Unicorn™ II

Fixed-Wavelength Mid-IR External Cavity Lasers

PERFORMANCE SPECIFICATIONS

Overall Performance	
Operation Mode:	Pulsed and cw[1]
Peak Wavelengths[2]:	3.5, 3.8, 4.0, 4.2, 4.4, 4.5, 4.6, 4.9, 5.3, 6.1, 6.2, 7.4, 7.8, 8.1, 8.8, 9.5, 10.4 µm
Wavelength Set-Point Accuracy:	±1 cm^{-1}
Beam Divergence:	<5 mrad
Beam Pointing Stability:	<50 µrad
Polarization:	Linear, Vertical, 100:1
Beam Spatial Mode:	TEM_{00}
Beam M^2:	≤1.3
Spot Size:	<2.5 mm (1/e point)
Beam Waist:	30-50 cm from exit port
CW Performance	
Power:	Depends on wavelength, typically >100 mW
CW Linewidth[3]:	≤ 100 MHz
Wavelength Drift:	≤0.5 cm^{-1}/8 hr within operating temperature range
Current Modulations Bandwidth[4]:	DC to 2 MHz
Current Modulation Amplitude Depth:	>50%
Current Modulation Frequency Depth:	~0.05cm^{-1}
Pulsed Performance	
Pulsed Linewidth:	≤1 cm^{-1}
Peak Power:	Depends on wavelength, typically >100 mW
Minimum Average Power:	Depends on wavelength, typically >5 mW
Pulsewidths[5,6]:	40-500 ns
Power Variation (pulse-to-pulse)[7]:	≤2% rms
Repetition Rate[5,8]:	0.1-100 kHz
Maximum Duty Cycle[5]:	5%
Control Specifications	
Control Interface[9]:	1002-FLC Controller
Triggering Capabilities:	Internal or external trigger, external pulse input
External Control Interfaces:	USB 2.0, GPIB, RS-232
Operating Specifications	
Operating Temperature Range:	15-35 °C
Operating Humidity:	10-90% RH, non-condensing
Cooling (pulsed)[10]:	Passive air
Cooling (cw)[10,11]:	Water
Power Requirements:	100-240 VAC, 50-60 Hz, 1φ
Mechanical Specifications	
Head Dimensions:	5.50 x 3.45 x 3.31 inches, L x W x H
Controller Dimensions:	10.51 x 8.5 x 4.0 inches, L x W x H

Notes

All specifications subject to change without notice.

[1]Some wavelengths only available in pulsed operation.

[2]Peak of the gain curve for available QC gain chips. Essentially all wavelengths from 3.5–10.4 µm are available.

*Notes continued on reverse.

Daylight Solutions™ is pleased to present the next generation Unicorn™ II fixed-wavelength lasers.

Daylight Solutions™ has reinvented the fixed-wavelength laser with a series of innovations that mean better performance from the new Unicorn™ II laser. A more robust and stable resonator structure provides better linewidth and wavelength stability as environmental conditions vary. The new HFQD control electronics (High-Fidelity QCL Drive) allow for increased repetition rates and longer pulses while providing more protection for the gain chip. HFQD also includes an improved modulation circuit offering wider bandwidth of modulation frequencies from DC to 5 MHz. More stability, more control, more robust – the new Unicorn™ II.

The Unicorn™ II platform has been designed and now redesigned for flexibility and performance. The available wavelengths span the mid-IR spectrum from 3.5 µm to 10.4 µm and the wavelength is factory set to an accuracy of ±30 GHz (±1 cm^{-1}). Most systems can run in both pulsed and cw modes putting modulation schemes and maximum power at your fingertips. Powers up to 500 mW with a single QC chip is available.

Brought to you by the world's leading experts in tunable mid-infrared lasers, these sources are small and stable benchtop instruments. Simple and effective thermal management means that in pulsed mode, no external cooling is required and only with cw operation does the Unicorn™ II require water cooling. No cryogenic cooling ever!

The design is based on our award-winning CW-Pulsed tunable laser platform. Daylight Solutions™ is the leader in ECqcL™ (External Cavity Quantum Cascade Laser) Technology. We have used our design experience to offer you the most reliable, most flexible fixed-wavelength system to date. A current modulation input circuit offers fast control over the output amplitude and even 0.1 cm^{-1} of frequency modulation. Laser control is through the easy-to-use front panel display of the controller. Remote communication with the controller is also available with a PC through USB, GPIB, or RS-232 interfaces.

Unicorn™ II

- Fixed-wavelength
- High-power
- Pulsed and/or cw operation
- Accurate wavelength set
- Low wavelength drift
- Expanded repetition rate, pulse width, and duty cycles
- Expanded modulation functionality
- Excellent pointing stability
- No cryogenic cooling

Daylight Solutions™: The Source for All Applications in the Mid-IR

Call today for pricing and availability of specific wavelengths.

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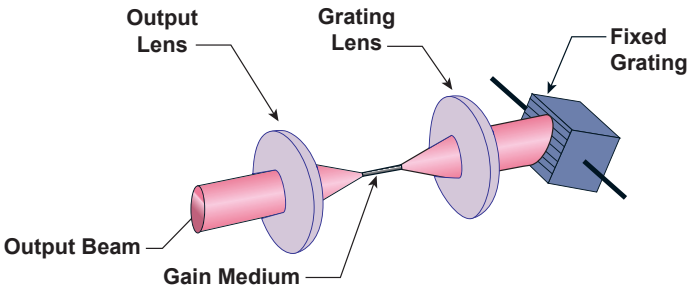
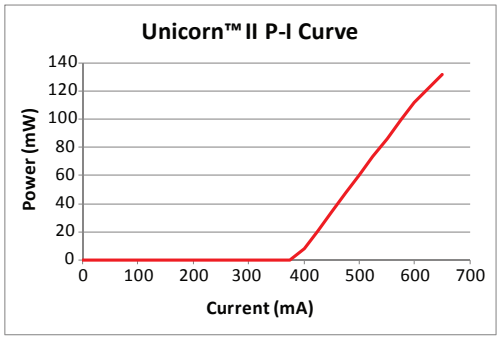
DAYLIGHT SOLUTIONS®

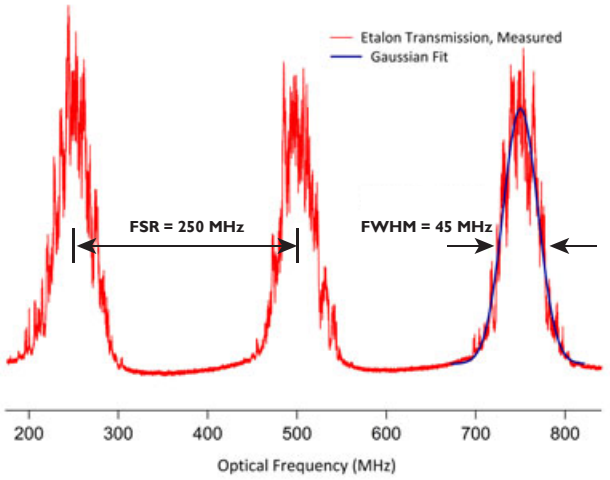
Reference Performance and Function:
Unicorn™ II Fixed-Wavelength Lasers



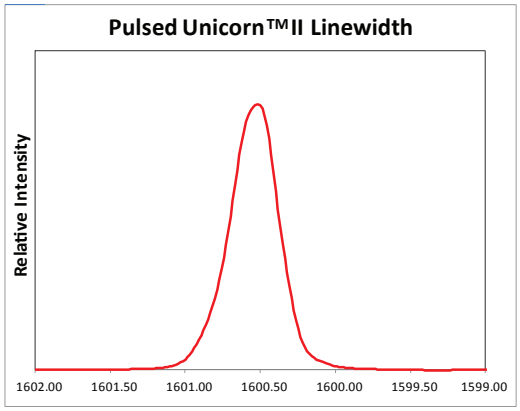
Cavity Design of ECqcL™



P-I curve for typical Unicorn™ II laser.
Smooth, kink-free P-I reveals quality gain material.



Fringes from a scanning étalon (250 MHz FSR and Finesse > 30) fit to a Gaussian. Typical cw linewidth ≤ 50 MHz (FWHM) averaged over 1000 ms.



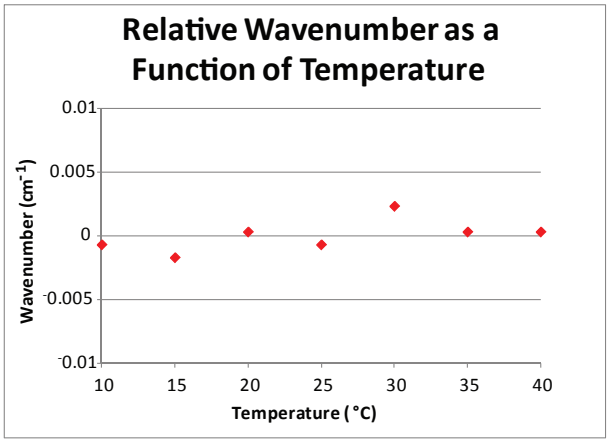
FTIR measurement of pulsed linewidth. FWHM ≤ 1 cm^{-1}.

The new Unicorn™ II is a stable, robust fixed-wavelength laser. The user can select the wavelength at the time of manufacture at virtually any wavelength from 3.55 to 12 µm. No moving parts and the new HFQD electronics make the Unicorn™ II the choice for calibration rigs, detector test stations, multi-spectral imaging development, and many other applications.

Unicorn™ II Part Numbering Scheme

UFa-x1yyy

- a = S For System / = H For Laser Head Only
- x = 3 For Pulsed Lasers / = 4 For cw Or cw-pulsed Lasers
- yyy = 3-digit Nominal Wavelength In Microns (046 = 4.6 µm)



The Unicorn™ II is extremely stable over the operating temperature range (15-35 °C).

***Notes (Cont.'d)**

[3]Averaged over 1 sec.
[4]Current modulation is only compatible with cw operation.
[5]Measured over 1 hour interval.
[6]Some gain chips can support longer or shorter pulsewidths, higher repetition rates, and/or duty cycles. Contact factory for your specific needs.
[7]20 ns increments.
[8]0.1 kHz increments.
[9]The fixed-wavelength laser heads are only compatible with HFQD-enabled controllers
[10]No cryogenic cooling required
[11]~50 W capacity water cooling

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