PDD-02 : Pulsed laser diode driver

User manual

Read carefully this document before start operations

Overview / Applications

PDD-02 is a pulsed diode driver with the possibility of high current operations.

The maximal output current is 200A. The maximal output voltage is 6V. The maximal output power is 100W-150W in dependence on the configuration.

Both short and long pulse widths are possible. In some cases CW operations is also possible.

Since PDD-02 supposes a lot of modifications different with current, voltage, pulse width, at the stage of inquiry we ask you to specify the parameters you need:
1. maximal output current I_{MAX} (up to 200A)
2. maximal compliance voltage V_{MAX} (up to 6V)
3. maximal pulse width needed T_{MAX} (up to CW)
4. maximal repetition rate needed F_{MAX} (up to 10kHz)

Example: PDD-02-200A-2V-300us-100Hz

Cooling / coverage case

Module is supplied as a printed board sandwich with a preinstalled fan.

Appearance

DIODE -

DIODE +

AIR FLOW

POWER
INPUT

INTERFACE   +12V DC

9

10

1

2
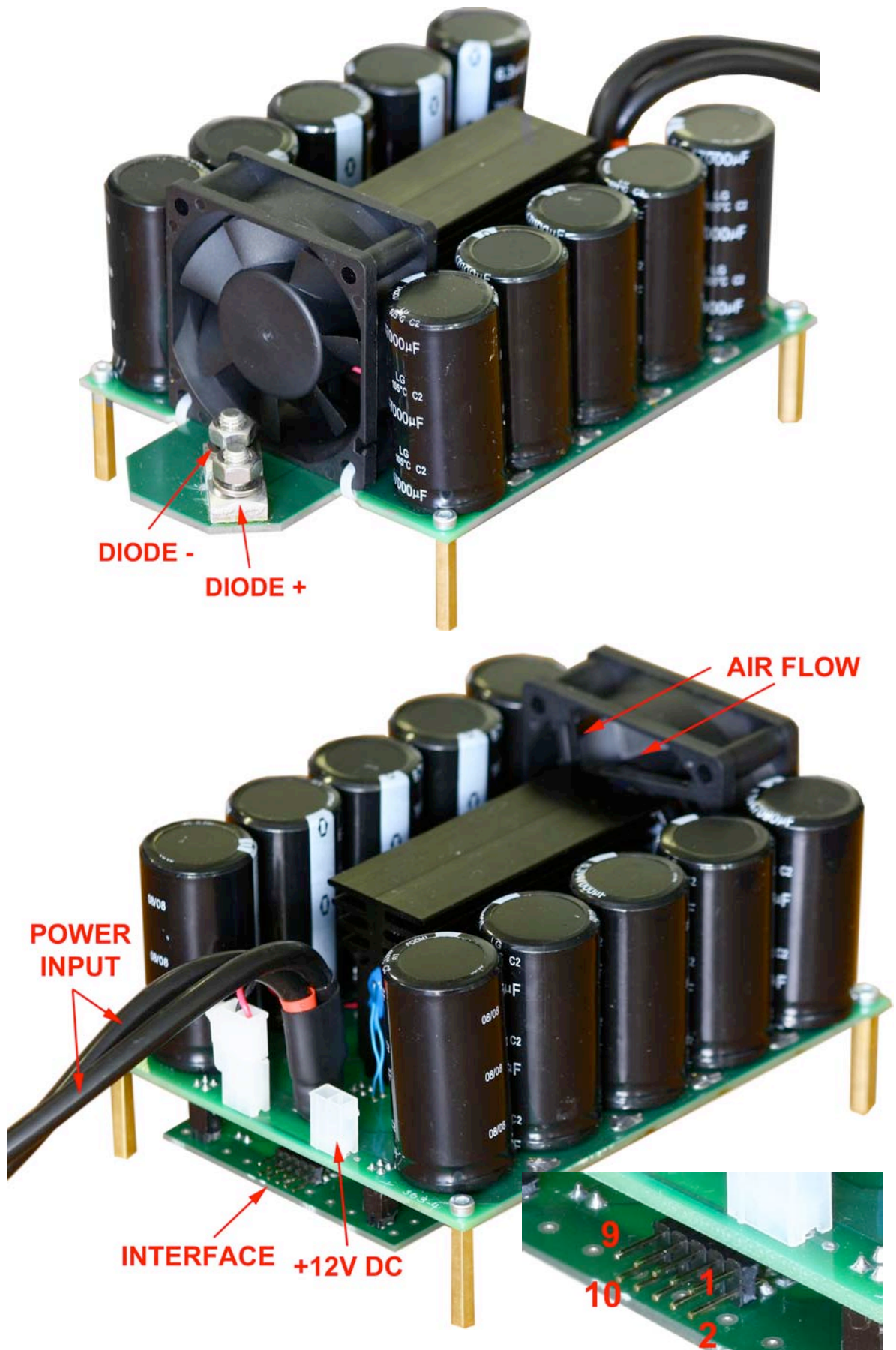
Connections, signals, signal descriptions

POWER INPUT

Power input is organized with two wires thick enough to supply high currents needed. Power input positive is marked with a piece of red shrink tube.

Recommended power input voltage is 1V above the actual diode voltage measured with the voltage meter. Higher input voltage is possible, but the maximal output power is reduced.

+12V DC: 2 PIN MOLEX MINIFIT

2 1	**Input type connector** Feeds interface circuits of the module

PIN (color)	DESCRIPTION
1 (red)	+12V DC positive
2 (blue)	+12V DC negative (return)

Alternatively, +12V DC voltage can be supplied to the board through the corresponding pin of INTERFACE connector.

OUTPUT: 2x STUDS WITH M6 THREAD

	Output type connector Connects the driver to the laser diode

PIN (color)	DESCRIPTION
output positive (red mark)	to laser diode anode
output negative (no mark)	to laser diode cathode

INTERFACE: 10 PIN connector

| PIN (type, color)	DESIGNATION	DESCRIPTION
1 (output, purple)	**TMonitor**	The voltage at this pin is a monitor signal proportional to the measured value of module's temperature. Calibration table is provided by the manufacturer.
2 (input, blue)	**IProgram**	The voltage applied to this pin sets the output current. 0-10V are linear with 0-I_{MAX}
3,4 (input, red)	**+12V DC**	Feeds the interface circuits. The voltage should be stabilized. The current consumption is less than 500mA.
5,6	**GND**	Return of all interface circuits
7 (input, white)	**Pulse**	Once the driver is *enabled* its output starts to follow the input *Pulse* signal. While *Pulse* is logical "0" no output occurs; when *Pulse* is logical "1" (5V) current is applied to the output
8 (input, green)	**Enable**	Apply +5V DC to this pin to *enable* PDD-02. While 0V are applied to this pin or pin is unconnected module is disabled. Once fault case has occurred module is blocked till you eliminate fault cause, then *disable* module and *enable* it again.
9 (output, orange)	**Fault 2***	If module is *enabled* and some trouble has occurred, module automatically stops operations and sets *Fault* status (*Fault* is set to "0"). In case of normal operations *Fault* is set to "1" (5V at the pin).
10 (output, yellow)	**Fault 1***	If module is *enabled* and some trouble has occurred, module automatically stops operations and sets *Fault* status (*Fault* is set to "0"). In case of normal operations *Fault* is set to "1" (5V at the pin).

* see also **Faults** section

ENABLE JUMPER:

Use ENABLE JUMPER instead of ENABLE signal of INTERFACE (pin 8).
Don't use ENABLE JUMPER and ENABLE signal at the same time.

CURRENT JUMPER AND CURRENT TRIMPOT:

Use CURRENT JUMPER instead of IPROGRAM signal of INTERFACE (pin 2). Once this jumper is installed use CURRENT TRIMPOT to set desired output current value. Don't use CURRENT JUMPER and IPROGRAM signal at the same time.
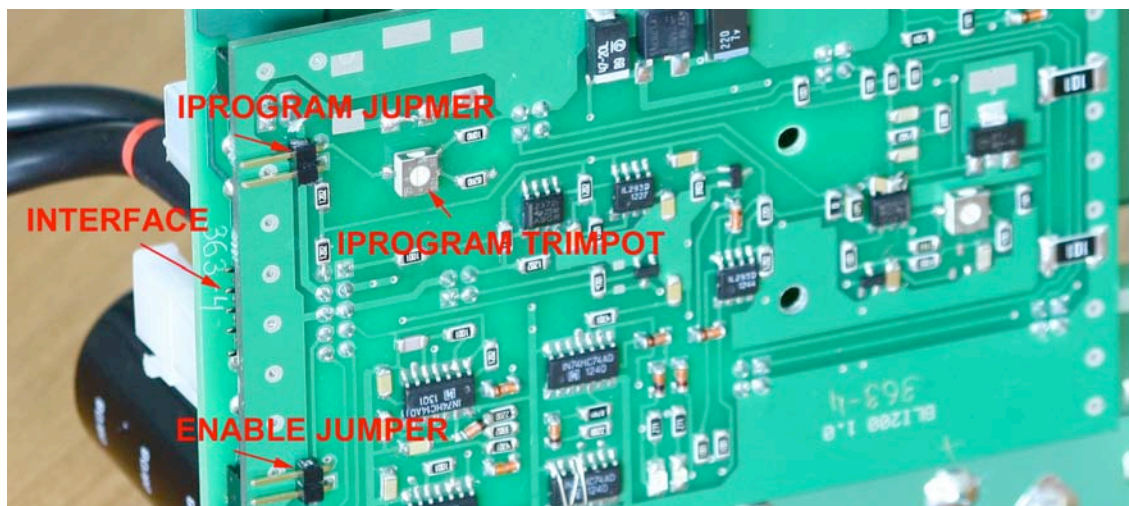
Operations

1. Connect laser diode to the module (OUTPUT sockets)
2. *Disable* module, set *Pulse* off, set *IProgram* signal to 0V
3. Feed both DC powers to the module
4. Set desired value of output current (*IProgram* signal)
5. *Enable* module
6. Use *Pulse* signal to On/Off output current

To power down PDD-02
1. Set *Pulse* to 0V, then *Disable* module
2. Remove power from the module

Faults and protections

Module sets *Fault* state in the following cases:

- *short circuit* – Fault 1 is set to "0", red LED is lighted.
- *open circuit* – Fault 2 is set to "0", yellow LED is lighted.
- *overheating* (temperature of the module exceeds 78+/–2 °C level) – both Fault 1 and Fault 2 are set to "0".

Once *Fault* has occurred you should eliminate the fault cause, then "reboot" module (*Disable* module and *Enable* it again).

The module has also protections from too long pulses (> 110% of T_{MAX}) and from too frequent pulses (>110% of F_{MAX}). These protections don't cause fault cases.
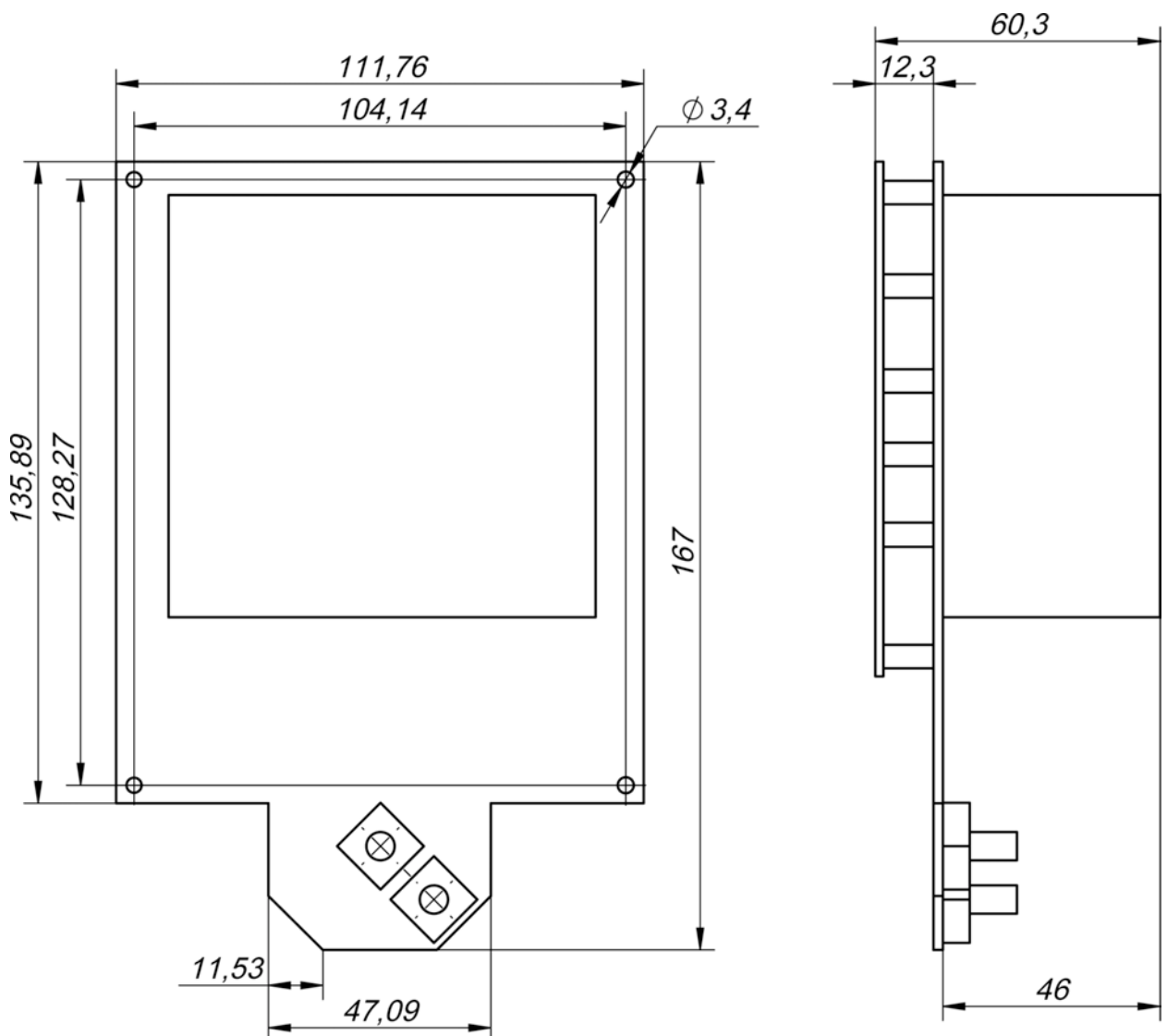
Specifications

ELECTRICAL SPECIFICATIONS

INPUTS	see datasheet of your modification
OUPUTS	see datasheet of your modification
ENVIRONMENTAL	
Operation temperature	+10 … +40 °C
Storage temperature	-20 … +60 °C
Humidity	90%, non-condensing

MECHANICAL SPECIFICATIONS

Dimensions	167 x 112 x 60 mm
Weight	0.5 kg

TMonitor calibration table (typical)

t,C - Tmonitor,V
29.20 - 4.92
30.00 - 4.66
34.00 - 4.29
37.00 - 4.00
42.50 - 3.50
49.20 - 3.00
56.00 - 2.50
64.00 - 2.00
74.00 - 1.50
78.00 - 1.34 protection from overheating

Typical modification 1 : Nd:YAG

Datasheet

INPUTS	
Power input	4V-5V *
Interface feeding	+12V DC stabilized, 0.5A max
OUTPUT	
Output current	40A-200A adjustable
Output voltage	up to 2V
Pulse width	40us – 300us
Pulse repetition rate	0Hz – 200Hz
Rise/fall time	about 20us (with proper cable)
Current overshoot	< 5% of I_{MAX}
Current ripple	< 1% of I_{MAX}
Current regulation accuracy	< 1% of I_{MAX}

* recommended input voltage depends on the actual diode voltage and preferably should be 2.6V higher

Typical modification 2 : Er:Glass

Datasheet

INPUTS	
Power input	4V-5V *
Interface feeding	+12V DC stabilized, 0.5A max
OUTPUT	
Output current	40A-200A **
Output voltage	up to 2V **
Pulse width	40us – 3ms **
Pulse repetition rate	0Hz – 200Hz **
Rise/fall time	about 20us (with proper cable)
Current overshoot	< 5% of I_{MAX}
Current ripple	< 1% of I_{MAX}
Current regulation accuracy	< 1% of I_{MAX}

* recommended input voltage depends on the actual diode voltage and preferably should be 2.6V higher; different input voltage increases heat dissipation in driver's components and thus decreases the performance
** these parameters aren't independent and cannot achieve their maximums at the same time because of possible driver's overheating; even if the input voltage is properly selected, the maximal output power cannot exceed 120W-150W