NanoSpeed™ 8x12 Fiber Optical Switch

(Bidirectional)

DATASHEET

BUY NOW

The NS Series fiber optic switch is developed for fast switching and low optical loss. This is achieved using patented electro-optical configuration featuring clean fast response without ripples. The NS fiber optic switch meets the most demanding switching requirements of continuous operations over 25 years and non-mechanical ultra-high reliability. The 8x12 NS switch is mounted on a single control board with TTL signal inputs. The switch is intrinsically bidirectional and selectable for polarization-independent or polarization-maintain by the fiber type.

The NS Series switch is controlled by 5V TTL signals with a specially designed electronic driver having performance optimized for various repetition rate.

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.

Features

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

Applications

- Optical blocking
- Configurable operation
- Instrumentation

Specifications

Parameter		Min	Typical	Max	Unit
Insertion Loss [1]	1900-2200nm		4.5	8	dB
	1260~1650nm		4	5	dB
	860~1100nm		6	8	dB
	480-860nm		7	10	dB
Cross Talk [2]		60	65	70	dB
Durability		10^{14}			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	dB
Return Loss		45	50	60	dB
Optical transition time [3]			100	300	ns
Repetition Rate		DC		200	kHz
Optic power	Normal power switches		0.3	20	W
Handling [4]	High power switches			5	W
Operating Temperature	Standard	-5		75	°C
	Large range version	-30		85	°C
Storage Temperature		-40		100	°C

Notes:

[1] Measured without connectors. Wavelength with red color can be implemented 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.**

Rev 03/08/24

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Ordering Information

8x12 module will be packaged in 2RU 19” mounting rack or similar package. The control interface of TTL will be through D-shape connector.

	8 1 2	☐	☐	☐	☐	☐	☐	☐	☐
Prefix	**Type**	**Wavelength[3]**	**Repetition Rate**	**Fiber Type**	**Fiber Cover**	**Fiber Length**	**Connector [4]**	**Package**	**Optical Power**
NSSW- [1] **NSHW- [2]**	8x12 = 812	1060 = 1 2000 = 2 1310 = 3 1550 = 5 1625 = 6 780 = 7 850 = 8 650 = E Special = 0	100kHz = 1 200kHz = 2 300kHz = 3 Special = 0	SMF-28 = 1 HI1060 = 2 HI780 = 3 PM1550 = 5 PM980 = 9 Special = 0	900um 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	PCB = 1 1U Rack = 2	Regular = 1 1W = A 2W = B 5W = C 10W = D 20W = E

[1]. **NSSW** – Normal power version
[2]. **NSHW** – High power version
[3]. Wavelength with red color will be implemented in the special version with a long lead time.
[4]. Please contact us about the high power connector for NSHW version.

NOTE:

- **PM1550** fiber works well for **1310nm**

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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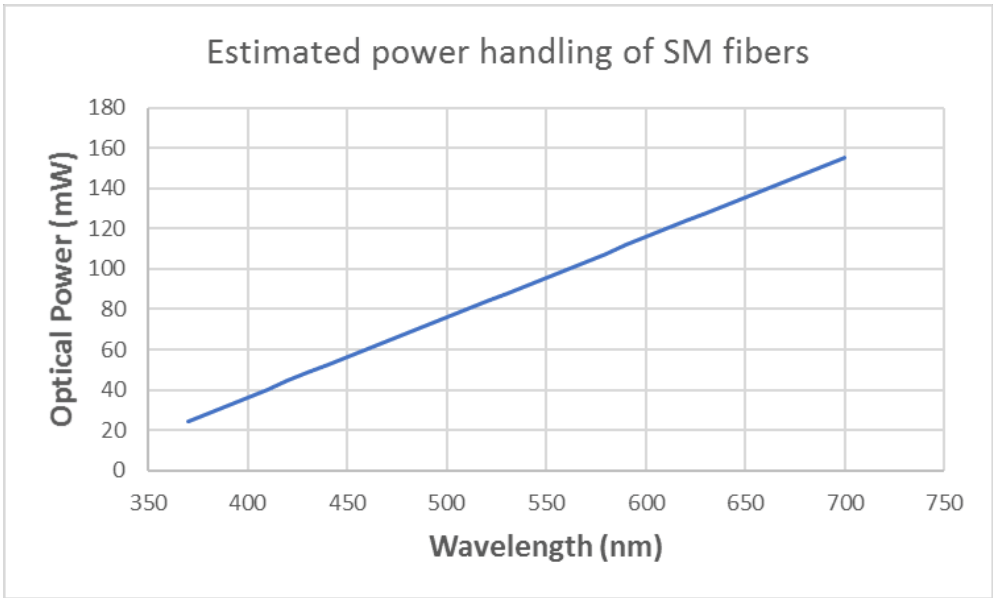
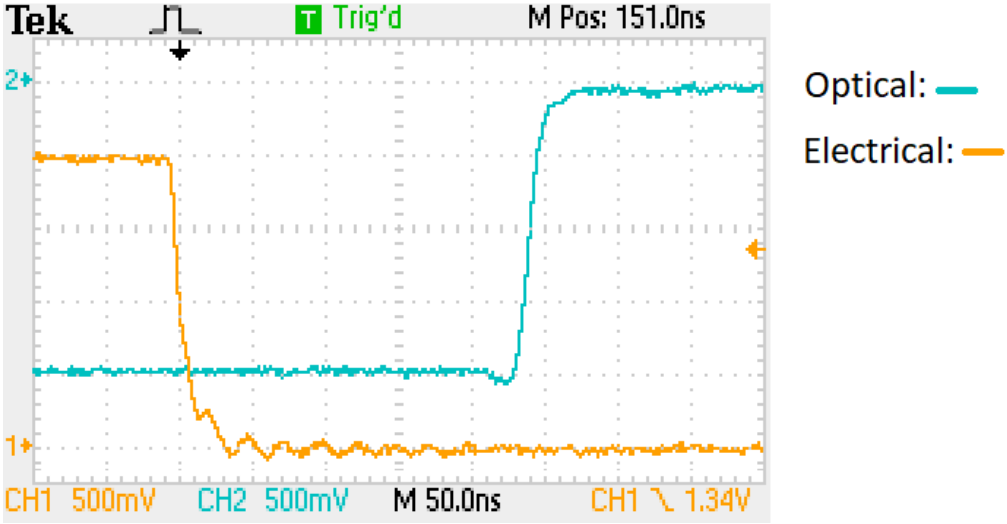
Optical Power Handling vs Wavelength For Single-Mode Fibers



Typical Speed Response Measurement



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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.