NanoSpeed™ Non-Drift
72dB Extinction 1x1 Fiber Optical Switch
1.8dB Loss, SMF, PMF, High Power, Bidirectional

(Protected by U.S. patent 7,403,677B1 and pending patents)

DATASHEET

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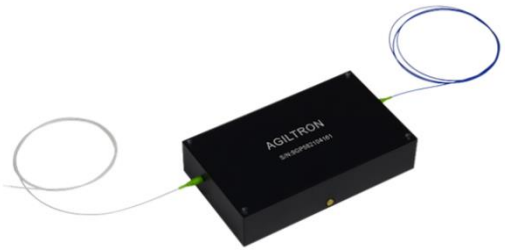

The NSSI series of NanoSpeed™ electro-optical switches delivers low optical loss, over 70 dB on/off extinction, little drift, fast response, and high optical power handling through drift-compensating control technology. Built by cascading multiple switches on a PCB with a protective cover, they operate via 5 V TTL control (SMA input) and a 12 V DC supply. Designed for exceptional reliability — including undersea, space, and continuous-duty applications with lifetimes exceeding 25 years — the intrinsically bidirectional switches are available in polarization-independent or polarization-maintaining fiber configurations and transfer optical power seamlessly between ports with no loss during switching. The Low-Drift series is optimized for repetition rates above 1 Hz, responds to arbitrarily timed control signals, and exhibits power consumption proportional to switching rate, with some drift occurring only when operated at zero switching rate.

Applications

- Laser Systems
- Sensor Systems
- Instruments
- Quantum Systems

Features

- 30dB High on/off Ratio
- Solid State High Reliability
- High Speed
- Very Low Optical Loss
- High Optical Power Handling
- Minimal Transit Echoes
- Wide Operation Temperature Range
- Vibration Insensitive

Specifications

Parameter	Min	Typical	Max	Unit
Center Wavelength	650		2300	nm
Operation Bandwidth	50		200	nm
Insertion Loss [2] 1900 – 2300nm		2	3	dB
Insertion Loss [2] 1700 – 2300nm		2	2.9	
Insertion Loss [2] 1260 – 1650nm	1.7	2	2.5	
Insertion Loss [2] 960 – 1100nm	2	2.5	3	
Insertion Loss [2] 650 – 950nm	2	3	4	
Cross Talk On/Off Ratio [3]	67	70	75	dB
Durability	10^{14}			cycle
PDL (SMF)		0.15	0.3	dB
PMD (SMF)		0.1	0.3	ps
ER (PMF)	18	25		dB
Insertion Loss Temperature Dependence		0.25	0.5	dB
Return Loss	45	50	60	dB
Response Time (Rise or Fall)		50	100	ns
Electrical-Optical Delay			250	ns
Optical Power Handling [4]		0.3	20	W
Repetition Rate [5]	0.0001		20	kHz
Operating Temperature	-10		50	°C
Storage Temperature	-40		80	°C
Power Consumption			2	W

Notes:

[1] Operation bandwidth is ±25nm with on/off ~70dB, beyond this range on/off ratio decrease

[2] Measured without connectors. Each connector adds about 0.25dB loss

[3] ±25nm, measured at 50kHz. The time gap between switching should be <10ms to avoid charge built-up at wavelengths shorter than 800nm that may degrade the on/off value.

[4] Defined at 1310nm/1550nm. For the shorter wavelength, the handling power may be reduced.

[5] Currently, only DC-100kHz is available. Higher frequency is under development

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.**

Rev 12/02/25

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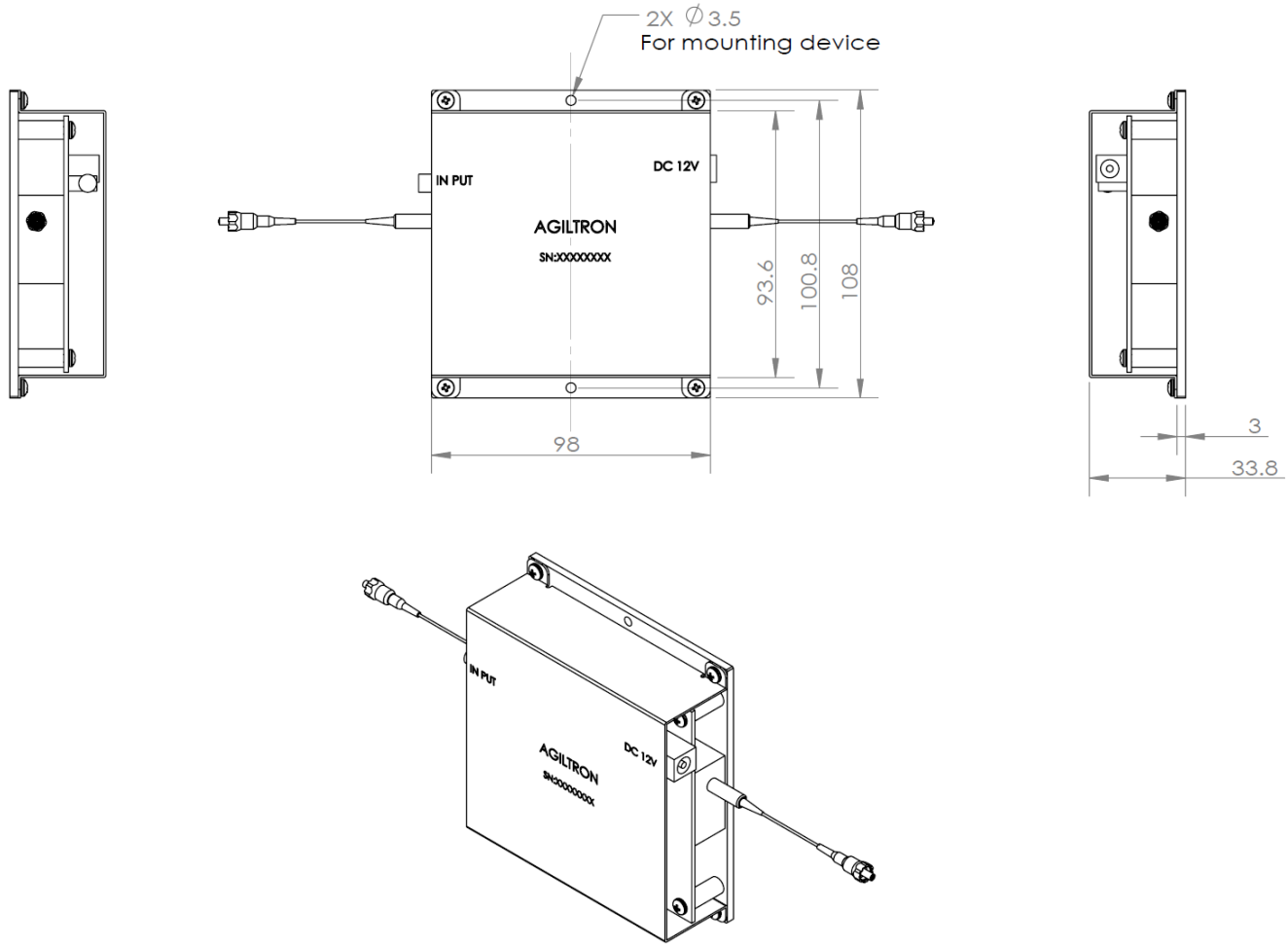
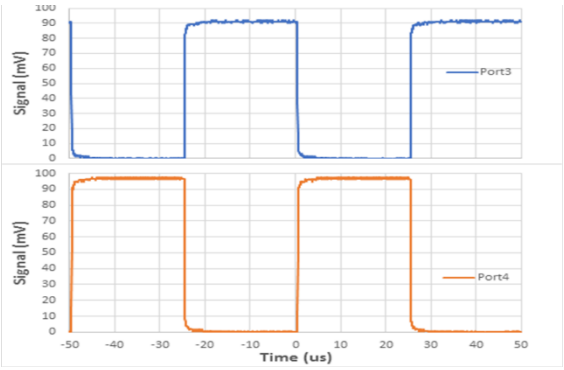
Mechanical Dimensions (mm)

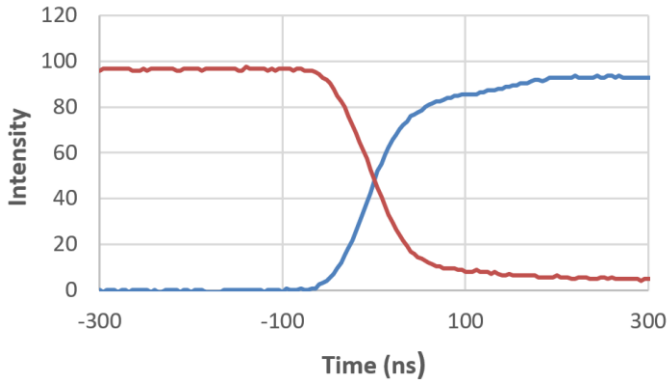


*Product dimensions may change without notice. This is sometimes required for non-standard specifications.

Typical 20KH Switching Between Two Ports



Output Ports Intensity Exchange During Switching



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Ordering Information

	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Prefix	**Type**	**Wavelength[1]**	**Optical Power[2]**	**Configuration**	**Max Frequency**	**Fiber Type**	**Fiber Cover**	**Fiber Length**	**Connector**	**Benchtop**
NSN4-	1x1 = 1	1060nm = 1 L Band = 2 1310nm = 3 1410nm = 4 1550nm = 5 1750nm = A 2000nm = B 980nm = 9 850nm = 8 780nm = 7 650nm = 6 Special = 0	Standard = 1 5W = 2 10W = A 15W = C 20W = D Special = 0	Transparent = A Opaque = B	20kHz = 2 50kHz = 5 Special = 0	SMF-28 = 1 HI1060 = 2 HI780 = 3 PM1550 = 5 PM980 = 9 PM850 = 8 SM600 = 6 PM630 = 4 Special = 0	Bare fiber = 1 0.9mm 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 Duplex LC/PC = 8 LC/APC = 9 E2000 APC = A LC/UPC = U Special = 0	None = 1 Benchtop = B

[1]. Center wavelength. The high power switch isn't available for the wavelength shorter than 960nm.

[2]. Regular connectors cannot handle high power. Please contact us for Agiltron's unique high-power connectors.

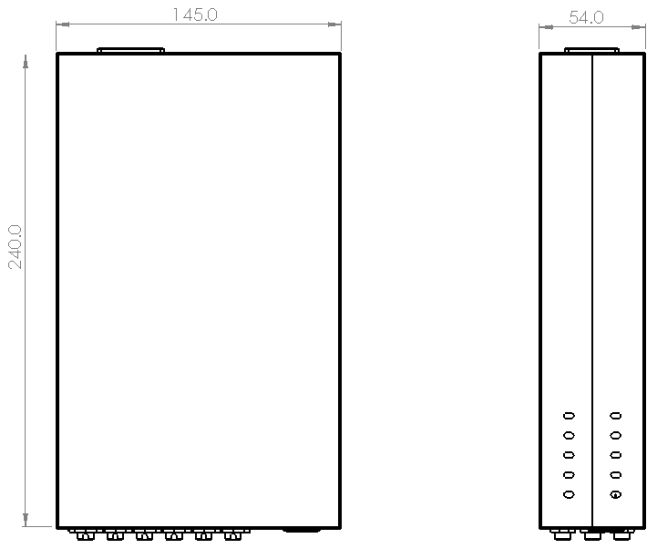
* This unit comes with an integrated driver, and a power supply is included.

Red color indicates special order

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



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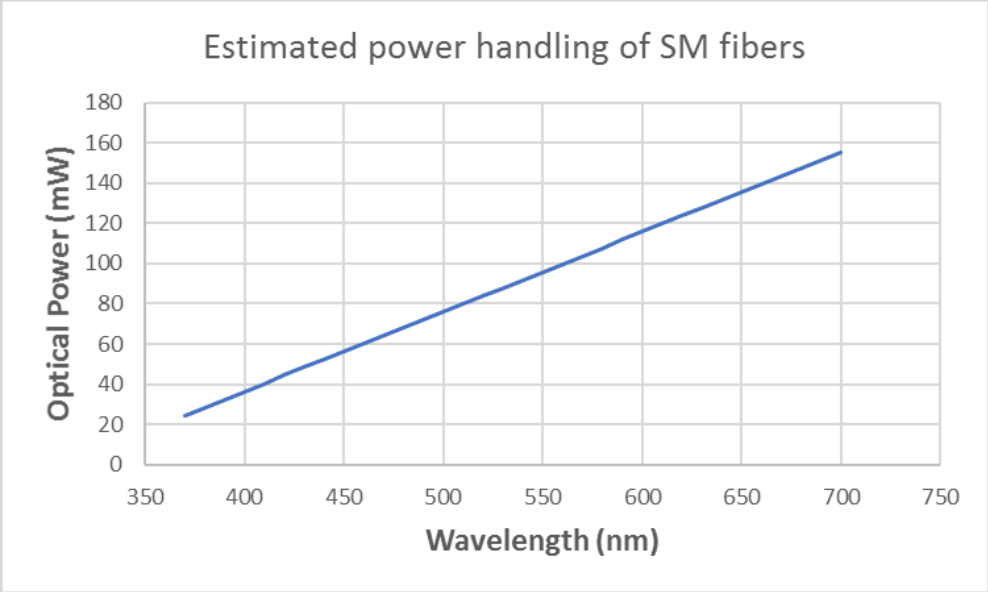
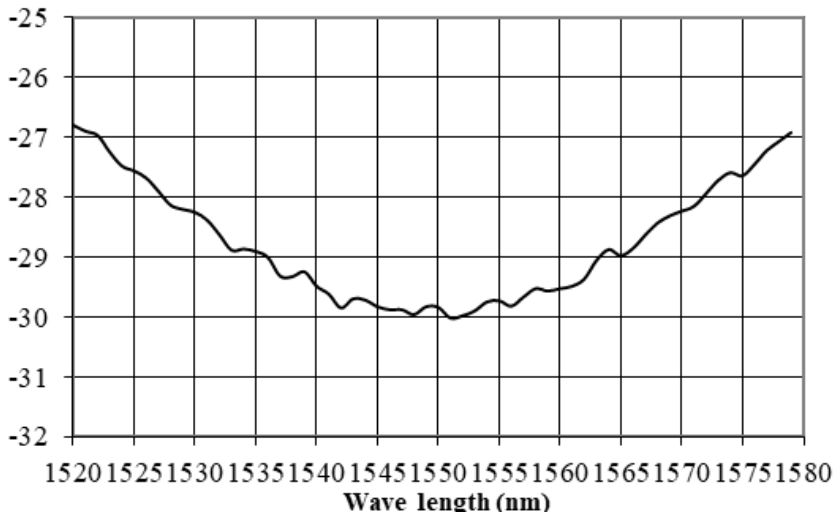
Optical Power Handling vs Wavelength For Single-Mode Fibers



Typical On/Off Ratio (dB) vs Wavelength



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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.