

Excelsior® Compact CW Lasers

mks | Spectra-Physics®

Complete Portfolio of Low Power Lasers

The Spectra-Physics Excelsior family of low-power continuous wave (CW) solid state lasers offers customers a comprehensive range of wavelengths and power levels. Excelsior lasers provide state-of-the-art performance with the smallest footprint in their class.

473, 505, 515, 532, 542, 561, and 1064 nm – Diode-Pumped Solid State Lasers

Using patented frequency-doubling techniques, Excelsior diode-pumped solid state (DPSS) lasers provide visible light with high conversion efficiency for lower power consumption and improved reliability. The DPSS models are available in the regular, compact laser head size, or in the slightly larger footprint called the “Extended Cavity” (XC) series that is used for the 505 nm and 515 nm models as well as the higher power 532 nm and 561 nm models. The 1064 nm version is operated at its fundamental wavelength.

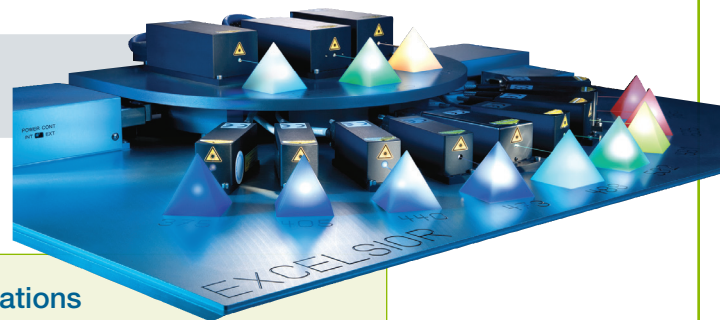
375, 405, 445, 488, 642 and 785 nm – Direct Diode Lasers

The Excelsior family also includes a line of diode-based lasers with output powers from 16 to 100 mW. Wavelengths are generated directly from a semiconductor gain chip to reduce operational costs, increase lifetime use, and minimize space requirements.

The Spectra-Physics Excelsior product line provides a consistent platform with the same mechanical footprint over a wide range of power levels and wavelengths. This allows for full component interchangeability among laser heads and controllers within a given architecture, requiring no additional adjustment or optimization. OEM customers can streamline supply chain and inventory management, as well as simplify service components for field maintenance.

The Excelsior Advantage

- 14 wavelengths from UV to IR with power levels up to 500 mW
- Full suite of OEM and scientific models
- High-quality TEM₀₀ beam
- Exceptionally low optical noise on multi-longitudinal mode and single-frequency models
- Highly reliable, with lifetime data exceeding 60,000 hours
- Small laser heads for easy integration
- Fiber-coupled OEM versions available
- High speed TTL and analog modulation on direct diodes



Applications

- Flow cytometry
- Confocal microscopy
- Micro-array readers
- Laser-induced fluorescence
- Raman spectroscopy
- DNA sequencing
- Interferometry
- Semiconductor inspection and metrology

375–515 nm Specifications^{1, 6, 11}

	Excelsior 375	Excelsior 405	Excelsior 445	Excelsior 473	Excelsior 488	Excelsior 505	Excelsior 515
Output Characteristics							
Wavelength	375 ±5 nm	405 ±5 nm	445 ±5 nm	473 nm	488 nm ±5 nm	505 nm	515 nm
Output Power ²	16 , 70 mW	50, 100 mW	40, 100 mW	5, 10, 50 mW	20, 50, 100 mW	10, 20 mW	50 mW
Spectral Linewidth	<0.5 nm	<1 nm	<1 nm	<10 MHz (<0.01 pm)	<1.5 nm	<1 nm	<10 MHz (<0.01 pm)
Spatial Mode	TEM ₀₀						
Longitudinal Mode	Multi	Multi	Multi	Single	Multi	Multi	Single
Frequency Drift	–	–	–	<50 MHz/°C	–	–	–
Beam Quality (M ²)	<1.5	<1.5	<1.5	<1.1	<1.5	<1.2	<1.1
Beam Diameter (1/e ²)	1.3 ±0.3 mm	1.3 ±0.3 mm	1.3 ±0.3 mm	0.10 ±0.01 mm 0.32 ±0.02 mm ¹⁰	1.3 ±0.3 mm	0.67 ±0.07 mm	0.67 ±0.07 mm
Beam Divergence	<0.71 mrad	<0.76 mrad	<0.84 mrad	<7.3 mrad <2.2 mrad ¹⁰	<0.9 mrad	<1.2 mrad	<1.2 mrad
Beam Ellipticity	1 ±0.1	1 ±0.1	1 ±0.1	1 ±0.15	1 ±0.1	1 ±0.2	1 ±0.2
Beam Pointing Stability	<6 μrad/°C	<6 μrad/°C	<6 μrad/°C	<6 μrad/°C	<6 μrad/°C	<10 μrad/°C	<10 μrad/°C
Noise	<0.2% rms (20 Hz–20 MHz) <1% rms (20 Hz–500 MHz)	<0.2% rms (20 Hz–20 MHz) <1% rms (20 Hz–500 MHz)	<0.2% rms (20 Hz–20 MHz) <1% rms (20 Hz–500 MHz)	<0.5% rms (20 Hz–20 MHz)	<0.2% rms (20 Hz–20 MHz) <1% rms (20 Hz–500 MHz)	<1% rms (10 Hz–500 Hz)	<0.5% rms (10 Hz–100 MHz)
Power Stability (over 8 hours)	<±2%						
Polarization Ratio	>100:1 (vertical)	>100:1 (vertical)	>100:1 (vertical)	>100:1 (vertical)	>100:1 (vertical)	>100:1 (horizontal)	>100:1 (vertical)
Warm-up Time	<5 min	<5 min	<5 min	<5 min	<5 min	<10 min	<10 min
Beam Height	19 mm						
Technology	Direct Diode	Direct Diode	Direct Diode	DPSS	Direct Diode	DPSS (XC)	DPSS (XC)
Utility and Environmental Specifications							
Operating Voltage ³	5 VDC	5 VDC	5 VDC	5 VDC	5 VDC	12 VDC	12 VDC
Maximum Power Consumption	<10 W	<10 W	<10 W	<30 W	<10 W	<60 W	<60 W
Operating Temperature	10–40°C (80% relative humidity)						
Maximum Laser Head BasePlate Temperature ⁴	50°C						
Storage Temperature Range	-20 to 60°C (90% relative humidity, non-condensing)						
Vibration	3 G (15–500 Hz)	3 G (15–500 Hz)	3 G (15–500 Hz)	3 G (15–500 Hz)	3 G (15–500 Hz)	3 G (15–500 Hz)	2 G (15–200 Hz)
Shock Tolerance	Up to 25 G						
Static Alignment Tolerance⁵							
Beam Position	±1 mm	±1 mm	±1 mm	±1 mm	±1 mm	±0.5 mm	±0.5 mm
Beam Angle	±5 mrad	±5 mrad	±5 mrad	±5 mrad	±5 mrad	±5 mrad	±5 mrad

- Complies with EN 60825-1:2001 Standards as applicable, laser safety Class 3B laser.
- Output power is variable via analog power supply. Specifications apply at nominal power level to 50% of nominal power. Recommended power range 10–100% of nominal power. Excelsior 488 available as fixed power version only.
- Power supply must meet following requirements:
 - DC Voltage 5 and 12 VDC ±5%
 - Power 30 W for 5 VDC, 60 W for 12 VDC
 - Supply Input Ripple <150 mV peak-to-peak
- With adequate heatsink.

- Static alignment tolerances relative to adjustment holes.
- Available cable lengths range from 0.5 to 1.8 m.
- 300 mW Excelsior 532.
- 100/150 mW Excelsior 561.
- Output power for Excelsior 1064 OEM model is 500 mW. Output power for Excelsior 1064 CDRH models is 500 mW and 800 mW.
- CDRH model.
- Specifications subject to change without notice.

532–1064 nm Specifications^{1, 6, 10}

	Excelsior 532 Multi Mode	Excelsior 532 Single Mode	Excelsior 542	Excelsior 561	Excelsior 642	Excelsior 785	Excelsior 1064
Output Characteristics							
Wavelength	532 nm	532 nm	542 nm	561 nm	642 ±3 nm	785 ±10 nm	1064 nm
Output Power ²	10, 20, 50 mW	50, 100, 150, 200, 300 mW ⁷	50 mW	20, 50, 75 mW 100, 150 mW ⁸	35, 60, 100 mW	45 mW	500, 800 mW ⁹
Spectral Linewidth	<0.5 nm	<10 MHz (<0.01 pm)	<10 MHz (<0.01 pm)	<10 MHz (<0.01 pm)	<0.5 nm	<0.01 nm	<10 MHz (<0.04 pm)
Spatial Mode	TEM ₀₀						
Longitudinal Mode	Multi	Single	Single	Single	Multi	Multi	Single
Frequency Drift	–	<50 MHz/°C	<50 MHz/°C	<50 MHz/°C	–	–	<50 MHz/°C
Beam Quality (M ²)	<1.1	<1.1	<1.1	<1.1	<1.5	<1.5	<1.1
Beam Diameter (1/e ²)	0.32 ±0.02 mm	0.32 ±0.02 mm 0.7 ±0.07 mm ⁷	0.7 ±0.07 mm	0.7 ±0.05 mm	1.0 ±0.2 mm	1.0 ±0.2 mm	0.45 ±0.05 mm
Beam Divergence	<2.5 mrad	<2.5 mrad <1.2 mrad ⁷	<1.2 mrad	<1.2 mrad	<1.5 mrad	<1.9 mrad	<3.3 mrad
Beam Ellipticity	1 ±0.1	1 ±0.1	1 ±0.1	1 ±0.1	1 ±0.1	1 ±0.1	1 ±0.1
Beam Pointing Stability	<6 μrad/°C	<6 μrad/°C	<6 μrad/°C	<6 μrad/°C	<6 μrad/°C	<6 μrad/°C	<6 μrad/°C
Noise	<0.5% rms (20 Hz–20 MHz)	<0.2% rms (20 Hz–20 MHz)	<0.2% rms (10 Hz–100 MHz)	<0.2% rms (20 Hz–20 MHz)	<0.2% rms (20 Hz–20 MHz) <1% rms (20 Hz–500 MHz)	<0.2% rms (20 Hz–20 MHz) <1% rms (20 Hz–500 MHz)	<0.2% rms (10 Hz–100 MHz)
Power Stability (over 8 hours)	<±1%	<±1%	<±2%	<±1%	<±2%	<±2%	<±2%
Polarization Ratio	>100:1 (vertical)	>100:1 (vertical)	>100:1 (vertical)	>100:1 (vertical)	>100:1 (vertical)	>100:1 (vertical)	>100:1 (horizontal)
Warm-up Time	<5 min	<5 min	<5 min	<5 min	<5 min	<5 min	<5 min
Beam Height	19 mm						
Technology	DPSS	DPSS	DPSS	DPSS	Direct Diode	Direct Diode	DPSS
Utility and Environmental Specifications							
Operating Voltage ³	5 VDC	5 VDC 12 VDC ⁷	5 VDC	5 VDC 12 VDC ⁸	5 VDC	5 VDC	5 VDC
Maximum Power Consumption	<30 W	<30 W <60 W ⁷	<30 W	<40 W <60 W ⁸	<10 W	<10 W	<30 W
Operating Temperature	10–40°C (<90% relative humidity)						
Maximum Laser Head Base Plate Temperature ⁴	50°C	50°C	45°C	45°C	50°C	50°C	45°C
Storage Temperature Range	-20 to 60°C (<90% relative humidity, non-condensing)						
Vibration	3 G (15–500 Hz)					3 G (15–500 Hz)	
Shock Tolerance	Up to 25 G						
Static Alignment Tolerance⁵							
Beam Position	±0.5 mm	±1 mm	±0.1 mm	±0.1 mm	±1 mm	±1 mm	±0.1 mm
Beam Angle	±5 mrad	±0.5 mrad	±0.5 mrad	±0.5 mrad	±5 mrad	±5 mrad	±0.5 mrad

1. Complies with EN 60825-1:2001 Standards as applicable, laser safety Class 3B laser.

2. Output power is variable via analog power supply. Specifications apply at nominal power level to 50% of nominal power. Recommended power range 10–100% of nominal power. Excelsior 488 available as fixed power version only.

3. Power supply must meet following requirements:
 - DC Voltage 5 and 12 VDC ±5%
 - Power 30 W for 5 VDC, 60 W for 12 VDC
 - Supply Input Ripple <150 mV peak-to-peak

4. With adequate heatsink.

5. Static alignment tolerances relative to adjustment holes.

6. Available cable lengths range from 0.5 to 1.8 m.

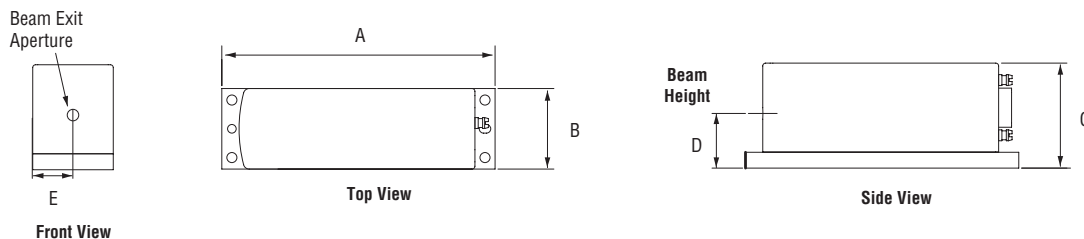
7. 300 mW Excelsior 532.

8. 100/150 mW Excelsior 561.

9. Output power for Excelsior 1064 OEM model is 500 mW. Output power for Excelsior 1064 CDRH models is 500 mW and 800 mW.

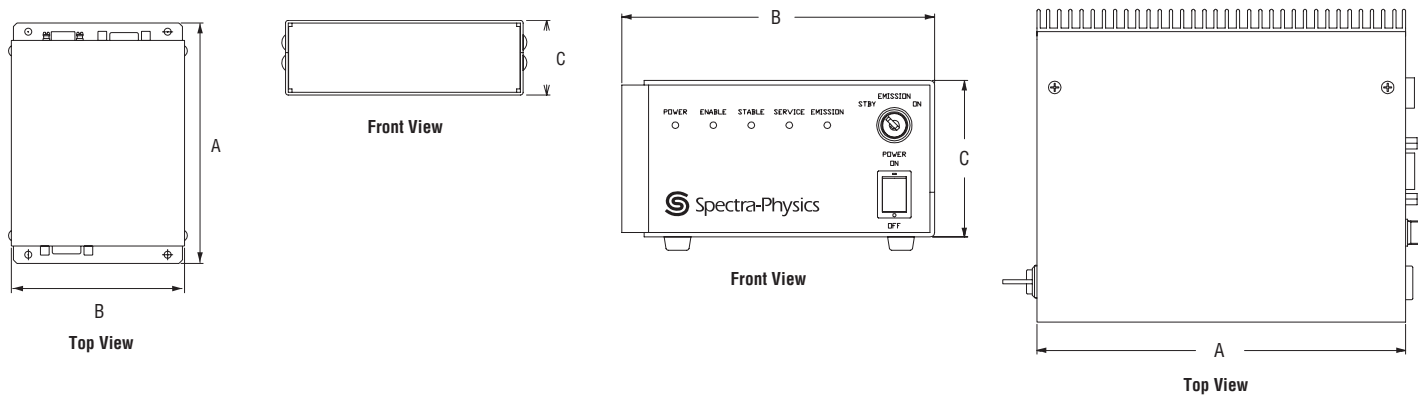
10. Specifications subject to change without notice.

Excelsior Compact CW Lasers



Excelsior Laser Head Dimensions

Model	532 nm (Multi Mode Non-collimated)	375 nm, 405 nm, 440 nm, 473 nm, 488 nm, 532 nm (Single Mode, Multi Mode Collimated), 542 nm, 561 nm, 642 nm, 785 nm, 1064 nm	Direct Diode and DPSS CDRH models	505 nm, 515 nm, 561 nm (100 & 150 mW) 532 nm (300 mW), DPSS XC CDRH models
A Length	3.33 in (84.5 mm)	3.74 in (95 mm)	4.33 in (110 mm)	4.53 in (115 mm)
B Width	1.1 in (28 mm)	1.1 in (28 mm)	1.65 in (42 mm)	1.97 in (50 mm)
C Height	1.44 in (36.5 mm)	1.44 in (36.5 mm)	1.44 in (36.5 mm)	1.71 in (43.5 mm)
D Beam Height	0.75 in (19 mm)	0.75 in (19 mm)	0.75 in (19 mm)	0.75 in (19 mm)
E Beam Exit (from side)	0.55 in (14 mm)	0.55 in (14 mm)	0.83 in (21 mm)	0.83 in (21 mm) offset 0.16 in (4 mm) from center



Excelsior OEM Controller and CDRH Power Supply Dimensions

Model	375 nm, 405 nm, 440 nm, 488 nm, 642 nm, 785 nm	473 nm, 532 nm, 542 nm, 561 nm, 1064 nm	505 nm, 515 nm, 561 nm (100 & 150 mW) 532 nm (300 mW)	Direct Diode CDRH models	DPSS CDRH models	DPSS XC CDRH models
A Length	2.76 in (70 mm)	5.43 in (138 mm)	6.69 in (170 mm)	6.49 in (165 mm)	6.49 in (165 mm)	7.09 in (180 mm)
B Width	2.76 in (70 mm)	3.91 in (99.4 mm)	3.94 in (100 mm)	5.51 in (140 mm)	5.51 in (140 mm)	5.51 in (140 mm)
C Height	0.87 in (22 mm)	1.32 in (33.5 mm)	1.57 in (40 mm)	1.57 in (40 mm)	2.75 in (70 mm)	2.75 in (70 mm)



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