LP780-SAD15 - August 22, 2024

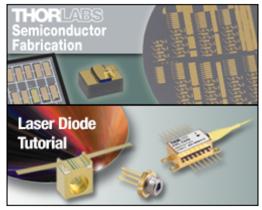
Item # LP780-SAD15 was discontinued on August 22, 2024. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

PIGTAILED, DISTRIBUTED FEEDBACK (DFB) SINGLE-FREQUENCY LASERS WITH INTERNAL ISOLATOR

OVERVIEW

Features

- Center Wavelengths: 780 nm, 1310 nm, or 1550 nm
- Mode-Hop-Free Output Over Operating Current Range
- Single Mode or Polarization-Maintaining Fiber Pigtail
- Integrated Optical Isolator Protects Laser from Back Reflections
- Typical Linewidth (CW):
    - 2 MHz at -3 dB (780 nm Version)
    - 0.1 nm at -20 dB (1310 nm and 1550 nm Versions)
- 2.0 mm Narrow-Key FC/APC Connector



Laser Diode Selection Guide[a]
Shop by Package / Type
TO Can (Ø3.8, TO-46, Ø5.6, Ø9, and Ø9.5 mm)
TO Can Pigtail, Collimator Output (SM)
TO Can Pigtail (SM)
TO Can Pigtail (PM)
TO Can Pigtail (MM)
Fabry-Perot Butterfly Package
FBG-Stabilized Butterfly Package
VHG-Stabilized Butterfly Package (MM)
MIR Fabry-Perot QCL, TO Can
MIR Fabry-Perot QCL, Two-Tab C-Mount
MIR Fabry-Perot QCL, D-Mount
MIR Fabry-Perot QCL, High Heat Load
Chip on Submount
Single-Frequency Lasers
DFB TO Can Pigtail
DFB Butterfly Package
VHG-Stabilized TO Can
VHG-Stabilized TO Can Pigtail (SM)
VHG-Stabilized Butterfly Package
ECL Butterfly Package
DBR Butterfly Package
ULN Hybrid Extended Butterfly Package
MIR DFB QCL, Two-Tab C-Mount
MIR DFB QCL, D-Mount
MIR DFB QCL, High Heat Load
Shop By Wavelength

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

Applications

- Raman Spectroscopy
- Microscopy
- Telecommunications
- Wavelength Tuning

Thorlabs' Distributed Feedback (DFB) Lasers are narrow-linewidth, single-frequency laser diodes that use a corrugated waveguide throughout the active region of the laser cavity (see *SFL Guide* tab). A DFB laser's periodic structure acts as a distributed reflector, providing optical feedback and wavelength selection for the diode. This allows these lasers to achieve a 2 MHz or 0.1 nm typical linewidth with an excellent side mode suppression ratio (40 dB typical). These DFB lasers are designed for mode-hop-free, continuous current tuning from 15 °C to 35 °C. These diodes can be both temperature and current tuned to achieve the desired operating wavelength with typical output powers of 2 mW for the 1310 nm and 1550 nm devices or 15 mW for the 780 nm device. Typical performance graphs and specifications can be viewed by clicking on the blue icon ( ) in the tables below. More information on this stabilized temperature range can be found on the individualized data sheet for each laser diode. By clicking "Choose Item" below, a list will appear that contains the specific center wavelength, output power, and operating current of each in-stock unit.

These DFB lasers are housed in a compact, pigtailed, TO can package with a B-pin or D-pin code. Thorlabs also offers a compatible mount with an integrated thermistor and TEC (Item # LDM9LP), which provides temperature control that can help maximize the life of the laser diode. An integrated optical isolator and FC/APC connector provide protection against back reflections that could de-stabilize the laser performance. The FC/APC connector key of the LP1310-PAD2 and LP1550-PAD2 is aligned with the slow axis of the fiber.

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.
Choose Item	Clicking the words "Choose Item" opens a drop-down list containing all of the in-stock lasers around the desired center wavelength. The red icon next to the serial number then allows you to download L-I-V and spectral measurements for that serial-numbered device.

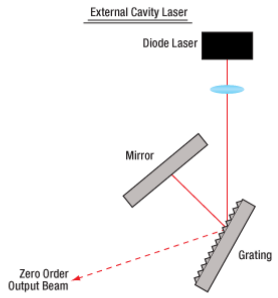
While the center wavelength is listed for the laser diodes below, this is only a typical number. The center wavelength of a particular unit varies from production run to production run, so the diode you receive may not operate at the typical center wavelength. After clicking "Choose Item" below, a list will appear that contains the center wavelength, output power, and operating current of each in-stock unit. Clicking on the red Docs Icon ( ) next to the serial number provides access to a PDF with serial-number-specific L-I-V and spectral characteristics.

Laser diodes are sensitive to electrostatic shock. Please take the proper precautions when handling the device, such as using an ESD wrist strap.

We recommend cleaning the fiber connector before each use if there is any chance that dust or other contaminants may have deposited on the surface. The laser intensity at the center of the fiber tip can be very high and may burn the tip of the fiber if contaminants are present. While the connectors on these pigtailed laser diodes are cleaned and capped before shipping, we cannot guarantee that they will remain free of contamination after it is removed from the package. We also recommend that the laser is turned off when connecting or disconnecting the device from other fibers.

Thorlabs also offers external cavity and distributed Bragg reflector (DBR) butterfly-packaged single-frequency lasers as well as volume holographic grating (VHG) pigtailed single-frequency lasers. The butterfly-packaged external cavity lasers offer the narrowest linewidth (<100 kHz). Our DBR single-frequency lasers offer similar linewidths and tuning ranges to the DFB lasers, but have a higher output power at the expense of mode-hop-free operation. The VHG-stabilized lasers offer a higher output power as compared to our DFB lasers with less variation in wavelength due to current and temperature. See the *SFL Guide* tab for more information.

ECL, DFB, VHG-Stabilized, DBR, and Hybrid Single-Frequency Lasers



Click to Enlarge
Figure 1: ECL Lasers have a Grating Outside of the Gain Chip

A wide variety of applications require tunable single-frequency operation of a laser system. In the world of diode lasers, there are currently four main configurations to obtain a single-frequency output: external cavity laser (ECL), distributed feedback (DFB), volume holographic grating (VHG), and distributed Bragg reflector (DBR). All four are capable of single-frequency output through the utilization of grating feedback. In addition, an ECL can be combined with a fiber Bragg grating (FBG) to create a hybrid design. However, each type of laser uses a different grating feedback configuration, which influences performance characteristics such as output power, tuning range, and side mode suppression ratio (SMSR). We discuss below some of the main differences between these types of single-frequency diode lasers.

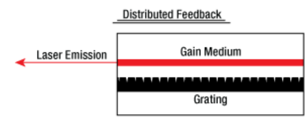
External Cavity Laser

The External Cavity Laser (ECL) is a versatile configuration that is compatible with most standard free space diode lasers. This means that the ECL can be used at a variety of wavelengths, dependent upon the internal laser diode gain element. A lens collimates the output of the diode, which is then incident upon a grating (see Figure 1). The grating provides optical feedback and is used to select the stabilized output wavelength. With proper optical design, the external cavity allows only a single longitudinal mode to lase, providing single-frequency laser output with high side mode suppression ratio (SMSR > 45 dB).

One of the main advantages of the ECL is that the relatively long cavity provides extremely narrow linewidths (several hundred kHz). Additionally, since it can incorporate a variety of laser diodes, it remains one of the few configurations that can provide narrow linewidth emission at blue or red wavelengths. The ECL can have a large tuning range (>100 nm) but is often prone to mode hops, which are very dependent on the ECL's mechanical design as well as the quality of the antireflection (AR) coating on the laser diode.

Distributed Feedback Laser

The Distributed Feedback (DFB) Laser incorporates the grating within the laser diode structure itself (see Figure 2). This corrugated periodic structure coupled closely to the active region acts as a Bragg reflector, selecting a single longitudinal mode as the lasing mode. If the active region has enough gain at frequencies near the Bragg frequency, an end reflector is unnecessary, relying instead upon the Bragg reflector for all optical feedback and mode selection. Due to this “built-in” selection, a DFB can achieve single-frequency operation over broad temperature and current ranges. To aid in mode selection and improve manufacturing yield, DFB lasers often utilize a phase shift section within the diode structure as well.



Click to Enlarge
Figure 2: DFB Lasers Have a Bragg Reflector Along the Length of the Active Gain Medium

The lasing wavelength for a DFB is approximately equal to the Bragg wavelength:

$$\lambda = 2n_{eff}\Lambda$$

where λ is the wavelength, n_{eff} is the effective refractive index, and Λ is the grating period. By changing the effective index, the lasing wavelength can be tuned. This is accomplished through temperature and current tuning of the DFB.

The DFB has a relatively narrow tuning range: about 2 nm at 850 nm, about 4 nm at 1550 nm, or at least 1 cm^{-1} in the mid-IR (4.00 - 11.00 µm). However, over this tuning range, the DFB can achieve single-frequency operation, which means that this is a continuous tuning range without mode hops. Because of this feature, DFBs have become a popular and majority choice for real-world applications such as telecom and sensors. Since the cavity length of a DFB is rather short, the linewidths are typically from several hundred kHz to 10 MHz. Additionally, the close coupling between the grating structure and the active region results in lower maximum output power compared to ECL and DBR lasers. Thorlabs catalog offering of DFB lasers includes TO can, pigtailed TO can, and butterfly packaged versions for NIR wavelengths, as well as two-tab C-mount, D-mount, and HHL packages for the MIR.

Volume-Holographic-Grating-Stabilized Laser

A Volume-Holographic-Grating-(VHG)-Stabilized Laser also uses a Bragg reflector, but in this case a transmission grating is placed in front of the laser diode output (see Figure 3). Since the grating is not part of the laser diode structure, it can be thermally decoupled from the laser diode, improving the wavelength stability of the device. The grating typically consists of a piece of photorefractive material (typically glass) which has a periodic variation in the index of refraction. Only the wavelength of light that satisfies the Bragg condition for the grating is reflected back into the laser cavity, which results in a laser with extremely wavelength-stable emission. A VHG-Stabilized laser can produce output with a similar linewidth to a DFB laser at higher powers that is wavelength-locked over a wide range of currents and temperatures.

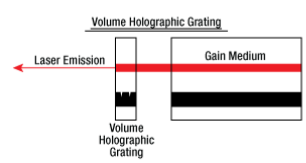


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Figure 3: VHG Lasers have a Volume Holographic Grating Outside of the Active Gain Medium

Distributed Bragg Reflector Laser

Similar to DFBs, Distributed Bragg Reflector (DBR) lasers incorporate an internal grating structure. However, whereas DFB lasers incorporate the grating structure continuously along the active region (gain region), DBR lasers place the grating structure(s) outside this region (see Figure 4). In general a DBR can incorporate various regions not typically found in a DFB that yield greater control and tuning range. For instance, a multiple-electrode DBR laser can include a phase-controlled region that allows the user to independently tune the phase apart from the grating period and laser diode current. When utilized together, the DBR can provide single-frequency operation over a broad tuning range. For example, high end sample-grating DBR lasers can have a tuning range as large as 30 - 40 nm. Unlike the DFB, the output is not mode hop free; hence, careful control of all inputs and temperature must be maintained.

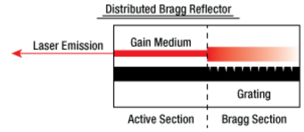

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Figure 4: DBR Lasers have a Bragg Reflector Outside of the Active Gain Medium

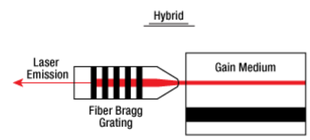
In contrast to the complicated control structure for the multiple-electrode DBR, a simplified version of the DBR is engineered with just one electrode. This single-electrode DBR eliminates the complications of grating and phase control at the cost of tuning range. For this architecture type, the tuning range is similar to a DFB laser but will mode hop as a function of the applied current and temperature. Despite the disadvantage of mode hops, the single-electrode DBR does provide some advantages over its DFB cousin, namely higher output power because the grating is not continuous along the length of the device. Both DBR and DFB lasers have similar laser linewidths. Currently, Thorlabs offers only single-electrode DBR lasers.

Ultra-Low-Noise Hybrid Laser

Thorlabs Ultra-Low-Noise (ULN) Hybrid Lasers each consist of a single angled facet (SAF) gain chip coupled to an exceptionally long fiber Bragg grating (FBG). They are designed to create a laser cavity, similar to an ECL, through the length of fiber. This cavity provides the ULN hybrid laser with a very narrow line width on the order of 100 Hz and low relative intensity noise of -165 dBc/Hz (typical). The FBG reflects a portion of the light emitted from the gain medium while remaining thermally isolated from it. The grating period can be changed by introducing thermal stress to the fiber, allowing users to temperature tune the laser output while being able to independently stabilize the gain medium's temperature. Because the laser's configuration provides excellent low-noise performance, it is likely the laser will not be the limiting factor at low-noise levels. It is critical to monitor the laser's environment to limit external noise contributions like acoustic and seismic vibrations, as well as driving the laser with a low-noise current source.

Conclusion

ECL, DFB, VHG, DBR, and hybrid laser diodes provide single-frequency operation over their designed tuning range. The ECL can be designed for a larger selection of wavelengths than either the DFB or DBR. While prone to mode hops, it also provides the narrowest linewidth (several hundred kHz) of these three choices. In appropriately designed instruments, ECLs can also provide extremely broad tuning ranges (>100 nm).



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Bragg Grating Coupled to the Active Gain Medium

The DFB laser is the most stable single-frequency, tunable laser configuration. It can provide mode-hop-free performance over its entire tuning range (<5 nm), making it one of the most popular forms of single-frequency laser for much of industry. It often has low output power due to inherent properties of the continuous grating feedback structure, but higher powers can be achieved with different packaging styles.

The VHG laser provides the most stable wavelength performance over a range of temperatures and currents and can provide higher powers than are typical in DFB lasers. This stability makes it excellent for use in OEM applications.

The single-electrode DBR laser provides similar linewidth and tuning range as the DFB (<5 nm). However, the single-electrode DBR will have periodic mode hops in its tuning curve.

Hybrid lasers can be used to achieve extremely low-noise signals. In order to take advantage of this characteristic, the laser must be isolated from unwanted noise sources, such as acoustic and seismic vibrations and drive current noise.

LD OPERATION

Video Insight: Setting Up a TO Can Laser Diode

Installing a TO can laser diode in a mount and setting it up to run under temperature and current control presents many opportunities to make a mistake that could damage or destroy the laser. This step-by-step guide includes tips for keeping humans and laser diodes safe from harm.

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 and 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 opened. Laser diodes in their original sealed package can be returned for a full refund or credit.

Handling and Storage Precautions

Because of 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 Safety Precautions

Use an Appropriate Driver
Laser diodes require precise control of operating current and voltage to avoid overdriving the laser. 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 diode.

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 diode 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 diode 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
Laser diodes are susceptible to ESD damage even during operation. 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 diode or its mounting apparatus to ESD 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, and thus surge-protected outlets should always be used when working with laser diodes.

If you have any questions regarding laser diodes, please contact Thorlabs Technical Support for assistance.

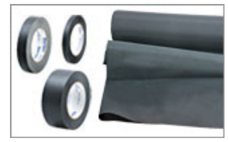
LASER SAFETY

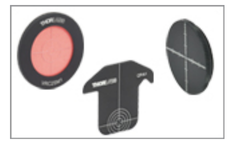
Laser Safety and Classification

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





- Laser safety eyewear must be worn whenever working with Class 3 or 4 lasers.
- Regardless of laser class, Thorlabs recommends the use of laser safety eyewear whenever working with laser beams with non-negligible powers, 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 Safety Curtains and Laser Safety Fabric shield other parts of the lab from high energy lasers.
- 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.	

<table>
<tr><th>Class</th><th>Description</th><th>Warning Label</th></tr>
<tr><td>2</td><td>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).</td><td>
</td></tr>
<tr><td>2M</td><td>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.</td><td>
</td></tr>
<tr><td>3R</td><td>Class 3R lasers produce visible and invisible light that is hazardous under direct and specular-reflection viewing conditions. Eye injuries may occur if you directly view the beam, especially when using optical instruments. 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 in this class are limited to 5 mW of output power.</td><td>
</td></tr>
<tr><td>3B</td><td>Class 3B lasers are hazardous to the eye if exposed directly. Diffuse reflections are usually not harmful, but may be when using higher-power Class 3B lasers. Safe handling of devices in this class includes wearing protective eyewear where direct viewing of the laser beam may occur. Lasers of this class must be equipped with a key switch and a safety interlock; moreover, laser safety signs should be used, such that the laser cannot be used without the safety light turning on. Laser products with power output near the upper range of Class 3B may also cause skin burns.</td><td>
</td></tr>
<tr><td>4</td><td>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.</td><td>
</td></tr>
<tr><td colspan="2">All class 2 lasers (and higher) must display, in addition to the corresponding sign above, this triangular warning sign.</td><td></td></tr>
</table>

780 nm DFB Laser Diode with Internal Isolator

Item #	Info	Center Wavelength (Typical)	Power (Typical)[a]	Drive Current (Max)[a]	Pin Code	Package	Built-In Isolator	Compatible Socket	Wavelength Tested	Laser Mode	Recommended Mount	Recommended Driver
LP780-SAD15		780 nm	15 mW	180 mA	B	Ø9 mm SM Pigtail, FC/APC	Yes	S8060 or S8060-4	Yes	Single[b]	LDM9LP	LDC202C[c]

a. Do not exceed the maximum optical power or maximum drive current, whichever occurs first.
b. Single Longitudinal Mode and Single Transverse Mode
c. We recommend using the LDC202C current controller in conjunction with one of Thorlabs' temperature controllers, such as the TED200C.

Part Number	Description	Price	Availability
LP780-SAD15	**780 nm, 15 mW, TO Can DFB Laser, SM Fiber, Internal Isolator, FC/APC**	**$4,251.57**	**Lead Time**

1310 nm DFB Laser Diode with Internal Isolator

Item #	Info	Center Wavelength (Typical)	Power (Typical)[a]	Drive Current (Max)[a]	Pin Code	Package	Built-In Isolator	Compatible Socket	Wavelength Tested	Laser Mode	Recommended	
											Mount	Driver
LP1310-SAD2		1310 nm	2 mW	40 mA	D	Ø5.6 mm SM Pigtail, FC/APC	Yes	-	Yes	Single[b]	LDM9LP	LDC201CU[c]
LP1310-PAD2						Ø5.6 mm PM Pigtail, FC/APC						

a. Do not exceed the maximum optical power or maximum drive current, whichever occurs first.
b. Single Longitudinal Mode and Single Transverse Mode
c. We recommend using the LDC201CU current controller in conjunction with one of Thorlabs' temperature controllers, such as the TED200C.

Part Number	Description	Price	Availability
LP1310-SAD2	**1310 nm, 2 mW, TO Can DFB Laser, SM Fiber, Internal Isolator, FC/APC**	**$617.72**	**Today**
LP1310-SAD2	**CWL = 1309.8 nm, P = 2.0 mW (I = 13 mA), 25 °C**	**$617.72**	**7-10 Days**
LP1310-SAD2	**CWL = 1310.9 nm, P = 2.0 mW (I = 13 mA), 25 °C**	**$617.72**	**Today**
LP1310-SAD2	**CWL = 1311.8 nm, P = 2.0 mW (I = 13 mA), 25 °C**	**$617.72**	**Today**
LP1310-SAD2	**CWL = 1310.1 nm, P = 2.0 mW (I = 12 mA), 25 °C**	**$617.72**	**Today**
LP1310-SAD2	**CWL = 1309.2 nm, P = 2.0 mW (I = 12 mA), 25 °C**	**$617.72**	**Today**
LP1310-SAD2	**CWL = 1309.9 nm, P = 2.0 mW (I = 14 mA), 25 °C**	**$617.72**	**Today**
LP1310-SAD2	**CWL = 1308.6 nm, P = 2.0 mW (I = 12 mA), 25 °C**	**$617.72**	**Today**
LP1310-SAD2	**CWL = 1308.4 nm, P = 2.0 mW (I = 13 mA), 25 °C**	**$617.72**	**Today**
LP1310-SAD2	**CWL = 1308.5 nm, P = 2.0 mW (I = 12 mA), 25 °C**	**$617.72**	**Today**
LP1310-SAD2	**CWL = 1308.5 nm, P = 2.0 mW (I = 12 mA), 25 °C**	**$617.72**	**Today**
LP1310-SAD2	**CWL = 1308.3 nm, P = 2.0 mW (I = 12 mA), 25 °C**	**$617.72**	**Today**
LP1310-SAD2	**CWL = 1308.6 nm, P = 2.0 mW (I = 13 mA), 25 °C**	**$617.72**	**Today**
LP1310-SAD2	**CWL = 1309.5 nm, P = 2.0 mW (I = 13 mA), 25 °C**	**$617.72**	**7-10 Days**
LP1310-SAD2	**CWL = 1307.9 nm, P = 2.0 mW (I = 12 mA), 25 °C**	**$617.72**	**7-10 Days**
LP1310-PAD2	**1310 nm, 2 mW, TO Can DFB Laser, PM Fiber, Internal Isolator, FC/APC**	**$744.60**	**Today**
LP1310-PAD2	**CWL = 1308.8 nm, P = 2.0 mW (I = 13 mA), 25 °C**	**$744.60**	**Today**
LP1310-PAD2	**CWL = 1308.7 nm, P = 2.0 mW (I = 14 mA), 25 °C**	**$744.60**	**Today**
LP1310-PAD2	**CWL = 1308.7 nm, P = 2.0 mW (I = 14 mA), 25 °C**	**$744.60**	**Today**
LP1310-PAD2	**CWL = 1309.1 nm, P = 2.0 mW (I = 13 mA), 25 °C**	**$744.60**	**Today**

1550 nm DFB Laser Diode with Internal Isolator

Item #	Info	Center Wavelength (Typical)	Power (Typical)[a]	Drive Current (Max)[a]	Pin Code	Package	Built-In Isolator	Compatible Socket	Wavelength Tested	Laser Mode	Recommended	
											Mount	Driver
LP1550-SAD2		1550 nm	2 mW	40 mA	D	Ø5.6 mm SM Pigtail, FC/APC	Yes	-	Yes	Single[b]	LDM9LP	LDC201CU[c]
LP1550-PAD2						Ø5.6 mm PM Pigtail, FC/APC						

a. Do not exceed the maximum optical power or maximum drive current, whichever occurs first.
b. Single Longitudinal Mode and Single Transverse Mode
c. We recommend using the LDC201CU current controller in conjunction with one of Thorlabs' temperature controllers, such as the TED200C.

Part Number	Description	Price	Availability
LP1550-SAD2	1550 nm, 2 mW, TO Can DFB Laser, SM Fiber, Internal Isolator, FC/APC	$772.15	Today
LP1550-SAD2	CWL = 1547.4 nm, P = 2.0 mW (I = 19 mA), 25 °C	$772.15	7-10 Days
LP1550-SAD2	CWL = 1548.4 nm, P = 2.0 mW (I = 16 mA), 25 °C	$772.15	7-10 Days
LP1550-SAD2	CWL = 1547.7 nm, P = 2.0 mW (I = 16 mA), 25 °C	$772.15	Today
LP1550-SAD2	CWL = 1548.2 nm, P = 2.0 mW (I = 15 mA), 25 °C	$772.15	Today
LP1550-SAD2	CWL = 1548.9 nm, P = 2.0 mW (I = 16 mA), 25 °C	$772.15	Today
LP1550-SAD2	CWL = 1548.8 nm, P = 2.0 mW (I = 17 mA), 25 °C	$772.15	Today
LP1550-SAD2	CWL = 1548.7 nm, P = 2.0 mW (I = 16 mA), 25 °C	$772.15	Today
LP1550-SAD2	CWL = 1547.8 nm, P = 2.0 mW (I = 17 mA), 25 °C	$772.15	Today
LP1550-SAD2	CWL = 1548.7 nm, P = 2.0 mW (I = 18 mA), 25 °C	$772.15	Today
LP1550-SAD2	CWL = 1548.3 nm, P = 2.0 mW (I = 17 mA), 25 °C	$772.15	Today
LP1550-SAD2	CWL = 1548.2 nm, P = 2.0 mW (I = 16 mA), 25 °C	$772.15	Today
LP1550-SAD2	CWL = 1548.2 nm, P = 2.0 mW (I = 16 mA), 25 °C	$772.15	Today
LP1550-SAD2	CWL = 1548.1 nm, P = 2.0 mW (I = 16 mA), 25 °C	$772.15	Today
LP1550-SAD2	CWL = 1548.7 nm, P = 2.0 mW (I = 15 mA), 25 °C	$772.15	Today
LP1550-SAD2	CWL = 1549.1 nm, P = 2.0 mW (I = 15 mA), 25 °C	$772.15	Today
LP1550-PAD2	1550 nm, 2 mW, TO Can DFB Laser, PM Fiber, Internal Isolator, FC/APC	$795.90	Today
LP1550-PAD2	CWL = 1548.4 nm, P = 2.0 mW (I = 16 mA), 25 °C	$795.90	7-10 Days
LP1550-PAD2	CWL = 1548.0 nm, P = 2.0 mW (I = 16 mA), 25 °C	$795.90	7-10 Days
LP1550-PAD2	CWL = 1548.2 nm, P = 2.0 mW (I = 16 mA), 25 °C	$795.90	Today
LP1550-PAD2	CWL = 1547.9 nm, P = 2.0 mW (I = 15 mA), 25 °C	$795.90	Today
LP1550-PAD2	CWL = 1548.4 nm, P = 2.0 mW (I = 16 mA), 25 °C	$795.90	Today
LP1550-PAD2	CWL = 1548.8 nm, P = 2.0 mW (I = 17 mA), 25 °C	$795.90	Today

Specifications | Fiber Specs | Drawing | Spectrum | SMSR | Tuning | LIV

Optical Electrical Characteristics (T_{CASE} = 25 °C, P_{CW} = 15 mW)				
Characteristic	**Min**	**Typ.**	**Max**	**Unit**
Center Wavelength	779	780	781	nm
Side-Mode Suppression Ratio (SMSR)	30	40	-	dB
Laser Linewidth	-	2	-	MHz
Optical Output Power	-	15	-	mW
Operating Current	-	-	180	mA
Temperature Tuning Range	15	-	35	°C
Wavelength Shift Over Temperature	-	0.06	-	nm/°C
Wavelength Shift Over Current	-	0.003	-	nm/mA
Operating Voltage	-	2.2	2.8	V
Threshold Current	-	-	40	mA
Slope Efficiency	-	0.2	-	mW/mA
Internal Isolator Isolation	35	-	-	dB
Pin Code		9B		-

Absolute Maximum Ratings[a]		
Characteristic	**Value**	**Unit**
LD Reverse Voltage	2	V
PD Reverse Voltage	20	V
Absolute Max Current	180	mA
Absolute Max Power	25	mW
Operating Temperature	15 to 35	°C
Storage Temperature	-10 to 65	°C

a. Absolute Maximum Rating specifications should never be exceeded. Operating beyond these conditions can seriously damage the laser. For more information, please see the Laser Diode Tutorial.

General Specifications	
Characteristic	**Value**
Monitor Photodiode	Yes[a]
Package	Ø9 mm SM Pigtail, FC/APC
Pin Code	B
Built-In Isolator	Yes
Compatible Socket	S8060 or S8060-4
Recommended Mounts	LDM9LP
Recommended Driver	LDC202C[b]
Laser Mode	Single Frequency[c]
Wavelength Tested	Yes

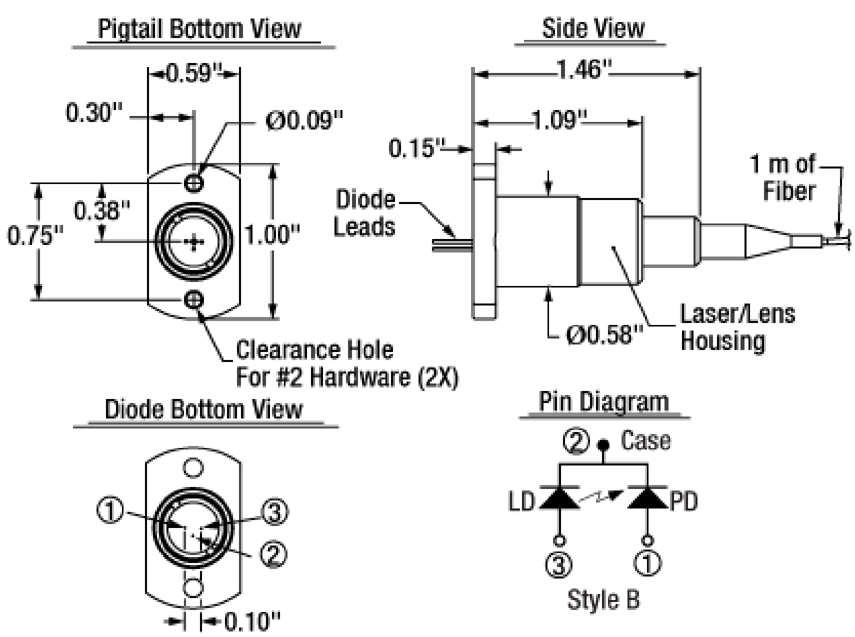
a. Laser diodes with a built-in monitor photodiode can operate at constant power.
b. We recommend using the LDC202C current controller in conjunction with one of Thorlabs' temperature controllers, such as the TED200C.
c. Single Longitudinal Mode and Single Transverse Mode

Specifications | **Fiber Specs** | Drawing | Spectrum | SMSR | Tuning | LIV

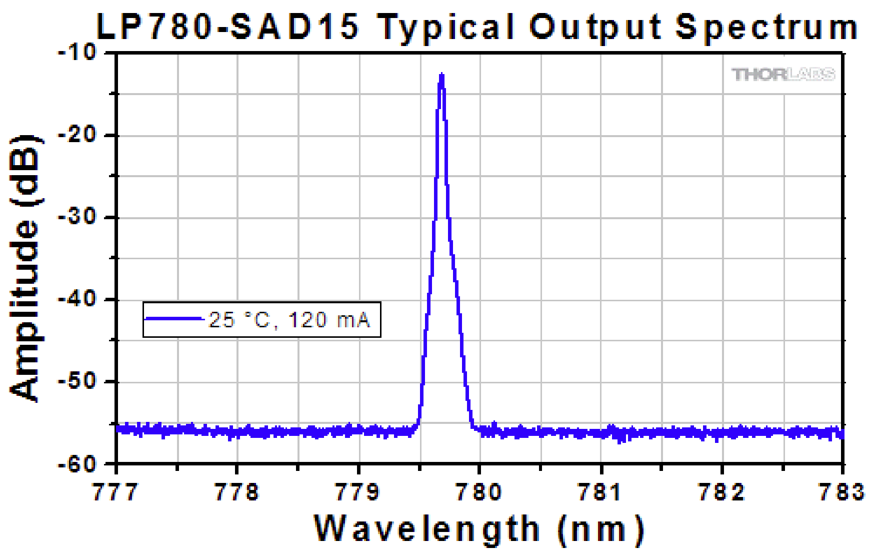
Fiber Specifications	
Characteristic	
Fiber Type	780HP
Mode Field Diameter[a]	5.0 ± 0.5 µm @ 850 nm
Numerical Aperture	0.13
Fiber Length	1.0 m
Connector	2.0 mm Narrow Key FC/APC
Jacket	Ø900 µm Yellow Tubing

a. Mode Field Diameter (MFD) is specified as a nominal value.

Specifications | Fiber Specs | **Drawing** | Spectrum | SMSR | Tuning | LIV

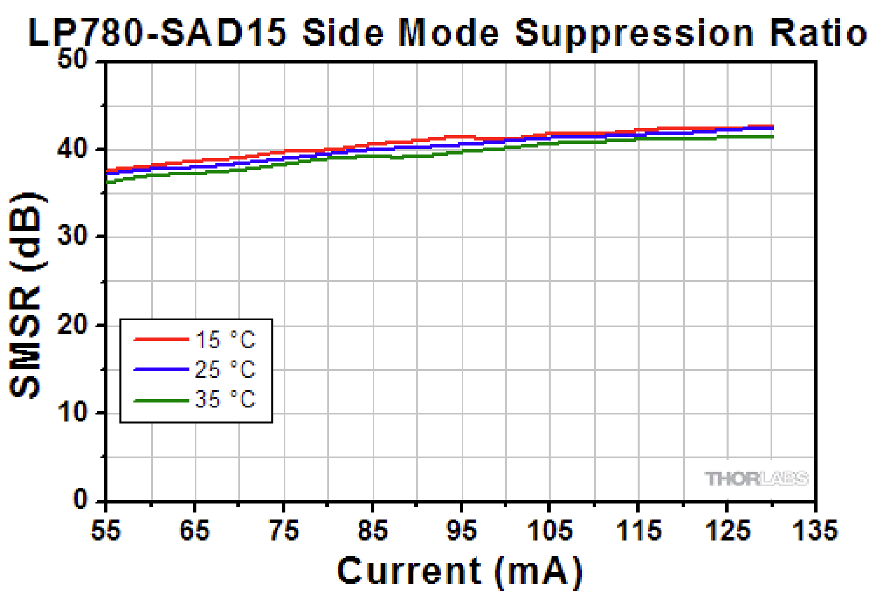


Specifications | Fiber Specs | Drawing | **Spectrum** | SMSR | Tuning | LIV



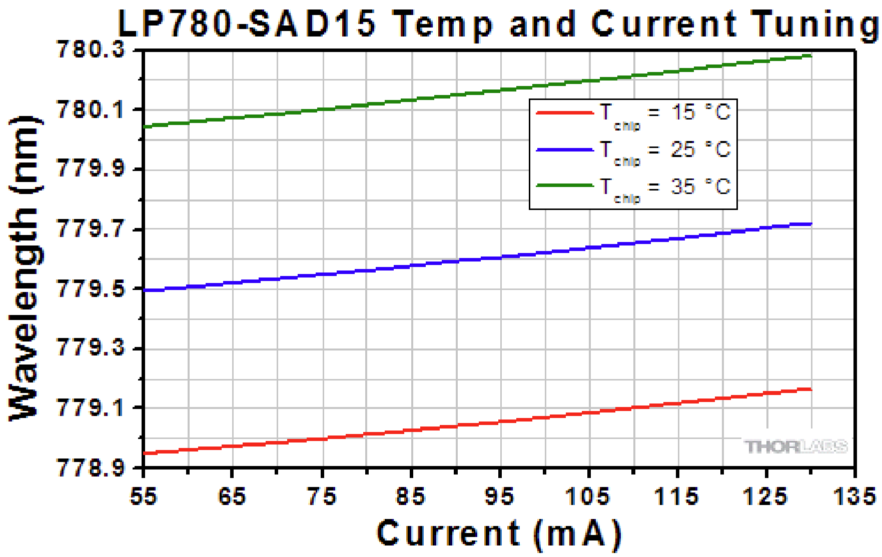
Note: the plot above is typical, resolution limited by the measuring instrument, and performance will vary between individual lasers. The spectrum was measured using an optical spectrum analyzer with a spectral resolution of 0.05 nm. Serial-number-specific documentation is available by clicking "Choose Item" on the left side of the price box.

Specifications | Fiber Specs | Drawing | Spectrum | **SMSR** | Tuning | LIV



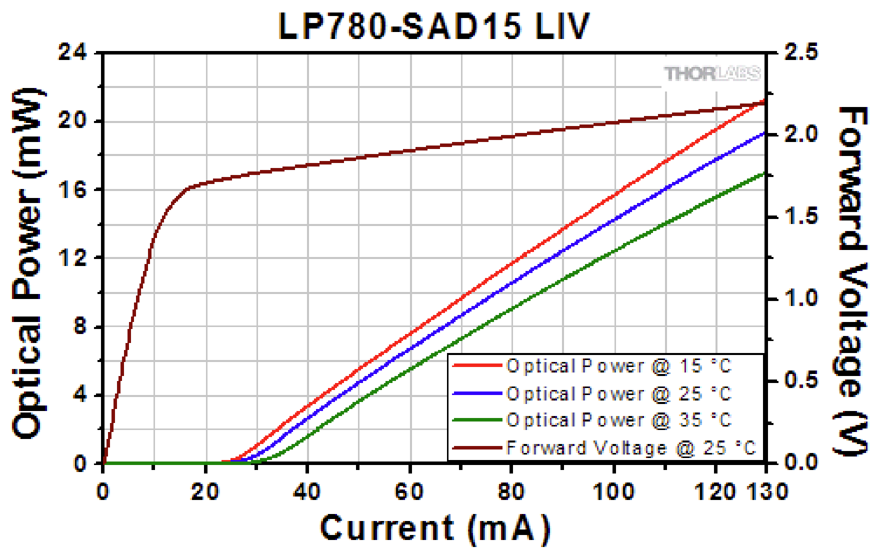
Note: the plot above is typical, and performance will vary between individual lasers. Serial-number-specific documentation is available by clicking "Choose Item" on the left side of the price box.

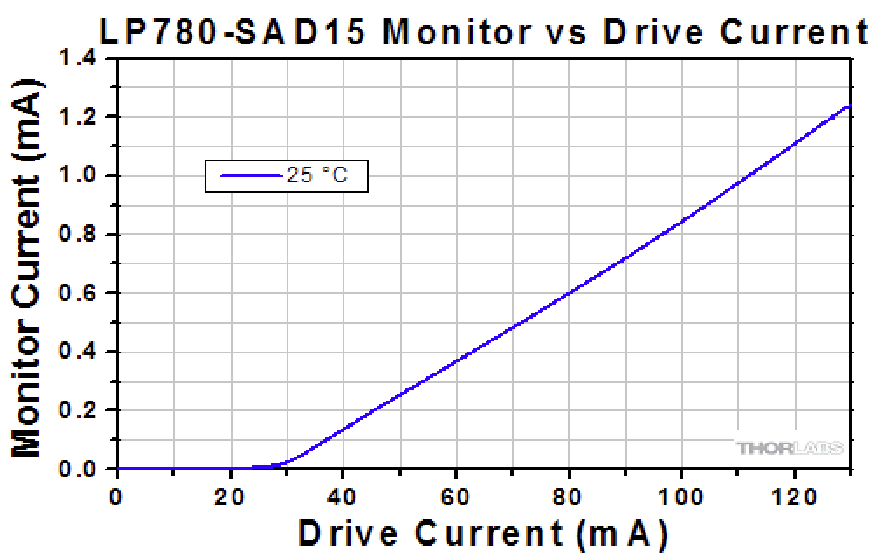
Specifications | Fiber Specs | Drawing | Spectrum | SMSR | **Tuning** | LIV



Note: the plot above is typical, and performance will vary between individual lasers. Serial-number-specific documentation is available by clicking "Choose Item" on the left side of the price box.

Specifications | Fiber Specs | Drawing | Spectrum | SMSR | Tuning | LIV





Note: the plot above is typical, and performance will vary between individual lasers. Serial-number-specific documentation is available by clicking "Choose Item" on the left side of the price box.