



Compact, Rapid-Scan, Tunable Mid-IR CW/Pulsed Lasers for Research & OEM Applications



For Spectroscopy at Speed, Without Compromise™.

Molecular spectroscopy applications benefit from rapid, high Signal-to-Noise Ratio data acquisition. This demands fast-scan mid-IR lasers delivering high-quality light. Until now, high tuning speed has come with compromises. The new Hedgehog from Daylight Solutions changes this. For the first time, fast tuning **and** high-fidelity output is available from a compact, robust mid-IR laser.

Hedgehog is built on Daylight's field-proven Quantum Cascade Laser (QCL) technology. Available center wavelengths span the mid-IR spectrum from < 4 to > 13 μm , and Hedgehog can provide pulsed or CW output². Users can select from three model types (HHG, HHG-UT, or HHG-LT) depending on their application power and tuning range requirements. All models include: a GUI option for ultra-quiet CW operation; high wavelength repeatability; and multiple tuning modes.

Hedgehog's small size and rugged design make it ideally suited to either laboratory use or OEM integration. Each Hedgehog is shipped with a compact, easy-to-use SideKick™ multi-function QCL controller. All control functionality is via USB/Ethernet connectivity and an included GUI and SDK command set. Daylight's proprietary HFQD™ (High-Fidelity QCL Drive) circuitry also protects your QCL chip.

With Hedgehog, high-speed, high-quality mid-IR spectroscopic data acquisition is now a reality. Hedgehog brings new capabilities to a wide range of molecular sensing applications including: process control; detection of pollutants, chemical and biological agents; time-resolved spectroscopy; and cellular imaging. Please contact us today to learn how Hedgehog, and our highly experienced team, can help your application.

FEATURES:

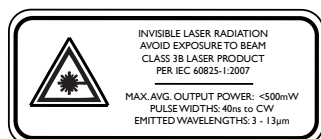
- Tuning slew rates to > 5000 cm^{-1}/s
- Ultra-low noise mode (CW RIN as low as -145 dBc/Hz)
- High wavelength accuracy, precision and repeatability
- Available center wavelengths: < 4 to > 13 μm
- Compact head ideal for OEM integration or lab use
- New Hedgehog-LT: greater utility than DFBs

Daylight Solutions, The Source for all Applications in the Mid-IR

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*This product may be covered by one or more of U.S. Patent Nos.: 7,424,042; 7,466,734; 7,492,806; 7,535,656; 7,535,936; 7,733,925; 7,796,341; 7,826,503; 7,873,094; 8,027,094; 8,050,307.



PERFORMANCE SPECIFICATIONS¹

Model	HHG	HHG-UT	HHG-LT
Tuning Range ^{2,3}	Up to 200 cm^{-1}	Up to 400 cm^{-1}	30 cm^{-1}
Average Power ^{2,3}	Up to 500 mW	Up to 500 mW	Up to 150 mW
Peak Power ³	Up to 1 W	Up to 1 W	Up to 200 mW

Center Wavelength Availability	< 4 to > 13 μm
Modes of Operation	Pulsed or CW ²
Tuning Modes	Set λ , step & measure, continuous scans
Max. Tuning Speed (Step Mode)	250 ms step-& settle time to arbitrary λ
(Scan Mode)	Slew rates to > 5000 cm^{-1}/s
Wavelength Accuracy	$\leq 1 \text{ cm}^{-1}$
Wavelength Repeatability	To $\leq 0.1 \text{ cm}^{-1}$ [3]
Average Power Stability	< 2 % (1 hr)
Spatial Mode	TEM ₀₀ (nominal)
Beam Divergence	< 4 mrad (full angle, $1/e^2$ intensity width) ⁴
Beam Pointing Stability	< 1 mrad (beam centroid change) ³
Spot Size	< 2.5 mm ($1/e^2$ intensity radius) ⁴
Polarization	Linear, vertical, > 100:1

CW PERFORMANCE^{1,2}

Linewidth $\leq 100 \text{ MHz}$ (FWHM, over 1s)⁵

PULSED PERFORMANCE¹

Energy Stability	< 3%, standard deviation
Linewidth	$\leq 1 \text{ cm}^{-1}$ (FWHM)
Pulse Width⁶	40 to 500 ns, 20-ns increments
Repetition Rate⁶	0.1 kHz to 1 MHz, 0.1-kHz increments
Maximum Duty Cycle⁶	10% (custom up to 30% - please inquire)

OTHER SPECIFICATIONS

Triggering (Pulsed Operation)	Internal/external, external pulse input
Triggering (Scans)	External wavelength step, scan start
External Control Interfaces⁷	USB 2.0, Ethernet 10/100
Temperature Range (°C)	15 to 35 (operating)
Humidity	0–80% RH, non-condensing
Cooling	Passive air (pulsed, up to 5% duty cycle) Water (CW, or >5% duty cycle pulsed)
Power Requirements	$\leq 2\text{A}$, 90 to 264 VAC, 47 to 63 Hz, single ϕ ; (or $\leq 3\text{A}$, 24 VDC, OEM models)
Dimensions (LxWxH)	Head: 4.2 x 2.6 x 2.1 in. (11 x 6.5 x 5.2 cm) ⁸ Controller: 7.3 x 5.2 x 1.4 in. (19 x 13 x 4 cm) ⁹

1. All specifications are subject to change without notice and defined: at the tuning curve ceiling; after a 3-min warm-up; at the factory-defined maximum operating current.
2. Requires CW-capable gain chip - please inquire.
3. Depends on gain chip. Specifications to be agreed at time of order - please inquire.
4. Measured at 4 μm ; scales with wavelength - please inquire.
5. With laser tuned for single longitudinal mode operation.
6. Some chips support pulse widths to 10 μs , rep. rates to 3 MHz, and duty cycles to 30% - please inquire.
7. GUI compatible with Windows® 7, 8.1 & 10. Please inquire for other OS.
8. Head includes cooling plate for lab use. Head with plate: 5.7 x 2.6 x 2.8 in. (14.5 x 6.5 x 7.0 cm).
9. Daylight Solutions' SideKick™ model SK-1000. Dimensions listed exclude connectors.