

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

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

## Product Description

The NS Series Variable Fiber Optical Attenuator (VOA) 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 dual-stage NS Series Variable Optical Attenuators are designed to meet the high attenuation in addition 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. This type of VOA is bidirectional.

The NS Series VOA is available in either normally-transparent or normally-opaque configurations.

The NS Series VOA is controlled by 5V TTL signals with a specially designed electronic driver having performance optimized for various repetition rate.

## Performance Specifications

| NanoSpeed Series VOA                | Min                                  | Typical    | Max  | Unit |
|-------------------------------------|--------------------------------------|------------|------|------|
| Central wavelength <sup>[1]</sup>   | 780                                  |            | 1650 | nm   |
| Insertion Loss <sup>[2]</sup>       | 1260-1650nm                          | 0.6        | 1.0  | dB   |
|                                     | 960-1100nm                           | 0.8        | 1.3  |      |
|                                     | 780-960nm<br>(Normal power VOA only) | 1.0        | 1.5  |      |
| Attenuation Range <sup>[3]</sup>    | 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   |
| Response Time (Rise, Fall)          |                                      |            | 300  | ns   |
| Fiber Type                          | SMF-28, Panda PM, or equivalent      |            |      |      |
| Driver Repeat Rate                  | 5kHz driver                          | DC         | 5    | kHz  |
|                                     | 200kHz driver                        | DC         | 20   |      |
|                                     | 100kHz driver                        | DC         | 100  |      |
| Modulation rate <sup>[4]</sup>      |                                      |            | 5    | MHz  |
| Optic power Handling <sup>[5]</sup> | Normal power VOA                     | 300        |      | mW   |
|                                     | High power VOA                       |            |      | 5 W  |
| Operating Temperature               | -5                                   |            | 70   | °C   |
| Storage Temperature                 | -40                                  |            | 85   | °C   |

[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.

## Features

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

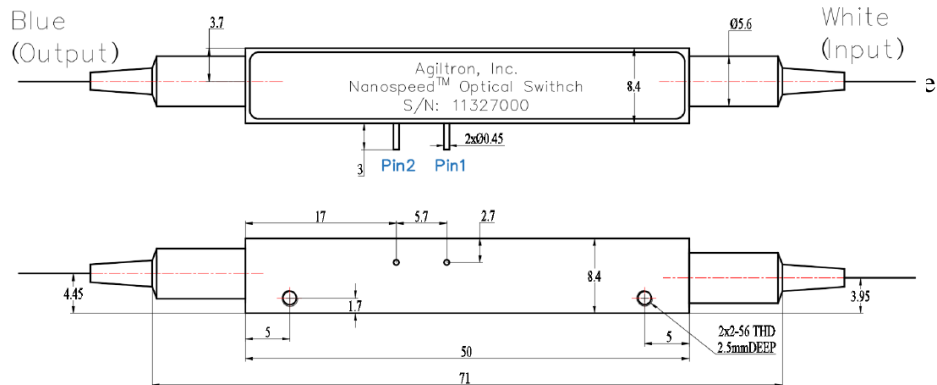
## Applications

- Optical blocking
- Configurable operation
- Instrumentation

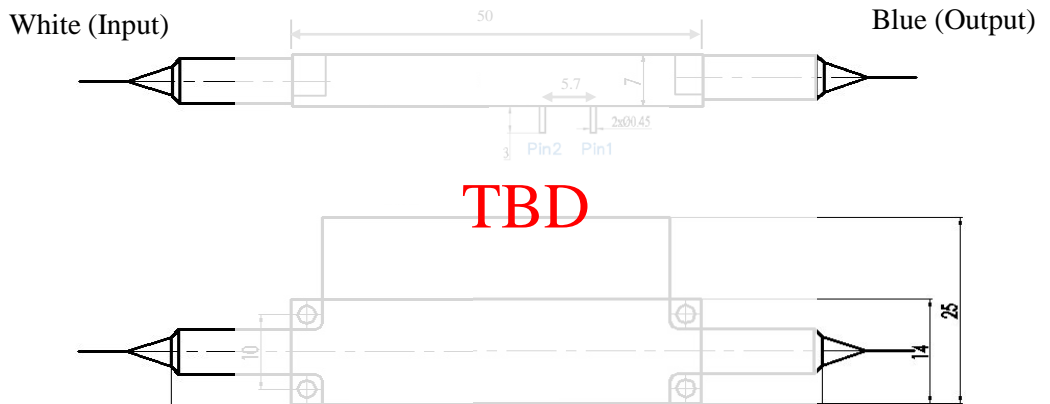


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## Mechanical Dimensions (mm)



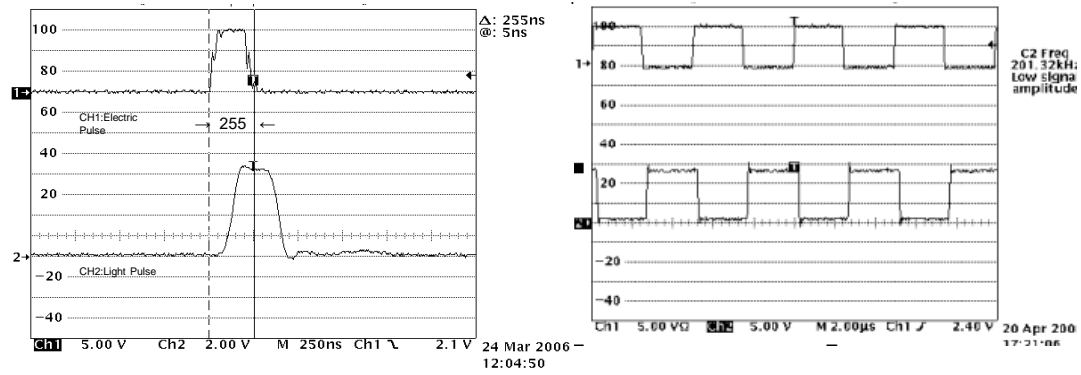
Normal Power VOA



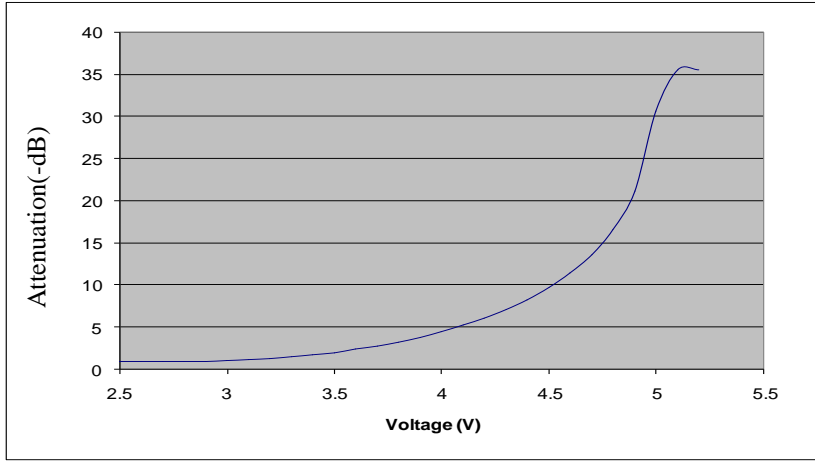
High Power VOA

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## Typical Speed and Repetition Measurement



## Typical Attenuation versus Voltage



\* Measured with Agiltron's NDVR driver

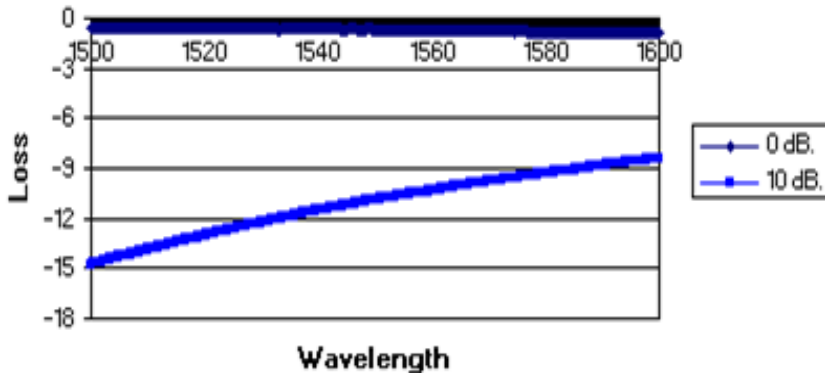
## Driving Board Selection

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

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## Typical WDL @10dB attenuation



## Ordering Information

| <input type="checkbox"/>                      | <input type="checkbox"/> | <input type="checkbox"/>  | <input type="checkbox"/>   | <input type="checkbox"/>   | <input type="checkbox"/>                        | <input type="checkbox"/>                  | <input type="checkbox"/>  | <input type="checkbox"/> | <input type="checkbox"/> |
|---|--------------------------|---|--|--|---|---|---|--------------------------|--------------------------|
|   | 3 2                      | <input type="checkbox"/>  | <input type="checkbox"/>   | <input type="checkbox"/>   | <input type="checkbox"/>                        | <input type="checkbox"/>                  | <input type="checkbox"/>  | <input type="checkbox"/> | <input type="checkbox"/> |
|   | Type                     | Wavelength <sup>[1]</sup>   | Configuration  | Fiber Type   | Fiber Length                                    | Connector <sup>[2]</sup>                  |   |                          |                          |
| NVOA = Low power VOA<br>NHOA = High power VOA |                          | 1060nm=1<br>L Band=2<br>1310nm=3<br>1410nm=4<br>1550nm=5<br>780nm=7<br>850nm=8<br>Special=0 | Transparent & Dual-stage =12<br>Opaque & Dual-stage = 22<br>Special = 00 | SMF-28=1<br>HI1060=2<br>HI780=3<br>PM 1550/400=4<br>PM 1550/250=5<br>PM980=9<br>PM850=8<br>Special=0 | Bare fiber=1<br>900um loose tube=3<br>Special=0 | 0.25m=1<br>0.5m=2<br>1.0 m=3<br>Special=0 | None=1<br>FC/PC=2<br>FC/APC= 3<br>SC/PC=4<br>SC/APC=5<br>ST/PC=6<br>LC/PC=7<br>Duplex LC=8<br>LC/APC=9<br>Special=0 |                          |                          |

[1]. High power VOA isn't available for the wavelength shorter than 960nm

[2]. There isn't any connector in the high power VOA normally. Please contact us for high power connectors.

