



S2011
Adjustable Focus Laser Diode Kit
User Guide



















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Chapter 1 Warning Symbol Definitions

Below is a list of warning symbols you may encounter in this manual or on your device.

Symbol	Description
	Direct Current
	Alternating Current
	Both Direct and Alternating Current
	Earth Ground Terminal
	Protective Conductor Terminal
	Frame or chassis Terminal
	Equipotentiality
	On (Supply)
	Off (Supply)
	In Position of a Bi-Stable Push Control
	Out Position of a Bi-Stable Push Control
	Caution, Risk of Electric Shock
	Caution, Hot Surface
	Caution, Risk of Danger
	Warning, Laser Radiation
	Caution, Spinning Blades May Cause Harm

Chapter 2 Safety



SHOCK WARNING



The LDS1 operates from AC voltages, which are potentially harmful and could cause serious injury. Turn the LDS1 power switch OFF and unplug the AC line BEFORE attempting to perform any.



WARNING: LASER RADIATION



This device is a Class 3R laser product. Appropriate precautions, which include never looking directly into the laser modules output and wearing appropriate eye protection, should be taken at all times.

The following precautions should be taken to avoid failure of the device:

- Workers and workbenches should be grounded to a common stable earth at all times when working with laser diodes.
- All equipment, including power supplies, soldering irons, etc. must be grounded to a common stable earth.
- Power supplies should be well regulated and free of transients.
- Drive circuit connections should be made either by soldering or by high reliability connectors. Clip leads such as alligator clips are not recommended. Mechanically unreliable contacts cause transients and destroy the laser diode.
- Maximum soldering temperature is 250° C for a maximum of 5 seconds.
- Drive circuits should include a 'slow start and stop' feature to suppress turn on/turn off transients.
- High quality and high reliability components should be used throughout the drive circuits.
- It is recommended that the laser diodes be driven by an Automatic Power Control (APC) circuit, using the built-in monitor photodiode in a feedback loop to maintain constant optical power output over the full operating temperature range and throughout the life of the device.
- Always store laser diodes in static-free containers and use a short-circuit connector.
- Never connect or disconnect any components or external equipment such as voltmeters, to or from the device circuit while the power is on.
- Avoid touching the glass window. If necessary, clean gently with a cotton swab dampened with alcohol.
- Leads have to be soldered to their environment without mechanical stress. Any force during and after mounting must be avoided.
- Mechanical clamping should take place along the cylinder without any mechanical deformation of the housing (advised maximum force: 20 N).
- Do not look into the operating laser diode through a microscope!

Chapter 3 System Description

The S2011 laser Kit is a complete laser diode system, which includes a visible laser module, DC power supply, and mounting hardware. The S2011 is designed for experimenters and system designers and includes everything needed to start experimenting with visible diode lasers. The laser module includes an internal constant-power driver circuit to regulate the output power to better than 99.5%. A fixed 2-element glass optic collimates the laser output beam. The module has been ruggedized to MIL-STD 883C for exceptional ESD protection.

The laser is mounted in a Thorlabs KM100T mount, which provides convenient mounting and alignment of the laser pointing. Since the KM100T is a kinematic mount, beam stability is assured.

Included Mounting Hardware

- **Mount:** KM100T Ø1" Kinematic Mount
- **Post:** PH3-ST (-EC Version: PH3/M)
- **Post Holder:** TR3 (-EC Version: TR75/M)
- **Base:** BA2
- **Laser Adapter:** AD11F

Chapter 4 Setup and Operation

4.1. Setup

1. Unpack Contents
2. Insert Laser Module into Optical Head Mount and tighten setscrew with a 1/16" hex key or ball driver.
3. Verify line voltage setting on the LDS1 power Supply indicates the correct operating AC voltage (120 VAC or 240 VAC). Refer to Section A1 if the voltage selection needs to be changed.
4. Attach the AC line cord to the LDS1 power supply and plug into an AC outlet.
5. Plug the laser module power cable into the DC cable of the LDS1.

4.2. CW Operation

The S2011 includes everything to operate the laser with a CW output. Follow the instructions above and, when ready, turn the rocker switch on the LDS1 to the ON position and the laser will begin operating. The constant power feedback circuit in the laser module should stabilize the output power to within 0.1%.

4.3. Operating and Handling Precautions

Semiconductor laser diodes in general are easily damaged by overdriving and by electrical transients. The laser diode is highly susceptible to damage because of the extremely high optical flux density passing through both facets while in operation. In case of overdriving or of transients the optical flux density can rise to unacceptable values, causing catastrophic failure or gradual damage of the laser diode facets. Current transients should therefore be carefully avoided since they may destroy the laser or substantially decrease the laser diode lifetime. Before connecting the laser diode to the supply circuit, make sure that there are no transients that could make the laser diode output exceed the maximum rating for radiant flux or forward current.

Chapter 5 Maintenance and Troubleshooting

5.1. Maintenance of the LDS1 Power Supply

5.1.1. Setting the LDS1 AC Line Voltage

The operating AC voltage is indicated by the value shown in the small gray window located below the AC receptacle. The S2011 systems are shipped with this set to 120 VAC, the S2011/M Metric versions are shipped with this set to 220 VAC. If this needs to be changed, follow the instructions below:

1. Make sure the LDS1 is turned off and remove the AC line cord.
2. Slide the voltage selector (located underneath the AC input receptacle) to the appropriate line voltage (115V or 230V), using a small screwdriver.
3. Verify the correct voltage is shown through the window, if not, repeat the above steps.

5.1.2. Fuse Replacement

The LDS1 uses a 5 x 20 mm, 500 mA, 250 V, Slo-blo style fuse, which under normal operation should not have to be replaced. If the fuse is suspected blown, follow the steps below to replace them.

1. Remove the AC line cord from the LDS1.
2. Using a small screwdriver, pry the voltage selection module out of the AC receptacle.
3. Remove the fuse and replace only with 5x20mm fuses rated at 500mA / 250V (Slo-blo).
4. Install the voltage selector module.
5. Do not use the S2011 if the unit continues to blow fuses. Contact your local Technical Support Office for further assistance.

5.2. Troubleshooting

The S2011 is a robust system, which should provide many hours of reliable service. There are no user-serviceable inside the system. If the unit stops functioning normally, please call you local Thorlabs' Technical Support Office and a technician will be happy to assist you.

Chapter 6 Specifications

Laser Module

CPS196 Performance Specifications	
Housing	Anodized Aluminum
Lens	Glass
Laser Type	N-Type
Class	3R
Operating Temperature	-10 to 40 °C
Storage Temperature	-40 to 85 °C

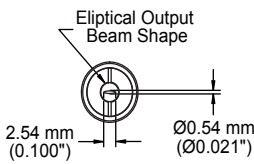
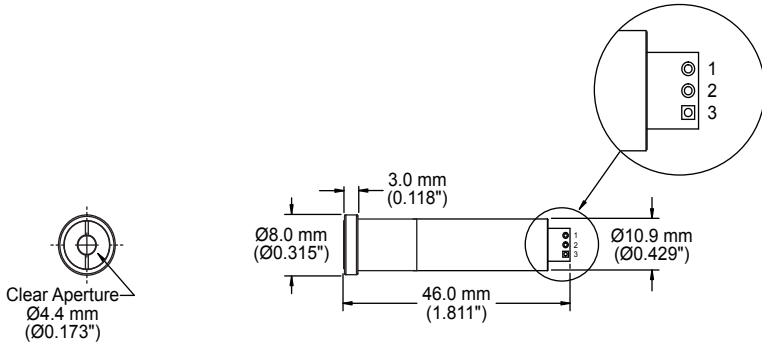
Parameter	Sym	Min	Typ	Max	unit
Wavelength	λ		635	640	nm
Optical Output Power	Po			4.5	mW
Beam Divergence (Including Natural Divergence) ¹	θ_{\perp} $\theta_{//}$			0.6 1.8	mrad
Focal range	FR	50		∞	mm
Beam Diameter, Focused @400 mm (FWHM)	S \perp xS//		75 x 300		μ m
Beam Diameter (FWHM) ¹	S \perp xS//		2.45 x 0.54		mm
Optical-Axis Deviation	α_{om}		7	15	mrad
Clear Aperture	dca		4		mm
Operating Current	lop		55		mA
Operating Voltage (Referenced to Ground)	Vop	-4.5	-5	-5.5	V

Power Supply

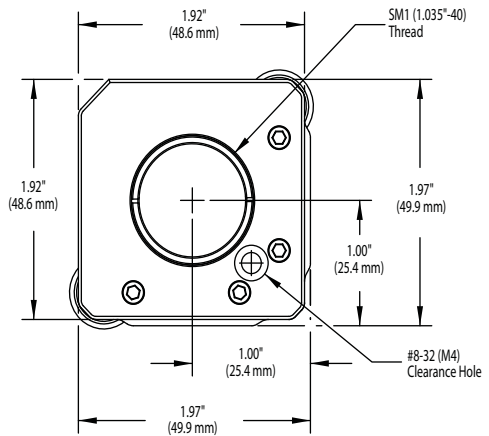
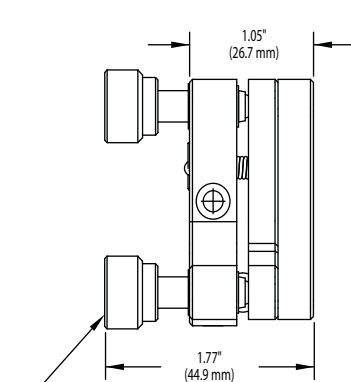
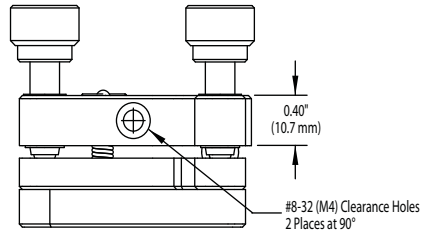
LDS1 Performance Specifications	
Type	Linear, DC Output
Input	110 – 120 VAC/220-240VAC, 50 – 60 Hz
Input Receptacle	IEC 320 Style
Output	5VDC, 250mA
Output Connector	2.5mm mini phono plug
Power Switch	Rocker Style, Green LED On indicator
Fuses	(2) 20mm 500mA @ 250V

¹ When collimated.

Chapter 7 Mechanical Drawing



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



Ø1/4 - 80
Adjuster Screws with
Removeable Knobs

Chapter 8 Regulatory

As required by the WEEE (Waste Electrical and Electronic Equipment Directive) of the European Community and the corresponding national laws, Thorlabs offers all end users in the EC the possibility to return “end of life” units without incurring disposal charges.

- This offer is valid for Thorlabs electrical and electronic equipment:
- Sold after August 13, 2005
- Marked correspondingly with the crossed out “wheelie bin” logo (see right)
- Sold to a company or institute within the EC
- Currently owned by a company or institute within the EC
- Still complete, not disassembled and not contaminated



Wheelie Bin Logo

As the WEEE directive applies to self contained operational electrical and electronic products, this end of life take back service does not refer to other Thorlabs products, such as:

- Pure OEM products, that means assemblies to be built into a unit by the user (e.g. OEM laser driver cards)
- Components
- Mechanics and optics
- Left over parts of units disassembled by the user (PCB's, housings etc.).

If you wish to return a Thorlabs unit for waste recovery, please contact Thorlabs or your nearest dealer for further information.

8.1. Waste Treatment is Your Own Responsibility

If you do not return an “end of life” unit to Thorlabs, you must hand it to a company specialized in waste recovery. Do not dispose of the unit in a litter bin or at a public waste disposal site.

8.2. Ecological Background

It is well known that WEEE pollutes the environment by releasing toxic products during decomposition. The aim of the European RoHS directive is to reduce the content of toxic substances in electronic products in the future.

The intent of the WEEE directive is to enforce the recycling of WEEE. A controlled recycling of end of life products will thereby avoid negative impacts on the environment.

Chapter - Thorlabs Worldwide Contacts

For technical support or sales inquiries, please visit us at www.thorlabs.com/contact for our most up-to-date contact information.



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