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LPLDD 5A PID

Product Description:

This is a 3rd version of professional driver for laser diodes with a built-in digital temperature controller using the PID algorithm. Its size allows for mounting it in small devices such as compact laser projectors. The driver is available in two versions. One includes heatsink, the second one is without it and is dedicated to users who would like to use their own heatsink or optic plate. We intentionally resigned from a plug connector powering the circuit because experience shows that soldering the wire is the only sure way to avoid the problems associated with oxidation of contacts and arcing, particularly when a current of 15A can flow through the wires.

Despite its small size, the driver is able to work with thermocouples (Peltier modules) such as 12706, 12708, 07113, and many others that draw up to 15A of current. Despite high current, thanks to using PWM the controller does not heat up. Used PID algorithm learns the behavior of the system, hence quicker reacts to changes in temperature and provides higher accuracy of stabilization. The driver easily handles all laser diodes of up to 5W, and at the customer's request it is possible to customize the driver up to 10A version. Separate laser diode supply voltage input and TEC input enable the selection of any components the driver can work with. Analog input allows for the modulation of the current flowing through the diode up to 100kHz. Two potentiometers are used to set the values of maximum diode current and bias current. The third potentiometer is responsible for setting the setpoint temperature in the range of 0 to 40 degrees Celsius. The possibility to power laser diodes of any wavelength and control the Peltier modules with a rated voltage from 3.3

to 16V and current up to 15A make this driver truly unique and extremely versatile.

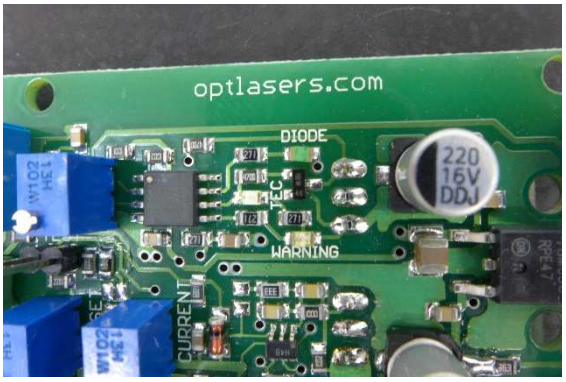
New features:

Added screw connectors (ARK) - smaller size easy to connect the wires

Added test jumper - possibility of switching on the driver without external analog signal

Added current monitor output - possibility of measuring the current while the device is working

Added signal diodes: diode, TEC, warning

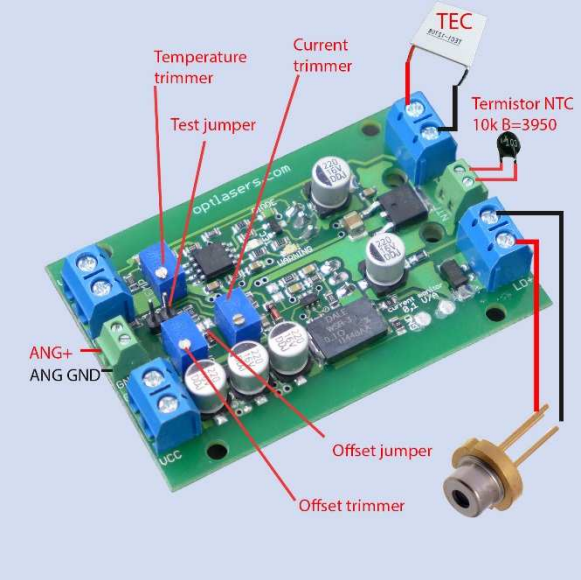


Added labels on the board - more intuitive and easier to set

Technical Data:

TEC maximum current	15A
TEC supply voltage	3,3 - 16V
Maximum diode current	5A
Current set by default	~2000mA
Laser diode suppply voltage	7 - 16V
Modulation voltage (analog)	0 - 5V
Maximum modulation frequency	100kHz
Current monitor	100mV / 1A
Softstart	YES - 2000ms
Temperature sensor	10k NTC thermistor
Temperature stabilization accuracy	+-0,1*C
TEC indicator	YES - blue LED diode
Laser diode indicator	YES - red LED diode
Over temperature protection	YES >50*C
Board dimensions	68mm x 45mm
Mounting holes distance	40mm x 50mm
Transistor type	N-MOSFET

How to connect the LPLDD 5A PID



Connecting "Test jumper" allows to switch on the driver without external analog signal.

While Offset jumper is not connected the Offser trimmer is not working.

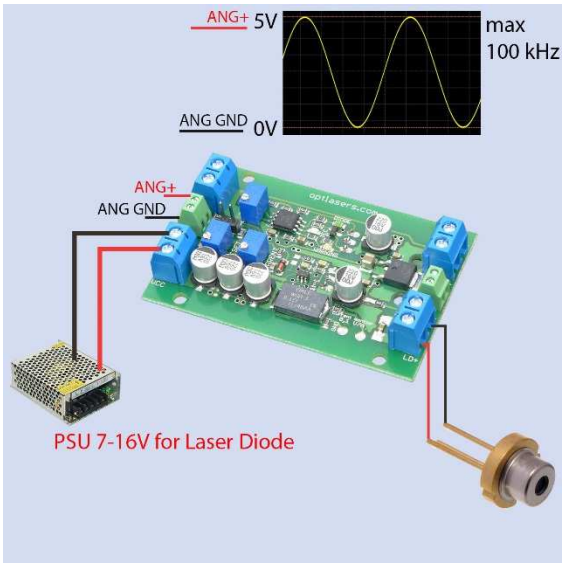
Temperature trimmer allows to set the working point of TEC in range of 0-40 degrees Celcius.

How to power supply the LPLDD 5A PID

Thanks to dual power line of the driver it is possible to power supply the driver in various way.

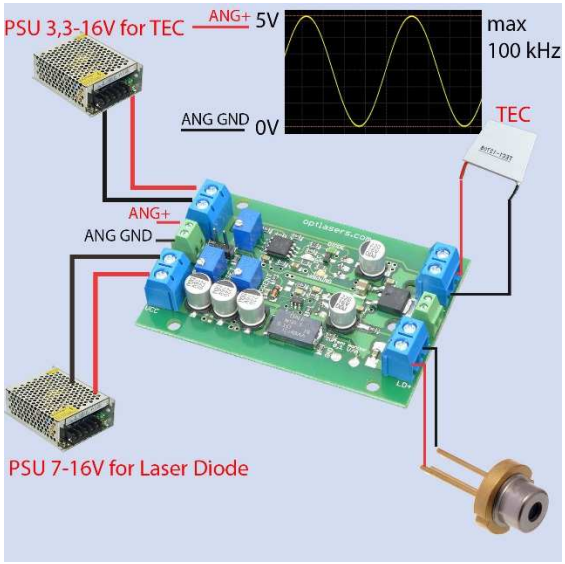
1. Laser diode driver with one PSU

If the driver is used without TEC, single power supply 7-16V can be used. Analog modulation should be 0-5V.



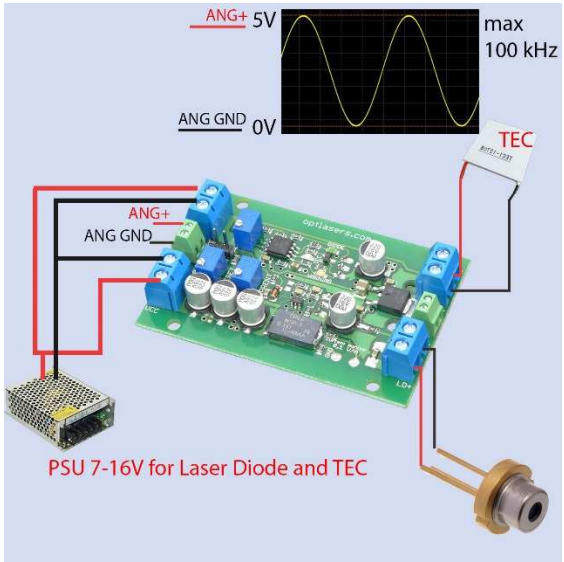
2. Laser diode driver with TEC and two PSU.

If the driver is working with TEC, double power supply can be used. The one for laser diode should be 7-16V, meanwhile the second for TEC should be 3,3-16V. Analog modulation should be 0-5V.



3. Laser diode driver with TEC and one PSU.

If 7-16V PSU is used, it can power supply both, laser diode as well as TEC. Analog modulation should be 0-5V.



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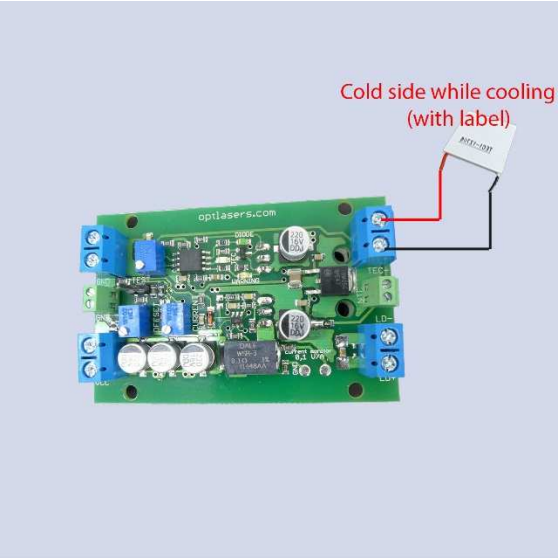
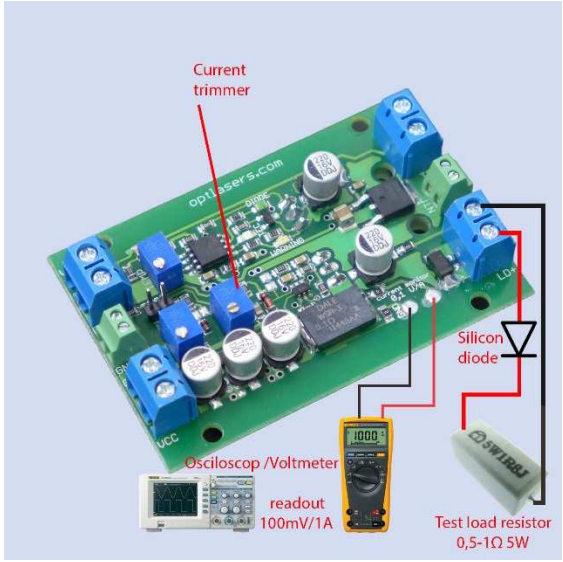
Connecting TEC to the driver

If one connects the TEC accordingly to the picture below, the side with the label will be cold during driver's work. If one connects the cables in the reverse order, the side without label will be cold.

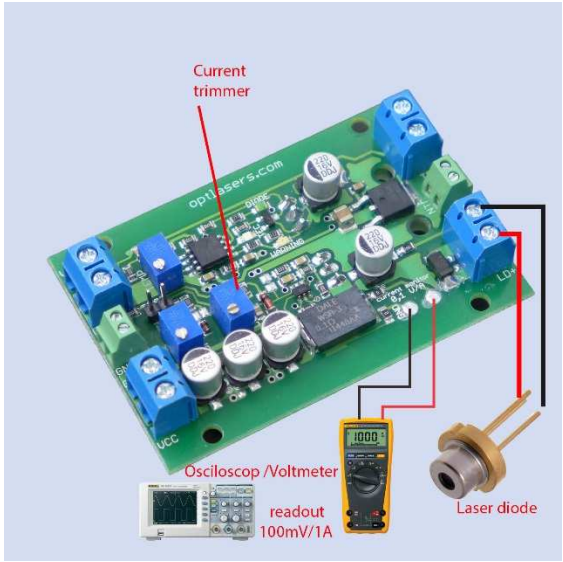


Checking the current set on the driver

The driver is fitted with a current monitor. Safe test of the current can be made without using a laser diode. Instead of using laser diode, use a test load resistor (0,5-1Ω 5W) with silicon diode then check/set the current using current monitor. Regulate the current with "Current trimmer". Each 100mV measured by voltmeter/osciloscop means 1A will be flowing through the laser diode.



It is also possible to check/set the current with the use of a laser diode. In such a situation, the measurement is the same as before.



We recommend to check/set the current using test load resistor because it is much safer and will harm the laser diode.

Recommendations and requirements

The minimum diode input voltage should be higher or equal to 7V, in other situations it is given by the formula:

Vin = 0,4* I + Vd + 0,6V

Vin - input voltage

Vd - diode working voltage

I - desired maximum current

Modulation input can be used as TTL input with its logic levels of 0V and 5V or as an analog input. Analog modulation means that by using 2,5 V on ANG input you get 50% output power, analogically by using 4 V you get 80% output power, etc.

You should be very careful not to cause short circuit between the + (VCC) of the power supply and - (GND) of the analog input, as a thin GND analog path can be irreparably damaged.

The MOSFET/MOSFETS must be isolated from the heatsink/plate with silicon pad as well as plastic sleeve. Short circuit between MOSFET and heatsink/plate can damage the driver and can be dangerous for the Laser Diode.

We recommend the use of power cables with cross-section of at least 0.5 mm2.

Protection

The circuit responsible for powering a laser diode is protected against reversed polarity. High current Schottky diode of an extremely low forward voltage secures the laser diode against connecting reversed voltage with the aim of protecting frequently the most expensive part of the entire device - a laser diode. In turn, the low forward voltage does not cause excessive heat loss during normal operation.

The analog input is protected by a 5V1 Zener diode on occasion there appears the voltage higher than 5V. Despite everything, this input should not be used with higher voltages.

A microcontroller ensures the proper operation of the entire system.

At start the microcontroller is checking the connection with a thermistor. If there is no thermistor used the WARNING LED is blinking but the driver is **still** working. If the connection with thermistor is lost during normal work, microcontroller turns off the laser diode supply circuit and does not allow for its further load. It also switches off the DIODE LED and switches on the WARNING LED. The TEC line is also switched off. The same situation happens when the thermistor reaches temperature above 50 degrees Celsius.

The driver is fitted with a two-second softstart designed to protect the laser diode against switch-on effects.

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