

Instruction Manual

Single Frequency Lasers

BWG-532-OEM



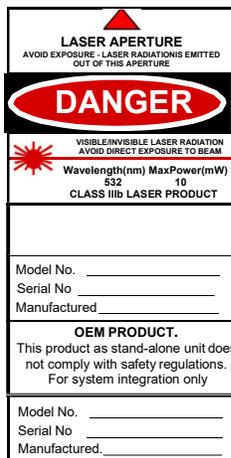
1. PREPARE FOR LASER OPERATIONS:

Warning !!! Laser Safety !!!

The laser **Poses Extreme Hazards** for the operator's eyes even with indirectly scattered or reflected beams. Wear laser safety glasses or goggles while operating the laser.

- 1) Never expose the eyes by looking directly into the laser beam.
- 2) Never use the eye to align or orient the beam looking into its source.
- 3) Do not install the laser or use it for an experiment at eye level.
- 4) Do not permit any reflective object in the path of the beam. Scattering the beam from a reflective surface is very damaging to eyes or skin.
- 5) Do not wear rings, metal watch bands, or jewelry.
- 6) Turn the power off, preventing stray reflections from occurring either between experiments and when moving the laser for another application.
- 7) Point the laser beam at a specific target.
- 8) If possible, have an enclosed path for the laser beam.
- 9) Designate a specific area for laser use only. Permit only trained operators in the area.
- 10) Post warning signs indicating the laser is being used.

This laser product is built per customer's specifications and sold solely as a component (or a module) for incorporation into other equipment. The purchaser assumes responsibility to comply with US FDA21 CFR 1040 with regard to the use of this laser and its introduction into commerce.



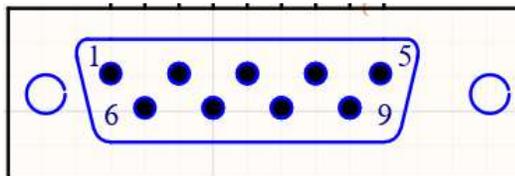
Sources for additional information and assistance on laser safety:

**CDRH-Radiological Health Program
Office of Communication, Education and Radiation Programs
Center for Devices and Radiological Health
Food and Drug Administration
10903 New Hampshire Avenue W066-4613
Silver Spring, MD 20993 USA
Tel: 1-800-638-2041, Fax: 1-301-847-8149
dsmica@fda.hhs.gov**

**Laser Institute of America
13501 Ingenuity Drive, Suite 128
Orlando, FL 32826 USA
Toll-Free: 1-800-345-2737
Tel: 1-407-380-1553, Fax: 1-407-380-5588
www.lia.org**

2. 9-Pin connector definition

The 9-pin (DB9 male) connector at the laser drive device serves for controlling signals and power lines.



- 2.1. Pin 1, 2, 6: Power supply negative terminals (circuit signal ground, signal return terminals). They must not be grounded (to earth).
- 2.2. Pin 3: A digital input terminal to enable/disable laser-beam output (TTL modulation). It is a TTL level active (a high, 5V, to enable laser-beam output, a low to disable laser output). Modulation frequency: $\leq 10\text{Hz}$. Input impedance: 1 k ohms
- 2.3. Pin 4, 5: Power supply positive terminals. They must not be connected to chassis (device case). The power supply output range: 4.75 to 5.25 Volts at 5 Amperes, noise ripple: $\leq 50\text{mV}$
- 2.4. Pin 7: An input terminal to enable laser-beam output. It is a TTL low level active (connected to power negative terminal to turn laser beam on).
- 2.5. Pin 8: An input terminal to set laser-beam power-output level. Input 0 to 5 Volts corresponds to 0 to maximum laser-beam power-output. Specific information shows in the laser test report. Input impedance: 50 k ohms.
- 2.6. Pin 9: Current monitoring. An output terminal to indicate laser-beam output power level. The output voltage range is: 0 to 5 Volts. This is maximum level of power output for a typical 50 mW laser corresponding to voltage range: 0.4-0.6VDC. The output impedance is 100 ohms.

3. Installation

- 3.1. The laser head mounting plate should be coated with as thin as possible layer and evenly distributed thermal material (such as thermal grease), and mounted in the best contact possible onto a heat sink with sufficient dissipation. Ensure even torque from all the mounting screws is used.
- 3.2. Connect the 15 pin laser connector from the laser head to the matching receptacle on the driver module. Secure the connections by tightening the two locking screws.
- 3.3. Connect the power terminals at 9-pin connector to a 5VDC power supply. The pins 4 and 5 of the 9-pin connector connect to the positive terminal of the power supply; and the pins 1, 2, and 6 to negative.
- 3.4. Make connection for pins 3, 7, and 8 at the 9-pin connector. Pin 3 connects to positive 5VDC power terminal, pin 7 to negative power terminal (signal ground), and pin 8 to positive 5VDC power terminal.

Note: The pin 9 at the 9-pin connector can be floating if not needed.

4. Operation

- 4.1. Ensure the power supply meets the required specifications especially for voltage, current and ripple ratings.
- 4.2. Ensure the control inputs meet the requirements of the voltage, surge, spike and ripple requirements.
- 4.3. Before the laser is powered on make sure that the control input connected through pin 7 is pulled high for the laser output to be in the dithered status, while the input to Pin 8 is set to low (connecting to negative power supply terminal).
- 4.4. The warm up time for the laser and the driver is 5 minutes minimum.
- 4.5. After the laser is powered and warmed up, a TTL low at pin 7 (inputting a zero voltage at pin 7) will enable laser output. Slowly increase the voltages supplied to pin 8 for desired laser output power.
- 4.6. The minimum possible laser output power over its lasing threshold can be determined through the gradual adjustment of the control input voltage with the observed lasing threshold point, while the control voltage corresponding to the maximum output power can also be experimentally determined. For OEM applications the above two control values need to be saved and applied by the control input source (i.g, system micro-controller) to match the specific laser/driver set.
- 4.7. There is a nearly linear relationship between the supplied control voltage and the laser output power within the Min and Max range.
- 4.8. To ensure the performance of the laser and safety of the personnel, always set pin 7 to High and pin 8 to Low before turning laser-beam on. Always allow sufficient time (eg. 5 minutes) for the laser to reach its thermal equilibrium.
- 4.9. Power off sequence: Set the voltage of pin 8 to zero before powering off the laser's power supply.

5. Notes

- 5.1. Every laser/driver pair has its unique laser power control voltage values specific to the matched laser/driver set. Ensure the pair-specific control voltage values determined are saved and applied correctly to the matched set only.
- 5.2. Ensure the 5 minute warm up routine from the system level whenever possible.
- 5.3. The laser has a built in isolator mechanism against the reflected laser beam for maximum possible operation stability in most applications. It is good practice in the system design to avoid or minimize the reflected beam back into the laser. In special applications contact the factory, should higher isolation performance be required.
- 5.4. The driver unit has been adjusted to work with the specific laser head to the highest possible performance. Hence neither mismatch of the laser heads to drivers, or customer alteration to the laser head/driver setting is allowed.