



RO USB Laser Diode Module



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1 Safety Precautions

This instruction manual explains how to use the RO USB Laser Diode Module.

Before use, please read this manual thoroughly. After reading, keep it together with the product for reference when necessary. Please retain packaging material in the event the unit is stored or shipped in the future.

Caution – use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure. Body of the unit contains labels specifying wavelength and maximum emitted power.

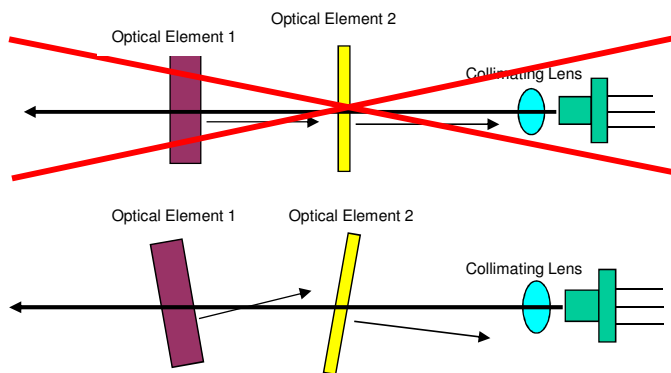
Recommend following user requirements for Class 3B products according to latest ANSI Z136.1 Standard for the Safe Use of Lasers. Use protective eyewear when engineering or other procedural and administrative controls are inadequate to eliminate potential exposure in excess of the MPE.

Laser Diode Optical Feedback Warning

Semi-conductor laser diodes are highly sensitive to optical feedback. They can suffer damage that maybe immediately apparent through loss in power or a reduction in life. Furthermore, wavelength stabilized laser diodes may lose their spectral characteristics such as center wavelength and linewidth if sufficient optical feedback exists.

Your Ondax laser diode does not incorporate an optical isolator, so may be susceptible to extraneous optical feedback. We recommend the following precautions:

- If the output of the laser diode is collimated, all reflective surfaces in the optical path should be angled so that surface reflections would not be reflected back to the laser diode. Furthermore, since optimal alignment for interferometric measurement instruments is often achieved with the instrumentation optics at normal incidence to the laser, we recommend the use of optical isolators or slightly misaligning the instrument to avoid direct feedback into the laser.
- Beware of focusing the light output on a highly reflective/scattering surface. This is another means of generating high optical feedback to the diode.
- If fiber coupling, anti-reflective (AR) coated tips are recommended for multimode (MM) fiber. Angle polished tips and AR coating are recommended for single mode (SM) fiber.
- Beware of wavelength selective filters with narrow wavelength pass bands. Care should be taken not to align at normal incidence to the beam. Furthermore, be careful not to align the reflected light to be normal incidence during the alignment process (e.g. sweeping the beam back across the laser during alignment). If such a possibility is unavoidable, use a sufficient OD filter (or isolator) at the output of the laser diode during the alignment process. Please note that if sufficient additional feedback reaches the laser diode, it would overcome the grating-induced stabilization, unlocking and shifting the wavelength of the laser beyond the pass band of the filter. This will dramatically increase the reflected intensity back into the laser possibly causing damage.



1.1 Explanation of Warning Symbols

The meaning of the symbols used in this manual and attached to the product follows.

Warning messages are intended to prevent accidents to operating personnel such as burns and electrical shocks.

Some caution messages are intended to prevent damage to the module.



Precaution for handling electrostatic sensitive devices.



Visible and/or invisible Class 3B laser radiation. Avoid direct exposure to beam. Wear suitable protective eyewear whenever laser is in operation.

Laser Aperture

Laser output location warning.



Warning

To prevent permanent damage, observe these precautions:

1. Protect against electrostatic discharge.
2. Avoid external damage to the enclosure.
3. Use supplied power supply or power supply meeting specifications.
4. Do not drop the module or operate it at extreme temperatures or humidity.
5. Beware of optical feedback from reflective surfaces. Permanent damage to the laser diode is possible.

2 Application and Features

2.1 Applications

This device is a RO USB Laser Diode Module with integrated laser diode current driver and temperature control for high precision equipment and instrumentation. It plays a pivotal role in testing or manufacturing, and can be used in various applications such as Flow Cytometry, Confocal Microscopy, Protein Crystallography, DNA Sequencing, Semiconductor Defect Detection, Thin Film Analysis, High Density Data Storage, and Raman Spectroscopy.

2.2 Standard Features

- Plug & Play Operation
- ESD Protection
- Constant Current Driver
- Adjustable Output Power
- Adjustable Temperature Setpoint
- Remote Key Switch with Remote Interlock (Optional for OEM customers)
- Remote Computer Control Capability
- Temperature Stabilized
- Compact Size

3 Specifications

OPTICAL

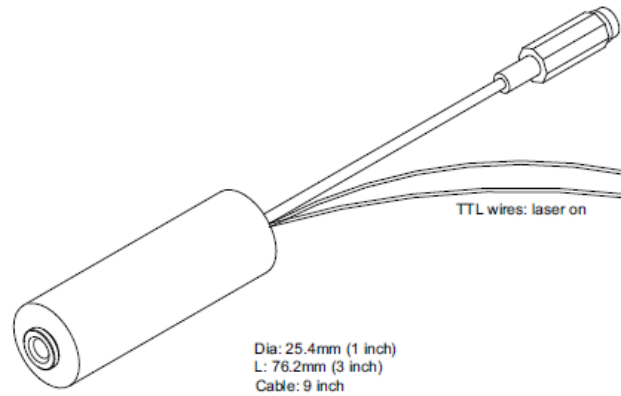
Power Stability (over 1 hr)	< 1%
Laser Noise (10 to 1Mhz) RMS	< 1%
Laser Class	Class 3B (maximum power and wavelength listed on warning labels of the unit)
Laser Operation	CW
Spatial Mode	TEM ₀₀
Beam Divergence (full)	< 1 mrad
Beam Size at Aperture (FWHM)	< 1 mm
Beam Pointing Stability	< ± 10 μ rad
Polarization (typical)	> 100:1, vertical or horizontal
Warm-up Time	< 5 min

ELECTRICAL

Operating Voltage	3.3 V DC
Operating Current	0.5 A max / 3 A for >300mW Modules

MECHANICAL

Laser Dimension	25.4 mm x 76.2 mm
Weight	< 1 lb
Operating Temperature	+10°C to +40°C
Storage Temperature	-40°C to +80°C



Supplied with leads for TTL laser On/Off (connector : DF13-2S-1.25C):
 Default Open: Laser On
 To Turn Laser Off: Connect TTL, white wire, to ground, black wire.

Figure 1: Mechanical Dimensions

2.1 x 5.5mm Center Positive Standard Jack for supplying operating voltage and current

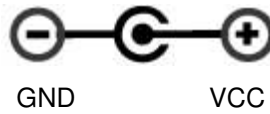
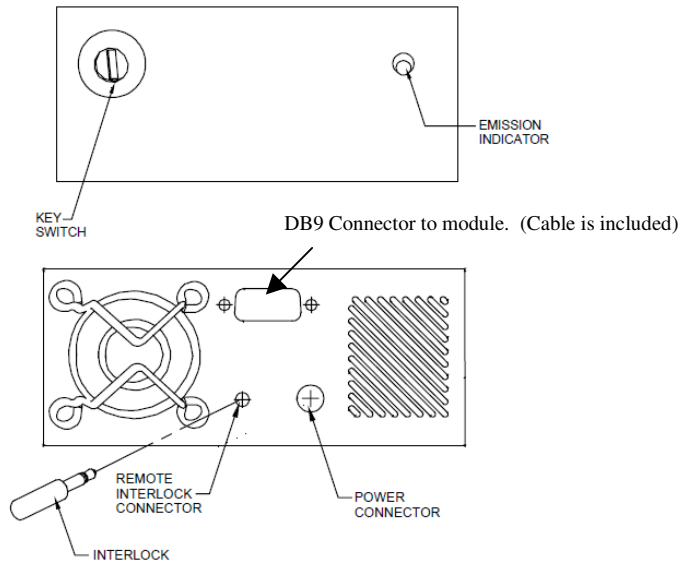


Figure 2 – Electrical Connections

Status LED:	Meaning
Fast flashing (150 ms on / 150 ms off)	Waiting for temperature stable after power on
Slow flashing (300 ms on / 300 ms off)	Waiting for 20 seconds
Flash 1 time (200 ms on) every 2 s (LED off)	Running normally

[VERSION 1] Remote Key Switch (Optional Only for OEM customers)



1. **Power on/off key switch**—Located on the front panel of the Remote Key Switch, this switch enables users to power the unit on with the turn of a key. The unit is inoperable when key is removed.
2. **Emission indicator**—This red LED, located to the upper right of the front panel, lights up when the unit is on to warn of eminent laser emission.
3. **5-second activation delay**—The unit does not apply power to the laser module until five seconds after a user has turned the key switch to the “on” position.
4. **Remote interlock & connector**— This feature is located on the rear panel of the Key Switch. The unit will not operate without the interlock intact. Interlock needs to be shorted for power to be available for laser diode module.

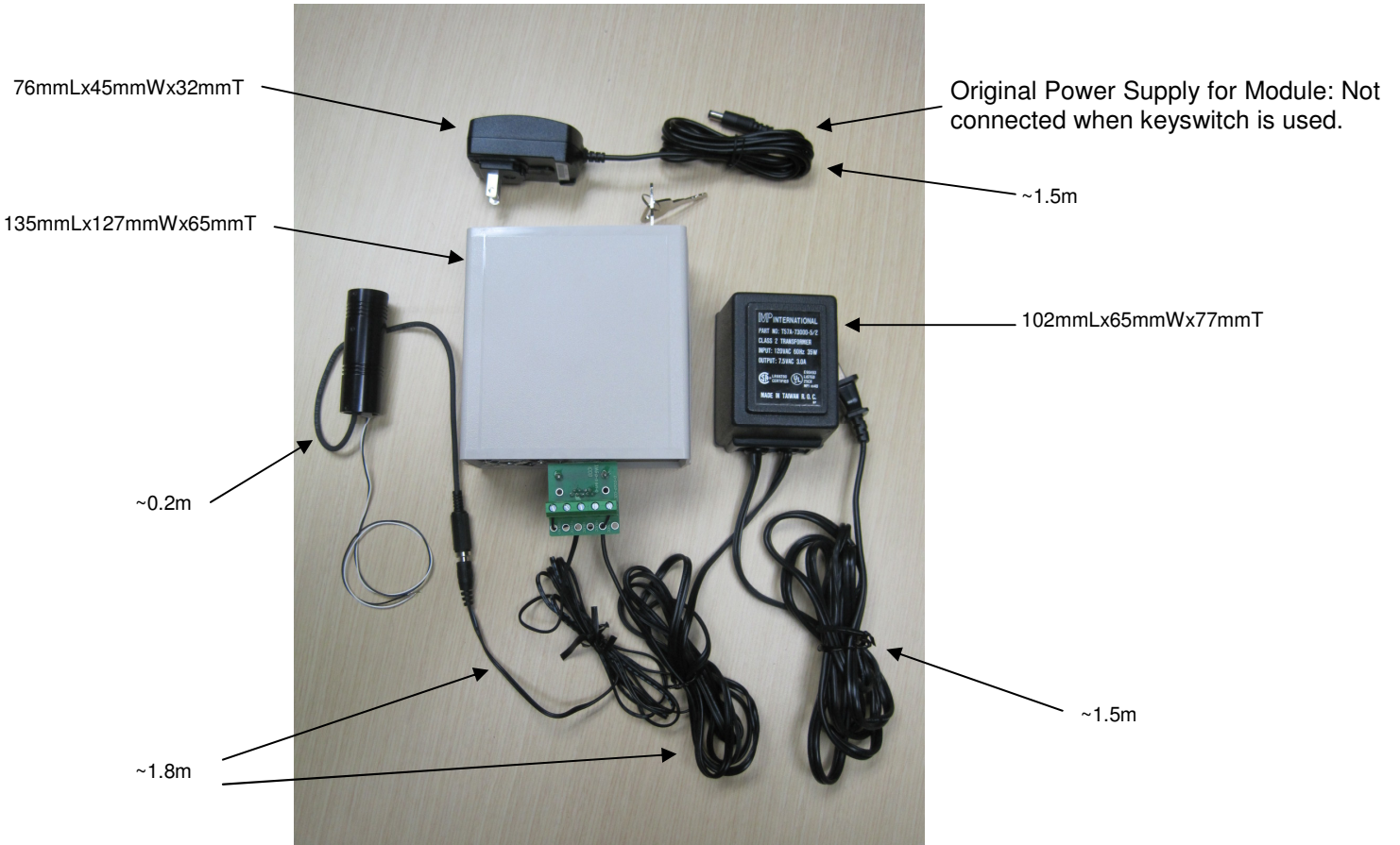
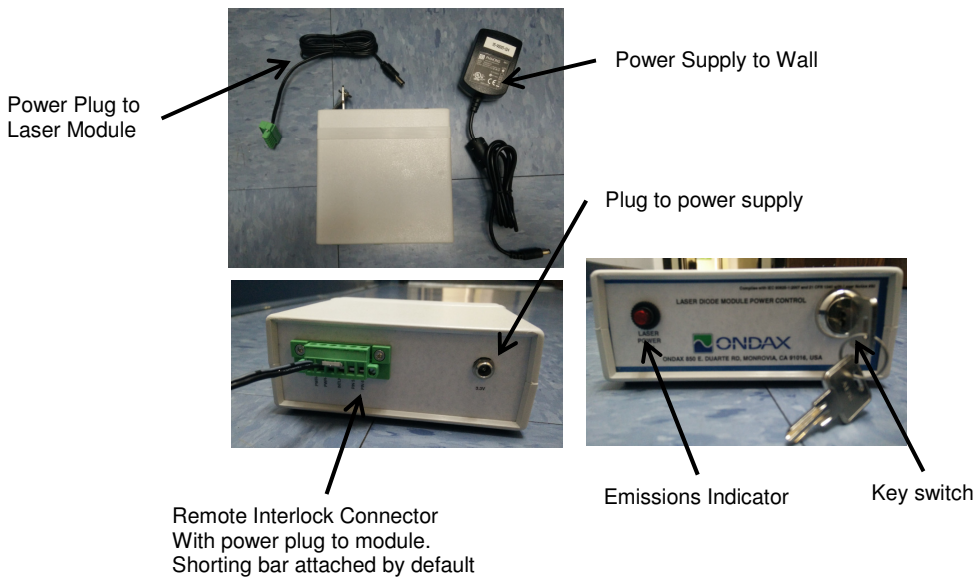


Illustration of Module with Keyswitch

[VERSION 2] Remote Key Switch (Optional Only for OEM customers)



1. **Power on/off key switch**—Located on the front panel of the Remote Key Switch, this switch enables users to power the unit on with the turn of a key. The unit is inoperable when key is removed.
2. **Emission indicator**—This red LED, located to the upper right of the front panel, lights up when the unit is on to warn of eminent laser emission.
3. **Remote interlock & connector**— This feature is located on the rear panel of the Key Switch. The unit will not operate without the interlock intact. Interlock needs to be shorted for power to be available for laser diode module. A shorting bar is connected by default.

4 Operating Procedures

4.1 Standard CW Operation

Laser module can be operated with or without USB communication port.

User Startup Procedure:

- Properly mount laser module on a heat sink
- If necessary, connect mini USB interface cable
- Connect power supply

Laser Module Startup Process:

Laser module controller will follow/indicate the following process after power on:

- Setpoints for current and temperature are saved aboard the laser diode module. Upon receiving power, temperature of the laser diode will be set after a few seconds.
- The LED at the rear end indicates the unit status. There is a 20 second wait period before emission of radiation.
- Laser will operate with the saved state

Warning: Laser module will emit light 20 seconds after providing power.

4.4 Operation via USB Communications Port

The laser system includes complete remote control capability through USB.

When the mini USB cable is plugged into a PC for the first time, allow time for drivers to install. Virtual COM port (serial) drivers will install to allow the device to appear as an additional COM port. Application software can access the laser diode module similar to a standard COM port.

If computer has issues downloading or installing Virtual COM port driver, they are also available for download from FTDI : <http://www.ftdichip.com/Drivers/VCP.htm>.

4.4.1 Baud rates and serial port settings

Each controller is shipped from the factory with a fixed 9600 baud, which cannot be changed.

The other serial port parameters are: 8 data bits, 1 stop bit and no parity. A hardware flow control is not supported.

4.4.2 Command formatting and termination characters

Each command to the controller must be terminated by a carriage return/line feed pair (ASCII 13 followed by ASCII 10).

All commands are case-sensitive.

Command arguments must be delimited by a single colon ':' character (ASCII 58).

4.4.3 Handshaking

Under no circumstances will the controller initiate communication. It only transmits characters in response to a message. Every message to the controller generates a response, either a numerical value or the acknowledgment string "OK". In the event that the controller receives a message that it cannot interpret, it responds: "ERROR". Every controller response is terminated by a carriage return/line feed pair (ASCII 13 followed by ASCII 10).

4.4.4 Commands

Commands	Argument	Response	Function
rli	No	**.*	Return the present operating current of the laser diode in mA
rtt	No	**.*	Return the TEC present measured temperature of laser diode in degrees Celsius
rti	No	**.*	Return the TEC present operating current in mA
stt:	**.*	OK	Set the TEC temperature in degrees Celsius(Default:25 Degree)
slc:	**.*	OK	Set ACC driver current in mA
ton	No	OK	Enable TEC control
tof	No	OK	Shut down TEC control
rsv	No	*****	Return the laser system firmware version
rsp	No	**.*	Return the present laser setting power in mW
rst	No	**.*	Return the TEC setpoint temperature in degree Celsius
rsi	No	**.*	Return the ACC setpoint current in mA
ssc	No	OK	Save the setting to the flash memory so the laser system can operate in the same setting after repower it
rcm	No	**.*	Read the maximum laser current in mA
rsn	No	*****	Return the laser controller serial number
con	No	OK	Turn on ACC laser driver
cof	No	OK	Turn off ACC laser driver

5 Maintenance

5.1 Maintenance and Inspection

Routine maintenance is not required. If the unit appears to be operating incorrectly or with low output power, check the following:

- Inspect the enclosure for scratches, dings, dents, or other signs of damage due to handling.

- Verify that the module enclosure has not been opened and the factory seal is intact.
- Verify power source connections to the laser module.
- Ensure that the operating environment is within specifications.

6 Service

6.1 Repair

There are no user-serviceable parts inside and do not attempt to open housing. Warranty would not be valid if housing has been opened. If the module fails during use, check the items in section 5.1 before requesting an RMA.

Defective modules that are beyond the warranty period will be repaired at cost, if possible. An RMA must be requested before sending it to Ondax. When shipping, please use a box at least five times as large as the module with enough packaging material to prevent any movement of the module within the box.

6.2 For Information or Enquiries

If you need information regarding purchase or repair, or for any other Sales related questions, please contact the distributor or selling agent from whom the module was purchased.

6.3 Ondax Limited Warranty

Ondax warrants that all **SureLock™** integrated laser modules (RO, FCLM, LM) will be free from defects in material and workmanship for 12 months from the date of shipment. This limited warranty covers only those defects that arise as a result of normal use of the product, and does not cover any other problems, including those that arise as a result of: (i) improper handling, maintenance or modification, (ii) operation outside the product's specifications; or (iii) unauthorized modification or misuse.

If Ondax receives, during the applicable warranty period, notice of a defect in any product which is covered by this warranty, Ondax shall either repair or replace the product, at Ondax's option. Ondax shall have no obligation to repair, replace or refund until the customer returns the defective product to Ondax. Any replacement product may be either new or like-new, provided that it has functionality at least equal to that of the product being replaced. Ondax products may contain remanufactured parts, components, or materials equivalent to new in performance.

Limitations of Liability

1. TO THE EXTENT ALLOWED BY LOCAL LAW, NEITHER ONDAX NOR ITS THIRD PARTY SUPPLIERS MAKES ANY OTHER WARRANTY OR CONDITION OF ANY KIND, WHETHER EXPRESS OR IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY, SATISFACTORY QUALITY, AND FITNESS FOR A PARTICULAR PURPOSE.
2. TO THE EXTENT ALLOWED BY LOCAL LAW, EXCEPT FOR THE OBLIGATIONS SPECIFICALLY SET FORTH IN THIS WARRANTY STATEMENT, IN NO EVENT SHALL ONDAX OR ITS THIRD PARTY SUPPLIERS BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES, WHETHER BASED ON CONTRACT, TORT, OR ANY OTHER LEGAL THEORY AND WHETHER ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.
3. To the extent allowed by local law, the remedies provided in this Limited Warranty Statement are the customer's sole and exclusive remedies.

6.4 Contacting Ondax

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