NanoSpeed™ Ultra-Fast 1xN Fiber Optical Switch

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

DATASHEET

Return to the Webpage

The NS Ultra-Fast Series (NF) fiber optical switch is based on a patented electro-optical configuration featuring low optical loss, wide temperature operation, and polarization insensitivity. The NS fiber optical switch has ultra-high reliability and can continuously operate for over 25 years in a vibration environment (passed Telcordia and space qualifications). The switch is bidirectional and available with configurations of polarization-independent or polarization-maintain. The rise/fall time is intrinsically related to the crystal properties, and the repetition rate is associated with the driver. The NF Series switch is mounted on an electronic driver having a 5V TTL control signal SMA input and a DC power supplier. There are poor frequency response sections in which the on/off ratio does not meet the spec due to the device's mechanical resonances. The on/off ratio can be optimized for certain frequencies with requests.

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 prior to shipping. The electrical power consumption is related to the repetition rate the switch is operated.

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

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 Ratio [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
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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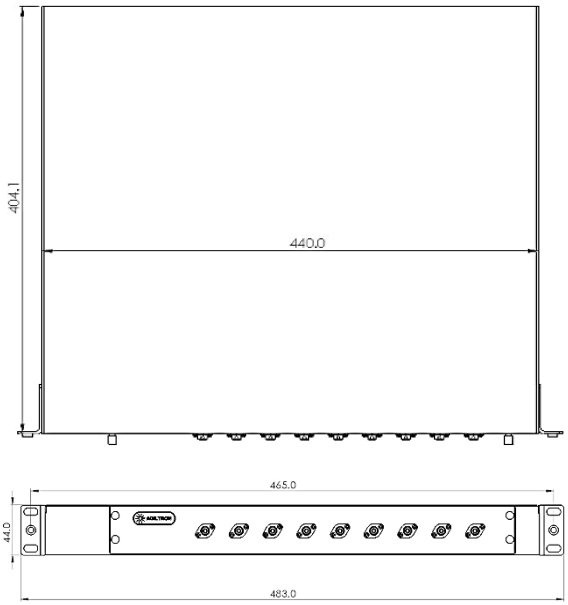
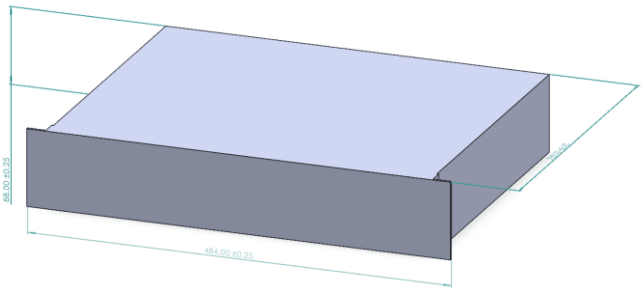
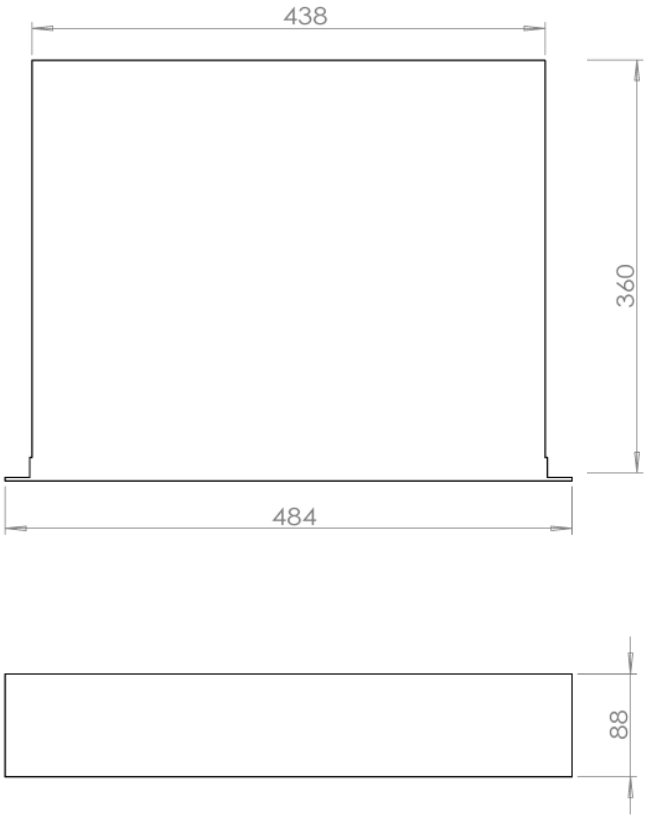
Mechanical Dimensions (Unit: mm): The Rack Size is related to the switch and connector selection

- 1 U



- 2 U





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

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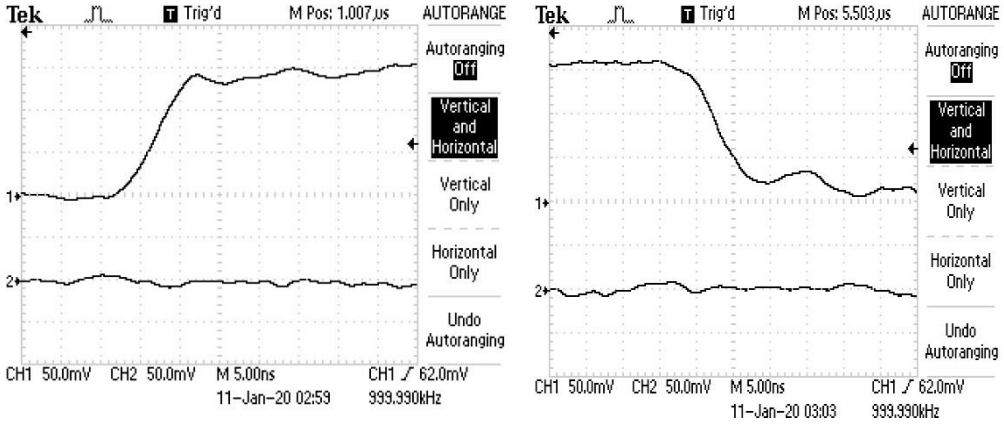
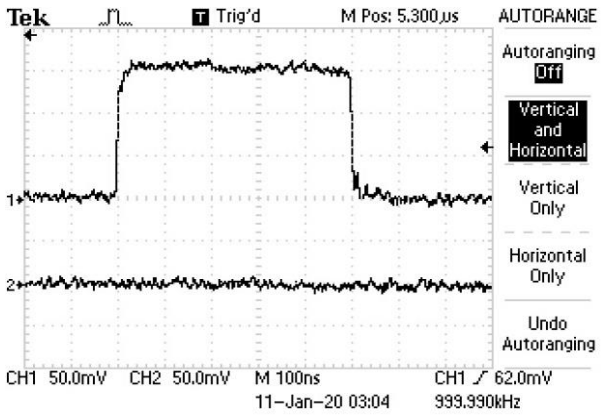
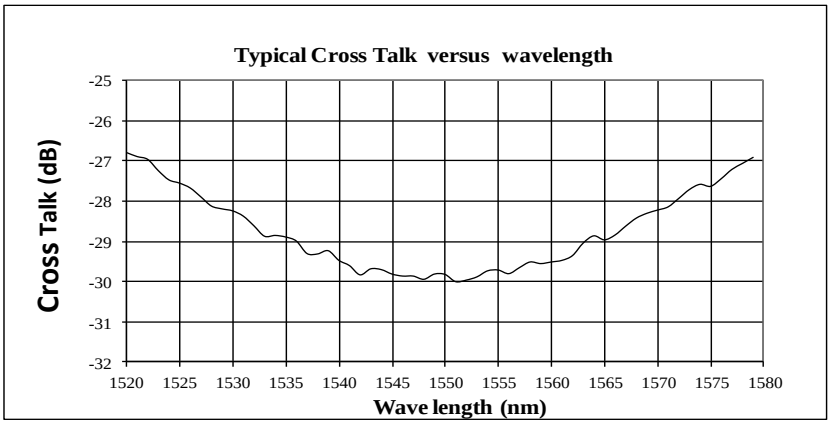
Typical Rise and Fall Optical Switching Profile (5ns)



Typical Optical Switching Repetition Profile (1MHz)



Typical Wavelength Dependence Profile



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Ordering Information

	☐☐	☐	☐	☐	☐	☐	☐	☐	☐
Prefix	**Type**	**Wavelength [1]**	**Configuration**	**Repetition Rate**	**Fiber Type**	**Fiber Cover**	**Fiber Length**	**Connector [5]**	**Optical Power**
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 = 4 800kHz = 8 900kHz = 9 2MHz = B	SMF-28 = 1 HI1060 = 2 780HP = 3 PM1550 = 5 PM850 = 8 PM980 = 9 Special = 0	Bare fiber = 1 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 ST/PC = 6 LC/PC = 7 LC/APC = A E2000 APC = 9 LC/UPC = U Special = 0	Regular = R 1W = 1 2W = 2 3W = 3 5W = 5 10W = A 15W = C 20W = D

[1]. Red Wavelength Bands are special orders. They use special crystals.

[5]. High-power connectors can ordered as special.

Red Color-marked is special order with a higher price and longer lead time.

Note:

- **PM1550** fiber works well for **1310nm**, **PM1310** fiber choice costs extra

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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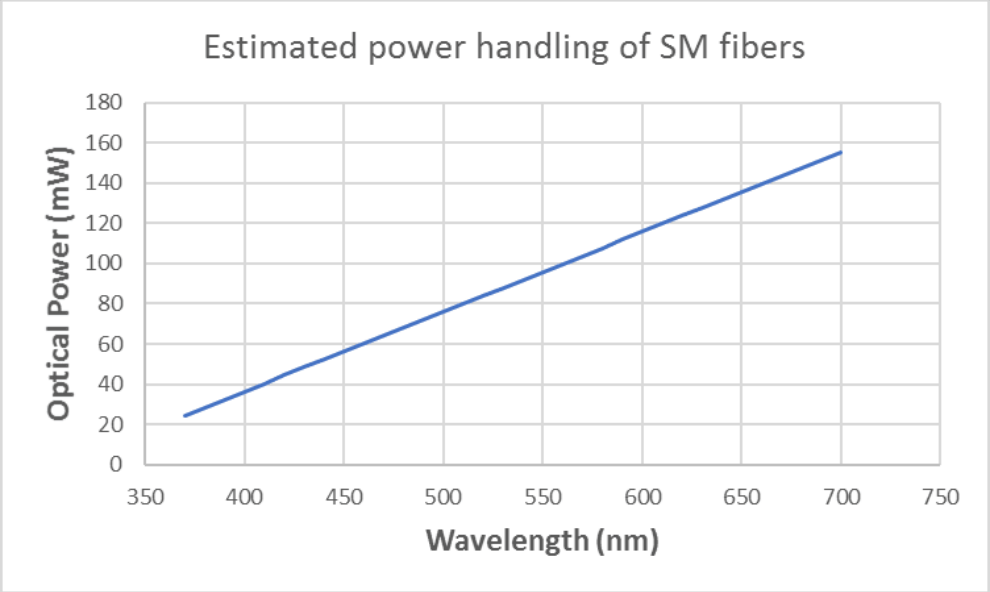
Optical Power Handling vs Wavelength For Single-Mode Fibers



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 fiber optical in and out via the connectors on the front panel
2. Connect control signals to the SMA connector on the front panel.
3. Connect power.
4. Turn on the switch at the back panel
5. The device should then function proper

Note: Do not alter device factory settings.

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