

CPS198 - May 28, 2015

Item # CPS198 was discontinued on May 28, 2015. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

LASER DIODE MODULES

- ▶ Wavelengths from 405 nm to 980 nm
- ▶ Collimated and Adjustable-Focus Versions
- ▶ Compact Ø8 mm or Ø11 mm Housing Options
- ▶ 850 nm Single-Wavelength Laser Module



CPS532
Collimated Laser Module
Power Supply Not Included



CPS850V
Single-Wavelength Laser Module
Power Supply Not Included



CPS635F
Adjustable-Focus Laser Module
Power Supply Not Included

[Hide Overview](#)

OVERVIEW

Features

- Collimated or Adjustable-Focus Laser Diode Modules
- Compact Ø8 mm or Ø11 mm Housing Makes these Modules Ideal as Alignment Lasers
- Lasing at Wavelengths from 405 nm to 980 nm (See Table to the Right)
 - Four 635 nm Wavelength Options Provide Alternatives to HeNe Lasers
- Single-Wavelength VCSEL Collimated Laser Module for 850 nm Available
- Power Supplies are Not Included with Individual Laser Diode Modules (Sold Separately Below)

Thorlabs' Laser Diode Modules are available in either collimated or adjustable-focus varieties and provide output powers ranging from 0.85 mW to 4.5 mW (laser safety Class 2 or 3R depending on the model). Each module has an output beam shape that is either elliptical or round, as indicated in the tables below. These modules, which offer single spatial mode output and a compact cylindrical housing, are ideal for use as alignment lasers in optical systems.

For single-frequency applications, our collimated 850 nm VCSEL Module produces a single-wavelength output and a round, Gaussian beam shape without clipping the beam. This laser module features a 2 to 3 order of magnitude narrower linewidth than our other laser modules, but this comes at the expense of a lower total power output.

Each module requires a 5 VDC power supply (not included), such as the LDS5 offered below, to operate. Alternatively, a 2.5 mm phono plug is included for customers who wish to wire their own power supply to the laser module. These diode modules have either a 18" (457 mm) or 24" (610 mm) long cable, with a 2.5 mm phono socket for connection to a power supply.

Mounting Options

The Ø8 mm and Ø11 mm housings are compatible with our line of optomechanical components through the use of various mounting adapters, as shown in the images to the right. Depending on the adapter chosen, these laser modules can be directly mounted into either internally SM1-threaded (1.035"-40) components or mechanics with a Ø1" bore. Further details on each adapter and its compatibility with our line of optomechanics can be found below.

Please note that the knurled knob used for focus adjustment on the CPS635F, CPS650F, and CPS670F laser modules is too large for the mounting adapter bore. This knob can be unthreaded to mount the diode module in the same manner

Quick Link Guide
Laser Diode Modules
405 nm - 532 nm
635 nm
650 nm - 780 nm
780 nm
808 nm - 980 nm
850 nm VCSEL
Accessories
Mounting Adapters
5 VDC Power Supply



Click to Enlarge
CPS450 Laser Diode Module
Held in
a KAD11NT Unthreaded
Kinematic Adapter and
Mounted into an
FMP1 Fixed Optic Mount



Click to Enlarge
CPS980 Module Held in an
AD11F SM1-Threaded
Adapter and Mounted into a
CP90F Quick-Release Cage
Plate Within a 30 mm Cage
System



Click to Enlarge
CPS980S Laser Diode
Module Held in an
AD8F SM1-Threaded
Adapter and Mounted into
an LM1XY XY Translation
Mount



as the collimated versions. Please make sure to loosen the setscrews locking the knob in place before unthreading; not doing so can damage the threading. Alternatively, the module can be mounted by threading the cord and phono plug through the adapter first.



Click to Enlarge
CPS850 Laser Diode Module
Held in an
AD11NT Unthreaded
Adapter and Mounted into a
KM100 Kinematic Mount

[Hide Laser Safety](#)

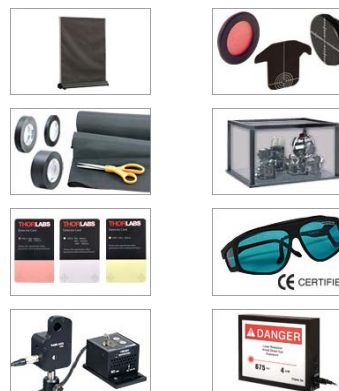
LASER SAFETY

Laser Safety and Classification

Safe practices and proper usage of safety equipment should be taken into consideration when operating lasers. The eye is susceptible to injury, even from very low levels of laser light. Thorlabs offers a range of laser safety accessories that can be used to reduce the risk of accidents or injuries. Laser emission in the visible and near infrared spectral ranges has the greatest potential for retinal injury, as the cornea and lens are transparent to those wavelengths, and the lens can focus the laser energy onto the retina.

Safe Practices and Light Safety Accessories




- Thorlabs recommends the use of safety eyewear whenever working with laser beams with non-negligible powers (i.e., > Class 1) since metallic tools such as screwdrivers can accidentally redirect a beam.
- Laser goggles designed for specific wavelengths should be clearly available near laser setups to protect the wearer from unintentional laser reflections.
- Goggles are marked with the wavelength range over which protection is afforded and the minimum optical density within that range.
- Laser Barriers and Blackout Materials can prevent direct or reflected light from leaving the experimental setup area.
- Thorlabs' Enclosure Systems can be used to contain optical setups to isolate or minimize laser hazards.
- A fiber-pigtailed laser should always be turned off before connecting it to or disconnecting it from another fiber, especially when the laser is at power levels above 10 mW.
- All beams should be terminated at the edge of the table, and laboratory doors should be closed whenever a laser is in use.
- Do not place laser beams at eye level.
- Carry out experiments on an optical table such that all laser beams travel horizontally.
- Remove unnecessary reflective items such as reflective jewelry (e.g., rings, watches, etc.) while working near the beam path.
- Be aware that lenses and other optical devices may reflect a portion of the incident beam from the front or rear surface.
- Operate a laser at the minimum power necessary for any operation.
- If possible, reduce the output power of a laser during alignment procedures.
- Use beam shutters and filters to reduce the beam power.
- Post appropriate warning signs or labels near laser setups or rooms.
- Use laser sign lightboxes if operating Class 3R or 4 lasers (i.e., lasers requiring the use of a safety interlock).
- Do not use Laser Viewing Cards in place of a proper Laser Barrier or Beam Trap.



Laser Classification

Lasers are categorized into different classes according to their ability to cause eye and other damage. The International Electrotechnical Commission (IEC) is a global organization that prepares and publishes international standards for all electrical, electronic, and related technologies. The IEC document 60825-1 outlines the safety of laser products. A description of each class of laser is given below:

Class	Description	Warning Label
1	This class of laser is safe under all conditions of normal use, including use with optical instruments for intrabeam viewing. Lasers in this class do not emit radiation at levels that may cause injury during normal operation, and therefore the maximum permissible exposure (MPE) cannot be exceeded. Class 1 lasers can also include enclosed, high-power lasers where exposure to the radiation is not possible without opening or shutting down the laser.	
1M	Class 1M lasers are safe except when used in conjunction with optical components such as telescopes and microscopes. Lasers belonging to this class emit large-diameter or divergent beams, and the MPE cannot normally be exceeded unless focusing or imaging optics are used to narrow the beam. However, if the beam is refocused, the hazard may be increased and the class may be changed accordingly.	
2	Class 2 lasers, which are limited to 1 mW of visible continuous-wave radiation, are safe because the blink reflex will limit the exposure in the eye to 0.25 seconds. This category only applies to visible radiation (400 - 700 nm).	
2M	Because of the blink reflex, this class of laser is classified as safe as long as the beam is not viewed through optical instruments. This laser class also applies to larger-diameter or diverging laser beams.	
3R	Lasers in this class are considered safe as long as they are handled with restricted beam viewing. The MPE can be exceeded with this class of laser, however, this presents a low risk level to injury. Visible, continuous-wave lasers are limited to 5 mW of output power in this class.	

3B	Class 3B lasers are hazardous to the eye if exposed directly. However, diffuse reflections are not harmful. Safe handling of devices in this class includes wearing protective eyewear where direct viewing of the laser beam may occur. In addition, laser safety signs lightboxes should be used with lasers that require a safety interlock so that the laser cannot be used without the safety light turning on. Class-3B lasers must be equipped with a key switch and a safety interlock.	
4	This class of laser may cause damage to the skin, and also to the eye, even from the viewing of diffuse reflections. These hazards may also apply to indirect or non-specular reflections of the beam, even from apparently matte surfaces. Great care must be taken when handling these lasers. They also represent a fire risk, because they may ignite combustible material. Class 4 lasers must be equipped with a key switch and a safety interlock.	
All class 2 lasers (and higher) must display, in addition to the corresponding sign above, this triangular warning sign		

[Hide Laser Diode Modules: 405 nm - 532 nm](#)

Laser Diode Modules: 405 nm - 532 nm

Click Image for Full View (Not to Scale)					
Item #	CPS405	CPS450	CPS520	CPS532	CPS532-C2
Collimation	Fixed	Fixed	Fixed	Fixed	Fixed
Wavelength (Typical)	405 nm	450 nm	520 nm	532 nm	532 nm
Power (Typical)	4.5 mW (Class 3R)	4.5 mW (Class 3R)	4.5 mW (Class 3R)	4.5 mW (Class 3R)	0.9 mW (Class 2)
Beam Shape^a (Click for Profile)	3.8 mm x 1.8 mm	3.2 mm x 1.0 mm	4.6 mm x 1.7 mm	Ø3.5 mm	Ø3.5 mm
Housing Dimensions	Ø11.0 mm x 40 mm	Ø11.0 mm x 40 mm	Ø11.0 mm x 40 mm	Ø11.0 mm x 72.8 mm	Ø11.0 mm x 72.8 mm
Specifications					

^aThe beam size was measured at a distance of 2" (50.8 mm) from the front of the housing.

Part Number	Description	Price	Availability
CPS405	Collimated Laser Diode Module, 405 nm, 4.5 mW, Elliptical Beam, Ø11 mm Housing	\$185.00	Today
CPS450	Collimated Laser Diode Module, 450 nm, 4.5 mW, Elliptical Beam, Ø11 mm Housing	\$212.00	Today
CPS520	Collimated Laser Diode Module, 520 nm, 4.5 mW, Elliptical Beam, Ø11 mm Housing	\$185.00	Today
CPS532	Collimated Laser Diode Module, 532 nm, 4.5 mW, Round Beam, Ø11 mm Housing	\$155.00	3-5 Days
CPS532-C2	Collimated Laser Diode Module, 532 nm, 0.9 mW, Round Beam, Ø11 mm Housing	\$155.00	Today

[Hide Laser Diode Modules: 635 nm](#)

Laser Diode Modules: 635 nm

The laser diode modules shown below have a center wavelength of 635 nm, providing alternatives to HeNe lasers. The power supplies are not included and are sold below.

Click Image for Full View (Not to Scale)				
Item #	CPS180	CPS182	CPS635S	CPS635F ^a
Collimation	Fixed	Fixed	Fixed	Adjustable
Wavelength (Typical)	635 nm	635 nm	635 nm	635 nm
Power (Typical)	1 mW (Class 3R)	4.5 mW (Class 3R)	4.5 mW (Class 3R)	4.5 mW (Class 3R)
Beam Shape^b (Click for Profile)	Ø4 mm	4 mm x 0.6 mm	3.8 mm x 1.2 mm	Collimated 5.0 mm x 1.9 mm
Housing Dimensions	Ø11.0 mm x 55 mm	Ø11.0 mm x 42 mm	Ø8.0 mm x 30 mm	Ø11.0 mm x 54 mm
Specifications				

^aFocus can be adjusted by loosening the knurled knob at the front of the laser housing. As the knob is turned, the lens will translate without rotation. Please note that the rotation of the knob can be locked with two setscrews using the provided 0.9 mm hex wrench.

^bThe beam size was measured at a distance of 2" (50.8 mm) from the front of the housing.

Part Number	Description	Price	Availability
CPS180	Collimated Laser Diode Module, 635 nm, 1 mW, Round Beam, Ø11 mm Housing	\$140.00	3-5 Days
CPS182	Collimated Laser Diode Module, 635 nm, 4.5 mW, Elliptical Beam, Ø11 mm Housing	\$116.00	Today
CPS635S	Collimated Laser Diode Module, 635 nm, 4.5 mW, Elliptical Beam, Ø8 mm Housing	\$82.00	Today
CPS635F	Adjustable Focus Laser Diode Module, 635 nm, 4.5 mW, Elliptical Beam, Ø11 mm Housing	\$99.80	Today

[Hide Laser Diode Modules: 650 nm - 780 nm](#)

Laser Diode Modules: 650 nm - 780 nm

Click Image for Full View (Not to Scale)					
Item #	CPS184	CPS650F ^a	CPS186	CPS198 ^b	CPS670F ^a
Type	Fixed	Adjustable	Fixed	Adjustable	Adjustable
Wavelength (Typical)	650 nm	650 nm	670 nm	670 nm	670 nm
Power (Typical)	4.5 mW (Class 3R)	4.5 mW (Class 3R)	4.5 mW (Class 3R)	4.5 mW (Class 3R)	4.5 mW (Class 3R)
Beam Shape ^c (Click for Profile)	4.4 mm x 1.2 mm	Collimated <u>5.0 mm x 2.4 mm</u>	4.4 mm x 1.2 mm	Collimated 2.54 mm x 0.54 mm	Collimated 5.0 mm x 2.4 mm
Housing Dimensions	Ø8.0 mm x 42 mm	Ø11.0 mm x 54 mm	Ø8.0 mm x 42 mm	Ø11.0 mm x 46 mm	Ø11.0 mm x 54 mm
Specifications					

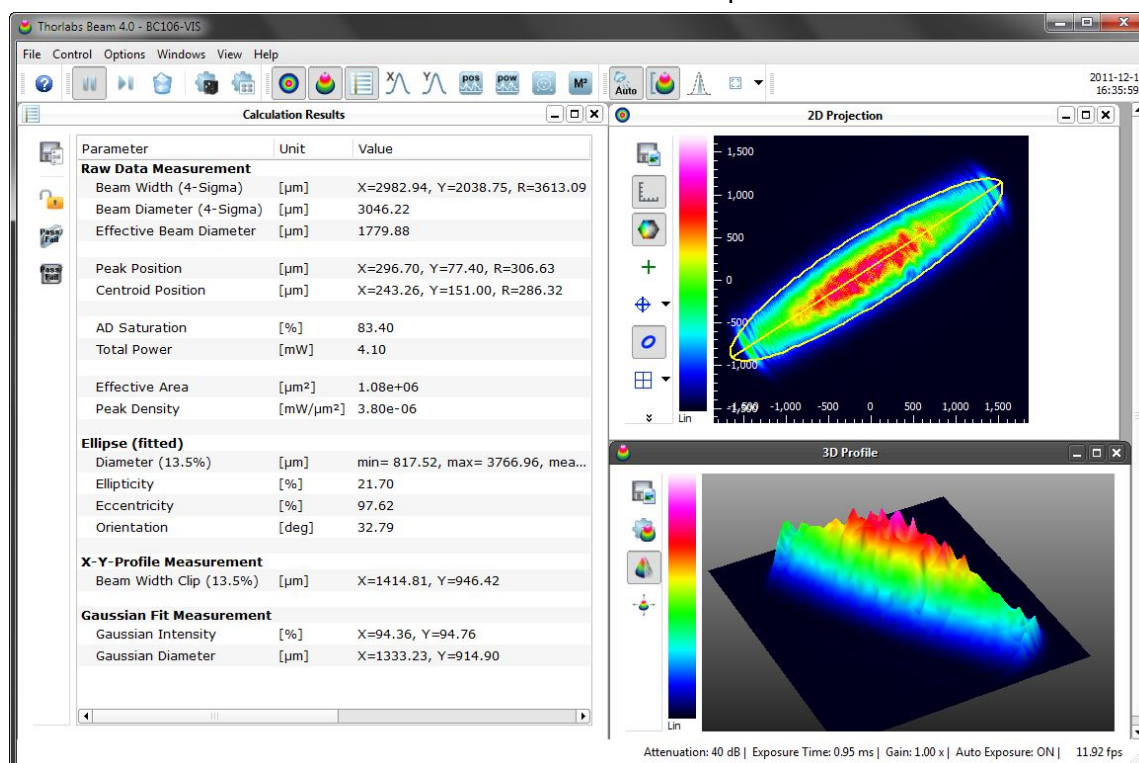
^aFocus can be adjusted by loosening the knurled knob at the front of the laser housing. As the knob is turned, the lens will translate without rotation. Please note that the rotation of the knob can be locked with two setscrews using the provided 0.9 mm hex wrench.

^bFocus can be adjusted by loosening the knurled locking nut at the front of the laser housing. A lens is located within a threaded body, which will translate the lens as it is rotated. Focus can be locked by reattaching the knurled locking nut.

^cThe beam size was measured at a distance of 2" (50.8 mm) from the front of the housing.

Part Number	Description	Price	Availability
CPS184	Collimated Laser Diode Module, 650 nm, 4.5 mW, Elliptical Beam, Ø8 mm Housing	\$108.00	Today
CPS650F	Focus Adjustable Laser Diode Module, 650 nm, 4.5 mW, Elliptical Beam, Ø11 mm Housing	\$99.70	3-5 Days
CPS186	Collimated Laser Diode Module, 670 nm, 4.5 mW, Elliptical Beam, Ø8 mm Housing	\$117.00	Today
CPS198	Adjustable Focus Laser Module, 670 nm, 4.5 mW, Elliptical Beam, Ø11 mm Housing	\$138.00	Lead Time
CPS670F	Adjustable Focus Laser Diode Module, 670 nm, 4.5 mW, Elliptical Beam, Ø11 mm Housing	\$113.20	Today

CPS198 Beam Shape



Specifications

Drawing

General Specifications

Characteristic

Housing Material	Aluminum
Housing Dimensions	Ø11.0 mm x 46 mm
Collimated Beam Size ^a	Elliptical, 2.54 mm x 0.54 mm
Operating Temperature	-10 to 60 °C
Storage Temperature	-40 to 85 °C
Operating Voltage	-4.5 V to -5.5 V
Laser Safety Class	3R
Individual Data Sheet ^b	Yes
Mounting Adapters	AD11F , AD11NT , KAD11E , KAD11NT
Compatible Power Supply (Not Included)	LD55

a. The beam size was measured at a distance of 2" (50.8 mm) from the front of the housing.

b. This product ships with individual test data sheet that includes the center wavelength, power stability, and operating current.

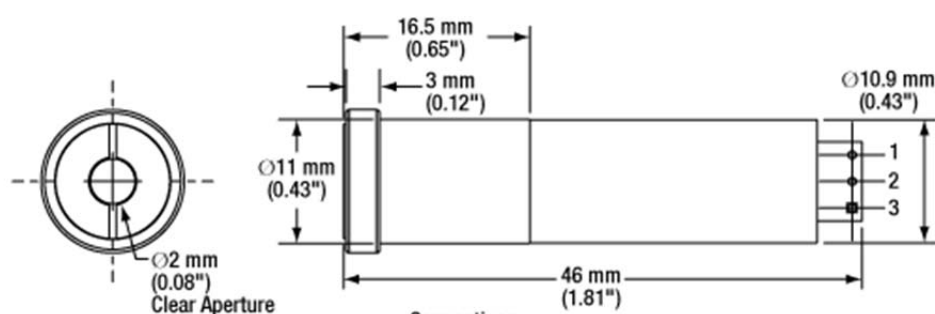
Optical Electrical Characteristics

Characteristic	MIN	TYP	MAX	UNIT
Wavelength	-	670	680	nm
Optical Output Power (CW)	-	-	4.5	mW
Axis Deviation ^a	-	7	15	mrad
Collimated Beam Divergence (Parallel)	-	-	0.6	mrad
Collimated Beam Divergence (Perpendicular)	-	-	1.8	mrad
Focal Range (From Exit Window)	50	-	Collimated	mm
Focused Spot Diameter (400 mm, FWHM)	-	75 x 300	-	µm
Operating Current (CW)	-	55	-	mA

a. Max Axis Deviation is the parallelism between the module housing and the output beam.

Specifications

Drawing

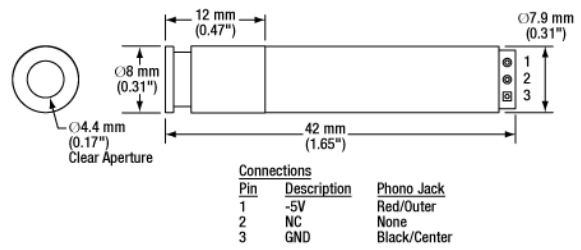


Connections

Pin	Description	Phono Jack
1	-5V	Red/Outer
2	NC	None
3	GND	Black/Center

Laser Diode Modules: 780 nm

Click Image for Full View (Not to Scale)		
Item #	CPS192	CPS780S
Type	Fixed	Fixed
Wavelength (Typical)	780 nm	780 nm
Power (Typical)	4.5 mW (Class 3R)	4.5 mW (Class 3R)
Beam Shape^a (Click for Profile)	4.4 mm x 1.7 mm	3.8 mm x 1.6 mm
Housing Dimensions	Ø8.0 mm x 42 mm	Ø8.0 mm x 30 mm
Specifications		



CPS192 Mechanical Drawing

^aThe beam size was measured at a distance of 2" (50.8 mm) from the front of the housing.

Part Number	Description	Price	Availability
CPS192	Collimated Laser Diode Module, 780 nm, 4.5 mW, Elliptical Beam, Ø8 mm Housing	\$106.00	Today
CPS780S	Collimated Laser Diode Module, 780 nm, 4.5 mW, Elliptical Beam, Ø8 mm Housing	\$98.00	Today

[Hide Laser Diode Modules: 808 nm - 980 nm](#)**Laser Diode Modules: 808 nm - 980 nm**

Click Image for Full View (Not to Scale)				
Item #	CPS808A	CPS808S	CPS830	CPS830S
Collimation	Fixed	Fixed	Fixed	Fixed
Wavelength (Typical)	808 nm	808 nm	830 nm	830 nm
Power (Typical)	4.5 mW (Class 3R)	4.5 mW (Class 3R)	4.5 mW (Class 3R)	4.5 mW (Class 3R)
Beam Shape^a (Click for Profile)	2.6 mm x 1.3 mm	2.8 mm x 1.6 mm	4.4 mm x 1.1 mm	4.0 mm x 1.3 mm
Housing Dimensions	Ø11.0 mm x 40 mm	Ø8.0 mm x 30 mm	Ø11.0 mm x 40 mm	Ø8.0 mm x 30 mm
Specifications				

Click Image for Full View (Not to Scale)				
Item #	CPS850	CPS850S	CPS980	CPS980S
Collimation	Fixed	Fixed	Fixed	Fixed
Wavelength (Typical)	850 nm	850 nm	980 nm	980 nm
Power (Typical)	4.5 mW (Class 3R)	4.5 mW (Class 3R)	4.5 mW (Class 3R)	4.5 mW (Class 3R)
Beam Shape^a (Click for Profile)	4.5 mm x 1.2 mm	3.8 mm x 1.5 mm	3.8 mm x 1.8 mm	3.8 mm x 1.8 mm
Housing Dimensions	Ø11.0 mm x 40 mm	Ø8.0 mm x 30 mm	Ø11.0 mm x 40 mm	Ø8.0 mm x 30 mm
Specifications				

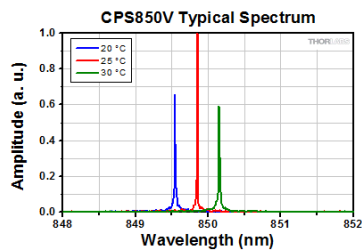
a. The beam size was measured at a distance of 2" (50.8 mm) from the front of the housing.

Part Number	Description	Price	Availability
CPS808A	Collimated Laser Diode Module, 808 nm, 4.5 mW, Elliptical Beam, Ø11 mm Housing	\$168.00	Today
CPS808S	Collimated Laser Diode Module, 808 nm, 4.5 mW, Elliptical Beam, Ø8 mm Housing	\$168.00	Today
CPS830	Collimated Laser Diode Module, 830 nm, 4.5mW, Elliptical Beam, Ø11 mm Housing	\$102.00	Today
CPS830S	Collimated Laser Diode Module, 830 nm, 4.5 mW, Elliptical Beam, Ø8 mm Housing	\$102.00	Today
CPS850	Collimated Laser Diode Module, 850 nm, 4.5 mW, Elliptical Beam, Ø11 mm Housing	\$102.00	Today
CPS850S	Collimated Laser Diode Module, 850 nm, 4.5 mW, Elliptical Beam, Ø8 mm Housing	\$102.00	Today
CPS980	Collimated Laser Diode Module, 980 nm, 4.5mW, Elliptical Beam, Ø11 mm Housing	\$99.00	Today
CPS980S	Collimated Slim Laser Module, 980 nm, 4.5mW, Elliptical Beam, Ø8 mm Housing	\$99.00	Today

[Hide VCSEL Laser Diode Module: 850 nm](#)

VCSEL Laser Diode Module: 850 nm

<p>Click Image for Full View (Not to Scale)</p>	
Item #	CPS850V
Collimation	Fixed
Wavelength (Typical)	850 nm
Power (Typical)	0.85 mW (Class 3R)
Beam Shape^a (Click for Profile)	Ø2.2 mm
Housing Dimensions	Ø11.0 mm x 40 mm
Specifications	



Click Here for Raw Data
 The CPS850V Collimated VCSEL Module has a single-wavelength output with a narrow linewidth. Graph above shows the typical spectrum taken at 20 °C, 25 °C, and 30 °C using a Thorlabs OSA201 Spectrum Analyzer. The apparent linewidth is limited by the measurement resolution, which is 7.5 GHz (0.25 cm⁻¹). This data is typical and will vary for each module.

a. The beam size was measured at a distance of 2" (50.8 mm) from the front of the housing.

Part Number	Description	Price	Availability
CPS850V	Customer Inspired!Collimated VCSEL Diode Module, 850 nm, 0.85 mW, Circular Beam, Ø11 mm Housing	\$211.00	3-5 Days

[Hide Laser Diode Module Mounting Adapters](#)

Laser Diode Module Mounting Adapters

These adapters provide mechanical compatibility between the laser diode housing and SM1 (1.035"-40) lens tubes, 30 mm cage systems, Ø1/2" posts, or Ø1/2" or Ø1" Mounts. Please see the application photos in the *Overview* tab for more details.

The KAD11F and KAD11NT Adapters both provide ±6° of pitch and yaw adjustment. Two 80 TPI fine adjustment screws on the front plate of the adapter control the pitch and yaw position and can be turned using a 5/64" (2.0 mm) hex key.

Please note that the knurled knob used for focus adjustment on the CPS635F, CPS650F, and CPS670F laser modules is too large for the mounting adapter bore. This knob can be unthreaded to mount the diode module in the same manner as the collimated versions, as shown in the animation to the right. Please make sure to loosen the setscrews locking the knob in place before unthreading; not doing so can damage the threading. Alternatively, the module can be mounted by threading the cord and phono plug through the adapter first.

Click Image to Enlarge						
Item #	AD8F	AD11BA	AD11F	AD11NT	KAD11F	KAD11NT
Description	Externally SM1-Threaded Adapter	Unthreaded Adapter with a 1/2" Outer Diameter	Externally SM1-Threaded Adapter	Unthreaded Adapter with a 1" Outer Diameter	Externally SM1-Threaded Kinematic Adapter with Pitch and Yaw Adjustment	Unthreaded Kinematic Adapter with a 1" Outer Diameter and Pitch and Yaw Adjustment
Diode Module Housing Diameter	8 mm	11 mm				

Part Number	Description	Price	Availability
AD8F	SM1-Threaded Adapter for Ø8 mm Cylindrical Components	\$27.50	Today
AD11BA	Ø1/2" Unthreaded Adapter for Ø11 mm Cylindrical Components	\$19.00	Today
AD11F	SM1-Threaded Adapter for Ø11 mm Cylindrical Components	\$27.80	Today
AD11NT	Customer Inspired!Ø1" Unthreaded Adapter for Ø11 mm Cylindrical Components	\$22.00	3-5 Days
KAD11F	SM1-Threaded Kinematic Pitch/Yaw Adapter for Ø11 mm Cylindrical Components	\$63.00	Today
KAD11NT	Ø1" Kinematic Pitch/Yaw Adapter for Ø11 mm Cylindrical Components	\$60.00	Today

[Hide 5 VDC Regulated Power Supply](#)

5 VDC Regulated Power Supply



- ▶ Compatible with CPS Series Laser Modules
- ▶ 5 VDC Power Output
- ▶ 6 ft (183 cm) Cable with 2.5 mm Phono Plug



The LDS5 is a 5 VDC power supply that is ideal for use with our CPS laser diode modules. A 6 ft (183 cm) cable with a 2.5 mm phono plug extends from the body of the power supply for connection to a CPS module.

The power supply has a selectable line voltage of 115 or 230 V. A 120 VAC power cable is included with the LDS5, while the LDS5-EC comes with a 230 VAC power cable. To order this item with a different power cable, please contact tech support.

Part Number	Description	Price	Availability
LDS5	5 VDC Regulated Power Supply, 2.5 mm Phono Plug, 120 VAC	\$83.35	Today
LDS5-EC	5 VDC Regulated Power Supply, 2.5 mm Phono Plug, 230 VAC	\$83.35	Today

Visit the *Laser Diode Modules*

http://www.thorlabs.com/newgrouppage9.cfm?objectgroup_id=1487