

Sapphire SF

CW Blue and Green Single-Frequency Lasers

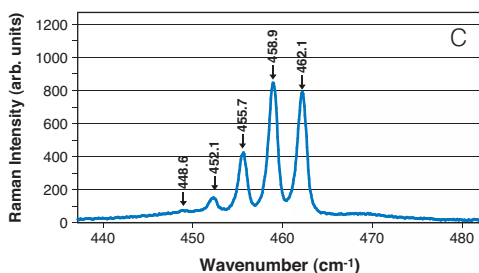
Sapphire SF is a series of compact CW visible single-frequency lasers based on Coherent's unique OPSSL (Optically Pumped Semiconductor Laser) technology. Sapphire SF lasers come with an ultra-narrow linewidth of <1.5 MHz, a high quality diffraction-limited beam with excellent pointing stability, high power stability and low noise.

Sapphire lasers are manufactured in cleanrooms using Coherent's patented PermAlign technology for optimal aligning and solder-bonding the optics. Sapphire SF lasers come with a flexible interface concept: Analog, RS-232 or USB – it is up to the user to select the appropriate communication channel.

Sapphire SF 488 overcomes the disadvantages of ion lasers (size, power consumption, background light, cost of ownership) and diode lasers (beam quality, wavelength precision).

Sapphire SF 532 is the alternative to Nd:YAG or Nd:YVO₄ based lasers eliminating their thermal lensing and green noise effects, a phenomenon causing power instability due to intracavity frequency-doubling mechanisms.

Sapphire SF lasers are intended for applications that need narrow and ultra-narrow linewidth light such as Raman spectroscopy, interferometry, holography, metrology, and inspection.



**High Resolution
Raman Spectra**



Superior Reliability & Performance

Sapphire SF Features:

- **Ultra-narrow linewidth**
- **High single-frequency power**
 - Up to 100 mW at 488 nm
 - Up to 150 mW at 532 nm
- **Outstanding power stability**
- **Ultra-low noise, esp. no discharge background or green noise (cf. ion, diode, DPSS lasers)**
- **Superior beam quality**
- **Flexible interface concept**
 - Analog, RS-232 & USB
- **PermAlign technology**
 - Permanent optimal alignment
 - Unsurpassed robust and stable
- **OEM and end-user versions**
- **Proven Sapphire reliability**

Sapphire SF Applications:

- **Raman spectroscopy**
- **Holography**
- **Metrology**
- **Inspection**

Sapphire SF

CW Blue and Green Single-Frequency Lasers

| System Specifications | Sapphire 488 SF | Sapphire 532 SF |
|--|---|------------------|
| Wavelength (nm) | 488 | 532 |
| Wavelength Accuracy (nm) | | 0.1 |
| Single-longitudinal Mode, Linewidth (MHz) | | <1.5 |
| Output Power ¹ (mW) | 20, 50, 100 | 20, 50, 100, 150 |
| Spatial Mode | TEM ₀₀ , M ² <1.1, single longitudinal mode | |
| Beam Asymmetry | 0.9 to 1.1 | |
| Beam Diameter at 1/e ² (mm) | 0.70 ±0.05 | |
| Beam Divergence (mrad) | <1.3 | |
| Pointing Stability (over 2 hours after warm-up and ±3°C)(μrad) | <30 | |
| Noise (%) | | |
| 20 Hz to 2 MHz, rms | <0.25 | |
| 20 Hz to 20 kHz, peak-to-peak | <1 | |
| Long-term Power Stability (%) (2 hours, ±3°C) | <2 | |
| Warm-up Time (minutes) | <5 | |
| Polarization Ratio | >100:1, vertical | |
| Static Alignment Tolerances ² | | |
| Beam Position (mm) | ±0.25 | |
| Beam Angle (mrad) | ±2.5 | |
| Beam Waist Position with respect to Exit Window | ±200 ³ | |

Utility and Environmental Requirements

| | | |
|--|--|--|
| Interfacing | Analog, RS-232, USB | |
| Operating Voltage ⁴ (VDC) | +10.8 to 15 | |
| Power Consumption (W) | <60 | |
| Max. Laser Head Baseplate Temp. ⁵ | +50°C (122°F) | |
| Max. Heat Dissipation of Head (W) | 25 (baseplate at 50°C) | |
| Ambient Temperature | | |
| Operating Conditions | 10 to 40°C (50 to 104°F) non-condensing | |
| Non-Operating Condition | -30 to 60°C (-22 to 140°F) | |
| Shock Tolerance (6 ms) | 7g laterally, 15g vertically | |
| Dimensions (L x W x H) | | |
| Laser Head | 125 x 70 x 34 mm (4.9 x 2.8 x 1.3 in.) | |
| Controller | 117.8 x 76.2 x 43.2 mm (4.6 x 3.0 x 1.7 in.) | |
| Heat Sink (optional) | 200 x 80 x 50 mm (7.9 x 3.2 x 2 in.) | |
| DC Power Supply (optional) | 172 x 105 x 55 mm (6.8 x 4.1 x 2.2 in.) | |
| Cable — Laser Head to Controller | 2m (6.56 ft.), optional 5m (16.4 ft.) | |
| Weights | | |
| Laser Head | 0.35 kg (0.77 lbs.) | |
| Controller | 0.25 kg (0.55 lbs.) | |
| Heat Sink (optional) | 0.75 kg (1.65 lbs.) | |
| DC Power Supply (optional) | 0.95 kg (incl. line cable)(2.1 lbs.) | |
| Packaged System (head+controller+cable>manual) | 1.7 kg (3.7 lbs.) | |
| Cable — Laser Head to Controller | 0.3 kg (0.66 lbs.) | |

Measurement Tools

| | | Part Number |
|--------|----------------|-------------|
| Meter | FieldMax™II-TO | 1098579 |
| Sensor | PS10Q | 1098400 |

¹ Output power is adjustable via analog or digital interface from 10% to 110%. Specifications are valid for 100% power. Recommended power range is 70 to 110% power.

² Static alignment tolerances are relative to the right bottom edge (in beam direction).

³ 200mm is ~25% of Raleigh Range at 488 nm and ~30% of Raleigh Range at 532 nm.

⁴ If user-supplied, the DC power supply has to meet the following requirements: Power >60W; ripple <5% peak-to-peak; line regulation <0.5%.

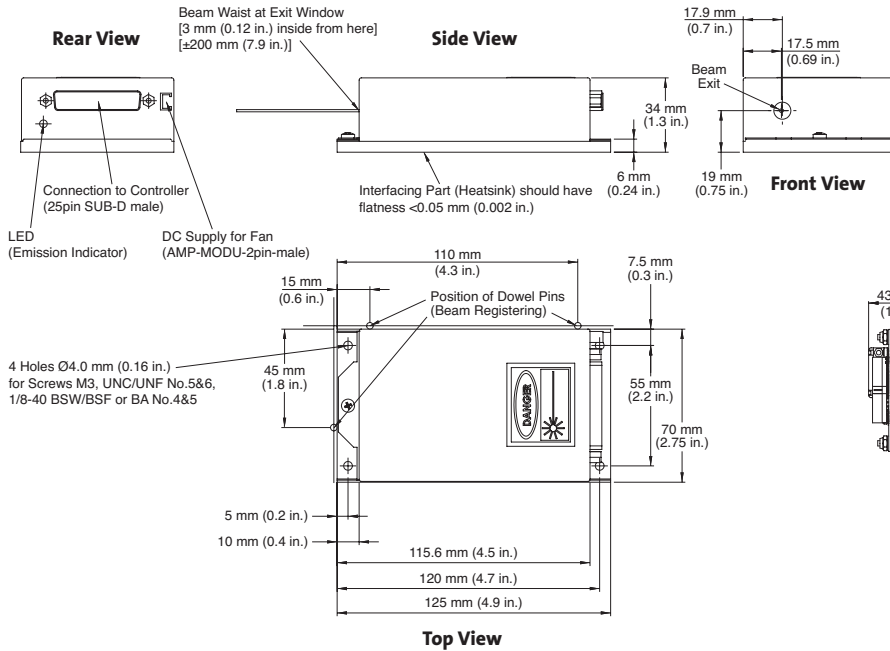
⁵ With factory-provided or other adequate heat sink.

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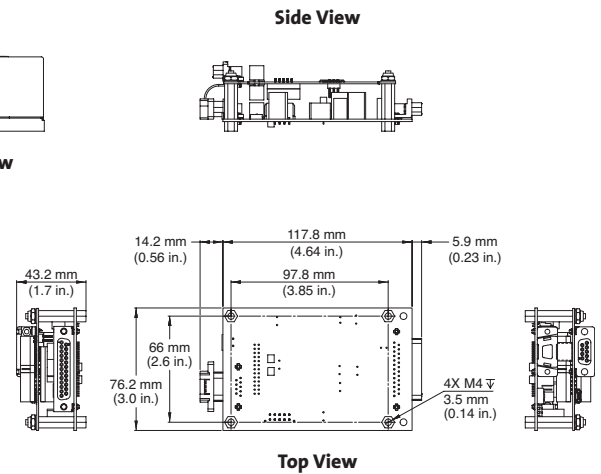
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Mechanical Specifications

Laser Head



Controller



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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 Sapphire 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.

