NanoSpeed™
Large Core Fiber Optical Variable Attenuator
(MMF Version, 105/200 µm cores, Bidirectional)

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

DATASHEET

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The NanoSpeed™ Large Core Variable Fiber Optical Attenuator (NSLA) provides electrical control of optical power. This is achieved using an electro-optic crystal between two crossed polarizers, activated via a voltage of the 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 NSLA is bidirectional. The NS Series VOA is available in either normally-transparent, in which the light passes through without applying a voltage, or normally-opaque, in which the light is blocked without applying a voltage. The attenuation level is related to the stage. The response speed is related to the attenuation level and driver power (repetition rate). The NS Series VOA is mounted on a specially designed electronic driving PCB board with a 0~5V control input and has performance optimized for various repetition rates.

Features

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

Specifications

Parameter	Min	Typical	Max	Unit
Central Wavelength	630		2000	nm
Operation Bandwidth		60		nm
Insertion Loss [1]	5	6	8	dB
Attenuation	15	20		dB
IL Temperature Dependency		0.25	0.5	dB
Return Loss	20	25		dB
Response Time (Rise, Fall)			500	ns
Driver Repeat Rate	DC		1	kHz
Optic Power Handling		0.5	20	W
Operating Temperature	-15		70	°C
Storage Temperature	-50		85	°C

Notes:

[1]. Measured without connector under source with CPR ≤ 15dB

Applications

- Optical protection
- Configurable operation
- Instrumentation

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.**

Rev 10/03/25

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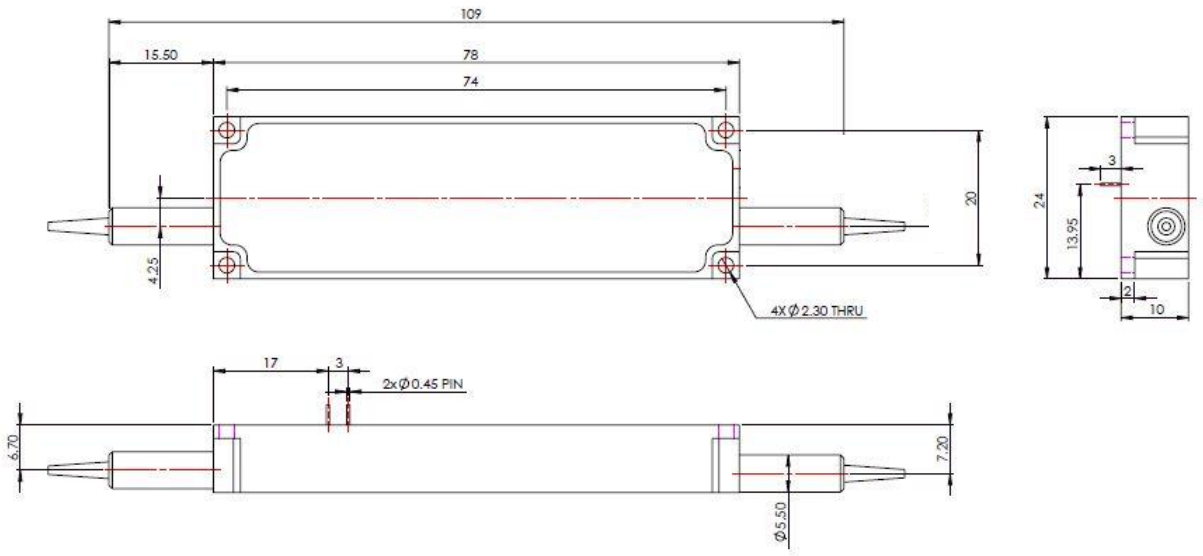
Mechanical Dimensions (mm)

Input (White)

Output (Blue)



High Power VOA

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

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Module Dimensions (mm) with Driver PCB and Regular Power NSVS

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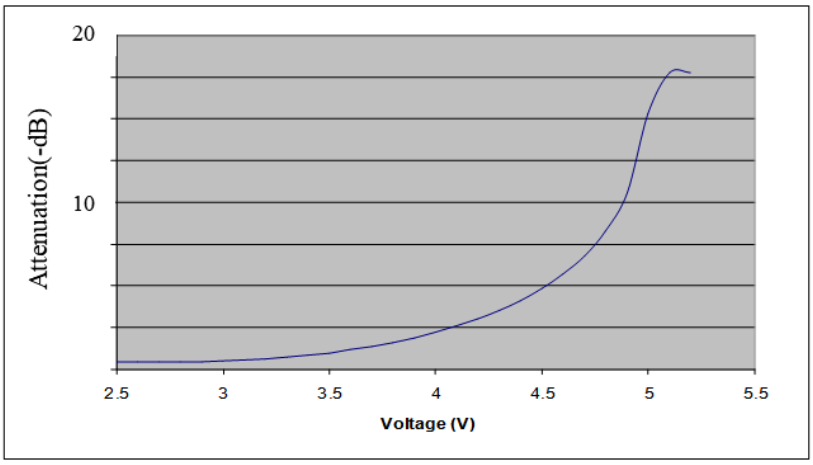
Typical Speed and Repetition Measurement

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.

Driving Board

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Ordering Information

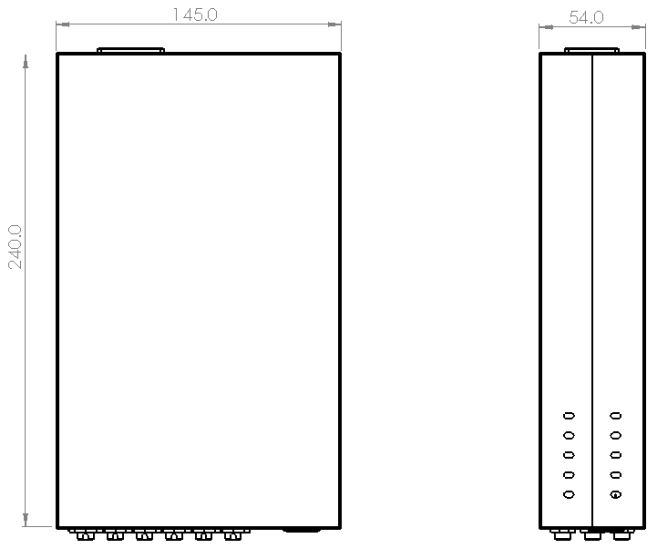
	☐☐	☐	☐	☐	☐	☐	☐	☐	☐
Prefix	**Type**	**Center Wavelength**	**Configuration**	**Package**	**Fiber Type**	**Fiber Cover**	**Fiber Length**	**Connector [1]**	**Benchtop**
NSLA-	Standard = 22	1060nm = 1 1310nm = 3 1550nm = 5 780nm = 7 850nm = 8 660 = 6 Special = 0	Transparent = 1 Opaque = 2 Special = 0	Standard = 1 Special = 0	50/125 = 5 62.5/125 = 6 105/125 = 1 200 µm/0.22NA = 2 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 SMA = S Special = 0	Non = 1 Yes = 2

[1]. Regular fiber connector has PER ~22dB. Connector with PER >27 dB is available using special process

Note:

"**transparent**" means no attenuation without applying a controlling voltage, the "**opaque**" means the highest attenuation without applying a controlling voltage.

Benchtop Box Mechanical Dimension



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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.

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.