NanoSpeed™ Fiber Optical Variable Attenuator
(MMF Version)

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

Product Description

The NanoSpeed™ series multi-mode optic attenuator rapidly changes the light intensity inside a multimode fiber of 50 or 62.5 μm core diameters. This is achieved using patent non-mechanical configurations with solid-state all-crystal designs, which eliminates the need for mechanical movement. The device insertion loss is related to the laser beam mode field ratio. High quality laser has lower insertion loss. The NS fiber VOA is designed to meet the most demanding requirements of ultra-high reliability, fast response time, continuous switching operation, and space application high reliability. This series of switches are **bidirectional** intrinsically.

The NS device is controlled by a specially designed electronic driver having performance optimized for various application scenarios.

Features

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

Applications

- Optical protection
- Configurable operation
- Instrumentation

Performance Specifications

NanoSpeed MM VOA		Min	Typical	Max	Unit
Central wavelength [1]		630		2000	nm
Insertion Loss [2]			1.5	1.8	dB
Attenuation [3]		15	20		dB
IL Temperature Dependency			0.25	0.5	dB
Return Loss		20	25		dB
Response Time (Rise, Fall)				300	ns
Fiber Type		50/125, 62.5/125, or equivalent			
Driver Repeat Rate	10kHz driver	DC	10		kHz
	100kHz driver	DC	100		
Optic power handling [4]			0.5	2	W
Operating Temperature		-5		70	°C
Storage Temperature		-40		85	°C

[1] Operation bandwidth is +/- 25nm approximately at 1550nm.
[2] Measured without connector under source with CPR < =13dB
[3] It is measured at 5kHz under light source with CPR <=13dB, which may be degraded at the high repeat rate and higher CPR.
[4] The handling power must be identified in P/N at the normal (<=0.5W) or high power (>=1W) when the PO is placed.

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Revised on 11-12-2020

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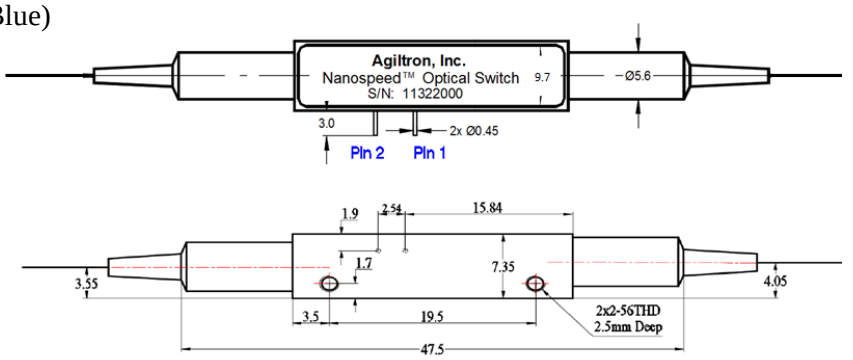
Mechanical Dimensions (mm)

Output (Blue)

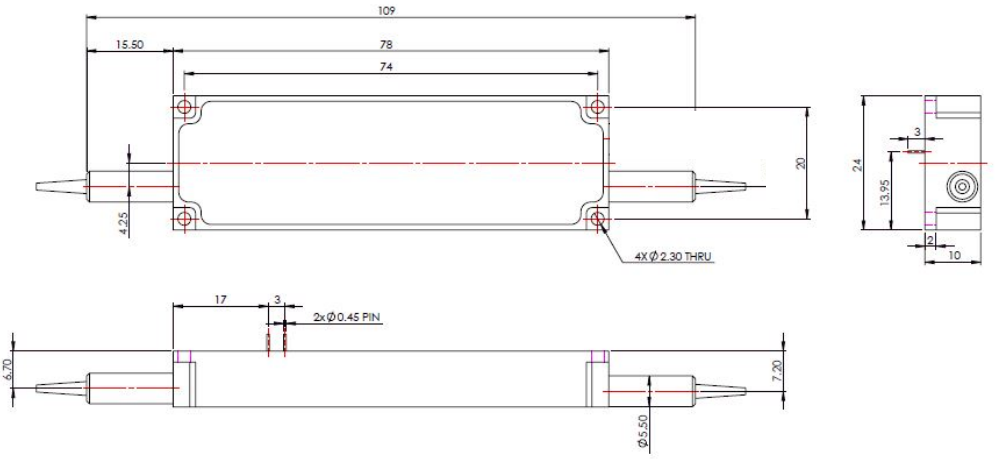
Input (White)



Normal Power VOA

Input (White)

Output (Blue)



High Power VOA

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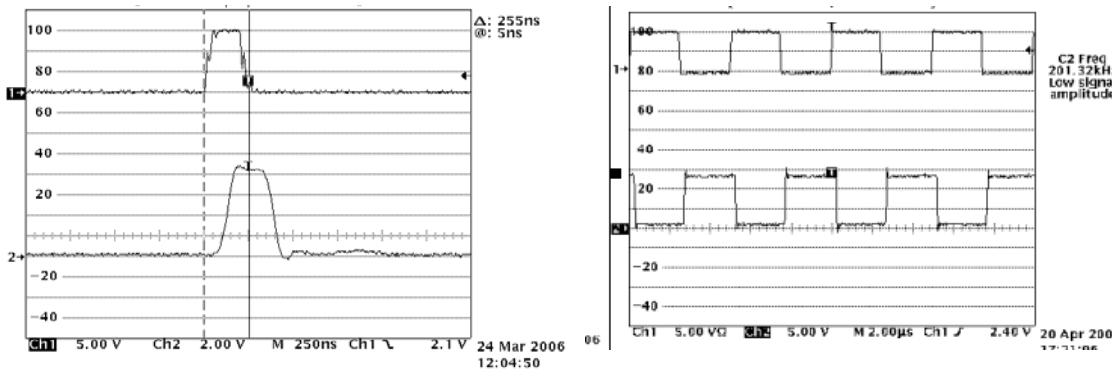
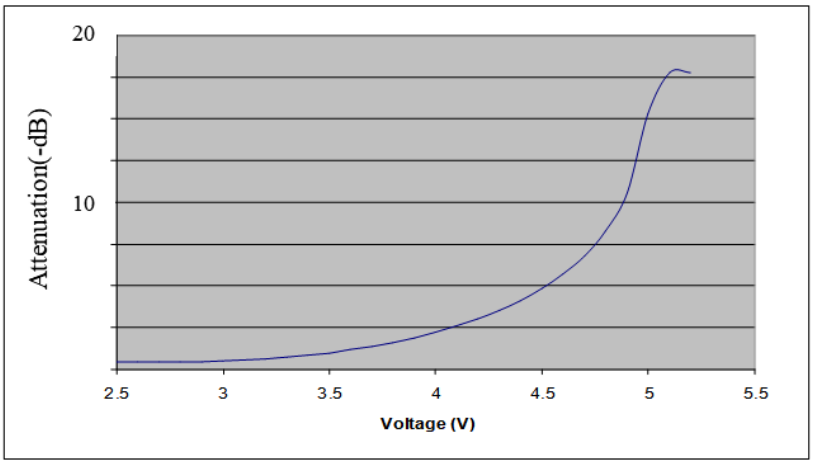
Typical Speed and Repetition Measurement



Driving Board Selection

Maximum Repetition Rate	Part Number (P/N)
5kHz	NVDR-111221112
20kHz	NVDR-113235112
100kHz	NVDR-112221112

Typical Attenuation versus Voltage



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

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Ordering Information

☐☐☐☐-	3 2	☐	☐	☐	☐	☐	☐	☐
	Type	**Wavelength [1]**	**Configuration**	**Package**	**Fiber Type**		**Fiber Length**	**Connector**
NMOA = NS, normal power, MMF, Optical, Attenuator NHMA = NS, High power, MMF, Optical, Attenuator		1060nm=1 L Band =2 1310nm=3 1410nm=4 1550nm=5 780nm=7 850nm=8 Special=0	Transparent =1 Opaque = 2 Special = 00	Standard = 1 (for optical power < =500mW) Hi power = 2 (for optical power >= 1W) Special = 0	50/125= 5 62.5/125= 6 Special=0	Bare fiber=1 900um loose 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=8 LC/APC=9 Special=0

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.

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