

4.2W 445nm Laser Diode Component

This multi-mode laser diode component is pressed fit mounted in an aluminum housing and has an aluminum mountable heat-sink. The laser is set in the heat sink with thermally conductive paste. The front of the component contains an adjustable high efficiency glass focusing lens for the laser output. MFG setting of 2.5amps will give approximately 4.2W or more of output power. While the mounting case provides heat sinking capability for the laser diode, it is up to the consumer to make sure the laser is operating effectively within these limits. We recommend a FAN to cool the laser within the 50 degree Celsius limit.

Absolute Maximum Ratings:

Item	Absolute Maximum Ratings	Unit
Forward Current (Tc = 25°C)	3	A
Allowable Reverse Current (Tc = 25°C)	85	mA
Operating Case Temperature	50	°C

Electrical / Optical Characteristics

Item	Min	Typ.	Max	Unit
Typical Optical Output Power @2.5 amp		4.2	7	W
Typical Operating Current		2.5		A
Dominant Wavelength	435	445	455	nm
Threshold Current	80		220	mA
Operating Voltage	3.7		5.5	V
Focused Spot Size	.008	0.011		Inch
Beam Divergence Full Angle (1/e ²) //	5	14	25	deg.
Beam Divergence Full Angle (1/e ²) - Perp	30	44	50	deg.

-Above specifications are for reference purposes only and are subject to change. Figures in specifications may contain measurement errors.

Output Conditions

The laser diode output will vary depending on the temperature. While there is a housing and a small heat sink, it is recommended that the diode not be on for long periods of time. The laser diode will also require more current to maintain the same amount of output power as the diode degrades.

Normal Operating Conditions:

The laser diode will operate at its optimal level for thermal performance at 2.5 amps and an output of 4.2W. Additional current above this level will lead to possible degradation of the laser output and thermal damage if additional precautions for thermal management are not taken.



Static Precautions

Take precaution when handling laser diodes as they are a static sensitive devices. Static electricity and electrical surges will degrade the performance of the laser diode.

Laser Safety



Laser light can cause damage to eyesight and skin if proper laser safety is not used. Always wear the appropriate laser goggles to prevent any laser light, either directly or indirectly to contact the eye. Never expose skin directly to laser radiation. Focused light will increase the safety hazard.

Laser Connection

If your laser was part of a driver kit, it will be cabled with a Molex mini fit Jr connector which will connect directly to the laser driver board output.

Connection:

- Connect the laser to the Molex Mini Fit Jr. Header "H3" for laser output.

If you want to connect the laser to another power supply, you can cut the connector off and:

- Connect the laser positive (Red Wire) to the positive output of the laser driver.
- Connect the laser ground (Black Wire) to the negative output of the laser driver.

Cleaning the Lens:

Sometimes soot or smoke can get onto the lens surface when processing, causing decreased levels in output power. Only clean the lens with approved lens wipes or a microfiber cloth. It is suitable to also use alcohol on the wipes or cloth when cleaning.

Focusing Your Laser

Your laser is set with focus at 1.5" from the front of the lens from the factory. If you mount your laser and then adjust your machine to 1.5" from the work surface, you should have a pretty good focused spot.

If you want to adjust the focus to maximize performance, then follow one of the procedures below. We will outline three methods to attain proper focus.

1. Using the adjustable potentiometer on the laser driver to turn down the power so you can focus.



2. Using PWM on your controller to turn down the laser power so you can focus. This is the preferred method.
3. Using your machine to make several lines at different heights to find the best focus.

The laser module has an adjustable lens at the output aperture. Turn clockwise to adjust the lens into the housing and counter clockwise to adjust it out. The high efficiency lens has been designed to provide the smallest spot and highest power density at about 1" (25mm) to 3" (76mm). When we discuss the word "spot", it is actually a very small rectangle that the laser is producing.

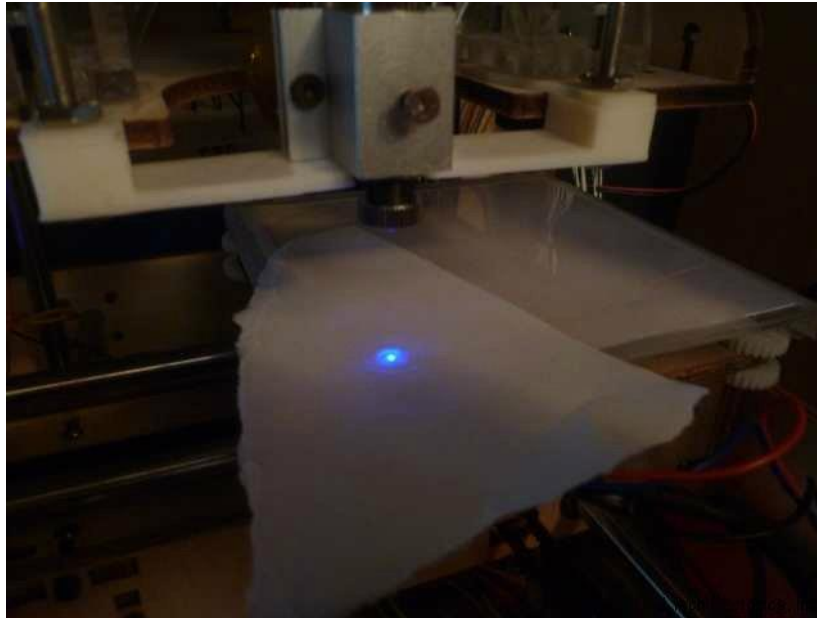
Remember to use laser shielding if possible and your safety goggles when performing this exercise.

Method 1: Using the Potentiometer on the laser driver to adjust the power to focus.

1. Adjust the Z height of the machine so the laser is between 1" and 3".
2. Set a piece of white paper on the work surface, or ON TOP of whatever material you are going to process (or where you would like to set the focus at).
3. Then WITH THE POWER OFF, turn the pot counter clockwise ALL THE WAY (approx 21 turns). You might hear a slight clicking sound when it has reached the maximum off distance or feel a clicking.
4. Then turn the driver board on.
5. Switch the front switch (mode selector) to CW (towards the power switch). The laser is now on, but will not be lasing because there is no current.
6. Turn the pot slowly clockwise until you just see the laser starting to shine light. Stop when you can see a bright spot in the center. Should be about 1-3 turns.
7. Now you can adjust the lens to get the smallest spot at the surface. Adjust the lens one direction and if it gets bigger, then adjust it the other direction until the spot is small. It is fine to pass it a couple of times in each direction until you get a feel for where the minimum will be.
8. Doing the same process, but now using your machine, adjust the Z axis to get the best possible smallest spot that you can tell by looking at it.
9. Now move the Z axis away from your smallest spot in a known increment until you can see the beam get bigger.
10. Move the other direction in the known increment until you pass the smallest spot and get to the same size big beam in the other direction. Count how many increments this was.
11. The smallest spot is now exactly between these "easier to see" larger beam sizes. Take the count of increments and divide by two and move the Z axis by this amount.
12. When you are done, set this new Z location as your "home" location.
13. Then switch the mode selector back to "TTL" (right).
14. Turn off the driver board.
15. Using you meter, adjust the potentiometer to the desired current output. (see section "adjusting current" in the instructions).
16. You are now ready to process with the laser at its smallest spot size.



Note: If you don't want to do this procedure every time you try a new material, then focus the beam at the work surface. Then, measure the thickness of the material you are processing and move the Z axis UP this thickness. I.e., if you are cutting 1/16" Balsa wood, move the Z Axis up 1/16" so it is focused on the top of the material.



Adjusting the focus and checking with a piece of paper.

Method 2: Using PWM from your controller to turn down the laser and focus.

In this case you don't need to adjust the potentiometer. It is really easy to set the power down to the minimal level. Do the instructions from the previous section, but instead of using the potentiometer to adjust the current, use the PWM control. For most firmware it will be a low number. Somewhere around 1% to 2% of maximum value should do the trick of not burning the paper and being able to see the laser spot on the white paper better.

For example the J Tech GRBL firmware for example you would send:

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M03 S5
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to get the laser at about 2% power. If you are using Inventables firmware or standard GRBL then:

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M03 S20
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probably would work good.

If you are using Marlin firmware on a 3D printer then:

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M106 S5
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would be a good level.

Just try different levels until you just have the laser turned on. Then complete steps 7 through 12 from the previous section.

Disclaimer

By purchasing this component laser diode you are agreeing to the following.

- You are over 18 years of age .
- You understand that these components that are mentioned above are dangerous when not properly assembled into a finished product.
- You will use these as components and properly incorporate them into a finished product.
- You will use these diodes/modules in a safe and responsible manner and for a legal purpose.
- You are legally responsible for the use of these components, improper use of these components or their end products.
- You are legally responsible for any injury to anybody resulting from the use of or assembly of these components or their finished products.
- You Accept this diode/module as a COMPONENT for integration in a system of YOUR OWN design and will be legally responsible from any and all LIABILITIES. These Diodes and Modules are sold solely as a component for incorporation into the customer's end products. Therefore, this diode/module is exempt from compliance with the appropriate requirements of FDA 21CFR, section 1040.10 and 1040.11 for complete products.

