

# Mephisto MOPA

Ultra-Narrow Linewidth High-Power CW DPSS Laser

Mephisto MOPA (Master Oscillator Power Amplifier) is a high power single frequency continuous wave solid-state laser designed for demanding low noise scientific and OEM applications. Laser's unique stability originates from the properties of widely recognized Non-Planar Ring Oscillator (NPRO) which is in the heart of MOPA's seed unit. The MOPA 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 (-130 dB/Hz RIN) is another unique characteristic of this laser. MOPA emits at 1064 nm wavelength and is available at power levels of 8, 25, 42 and 55W. Frequency doubled laser version is available upon request.

As the whole Mephisto family, MOPA is also based on NPRO crystal configuration. This diode-pumped monolithic device is compact, impervious to contamination and other degradation processes. The emission from NPRO is amplified by multiple power amplification stages in order to reach high output power with uncompromised frequency and intensity stability parameters. Mephisto MOPA is simple to stabilize in temperature and easy to fine-tune by using an integrated PZT providing the user full control over the laser emission frequency. The intrinsic stability of the laser is further improved by our acclaimed Noise Eater (NE) technology. This active intensity noise reduction circuitry is included with all MOPA variants as standard.

Unmatched combination of high output power, ultra-narrow linewidth, frequency tuning, extremely low noise, and excellent laser beam parameters makes Mephisto MOPA the laser of choice for demanding scientific applications like atom trapping and cooling, optical metrology, quantum optics, gravitational wave studies, LIDAR, OPO pumping and other applications requiring extremely narrow linewidth and ultra-stable laser beams.



**Superior Reliability & Performance**

## **Mephisto MOPA Features:**

- **Master oscillator power amplifier (MOPA) configuration**
- **Monolithic non-planar ring oscillator (NPRO) seed laser**
- **Extremely long coherence length**
- **Noise Eater – active intensity noise reduction technology**
- **User-installed, turn-key operation**
- **Low noise control electronics**

## **Mephisto MOPA Applications:**

- **Atom Trapping and Cooling**
- **Gravitational Wave Studies**
- **Laser-based Metrology**
- **Quantum Optics and Phenomena**
- **Nonlinear Optics Pump Source (SHG, DFG, OPO)**

[www.coherent.com/go/mephistoMOPA](http://www.coherent.com/go/mephistoMOPA)

# Mephisto MOPA

## Ultra-Narrow Linewidth High-Power CW DPSS Laser

### Specifications

### Mephisto MOPA

Laser Power at 1064 nm (W)	8, 25, 42, 55
Operational Mode	Continuous wave
Spatial Mode	TEM <sub>00</sub> (M <sup>2</sup> <1.3)
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
Coherence Length (km)	>1
Frequency Stability <sup>1</sup> (MHz/min.)	≅1
Relative Intensity Noise (RIN)(dB/Hz), f >20 kHz	<-130
Intensity Noise, 10 Hz to 2 MHz (% rms)	<0.06
Waist Location (inside laser head)(mm)	≅105
Laser Head Size (L x W x H) for 8W, 25W and 42W for 55W	386 x 381 x 117 mm (15.2 x 15.0 x 4.6 in.) 386 x 461 x 117 mm (15.2 x 18.1 x 4.6 in.)
Laser Head Weight for 8W, 25W and 42W for 55W	26 kg (57.3 lbs.) 28 kg (61.7 lbs.)
Laser Controller Master Size (L x W x H)	90 x 340 x 235 mm (3.5 x 13.4 x 9.25 in.)
Laser Controller Amplifier Size (L x W x H)	135 x 420 x 450 mm (5.3 x 16.5 x 17.7 in.)
Laser Controller Master Weight	4.2 kg (9.3 lbs.)
Laser Controller Amplifier Weight <sup>2</sup>	11.9 to 13.1 kg (26.2 to 28.9 lbs.)
Laser Head Cooling <sup>3</sup>	Water cooling
Water Flow Rate (l/min.)	>3
Water Pressure at Laser Head (bar)	<4
Water Temperature <sup>4</sup> (°C)	25
Cooling Power <sup>2</sup> (W)(chiller)	300 to 600
Options	Frequency doubled MOPA version available upon request

<sup>1</sup> Measured at constant room temperature.

<sup>2</sup> Depending on model.

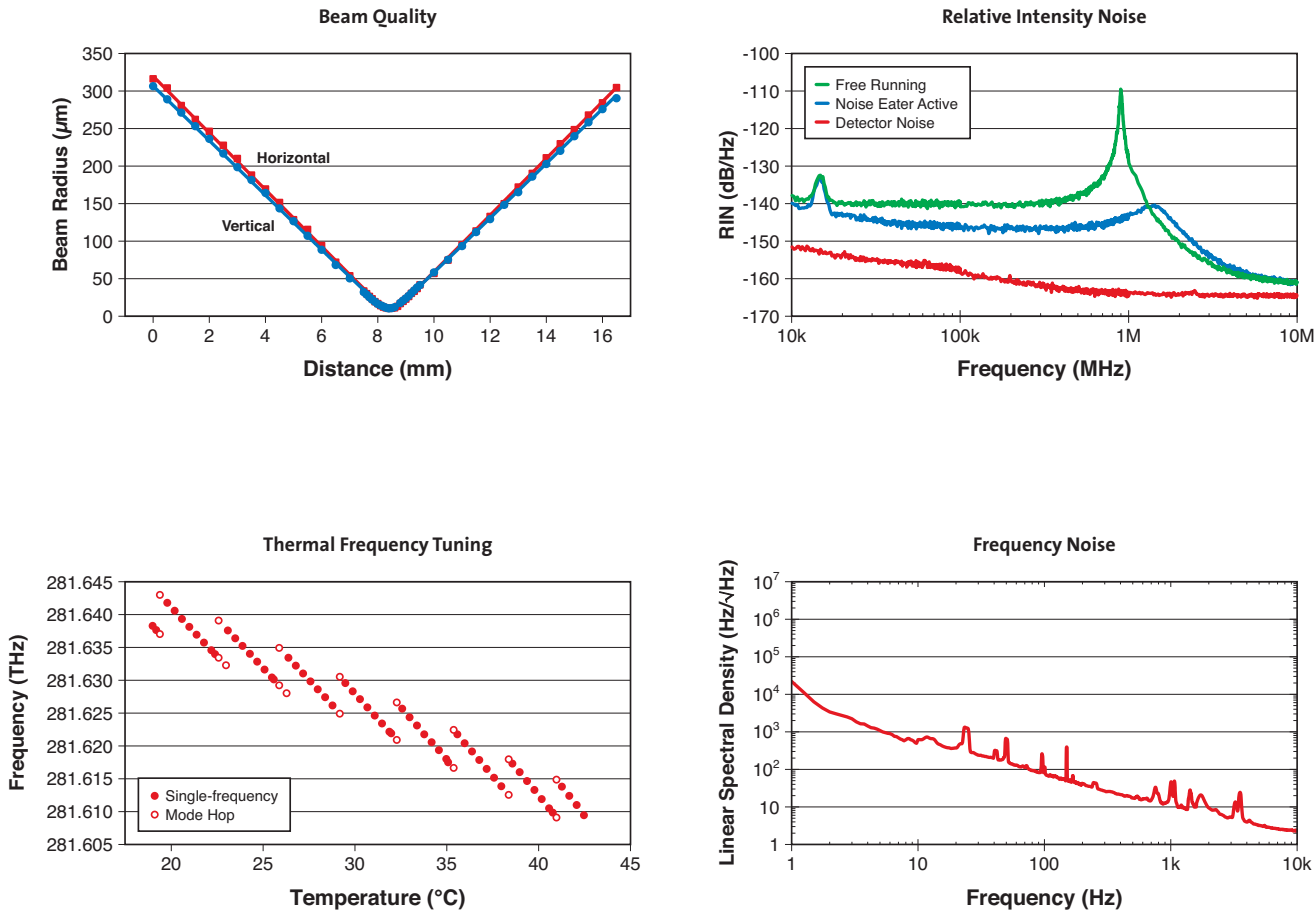
<sup>3</sup> Non-deionized water recommended. Chiller available upon request.

<sup>4</sup> Operation above dew point required to avoid condensation.

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Ultra-Narrow Linewidth High-Power CW DPSS Laser

## Typical Performance Data

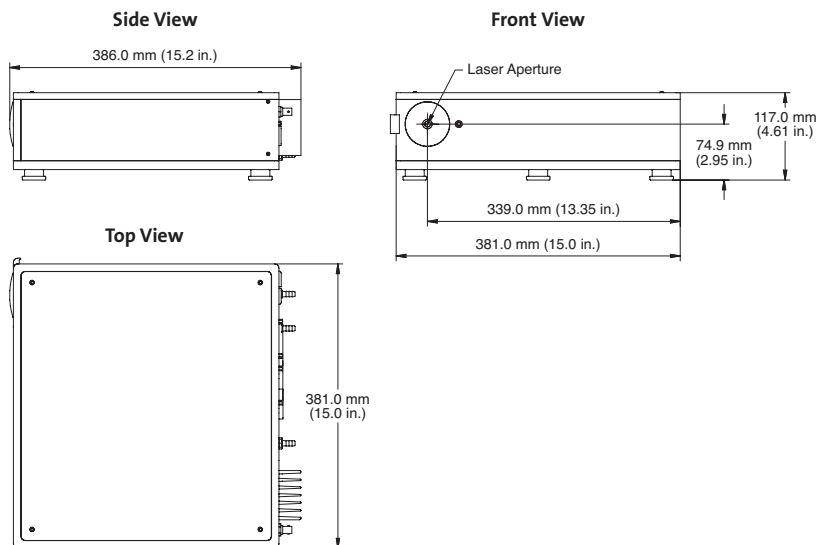


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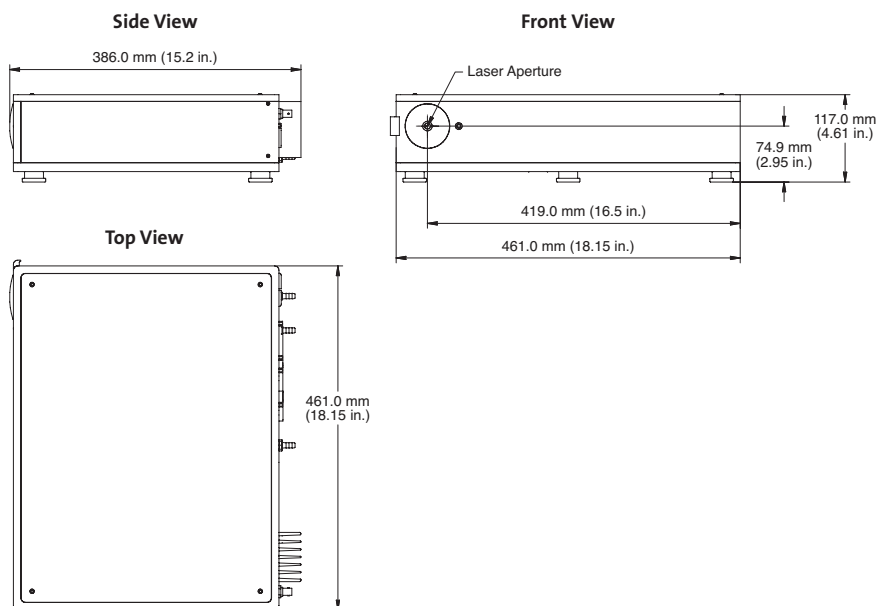
Ultra-Narrow Linewidth High-Power CW DPSS Laser

## Mechanical Specifications

### Mephisto MOPA 8W/25W/42W



### Mephisto MOPA 55W



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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.

