

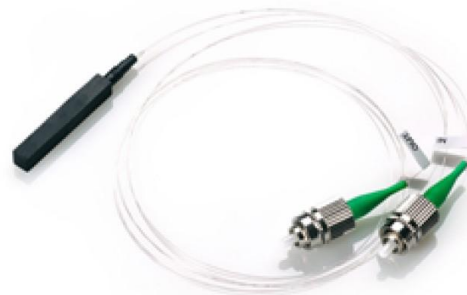
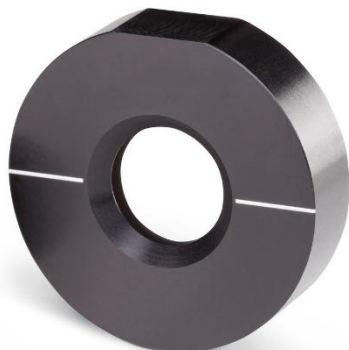
# NoiseBlock™ ASE Suppression Filters

## For Ultra-Low Frequency Raman spectroscopy with High Signal-to-Noise

NoiseBlock™ ASE (Amplified Spontaneous Emission) filters suppress the broad spectrum of spontaneous emission that commonly occurs in laser diodes to provide an ASE free, narrowband lasing emission.

Adding a NoiseBlock™ ASE filter to a single frequency wavelength stabilized laser effectively reduces broadband spectral ASE background to more than 70dB below the laser line while transmitting 90% of the single frequency line (see graph on next page).

The filter's narrow spectral profile (HWHM  $< 10 \text{ cm}^{-1}$ ) is designed to match the SureBlock™ ultra-narrow-band notch filter, making it ideal for enabling ultra-low frequency Raman spectroscopy with high signal-to-noise.



### FEATURES

- High transmittance at design wavelength
- Reduce typical broadband ASE levels to more than 70 dB below the laser line
- Narrow spectral bandwidth
- Customizable slant angle for angular separation of beams
- Large angular acceptance allows use for both, spatially single and multimode laser
- No degradation under high power illumination conditions
- Environmentally stable at high temperature and humidity with over 12,000 hours of testing at 150°C

### APPLICATIONS

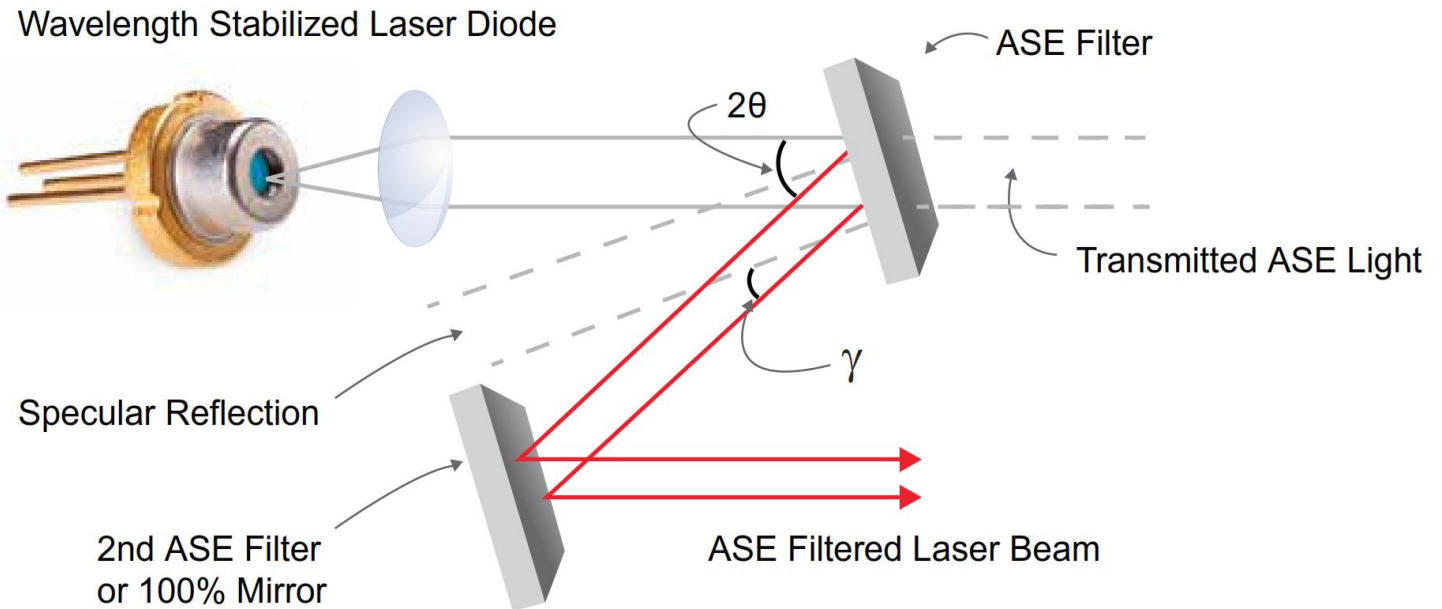
- Removal of broadband ASE, fluorescence, and parasitic laser line emission
- ASE noise reduction for Raman spectroscopy
- ASE removal after optical amplifier stages
- Dense wavelength multiplexing / de-multiplexing
- Spectral combining
- Telecommunication

| Specifications   | Typical  |
|--|--|
| Center Wavelength (nm)                                   | 405, 532, 640, 658, 685, 690, 780.25, 785, 808, 830, 976, 1064, 1550 |
| Bandwidth <sup>1</sup> (HWHM)<br>cm <sup>-1</sup><br>GHz | < 10<br>< 300  |
| Diffraction Efficiency (%)                               | >90 (>70 for 405 nm)   |
| Temperature Dependence (nm/°C)                           | 0.01   |
| Total Deflection Angle (2θ) (degrees)                    | 8 to 12  |
| Slant Angle (γ) (degrees)                                | 2  |
| Clear Aperture Diameter                                  | 4.5 mm in ½" mount. Custom sizes available                           |

<sup>1</sup> Grating bandwidth is a function of wavelength and thickness.

### Principle of Operation

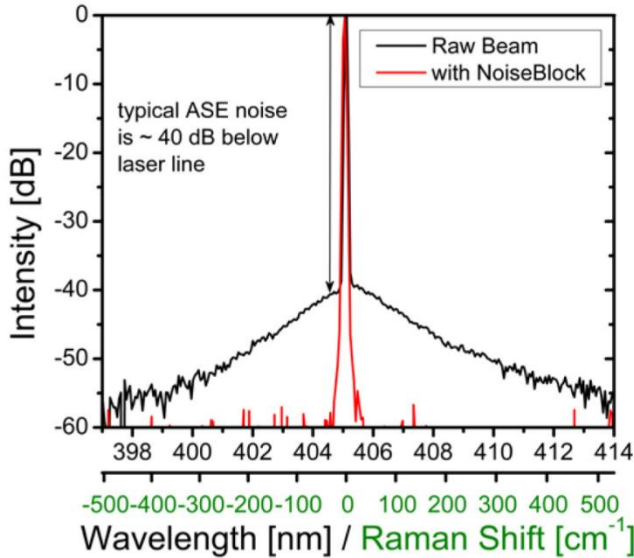
NoiseBlock™ ASE filters are designed to transmit ASE emission from a wavelength stabilized laser and reflect only the desired single frequency line. The inter-beam angle is chosen to separate the diffracted beam and the residual surface reflections, resulting in a clean, ASE-free output.



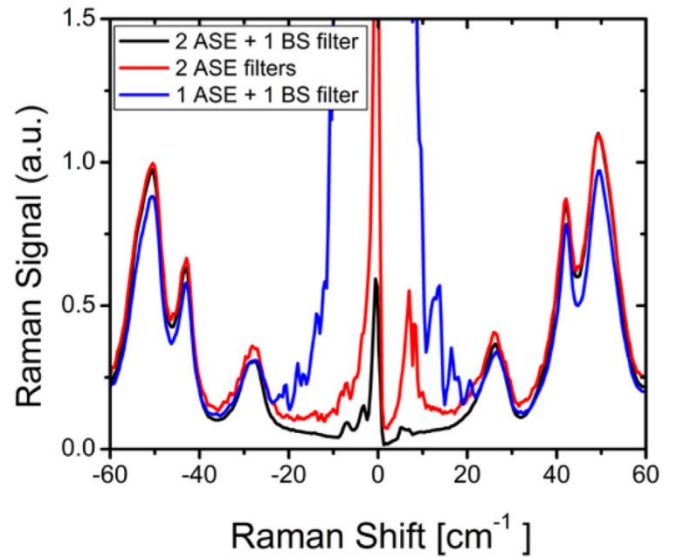
## Principle of Operation

Adding a single NoiseBlock™ ASE filter (see left image below) eliminates almost all ASE light from the emission of an Attalon SureLock™ 785 nm single frequency laser diode and enables diode lasers to be used as substitutes for gas lasers in many applications.

### Reduction of ASE light with NoiseBlock™ Filter



### Raman signal from Sulfur with multiple filters



For applications such as low frequency Raman spectroscopy that require extreme attenuation, filtering of the residual ASE near the laser line must be >70 dB below the excitation laser line for high signal-to-noise. In these cases, combining two ASE filters with a spectrally matched 90/10 beamsplitter (BS) filter, enables optimum alignment of SureBlock™ ultra narrow-band notch filters for maximum Rayleigh light suppression with high throughput to within 10cm<sup>-1</sup>.

The above image on the right shows the effect of adding one or two ASE filters on the measured sulfur spectrum from a low frequency Raman system at 785 nm. A single ASE filter and beamsplitter still shows residual ASE out to 20 cm<sup>-1</sup>.

## Ordering Information

**ASE- $\lambda\lambda\lambda.\lambda$ -AA**

$\lambda$ : Wavelength<sup>1</sup> (nm)

A: Package Style<sup>2</sup>

Notes:

1. Specified in vacuum to 0.1nm accuracy required for non-gas lines.
2. FS = Standard ½" round mount, FP = Fiber pigtailed (available for standard telecom wavelengths).