**AENBUSLM DLC-JG-3.0**

# AENBUSLM 40W Laser Module (Model DLC-JG-3.0) Instruction Manual

Your comprehensive guide to safe and effective operation.

## 1. Safety Information

This AENBUSLM 40W Laser Module is a Class 4 laser product. Improper use can result in serious injury, including eye damage, skin burns, and fire. Always adhere to the following safety precautions:

- **Eye Protection:** Always wear certified laser safety goggles that block 450nm wavelength light when operating the laser module. Never look directly into the laser beam or its reflection. The module includes a detachable eye protection cover to help filter blue light, but dedicated safety goggles are mandatory.
- **Skin Protection:** Avoid direct exposure of skin to the laser beam.
- **Fire Hazard:** The laser can ignite flammable materials. Ensure a fire extinguisher is readily available. Do not leave the laser operating unattended.
- **Ventilation:** Operate the laser in a well-ventilated area to disperse smoke and fumes generated during engraving and cutting. The built-in air assist helps manage smoke at the point of operation.
- **Children and Pets:** Keep children and pets away from the laser operating area.
- **Emergency Stop:** Familiarize yourself with the emergency stop procedure for your CNC machine or laser engraver.

## 2. Product Overview

The AENBUSLM 40W Laser Module is designed for precision carving, engraving, and cutting. It features a 40W machine power and a 5.5W (5500mW) optical output power, utilizing a high-quality diode with a built-in FAC (Fast Axis Collimation) lens for a double ultra-fine compressed spot (0.08x0.08mm). This module includes an integrated air assist system and a fan cooling system for enhanced performance and longevity.

### Key Features:

- **Optical Power:** 5.5W (5500mW)

- **Laser Wavelength:** 450nm
- **Spot Size:** 0.08mm x 0.08mm (Fixed-Focus)
- **Input Power:** DC 12V 3.2A
- **Control:** 5V PWM modulation
- **Connectivity:** XH2.54-3P socket (pluggable)
- **Lifespan:** Approximately 20,000 hours
- **Cooling:** Built-in fan cooling system (10,000 rpm)
- **Air Assist:** Integrated air assist for cleaner cuts and reduced smoke.


Figure 2.1: Front view of the AENBUSLM 40W Laser Module, highlighting its compact design and integrated features.


Figure 2.2: Overview of the laser module's key specifications and features, including 5.5W output power and integrated air assist.

## 3. Setup

This section details the installation and initial configuration of your AENBUSLM 40W Laser Module.

### 3.1 Unboxing and Components

Carefully unpack all components. Verify that all items listed below are present:

- AENBUSLM 40W Laser Module
- Mounting Board
- External Power Cord
- 3P Control Line
- Focus Fixing Plate
- Screwdriver Tool + Lens Replacement Tool
- Replaceable Protective Lens

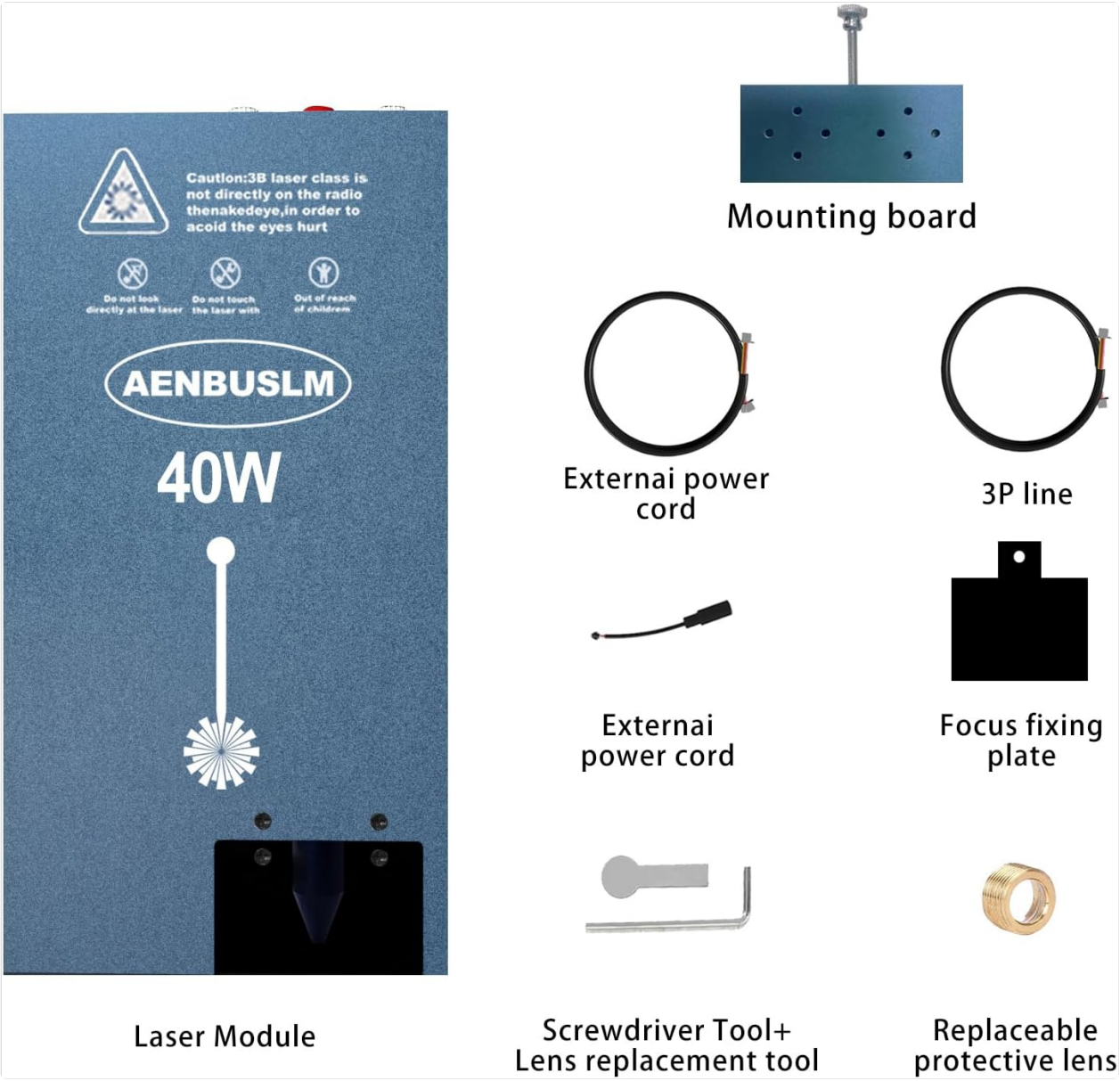


Figure 3.1: Included components for the AENBUSLM 40W Laser Module.

## 3.2 Mounting the Laser Module

1. Attach the provided mounting board to your CNC machine or laser engraver's gantry according to your machine's specifications.
2. Secure the AENBUSLM 40W Laser Module to the mounting board using the appropriate screws. Ensure it is firmly attached and stable.

## 3.3 Electrical Connections

1. Connect the 3P control line to the XH2.54-3P socket on the laser module. This line typically carries PWM signals for laser power control and ground.
2. Connect the other end of the 3P control line to the corresponding laser control port on your CNC controller board. Refer to your CNC machine's manual for specific pin assignments.
3. Connect the external power cord to the laser module's power input and then to a compatible 12V DC power supply (minimum 3.2A recommended).

## 3.4 Focusing

The AENBUSLM 40W Laser Module features a fixed-focus design, meaning the optimal focal length is pre-set. However, some CNC setups may require minor height adjustments for optimal performance. A review mentions an adjustable focal length via a set screw on the mount, which might be an additional feature

depending on the specific batch or mounting solution.

1. Place the focus fixing plate on the material surface.
2. Adjust the height of the laser module until the bottom of the module (or the laser nozzle) touches the focus fixing plate.
3. Remove the focus fixing plate. The laser is now set to the optimal focal distance for most materials.

### 3.5 Air Assist

The module has a built-in air assist system. This system automatically provides a stream of air to the laser's focal point during operation, which helps to:

- Blow away smoke and debris, resulting in cleaner cuts and engravings.
- Reduce charring and discoloration on the material.
- Improve cutting efficiency and depth.


Figure 3.2: Visual comparison demonstrating the benefits of air assist for cleaner cuts and reduced charring.


Figure 3.3: Illustration of the integrated air pump, which provides efficient smoke dispersion.

## 4. Operating Instructions

This section provides general guidelines for operating the AENBUSLM 40W Laser Module for various applications.

### 4.1 Compatible Materials

The laser module is suitable for engraving and cutting a wide range of materials, including:

- Wood (Pine board, bamboo, basswood, plywood)
- Metal (Mirror stainless steel, lacquered metal, aluminum oxide)
- Acrylic (Black acrylic)
- Paper and Cardboard
- Leather
- Stone
- Ceramics
- Coated Glass
- Plastic (ensure it does not produce toxic fumes when laser-processed)

### 4.2 Software and Control

The laser module is compatible with common laser engraving software and CNC control systems that support PWM modulation, such as:

- LaserGRBL
- LightBurn
- Other GRBL-compatible software

Ensure your software is configured to output 5V PWM signals for laser power control.

## 4.3 Engraving and Cutting Procedures

1. **Prepare Material:** Place the material securely on your machine's workbed. Ensure it is flat and properly aligned.
2. **Set Focus:** Use the focus fixing plate as described in Section 3.4 to set the optimal focal distance.
3. **Software Settings:** Adjust laser power, speed, and passes in your chosen software based on the material and desired outcome. Start with conservative settings and perform test cuts/engravings on scrap material.
4. **Start Operation:** Initiate the engraving or cutting job from your software. Monitor the process closely, ensuring safety precautions are maintained.

## 4.4 Performance Examples

- **Engraving Mirror Stainless Steel:** Direct engraving without needing to paint black.
- **Fast Engraving Speed:** Up to 300mm/s on 304 stainless steel with 45mm focus length.
- **Cutting Plywood:** Capable of cutting through 8mm thickness plywood in a single pass at a speed of 1.5mm/s with 45mm focus length.


Figure 4.1: Demonstration of the laser module's cutting capability on acrylic.


Figure 4.2: Examples of creative projects possible with the laser module, such as engraved coasters and cards.

## 5. Maintenance

Regular maintenance ensures the longevity and optimal performance of your laser module.

### 5.1 Lens Cleaning and Replacement

The protective lens can accumulate dust and debris, affecting laser performance. Clean the lens regularly with a soft, lint-free cloth and lens cleaning solution designed for optics. If the lens is scratched or damaged, replace it using the provided lens replacement tool and a new protective lens.

### 5.2 Cooling System

The built-in fan cooling system operates at 10,000 rpm to maintain optimal operating temperature. Ensure the fan vents are clear of obstructions to allow for proper airflow. Periodically clean any dust accumulation from the fan area.

### 5.3 General Cleaning

Keep the exterior of the laser module clean and free of dust and debris. Use a dry or slightly damp cloth. Avoid using harsh chemicals or abrasive materials.

## 6. Troubleshooting

This section addresses common issues you might encounter with your AENBUSLM 40W Laser Module.

### 6.1 Laser Not Firing or Weak Output

- **Check Power Connection:** Ensure the 12V DC power supply is properly connected and providing sufficient current (minimum 3.2A).
- **Check Control Line:** Verify the 3P control line is securely connected to both the laser module and the CNC controller.

- **Software Settings:** Confirm that the laser power (PWM) is set correctly in your engraving software and that the laser is enabled.
- **Focus:** Re-check the focus distance. An out-of-focus laser will have a weaker or diffused beam.
- **Lens Condition:** Inspect the protective lens for dirt, scratches, or damage. Clean or replace if necessary.

### 6.2 Poor Engraving/Cutting Quality

- **Focus:** Ensure the laser is precisely focused on the material surface.
- **Speed and Power:** Adjust engraving/cutting speed and laser power settings. Different materials require different parameters.
- **Air Assist:** Verify the built-in air assist is functioning. Lack of air assist can lead to charring and poor edge quality.
- **Material Quality:** Ensure the material itself is suitable for laser processing and free from defects.

### 6.3 Overheating

- **Fan Obstruction:** Check if the cooling fan vents are blocked. Clear any debris.
- **Ambient Temperature:** Operate the laser in a reasonably cool environment.
- **Continuous Operation:** While designed for extended use, prolonged operation at 100% power in high ambient temperatures may lead to minor power decrease. Allow for cool-down periods if necessary.

## 7. Specifications

| Specification | Value |
|---|---|
| Brand | AENBUSLM |
| Model Number | DLC-JG-3.0 |
| Machine Power | 40W |
| Optical Output Power | 5.5W (5500mW) |
| Laser Wavelength | 450nm |
| Spot Size | 0.08mm x 0.08mm |
| Input Voltage | DC 12V |
| Input Current | 3.2A |
| Control Method | 5V PWM Modulation |
| Connector Type | XH2.54-3P |
| Material | Aluminum |
| Product Dimensions | 2.95"L x 1.7"W (76mm x 17mm x 147mm) |
| Item Weight | 0.5 Kilograms (1.1 pounds) |
| Operation Mode | Automatic |

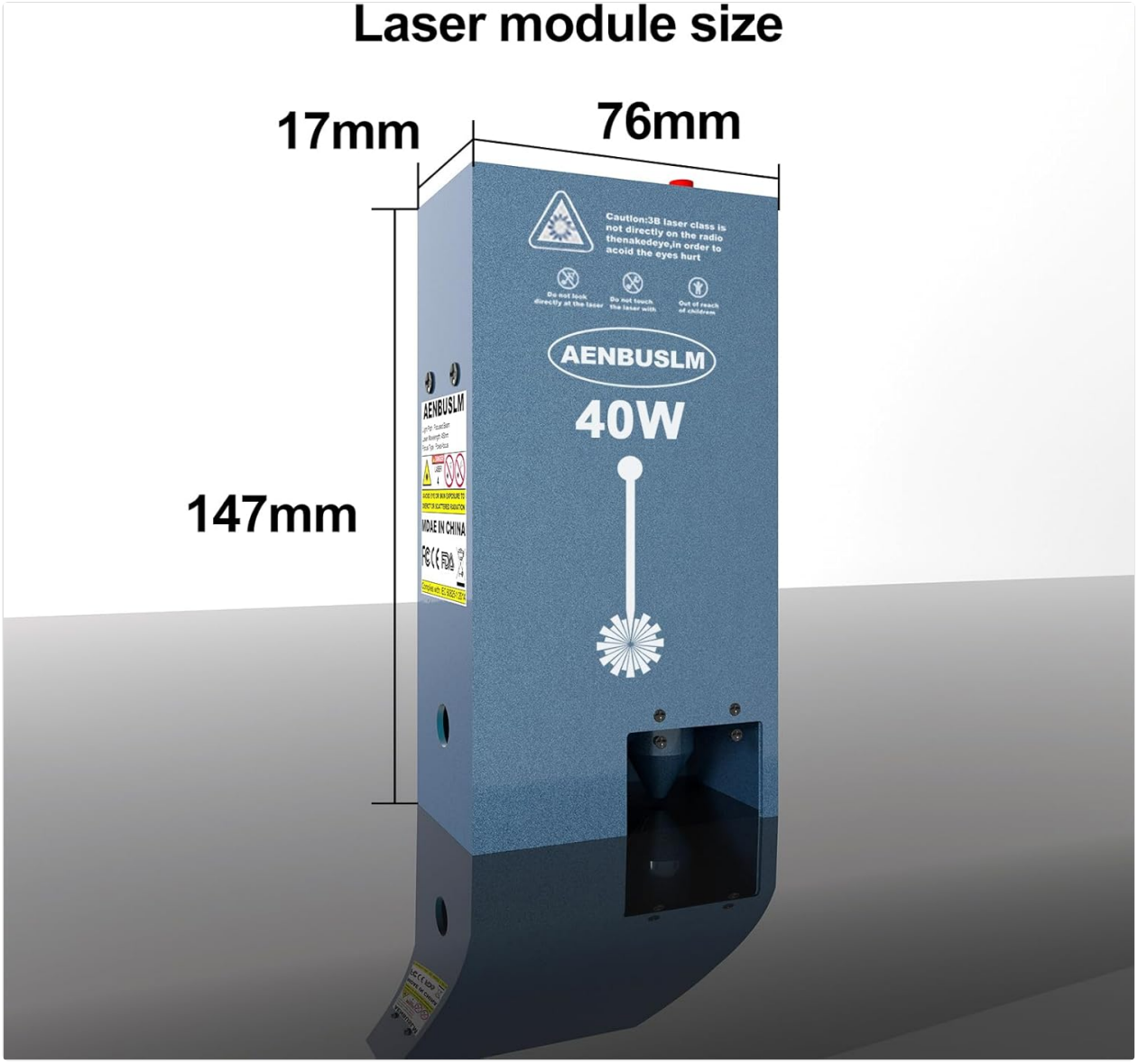


Figure 7.1: Dimensional drawing of the laser module.

## 8. Warranty and Support

AENBUSLM is committed to providing high-quality after-sales service. If you encounter any problems when using this product, please contact our customer support team. Our professional technicians are available to provide solutions and assistance in a timely manner.
Please refer to your purchase documentation for specific warranty terms and contact information.