



TWL-L-R Series Rackmount User's Manual

Tunable Wavelength Laser, L-Band, Rackmount

Caution: The user must read this manual before operating the TWL-L-R unit. Operations other than those described in this manual may result in personal injury and/or damage to the unit.

Note that any attempt to open or fix the equipment without prior approval by Optilab, LLC voids the warranty.

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1. General Information

1.1 Introduction

This manual contains information on the installation and operation of the TWL-L-R L-Band tunable wavelength laser source.

1.2 Product Overview

The Optilab TWL-L-R is a high spectral purity and very stable tunable wavelength laser source. The TWL-L-R features wide wavelength tuning range, narrow laser line width, high Side Mode Suppression Ratio (SMSR), excellent wavelength stability and optical output level exceeding 20mW. With the standard Polarization Maintaining (PM) fiber output, TWL-L-R offers a linearly polarized output. These features make TWL-L-R well-suited for many different applications, including DWDM device testing, optical sensing and laboratory measurement applications

1.3 Features

- Wide wavelength tuning range from 1570.01nm to 1607.04nm
- High optical output power of 20 mW
- Narrow laser linewidth <100 kHz
- Linewidth broadening to 750 MHz
- Excellent Side Mode Suppression Ratio of 55 dB
- Polarization Maintaining (PM) Output
- Intuitive and easy to use USB interface

1.4 User Safety

1. The TWL-L-R unit uses high intensity invisible light from the optical output receptacle. Avoid direct exposure to skin and eyes.
2. The equipment case is fully certified for EMS protection. The user should never open the equipment case; any attempt will void the warranty and may result in electric shock and EMS attack to equipment in the vicinity.
3. The user should avoid using any solvent or vaporizing chemical to clean the equipment panel or case. It may result in damage to the surface and internal circuits.

2. Operation

2.1 Introduction

This chapter describes how to operate the TWL-L-R unit, and discusses the location and function of the controls and connectors.

2.2 Initial Inspection

Your TWL-L-R unit was carefully inspected before it left the manufacturer. It should be in proper working order upon receipt. You should, however, inspect the unit for any damage that may have occurred in transit. If the shipping container or the packing material is damaged, keep it until the contents of the shipment have been checked to be free of mechanical and electrical damages. Notify Optilab, LLC promptly if any notable damage is found.

Each TWL-L-R shipment should include the following:

- TWL-L-R rackmount unit
- User Manual
- Test Datasheet
- AC Power Cord
- USB Cable and Software DVD
- Keys

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2.3 Controls

TWL-L-R Front and Rear Panel



Feature	Function
① Optical Output Port	This receptacle accepts the indicated fiber-optic connector for the tuned optical output, which is polarization-maintaining type (PM).
② USB Communication Port	This port is used to send the software commands for proper interface and control.
③ LED Indicators	These LED indicators provide the status of the TWL-L-R. The 'Power' indicator will illuminate green when the device has received proper AC power connections and the rear panel AC switch is enabled. The individual LED indicators beneath each optical output port will illuminate when an active output is detected.
④ Laser Enable Switch	This key switch toggles the internal TWL-L-R laser source On and Off
⑤ LCD display	This LCD display shows the power level and wavelength of the internal L-Band tunable laser.
⑥ Front Panel Control Buttons	These Buttons are used to control and edit the parameters displayed on the LCD.
⑦ AC Power Socket	This receptacle accepts the electrical input for the 110/220VAC source
⑧ AC Power Switch	Enables / disables the AC electrical power to the rackmount unit.

2.4 Operation Instructions

Start-up Procedure

1. Insert the AC power cord into an appropriate AC power supply source and the rear panel AC Power Socket on the TWL-L-R unit.
2. Make the proper PC communication port connection using a USB cable between each respective port.
3. Once all proper communication and optical connections are made, enable the rear panel AC Power Switch to the On position; the front panel Power LED should enable green.
4. Toggle the front panel Laser Enable Switch to the On position; the front panel optical output LED should enable.
5. The TWL-L-R unit is now fully operational; please refer to the Software Interface and Control section for more adjustment and operation details.

Patch Cord Swapping Procedure

1. Toggle the front panel Laser Enable Switch to the Off position to disable the TWL-L-R module output.
2. Swap patchcords as desired. Only connect the indicated connector patchcords to the optical input/output receptacles, cleaning them as necessary.
3. Toggle the front panel Laser Enable Switch to the On position; normal operation will resume after a few seconds.

2.5 Software Interface and Control

For wavelength and power control, as well as additional monitoring features, all of this is done via the software or front panel interface, which is detailed in the section below.

2.5.1 Serial communication

The TWL-L-R utilizes a built-in USB-Serial conversion IC for a convenient communication platform

Connect the TWL-L-R to the computer via a USB cable, and a driver needs to be setup to active the USB-Serial conversion IC. Using the installation package from Optilab to setup the drive, and TWL-L-R is ready for operating.

2.5.2 Operating Guide for GUI

For each TWL-L-R unit, Optilab offers an authorized PC client GUI to operating and setting via the USB port. The GUI suite is available from the DVD which is supplied by Optilab together with the TWL-L-R package.

2.5.3 Installation

Explore the software DVD included, and utilize the RS232 to USB drivers for your system to recognize the attached TWL-L-R device. And, use the “TWL Software Package” to “TWL-L-SETUP” file to setup the LabView GUI for operation. If LabVIEW is not already installed on your PC, you will need to use the “LabVIEW 2012 RTE 32bit” for proper operation of the GUI.

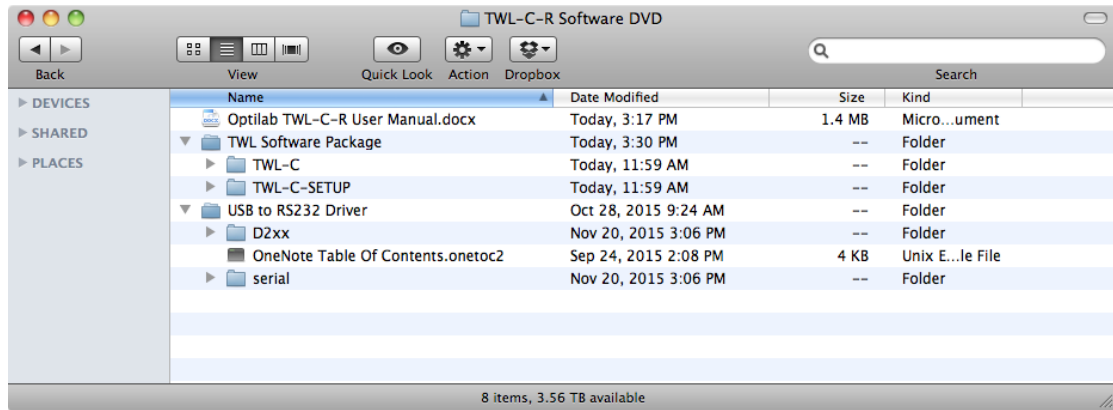


Figure 1: Sample application directory upon read of the software DVD (TWL-C-R displayed)

2.5.4 Operation

To start the GUI, execute either the TWL-L-R.vi or the TWL-L-R.exe application file. The window in Figure 2 will appear. Please refer to the table below for the description of each GUI features.

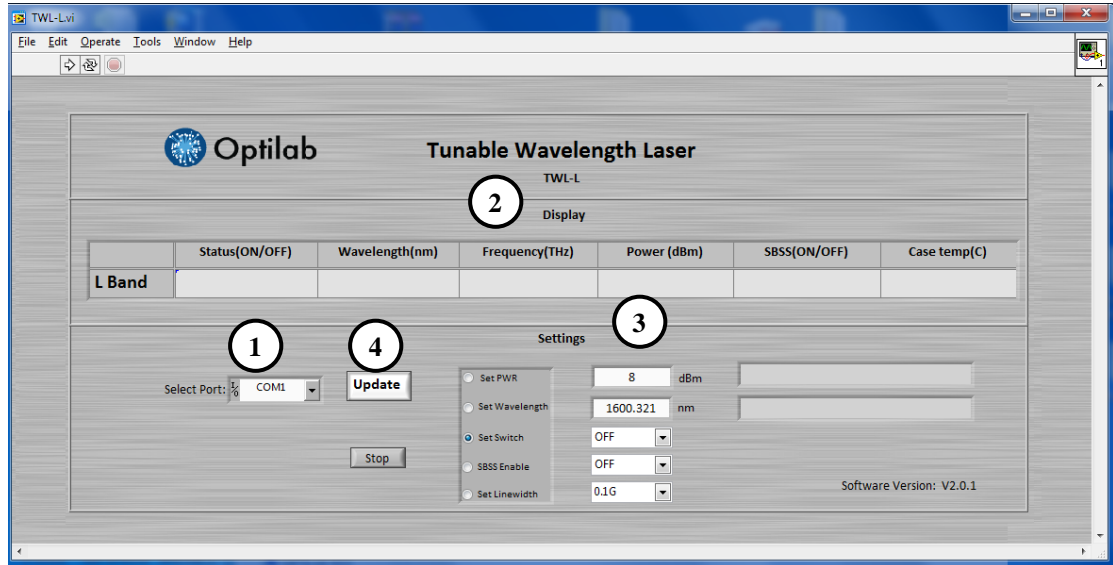


Figure 2: Main window of the GUI

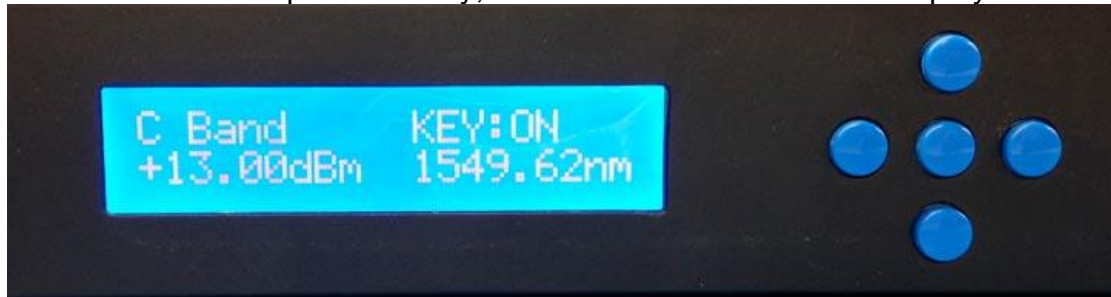
Feature	Function
① Comport Setting	This box is used to set the com port of the TWL-L-R Device. The COM selection must be made before running the software.
② Monitor Window	This box / window displays all the current set points and readings on the TWL-L-R during operation.
③ Optical Settings Adjustment	Use the box on the left side of the settings section of the screen to select the optical adjustment. Note that only the selected box on the left will be adjusted at any given time! <u>Set PWR</u> - Optical power of the system, from 6-16 dBm <u>Set Wavelength</u> - Center wavelength, in 0.001nm accuracy, please refer to test data sheet for set range. <u>Set Switch</u> - Turns the output laser on or off accordingly. <u>SBSS Enable</u> - Enable SBS suppression feature/linewidth broadening. <u>Set Linewidth</u> - Adjust the various internal linewidth features of the output lasers.
④ Update and Stop buttons	After the LabVIEW software is enabled and running, use these buttons to active the communication, Update any changed features, and Stop to shut down the program.

Once this screen is reached, please follow these instructions for operation:

1. After the LabVIEW GUI is opened, and the COM port setting are chosen on the Settings of the software, run the LabVIEW software to start the GUI.
2. Using the settings box, select the desired internal tunable LD first and then select the desired features of the optical output (Power, Wavelength, Linewidth, etc.), and then pressing the Update button afterwards to confirm each change. Note that only one feature can be changed at one time, with a press of the Update button required after each feature change.
3. Once the Power, Wavelength, and Linewidth settings are selected, choose the Laser Enable setting, and then turn the laser to the On position, with an Update button press to enable the laser.
4. The laser should now be enabled, make adjustments to each feature as desired, ensuring the desired feature is selected on the left side, and the Update button is pressed each time to ensure the setting is properly communicated.
5. To close the software, select the stop button, this should automatically disable the LabVIEW program from operation.

2.6 LCD Front Panel Controls

The Optilab TWL-L-R device allows user to adjust the lasers by using 5 buttons on the front panel directly, as shown below next to the display:



Once the TWL-L-R device has been powered on and the key switch has been turned to the ON position, the device is ready for operating, even without PC communication.

1. Press the “Up” or “Down” button to select the desired internal tunable LD, L-Band, and press the middle button to activate the setting function for the selected tunable LD.
2. While the setting function is active, press “Left” or “Right” button to select power or wavelength parameter, and then press middle button to get in the setting program of each parameter. Most importantly, the “Up” or “Down” button is only used to enable or disable the tunable LD before the “Middle” button has been pressed.
3. After the setting program of parameter is activated, use “Up”, “Down”, “Left”, or “Right” button to set the desired value, and press the middle button again to set and save the value, and the parameter selection program will be activated. Then, use the “Up” or “Down” button to

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enable/disable the tunable LD, or use the “Left”, “Right” or “Middle” button to edit the power or wavelength will be both functional.

3. Troubleshooting

Symptom	Possible Cause and Solution
Optical output power not high enough.	C: Optical input / output connector is dirty. S: Disable optical output to seed laser and clean optical connectors.
	C: Use of incorrect optical adapter or connector. S: Use only the indicated optical adapter and connector. If measurement instruments accept different connector type, then use a hybrid patch cord.
	C: Optical input / output connector damaged. S: Measure optical output power with power meter and compare with original test data. Return to Optilab for repair if the difference is high (>4 dB) and cannot be corrected by cleaning or replacing the optical connectors. Always apply dust cover plugs to unused optical receptacles to prevent the damage of internal optical connectors.
Optical output power unstable.	C: Insufficient optical output isolation. S: Connect isolator of corresponding wavelength to optical output connector.
Unit does not power up.	C: Blown fuse. S: Contact Optilab, LLC to replace fuse.
	C: Insufficient electrical voltage. S: Check that the electrical supply is 110 / 220 VAC.
	C: Power cord is loose. S: Plug power cord is firmly into the unit.
Unit resets or blinks on and off	C: Insufficient electrical voltage. S: Check that the electrical supply is at least 100 VAC.

4. Technical Specifications

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Optical Specifications

Operating Wavelength	1570.01nm ~1607.04nm
Wavelength Accuracy	± 1.5 GHz
Wavelength Stability	± 1pm over 24 hours
Output Power	40mW (+16 dBm) max. per channel
Output Stability	0.02 dB over 8 hours
Linewidth (FWHM)	< 100 kHz w/o SBS < 750 MHz w/ SBS
Carrier to Noise Ratio (CNR)	50 dB typ. @ -5 dBm
Side Mode Suppression Ratio	55 dB typ.
Relative Intensity Noise (RIN)	-145dB/Hz
Polarization Extinction Ratio	20 dB min.
Optical Isolation	30 dB min.
Fiber Type	Panda 1550 PM Fiber

5. Mechanical Specifications

Power Supply Requirements	100-240 VAC
Optical Connectors	PM Narrow Key FC/APC Standard, additional types available
Operating Temperature	0°C to +40°C
Storage Temperature	-40°C to +70°C
Control	Output Power Level, Wavelength
Communication Interface	RS232, via USB 2.0
Local Alarm	Over Temperature, Over Current
Dimensions	1U Rackmount: 19" x 16" x 1.75"

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6. Service and Support

6.1 Warranty

Optilab, LLC guarantees its TWL-L-R unit to be free of defects for 1 year from the date of shipment. The guarantee does not cover any damages resulting from the misuse or improper handling of the equipment, or any incidental or consequential loss. Note that the warranty will be void upon any attempt to open or to fix the equipment by the user without prior approval of Optilab, LLC

6.2 Service and Calibration

Your TWL-L-R unit has been designed to provide years of trouble-free operation. No internal maintenance is required provided that the equipment is properly handled, operated and kept away from contamination. For any questions regarding the operation and performance of the unit, please contact Optilab, LLC at:

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6.3 Care of Fiber-optic Connectors

Damage to optical connectors account for more than 70 percent of equipment performance degradation. To avoid such damage, the user should use only industrial grade 99% pure isopropyl alcohol and follow the procedures below to keep the connectors, adaptors and receptacles clean.

Cleaning Optical Connector End-face with Wipe and Alcohol

To properly clean optical connectors utilizing lens tissue grade wipes and alcohol follow the procedure below. The moist wipe removes dust particles, oil and contaminants that may damage or blot the end-face of the connector during connection. The dry wipe removes residual alcohol that may be ignited by optical emission.

1. Disable the optical output and turn off unit to prevent accidental exposure or damage to the optical connector by optical emission.
2. Moisten a wipe with alcohol by placing on top of the alcohol dispenser and push down to saturate the wipe.
3. Place the moist wipe on a work surface, and place a second dry wipe next to it.
4. Wipe the optical connector, end-face down on the moist wipe 3 times and then repeat on the dry wipe.
5. Visually inspect the end-face of the optical connector with an optical microscope to verify cleanliness. Repeat steps 2 to 5 as needed.

Cleaning Optical Connector Sides, Receptacles, Adaptors with Swab and Alcohol

Dust or particles can adhere to the insides of receptacles and adaptors or the sides of the optical connector ferrule. Their presence can affect the alignment of the optical fiber connectors and increase connection loss. To properly clean optical connectors, receptacles, and adaptors utilizing a swab and alcohol follow the procedure below:

1. Disable the optical output and turn off unit to prevent accidental exposure or damage to the optical connector by optical emission.
2. Moisten the swab by placing it on top of the alcohol dispenser and push down to saturate the swab.
3. For receptacles, adapters, or other connection points, insert the moistened swab and rotate the tip 1/2 turn clockwise and counter-clockwise 6 times while applying light but firm pressure.
4. For fiber connectors, rotate the tip of the moistened swab 5 revolutions around the connector while applying light but firm pressure.
5. Visually inspect the end face of the connector with an optical microscope to verify cleanliness. Clean end-face as needed.