



# Mephisto/Mephisto S

## Ultra-Narrow Linewidth CW DPSS Laser

Mephisto is a single frequency continuous-wave solid-state laser. It features the combination of optical properties unmatched by any other commercial product, such as a uniquely narrow linewidth of 1 kHz or extremely low noise (-140 dB/Hz RIN). Mephisto is available at power levels up to 2 W at 1064 nm and up to 0.8 W at 1319 nm. Mephisto S is a cost-effective version available at 1064 nm with output power up to 0.5 W. Fiber coupling is available as an option for all models.

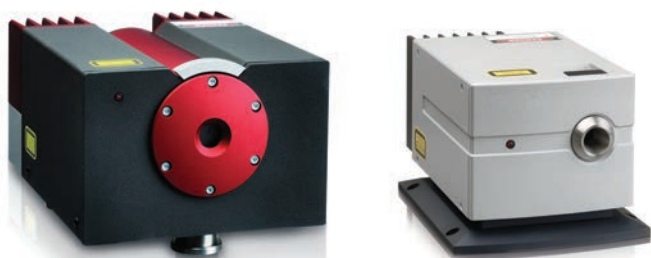
The Mephisto family is based on the widely recognized monolithic Nd:YAG crystal in Non-Planar Ring Oscillator (NPRO) configuration and is further improved by our acclaimed Noise Eater (NE) technology. The laser is simple to stabilize in temperature and easy to fine-tune by using an integrated PZT. Mephisto is the laser of choice for some of the most demanding low noise applications like atom cooling and trapping, gravitational wave studies, optical metrology, free space optical communications, and quantum optics.

### FEATURES & BENEFITS

- Monolithic non-planar ring oscillator (NPRO) technology for ultra-stable and narrow linewidth
- Extremely long coherence length
- Noise Eater – active intensity noise reduction technology
- User-installed, turn-key operation
- Low noise control electronics

### APPLICATIONS

- Atom Trapping and Cooling
- Gravitational Wave Studies
- Laser-based Metrology
- Laser Injection Locking and Seeding
- Optical Frequency Standards
- Quantum Optics (optical trapping, optical lattice, squeezing)
- Nonlinear Optics Pump Source (SHG, DFG, OPO)
- Optical Heterodyning and Coherent Communication
- LIDAR



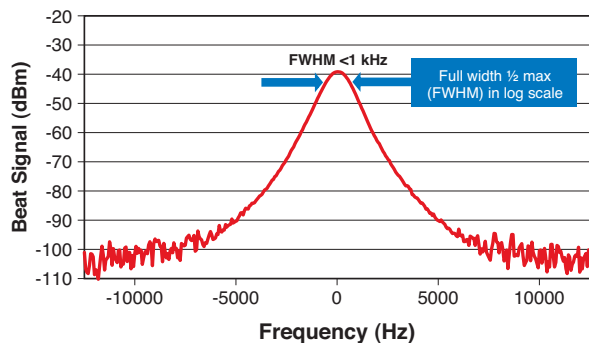
SPECIFICATIONS	Mephisto	Mephisto S
Laser Power (mW) at 1064 nm at 1319 nm	500 <sup>1</sup> , 1000, 2000 200, 500, 800	200 <sup>1</sup> , 500 <sup>1</sup> not available
Operational Mode	Continuous-wave	
Spatial Mode	TEM <sub>00</sub> (M <sup>2</sup> <1.1)	
Beam Roundness	<1.1	
Thermal Tuning Coefficient (GHz/K)	-3	
Thermal Tuning Range (GHz)	30	
Thermal Response Bandwidth (Hz)	≅ 1	
PZT Tuning Coefficient (MHz/V)	≅ 1	
PZT Tuning Range (MHz)	±65	
PZT Response Bandwidth (kHz)	100	
Emission Spectrum	Single-frequency	
Spectral Linewidth (kHz) (over 100 ms)	≅ 1	kHz range
Coherence Length (km)	>1	
Frequency Stability <sup>2</sup> (MHz/min.)	≅ 1	≅ 2
Relative Intensity Noise (RIN) (dB/Hz), f >10 kHz	<-140	<-120
Intensity Noise, 10 Hz to 2 MHz (% rms)	<0.03	<0.2
Waist Location (inside laser head) (mm)	≅ 105	≅ 95
Laser Head Size (L x W x H)	200 x 150 x 113 mm (7.9 x 5.9 x 4.4 in.)	175 x 121 x 97 mm (6.9 x 4.8 x 3.8 in.)
Laser Head Weight	3.9 kg (8.6 lbs.)	2.6 (5.7 lbs.)
Laser Controller Size (L x W x H)	345 x 340 x 135 mm (13.6 x 13.4 x 5.3 in.)	235 x 340 x 90 mm (9.25 x 13.4 x 3.5 in.)
Laser Controller Weight	9.2 kg (20.3 lbs.)	4.2 kg (9.3 lbs.)
Options	Extended Tuning Range (ETR) Fiber coupling (>60% coupling efficiency) Fast amplitude modulation (FAM) option available for Mephisto	

<sup>1</sup> Optional extended tuning range (ETR) available at time of order.

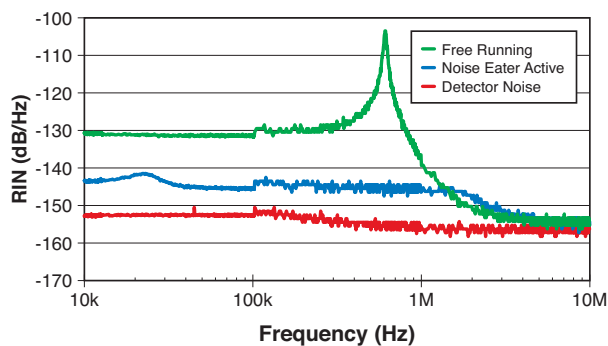
<sup>2</sup> Measured at constant room temperature.

TYPICAL PERFORMANCE DATA

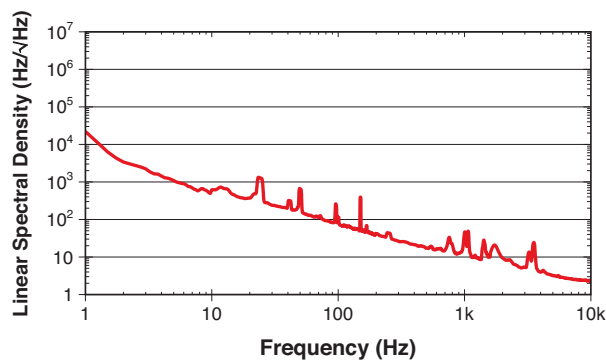
Spectral Linewidth<sup>1</sup>



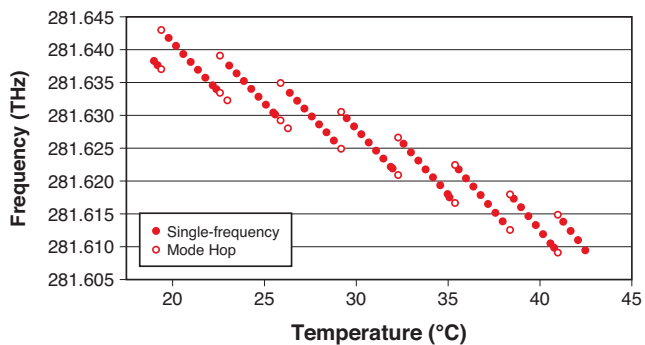
Relative Intensity Noise<sup>1</sup>



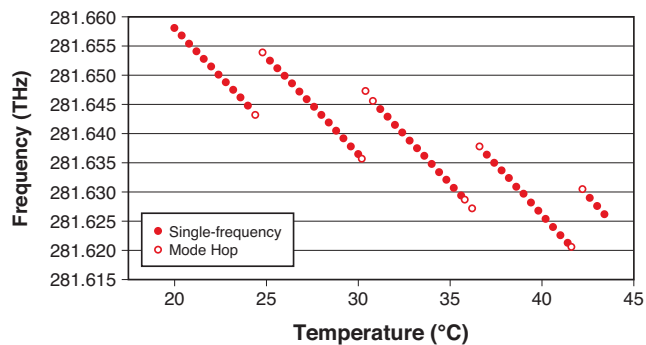
Frequency Noise<sup>1</sup>



Tuning Standard Geometry



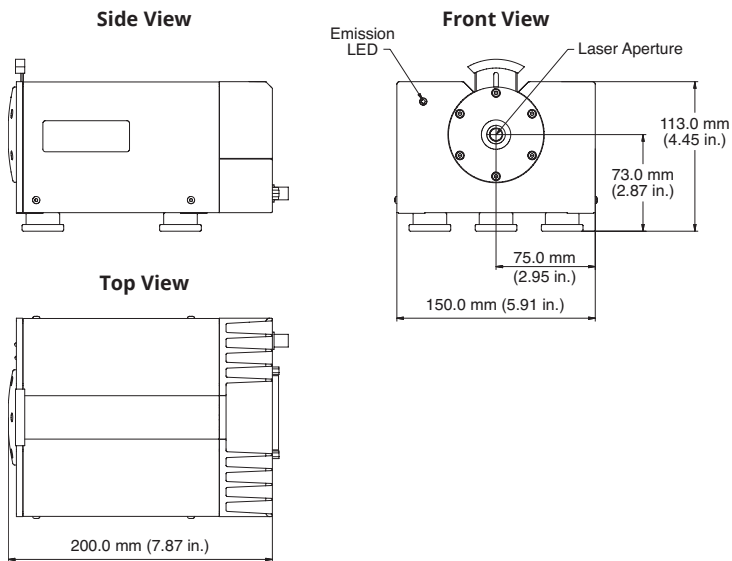
Tuning ETR Geometry



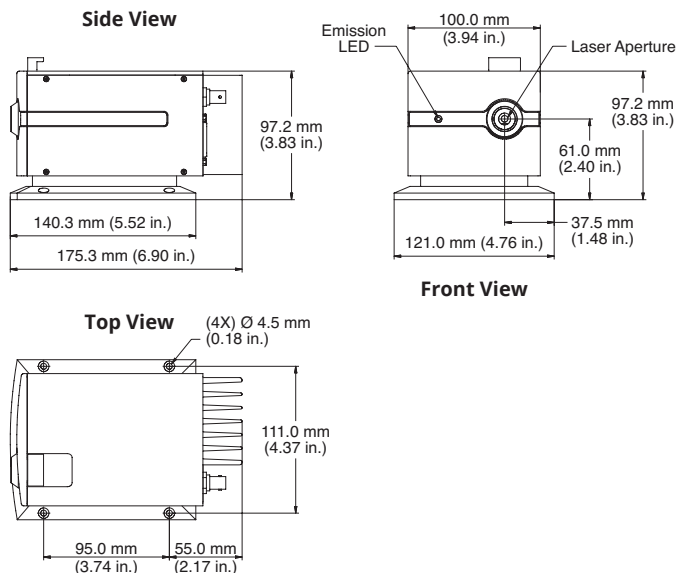
<sup>1</sup> Only for Mephisto product line.

**MECHANICAL SPECIFICATIONS**

**Mephisto**



**Mephisto S**



Coherent, Inc.,  
 5100 Patrick Henry Drive Santa Clara, CA 95054  
 p. (800) 527-3786 | (408) 764-4983  
 f. (408) 764-4646

[tech.sales@coherent.com](mailto:tech.sales@coherent.com) [www.coherent.com](http://www.coherent.com)

Coherent follows a policy of continuous product improvement. Specifications are subject to change without notice. Coherent's scientific and industrial lasers are certified to comply with the Federal Regulations (21 CFR Subchapter J) as administered by the Center for Devices and Radiological Health on all systems ordered for shipment after August 2, 1976.

Coherent offers a limited warranty for all Mephisto Lasers. For full details of this warranty coverage, please refer to the Service section at [www.coherent.com](http://www.coherent.com) or contact your local Sales or Service Representative. MC-013-13-0M0819Rev.E Copyright ©2019 Coherent, Inc.

