LED light source Assembly Instructions

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Caution: Use appropriate eye safety for testing and aligning the LEDs.

Steps:

Use appropriate wires of various colours for wiring of the setup. Too thin wires might be insufficient for carrying appropriate current and too thick wires might not allow for space between the pads and pins. Define a color coding scheme for the different wires for safety and trouble-shooting purposes. In this report, following standard electronics conventions, black is used for the ground or negative (cathode) terminal, while red is used for the positive (anode) terminal.

1. Connect cables to LED cathode and anode pads as shown in Figure 1. Be patient with soldering the wires as the LED PCBA takes long to heat up (~ 30 sec). It is helpful to use high temperature and bigger soldering tips for this particular step.

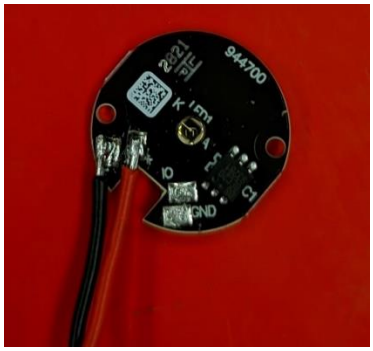

Figure 1 LED's wire connection.

2. Connect the wires from the LED to its respective driver (pin 2 and pin 3) according to the pin configuration outlined in Table 2. It is important to note that the LD3000R driver uses negative voltage. In order to keep a consistent colour coding and avoid confusion later on, we chose to use black for ground and red for –V. Use heat shrink wire protection to cover and isolate the pins as shown in Figure 2.

Table 1. LED driver LD3000R specifications.

LD3000R Specifications	
Output Current	0.02 - 2.5 A
Operating Mode	Constant Current
Internal Current Control	12-Turn On-Board Potentiometer
External Current Control	0 - 5 V Analog Input Voltage (J1 Pin 4)
Bandwidth	1.1 kHz
Operating Voltage	±8 to 12 V

Table 2. LED driver LD3000R pin configuration.

J1 Pin Configuration	
Pin #	Function
1	+V (5 to 12 VDC, 50 mA)
2	Ground
3	**-V (-8 to -12 VDC, 2.5 A)**

4	External Current Control (0 to 5 VDC)
5	No Contact (Polarization Key)
6	Laser Diode Anode (Internally Connected to Pin 2 Ground)
7	Laser Diode Cathode
~~8~~	~~Monitor Photodiode Anode (from Laser)~~
~~9~~	~~Photo Diode Monitor Output (~1 V/mA)~~
10	Laser Current Monitor Output (1 V/A) Referenced to -V
J2 Pin Configuration	
Pin #	Function
Jump 2 to 3	Mode 1: COMMON Referenced External Current Control
Jump 4 to 5	Mode 2: Disable External Current Control
1	No Connection (Leave Floating)
5	-V (May Also Be Used for Monitoring Signals)

3. Connect wires to the driver's anode and cathode (pin 6 and pin 7) according to Table 2. Use heat shrink wire protection to cover and isolate the pins as shown in Figure 2.
4. Repeat step 1 and 3 for all LEDs and their respective drivers. Use appropriate labelling to avoid mixing up the components. It is recommended to test the connections before moving on to the next steps. Use appropriate eye protection before powering the LEDs on. Set appropriate limit on the power supply in accordance with the LEDs and the driver's specifications as shown in Table 1 to prevent damaging the LEDs or the drivers. Use appropriate jump on the driver according to J2 Pin Configuration Table 2.

Figure 2 Driver's wire connections.

Figure 3 shows the optical layout of the LED light source.

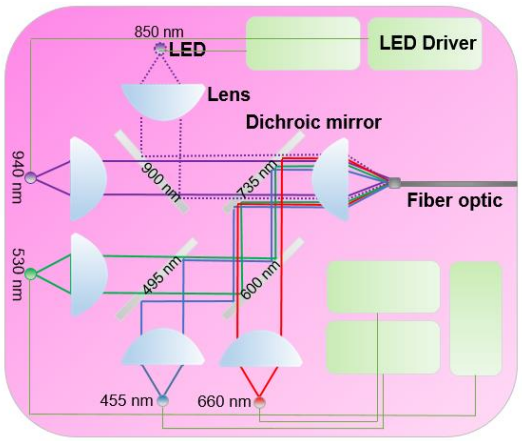

Figure 3 Optical layout of the LED light source.

5. Screw the LED PCBs to the custom-made holders. Use heat conducting paste behind the LED for additional heat conductivity. Attach the holders to the custom-made plate using screws, according the optical layout shown in Figure 3.
6. Mount the dichroic filters in cage cubes as shown in Figure 4. Take into consideration the small arrow on the filter. Handle with care. Mount so the longer wavelength passes through. Attach to the cubes to the plate using screws, according the optical layout shown in Figure 3.

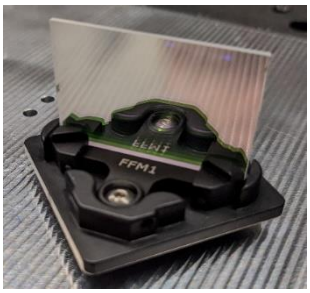

Figure 4 Assembling of dichroic filters in the cage system.

7. Mount the lenses in their cage plates and connect to the plate using screws, according the optical layout shown in Figure 3.
8. Mount the SMA fiber adapter plate in front of the final focusing lens and connect to the plate using screws, according the optical layout shown in Figure 3.
9. At this stage all the optical parts should be mounted on the metal plate as shown in Figure 5.

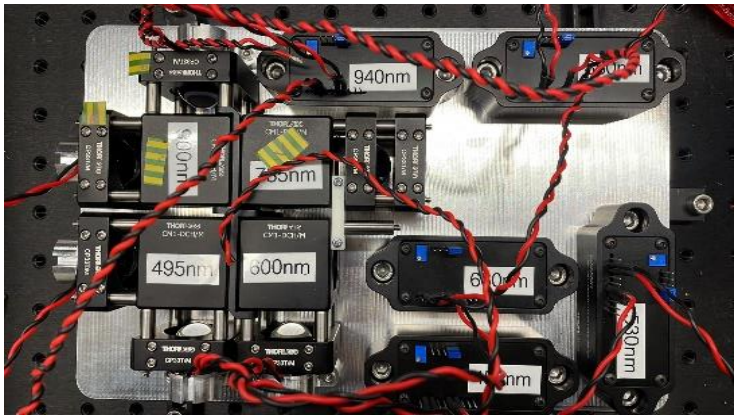

Figure 5 Mounted opto-mech, LED holders and drivers on the custom-made plate.

10. Connect the optical fiber of choice to the SMA connecter.

The next steps involve aligning the system to maximize optical output. At this stage we have not connected the LEDs to a dedicated power supply yet and a temporary lab power supplier will suffice for aligning and troubleshooting. Follow the recommendations in step 3 before moving on.

11. Connect the optical fiber to an optical power meter to measure the LED's light output. Adjust the position of the lens placed in front the LED to maximize the output power. Repeat for all LEDS.
12. Once satisfied with the alignment, tighten all screws. Use the a zip wrap or our custom-designed part to fixate the rods between neighbouring cages in order to further secure the optical setup.
13. The next steps involve connecting wires to the LED drivers to a dedicated external power supply as well as a control system for adjusting the LED current digitally. Use appropriate pins

based on table 2 and connect them to connector of choice. We used a standard 15-pin connector in our design as shown in Figure 6.

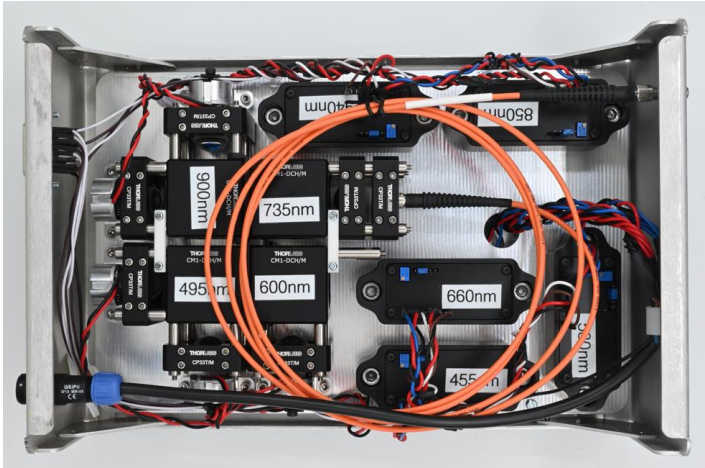

Figure 6 The LED platform with all parts assembled and all connectors in place.

14. Once all connections are made and the enclosure is closed, the power supply is ready as shown in Figure 7.

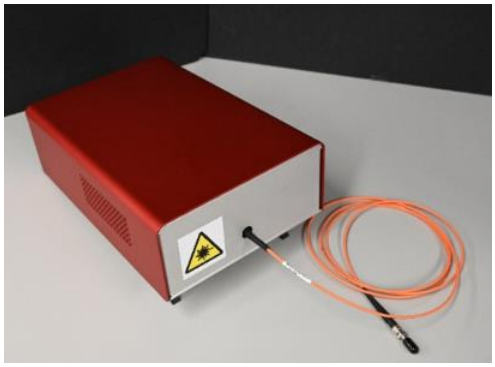

Figure 7 Assembled LED light source in an enclosure box.