

# 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 3 kHz or extremely low noise (-140 dB/Hz RIN). Mephisto is available at power levels up to 2 W at 1064 nm. Mephisto S is a cost-effective version available at 200mW fiber coupled model.

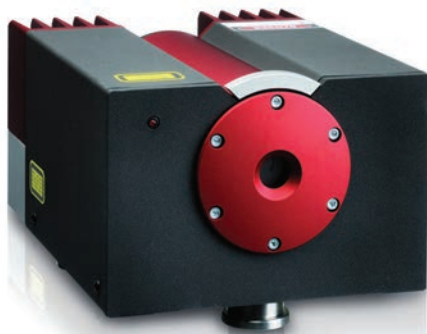
The Mephisto family is based on the widely recognized monolithic Nd:YAG crystal in Non-Planar Ring Oscillator (NPRO) configuration and is further improved by our acclaimed Noise Eater (NE) technology. The laser is simple to stabilize in temperature and easy to fine-tune by using an integrated PZT. Mephisto 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
	500 FC	500	1000	2000	200 FC
Output Power <sup>1</sup> (mW)	300	500	1000	2000	120
Wavelength (nm)	1064				
Operational Mode	Continuous-wave				
Spatial Mode	TEM <sub>00</sub> (M <sup>2</sup> <1.1)				
Beam Roundness	<1.2				
Thermal Tuning Coefficient (GHz/K)	-3				
Thermal Tuning Range (GHz)	30				
Thermal Response Bandwidth (Hz)	≅1				
Mode Hop-Free Tuning Range <sup>2</sup>	ETR	STR	STR	STR	ETR
PZT Tuning Coefficient (MHz/V)	≅1				
PZT Tuning Range (MHz)	±65				
PZT Response Bandwidth (kHz)	100				
Emission Spectrum	Single-frequency				
Spectral Linewidth (kHz)	≤3				kHz range
Coherence Length (km)	>1				
Frequency Stability <sup>3</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
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 kg (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	Fast Amplitude Modulation (FAM) is available with Mephisto 500 and 2000 models upon request				

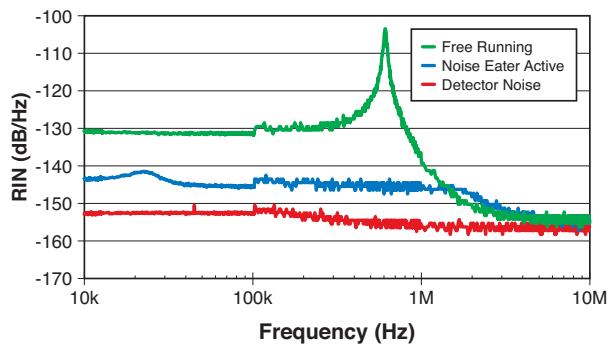
<sup>1</sup> Fiber Coupled (FC) models have >60% coupling efficiency.

<sup>2</sup> STR = Standard Tuning Range (typ. 6-8 GHz between mode hops). ETR = Extended Tuning Range (typ. 12-15 GHz between mode hops). See the graphs on next page for more information.

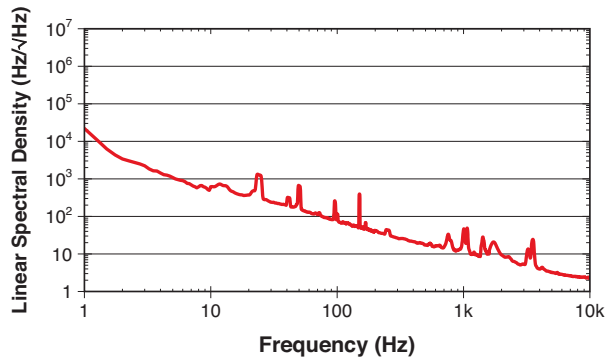
<sup>3</sup> Measured at constant room temperature.

## TYPICAL PERFORMANCE DATA

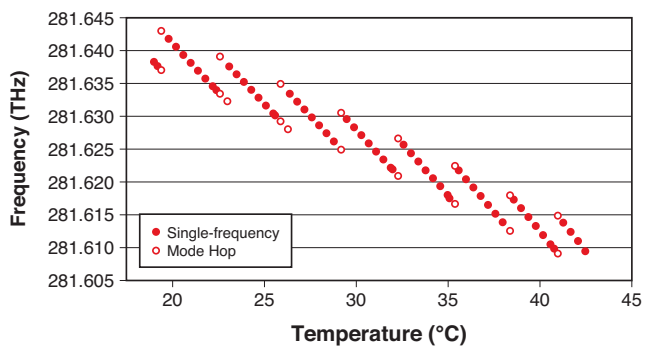
Relative Intensity Noise<sup>1</sup>



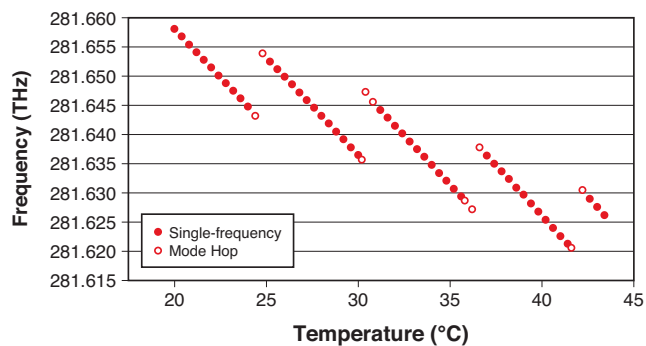
Frequency Noise<sup>1</sup>



Standard Tuning Range (STR)



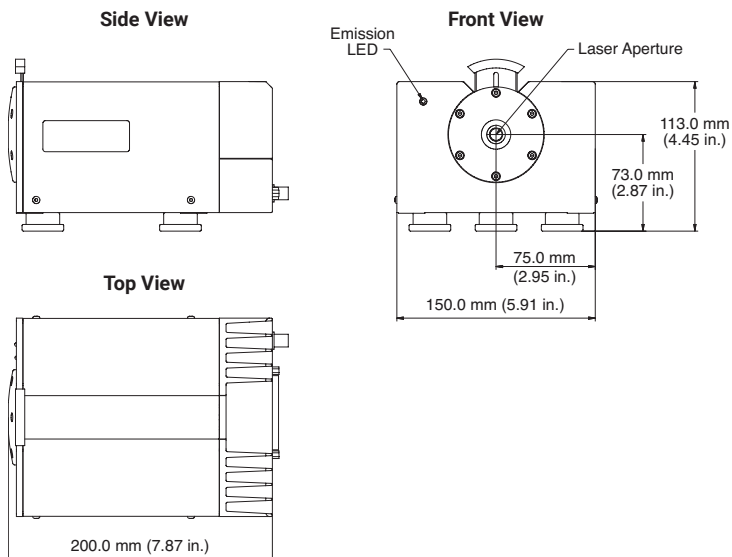
Extended Tuning Range (ETR)



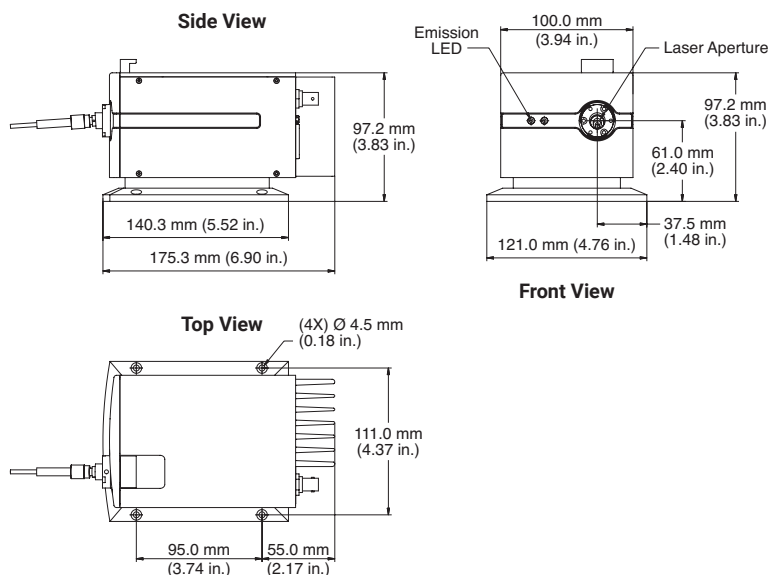
<sup>1</sup> Only for Mephisto product line.

## MECHANICAL SPECIFICATIONS

### Mephisto



### Mephisto S



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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.

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