

## SINGLE-FREQUENCY LASER *for enterprise*

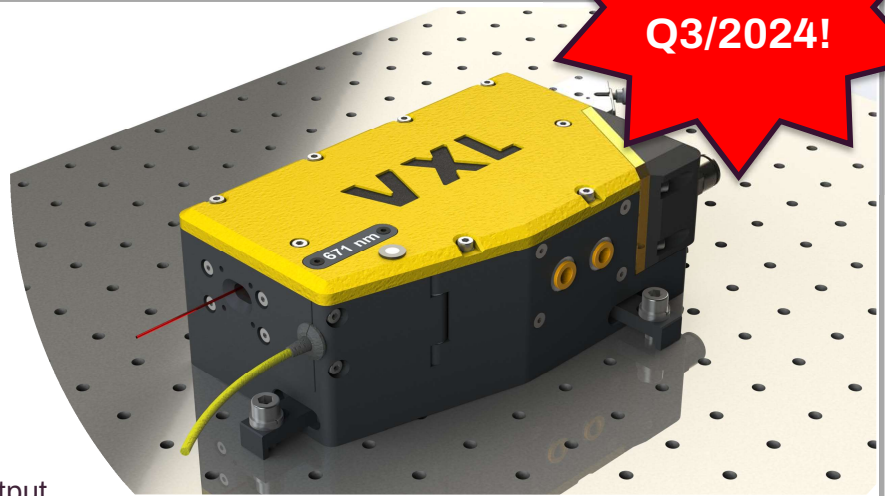


### Features

- ▶ High-output power
- ▶ Broad-wavelength coverage
- ▶ Narrow-linewidth single frequency
- ▶ Excellent beam quality

### For system integration

- ▶ Compact modular design
- ▶ Rugged sealed laser cavity
- ▶ Unparalleled SWaP-C for watt-level output
- ▶ Improved system performance
- ▶ High fiber coupling efficiency



Vertical-external-cavity surface-emitting laser (VECSEL)  
a.k.a. Optically pumped semiconductor laser (OPSL)

### VXL™ SF

### VXL™ SHG

	VXL™ SF	VXL™ SHG
Architecture	Direct emitting VECSEL	Intracavity doubled VECSEL
Gain	Optically-pumped semiconductor gain mirror	
Target wavelength <sup>1</sup>	700 – 2150 nm	350 – 800 nm
Free-space output power <sup>2</sup>	0.5 – 10 W with external pump laser	0.01 – 3 W with external pump laser
Coarse tuning <sup>3</sup>	+/- 0.5 nm	+/- 0.25 nm
Mode-hop free tuning range <sup>4</sup>	1 GHz	2 GHz
Free-running linewidth	< 10 kHz (10 μs), < 100 kHz (100 μs)	
Slow modulation	Piezo actuator, 10 kHz bandwidth	
Fast modulation (optional)	Intra-cavity electro-optical modulator (EOM), 1 MHz bandwidth	
RMS RIN (typical, unlocked)	< 0.05 % (10 Hz – 3 MHz)	
Power stability (typical, unlocked)	< 0.1 % (1.5 h)	
Beam quality	M <sup>2</sup> < 1.1 TEM <sub>00</sub>	M <sup>2</sup> < 1.2 TEM <sub>00</sub>
Beam diameter and divergence <sup>5</sup>	Up to 2 mm, up to 5 mrad	
Polarization, linear	Horizontal, p-polarized	Vertical, s-polarized
Secondary output beam	Not applicable	Secondary output of fundamental wavelength (horizontal, p-polarized)
Polarization extinction ratio (PER)	> 20 dB, linear polarization	
Laser head dimensions	176 mm x 102 mm x 65 mm (1.2 L)	
Control electronics <sup>6,7</sup>	Improved control unit for CW operation	
Cooling <sup>7</sup>	Air-cooling or water-cooling	

<sup>1</sup> Target wavelength is selected within the wavelength range.

<sup>2</sup> Output power is wavelength dependent. See the next page for typical power levels. Single-stage isolator is recommended for applications with back reflections.

<sup>3</sup> Coarse tuning range is wavelength dependent.

<sup>4</sup> Mode-hop free tuning range corresponds to the laser cavity free-spectral range scanned with piezo voltage control. Larger tuning range can be reached by adjusting other tuning elements simultaneously.

<sup>5</sup> Typical values at the laser exit aperture. Beam diameter = full width at 1/e<sup>2</sup> level of the beam. Divergence = full mean divergence angle. Values depend on the laser cavity configuration, i.e. the wavelength.

<sup>6</sup> The control unit includes a low noise laser diode driver for the pump laser, and up to 5 cavity element temperature controllers, which can be used for wavelength tuning and power optimization.

<sup>7</sup> The control unit and the standard water-cooling unit are 19" rack mountable. VXL™ can support air-cooling in low output power operation

## Compact single-frequency laser for system integration



### Next generation VECSEL platform

- ▶ Designed for system integration and for 24/7 operation
- ▶ Reduced system size, weight, power consumption and cost (SWaP-C)
- ▶ Modular design for easy and fast servicing with spares
- ▶ Fiber-in & fiber-out geometry with remote control for fieldable applications

