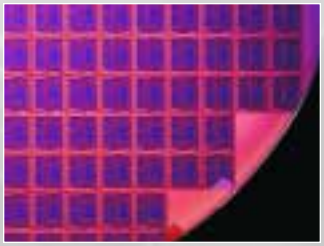
Diode Laser Modules and Systems

CUBE

Radius

Diode Laser Modules

Accessories



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key

Use this key to help determine beam shape

capabilities

Reliable solutions for all your photonics needs.

Quality solutions
Based on size, reliability and cost, diode lasers from Coherent are the first choice for single-mode diode lasers (<100 mW) for scientific, OEM, medical or industrial applications. With the highest quality design and superior beam quality, our high-performance diode laser modules can meet your exact needs.

Patented AlignLock technology
Only Coherent allows the laser beam to be simultaneously collimated and aligned. Other diode laser manufacturers can do one or the other, but not both. Patented AlignLock™ lets you know that the pointing stability and thermal/mechanical design is world class (US 5,111,476 and US 5,121,188).

Rock-solid potting
Diode modules are engineered for protection from mechanical shock, optimized for thermal conductivity and vibrationally damped, so factory alignment is rock-solid and reliable.

Electronic protection
Our diode laser modules are protected from electrostatic discharge (ESD) and are fully shielded with reverse polarity protection, meeting MIL-STD 1686B/Level 2 requirements, up to 4000 volts. With Radius™ and CUBE™ lasers, protection exceeds Level 4 ESD at 15,000 volts.

Beam performance
Diode laser modules are smaller, require less power, generate less heat and have longer lifetimes than other laser sources. Our laser modules are configured as elliptical beams, circular beams or line generators with optional adjustable focus to increase or decrease the divergence.

Temperature, wavelength and power
Temperature fluctuations can adversely affect diode lasers. For example, at 50°C typical red diode lifetimes are approximately 6,000 hours. However, when the diode is actively cooled, the expected lifetime becomes >30,000 hours. Both the Radius and CUBE systems offer an internal thermal-electric cooler (TEC) drive for complete thermal management and optimization of the diode laser's reliability and performance.

All Coherent diode modules feature constant power drive. Internal photodiodes provide for a closed-loop power drive so that the output power is constant over temperature and lifetime. Beware of other modules with only constant-current drive, which have the disadvantage of continual power loss over the life of the laser. Coherent laser modules provide stable power—always.

We also offer the only ultra-low-noise (ULN) diode laser modules, which feature no mode-hop noise and no warm-up time, with RMS noise levels of ≤0.06% over temperature and lifetime of the module (bandwidth <10 MHz). ULN lasers are ideal for instrumentation and particle counting applications, providing the maximum system dynamic range so you can reliably count even the smallest particle.

See our website
For product specification pages, product operation manuals, technical materials, competitive comparisons and prices, please visit the **Diode Modules** category at **www.coherent.com**.

Wavelength and Power Choices

Powers range from less than 1 mW up to 50 mW. Shorter wavelength blue/violet diodes provide output from 370 to 440 nm. For visual alignment systems, 635 nm is the wavelength of choice, while for instrumentation and measurement needs, wavelengths from 635 to 830 nm are available.

Confocal Microscopy

Flow Cytometry

Medical Alignment

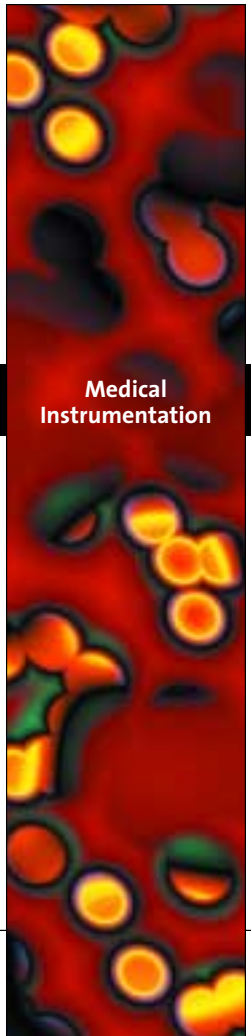
Industrial Alignment

Genomics

Home Land Security

Environmental Monitoring

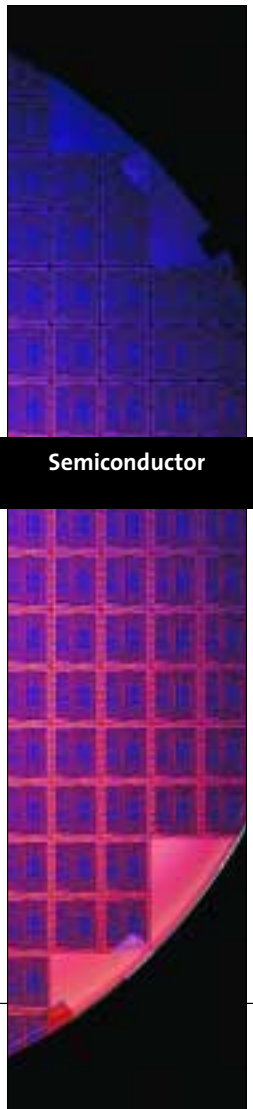
applications



Medical Instrumentation

Graphic Arts

DNA Sequencing



Semiconductor

Key Features

- ***Compact solid-state (Compass™-style) package***
- ***CDRH Class IIIb safety compliance***
- ***USB and RS-232 control***
- ***CW and pulsed up to 150 MHz***
- ***Analog modulation and variable power control***

CUBE
Diode Laser Systems

CUBE lasers are high-performance, full-feature diode laser systems. Each contains a laser head, power supply, cable, and control box. The system is designed to be one of the easiest to set-up and use. The CUBE delivers the most power, stability and performance—in the smallest package—with the best value.

A complete system
All CUBE electronics, optics and thermal management are built into the head. Every system includes a full-feature cable that lets you access all the features inside the CUBE. A compact 6V power supply, a control box for safety features, and USB software to drive the laser are also included.

The CUBE
The CUBE offers you full control. First, the CUBE can work as a CW laser with a convenient auto-start mode. The CUBE also offers a digital input connector, located on the back panel, to drive the laser up to 150 MHz with a TTL source. Users can then command the CUBE to change the power level, either through the RS-232 or USB. For analog modulation the CUBE offers a separate analog input, located on the front panel of the control box, which allows variable power control up to 350 kHz. For high dynamic range the digital modulation and analog power controls offer modulation depths greater than 250:1. For maximum flexibility in your application the CUBE also offers mode selection for constant-power or constant-current drive. The versatility of the CUBE includes CW, digital control, analog control and variable power operation.

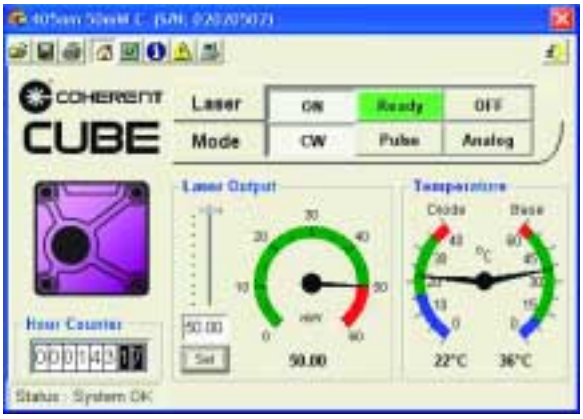
With all the electronics inside the head, the control and instrumentation are available through the 15-pin connector on the laser's back panel. The interlock input, laser enable input, or auto-start mode provide control. Instrumentation on the CUBE gives you a laser-ready output, laser output power (actual laser power in an analog signal), baseplate temperature and general fault conditions. Every CUBE laser has a built-in photodiode that measures the laser final output power. The photodiode enables closed-loop power stability and allows you to know the laser power via the analog output or computer. CUBE lasers are also equipped with dual-temperature probes, which control thermal management and display both the diode and baseplate temperature. Overall, the CUBE offers complete control and instrumentation without the need for additional equipment.

Multiple CUBE Connections

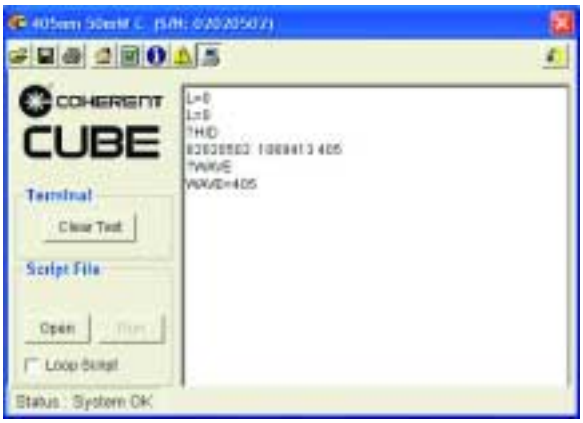
CUBE lasers make it possible to configure multiple lasers into the same computer. Using the USB can allow up to 127 CUBE lasers to be connected on a single computer. The CUBE connection software will display each laser on its own control panel. The CUBE also has intelligence, allowing it to report which version (375 nm, 405 nm, etc.) is on the port, so you can easily drive multiple lasers simultaneously.

The Software
The CUBE includes a full-feature software interface for Windows 2000 or Windows XP with multiple pages of status, control and configuration options. The home page includes an instrumentation dashboard for power, current, diode temperature and baseplate temperature. Buttons control laser on, mode, and power. A counter changes every one hundredth of an hour to show the actual 'on' time of the laser. The CUBE connection software makes it easy to use with help screens that feature descriptions, graphics and other assistance.

Home Screen
The Home Screen allows for computer control of the CUBE. Control laser On/Off, set laser power and change operating modes.



Options Screen
The Options Screen allows for configuration choices on settings such as laser current display, 5-second delay, external analog power and laser diode temperature.



Terminal Screen
The Terminal Screen allows for direct communication to the CUBE through the command line. Scripts can also be executed and set to loop. The Terminal Screen can accelerate the learning curve for laser control in embedded applications.

Status Screen
The Status Screen shows the details of the laser from serial number to operating hours. A separate Fault Screen also shows any faults from an interlock fault to over-temperature.

CUBE
Diode Laser Systems

The Control Box
To comply with the CDRH safety requirements for a Class IIIb laser, the CUBE includes both the shutter on the front of the laser and a separate control box. The control box includes the key switch that activates the laser, a five-second power-on delay, an interlock RCA jack on the back panel and a laser emission indicator. (For countries requiring a second laser emission indicator, a second lamp that connects to the cable I/O connector can be purchased separately [part no. 1079150].) The control box also offers a front panel BNC connection for the analog power control, which can use an external voltage source (0-5V) to change the CUBE's output power.

The Cable
The CUBE's full-feature cable allows access and control to all its capabilities. The cable offers four separate lines: for power, I/O, control box, and RS-232. The I/O cable is labeled with the signal's name, pin number, and description so you can easily connect to the eight (8) separate laser control/instrumentation signals. For example, connect a voltmeter between pin numbers 2 and 7 and instantly the meter is now reporting laser power with 2V equivalent to 100% laser output power. Or connect the convenient Second Emission Lamp [part no. 1079150] as an additional safety measure.

The RS-232 cable can plug the laser directly into a computer for remote control and instrumentation.

The control box is conveniently connected to allow required safety features and analog power control from the front panel BNC.

*Windows is a registered trademark of Microsoft Corporation.

Also included with each CUBE is a USB cable, which allows the laser to plug directly into any Windows* 2000 or Windows XP system.

The Power Supply
The CUBE, which has been designed for easy integration into your system with a single power supply input, can accept from 4.8V to 6.5VDC. Every CUBE system comes standard with a compact 6VDC supply with a power switch and an LED. The power supply is equipped with an IEC320 universal input, which allows most computer-style power cords to be easily used with your country's power (U.S. -style power cord is included).

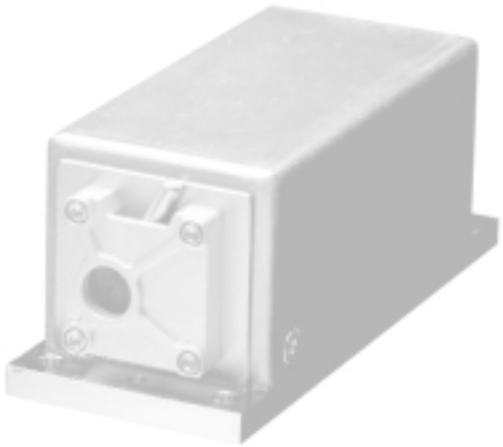
Reliability
The CUBE is fully protected from electro-static discharge (ESD) to Level 4 standards and is also equipped with temperate shutdown systems to protect the laser diode. The diode and optics are temperature-controlled through a TEC to provide the optimal performance and maximum lifetime. Reliability is the priority—within every CUBE is a computer processor controlling all the aspects of the laser drive, thermal systems and protection measures.

Control and I/O

CUBE systems offer an extensive list of commands that can be executed through the RS-232 or USB. Please visit www.coherent.com and download the CUBE User Manual or the CUBE help screens for a full description of the commands and I/O.

CUBE

Diode Laser Systems



PRODUCT SPECIFICATIONS	CUBE
Laser Drive	CW or Pulsed
Laser Drive Modes	Digital Control, External Analog Control Computer Power Control
Digital Control Rise and Fall Time (10% to 90%)	<2 nsec
Maximum Digital Modulation Frequency	150 MHz
Digital Control Modulation Depth	>250:1 at 150 MHz
Maximum Analog Modulation Frequency	350 kHz
Noise: (20 Hz - 10 MHz)	<0.2% RMS
Noise: (10 MHz - 500 MHz)	<1% RMS
Static Alignment[1]	<1 mm, <5 mrad
Pointing Stability	<6 µrad/°C
Beam Spatial Mode (Far Field)	TEMoo
Polarization	>100:1 Linear, Vertical ±5°
CDRH Classification	Class IIIb
LASER HEAD SPECIFICATIONS	
ESD Protection[2]	Level 4
Dimensions (L x W x H)	100 x 40 x 40 mm (3.9 x 1.6 x 1.6 in.)
Control Box (L x W x H)	138 x 62 x 26 mm (5.4 x 2.4 x 1 in.)
Baseplate Temperature Range for Operation[3]	10°C to 50°C (50°F to 122°F)
Storage Temperature	-20°C to 60°C (-4°F to 140°F)
Maximum Heat Load from Laser Head	13W
DC Input Requirements	4.8 to 6.5VDC, <2.5 amps
Weight	280 g (9.9 oz.)
POWER SUPPLY SPECIFICATIONS	
Power Supply included with System	Yes
Dimensions (L x W x H)	87 x 47 x 32 mm (3.4 x 1.9 x 1.3 in.)
Output to Laser Head	+6 VDC, 2.5 amps
Cord Length to Laser Head[4]	180 cm (70 in.)
AC Input Voltage[5]	100 to 240 VAC, 50 to 60 Hz
AC Input Power	<15W

[1] Static alignment tolerances are relative to right bottom edge in beam direction.
[2] Electro-Static Discharge Standard IEC 1000-4-2, 1995.
[3] Non-condensing.
[4] Power switch and LED included in cord to laser head.
[5] Shipped with USA power cord, IEC320 input connection.

CUBE

Diode Laser Systems

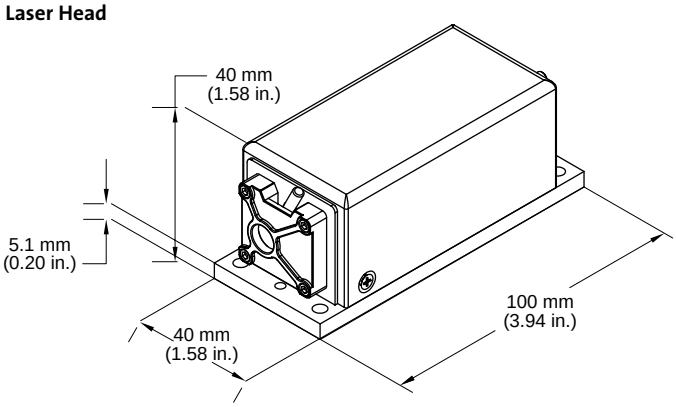
BEAM *elliptical*

Name	CUBE 375-8E	CUBE 405-50E	CUBE 440-16E	CUBE 635-30E	CUBE 785-45E
Wavelength (nm)	375 ±5	405 ±5	440 ±5	635 +7/-2	785 ±10
Power (mW)	8	50	16	30	45
Spot Size (mm) (typical)	1 x 3	1 x 3	1 x 3	1 x 3	1 x 3
Divergence (mrad) (typical)	0.6 x 1.0	0.6 x 1.0	0.6 x 1.0	0.6 x 1.0	0.6 x 1.0
Beam Shape (Far Field)	Elliptical, Vertical	Elliptical, Vertical	Elliptical, Vertical	Elliptical, Horizontal	Elliptical, Vertical
Part Number	1069407	1069408	1069409	1069410	1069411

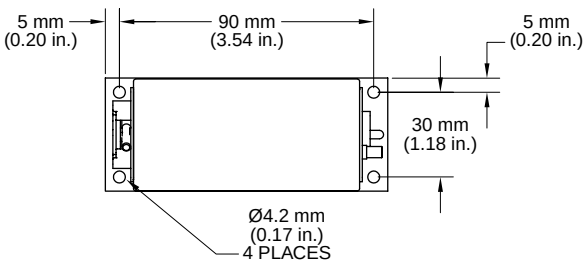
BEAM *circular*

Name	CUBE 375-8C	CUBE 405-50C	CUBE 440-16C	CUBE 635-25C	CUBE 785-40C
Wavelength (nm)	375 ±5	405 ±5	440 ±5	635 +7/-2	785 ±10
Power (mW)	8	50	16	25	40
Spot Size (mm) (typical)	1	1	1	1	1
Ellipticity	0.9 to 1.1	0.9 to 1.1	0.9 to 1.1	0.9 to 1.1	0.9 to 1.1
Divergence (mrad) (typical)	1	1	1	1	1
Beam Shape (Far Field)	Circular	Circular	Circular	Circular	Circular
Part Number	1069412	1069413	1069414	1069415	1069416

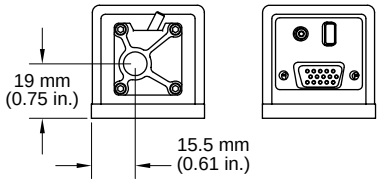
CUBE
Laser Head



Top View



Front View **Back View**



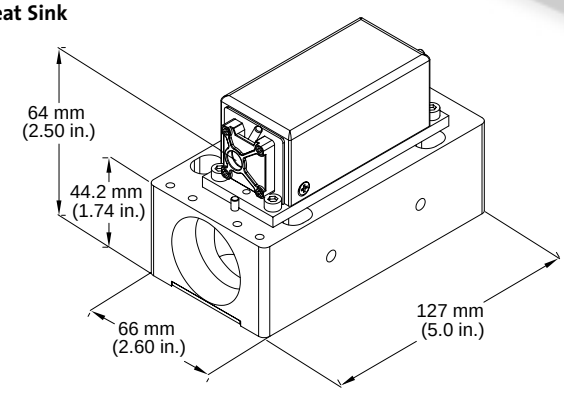
accessories

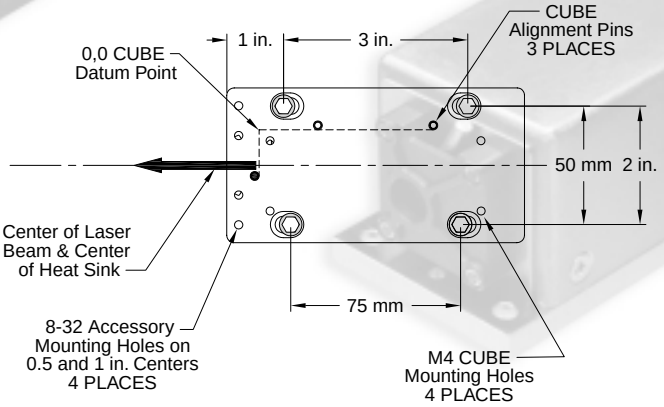
The Extras

For even simpler set-up and integration, a heat sink accessory provides a convenient 2.5" beam height and a universal bolt pattern for easy mounting—with the beam axis traveling directly down a row of holes on the laser table. For high-temperature applications a fan inside the heat sink provides additional cooling. Please note that the CUBE comes standard with the laser head, control box, cables, power supply, manual, software, and a U.S. power cord. The heat sink, however, is sold separately.

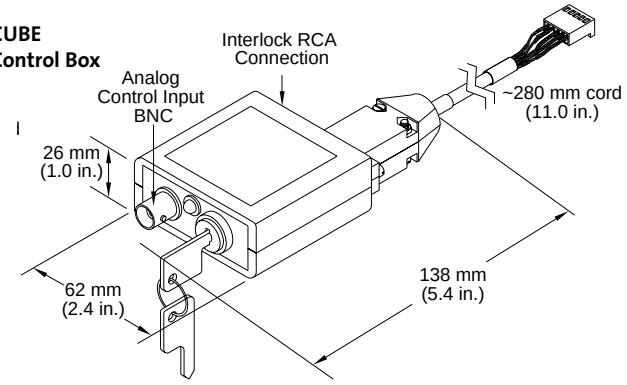
Overall, CUBE lasers can give you more powerful and efficient ways to use diode laser light in the fields of bioinstrumentation, particle counting, confocal microscopy, high-throughput screening, or general laboratory work.

CUBE
Heat Sink

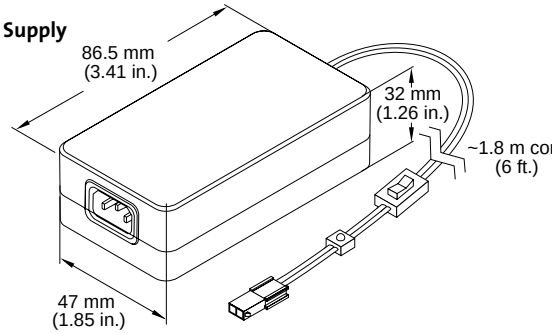




CUBE
Control Box



CUBE
Power Supply



CUBE Accessories

1073840	CUBE Heat Sink Accessory	CUBE Heat Sink with Fan, 127 x 66 x 44 mm, Metric/English
1079150	CUBE 2nd Emission Lamp	CDRH Lamp for Laser Emission. Connects to CUBE I/O Cable.
1072166	*CUBE Interface Cable	CUBE to control box, I/O, RS-232 and power
1072454	*CUBE Power Supply, 6VDC, 2.5 amp	IEC320 Input, 110V/220V, Switch and LED
1073053	*CUBE USB Cable, 6 ft. (1.8 m)	USB standard to mini for CUBE
1039966	*Control Box, CDRH, Keyswitch, Interlock	Control Box for RADIUS or CUBE lasers. Included box, key, interlock RCA and cable.
1080090	Cable, Extension, DB-9 M/F, 6 ft. (1.8 m)	Extension cable to extend control box or RS-232. M-F, DB-9
1040408	*Plug, RCA	Interlock RCA plug for Control Box, non-shorted
1079890	*CUBE Manual and Software	CUBE User Manual and Software CD for Windows 2000™ and Windows XP™

*** Included free with every CUBE system.**

Key Features

- ***HeNe cylindrical-style package***
- ***All-in-one design: Optics, electronics and TEC***
- ***Adjustable beam option***
- ***ESD protection***
- ***Internal cooling fan***
- ***CDRH Class IIIb safety compliance option***
- ***Constant power CW***

Radius
Diode Laser Systems

Radius lasers are full-featured, high-performance, CW diode laser systems that include a laser head, power supply and optional control box. Designed for convenient mounting into a HeNe laser holder for fast and simple integration, they deliver power, stability and performance in a complete package with the best value.

Adjustable Focus Radius lasers allow faster and easier system integration. When optimizing the beam for best focus or fiber launch, the adjustable focus eliminates the need for an expensive beam expander. Instead, a tool (included) adjusts the beam divergence through the front shutter port.

The optional control box—with a key-switch, 5-second power-on delay, emission indicator and interlock—allows the system to comply with CDRH safety regulations. The control box plugs into the side port of the Radius.

The side port can also be used to modulate the laser on-and-off as fast as 5 Hz (100 Hz for the Radius 635) through the interlock control input. This modulation can be used to extend the lifetime of the diode by enabling the laser to be 'on' only when needed—while the thermal system remains constant for improved stability.

Mounted on a large TEC, the diode laser and optics remain at a constant temperature of 22°C. A heat sink with an internal fan removes the heat. The closed-loop, constant temperature keeps the wavelength constant, minimizes mode-hops and maintains power stability.

Extra Photodiode
The Radius 405-30EP features an extra photodiode that provides the best power stability over time.

Circular Beam
The patented micro-lens technology and aspherical optics of the Radius 635-25 circularize the output of the diode laser to better than 80% with a typical M^2 <1.2.

Side Port

Using a side port, users can vary the diode temperature in order to change the center wavelength by ±1 nm (635 nm diodes). Varying the temperature adjustment also allows users to avoid mode-hops, thus providing the maximum coherence length.

HeNe Comparison

Radius 635 specifications are equal to or better than most HeNe lasers in most applications. Radius lasers also cost less and come in a smaller package. Both power stability and pointing stability are superior with the Radius. Warm-up time and output power over the laser's life are also far superior when compared to the HeNe. For all the details, please see the Radius 635 Competitive Comparison, found on the Radius page of our website, **www.Coherent.com**.

Radius
Diode Laser Systems

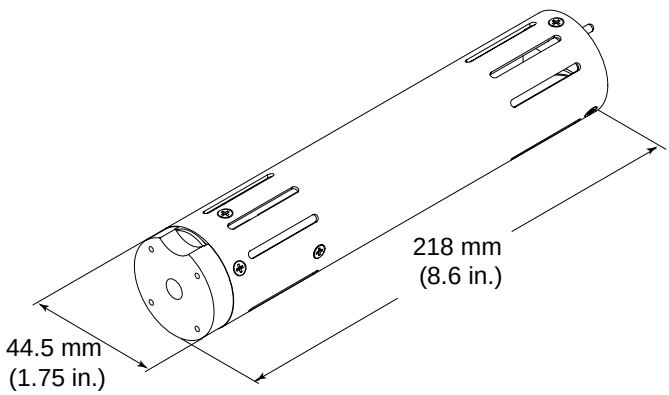
LASER HEAD SPECIFICATIONS	Radius
Laser Drive	CW, Constant Power
Pointing Stability	<6 µrad/°C
Beam Spatial Mode (Far Field)	TEMoo
ESD Protection	Level 4[2]
Dimensions (Diameter x Length)	44.5 x 218 mm (1.75 x 8.6 in.)
Optional Control Box (L x W x H)	138 x 62 x 26 mm (5.4 x 2.4 x 1 in.)
Ambient Temperature Range for Operation	10°C to 40°C (50°F to 104°F)[3]
Storage Temperature	-20°C to 60°C (-4°F to 140°F)
Maximum Heat Load from Laser Head	10W, typical 3W
POWER SUPPLY SPECIFICATIONS	
Power Supply included with System	Yes
Weight	570 g (1.25 lbs.)
Dimensions (L x W x H)	146 x 76 x 43 mm (5.8 x 3.0 x 1.7 in.)
Output to Laser Head	+5VDC, -5VDC, +12VDC
Cord Length to Laser Head	120 cm (48 in.)
AC Input Voltage	100 to 240VAC, 47 to 63 Hz[4]
AC Input Power	<15W

[1] Modulation through side panel I/O port. Via TTL signal with 400 KOhm input impedance (VH>4V, VL < 3V); TTL needs to be applied for minimum of 10 msec for Radius 635 and 100 msec for 375/405/440.

[2] Electro-Static Discharge Standard IEC 1000-4-2, 1995.

[3] Non-condensing.

[4] Shipped with USA power cord, IEC320 input connection.



Radius
Diode Laser Systems

elliptical

Name	Radius 375-8	Radius 405-25	Radius 405-30EP	Radius 405-50	Radius 440-16
Wavelength (nm)	375 ±5	405 ±5	405 ±5	405 ±5	440 ±5
Power (mW)	8	25	30	50	16
Max. Modulation Frequency (Hz)	5	5	5	5	5
RMS Noise (10 Hz - 10 MHz)	<1%	<0.5%	<0.2%	<0.5%	<0.5%
Power Stability (8 Hours)	<5%	<5%	<0.5%	<5%	<2%
Adjustable Beam Focus (Divergence)	Yes	Yes	No	Yes	Yes
Static Alignment Tolerances[1]	<5 mrad (angle)	<5 mrad (angle)	<15 mrad (angle)	<5 mrad (angle)	<5 mrad (angle)
Polarization (Vertical)	>100:1	>100:1	>200:1	>100:1	>100:1
CDRH Class	Class IIIb	Class IIIb	Class IIIb	Class IIIb	Class IIIb
Spot Size (mm)(typical)	1 x 3	4.7 x 1.6	2.9 x 1.0	4.7 x 1.6	1 x 3
Divergence (mrad)(typical)	0.6 x 1	0.2 x 0.3	0.2 x 0.4	0.2 x 0.3	0.7 x 0.3
Part Number for System with Control Box included	1053595	1051390	1051505	1064507	1055933
Part Number for System without Control Box[2]	1053594	1043000	1008553	1064506	1055932

circular adjustable elliptical

Name	Radius 635-25	Radius 635-30E
Wavelength (nm)	635 +7/-2	635 +7/-2
Power (mW)	25	30
Max. Modulation Frequency (Hz)	100	100
RMS Noise (10 Hz - 10 MHz)	<0.5%	<0.5%
Power Stability (8 Hours)	<2%	<2%
Adjustable Beam Focus (Divergence)	No	Yes
Static Alignment Tolerances[1]	<15 mrad (angle)	<5 mrad (angle)
Polarization (Horizontal)	>100:1	>100:1
CDRH Class	Class IIIb	Class IIIb
Spot Size (mm)(typical)	1	1.5 x 4.6
Divergence (mrad)(typical)	1.3	0.5 x 0.2
Part Number for System with Control Box included	1051385	—
Part Number for System without Control Box[2]	1008053	1070429

[1] Static alignment tolerances are relative to the laser's outside diameter.

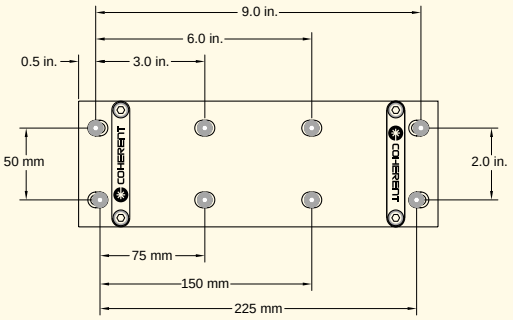
[2] Systems that do not include the control box do not comply with the Federal Regulations (21 CFR Subchapter J) as administered by the Center for Devices and Radiological Health. Purchaser acknowledges that his/her products must comply with these regulations before they can be sold to a customer.

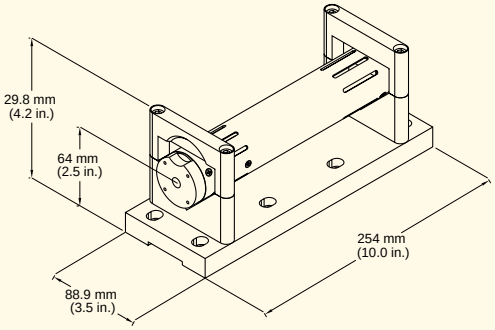
Radius Mount

The mounting of any laser is important to extend the stability of the beam over time and temperature. The success of the Radius Mount is the result of significant design research and testing. The Radius Mount provides proper mechanical positioning and allows for the system to have unobstructed airflow and a full view of all labels. The safety shutter is easily accessible, and the rear panel and side port are also unobstructed for access and connections.

The dual V-block design provides proper positioning of the laser tube, and the top clamps with the spring/ball hardware provide the proper compression. This mount offers several advantages:

- 2.5″ beam height
- Universal metric and English bolt patterns
- Ball/spring compression system
- Clear access to all the Radius features

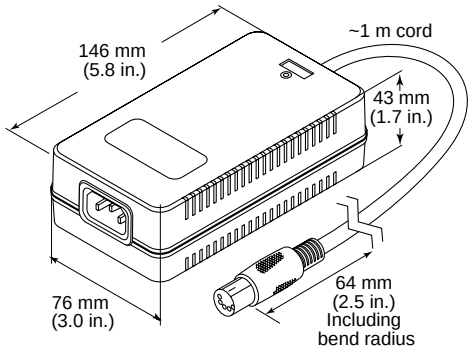




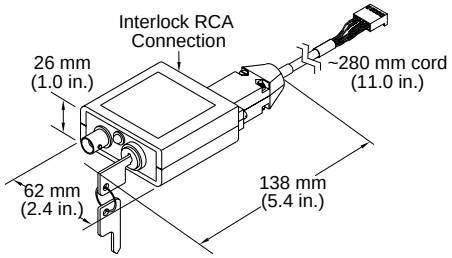
Radius Accessories

1057214	Radius Mount	Dual V-block, English/Metric
1039966	Control Box, CDRH, Keyswitch, Interlock	Control Box for RADIUS or CUBE lasers. Included box, key, interlock RCA and cable
1080090	Cable, Extension, DB-9 M/F, 6 ft. (1.8 m)	Extension cable to extend control box or RS-232. M-F, DB-9
1040408	Plug, RCA	Interlock RCA plug for Control Box, non-shorted
31-2538-000	Adapter,C Ring with screws	Adaptor for front of HeNe or Radius System
1057260	Power Supply, LDM, 110/220VAC	RADIUS or ULN, Desktop, 43 Watt, Triple Output

Power Supply



Control Box



Key Features

- ***Ultra-low noise (ULN)***
- ***RMS noise <0.06% for bandwidths of 10 Hz to 10 MHz***
- ***No mode-hop noise***
- ***No warm-up period***
- ***Wavelength 635 nm with 5 mW CW power***
- ***Long lifetime***

ULN Diode Laser Modules

ULN-Series diode laser modules are designed for applications that require particularly low noise or mode-hop, noise-free operation. Sophisticated drive electronics are used to ensure low noise output. Typical RMS noise is 0.06% or better for detector bandwidth from 10 Hz to 10 MHz, with practically no warm-up time.

MicroBlaze™ beam circulation technology produces a high-brightness, diffraction-limited circular beam that is fully collimated with low divergence.

Overall, these low-noise, compact LabLasers are ideal replacements for HeNe lasers, which require higher power and generate more heat.

Applications include genomics, particle counting, flow cytometry, optical storage, confocal microscopy, high throughput drug screening, and spectroscopy. They are also ideal for biomedical instrument design.

The ULN-Series features an alternative solution to the mode-hop problem. Rather than regulate temperature, a special modulation is used to force the laser into a multi-longitudinal mode.

While a normal laser will operate in a single-mode longitudinal or oscillate between two strong modes, the modulation creates several modes of lower intensity. As the laser temperature increases, these modes move like a caterpillar across the wavelength spectrum. The movement does not allow abrupt changes, so the system operates as if there were mode-hops. The result is low RMS noise (~0.06%), which is stable over changes in temperature and the life of the diode laser module.

- ULN stabilizes both power and noise during temperature changes (note that wavelength varies with the standard temperature coefficient of the diode, ~0.2 nm/°C).
- ULN controls noise over the lifetime of the laser and will not develop mode-hop noise as the laser ages.
- ULN does not change the spatial qualities of the laser beam, so the beam can be focused to the same spot size, profile and shape.

The ULN laser is sold with a triple output power supply to provide the necessary +5V and +12V to drive the laser.

Use the LabLaser mount [part no. 0221-449-00] for convenient heat sinking and mounting with adjustable alignment.

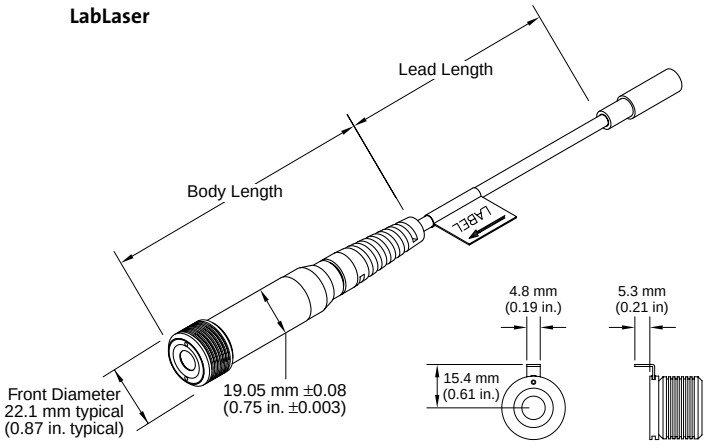
ULN circular diode laser modules create a 1 mm circular output beam using MicroBlaze patented technology. This is a technique that accurately positions a fiber microlens inside the diode laser cap. The microlens uniquely corrects the divergence of the fast axis. Once corrected, the beam shape changes from elliptical to circular, providing maximum power transmission and less astigmatism than other methods. The circular low-divergence beams have almost no astigmatism and a total wave-front error typically less than λ/10. The M^2 beam quality factor is typically 1.2 or better. These diode laser modules produce a beam of such high quality that they can replace more expensive HeNe lasers in many applications.

Compact, Rugged and Reliable
Our miniature laser modules are superb choices for many applications demanding affordable, compact lasers. Using AlignLock technology, all modules are optimized for thermal conductivity, protected from mechanical shock and deliver superior pointing accuracy and stability. These compact, rugged and reliable diode laser sources also have a sophisticated internal driver/controller circuit, which provides both surge and reverse polarity protection. The nominal operating temperature range is -10 to +40°C. Diode lifetime will be greater at lower temperatures.

BEAM *circular*

Name	LabLaser 635nm 5 mW C ULN
Wavelength (nm)	635 +7/-2
Power (mW)	5
CDRH Class	Class IIIb, Non-Conforming
Spot Size (mm)	1
Divergence (mrad)	1
Laser Drive	ULN, Ultra-Low Noise
Power Supply	Included
Body Length (mm)	136
Lead Length (mm)	460
Connector	5 PIN DIN
Part Number	31-0144-000

LabLaser



Wavelength vs. Temperature

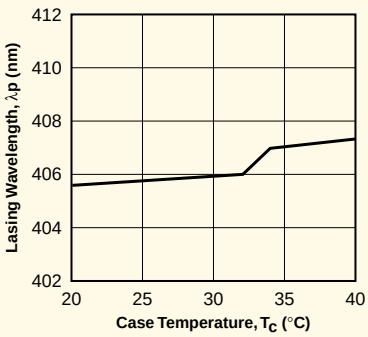
Wavelength vs. Temperature

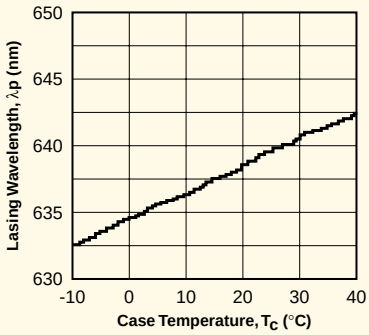
A special property of diode lasers is that the temperature of the device affects the lasing wavelength. So adjusting the temperature of a diode laser can be used to "tune" the wavelength. The temperature can also be used to avoid mode-hops. Mode-hops occur at certain temperatures when the diode is beating between two wavelengths. By using temperature controls it may be possible to center on a single mode for longer coherence length and lower RMS noise. Please note that as a diode ages, the wavelength also increases slightly, typically <0.5 nm over the entire life of the diode.

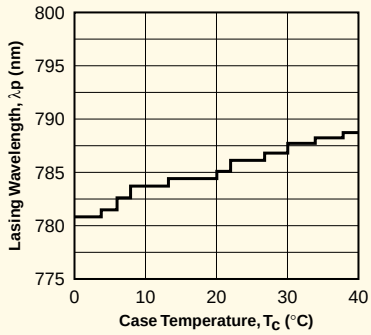
Higher diode temperatures can increase the wavelength. However, this shortens the lifetime of the diode. Cooler diode temperatures can reduce the wavelength and extend the product life, but this can reduce the dew point and could cause condensation on the optics.

As shown in the table, red laser diodes have a larger wavelength-to-temperature coefficient.

Wavelength	Approximate Δnm/°C
375	0.06
405	0.06
440	0.06
635	0.2
670	0.2
780	0.3
830	0.2







Key Features

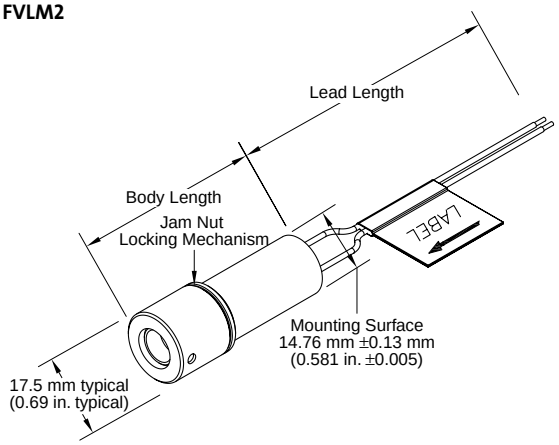
- ***Focusable VLM2-style package***
- ***High visibility 635 nm***
- ***Adjustable line width and focus***
- ***Dual-element optic design***
- ***High-quality diffractive optic***

Cross-Hair Line Generators

Cross-Hair Line Generators deliver two sharp, high-brightness, fan-angle lines at 635 nm. These adjustable-focus cross-hair generators are ideal for long-life projection and industrial applications. The adjustable focus allows the width of the line to be focused, while the length of the line remains fixed. The line can typically be focused as small as <0.1 mm at a distance of 10 cm or can be focused to as small as ~0.4 mm at a distance of 1.0 meter.

The front knob allows for easy adjustment of the line width and focus location. During adjustment the optics do not rotate and focusing action is even and uniform while beam alignment is maintained.[3] A locking ring is used to secure the focus in any position. Use the VLM2 mount [part no. 0221-437-00] for convenient heat sinking and mounting with adjustable alignment. For lasers without a connector, order plug no.1057734.

FVLM2



Name	FVLM2 Cross-Hair 635 nm 0.6 mW	FVLM2 Cross-Hair 635 nm 1.7 mW
Wavelength (nm)	635 +7/-2	635 +7/-2
Power (mW)	0.55	1.7
CDRH Class	Class II	Class II
Spot Size (mm)	1 Adjustable	1 Adjustable
Divergence (mrad)	24° x 1 mrad Adjustable	24° x 1 mrad Adjustable
Laser Drive[1]	CW	CW
Power Supply[2]	5-10VDC	5-10VDC
Body Length (mm)	48-55	48-55
Lead Length (mm)	610	610
Connector	none	none
Part Number	0222-210-00	0222-209-00

[1] Laser Drive is Continuous Wave (CW) with constant power. For MVP option the laser includes a 3rd wire for Modulation and Variable Power Control

[2] Power Supply: For modules with 5-10VDC it is recommended that the module be operated at 5V. For modules with 3-6VDC it is recommended that the module be operated at 3.3V or 5V. For modules with 6-10VDC it is recommended that the module be operated at 6V.

[3] Note the focus adjustment may slightly affect the beam-pointing direction. Due to the numerical aperture of the lens, slight variations in beam output power may occur as the lens is adjusted.

Key Features

- ***Focusable VLM2 style package***
- ***High visibility 635 nm, 670 nm and 830 nm***
- ***Adjustable divergence and focus***
- ***Circular, elliptical, line or cross-hair beams***

Focusable Diode Laser Modules

Focusable diode laser modules combine the technology of high-quality diode lasers with superior optics, sophisticated electronics and rugged alignment packaging. These modules can also be used in many applications to reduce the requirements for external optics. The result is an overall system that is smaller, simpler and less costly.

The adjustable focus is a great benefit for many applications. For machine vision, particle measurements and inspection—and their inherent need for direct measurements—the beam can be focused at a distance for the smallest spot size to optimize the system resolution. For fiber launch the adjustable beam can also optimize the focus spot position to achieve the ideal coupling efficiency. For instrumentation applications with multiple laser sources, the adjustable focus can match the red laser beam properties to another laser to simplify integration requirements.

The front knob allows for easy adjustment. During adjustment the optics do not rotate and focusing action is even and uniform while beam alignment is maintained.[1] A locking ring is used to secure the focus in any position. Use the VLM2 mount [part no. 0221-437-00] for convenient heat sinking and mounting with adjustable alignment. For lasers without a connector, order plug no. 1057734.

[1] The focus adjustment may slightly affect the beam-pointing direction. Due to the numerical aperture of the lens, slight variations in beam output power may occur as the lens is adjusted.

Compact, Rugged and Reliable

Our miniature laser modules are superb choices for many applications demanding affordable, compact lasers. Using AlignLock technology, all modules are optimized for thermal conductivity, protected from mechanical shock and deliver superior pointing accuracy and stability. These compact, rugged and reliable diode laser sources also have a sophisticated internal driver/controller circuit, which provides both surge and reverse polarity protection. The nominal operating temperature range is -10 to +40°C. Diode lifetime will be greater at lower temperatures.

MVP Technote

Modules with the optional Modulation and Variable Power (MVP) laser drive can be operated in several modes: continuous-wave (CW), modulation with digital drive, modulation with a high-fidelity analog signal, or as a variable power control. Refer to the MVP section for more details.

Focusable circular diode laser modules create a 1 mm circular output beam using MicroBlaze™ patented technology. This is a technique that accurately positions a fiber micro-lens inside the diode laser cap. The micro-lens uniquely corrects the divergence of the fast axis. Once corrected, the beam shape changes from elliptical to circular, providing maximum power transmission and less astigmatism than other methods. Diode modules with a 3 mm beam are also available. These modules feature a multi-element spatial filter that produces a large, clean, circular beam with an ~3 mm diameter.

Focusable elliptical diode laser modules offer exceptional beam quality with a typical M^2 of 1.4 or better in a typical 1 x 3 aspect ratio.

Focusable line and cross-hair generators deliver sharp lines with adjustable line width, while the length of the line remains fixed. The line can be typically focused as small as <0.1 mm at a distance of 10 cm or can be focused to as small as ~0.4 mm at a distance of 1 meter.

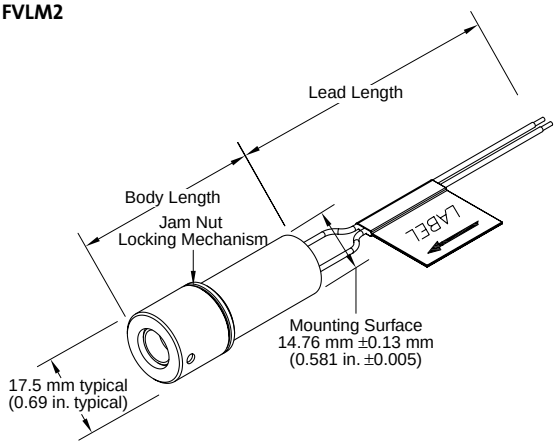
Advantages of the Focus Feature
The focus feature can be used to:

- Adjust the beam propagation so that it diverges to create a larger spot at the target for broader illumination.
- Adjust the beam so that it converges to create a specific focus spot size at a certain working distance.
- Adjust the beam so that the beam waist is at a particular point in space.
- Adjust the beam to move the focus spot location when an external objective lens is used. This is especially useful when matching multiple wavelengths into the same beam focus position.
- Adjust the beam at the laser to reduce the need for expensive and bulky adjustable beam expanders.

Circular 1 mm Beam

Circular diode laser modules produce a ~1 mm near-diffraction-limited beam. The circular low-divergence beams have almost no astigmatism and a total wave-front error typically less than $\lambda/10$. The M^2 beam quality factor is typically 1.2 or better. These diode laser modules produce a beam of such high quality that they can replace more expensive HeNe lasers in many applications. Circular diode laser modules are also smaller, require less power and generate less heat than traditional HeNe laser sources.

FVLM2



Focusable Diode Laser Modules

adjustable elliptical

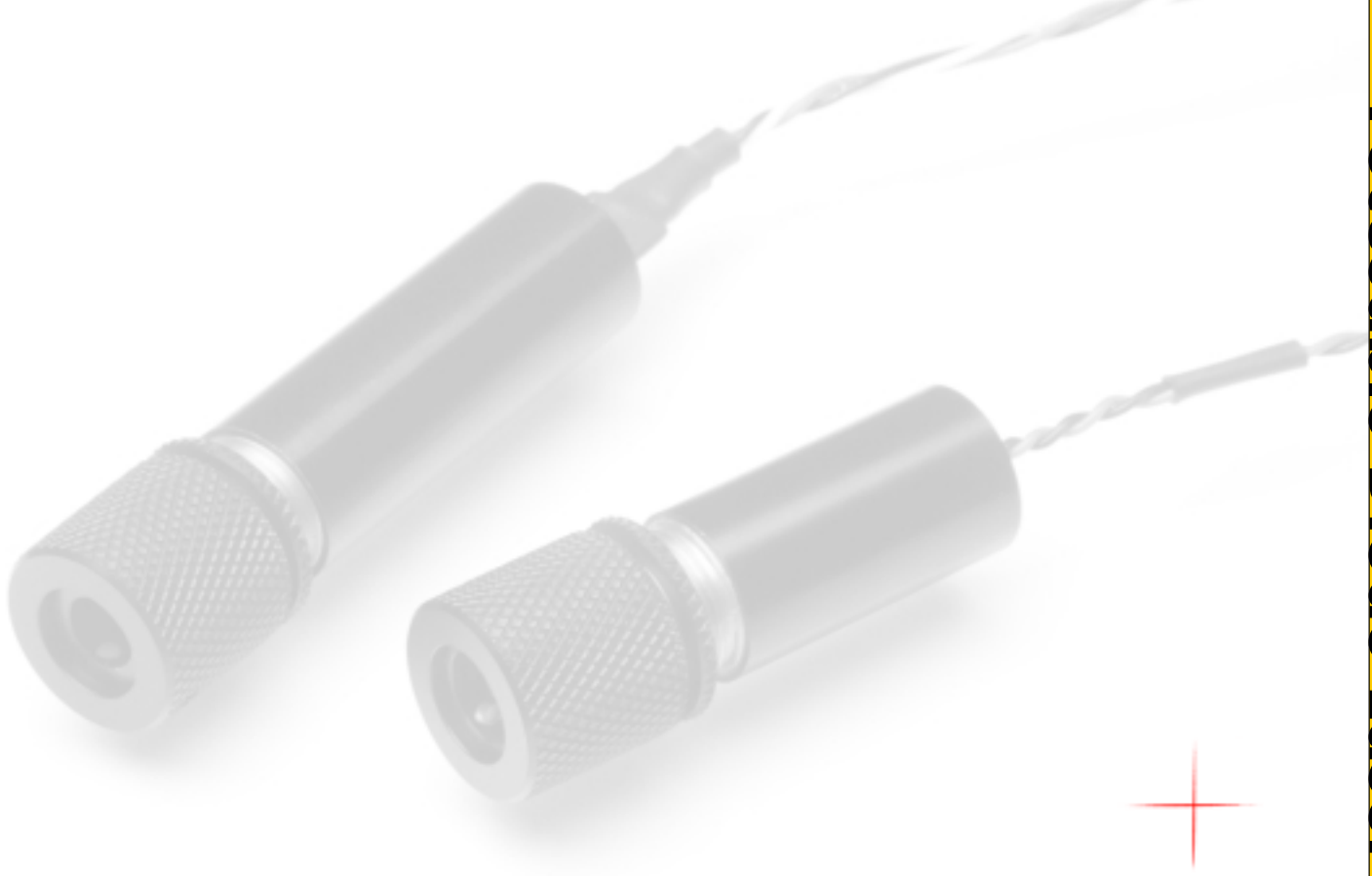
Name	FVLM2 635 nm 4mW E	FVLM2 635 nm 10mW E	FVLM2 670 nm 1mW E MVP	FVLM2 670 nm 4mW E	FVLM2 830 nm 28mW E
Wavelength (nm)	635 +7/-2	635 +7/-2	670 ±5	670 ±5	830 ±10
Power (mW)	4.2	10.5	0.95	4.2	28
CDRH Class	Class IIIa	Class IIIb Non-Conforming	Class II	Class IIIa	Class IIIb Non-Conforming
Spot Size (mm)	4.7 x 1.3 Adjustable	4.7 x 1.3 Adjustable	4.1 x 1.3 Adjustable	4 x 1 Adjustable	5 x 1.5 Adjustable
Divergence (mrad)	0.2 x 0.8 Adjustable	0.2 x 0.8 Adjustable	0.2 x 0.8 Adjustable	0.3 x 1.2 Adjustable	0.2 x 0.5 Adjustable
Laser Drive[1]	CW	CW	CW/MVP	CW	CW
Power Supply[2]	5-10VDC	4.5-5.6VDC	6-10VDC	5-10VDC	5-10VDC
Body Length (mm)	46-53	48-54	60-67	45-52	48-54
Lead Length (mm)	990	610	610	610	610
Connector	Phono-Mono	none	none	none	none
Part Number	31-0532-000	1008538	0223-103-00	0220-857-00	0222-235-00

adjustable circular

Name	FVLM2 635 nm 1mW C	FVLM2 670 nm 1mW C
Wavelength (nm)	635 +7/-2	670 ±5
Power (mW)	0.95	0.95
CDRH Class	Class II	Class II
Spot Size (mm)	3 Adjustable	3 Adjustable
Divergence (mrad)	0.4 Adjustable	0.4 Adjustable
Laser Drive[1]	CW	CW
Power Supply[2]	5-10VDC	5-10VDC
Body Length (mm)	45-52	45-52
Lead Length (mm)	990	914
Connector	Phono-Mono	none
Part Number	31-0458-000	0220-862-00

[1] Laser Drive is Continuous Wave (CW) with constant power. For MVP option the laser includes a 3rd wire for Modulation and Variable Power Control

[2] Power Supply: For modules with 5-10VDC it is recommended that the module be operated at 5V. For modules with 3-6VDC it is recommended that the module be operated at 3.3V or 5V. For modules with 6-10VDC it is recommended that the module be operated at 6V.



Name	FVLM2 Crosshair 635 nm 0.6 mW	FVLM2 Crosshair 635 nm 1.7 mW
Wavelength (nm)	635 +7/-2	635 +7/-2
Power (mW)	0.55	1.7
CDRH Class	Class II	Class II
Spot Size (mm)	1 Adjustable	1 Adjustable
Divergence (mrad)	24° x 1 mrad Adjustable	24° x 1 mrad Adjustable
Laser Drive[1]	CW	CW
Power Supply[2]	5-10VDC	5-10VDC
Body Length (mm)	48-55	48-55
Lead Length (mm)	610	610
Connector	none	none
Part Number	0222-210-00	0222-209-00

adjustable line generator

Name	FVLM2 635 nm 1.8 mW 60°	FVLM2 635 nm 5.6 mW 15°
Wavelength (nm)	635 +7/-2	635 +7/-2
Power (mW)	1.8	5.6
CDRH Class	Class II	Class IIIa
Spot Size (mm)	1 Adjustable	1 Adjustable
Divergence (mrad)	60° x 1 mrad Adjustable	15° x 1 mrad Adjustable
Laser Drive[1]	CW	CW
Power Supply[2]	5-10VDC	5-10VDC
Body Length (mm)	48-54	48-54
Lead Length (mm)	610	610
Connector	none	none
Part Number	0220-846-00	1007610

[1] Laser Drive is Continuous Wave (CW) with constant power. For MVP option the laser includes a 3rd wire for Modulation and Variable Power Control

[2] Power Supply: For modules with 5-10VDC it is recommended that the module be operated at 5V. For modules with 3-6VDC it is recommended that the module be operated at 3.3V or 5V. For modules with 6-10VDC it is recommended that the module be operated at 6V.

Key Features

- ***Industrial-style package***
- ***High visibility 635 nm, 670 nm, 780 nm and 830 nm***
- ***Optional beam shutter***
- ***CDRH compliance***
- ***Circular, elliptical or line generator beams***

Mount sold separately

LabLaser Diode Laser Modules

Diode LabLaser™ and industrial products from Coherent deliver high-brightness, low-divergence elliptical, circular or line generator beams. Wavelength choices range from 635 nm to 830 nm. Either CW or Modulation and Variable Power (MVP) control encloses index-guided, single-mode diodes, high-quality optics and sophisticated electronics in rugged packaging.

The LabLaser used in conjunction with the LabLaser Power Supply [part no. 31-1050-00] provide a complete CDRH-compliant system with all the safety features, including 5-second power-on delay, interlock and key switch.

Use the LabLaser mount [part no. 0221-449-00] for convenient heat sinking and mounting with adjustable alignment.

For lasers without a connector, order plug no. 1057734.

MVP Technote

Modules with the optional Modulation and Variable Power (MVP) laser drive can be operated in several modes: continuous-wave (CW), modulation with digital drive, modulation with a high-fidelity analog signal, or as a variable power control. Refer to the MVP section for more details.

LabLaser circular diode laser modules create a 1 mm circular output beam using MicroBlaze patented technology. This is a technique that accurately positions a fiber micro-lens inside the diode laser cap. The micro-lens uniquely corrects the divergence of the fast axis. Once corrected, the beam shape changes from elliptical to circular, providing maximum power transmission and less astigmatism than other methods. Diode modules with a 3 mm beam are also available. These modules feature a multi-element spatial filter that produces a large, clean, circular beam with an ~3 mm diameter.

LabLaser elliptical diode laser modules offer exceptional beam quality with a typical M^2 of 1.4 or better in a typical 1 x 3 aspect ratio.

LabLaser line generator modules produce a line with a known fan angle to generate the length of the line and an ~1 mm line width.

Compact, Rugged and Reliable

Our miniature laser modules are superb choices for many applications demanding affordable, compact lasers. Using AlignLock technology, all modules are optimized for thermal conductivity, protected from mechanical shock and deliver superior pointing accuracy and stability. These compact, rugged and reliable diode laser sources also have a sophisticated internal driver/controller circuit, which provides both surge and reverse polarity protection. The nominal operating temperature range is -10 to +40°C. Diode lifetime will be greater at lower temperatures.

BEAM elliptical

Name	LabLaser 635 nm 4 mW E	LabLaser 635 nm 4 mW E MVP	LabLaser 635 nm 7 mW E	LabLaser 635 nm 7 mW E MVP	LabLaser 635 nm 10 mW E	LabLaser 635 nm 10 mW E MVP	LabLaser 785 nm 25 mW E MVP	LabLaser 830 nm 25 mW E MVP
Wavelength (nm)	635 +7/-2	635 +7/-2	635 +7/-2	635 +7/-2	635 +7/-2	635 +7/-2	785 ±10	830 ±10
Power (mW)	4.2	4.2	7.5	7.5	10.5	11.5	25	25
CDRH Class	Class IIIa	Class IIIa	Class IIIb	Class IIIb	Class IIIb	Class IIIb	Class IIIb	Class IIIb
Spot Size (mm)	5.8 x 1.7	5.8 x 1.7	5.8 x 1.7	5.8 x 1.7	5.8 x 1.7	5.8 x 1.7	4.8 x 2.1	4.8 x 2.1
Divergence (mrad)	0.2 x 0.6	0.2 x 0.6	0.2 x 0.6	0.2 x 0.6	0.2 x 0.6	0.2 x 0.6	0.2 x 0.5	0.2 x 0.5
Laser Drive[1]	CW	CW/MVP	CW	CW/MVP	CW	CW/MVP	CW/MVP	CW/MVP
Power Supply[2]	5-10VDC	6-10VDC	5-10VDC	6-10VDC	5-10VDC	6-10VDC	6-10VDC	6-10VDC
Body Length (mm)	124	140	124	141	124	141	141	141
Lead Length (mm)	990	990	990	990	990	990	990	990
Connector	Phono-Stereo	Phono-Stereo	Phono-Stereo	Phono-Stereo	Phono-Stereo	Phono-Stereo	Phono-Stereo	Phono-Stereo
Part Number	31-0102-000	31-0110-000	31-0201-000	31-0219-000	31-0300-000	31-0315-000	1062079	1062083

BEAM circular

Name	LabLaser 635 nm 5 mW C MVP	LabLaser 635 nm 5 mW C	LabLaser 635 nm 7 mW C	LabLaser 635 nm 7 mW C MVP	LabLaser 635 nm 10 mW C	LabLaser 635 nm 10 mW C MVP
Wavelength (nm)	635 +7/-2	635 +7/-2	635 +7/-2	635 +7/-2	635 +7/-2	635 +7/-2
Power (mW)	4.2	4.9	7	7	10.5	10.5
CDRH Class	Class IIIa	Class IIIa	Class IIIb	Class IIIb	Class IIIb	Class IIIb
Spot Size (mm)	1.4	1.1	1.4	1.4	1.3	1.3
Divergence (mrad)	0.7	0.7	0.7	0.7	0.7	0.7
Laser Drive[1]	CW/MVP	CW	CW	CW/MVP	CW	CW/MVP
Power Supply[2]	6-10VDC	5-10VDC	5-10VDC	6-10VDC	5-10VDC	6-10VDC
Body Length (mm)	143	127	127	143	127	143
Lead Length (mm)	990	990	990	990	990	990
Connector	Phono-Stereo	Phono-Stereo	Phono-Stereo	Phono-Stereo	Phono-Stereo	Phono-Stereo
Part Number	31-0136-000	31-0128-000	31-0227-000	31-0235-000	31-0326-000	31-0334-000

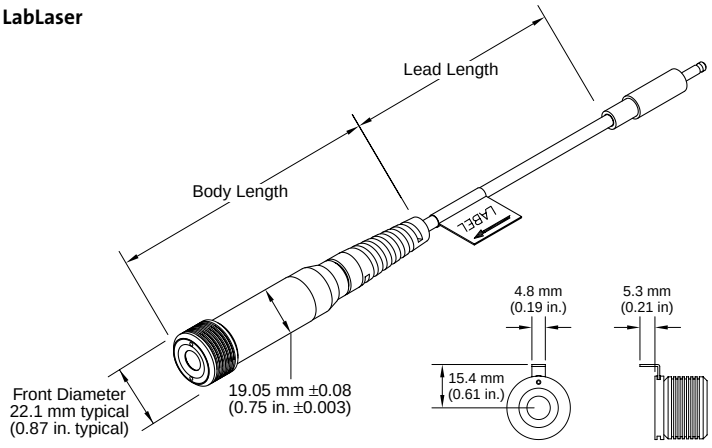
BEAM line generator

Name Name	Indust 635 nm 2 mW 60°	LabLaser 635 nm 7.5 mW 85°
Wavelength (nm)	635 +7/-2	635 +7/-2
Power (mW)	2	7.5
CDRH Class	Class II	Class II
Spot Size (mm)	1	1
Divergence (mrad)	60° x 1 mrad	85° x 1 mrad
Laser Drive[1]	CW	CW
Power Supply[2]	5-10VDC	5-10VDC
Body Length (mm)	124	124
Lead Length (mm)	3700	990
Connector	none	Phono-Stereo
Part Number	0220-936-00	31-0268-000

[1] Laser Drive is Continuous Wave (CW) with constant power. For MVP option the laser includes a 3rd wire for Modulation and Variable Power Control

[2] Power Supply: For modules with 5-10VDC it is recommended that the module be operated at 5V. For modules with 3-6VDC it is recommended that the module be operated at 3.3V or 5V. For modules with 6-10VDC it is recommended that the module be operated at 6V.

LabLaser



NOTE: Line generator modules (0220-936-00 and 31-0268-000) do not include shutter.

Key Features

- ***VLM2, VLM3 and LabLaser™-style packages***
- ***Optional adjustable line width and focus***
- ***15°, 40°, 60° and 85° fan angles***
- ***High brightness 635 nm, 650 nm and 670 nm***

Line Generator Diode Laser Modules

Line generators from Coherent project a clean, sharp line ~1 mm wide, with the line length represented by the specific fan angle. With fan angles of 15, 40, 60 or 85 degrees, wavelength options ranging from 635 nm to 670 nm, and various output powers available, line generators from Coherent offer the options you need for your particular application.

Focusable line generators deliver sharp lines with adjustable line width, while the length of the line remains the same fan angle. The line can be typically focused as small as <0.1 mm at a distance of 10 cm or can be focused to as small as ~0.4 mm at a distance of 1 meter.

Use the appropriate LabLaser mount [part no. 0221-449-00]; VLM2 mount [part no. 0221-437-00]; or VLM3 mount [part no. 0221-448-00] for convenient heat sinking and mounting with adjustable alignment.

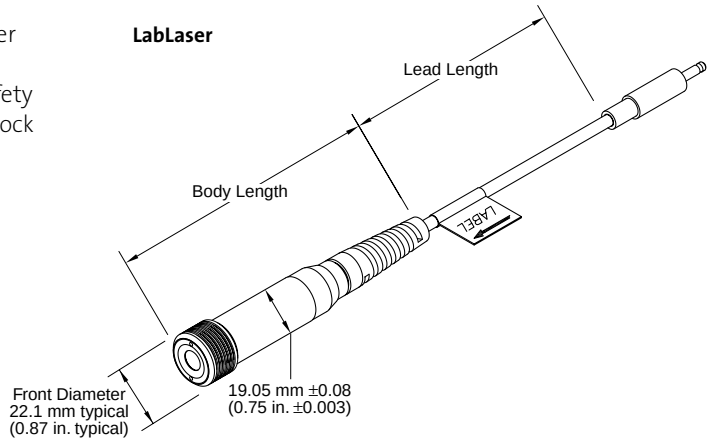
The LabLaser used in conjunction with the LabLaser Power Supply [part no. 31-1050-000] provides a complete CDRH-compliant system with all the safety features, including 5-second power-on delay, interlock and key switch.

For lasers without a connector, order plug no. 1057734.

Compact, Rugged and Reliable

Our miniature laser modules are superb choices for many applications demanding affordable, compact lasers. Using AlignLock technology, all modules are optimized for thermal conductivity, protected from mechanical shock and deliver superior pointing accuracy and stability. These compact, rugged and reliable diode laser sources also have a sophisticated internal driver/controller circuit, which provides both surge and reverse polarity protection. The nominal operating temperature range is -10 to +40°C. Diode lifetime will be greater at lower temperatures.

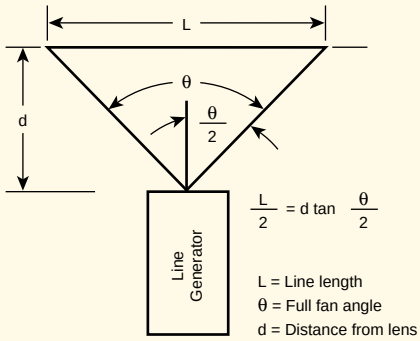
LabLaser



Line Generator Line Length

The Coherent Line Generator projects a sharp line that is ~1 mm wide at the module face and ~1.5 mm wide at one meter. The length of a line is traditionally defined by specifying the visual fan angle, which is 85° for these modules. The $1/e^2$ intensity fan angle is about 65°.

Fan Angle θ	Line Length L			
	d = 0.25 m	d = 0.5 m	d = 1 m	d = 2 m
85°	0.46 m	0.92 m	1.83 m	3.67 m
60°	0.29 m	0.58 m	1.16 m	2.31 m
40°	0.18 m	0.36 m	0.73 m	1.46 m
15°	0.06 m	0.12 m	0.25 m	0.50 m



BEAM line generator

Name	LG3 635 nm 1.5 mW 40°	Indust 635 nm 2 mW 60°	LG 635 nm 2 mW 85°	LG2 635 nm 2 mW 60°	LG3 635 nm 3 mW 85°	LabLaser 635 nm 7.5 mW 85°	LG3 650 nm 3.7 mW 85°	LG2 670 nm 2.5 mW 85°
Wavelength (nm)	635 +7/-2	635 +7/-2	635 +7/-2	635 +7/-2	635 +7/-2	635 +7/-2	650 ±5	670 ±5
Power (mW)	1.5	2	2	2	3	7.5	3.7	2.5
CDRH Class	Class II	Class II	Class II	Class II	Class II	Class II	Class II	Class II
Spot Size (mm)	1	1	1	1	1	1	1	1
Divergence (mrad)	40° x 1	60° x 1	85° x 1	60° x 1	85° x 1	85° x 1	85° x 1	85° x 1
Laser Drive[1]	CW	CW	CW	CW	CW	CW	CW	CW
Power Supply[2]	3-6VDC	5-10VDC	5-10VDC	5-10VDC	3-6 VDC	5-10VDC	3-6VDC	5-10VDC
Body Length (mm)	24	124	34	35	21	124	24	34
Lead Length (mm)	914	3700	914	914	914	990	990	914
Connector	none	none	none	none	none	Phono-Stereo	Phono-Mono	none
Part Number	0222-037-00	0220-936-00	0220-971-00	0220-934-00	0223-062-00	31-0268-000	31-0615-000	0220-866-00

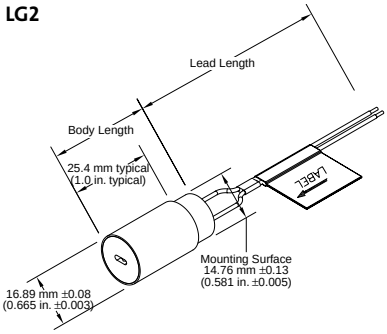
BEAM adjustable line generator

Name	FVLM2 635 nm 1.8 mW 60°	FVLM2 635 nm 5.6 mW 15°
Wavelength (nm)	635 +7/-2	635 +7/-2
Power (mW)	1.8	5.6
CDRH Class	Class II	Class IIIa
Spot Size (mm)	1 Adjustable	1 Adjustable
Divergence (mrad)	60° x 1 mrad Adjustable	15° x 1 mrad Adjustable
Laser Drive[1]	CW	CW
Power Supply[2]	5-10VDC	5-10VDC
Body Length (mm)	48-54	48-54
Lead Length (mm)	610	610
Connector	none	none
Part Number	0220-846-00	1007610

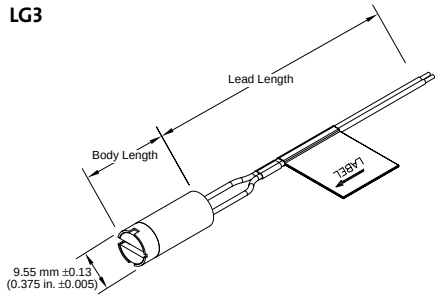
[1] Laser Drive is Continuous Wave (CW) with constant power. For MVP option the laser includes a 3rd wire for Modulation and Variable Power Control

[2] Power Supply: For modules with 5-10VDC it is recommended that the module be operated at 5V. For modules with 3-6VDC it is recommended that the module be operated at 3.3V or 5V. For modules with 6-10VDC it is recommended that the module be operated at 6V.

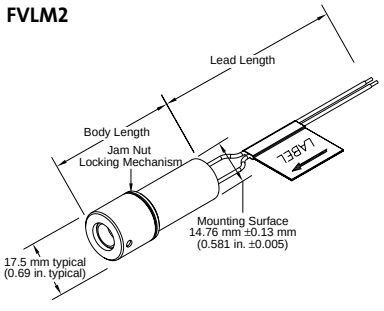
LG2



LG3



FVLM2



Key Features

- ***VLM2 and VLM3-style packages***
- ***High visibility 635 nm, 650 nm, and 670 nm***
- ***Option MVP drive for Modulation and Variable Power***
- ***Circular or elliptical beams***

Miniature Diode Laser Modules

Circular and elliptical miniature diode laser modules provide the smallest package size and best value. Included inside every module are complete electronics to manage the constant power laser drive with a closed-light loop based on an internal photodiode. Also included in the electronics are protection circuits to provide a robust system in even the smallest of packages.

Miniature diode laser modules use the patented AlignLock technology to guarantee beam-pointing alignment of <4.3 mrad. This allows for simpler and easier integration, as you can trust the unit-to-unit consistency of each beam.

Use the appropriate VLM2 mount [part no. 0221-437-00] or the VLM3 mount [part no. 0221-448-00] for convenient heat sinking and mounting with adjustable alignment.

For lasers without a connector, order plug no. 1057734.

Miniature VLM2 circular diode laser modules create a 1 mm circular output beam using MicroBlaze patented technology. This is a technique that accurately positions a fiber micro-lens inside the diode laser cap. The micro-lens uniquely corrects the divergence of the fast axis. Once corrected, the beam shape changes from elliptical to circular, providing maximum power transmission and less astigmatism than other methods. Diode modules with a 3 mm beam are also available. These modules feature a multi-element spatial filter that produces a large, clean, circular beam with an ~3 mm diameter.

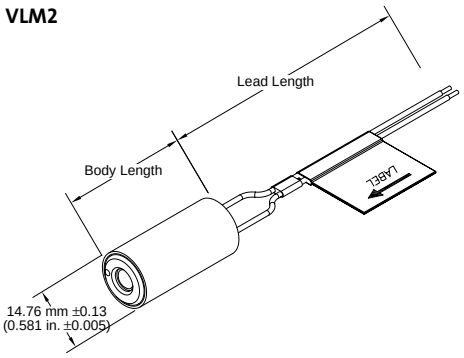
Miniature elliptical diode laser modules offer exceptional beam quality with a typical M^2 of 1.4 or better in a typical 1 x 3 aspect ratio.

Compact, Rugged and Reliable
Our miniature laser modules are superb choices for many applications demanding affordable, compact lasers. Using AlignLock technology, all modules are optimized for thermal conductivity, protected from mechanical shock and deliver superior pointing accuracy and stability. These compact, rugged and reliable diode laser sources also have a sophisticated internal driver/controller circuit, which provides both surge and reverse polarity protection. The nominal operating temperature range is -10 to +40°C. Diode lifetime will be greater at lower temperatures.

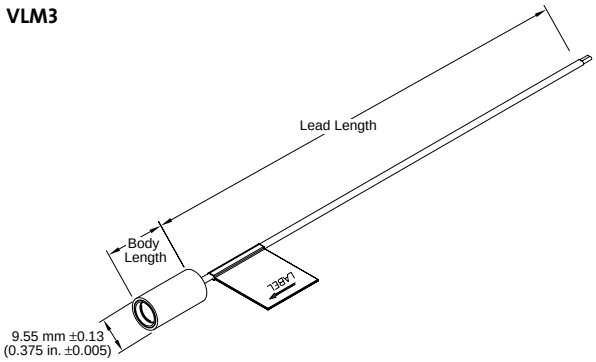
Circular 1 mm Beam

Circular diode laser modules produce a ~1 mm near-diffraction-limited beam. The circular low-divergence beams have almost no astigmatism and a total wave-front error typically less than $\lambda/10$. The M^2 beam quality factor is typically 1.2 or better. These diode laser modules produce a beam of such high quality that they can replace more expensive HeNe lasers in many applications. Circular diode laser modules are also smaller, require less power and generate less heat than traditional HeNe laser sources.

VLM2



VLM3



BEAM *elliptical*

Name	VLM3 635 nm 2.5 mW E	VLM2 635 nm 4 mW E	VLM2 635 nm 10 mW E	VLM2 635 nm 21 mW E	VLM3 650 nm 4 mW E	VLM3 670 nm 4 mW E	VLM2 670 nm 4 mW E MVP	VLM2 670 nm 7.5 mW E
Wavelength (nm)	635 +7/-2	635 +7/-2	635 +7/-2	635 +7/-2	650 ±5	670 ±5	670 ±5	670 ±5
Power (mW)	2.5	4.2	10.5	21	4.2	4.2	4.2	7.5
CDRH Class	Class IIIa	Class IIIa	Class IIIb Non-Conforming	Class IIIb Non-Conforming	Class IIIa	Class IIIa	Class IIIa	Class IIIb Non-Conforming
Spot Size (mm)	4.6 x 1.3	5.8 x 1.7	5.8 x 1.7	5.8 x 1.7	4.3 x 1.3	4.6 x 1.3	4.6 x 1.3	3.4 x 1.3
Divergence (mrad)	0.2 x 0.7	0.2 x 0.6	0.2 x 0.6	0.2 x 0.6	0.2 x 0.8	0.2 x 0.7	0.2 x 0.7	0.3 x 0.8
Laser Drive[1]	CW	CW	CW	CW	CW	CW	CW/MVP	CW
Power Supply[2]	3-6VDC	5-10VDC	5-10VDC	5-6VDC	3-6VDC	3-6VDC	6-10VDC	5-10VDC
Body Length (mm)	19	32	32	41	19	19	43	28
Lead Length (mm)	914	914	914	914	990	914	914	305
Connector	none	none	none	none	Phono-Mono	none	none	none
Part Number	0221-814-00	0221-534-00	0221-895-01	1051904	31-0607-000	0220-968-00	0221-202-00	0223-038-00

[1] Laser Drive is Continuous Wave (CW) with constant power. For MVP option the laser includes a 3rd wire for Modulation and Variable Power Control

[2] Power Supply: For modules with 5-10VDC it is recommended that the module be operated at 5V. For modules with 3-6VDC it is recommended that the module be operated at 3.3V or 5V. For modules with 6-10VDC it is recommended that the module be operated at 6V.

BEAM *circular*

Name	VLM2 635 nm 1 mW C 3 mm	VLM2 635 nm 4 mW C 1 mm	VLM2 635 nm 10 mW C 1 mm	VLM3 650 nm 1.6 mW C 1.3 mm	VLM2 670 nm 1 mW C 3 mm	VLM2 670 nm 1 mW C 3 mm MVP
Wavelength (nm)	635 +7/-2	635 +7/-2	635 +7/-2	650 ±5	670 ±5	670 ±5
Power (mW)	0.95	4.2	10.5	1.6	0.95	0.95
CDRH Class	Class II	Class IIIa	Class IIIb Non-Conforming	Class IIIa Non-Conforming	Class II	Class II
Spot Size (mm)	3.0	1.3	1.3	1.3	3.0	3.0
Divergence (mrad)	0.4	0.7	0.7	0.8	0.4	0.4
Laser Drive[1]	CW	CW	CW	CW	CW	CW/MVP
Power Supply[2]	5-10VDC	5-10VDC	5-10VDC	5-6VDC	5-10VDC	6-10VDC
Body Length (mm)	45	34	34	26	45	58
Lead Length (mm)	990	914	914	914	990	914
Connector	Phono-Mono	none	none	none	Phono-Mono	none
Part Number	31-0441-000	0222-200-00	0222-021-01	0222-002-01	31-0425-000	0221-460-00

Key Features

- ***LabLaser and VLM2-style packages***
- ***Optional Focusable VLM2***
- ***High visibility 635 nm, 670 nm, 785 nm and 830 nm***
- ***Modulation with Digital TTL***
- ***High-fidelity analog control to 500 KHz***
- ***Variable Power Control***

MVP Control Diode Laser Modules

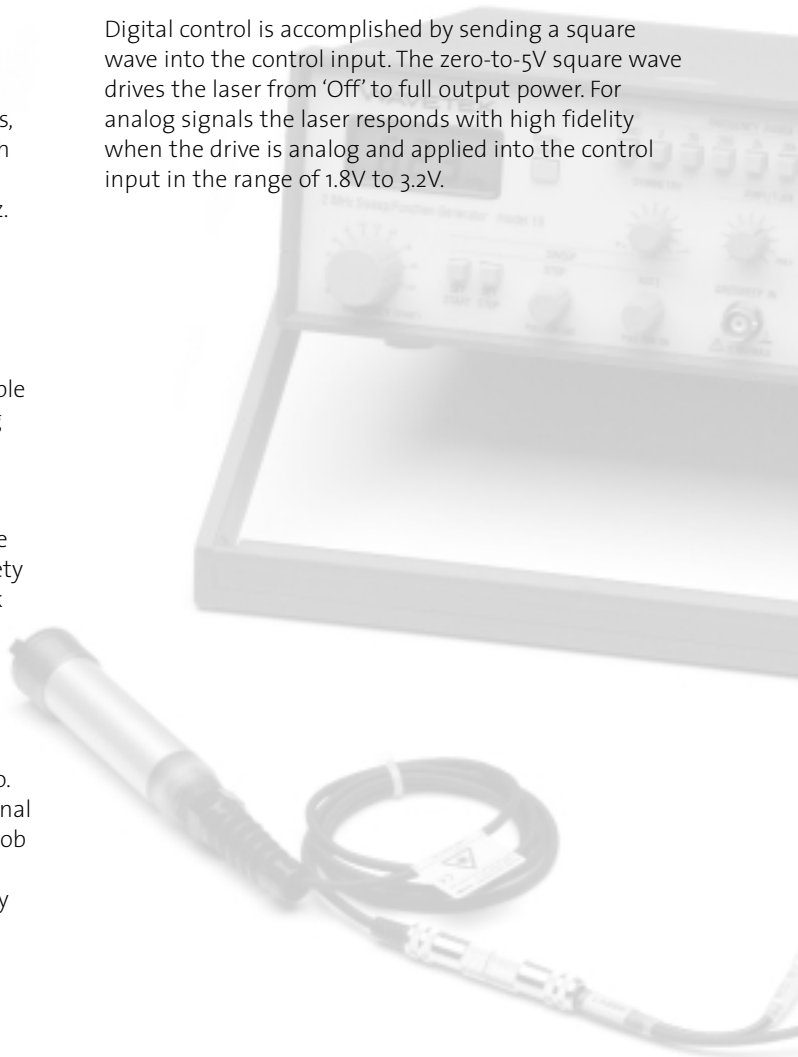
Modules with Modulation and Variable Power (MVP) deliver high-brightness, low-divergence beams with wavelength choices from 635 nm to 830 nm. Rugged packaging encloses index-guided, single-mode diodes, high-quality optics and sophisticated electronics with MVP control. The MVP is a third-wire control for modulation and variable power from DC to >500 kHz. These VLM laser modules are ideal for long-life laboratory and instrument applications.

Use the appropriate LabLaser mount [part no. 0221-449-00] or VLM2 mount [part no. 0221-437-00] for convenient heat sinking and mounting with adjustable alignment. For lasers without a connector, order plug no. 1057734.

The LabLaser MVP used in conjunction with the LabLaser Power Supply [part no. 31-1050-000] provide a complete CDRH-compliant system with all the safety features including 5-second power-on delay, interlock and key switch. The front panel knob on the power supply can control the laser power.

The LabLaser MVP can use an external signal to control the laser power. The signal can be connected to the laser with the optional interface cable [part no. 31-1068-000]. Please note that when using the optional interface cable that the front panel power control knob on the LabLaser power supply [part no. 31-1050-000] will not function. Instead, the laser is responding only to the external signal.

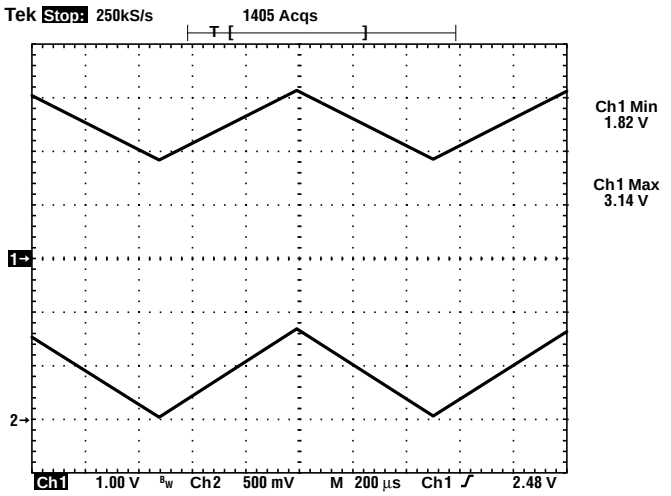
Digital control is accomplished by sending a square wave into the control input. The zero-to-5V square wave drives the laser from 'Off' to full output power. For analog signals the laser responds with high fidelity when the drive is analog and applied into the control input in the range of 1.8V to 3.2V.



With analog modulation the output laser power will track the input voltage as shown in the oscilloscope trace at right.

Ch 1: Input Analog Voltage
Min. = 1.8V
Max. = 3.2V

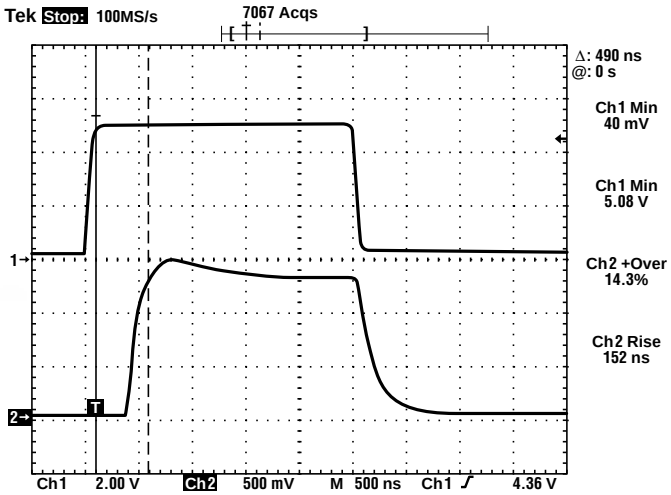
Ch 2: Output Laser Power



With digital modulation the output laser power will track the input voltage as shown in the oscilloscope trace at right.

Ch 1: Input

Ch 2: Output Laser Power

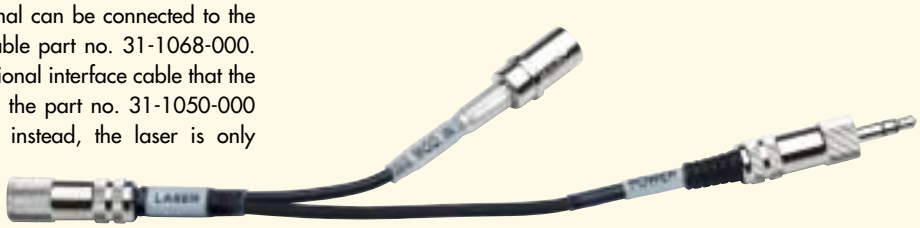


The 490 ns delay from the rising edge of the input to the rising edge of the output can be minimized by setting the "0" level at 1.8VDC instead of 0.0VDC.

For more details on how to use the MVP, please visit the Diode Modules category at **www.coherent.com**.

Modulation Interface Cable

For the LabLaser MVP modules an external signal can be used to control the laser power. The signal can be connected to the laser with the optional interface cable part no. 31-1068-000. Please note that when using the optional interface cable that the front panel power control knob on the part no. 31-1050-000 power supply will not function – instead, the laser is only responding to the external signal.



Specifications at 0°C to 40°C

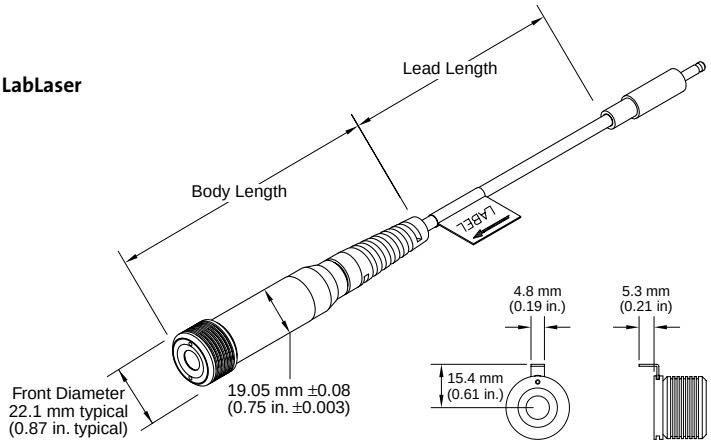
Design Parameter	Min.	Typ.	Max.	Units	Condition
Modulation Bandwidth	400	500	—	kHz	Output to -3dB
Control Input: Laser OFF Minimum Linear Voltage	1.6	1.8	1.9	V	<1% of Full Output Power
Control Input: Maximum Linear Voltage	3.0	3.2	3.5	V	>90% of Full Rated Output Power
Control Input: Laser ON	n/a	5.0	n/a	V	Full Rated Output Power
Linearity	.95	.99	1	—	
Output Stability	0	0.2	1.0	%	t = 1 minute
Output Power Variation Over Temperature Range	0	1.3	±5	%	
RMS Laser Output Noise	0	.05	.5	%	
Laser-Enabled Delay	140	240	560	msec	After Power Applied
Input Resistance	—	5500	—	Ohm	

BEAM circular

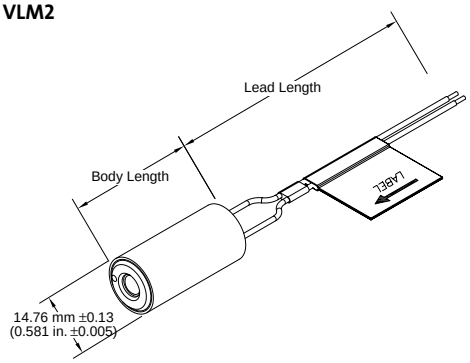
Name	LabLaser 635 nm 5 mW C MVP	LabLaser 635 nm 7 mW C MVP	LabLaser 635 nm 10 mW C MVP	VLM2 670 nm 1 mW C 3 mm MVP
Wavelength (nm)	635 +7/-2	635 +7/-2	635 +7/-2	670 ±5
Power (mW)	4.2	7	10.5	0.95
CDRH Class	Class IIIa	Class IIIb	Class IIIb	Class II
Spot Size (mm)	1.4	1.4	1.3	3.0
Divergence (mrad)	0.7	0.7	0.7	0.4
Laser Drive	CW/MVP	CW/MVP	CW/MVP	CW/MVP
Power Supply[1]	6-10VDC	6-10VDC	6-10VDC	6-10VDC
Body Length (mm)	143	143	143	58
Lead Length (mm)	990	990	990	914
Connector	Phono-Stereo	Phono-Stereo	Phono-Stereo	none
Part Number	31-0136-000	31-0235-000	31-0334-000	0221-460-00

[1] For modules with 6-10VDC it is recommended that the module be operated at 6V.

LabLaser



VLM2



BEAM elliptical

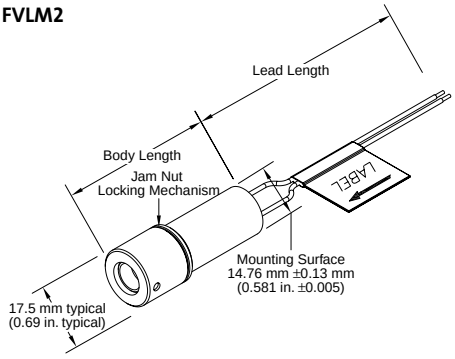
Name	LabLaser 635 nm 4 mW E MVP	LabLaser 635 nm 7 mW E MVP	LabLaser 635 nm 10 mW E MVP	VLM2 670 nm 4 mW E MVP	LabLaser 785 nm 25 mW E MVP	LabLaser 830 nm 25 mW E MVP
Wavelength (nm)	635 +7/-2	635 +7/-2	635 +7/-2	670 ±5	785 ±10	830 ±10
Power (mW)	4.2	7.5	11.5	4.2	25	25
CDRH Class	Class IIIa	Class IIIb	Class IIIb	Class IIIa	Class IIIb	Class IIIb
Spot Size (mm)	5.8 x 1.7	5.8 x 1.7	5.8 x 1.7	4.6 x 1.3	4.8 x 2.1	4.8 x 2.1
Divergence (mrad)	0.2 x 0.6	0.2 x 0.6	0.2 x 0.6	0.2 x 0.7	0.2 x 0.5	0.2 x 0.5
Laser Drive	CW/MVP	CW/MVP	CW/MVP	CW/MVP	CW/MVP	CW/MVP
Power Supply[1]	6-10VDC	6-10VDC	6-10VDC	6-10VDC	6-10VDC	6-10VDC
Body Length (mm)	141	141	141	43	141	141
Lead Length (mm)	990	990	990	914	990	990
Connector	Phono-Stereo	Phono-Stereo	Phono-Stereo	none	Phono-Stereo	Phono-Stereo
Part Number	31-0110-000	31-0219-000	31-0315-000	0221-202-00	1062079	1062083

BEAM adjustable elliptical

Name	FVLM2 670 nm 1 mW E MVP
Wavelength (nm)	670 ±5
Power (mW)	0.95
CDRH Class	Class II
Spot Size (mm)	4.1 x 1.3
Divergence (mrad)	0.2 x 0.8
Laser Drive	CW/MVP
Power Supply[1]	6-10VDC
Body Length (mm)	60-67
Lead Length (mm)	610
Connector	none
Part Number	0223-103-00

[1] For modules with 6-10VDC it is recommended that the module be operated at 6V.

FVLM2



Key Features

- ***Fully-featured LabLaser 6 VDC power supply***
- ***Variable laser power control***
- ***Keylock, emission delay and remote interlock***

Diode LabLaser Universal Power Supply

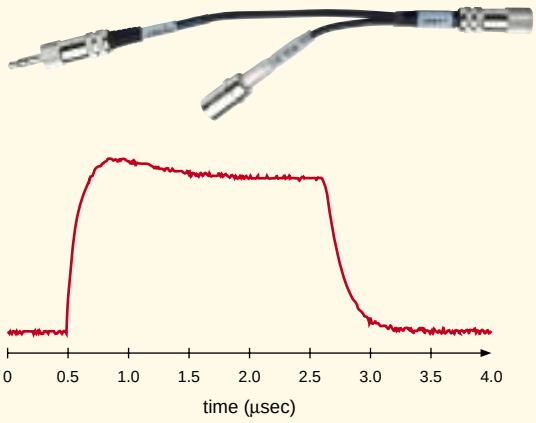
The Diode LabLaser™ Universal Power Supply provides a well-regulated 6 VDC, 250 mA output for driving any of the Coherent Diode LabLasers with the additional benefit of variable power control. To vary the output power of the Diode LabLasers which incorporate the Variable Power and Modulation Control circuitry simply adjust the multi-turn knob on the front panel of the 31-1050 power supply. This varies a voltage on the "third wire" connection in the laser cables and the laser power can be smoothly varied between threshold and the rated power. The supply incorporates CDRH safety features (keylock, power-on indicator, 4-6 second emission time delay and remote interlock socket), is CE-marked and meets appropriate UL, CSA, and EN requirements.

This compact (120 x 76 x 48 mm) power supply can be connected to any 90-130 or 180-260 VAC 50/60 Hz supply. There is an IEC 320 input socket and a 1.8 m detachable line cord with plug provided. The output to the laser features an easy connect/disconnect 3-terminal jack socket on the front panel which mates to the male plugs of the cables connected to all Diode LabLasers.

31-1050-000	**LabLaser Power Supply**	Power Supply, LabLaser, 6VDC, 250 mA, Adjustable Power Control for MVP
31-1068-000	**Cable, MVP Interface**	Connects MVP Laser to Power Supply with BNC for Control Input
1057734	**Plug, 3.5 mm Stereo**	Phono Plug to take Laser Diode Module with leads and add a Power Supply Plug

500 kHz Modulation Bandwidth

To modulate the laser power disconnect the "third wire" power-control (incorporated in the laser cable and jack, and power supply socket) and apply the desired AC/DC modulation in its place. This is simply done by inserting the special Modulation Interface Cable 31-1068 between the cable jack and power supply socket and applying the modulation to the BNC socket attached to the cable. The control should be TTL, or 5V for full laser power, or varied over the range 1.8 to 3.2V for analog linear modulation. Bandwidth is ~500 kHz. Full details are supplied with the LabLasers which incorporate the Variable Power and Modulation Control circuitry.



Key Features

- ***Well-regulated 5VDC output***
- ***Autoranging 90-260 VAC IEC input***
- ***Output cable with easy connect/disconnect jack***

Universal Diode Laser Module Power Supply

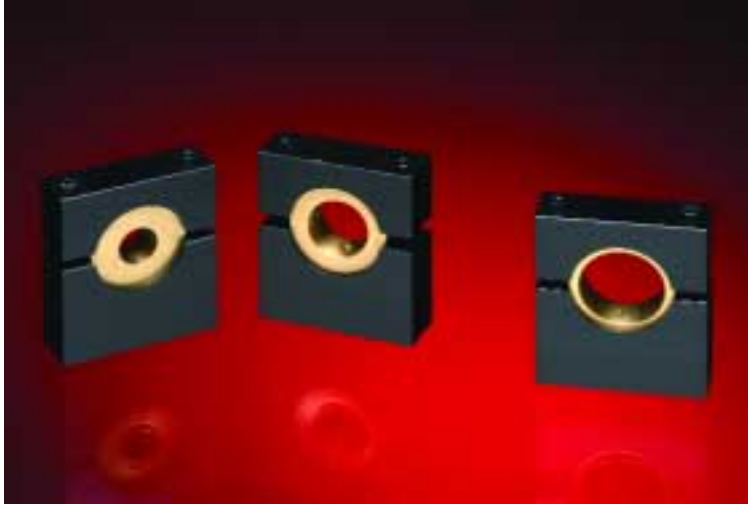
The Universal Diode Laser Module Power Supply uses the latest switchmode technology to provide a well-regulated 5 VDC output suitable for driving any of the Coherent laser diode modules. The supply is CE-marked and meets appropriate UL, CSA, TUV, GS, and FCC requirements.

This compact (75 x 50 x 41 mm) autoranging power module can be connected to any 90-260 VAC 50/60 Hz supply. There is an IEC 320 input socket and a 1.8 m detachable line cord with plug provided. The 1.8 m output cable is terminated with an easy connect/disconnect jack socket which mates to the male plugs connected to all laser modules.

31-1001-000	**LDM Power Supply**	Power Supply, Laser Diode Module, Desk Top, 5VDC , 1.5 amp
1057734	**Plug, 3.5 mm Stereo**	Phono Plug to take Laser Diode Module with leads and add a Power Supply Plug

Key Features

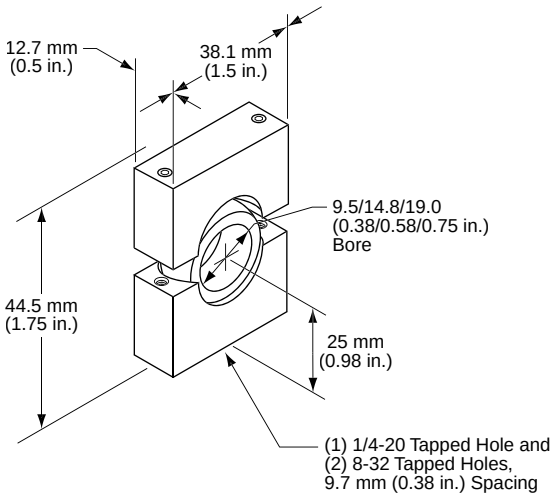
- ***Patent pending***
- ***Simple tip/tilt and lock in place mechanism***
- ***Very affordable***
- ***Adjustable angle through about ±15 degrees***



Variable Angle Diode Laser Mounts

Coherent's variable angle laser diode module mounts are designed to accept three different sizes of diode laser module namely VLM3, VLM2 and LabLasers (9.5 mm, 14.8 mm and 19.0 mm diameter).

This simple mount acts as combined heat sink, electrical insulator and variable-angle mount for 9.5 or 14.8 mm diameter diode modules and 19.0 mm Diode LabLasers. The lasers are held firmly in a spherical-surface brass ring by two small set screws. This ring is clamped between two insulating blocks forming a "ball and socket" arrangement. Two socket-head screws can be loosened to allow easy angular adjustment of the module (±15° range) and quick, rigid locking in position.



0221-437-00	**Mount for VLM2, FVLM2 or LG2**	Variable Angle, 1/4-20 inch Base, 14.8 mm Bore
0221-448-00	**Mount for VLM3 or LG3**	Variable Angle, 1/4-20 inch Base, 9.5 mm Bore
0221-449-00	**Mount, LabLaser/Industrial**	Variable Angle, 1/4-20 inch Base, 19 mm Bore

Recommended Products for Power Measurement

FieldMax-TO Laser Power Meter

Key Features

- ***Measures laser power from nW to kW***
- ***Works with Thermal and Optical sensors***
- ***Large, bright, backlit LCD display***
- ***Simulated analog-like movement for laser tuning***
- ***Intuitive button-driven user interface***
- ***USB 1.1 interface***
- ***Portable AC/DC operation***
- ***Compact, rugged enclosure with stand***

FieldMax™-TO is an affordable, versatile, easy-to-use digital power meter designed for field service and production test applications.

FieldMax-TO features a large, easy-to-read backlit LCD and an intuitive user interface offering direct button-driven control for simple operation. To facilitate laser tuning, FieldMax-TO provides a fast and responsive tuning feature. Statistics are supported, including min., max., and mean. FieldMax-TO is compatible with our thermal and optical sensors. It can measure power from nW to kW.

1058846	**FieldMax-TO**	Laser Power Meter

LaserCheck Handheld Laser Power Meter

LaserCheck™ is a handheld, inexpensive laser power meter specifically designed to provide power measurements in a small, lightweight, self-contained package that can easily be stored in a pocket or tool kit. At higher powers the silicon sensor is protected from saturation with a built-in optical attenuator, and all measurements are displayed on a 3-digit LCD screen. LaserCheck is microprocessor-controlled with wavelength correction, auto-ranging (µW or mW displayed), optical attenuator, power overload warning and automatic shutoff.

Key Features

- ***Auto-ranging with peak sample-and-hold***
- ***Power measurement from 0.5 µW to 1W***
- ***±5% calibrated accuracy from 400 to 1064 nm***

33-1533-000	**LaserCheck**	Handheld Laser Power Meter

For Beam Measurement and Instrumentation contact: Toll Free (800) 343-4912 • Tel: (971) 327-2734 • Fax: (971) 327-2778

Key Features

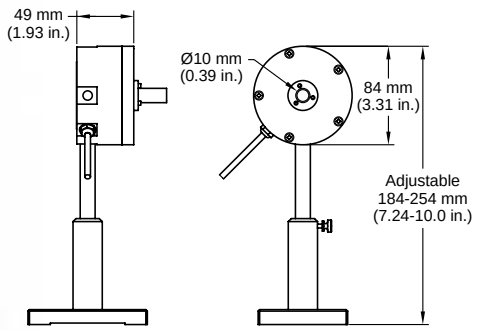
- ***Thermally stabilized designs***
- ***Broadband 0.3 to 11 µm spectral range***
- ***High resolution to 10 µW***
- ***Large area: 10 and 19 mm diameter***
- ***Fiber-optic connector options***

High-Sensitivity Thermopile Sensors (to 1W)

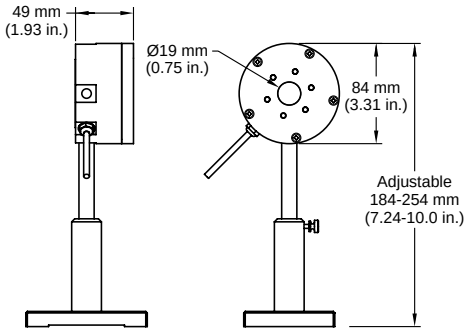
The PS model sensors offer a thermally stabilized, amplified power sensor with a broad spectral response, high sensitivity, and large active area. These sensors are ideal for laser diodes, diode bars and stacks, HeNe, HeCd and small ion lasers. For optimum performance at low power levels we recommend the PS10Q and PS19Q, which utilize quartz windows.

PS10 models include a detachable beam tube to block stray light.

PS10/PS10Q



PS19/PS19Q



Name	PS10	PS10Q	PS19	PS19Q
Wavelength Range (µm)	0.3 - 11	0.3 - 3	0.3 - 11	0.3 - 3
Power Range	100 µW - 1W	100 µW - 1W	100 µW - 1W	100 µW - 1W
Resolution (µW)	10	10	10	10
Max. Thermal Drift	40 µW	20 µW	400 µW	20 µW
Max. Avg. Power Density (kW/cm^2)	0.5	0.5	0.5	0.5
Max. Pulse Energy Density (mJ/cm^2, 10 ns pulse)	50	50	50	50
Response Time (sec.)	2	2	2	2
Detector Coating	Black	Black	Black	Black
Quartz Filter Window	-	Yes	-	Yes
Detector Diameter (mm)	10	10	19	19
Dimensions (mm)	Δ 84 x 49	Δ 84 x 49	Δ 84 x 49	Δ 84 x 49
Calibration Uncertainty	±1%	±1%	±1%	±1%
Calibration Wavelength (nm)	514	514	514	514
Cooling Method	Air	Air	Air	Air
Connector Type	PM DB-25	PM DB-25	PM DB-25	PM DB-25
Cable Length (m)	2	2	2	2
Part Number	0012-4595	0012-4600	0012-4605	0012-4610

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Prices indicated are current at the time of publication, but we reserve the right to change these without notice. Prices are FOB Auburn, CA, and do not include freight, duty or any applicable taxes.

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Specifications
Specifications are current at the time of publication, but Coherent reserves the right to change these without prior notice.

Technical Information
The technical information provided in this catalog is intended to be helpful in the application of Coherent products, but we do not accept responsibilty for its use.

Terms and Conditions of Sale
Terms and Conditions of Sale are specific to each country in which Coherent operates. They are supplied with all quotations and invoices and can be sent by fax or mail on request. Nothing in the foregoing statements modifies the Terms and Conditions in effect for each country of operation.

Laser Output Power
The laser output power is rated with a typical ±5% tolerance from the published values.


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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.

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