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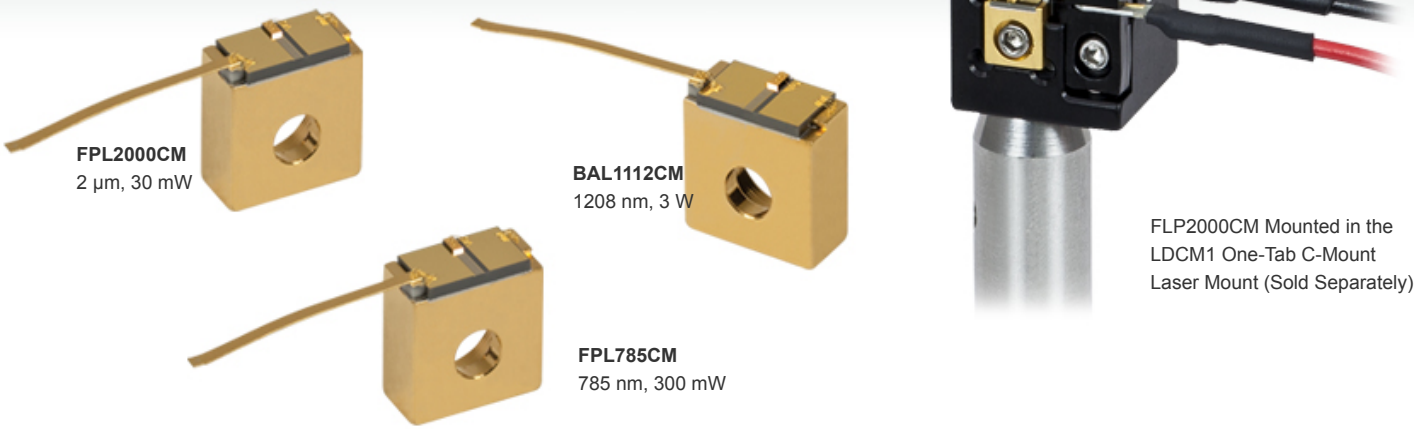
THORLABS

FPL785CM - NOV 30, 2018

Item # FPL785CM was discontinued on NOV 30, 2018. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

ONE-TAB C-MOUNT LASER DIODES

- ► Ideal for High-Power and OEM Applications
- ► Single Mode and Multimode Versions
- ► 785, 1208, or 2000 nm Central Wavelength



FPL2000CM
2 µm, 30 mW

BAL1112CM
1208 nm, 3 W

FPL785CM
785 nm, 300 mW

FLP2000CM Mounted in the LDCM1 One-Tab C-Mount Laser Mount (Sold Separately)

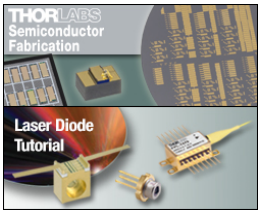
OVERVIEW

Features

- C-Mount Available in 785 nm, 1208 nm, and 2000 nm Center Wavelengths
- High Optical Output Power (Versions up to 3 W)
- Dimension (L × W × H): 3 mm × 6.4 mm × 6.79 mm

Limited STOCK

These items will be retired without replacement when stock is depleted. If you require one of these parts for line production, please contact our OEM Team.



Laser Diode Selection Guide[a]
Shop by Package / Type
TO Can (Ø3.8, Ø5.6, Ø9, and Ø9.5 mm)
TO Can Pigtail (SM)
TO Can Pigtail (PM)
TO Can Pigtail (MM)
Fabry-Perot Butterfly Package
FBG-Stabilized Butterfly Package
Chip on Submount
MIR Fabry-Perot Two-Tab C-Mount
MIR Fabry-Perot D-Mount
One-Tab C-Mount
Single-Frequency Lasers
DFB TO Can Pigtail (SM)
VHG-Stabilized TO Can or Pigtail (SM)
VHG-Stabilized Butterfly Package (SM)
ECL Butterfly Package
DBR Butterfly Package
MIR DFB Two-Tab C-Mount
MIR DFB D-Mount
MIR DFB High Heat Load
Shop By Wavelength

- Our complete selection of laser diodes is available on the *LD Selection Guide* tab above.

Webpage Features	
	Clicking this icon opens a window that contains specifications and mechanical drawings.
	Clicking this icon allows you to download our standard support documentation.

Our high-quality one-tab C-mount package laser diodes are available as broad-area, high-power devices or Fabry-Perot laser diodes. The industry-standard, one-tab C-mount package is easy to mount and provides good thermal contact, making it an ideal choice for high-power and OEM applications. Thorlabs' one-tab C-mount package has two welded gold contacts to the n- and p- doped semiconductor layers. The FPL series lasers are high-power, Fabry-Perot lasers (FPLs) based on state-of-the-art, quantum-well epitaxial layer growth and reliable ridge waveguide structure. Thorlabs offers these lasers in one of three configurations: chip on submount, C-Mount, and butterfly package. Our Broad Area Laser (BAL) diodes are used for solid-state laser pumping, material processing, and medical applications as well as in scientific research.

For mounting options, Thorlabs offers the LDCM1 Passive Thermal Mount. This mount provides a passive heat sink and mount that facilitates quick installation and removal for the FPL785CM and FPL2000CM. The compact [0.75" × 0.75" × 0.80" (19 mm x 19 mm x 20 mm) L × W × H], finned aluminum block provides up to 2 W of passive thermal dissipation. It is designed for low-power laser diodes and is fully compatible with the FPL785CM and FPL2000CM one-tab C-Mount laser diodes. It is not recommended for use with the BAL1112CM laser diode, as running it above 1.5 A (~100 – 150 mW output power) will quickly overwhelm the capacity of the 2 W passive thermal heat sink.

Please see our Laser Diode Tutorial for more information on these topics and laser diodes in general and contact Technical Support to inquire about customized C-mount laser diodes.

Handling C-Mount Laser Diodes

Proper precautions must be taken when handling and using C-mount laser diodes. Since these laser diodes are sensitive to electrostatic shock, they should always be handled using standard static-avoidance practices. Additionally, these lasers do not have a built-in monitor photodiode and should be used with a high-quality, constant current driver specifically designed for use with laser diodes. For constant power mode operation, please see our TO-can, pigtailed, and butterfly laser diode offerings in the selection guide to the right for options with monitor photodiodes.

Unlike TO can and butterfly packages, the laser chip of a C-mount laser diode is exposed to air; hence, there is no protection for the delicate laser chip. Contamination of the laser facets must be avoided. Do not blow on the laser or expose it to smoke, dust, oils, or adhesive films. The laser facet is particularly sensitive to dust accumulation.

During standard operation, dust can burn onto the laser facet causing tiny “specs” that will lead to premature degradation of the laser. If operating a C-mount laser for long periods of time outside a cleanroom, it should be sealed in a container to prevent dust accumulation.

As with all laser diodes, temperature regulation is necessary for sustained, reliable, long-term operation. The back face of the C-mount package is machined flat to make proper thermal contact with a heat sink. However, do not use thermal grease with this package, as it can creep, eventually contaminating the laser facet. When making electrical connections, care must be taken if soldering to the wire lead. Solder with the C-mount already attached to a heat sink to avoid unnecessary heating of the laser chip. The flux fumes created by soldering can also cause laser damage, so care must be taken to avoid this.

For warranty information and the Thorlabs Life Support and Military Use Policy for laser diodes, please refer to the *LD Operation* tab.

LD OPERATION

Laser Diode and Laser Diode Pigtail Warranty

When operated within their specifications, laser diodes have extremely long lifetimes. Most failures occur from mishandling or operating the lasers beyond their maximum ratings. Laser Diodes are among the most static-sensitive devices currently made. Proper ESD Protection should be worn whenever handling a laser diode. Due to their extreme electrostatic sensitivity, laser diodes cannot be returned after their sealed package has been open. Laser diodes in their original sealed package can be returned for a full refund or credit.

Handling and Storage Precautions

Due to their extreme susceptibility to damage from electrostatic discharge (ESD), care should be taken whenever handling and operating laser diodes:

- Wrist Straps: Use grounded anti-static wrist straps whenever handling diodes.
- Anti-Static Mats: Always work on grounded anti-static mats.
- Laser Diode Storage: When not in use, short the leads of the laser together to protect against ESD damage.

Operating and Saftey Precautions

Use an Appropriate Driver:
Laser diodes require precise control of operating current and voltage to avoid overdriving the laser diode. In addition, the laser driver should provide protection against power supply transients. Select a laser driver appropriate for your application. Do not use a voltage supply with a current limiting resistor since it does not provide sufficient regulation to protect the laser.

Power Meters:
When setting up and calibrating a laser diode with its driver, use a NIST-traceable power meter to precisely measure the laser output. It is usually safest to measure the laser output directly before placing the laser in an optical system. If this is not possible, be sure to take all optical losses (transmissive, aperture stopping, etc.) into consideration when determining the total output of the laser.

Reflections:
Flat surfaces in the optical system in front of a laser diode can cause some of the laser energy to reflect back onto the laser's monitor photodiode giving an erroneously high photodiode current. If optical components are moved within the system and energy is no longer reflected onto the monitor photodiode, a constant power feedback loop will sense the drop in photodiode current and try to compensate by increasing the laser drive current and possibly overdriving the laser. Back reflections can also cause other malfunctions or damage to laser diodes. To avoid this, be sure that all surfaces are angled 5-10°, and when necessary, use optical isolators to attenuate direct feedback into the laser.

Heat Sinks:
Laser diode lifetime is inversely proportional to operating temperature. Always mount the laser in a suitable heat sink to remove excess heat from the laser package.

Voltage and Current Overdrive:
Be careful not to exceed the maximum voltage and drive current listed on the specification sheet with each laser diode, even momentarily. Also, reverse voltages as little as 3 V can damage a laser diode.

ESD Sensitive Device:
Currently operating lasers are susceptible to ESD damage. This is particularly aggravated by using long interface cables between the laser diode and its driver due to the inductance that the cable presents. Avoid exposing the laser or its mounting apparatus to ESDs at all times.

ON/OFF and Power Supply Coupled Transients:
Due to their fast response times, laser diodes can be easily damaged by transients less than 1 µs. High current devices such as soldering irons, vacuum pumps, and fluorescent lamps can cause large momentary transients. Thus, always use surge-protected outlets.

If you have any questions regarding laser diodes, please call your local Thorlabs Technical Support office for assistance.

Life Support and Military Use Application Policy

Thorlabs' products are not authorized for use as critical components in life support devices or systems or in any military applications without the express written approval of the president of Thorlabs:

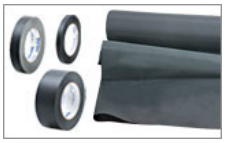
1. Life support devices or systems are devices or systems intended for either surgical implantation into the body or to sustain life and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system or to affect its safety or effectiveness.
3. Thorlabs' laser diodes are not intended nor warranted for usage in Military Applications.

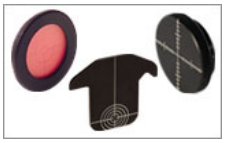
LASER SAFETY

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.
- 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 a laser sign with a lightbox 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 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.	

Class	Description	Warning Label
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		

785 nm, C-Mount

- Fabry-Perot Laser Diode
- 785 nm Center Wavelength
- Quantum Well Structure

The FPL785CM Fabry-Perot laser is based on state-of-the-art, quantum-well epitaxial layer growth and reliable ridge waveguide structure. This FPL chip is manufactured to form an FP laser cavity tuned to emit 300 mW of CW light at 785 nm. The FP laser cavity yields a typical spectral bandwidth of ~0.5 nm.

Item #	Info	Center Wavelength	Output Power (Typical)[a]	Typical/Max Drive Current[a]	Bandwidth	Slope Efficiency	Spatial Mode
FPL785CM		785 nm	300 mW	400 mA / 450 mA	0.5 nm	0.95 W/A	Single Mode

- Do not exceed the maximum optical power or maximum drive current, whichever occurs first.

Part Number	Description	Price	Availability
FPL785CM	**785 nm, 300 mW, One-Tab C-Mount, Laser Diode**	**$468.18**	**Lead Time**

1208 nm, C-Mount

- Broad Area Laser
- 1208 nm Center Wavelength
- Multiple Quantum Well Layer Structure

The BAL1112CM Broad Area Laser (BAL) diode is a compact, high-power source that can be produced at a relatively low cost while providing larger emitter widths than those of conventional laser diodes. This diode is ideal for a variety of applications requiring high output power, and can be customized for targeted specifications such as wavelength and power to meet the user's needs. This device is built by using a highly efficient InP/InGaAsP Multiple Quantum Well (MQW) layer structure. In addition to the advanced ridge waveguide, this BAL diode features advanced epitaxial structures, wafer processing techniques, and die bonding processes. The BAL1112CM is a multimode laser with an output power in excess of 2.5 W.

Item #	Info	Center Wavelength	Output Power (Typical)[a]	Typical/Max Drive Current[a]	Bandwidth	Slope Efficiency	Spatial Mode
BAL1112CM		1208 nm	3000 mW	5000 mA / 7000 mA	1.5 nm	0.6 W/A	Multimode

- Do not exceed the maximum optical power or maximum drive current, whichever occurs first.

Part Number	Description	Price	Availability
BAL1112CM	**Customer Inspired! 1208 nm, 3000 mW, One-Tab C-Mount, MM, Laser Diode**	**$676.26**	**5-8 Days**

2000 nm, C-Mount

- Fabry-Perot Laser Diode
- 2000 nm Center Wavelength
- Quantum Well Structure

The FPL2000CM Fabry-Perot laser is based on state-of-the-art, quantum-well epitaxial layer growth and reliable ridge waveguide structure. This FPL chip is manufactured to form an FP laser cavity tuned to emit 30 mW of CW light at 2000 nm. The FP laser cavity yields a typical spectral bandwidth of ~15 nm.

Item #	Info	Center Wavelength	Output Power (Typical)[a]	Typical/Max Drive Current[a]	Bandwidth	Slope Efficiency	Spatial Mode
FPL2000CM		2000 nm	30 mW	400 mA / 500 mA	15 nm	0.05 W/A	Single Mode

- Do not exceed the maximum optical power or maximum drive current, whichever occurs first.

Part Number	Description	Price	Availability
FPL2000CM	**2000 nm, 30 mW, One-Tab C-Mount, Laser Diode**	**$1,564.68**	**5-8 Days**

Visit the *One-Tab C-Mount Laser Diodes* page for pricing and availability information:
https://www.thorlabs.com/newgrouppage9.cfm?objectgroup_id=5245