



Features

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

Applications

- Optical blocking
- Configurable operation
- Instrumentation



The Nano-speed Broadband Variable Fiber Optical Attenuator (NSBA) provides electrical control of optical power using a patent-pending configuration activated by a voltage signal. Its solid-state optical crystal design eliminates mechanical movement and organic materials, ensuring ultra-high reliability and fast response times. The NSBA supports a wide wavelength range and is packaged with a driver that includes an SMA 0-5V control input and a 12V power supply input. It is bidirectional, with two configurations: normally-transparent, where light passes through without applied voltage, or normally-opaque, where light is blocked without voltage. The wavelength range and attenuation levels depend on the number of electro-optic crystal stages, while response speed is influenced by attenuation level and driver power. Small attenuation levels can achieve response speeds up to MHz.

Specifications

Parameter		Min	Typical	Max	Unit
Central wavelength		350		2300	nm
Insertion Loss ^[1]	1260~1650nm		1	1.5	dB
	960~1100nm		1	1.6	
	750~950nm		1.5	2	
	550~750nm		1.8	2.5	
	400~550nm		2.3	3.5	
Operation Wavelength Band (3dB @10dB attenuation)		±30		±150	nm
Attenuation Range ^[2]		18	25	32	dB
PDL (SMF VOA only)			0.1	0.3	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
Driver Repeat Rate	100kHz driver	DC		1	MHz
Small Modulation rate ^[3]		0.1		5	MHz
Optic Power Handling ^[4]	Normal power VOA		300		mW
	High power VOA	5	10	20	W
Operating Temperature ^[5]		-5		45	°C
Storage Temperature		-40		85	°C

Notes:

- [1]. Measured with a 60nm bandwidth at 1550nm, excluding the connector. Each connector adds 0.3dB of loss. A 120nm bandwidth doubles the loss, while a 180nm bandwidth triples it.
- [2]. Full attenuation is measured at 5kHz, which may be degraded slightly at the high repeat rate.
- [3]. Maximum modulation depth is 5~10%.
- [4]. Defined at 1310nm/1550nm. For the shorter wavelength, the handling power is reduced.
- [5]. The VOA can be operated in a wider temperature range from as -10 to 70°C, but some performances such as the maximum attenuation will be degraded.

Warning: The device mounted on the PCB is an OEM module designed exclusively for system integration and not for general use. Avoid touching the PCB by hand, as electrostatic discharge can damage the chips even when the device is not powered, and it may also cause an unpleasant shock. For laboratory use, please purchase the protected benchtop system.

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☎ +1 781-935-1200

✉ sales@agiltron.com

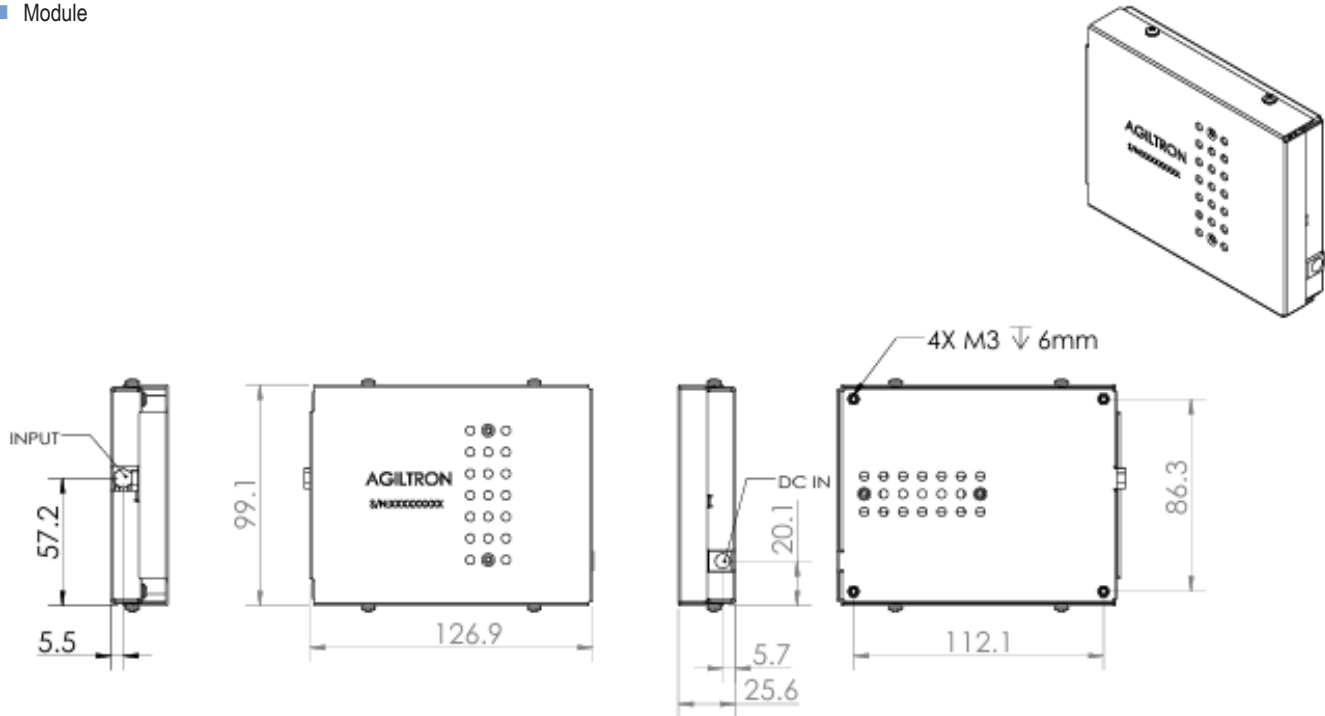
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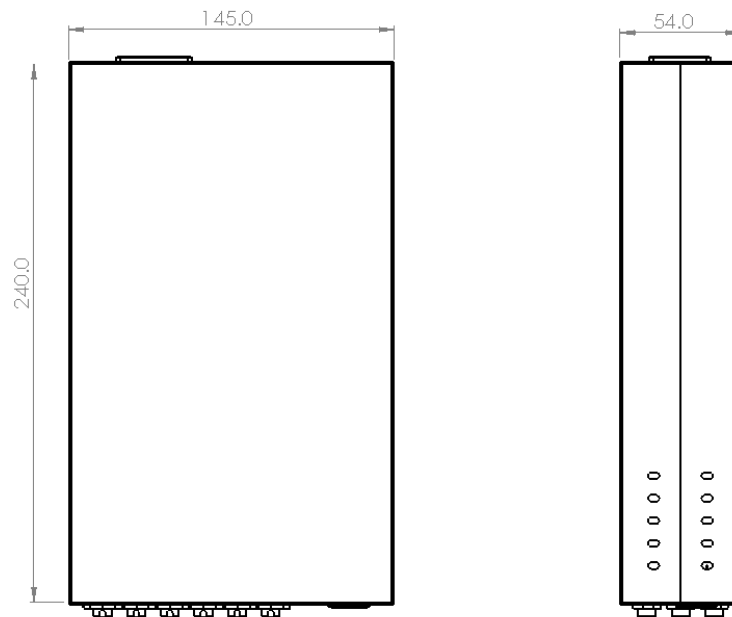
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Mechanical Dimensions (mm)

■ Module



■ Benchtop



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

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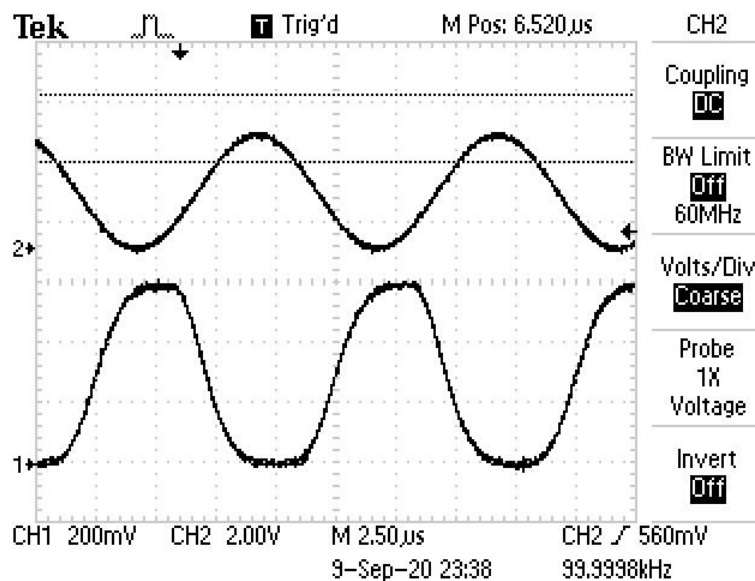
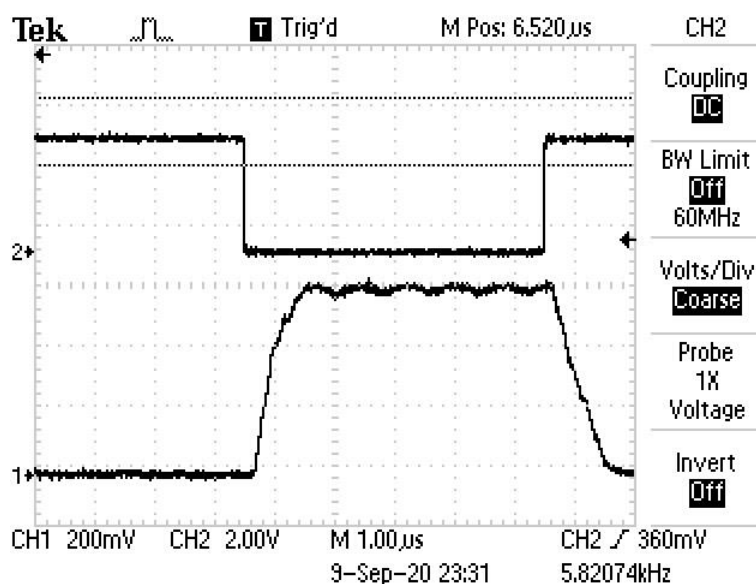
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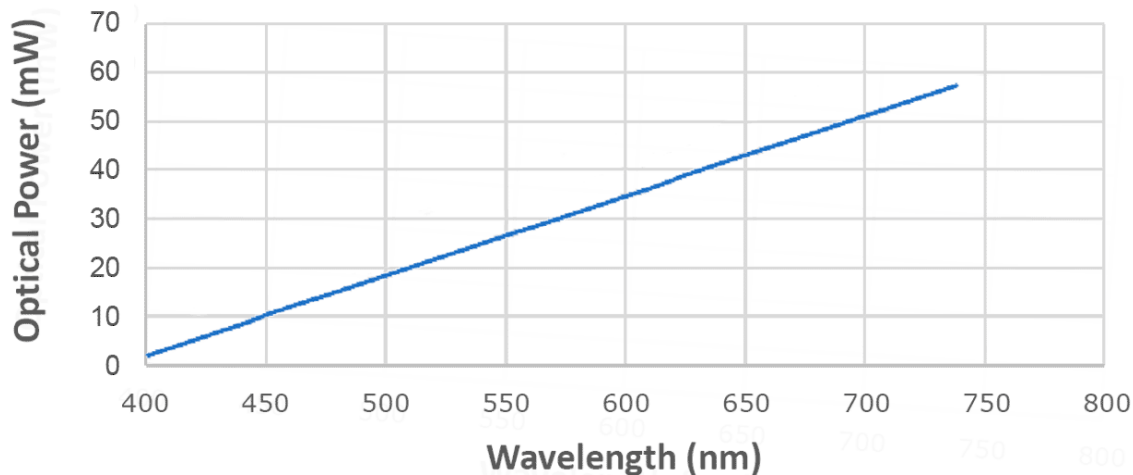
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Typical High Speed Response



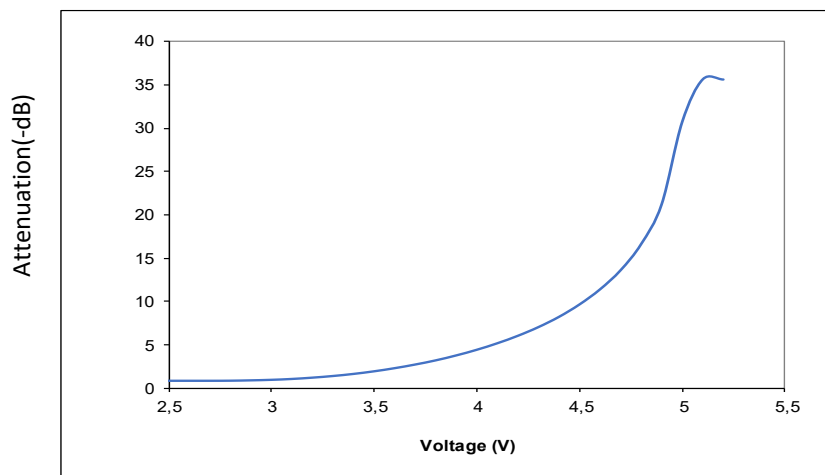
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Optical Power Handling vs Wavelength for Standard SM Fibers



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Typical Attenuation versus Voltage



Ordering Information (Part Number)

Prefix	Bandwidth	Power	Center Wavelength	Configuration ^[1]	Fiber Type	Fiber Cover	Fiber Length	Connector ^{[2][3]}	PER	Benchtop
NPBA-	±30nm = 1 ±60nm = 2 ±90nm = 3 ±120nm = 4 Special = 0	0.3W = S 1W = 1 5W = 5 10W = 10	1060 = 1 2000 = 2 1310 = 3 1550 = 5 1625 = 6 850 = 8 780 = 7 650 = E 550 = F 450 = G Special = 0	Transparent = 1 Opaque = 2 Special = 0	SMF-28 = 1 Hi1060 = 2 Hi780 = 3 PM1550 = 5 SM600 = 6 SM800 = 8 PM850 = A PM780 = B PM630 = C PM980 = 9 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 HPFC/PC = H LC/APC = 9 LC/UPC = U Special = 0	Non = 1 >18 = 2 >25 = 3 >29 = 4	Non = 1 Yes = 2

Note:

[1]. "Transparent" indicates no attenuation when no controlling voltage is applied, while "opaque" indicates maximum attenuation under the same condition.

[2]. A regular connector supports power levels below 5W, while the H connector can handle up to 5W.

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

[3]. The default connector configuration uses fiber with 0.9 mm buffer protection. The connector cannot be installed directly onto bare fiber because the bare fiber is prone to damage during shipping. However, the connector can be assembled on bare fiber if a 3 cm protective loose tube is added for reinforcement. The customer may remove this protective tube after testing. The optical power handling of a standard connector is less than 0.5 W for SMF-28 fiber and decreases further for smaller-core fibers.

Red is available as a special order.

Operation Instruction

1. **Connect the fiber input and output;** the device supports bidirectional use in either direction.
2. **Plug in the provided power supply.**
3. **Connect the control signal to the SMA connector.**
4. The VOA should attenuate proportionally to the input 0-5V