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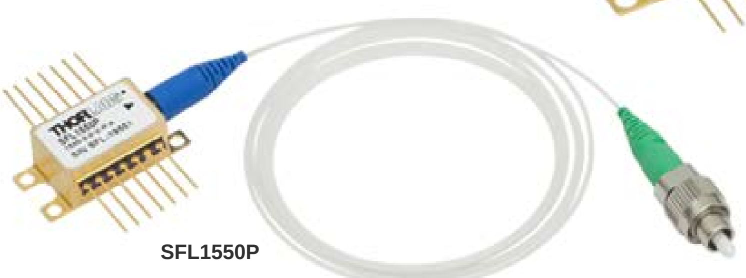
SFL1620S - February 6, 2018

Item # SFL1620S was discontinued on February 6, 2018. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

PIGTAILED EXTERNAL CAVITY (ECL) SINGLE-FREQUENCY LASERS, BUTTERFLY PACKAGE

- Narrow Linewidth, Single-Frequency Laser Diodes
- 1550 nm or 1620 nm Center Wavelength
- Integrated TEC Element
- FC/APC Terminated

SFL1620P



SFL1550P

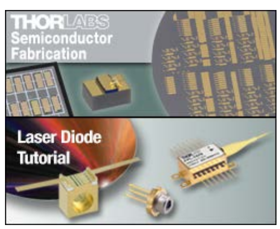
Application Idea
SFL1550S Installed in the CLD1015 Compact Laser Diode Controller

Hide Overview

OVERVIEW

Features

- Output Centered at 1550 nm or 1620 nm
- External Cavity, Single-Frequency Design
- Narrow 50 kHz Typical Linewidth with 45 dB Typical SMSR
- SM or PM Fiber Output (FC/APC Connector, 2.0 mm Narrow Key)
- Industry-Standard Type 1 14-Pin Butterfly Package



Applications

- Seed Laser
- Laser Communications
- Metrology
- Nonlinear Frequency Doubling
- Source Laser for LIDAR/Remote Sensing Systems

Thorlabs' External Cavity (ECL) Single-Frequency Laser Diodes deliver a narrow linewidth (50 kHz typical), single-frequency output with up to 40 mW of output power. Each external cavity, semiconductor laser is housed in a compact, 14-pin butterfly package, enabling compatibility with any standard 14-pin laser diode mount (LM14S2 or CLD1015). The single-frequency laser contains an integrated thermoelectric cooler (TEC), thermistor, and optical isolator with a single mode or

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)
FP Butterfly Package
FBG-Stabilized Butterfly Package
Chip on Submount
MIR Fabry-Perot Two-Tab C-Mount
One-Tab C-Mount
Single Frequency Lasers
DFB TO Can Pigtail (SM)
VHG-Stabilized TO Can or Pigtail (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

polarization-maintaining output fiber with an FC/APC connector. These lasers do not have built-in monitor photodiodes and must be operated in constant current mode. 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.

- 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.

For current and temperature control, the CLD1015 Compact Laser Diode Controller (pictured above in the Application Idea) provides an all-in-one controller for these butterfly-packaged SFL diodes. This inclusive controller features a 14-pin butterfly mount, integrated current source, and digital PID TEC controller. Additionally, these SFL diodes are compatible with Thorlabs' line of laser diode drivers and temperature controllers.

While the SCLs are designed to provide high-power, single-frequency operation over a range of operating currents and temperatures, there are certain combinations where these lasers exhibit multimode operation. Proper temperature control and current tuning is needed to ensure single-frequency operation. To assist the user in selecting the appropriate operating conditions, a datasheet, which provides the operating characteristics and single-frequency regimes of that particular laser, is provided with each unit. For additional single frequency laser options, see our line of Distributed Bragg Reflector (DBR) lasers.

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 they are removed from the package. For all of these pigtailed laser diodes, the laser must be off when connecting or disconnecting the device from other fibers, particularly when the power level is above 10 mW.

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

Hide Specs

SPECS

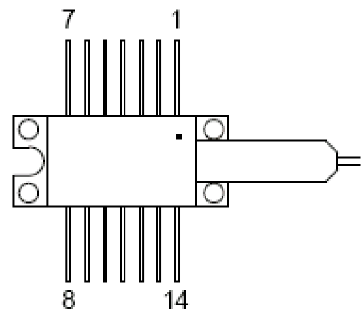
SFL1550 Series Single-Frequency Laser

	Symbol	Min	Typical	Max
Center Wavelength	λ_C	1549.5 nm	1550 nm	1550.5 nm
Linewidth	Δv	-	50 kHz	100 kHz
Side Mode Supression Ratio	SMSR	40 dB	45 dB	-
Optical Power @ I_{OP}	P_O	25 mW	40 mW	-
Forward Voltage @ I_{OP}	V_F	-	1.5 V	1.8 V
Operating Current	I_{OP}	-	300 mA	-
Threshold Current	I_{TH}	-	50 mA	-
Slope Efficiency	ΔP/ΔI	-	0.2 mW/mA	-
Relative Intensity Noise	RIN	-	-150 dB/Hz	-
Single-Frequency Continuous Tuning Range (1 kHz rate)	Δf	-	3 GHz	-
Operation Chip Temperature	T_{CHIP}	-	25 °C	-
Operation Case Temperature	T_{CASE}	10 °C	-	60 °C
TEC Operation @ T_{CASE} = 25 °C				
TEC Current	I_{TEC}	-	0.3 A	-
TEC Voltage	V_{TEC}	-	0.6 V	-
Thermistor Resistance	R_{TH}	-	10 kΩ	-

Pin Identification			
1	TEC +	**14**	TEC -
2	Thermistor	**13**	Case
3	NC	**12**	NC
4	NC	**11**	LD +

Type 1 14 Pin Butterfly Pin Diagram

5	Thermistor	**10**	LD -
6	NC	**9**	NC
7	NC	**8**	NC



SFL1620 Series Single-Frequency Laser

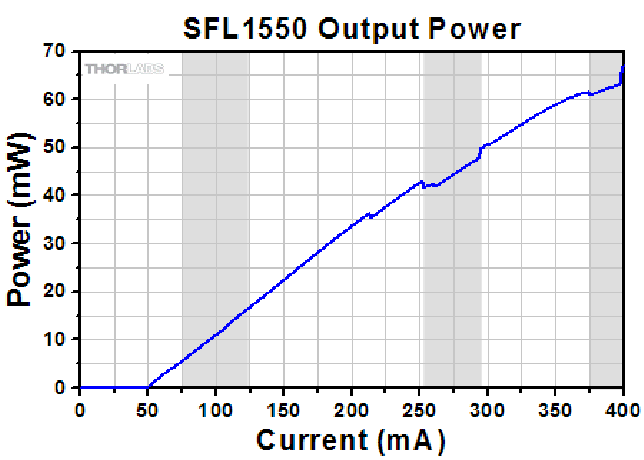
	Symbol	Min	Typical	Max
Center Wavelength	λ_C	1619.5 nm	1620 nm	1620.5 nm
Linewidth	Δv	-	50 kHz	100 kHz
Side Mode Supression Ratio	SMSR	40 dB	45 dB	-
Optical Power @ I_{OP}	P_O	25 mW	40 mW	-
Forward Voltage @ I_{OP}	V_F	-	1.5 V	1.8 V
Operating Current	I_{OP}	-	300 mA	-
Threshold Current	I_{TH}	-	50 mA	-
Slope Efficiency	ΔP/ΔI	-	0.2 mW/mA	-
Relative Intensity Noise	RIN	-	-150 dB/Hz	-
Single-Frequency Continuous Tuning Range (1 kHz rate)	Δf	-	3 GHz	-
Operation Chip Temperature	T_{CHIP}	-	25 °C	-
Operation Case Temperature	T_{CASE}	10 °C	-	60 °C
TEC Operation @ T_{CASE} = 25 °C				
TEC Current	I_{TEC}	-	0.3 A	-
TEC Voltage	V_{TEC}	-	0.6 V	-
Thermistor Resistance	R_{TH}	-	10 kΩ	-

Hide Graphs

GRAPHS

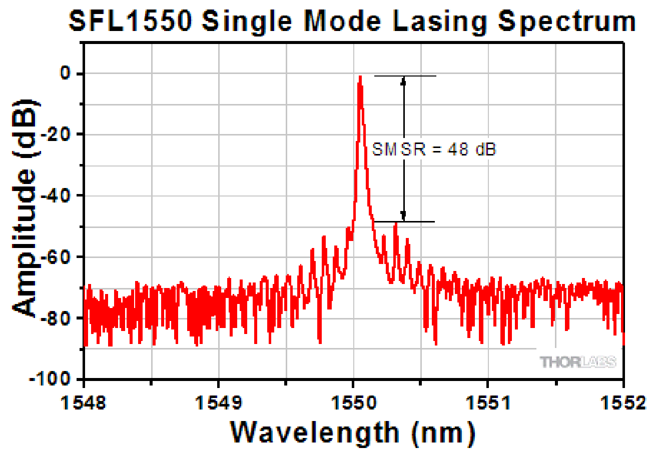
The plots below are typical, and performance will vary between individual lasers. Each SFL laser diode comes with individual performance plots.

Typical Characteristics: SFL1550 Series Laser



Click to Enlarge

Grey shaded areas indicate regions of multimode operation.



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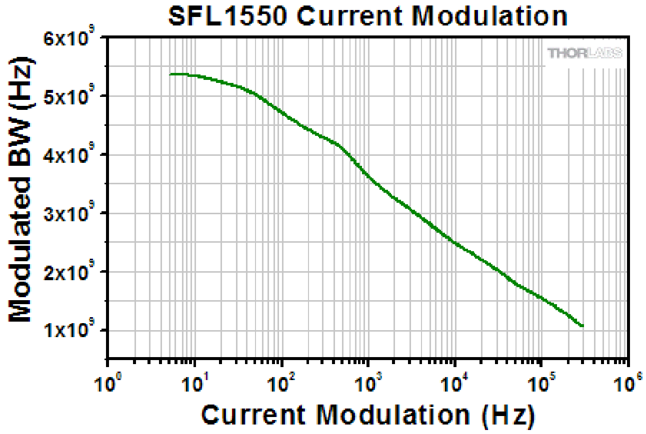

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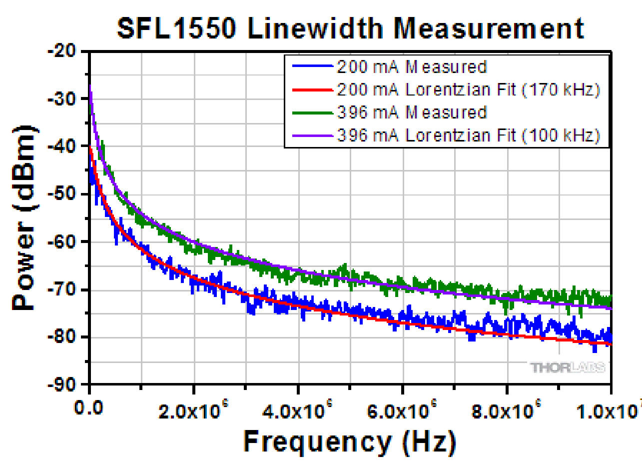

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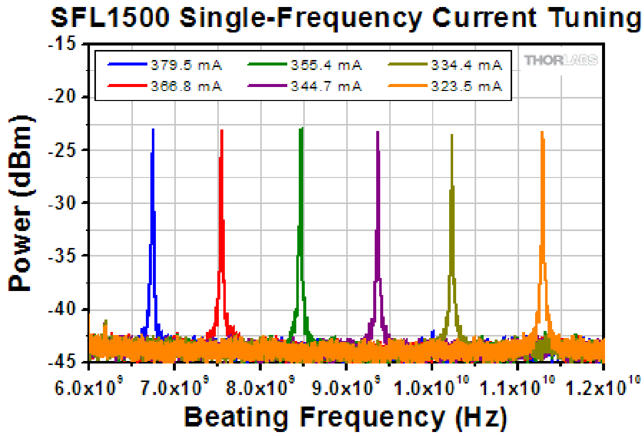
For a Lorentzian lineshape, the measured delayed self-homodyne linewidth is exactly double the laser linewidth. To obtain a Lorentzian lineshape, an ultra-low noise current driver and TEC controller must be used.



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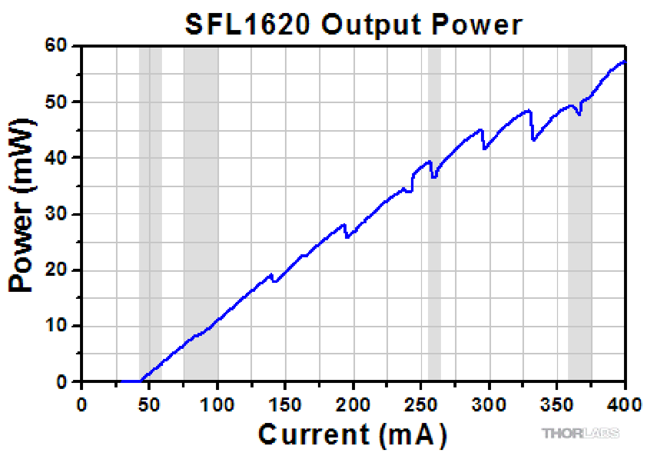
To demonstrate single-frequency, continuous tuning, the outputs from two SFL1550 lasers were combined and the heterodyne beat frequency was measured on an RF spectrum analyzer.

Typical Characteristics: SFL1620 Series Laser



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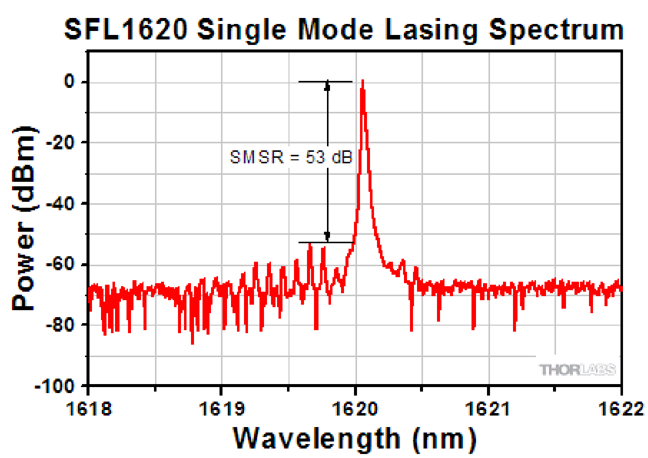
Grey shaded areas indicate regions of multimode operation.



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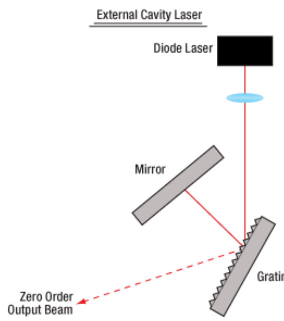
Hide SFL Guide

SFL GUIDE

ECL, DFB, VHG-Stabilized, and DBR 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. 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 four types of single-frequency diode lasers.

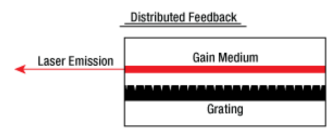
External Cavity Laser

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 (<1 MHz). 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 (available in NIR and MIR) 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 in the 1 MHz to 10 MHz range. Additionally, the close coupling between the grating structure and the active region results in lower maximum output power compared to ECL and DBR lasers.

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.

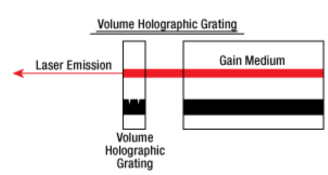


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Figure 3: VHG Lasers have a Volume Holographic Grating Outside of the Active Gain Medium

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

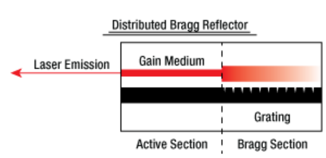

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Figure 4: DBR Lasers have a Bragg Reflector Outside of the Active Gain Medium

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.

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.

Conclusion
ECL, DFB, VHG, and DBR 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 (<1 MHz) of the three choices. In appropriately designed instruments, ECLs can also provide extremely broad tuning ranges (>100 nm).

The DFB laser is the most stable single-frequency, tunable laser of the four. 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 has the lowest output power due to inherent properties of the continuous grating feedback structure.

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.

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 Safety Curtains, 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 LD Operation

LD OPERATION

Laser Diode and Laser Diode Pigtail Warranty

When operated within their specifications, laser diodes have extremely long lifetimes. However most failures occur from mishandling or operating the lasers beyond their maximum ratings. Laser Diodes are among the most static sensitive devices currently made. Since Thorlabs does not receive any warranty credit from our laser manufacturers we cannot guarantee the lasers after their sealed package has been open. Thorlabs will be happy to extend a full refund or credit for any lasers returned in their original sealed package.

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.
- **Storing Lasers:** 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 lasers. 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 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 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 currents even momentarily. Also, reverse voltages as little as 3 V can damage a laser diode.
- **ESD Sensitive Device:** Even when a laser is operating it is susceptible to ESD damage. This is particularly aggravated by using long interface cables between the laser 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:** Because of 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, fluorescent lamps, etc., can cause large momentary transients; 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 APPLICATION WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF THORLABS, INC.

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or 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. The Thorlabs products described in this document are not intended nor warranted for usage in Military Applications.

Hide 1550 nm External Cavity Single-Frequency Laser Diode

1550 nm External Cavity Single-Frequency Laser Diode

Item #	Info	Wavelength (nm)	Power (mW)	Typical Drive Current	Package	Pin Code	Wavelength Tested[a]	Spatial Mode
SFL1550S		1550	40	300 mA	SM Butterfly	14-Pin Butterfly	Yes	Single Mode[b]
SFL1550P		1550	40	300 mA	PM Butterfly[c]	14-Pin Butterfly	Yes	Single Mode[b]

- For the center wavelengths currently available or to place an order, please contact Technical Support.
- The laser output is single mode in both transverse and longitudinal modes.
- The slow axis is aligned to the connector key.

Part Number	Description	Price	Availability
SFL1550S	**1550 nm, 40 mW, Butterfly External Cavity Laser, SM Fiber, FC/APC**	**$2,567.00**	**Today**
SFL1550P	**1550 nm, 40 mW, Butterfly External Cavity Laser, PM Fiber, FC/APC**	**$2,720.00**	**Today**

Hide 1620 nm External Cavity Single-Frequency Laser Diode

1620 nm External Cavity Single-Frequency Laser Diode

Item #	Info	Wavelength (nm)	Power (mW)	Typical Drive Current	Package	Pin Code	Wavelength Tested[a]	Spatial Mode
SFL1620S		1620	40	300 mA	SM Butterfly	14-Pin Butterfly	Yes	Single Mode[b]
SFL1620P		1620	40	300 mA	PM Butterfly[c]	14-Pin Butterfly	Yes	Single Mode[b]

- For the center wavelengths currently available or to place an order, please contact Technical Support.
- The laser output is single mode in both transverse and longitudinal modes.
- The slow axis is aligned to the connector key.

Part Number	Description	Price	Availability
SFL1620S	**1620 nm, 40 mW, Butterfly External Cavity Laser, SM Fiber, FC/APC**	**$2,008.00**	**Today**
SFL1620P	**1620 nm, 40 mW, Butterfly External Cavity Laser, PM Fiber, FC/APC**	**$2,128.00**	**Lead Time**

SFL1620S - 1620 nm, 40 mW, Butterfly Single-Frequency Laser, SM Fiber, FC/APC

Specifications | Fiber Specs | Drawings | Spectrum | Output Power

Optical Electrical Characteristics (T_{CHIP} = 25 °C, P = 40 mW)				
Characteristic	**MIN**	**TYP**	**MAX**	**UNIT**
Center Wavelength	1619.5	1620	1620.5	nm
Linewidth (Lorentzian Line Shape)	-	50	100	kHz
Side Mode Suppression Ratio (SMSR)	40	45	-	dB
Optical Output Power (CW)	25	40	-	mW
Forward Voltage	-	1.5	1.8	V
Operating Current	-	300	-	mA
Threshold Current	-	50	-	mA
Slope Efficiency	-	0.2	-	mW/mA
Relative Intensity Noise (RIN)	-	-150	-	dB/Hz
Single Frequency Continuous Tuning Range	-	3	-	GHz

Absolute Maximum Ratings[a] (T_{CHIP} = 25 °C)		
Characteristic		
Operation Case Temperature	10 to 60	°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.

TEC Operation (Typ./Max @ T_{CASE} = 25 °C/60 °C)				
Characteristic	**MIN**	**TYP**	**MAX**	**UNIT**
TEC Current	-	0.3	-	A
TEC Voltage	-	0.6	-	V
Thermistor Resistance	-	10	-	KOhms

SFL1620S - 1620 nm, 40 mW, Butterfly Single-Frequency Laser, SM Fiber, FC/APC

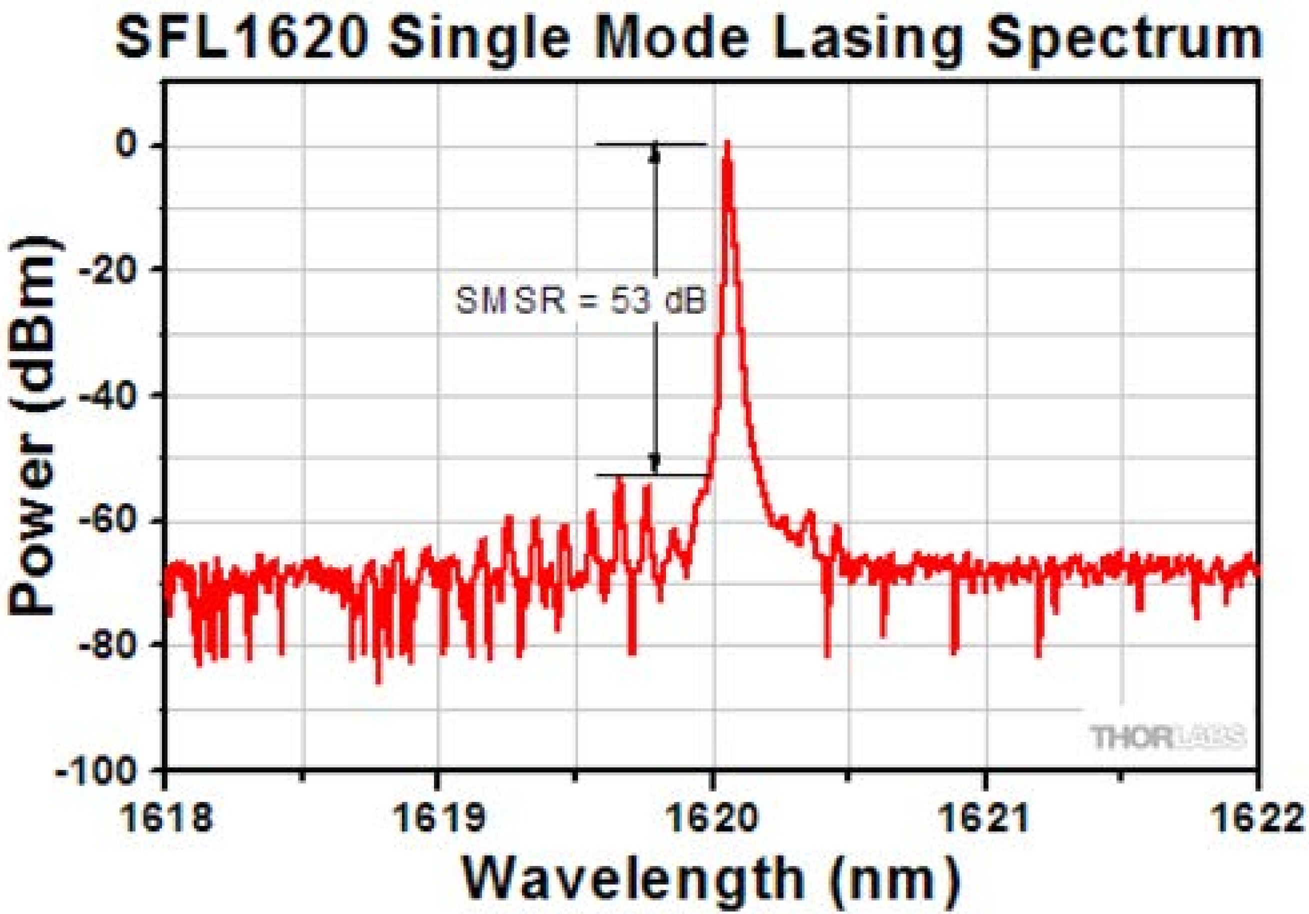
Specifications | **Fiber Specs** | Drawings | Spectrum | Output Power

Fiber Specifications	
Characteristic	
Fiber Type	SMF-28-J9
Core Diameter	N/A
Mode Field Diameter[a]	10.4 ± 0.5 µm at 1550 nm
Numerical Aperture	0.14
Fiber Length	1.5 m
Connector	FC/APC, 2.0 mm Narrow Key

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

SFL1620S - 1620 nm, 40 mW, Butterfly Single-Frequency Laser, SM Fiber, FC/APC

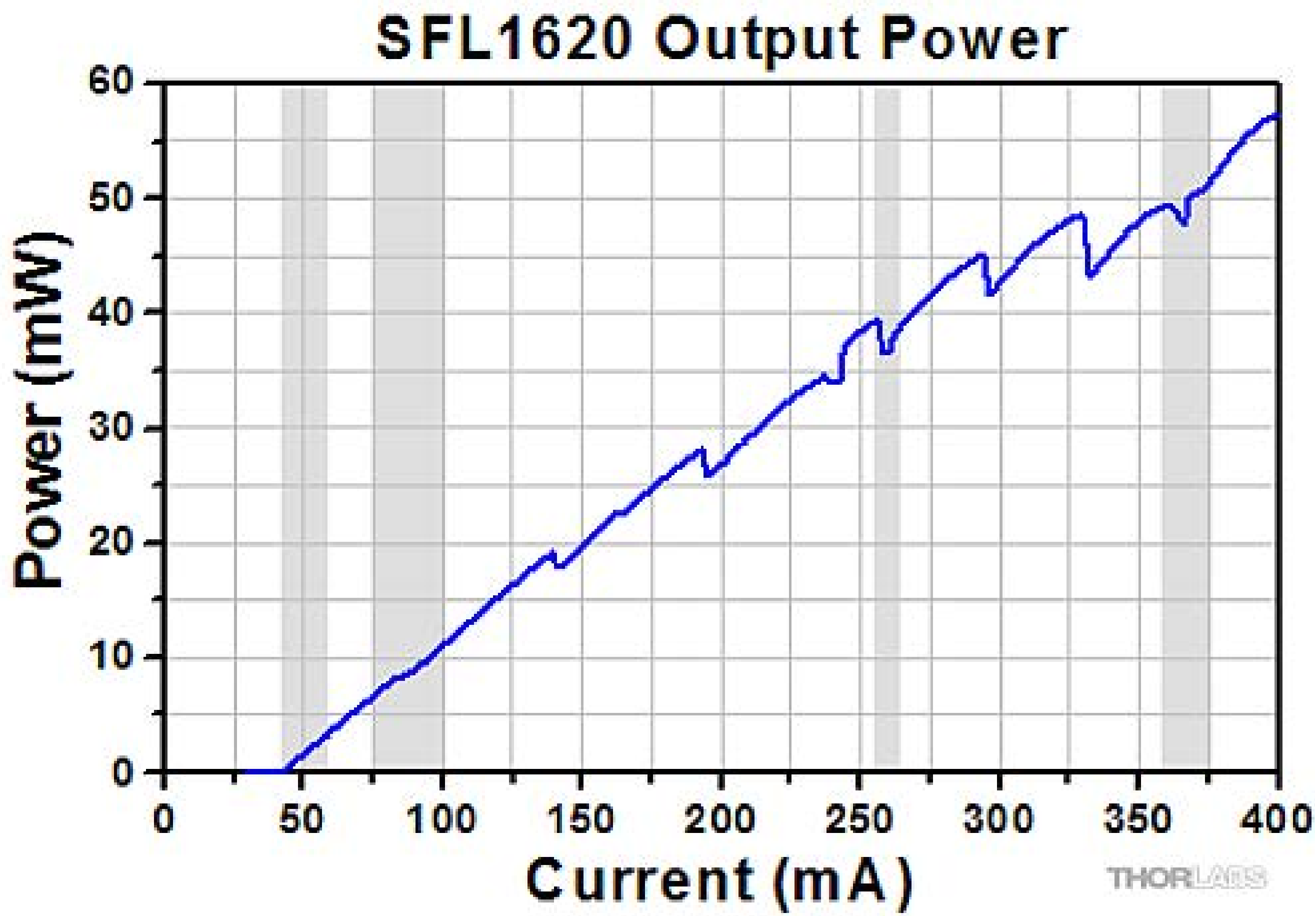
Specifications	Fiber Specs	Drawings	**Spectrum**	Output Power



Note: the plot above is typical, and performance will vary between individual lasers.

SFL1620S - 1620 nm, 40 mW, Butterfly Single-Frequency Laser, SM Fiber, FC/APC

Specifications | Fiber Specs | Drawings | Spectrum | **Output Power**



Note: Shaded areas indicate regions of multimode operation. The plot above is typical, and performance will vary between individual lasers.