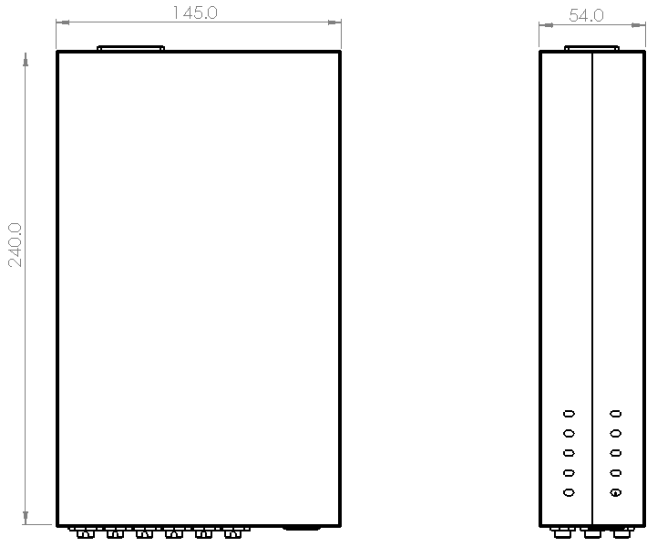
[3]. The connector cannot be installed directly onto bare fiber, as it is prone to damage during shipping. However, the connector can be assembled on bare fiber if a 3 cm protective loose tube is added for reinforcement. The customer can remove this protective tube after testing. The optical power handling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

[4]. For laser with mode fill ratio CPR <14

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

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

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.