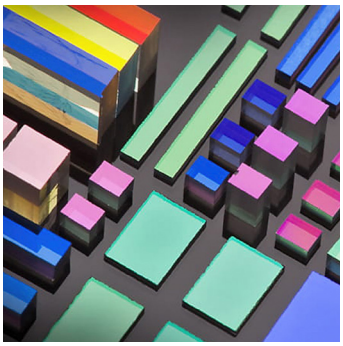
PowerLocker™ VBG WAVELENGTH STABILIZATION GRATINGS

Volume Bragg Gratings (VBG/VHG) for Stable, Narrowband Wavelength Locking of Laser Diodes

PowerLocker™ wavelength stabilization gratings are Volume Bragg Gratings (VBGs) that lock the emission of a laser diode into a narrowed optical spectrum, increasing spectral brightness and ensuring highly stable optical performance over extended temperature ranges. PowerLocker™ gratings enable compact external cavity designs that deliver superior mode selection and wavelength stability without compromising power output.

PowerLocker™ VBGs are holographically recorded throughout the volume of glass. They are stable over a wide range of operating conditions, optical intensities, and do not degrade over time.

Using proprietary materials, precision manufacturing processes and industry leading test techniques, Coherent delivers world-class consistency, reproducibility, and data traceability on every VBG, every time.



FEATURES

- Increase spectral brightness
- Reduce thermal dependence
- Filter unwanted spectral components
- Narrow spectral bandwidth
- Low loss, Low power penalty
- Environmentally stable at high temperature and humidity, with over 12,000 hours of testing at 150°C
- No degradation under high optical intensities

USES

- External Cavity wavelength stabilization
- Targeting absorption band of a pump medium - maximize efficiency / reduce overall power consumption
- Wavelength Tuning
- Spectral Filtering
- Spatial Filtering
- Wavelength-selective Output Coupler
- Spectral Beam Combining

APPLICATIONS

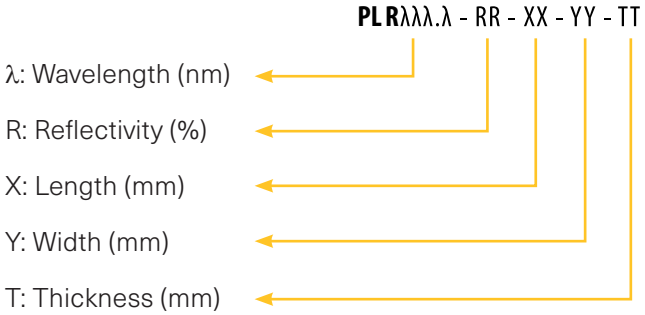
- Optical Pumping for Fiber & Slab Laser
- Direct Diode Material Processing
- Diode Pumped Alkali Vapor Laser (DPAL)
- Laser Spin Exchange Optical Pumping (SEOP)
- Pr3+ Doped Crystals Pumping
- Diode Pumped Solid State (DPSS) Laser
- Raman Spectroscopy
- RGB Sources
- Quantum Computing, Entangled Photon Source
- Frequency Doubling
- Gas Sensing
- Bioinstrumentation
- Particle Counting
- Lung Imaging
- LiDAR
- Skincare, Tattoo Removal, Acne Treatment
- Metrology, Holography
- Graphic Arts (Printing & Digital Imaging)
- Photodynamic Therapy

COHERENT

Specification[1]	Min.	Typical	Max.
Center Wavelength[2] (nm)	375	405, 633, 658, 780, 785, 794.7, 808, 885, 888, 940, 976, 981, 1064, O-Band, C-Band, 1725, 2100	2700+
Wavelength Tolerance[3] (nm)		±0.5	
Wavelength Variation (nm) (within filter)			0.2
Bandwidth[4] (nm) (FWHM)	0.03	0.1	1
Temperature Dependence (nm/°C)		0.01	
Diffraction Efficiency (%) (Bragg Mirror Reflectivity)	3	5 to 98	99
Diffraction Efficiency[3] (%) (Reflectivity) Tolerance		±5	
Grating Slant Angle[5] (°)		<1	
AR Coating Reflectivity (%) (per surface)[3]			0.5
Insertion Loss (%) (scatter + absorption)		<1	
Laser Induced Damage Threshold (J/cm^2) (at 1064 nm, 20 ns pulse width)		15	
Dimensions	0.5		25
Thickness	0.5		30

Notes:
1. Not all Max./Min. specifications are available in all items.
2. Custom wavelength available.
3. Tighter tolerances available on request.
4. Grating bandwidth is a function of wavelength and thickness.
5. Custom slant angles available on request.

Ordering Information



• Bandwidth is a function of WL and thickness, and goes inverse linear with thickness
• Wavelength is specified at 25°C, vacuum referenced by default. Please note if air referenced.

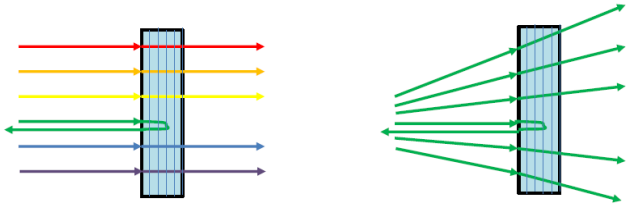
Options Available

• VBG assembled in 1" diameter or ½" diameter round mount
• Transverse-chirped wavelength (linear wavelength gradient)
• Custom wavelength and tighter tolerances available
• Custom slant angles available

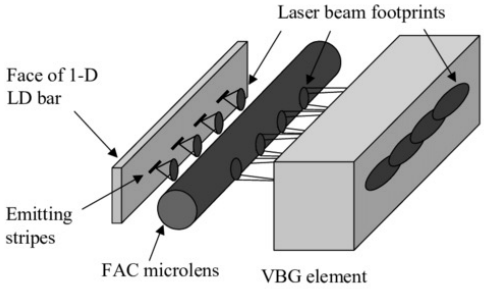
Principle of Operation

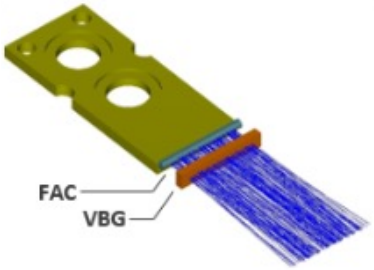
A Volume Bragg Grating (VBG) acts as a partially reflective, WL-selective mirror. When well-aligned to a laser source, the VBG creates an external cavity, and retro-reflects a well-defined percentage of the input beam at the design wavelength. This stabilizes the output, locks the wavelength, and increase the power in the desired mode.

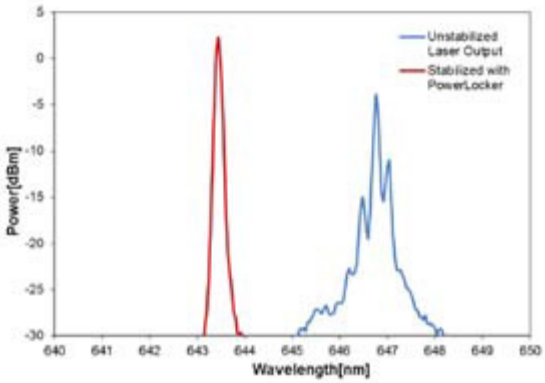
VHG Bragg matches only **ONE** Wavelength, at only **ONE** angle

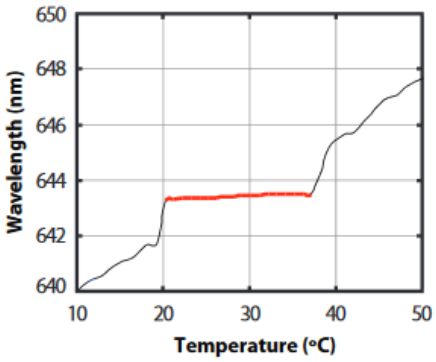


For a well-collimated, well-aligned beam, the retro-reflected light is not lost – it is coupled back into the laser cavity and further amplified.









Handling

Shipping: VBG's are shipped in low-VOC Gel-Paks, with vacuum release. Custom packaging options are available.

Storage Temperature: VBG storage temperature: -20°C to 250°C; Gel-Pak storage temperature: -10°C to +75°C

UV Exposure: Avoid exposure to UV wavelengths below 350 nm. If bonding VBG's with a UV-cure epoxy use preferably a filtered LED source above 350 nm.