NanoSpeed™
High Speed NxM Fiber Optical Switch

(10ns rise/fall time, polarization insensitive, all wavelengths, bidirectional, up to 20W)

DATASHEET

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The NS NxM fiber optic switch utilizes a patented electro-optical design, providing low optical loss, wide temperature operation, and polarization insensitivity. It boasts ultra-high reliability, capable of continuous operation for over 25 years in vibration-prone environments (Telcordia and space-qualified). This bidirectional switch is available in polarization-independent and polarization-maintaining configurations. The rise and fall times are intrinsically linked to the crystal properties, while the repetition rate depends on the driver. The NS Series switch is mounted on an electronic driver within a network-ready rack enclosure with 100-240 ACV input at the back. It responds to control signals with arbitrary timing frequencies from DC up to MHz. Certain frequencies may exhibit reduced on/off ratios due to mechanical resonances, but optimization for specific frequencies is available upon request. Power consumption varies with the switch's repetition rate, and the dual-stage configuration enhances the extinction ratio or cross-talk performance.

Features

- Low Loss
- High Reliability
- High Power
- Bidirectional

Applications

- Laser System
- Quantum System
- Instruments

Specifications

Parameter		Min	Typical	Max	Unit
Insertion Loss [1]	1900~2200nm		5	5.4	dB
	1260~1650nm		3	3.6	
	960~1100nm		3	3.9	
	780~960nm		4	4.5	
	520~680nm		6	6.9	
Cross Talk(On/Off) [2]		18	20 [2]	30	dB
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	0.5	dB
Return Loss		45	50		dB
Optical Rise Time		5	8	10	ns
Optical Fall Time		5	8	10	ns
Minimum Pulse Width			90		ns
Repetition Rate [5]		DC		2	MHz
Optic Power Handling [4]	Normal power version		0.3	0.5	W
	High power version		5	20	W
Operating Temperature	Standard	-5		75	°C
	Special version	-30		85	
Storage Temperature		-40		100	°C

Notes:

[1] For 1x4,for 1x8 adds 1dB, for 1x12 adds 2dB, for 1x24 adds 3dB. For 16x16 the loss is about 16dB. Measured without connectors. Each connector adds 0.2 to 0.3dB

[2] ± 25nm, The typical cross talk is measured at DC-20kHz and may be degraded at a higher repeat rate.

[4] The standard version is defined at 1310nm/1550nm. For the shorter wavelength, the handling is reduced see the graph. High power version has a fiber end beam expander, thus cost more

[5] The driver is optimized at a repeat rate >500kHz. The specs exclude a few resonant frequency points. The performance can be optimized at other frequencies.

Note: The specifications provided are for general applications with a cost-effective approach. If you need to narrow or expand the tolerance, coverage, limit, or qualifications, please [click this link]:

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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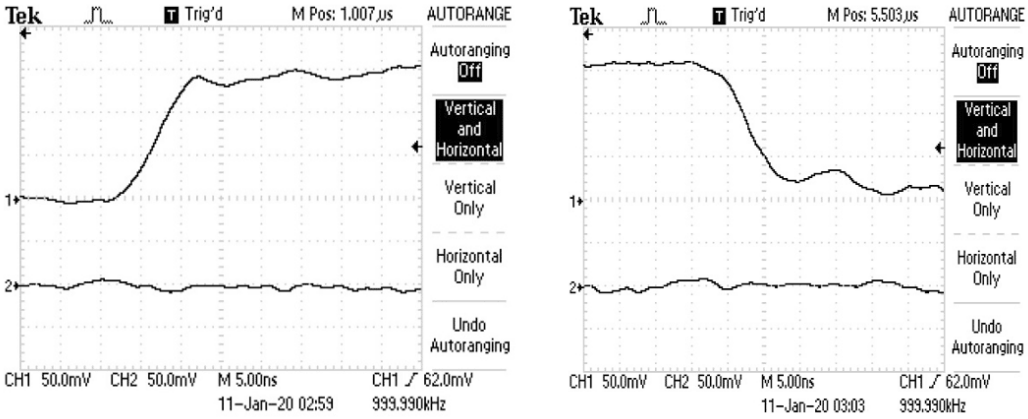
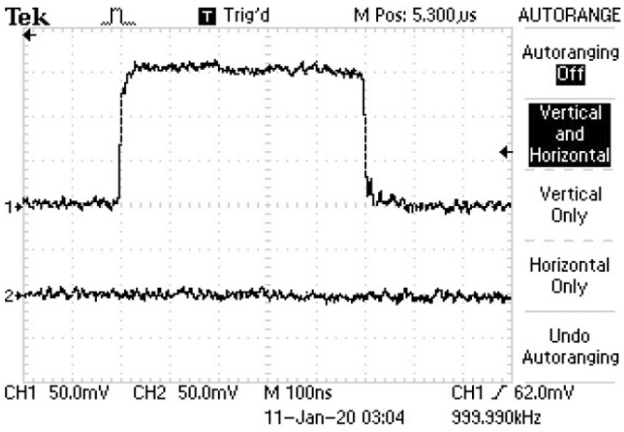
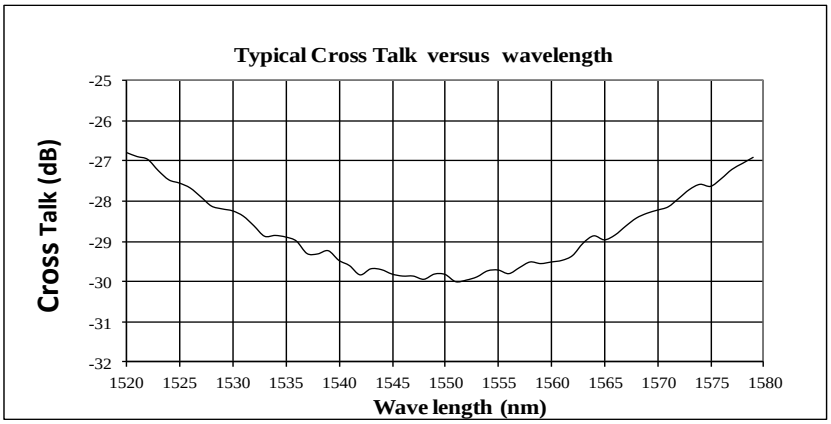
Typical Rise and Fall Optical Switching Profile (5ns)



Typical Optical Switching Repetition Profile (1MHz)



Typical Wavelength Dependence Profile



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Ordering Information

	☐☐☐☐	☐	☐	☐	☐	☐
Prefix	**Type**	**Wavelength**	**Configuration**	**Repetition Rate**	**Fiber Type**	**Connector [1]**
NFNM-	1x1 = A1 1x2 = A2 1x4 = A4 1x8 = A8 1x12 = 12 1x16 = 16	1060nm = 1 2000nm = 2 1310nm = 3 1480nm = 4 1550nm = 5 1625nm = 6 780nm = 7 850nm = 8 650nm = E 550nm = F Special = 0	Single stage = 1 Single Stage 5W = H Single Stage 10W = J Special = 0	100kHz = 1 200kHz = 2 300kHz = 3 500kHz = 5 800kHz = 8	SMF-28 = 1 HI1060 = 2 HI780 = 3 PM1550 = 5 PM850 = 8 PM980 = 9 PM1310 = P Special = 0	None = 1 FC/PC = 2 FC/APC = 3 ST/PC = 6 LC/PC = 7 LC/APC = A E2000 APC = 9 LC/UPC = U Special = 0

[1]. High-power connectors can ordered as special.
Red Color-marked is special order with a higher price and longer lead time.

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.

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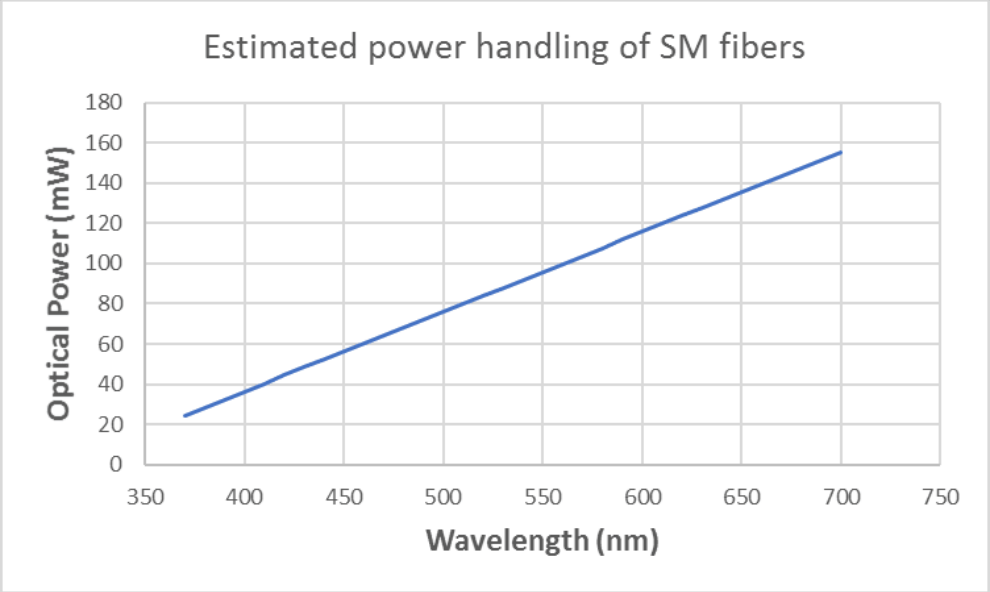
Optical Power Handling vs Wavelength For Single-Mode Fibers



Electrical Driving Specification

Control signal Input: 0-5V through SMA connector
Power supply in driver: 110-220 AC
Power Consumption in driver: <10W

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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