

Mephisto/Mephisto S

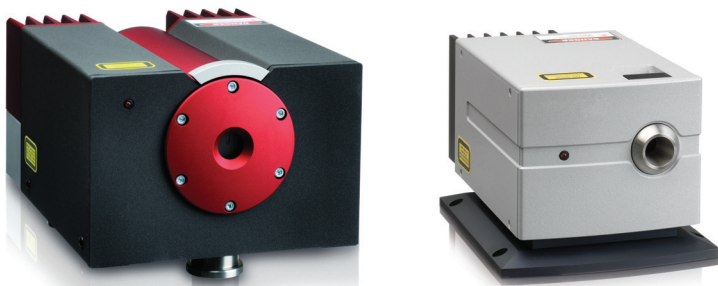
Ultra-Narrow Linewidth CW DPSS Laser

Mephisto is a single frequency continuous wave solid-state laser. It exhibits optical properties unmatched by any other commercial product, such as an output frequency tunable over 30 GHz and the extraordinarily narrow linewidth of 1 kHz. Extremely low noise (-140 dB/Hz RIN) is another unique characteristic of this laser. Mephisto is available at power levels up to 2W at 1064 nm and up to 0.8W at 1319 nm. Mephisto S is a cost-effective version available at 1064 nm with output power up to 0.5W. Fiber coupling is available as an option for all models.

The Mephisto family is based on the widely recognized original Mephisto design featuring a monolithic Nd:YAG crystal in Non-Planar Ring Oscillator (NPRO) configuration. This diode-pumped monolithic device is extremely compact, impervious to contamination and other degradation processes. The laser is simple to stabilize in temperature and easy to fine-tune by using an integrated PZT. The intrinsic stability of the laser is further improved by our acclaimed Noise Eater (NE) technology. This active intensity noise reduction scheme is included with all Mephisto variants as standard.

Excellent laser beam parameters, unmatched combination of ultra-narrow linewidth, frequency tuning, and extremely low noise make the Mephisto family the laser of choice for demanding scientific applications like atom cooling and trapping, optical metrology, quantum optics, gravitational wave studies and other applications requiring extremely narrow linewidth and ultra-stable laser beams.

Mephisto laser is also at the heart of other ultra-stable continuous wave products including frequency doubled and power amplified lasers – please see descriptions of Prometheus and Mephisto MOPA for more information.



Superior Reliability & Performance

Mephisto/Mephisto S Features:

- **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**

Mephisto/Mephisto S 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**

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Ultra-Narrow Linewidth CW DPSS Laser

Specifications	Mephisto	Mephisto S
Laser Power (mW) at 1064 nm at 1319 nm	500 ¹ , 1000, 2000 200, 500, 800	200 ¹ , 500 ¹ not available
Operational Mode	Continuous wave	
Spatial Mode	TEM ₀₀ (M ² <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 ² (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	

¹ Optional extended tuning range (ETR) available at time of order.

² Measured at constant room temperature.

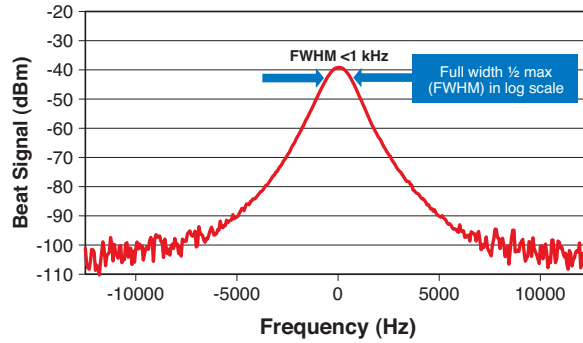
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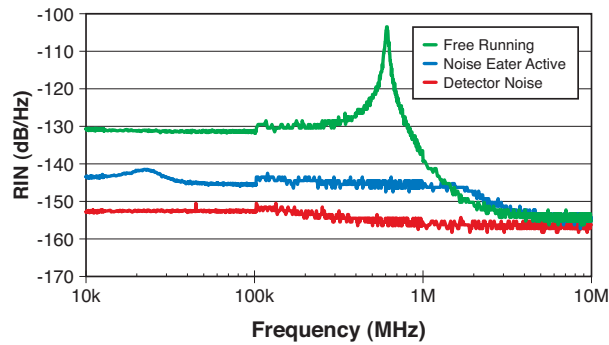
Typical Performance Data

¹ Only for Mephisto product line.

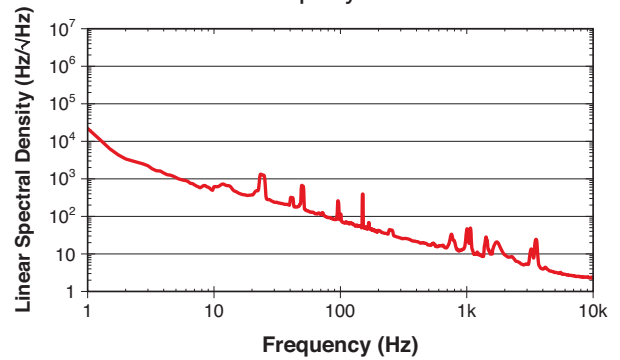
Spectral Linewidth¹



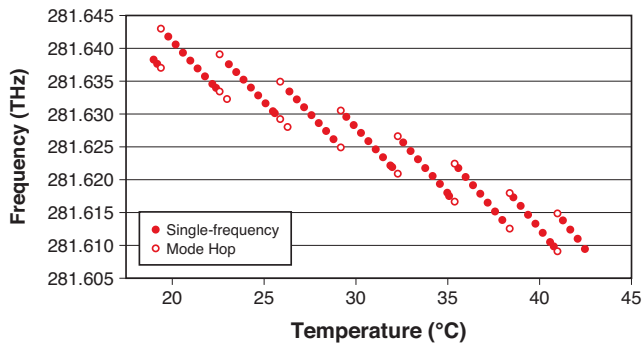
Relative Intensity Noise¹



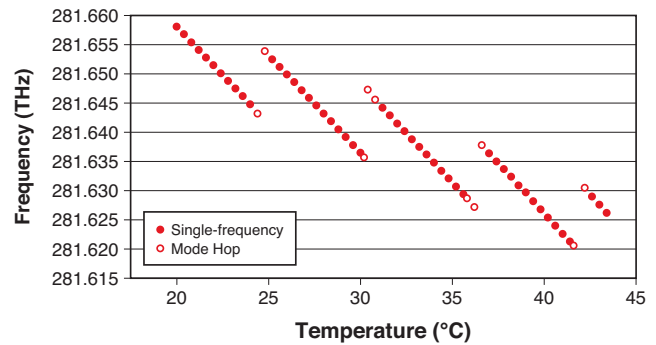
Frequency Noise¹



Tuning Standard Geometry



Tuning ETR Geometry

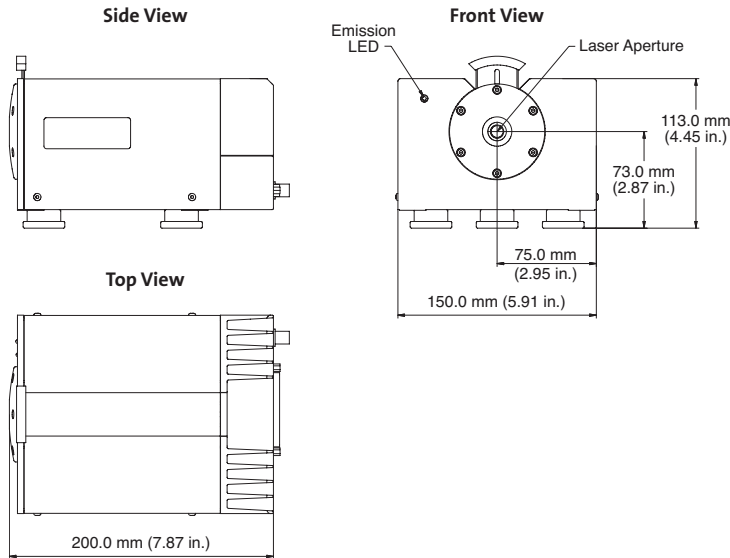


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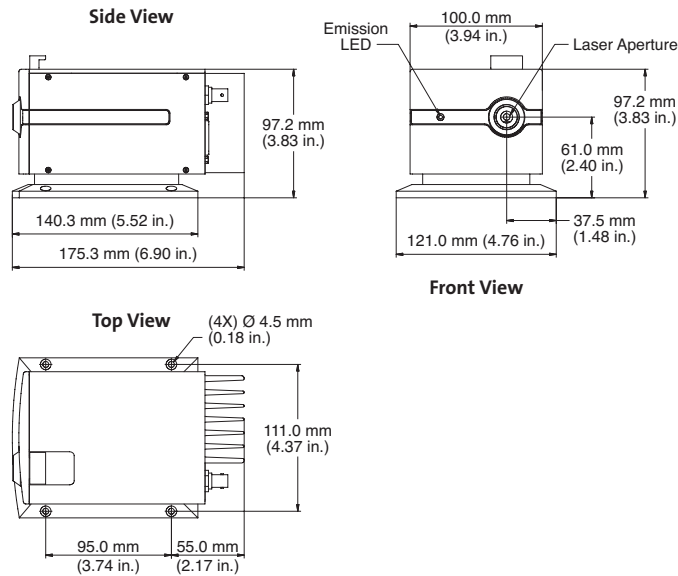
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Mechanical Specifications

Mephisto



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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 or contact your local Sales or Service Representative.

