NanoSpeed™
Dual-Stage Variable Fiber Optical Attenuator
(SMF, PMF, High Power, Bidirectional)

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

DATASHEET

BUY NOW

Features

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

Applications

- Optical blocking
- Configurable operation
- Instrumentation

The Nano-speed Premium Variable Fiber Optical Attenuator (NPOA) provides electrical control of optical power. This is achieved using a patent pending non-mechanical configuration and activated via a voltage electrical control signal. The solid-state optical crystal design eliminates mechanical movement and organic materials. The NP Series Variable Optical Attenuators are designed to meet the most demanding operation requirements of ultra-high reliability and fast response time with minimal mechanical footprint. Agiltron also offers customized electronic designs to meet special control requirements and applications. The NPOA is bidirectional. The NP Series VOA is available in either normally-transparent in which the light passing through without the applying a voltage or normally-opaque in which the light is blocked without the applying of a voltage. The attenuation level is related to the stage. The response speed is related to the attenuation level and driver power (repetition rate). Small attenuation can reach MHz response.

The NP Series VOA is mounted on a specially designed electronic driving PCB board with a 0~5V control input and having performance optimized for various repetition rate.

Specifications

Parameter		Min	Typical	Max	Unit
Central wavelength [1]		780		2400	nm
Insertion Loss [2]	1260~1650nm		0.8	1.3	dB
	960~1100nm		1.3	1.8	
	780~960nm (Normal power VOA only)		1.5	2.5	
Attenuation Range [3]		30	35	45	dB
PDL (SMF VOA only)			0.2	0.35	dB
PMD (SMF VOA only)			0.1	0.3	ps
ER (PMF VOA only)		18	25		dB
Resolution			Continuous		dB
Return Loss		45	50	60	dB
Fiber Type			SMF-28, Panda PM, or equivalent		
Driver Repeat Rate	10kHz driver	DC	10		kHz
	60kHz driver	DC	60		
Modulation rate [4]		0.1		5	MHz
Optic Power Handling [5]	Normal power VOA		300		mW
	High power VOA			20	W
Operating Temperature		-5		70	°C
Storage Temperature		-40		85	°C

Notes:

[1] Operation bandwidth is ± 25nm approximately at 1550nm.

[2] Measured without connectors. For other wavelength, please contact us.

[3] Full attenuation is measured at 5kHz, which may be degraded at the high repeat rate.

[4] Special circuit for narrow frequency range, maximum modulation depth is 5~10%.

[5] Defined at 1310nm/1550nm. For the shorter wavelength, the handling power may be reduced, please contact us for more information.

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: **The device mounted on the PCB is an OEM module designed for system integration only, not for general uses. Do not touch the PCB by hand. The electrical static can kill the chips even without a power plug-in, and unpleasant electrical shock may also be felt. For laboratory use, please buy a protected Turnkey system.**

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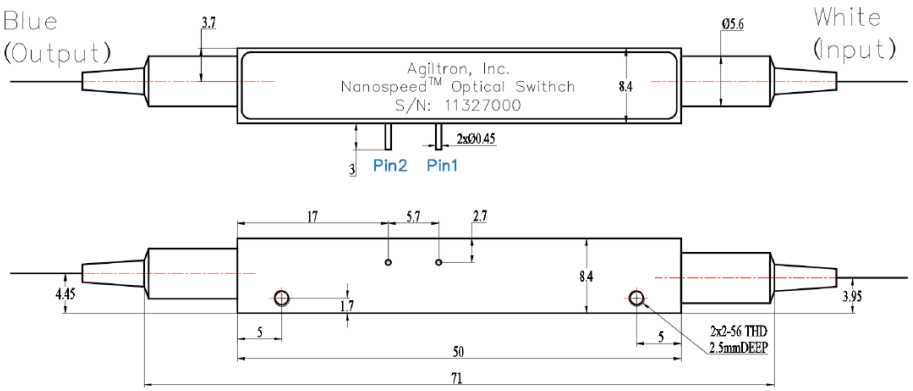
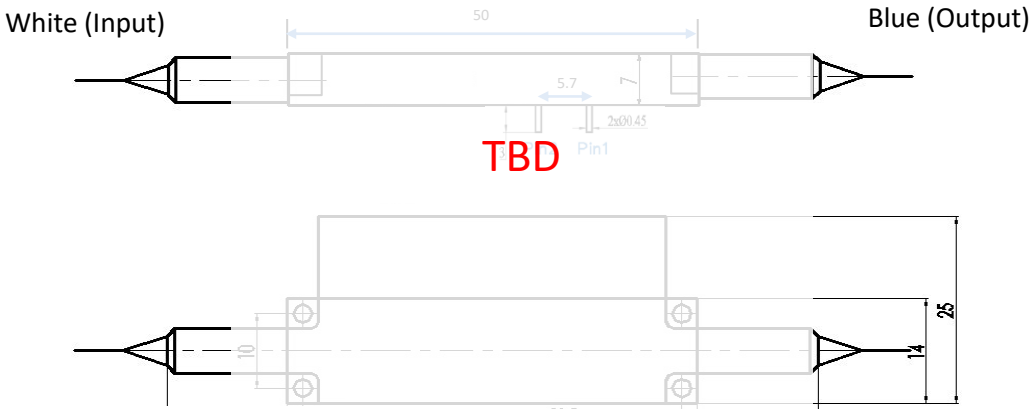
Mechanical Dimensions (mm)



Normal Power VOA



High Power VOA

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

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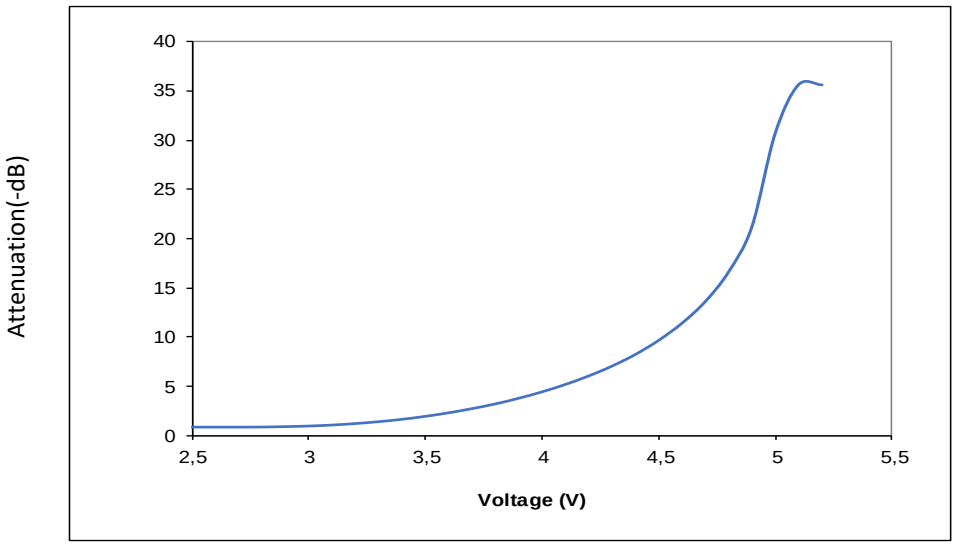
Typical Attenuation versus Voltage



* Measured with Agiltron's NVDR driver

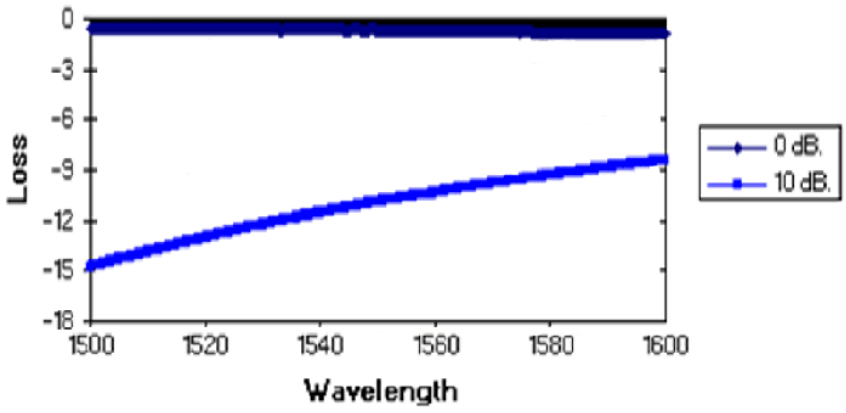
Driving Board Selection

100kHz Driver for NanoSpeed™ Variable Optic Attenuator

Bandwidth	Part Number (P/N)
DC - 10kHz	NVDR-113235112
DC - 60kHz	NVDR-112221112

Note: For customers that prefer to design their own driving circuit, they are responsible for the optical performance. For more technical information, please contact us.

Typical WDL @10dB attenuation



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Ordering Information

	☐☐	☐	☐☐	☐	☐	☐	☐	☐
Prefix	**Type**	**Wavelength**	**Configuration**	**Fiber Type**	**Fiber Cover**	**Fiber Length**	**Connector [3]**	**ER**
NVOA- [1] **NHOA- [2]**	Standard Power = 32 5W Power = 05 10W Power = 10 20W Power = 20	1060 nm = 1 L Band = 2 1310 nm = 3 1410 nm = 4 1550 nm = 5 780 nm = 7 850 nm = 8 1950 nm = 9 2100 nm = 6 Special=0	Transparent = 12 Opaque = 23 Special = 00	SMF-28 = 1 HI1060 = 2 HI780 = 3 PM1550 = 5 PM980 = 9 PM850 = 8 PM1950 = 4 PM2000 = 6 Special = 0	Bare fiber = 1 900um tube = 3 Special = 0	0.25 m = 1 0.5 m = 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 LC/UPC = U Special = 0	Non = 1 >18 = 2 >25 = 3 >29 = 4

[1]. **NVOA** – Normal Power
[2]. **NHOA** – High Power
[3]. Please contact us for high power connectors.

Note:
- "**transparent**" means no attenuation without applying a controlling voltage, the "**opaque**" means the highest attenuation without applying a controlling voltage.
- **PM1550** fiber works well for **1310nm**

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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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 °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.