

# CUBE

## Diode Laser System

The Coherent CUBE laser is a compact, all-in-one laser system leveraging laser diode technologies to create a high-performance, high-quality laser beam. CUBE lasers, with the industry standard 40 mm x 100 mm footprint, offer large 1+ mm beam diameters and feature wavelengths from 375 nm to 730 nm with output power as high as 100 mW.

The CUBE laser has an internal processor to support the USB and RS-232 interface as well as analog and digital I/O. With multiple modulation options the CUBE laser can be operated in a Continuous-Wave (CW) mode, Analog Modulation, Digital Modulation, or a combined Analog + Digital Modulation.

### FEATURES & BENEFITS

- Compact and modular OEM design
- Superior beam quality
- Minimal laser output RMS noise
- Complete CDRH safety features for scientific and laboratory use
- TEC temperature-stabilized and conductively cooled through baseplate
- Analog and digital modulation
- USB and RS-232

### APPLICATIONS

- Confocal Microscopy
- DNA Sequencing
- Flow Cytometry
- Medical Imaging and Instrumentation



SPECIFICATIONS	CUBE 375-16C	CUBE 405-50C	CUBE 405-100C	CUBE 445-40C	CUBE 488-50C
Part Number	1112774	1286998	1287002	1069418	1174040
Wavelength <sup>1</sup> (nm)	375	405	405	445	488
Output Power <sup>2</sup> (mW)	16	50	100	40	50
Beam Diameter at 1/e <sup>2</sup> (mm) (typical)	1.1	1.4	1.4	1.1	1.3
Beam Divergence (mrad) (typical)	0.5	0.4	0.4	0.6	0.6
M <sup>2</sup> (ModeMaster beam quality) <sup>3</sup>	<1.3	<1.3	<1.2	<1.2	<1.2
Beam Asymmetry <sup>3</sup>	<1:1.2	<1:1.2	<1:1.2	<1:1.2	<1:1.2
Laser Drive Modes	Continuous (CW), Digital modulation, Analog modulation, Digital + Analog and PC Control				
Digital Modulation					
Maximum Bandwidth (MHz)	150	150	150	125	125
Rise Time (10% to 90%) (nsec)	<2	<2	<2	<2	<2
Fall Time (10% to 90%) (nsec)	<2	<2	<2	<2.5	<2.5
Modulation Depth (extinction ratio)					
at 0 Hz	>1,000,000:1	>1,000,000:1	>1,000,000:1	>1,000,000:1	>1,000,000:1
at 150 MHz	>250:1	>250:1	>250:1	>250:1	>250:1
Analog Modulation					
Maximum Bandwidth (kHz)	70	350	350	350	350
Rise or Fall Time (10% to 90%) (µsec)	<5	<1	<1	<1	<1
Modulation Depth (extinction ratio)	>10,000:1	>10,000:1	>10,000:1	>10,000:1	>10,000:1
Laser Enable Control Input					
Maximum Bandwidth (kHz)	130	130	130	130	130
Rise or Fall Time (10% to 90%) (µsec)	<1	<1	<1	<1	<1
Modulation Depth (extinction ratio)	Infinite, Complete On/Off	Infinite, Complete On/Off	Infinite, Complete On/Off	Infinite, Complete On/Off	Infinite, Complete On/Off
RMS Noise (%)					
20 Hz to 10 MHz	<0.15	<0.1	<0.1	<0.1	<0.1
10 MHz to 500 MHz	<1.0	<1.0	<1.0	<1.0	<1.0
Long-Term Power Stability (%) (8 hours)	<±2	<±2	<±2	<±2	<±2
Warm-Up Time (minutes)	<5	<5	<5	<5	<5
Spatial Mode (far field)	TEM <sub>00</sub>	TEM <sub>00</sub>	TEM <sub>00</sub>	TEM <sub>00</sub>	TEM <sub>00</sub>
Pointing Stability (µrad/°C)	<6	<6	<6	<6	<6
Polarization Ratio <sup>4</sup>	Minimum 100:1, Vertical ±5°				
Static Alignment Tolerances <sup>5</sup>					
Beam Position (mm)	<1	<1	<1	<1	<1
Beam Angle (mrad)	<5	<5	<5	<5	<5
CDRH Laser Classification	Class IIIb	Class IIIb	Class IIIb	Class IIIb	Class IIIb
ESD Protection <sup>6</sup>	Level 4	Level 4	Level 4	Level 4	Level 4

<sup>1</sup> Laser-to-laser tolerance. All lasers ±5 nm except CUBE 640-40 with 635 to 642 nm range, CUBE 640-100 with 635 to 644 nm range, CUBE 647-100 with 646 to 651 nm range, CUBE 660 with 652 to 665 nm range, and CUBE 730 ±10 nm.

<sup>2</sup> Output power is variable via RS-232, USB or analog interface from 1% to 100%. Specifications are valid for 100% power. Recommended power range is 70% to 100% power.

<sup>3</sup> M<sup>2</sup> and Beam Asymmetry measured with ModeMaster with 90/10 clip levels.

<sup>4</sup> Polarization measurement is max/min. power.

<sup>5</sup> Static alignment tolerances are relative to the right bottom edge (in beam direction).

<sup>6</sup> Electro-Static Discharge Standard IEC 61000-4-2:2008.

SPECIFICATIONS	CUBE 640-40C	CUBE 640-100C	CUBE 647-100C
Part Number	1069417	1150205	1190357
Wavelength <sup>1</sup> (nm)	640	640	647
Output Power <sup>2</sup> (mW)	40	100	100
Beam Diameter at 1/e <sup>2</sup> (mm) (typical)	1.0	1.0	1.0
Beam Divergence (mrad) (typical)	1.0	1.0	1.0
M <sup>2</sup> (ModeMaster beam quality) <sup>3</sup>	<1.2	<1.2	<1.2
Beam Asymmetry <sup>3</sup>	<1:1.2	<1:1.2	<1:1.2
Laser Drive Modes	Continuous (CW), Digital modulation, Analog modulation, Digital + Analog and PC Control		
Digital Modulation			
Maximum Bandwidth (MHz)	150	150	150
Rise Time (10% to 90%) (nsec)	<2	<2	<2
Fall Time (10% to 90%) (nsec)	<2	<2	<2
Modulation Depth (extinction ratio)			
at 0 Hz	>1,000,000:1	>1,000,000:1	>1,000,000:1
at 150 MHz	>250:1	>250:1	>250:1
Analog Modulation			
Maximum Bandwidth (kHz)	350	350	350
Rise or Fall Time (10% to 90%) (µsec)	<1	<1	<1
Modulation Depth (extinction ratio)	>10,000:1	>10,000:1	>10,000:1
Laser Enable Control Input			
Maximum Bandwidth (kHz)	130	130	130
Rise or Fall Time (10% to 90%) (µsec)	<1	<1	<1
Modulation Depth (extinction ratio)	Infinite, Complete On/Off	Infinite, Complete On/Off	Infinite, Complete On/Off
RMS Noise (%)			
20 Hz to 10 MHz	<0.1	<0.1	<0.1
10 MHz to 500 MHz	<1.0	<1.0	<1.0
Long-Term Power Stability (%) (8 hours)	<±2	<±2	<±2
Warm-Up Time (minutes)	<5	<5	<5
Spatial Mode (far field)	TEM <sub>00</sub>	TEM <sub>00</sub>	TEM <sub>00</sub>
Pointing Stability (µrad/°C)	<6	<6	<6
Polarization Ratio <sup>4</sup>	Minimum 100:1, Vertical ±5°		
Static Alignment Tolerances <sup>5</sup>			
Beam Position (mm)	<1	<1	<1
Beam Angle (mrad)	<5	<5	<5
CDRH Laser Classification	Class IIIb	Class IIIb	Class IIIb
ESD Protection <sup>6</sup>	Level 4	Level 4	Level 4

<sup>1</sup> Laser-to-laser tolerance. All lasers ±5 nm except CUBE 640-40 with 635 to 642 nm range, CUBE 640-100 with 635 to 644 nm range, CUBE 647-100 with 646 to 651 nm range, CUBE 660 with 652 to 665 nm range, and CUBE 730 ±10 nm.

<sup>2</sup> Output power is variable via RS-232, USB or analog interface from 1% to 100%. Specifications are valid for 100% power. Recommended power range is 70% to 100% power.

<sup>3</sup> M<sup>2</sup> and Beam Asymmetry measured with ModeMaster with 90/10 clip levels.

<sup>4</sup> Polarization measurement is max/min. power.

<sup>5</sup> Static alignment tolerances are relative to the right bottom edge (in beam direction).

<sup>6</sup> Electro-Static Discharge Standard IEC 61000-4-2:2008.

SPECIFICATIONS	CUBE 660-60C	CUBE 660-100C	CUBE 730-30C
Part Number	1094060	1130061	1178855
Wavelength <sup>1</sup> (nm)	660	660	730
Output Power <sup>2</sup> (mW)	60	100	30
Beam Diameter at 1/e <sup>2</sup> (mm) (typical)	1.4	1.0	1.2
Beam Divergence (mrad) (typical)	0.6	1.0	0.9
M <sup>2</sup> (ModeMaster beam quality) <sup>3</sup>	<1.2	<1.2	<1.2
Beam Asymmetry <sup>3</sup>	<1:1.2	<1:1.2	<1:1.2
Laser Drive Modes	Continuous (CW), Digital modulation, Analog modulation, Digital + Analog and PC Control		
Digital Modulation			
Maximum Bandwidth (MHz)	150	150	150
Rise Time (10% to 90%) (nsec)	<2	<2	<2
Fall Time (10% to 90%) (nsec)	<2	<2	<2
Modulation Depth (extinction ratio)			
at 0 Hz	>1,000,000:1	>1,000,000:1	>1,000,000:1
at 150 MHz	>250:1	>250:1	>250:1
Analog Modulation			
Maximum Bandwidth (kHz)	350	350	350
Rise or Fall Time (10% to 90%) (µsec)	<1	<1	<1
Modulation Depth (extinction ratio)	>10,000:1	>10,000:1	>10,000:1
Laser Enable Control Input			
Maximum Bandwidth (kHz)	130	130	130
Rise or Fall Time (10% to 90%) (µsec)	<1	<1	<1
Modulation Depth (extinction ratio)	Infinite, Complete On/Off	Infinite, Complete On/Off	Infinite, Complete On/Off
RMS Noise (%)			
20 Hz to 10 MHz	<0.1	<0.1	<0.1
10 MHz to 500 MHz	<1.0	<1.0	<1.0
Long-Term Power Stability (%) (8 hours)	<±2	<±2	<±2
Warm-Up Time (minutes)	<5	<5	<5
Spatial Mode (far field)	TEM <sub>00</sub>	TEM <sub>00</sub>	TEM <sub>00</sub>
Pointing Stability (µrad/°C)	<6	<6	<6
Polarization Ratio <sup>4</sup>	Minimum 100:1, Vertical ±5°		
Static Alignment Tolerances <sup>5</sup>			
Beam Position (mm)	<1	<1	<1
Beam Angle (mrad)	<5	<5	<5
CDRH Laser Classification	Class IIIb	Class IIIb	Class IIIb
ESD Protection <sup>6</sup>	Level 4	Level 4	Level 4

<sup>1</sup> Laser-to-laser tolerance. All lasers ±5 nm except CUBE 640-40 with 635 to 642 nm range, CUBE 640-100 with 635 to 644 nm range, CUBE 647-100 with 646 to 651 nm range, CUBE 660 with 652 to 665 nm range, and CUBE 730 ±10 nm.

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UTILITY AND ENVIRONMENTAL REQUIREMENTS															
Laser Head Operating Voltage (VDC)	+4.8 to 6.5														
Laser Head Operating Current (A)	<2.5														
Baseplate Temperature Range <sup>1</sup>	+10° to 50°C (50° to 122°F)														
Maximum Heat Dissipation of Head (W) (baseplate at 50°C)	13														
Storage Temperature	-20° to 60°C (-4° to 140°F)														
Power Supply <sup>2</sup> (included) Operating Voltage <sup>3</sup> (VAC) Power Consumption (W)	100 to 240, 50 to 60 Hz <15														
Laser Head Control Box Power Supply Interface Cable USB Cable Heat Sink (optional)	<table border="1"> <thead> <tr> <th>Dimensions (L x W x H)</th> <th>Weight</th> </tr> </thead> <tbody> <tr> <td>100 x 40 x 40 mm (3.9 x 1.6 x 1.6 in.)</td> <td>0.3 kg (0.7 lbs.)</td> </tr> <tr> <td>138 x 62 x 26 mm (5.4 x 2.4 x 1.1 in.)</td> <td>0.12 kg (0.3 lbs.)</td> </tr> <tr> <td>87 x 47 x 32 mm (3.4 x 1.9 x 1.3 in.)</td> <td>0.22 kg (0.5 lbs.)</td> </tr> <tr> <td>254 to 406 mm (10 to 18 in.)</td> <td>0.08 kg (0.2 lbs.)</td> </tr> <tr> <td>1.8 m (6 ft.)</td> <td>0.1 kg (0.2 lbs.)</td> </tr> <tr> <td>127 x 66 x 44 mm (5 x 2.6 x 1.74 in.)</td> <td>0.4 kg (0.9 lbs.)</td> </tr> </tbody> </table>	Dimensions (L x W x H)	Weight	100 x 40 x 40 mm (3.9 x 1.6 x 1.6 in.)	0.3 kg (0.7 lbs.)	138 x 62 x 26 mm (5.4 x 2.4 x 1.1 in.)	0.12 kg (0.3 lbs.)	87 x 47 x 32 mm (3.4 x 1.9 x 1.3 in.)	0.22 kg (0.5 lbs.)	254 to 406 mm (10 to 18 in.)	0.08 kg (0.2 lbs.)	1.8 m (6 ft.)	0.1 kg (0.2 lbs.)	127 x 66 x 44 mm (5 x 2.6 x 1.74 in.)	0.4 kg (0.9 lbs.)
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<sup>1</sup> Non-condensing with laser diode TEC at set point of 22°C.

<sup>2</sup> On-off power switch and LED included in cord to laser head.

<sup>3</sup> System includes USA-type power cord, IEC320 input connection.

CUBE ACCESSORIES	Part Number	Description
CUBE Heat Sink Accessory	1073840	CUBE heat sink with fan, 127 x 66 x 44 mm
CUBE 2nd Emission Lamp	1079150	CDRH lamp for laser emission. Connects to CUBE I/O cable.
CUBE Interface Cable <sup>1</sup>	1072166	CUBE to control box, I/O, RS-232, and power
CUBE Power Supply <sup>1</sup> , 6 VDC, 2.5 amps	1072454	IEC320 input, 110V/220V, switch, and LED
CUBE USB Cable <sup>1</sup> , 1.8 m (6 ft.)	1108906	USB standard to mini for CUBE
Control Box <sup>1</sup> , CDRH, Keyswitch, Interlock	1039966	Control box for CUBE lasers. Includes box, key, interlock RCA, and cable.
CUBE Manual <sup>1</sup> and Software <sup>2</sup>	1079890	CUBE user manual and software CD for Windows XP <sup>3</sup> and Windows 7 (32-bit) <sup>3</sup>
Power Cord <sup>1</sup> , 1.8 m (6 ft.)	1108063	Power cord, North America plug style to IEC320
CUBE, I/O Cable, 23 cm (9.06 in.)	1103937	Cable, 8 pin to leads for Laser Output Power, Temperature, Laser Ready, Emission Lamp, Laser Enable, Manual Mode, and Ground.
RS-232 to USB Adaptor	1415602	Allows CUBE laser through RS-232 to connect to the host computer USB

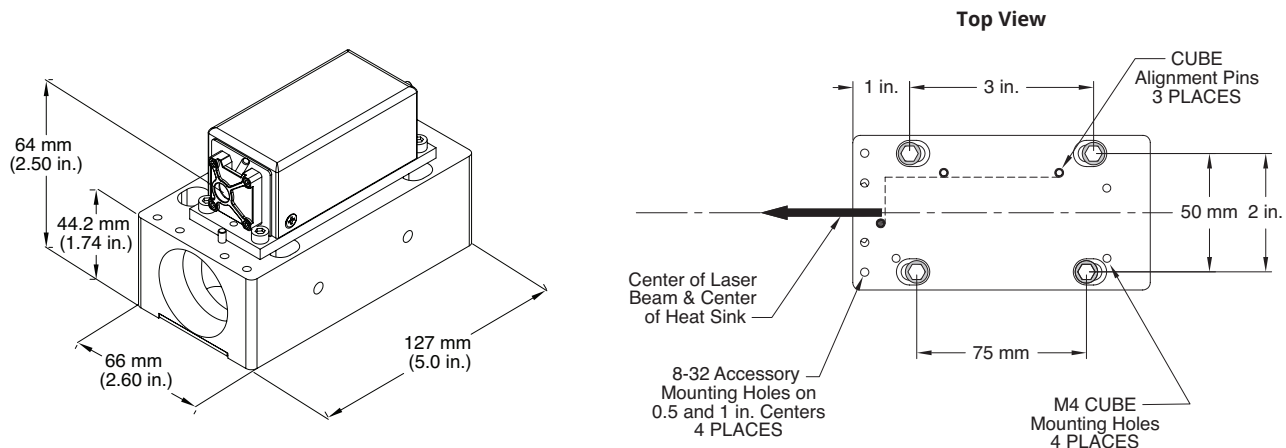
<sup>1</sup> Included at no additional charge with every CUBE system.

<sup>2</sup> Coherent CUBE Connection PC Software only supports Windows OS in 32-bit for USB connection.

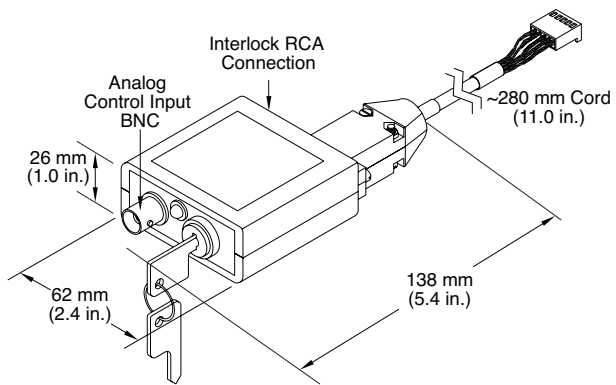
<sup>3</sup> Windows XP and Windows 7 are registered trademarks of Microsoft Corporation.

## MECHANICAL SPECIFICATIONS

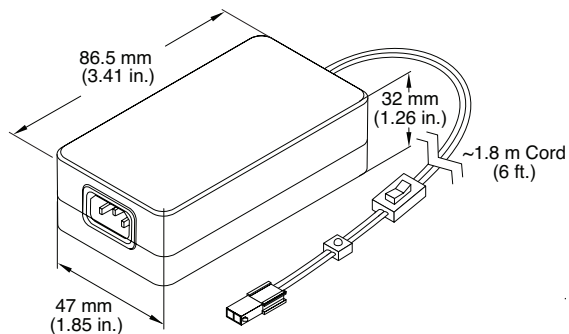
### CUBE Heat Sink (sold separately)



### CUBE Control Box

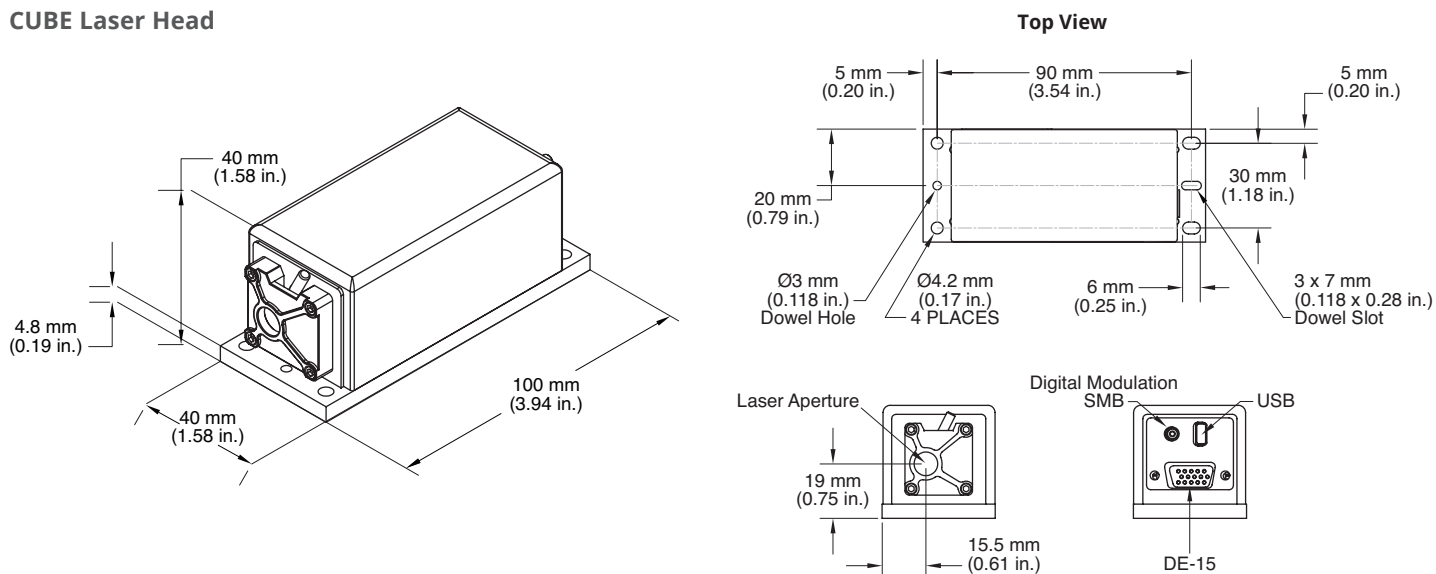


### CUBE Power Supply



## MECHANICAL SPECIFICATIONS

### CUBE Laser Head



### CUBE Laser with Included Accessories



Coherent, Inc.,  
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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 CUBE 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.  
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