Excelsior® Compact CW Lasers

COMPLETE PORTFOLIO OF LOW POWER LASERS



The Excelsior Advantage

- Complete range of wavelengths – 375, 405, 440, 473, 488, 505, 515, 532, 542, 561, 594, 642, 785 and 1064 nm
- Full suite of OEM and Scientific models
- Exceptionally low optical noise for reliable high-speed data acquisition
- High-quality TEM_{00} beam
- Constant power mode requires no external control mechanism
- Multi-longitudinal mode and single-frequency operation meet a wide range of application needs
- Output power from 5 to 500 mW for more flexibility
- Highly reliable, with lifetime data exceeding 60,000 hours
- Small laser heads for easy integration
- CE certified
- Complete line of fiber coupled OEM versions are available upon request
- High speed TTL and analog modulation as well as RS 232 interface is available for all OEM direct diode models upon request

Spectra-Physics
A Newport Corporation Brand

The Spectra-Physics Excelsior® family of low-power continuous wave (CW) solid state lasers offers customers a complete 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, 594, 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, 515, and 594 nm models as well as the higher power 532 nm and 561 nm models. The 1064 nm version is operated at its fundamental wavelength.

488 nm – Externally Doubled Diode Lasers

For applications requiring 488 nm, Spectra-Physics offers an Excelsior laser based on highly reliable, externally doubled diode laser technology. The Excelsior is the world's smallest 488 nm laser head, with a 40% narrower width than other commercially available lasers. This enables OEM designers to shrink next-generation desktop instruments—where size is a driving factor.

375, 405, 440, 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. Excelsior direct diode lasers offer a choice of elliptical or collimated (circular) output beam configurations.

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.

APPLICATIONS

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

Excelsior® Compact CW Lasers

375–515 nm Specifications[1, 6, 10]

	Excelsior 375	Excelsior 405	Excelsior 440	Excelsior 473	Excelsior 488	Excelsior 505	Excelsior 515
Wavelength	375 ±5 nm	405 ±5 nm	445 ±5 nm	473 nm	488 nm	505 nm	515 nm
Output Power[2]	8, 16 , 70 mW	50, 100 mW	40 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	<1.5	<1.5	<1.5	M^2 <1.1	<1.5	M^2 <1.2	M^2 <1.1
Beam Diameter ($1/e^2$)							
Non-collimated	1.3 ±0.3 mm (V) 2.6 ±0.6 mm (H)	1.3 ±0.3 mm (V) 2.6 ±0.6 mm (H)	1.3 ±0.3 mm (V) 2.6 ±0.6 mm (H)	0.11 ±0.01 mm	–	–	–
Collimated	1.3 ±0.3 mm	1.3 ±0.3 mm	1.3 ±0.3 mm	–	1.3 ±0.3 mm	0.67 ±0.07 mm	0.67 ±0.07 mm
Beam Divergence							
Non-collimated	<0.71 mrad (V) <0.35 mrad (H)	<0.76 mrad (V) <0.38 mrad (H)	<0.84 mrad (V) <0.42 mrad (H)	<7.3 mrad	–	–	–
Collimated	<0.71 mrad	<0.76 mrad	<0.84 mrad	–	<0.9 mrad	<1.2 mrad	<1.2 mrad
Beam Ellipticity	1 ±0.1 (collimated)	1 ±0.1 (collimated)	1 ±0.1 (collimated)	1 ±0.15	1 ±0.1	1 ±0.2	1 ±0.2
Beam Pointing Stability	<6 µrad/°C	<6 µrad/°C	<6 µrad/°C	<20 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 Base Plate Temperature[4]				50°C			
Storage Temperature Range				-20 to 60°C (90% relative humidity, non-condencing)			
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 Tolerance[5]							
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

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

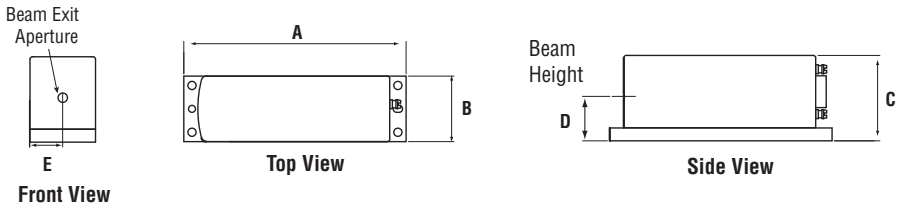
532–1064 nm Specifications[1, 6, 10]

	Excelsior 532 Multi Mode	Excelsior 532 Single Mode	Excelsior 542	Excelsior 561	Excelsior 594	Excelsior 642	Excelsior 785	Excelsior 1064
Wavelength	532 nm	532 nm	542 nm	561 nm	594 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]	30, 50 mW	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)	<1 nm	<0.5 nm	<0.01 nm	<10 MHz (<0.04 pm)
Spatial Mode	TEM_{00}							
Longitudinal Mode	Multi	Single	Single	Single	Multi	Multi	Multi	Single
Frequency Drift	–	<50 MHz/°C	<50 MHz/°C	<50 MHz/°C	–	–	–	<50 MHz/°C
Beam Quality	M^2 <1.1	M^2 <1.1	M^2 <1.1	M^2 <1.1	M^2 <1.2	<1.5	<1.5	M^2 <1.1
Beam Diameter ($1/e^2$)								
Non-collimated	0.11 ±0.01 mm	–	–	–	–	1.0 ±0.2 mm (V) 2.0 ±0.4 mm (H)	1.0 ±0.2 mm (V) 1.9 ±0.4 mm (H)	–
Collimated	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	0.67 ±0.07 mm	1.0 ±0.2 mm	1.0 ±0.2 mm	0.45 ±0.05 mm
Beam Divergence								
Non-collimated	<7.4 mrad	–	–	–	–	<1.5 mrad (V) <0.76 mrad (H)	<1.9 mrad (V) <1.0 mrad (H)	–
Collimated	<2.5 mrad	<2.5 mrad <1.2 mrad[7]	<1.2 mrad	<1.2 mrad	<1.2 mrad	<1.5 mrad	<1.9 mrad	<3.3 mrad
Beam Ellipticity	1 ±0.15 (non-collimated) 1 ±0.1 (collimated)	1 ±0.1 (collimated)	1 ±0.1	1 ±0.1	1 ±0.2	1 ±0.1 (collimated)	1 ±0.1 (collimated)	1 ±0.1
Beam Pointing Stability	<20 µrad/°C (non-collimated) <6 µrad/°C (collimated)	<6 µrad/°C	<6 µrad/°C	<6 µrad/°C	<10 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)	<1% rms (10 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%	<±2%
Polarization Ratio	>100:1 (vertical)	>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	<10 min	<5 min	<5 min	<5 min
Beam Height	19 mm							
Technology	DPSS	DPSS	DPSS	DPSS	DPSS (XC)	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]	12 VDC	5 VDC	5 VDC	5 VDC
Maximum Power Consumption	<30 W	<30 W <60 W[7]	<30 W	<40 W <60 W[8]	<60 W	<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	50°C	45°C
Storage Temperature Range	-20°C 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)	2 G (15–200 Hz)	2 G (15–200 Hz)	2 G (15–200 Hz)	3 G (15–500 Hz)
Shock Tolerance	Up to 25 G							
Static Alignment Tolerance[5]								
Beam Position	±0.5 mm	±1 mm	±0.1 mm	±0.1 mm	±0.5 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	±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

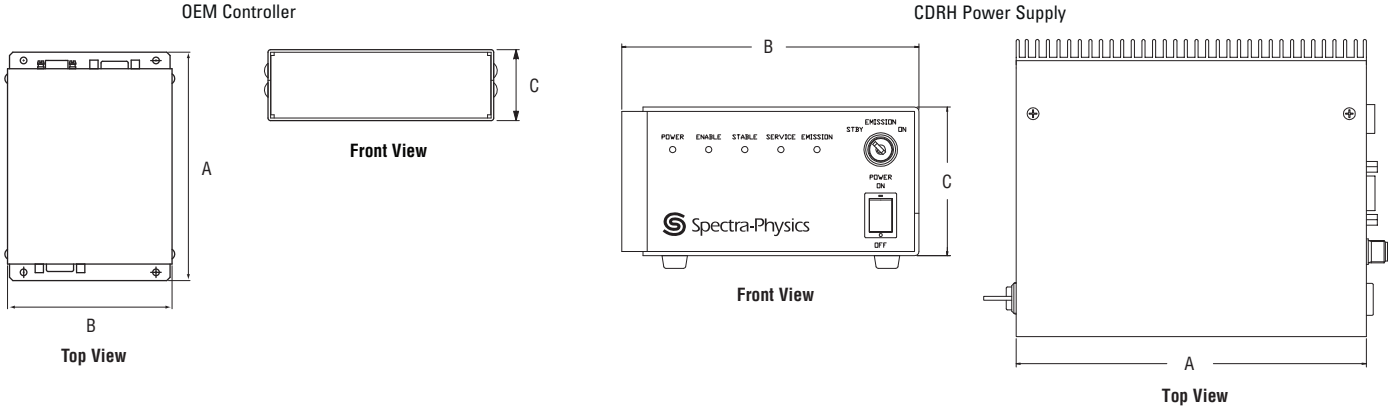
Excelsior® Compact CW Lasers

Excelsior Laser Dimensions



		Model	Model	Model	Model
		473 nm (5 and 10 mW), 532 nm (Multi Mode Non-collimated)	375 nm, 405 nm, 440 nm, 473 nm (50 mW), 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, 594 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	Model	Model	Model	Model	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, 594 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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