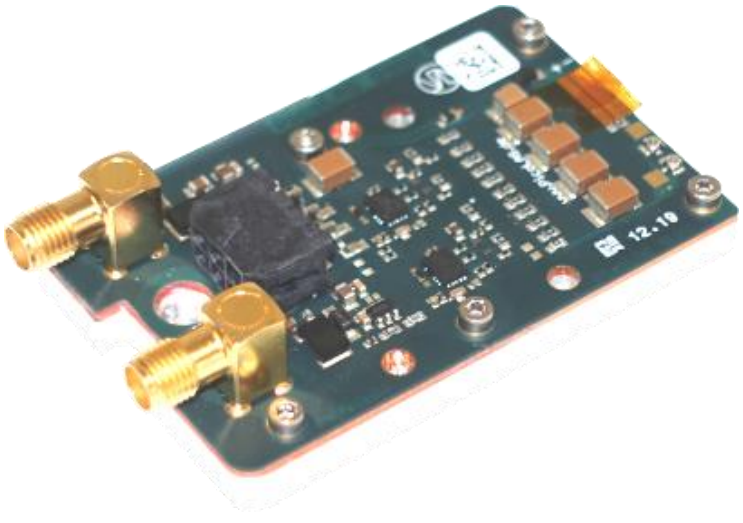
User Manual

LDP-V 75-200



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Rev. 2201

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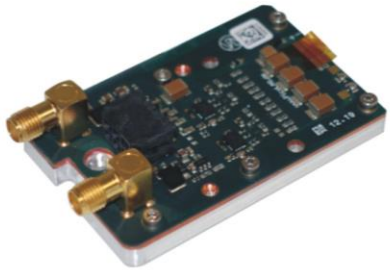
PicoLAS

FOCUSSING POWER TO THE POINT

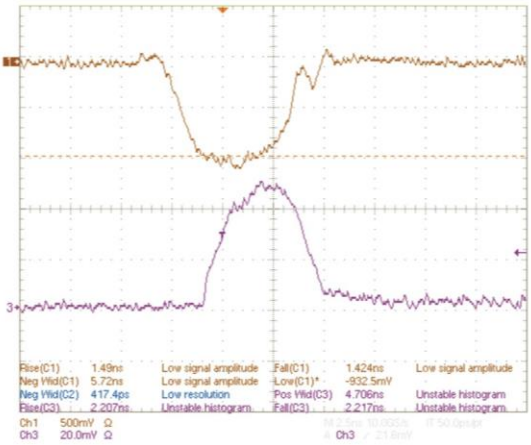
Rev. 2201

LDP-V 75-200

Driver Module for variable Pulse Width



- Compact OEM module
- 0 to 75 A output
- 2.5 ns rise time
- Pulse width control via SMC trigger input (4 ns to > 100 ns)
- Rep. rates from single shot to 250 kHz
- Current monitor
- Applications: LIDAR, Measurements, Ignition, Rangefinding, Biochemistry, ...



Orange: current monitor voltage scaling 500 mV / div
Violet: optical pulse width. Time scaling 2.5 ns/div

Technical Data*

Output current	0 .. 75 A
Max. output voltage	190 V
Rise time	Typ. 2.5 ns
Trigger delay	TBD
Min. pulse duration	4 ns
Max. pulse duration	> 100 ns*
Trigger range	Single shot to 250 kHz* (refer to diagram with operating limits)
Trigger input	5 V into 50 Ω via SMC jack
Current monitor	20 A / V into 50 Ω
Supply voltage	20 .. 30 V
External high voltage	0 .. 190 V
Laser diode pad size	LD+: 1.3 mm x 8.6 mm LD-: 2.2 mm x 8.6 mm
Max. power dissipation	TBD
Dimensions in mm	62 x 40 x 16
Weigth	56 g
Operating temperature	TBD

* See manual for detailed information.

Product Description

The LDP-V 75-200 is a small and inexpensive driver for nanosecond pulses. The device is optimized for pulse repetition from single shot up to kilohertz-repetition rates.
Different laser diodes can be mounted directly onto the LDP-V and offers the ability to eliminate strip lines and to decrease the connection inductance. Another feature of the LDP-V 75-200 is the output compliance voltage from up to 190 V.
This driver offers the ability to increase the efficency of the laser diode with a unique technology of heat transfer.

Optional Accessories: None

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How to use the Manual

Notice: Depending on the final application and operation regime this unit must be assembled onto a heat sink or may stay non-cooled. Improper cooling may cause damage to the electronic components. Please refer to section “Power Dissipation” for more details on the thermal power losses during operation.

Before powering on your driver unit read this manual thoroughly and make sure you have understood everything.

Caution: High voltages up to 200 V are present at several PCB components. Do not touch during operation.

Please pay attention to all safety warnings.

If you have any doubts or suggestions, please do not hesitate to contact us!

Dos and Don’ts

Never ground any output connector.

Never use any grounded probes at the output.

Do not connect your oscilloscope to the output!

This will immediately destroy the driver and the probe!

Do not connect voltages in reverse polarity to the device as there is no built-in protection circuit.

Do use power-up sequencing: Allow the +5 V supply voltage to fully ramp up before applying any other voltages (HV; Trigger Input).

Do not use mechanical force on the PCB components as they are fragile.

Resulting damages are not covered by warranty.

Beware: Some lab power supplies cause excessive ringing during powering on and off. These may damage the unit!

Do keep connecting cables between power supply and driver as short as possible.

How to get started

Step	What to do	Check
1	Unpack your device.	
2	Attach the laser diode to the driver.	Please see section “Connection of the Laser Diode” for further details.
3	Assemble the driver onto an appropriate heat sink. This step may only be omitted if the stress to the driver is kept very low.	See section “Power Dissipation” for further information on thermal dissipation.
4	Connect GND, +20 V and HV+ to the 6 pin MOLEX 430450606 connector. Keep the power supply off.	Please see section “How to connect the Driver” for further details.
5	Connect the pulse generator to the SMA trigger input jack.	Ensure that no pulse is fed before powering up the unit.
6	Carry out the power-up sequence as follows: 1) Fully ramp up the +20 V rail 2) Enable the HV+ supply Then feed a pulse signal to the input terminal. For example 5 V amplitude, 10 ns pulse width and 1 kHz repetition rate.	**Security advice**: Do not touch the PCB components near the laser diode since they may carry high voltages up to 200 V. **Note**: Observe the drivers limits as in section “Power Dissipation” to avoid overloading the driver.
7	Check the optical output of your laser diode.	
8	Turn off sequence: Disable the pulse generator and then turn off all power sources (+20 V and HV+).	

Connection of the Laser Diode

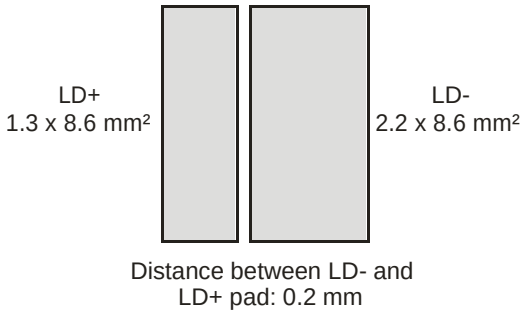

Figure 1: Dimensions of bonding pads for the laser diode

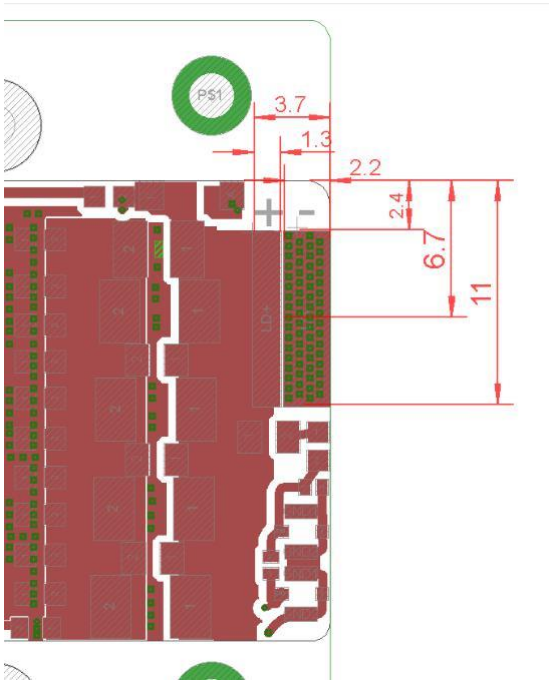

Figure 2: Close up of the LD pads; dimensions in milimeter

The LD- and LD+ pads are located in the upper edge of the driver. For the standard dimensions please refer to the dimensions in Figure 1. Both pads are also marked with + /- to indicate the correct polarity.

Many elements and parasitic “stray” components may affect the performance of the driver unit. The stray inductance of the load connected to the driver is very important. The term “load” not only includes the diode itself but also the packaging (bond wires!) and the connection between the driver and the diode. However, PicoLAS has no influence on these parts.

Refer to the PicoLAS Application Notes “Impedance of Diodes” and “LD- Connections” for more information on parasitic elements and their effect on the pulse shape.

If you need a different pad sizes for your laser diode, please do not hesitate to contact us. Customized pad layouts are possible for adapting the dimensions of your load.

How to connect the Driver

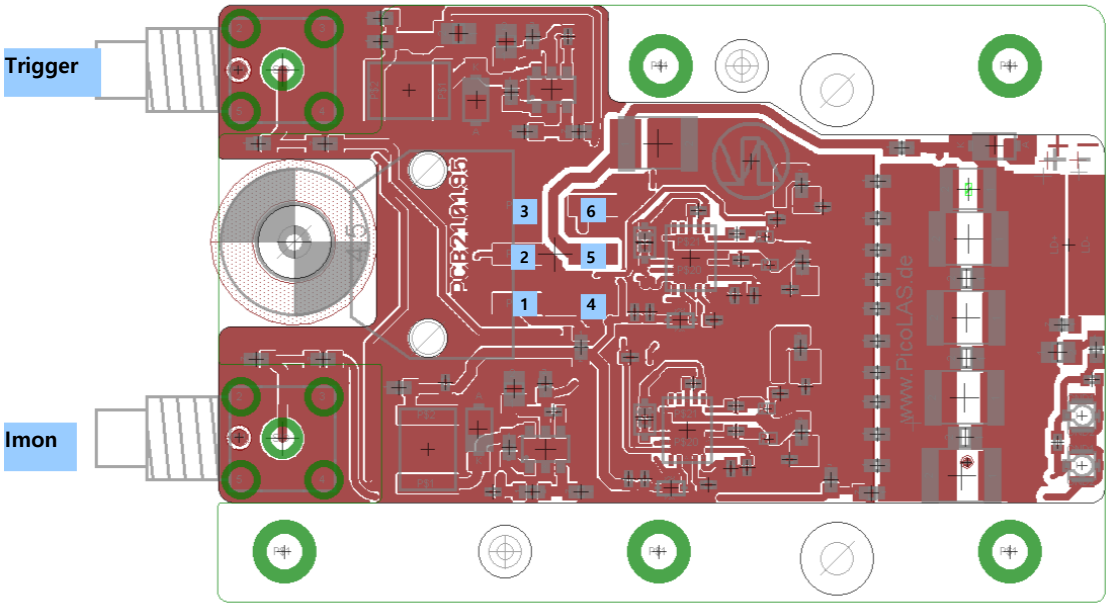

Figure 3: Picture of the PCB layout

Signals of the 6 pin Micro-Match header:

Pin	Name	Description
1	nc	nc
2	NTC	Internal 10 kOhms NTC versus GND for temperature monitoring, PT1000 B-value: 3850 ppm / K
3	GND	Ground return
4	GND	Ground return
5	HV+	External high voltage supply input (0 .. 190 V)
6	+20 .. 25 V	+20 .. 25 V supply voltage, connect to a stabilized power supply

Trigger Input (7):

The trigger input requires a signal of 5 V and is terminated with 50 Ohms. The input signal pulse width is in the range from 4 .. 100 ns. For more details see the next section.

Security Advice:

Do not touch any leads of the output or the output capacitors as they can carry high voltages of up to 200 V.

Pulse Input

The trigger generator must be capable of delivering 5 V into 50 Ohms and at least 4 ns up to 100 ns pulse width.

Note: It is recommended to keep the trigger pulse width within the range of 4 .. 100 ns since longer pulses will increase the power loss.

Given a valid trigger signal the output pulse form depends only on the high voltage supply level and the laser diode's characteristics.

Power Supply Requirements

The driver requires a stabilized +20 V supply (used by control logic).

Caution: The +20 V rail must be completely ramped-up within 2 ms to guarantee a proper start-up of the gate driver.

Adhere to the power-up sequence as follows:
1) Fully ramp up the +20 V rail
2) Enable the HV+ supply
3) Apply trigger signal

Should you aim to connect a large number of driver units to a single power supply the high start-up current spikes can be taken care of by using an additional capacitor bank and hard power switching at its output. Failure to meet this requirement may cause the gate driver circuitry to stay in a faulty state.

Note: The HV+ laser diode supply can be interrupted at any time e.g. for safety reasons by the customer.

Current Consumption

Quiescent currents

Supply input	Conditions	Min.	Max.	Unit
+20 V	20 V .. 25 V	/	/	mA

Trigger signal present

Supply input	Conditions	Typ.	Max.	Unit
+5 V	4.8 V .. 5.2 V	0.3	1	mA

Cooling

The driver is base plate cooled only. Please assemble the entire unit to a heat sink which is capable to take out the heat.

The heat sink is suitable if the system temperature does not exceed the maximum operating limits.

Current Monitor

The trigger generator must be capable of delivering 5 V into 50 Ohms and at least 4 ns in pulse width.

Given a valid trigger signal the output pulse form depends only on the high voltage supply level and the laser diode's characteristics. To illustrate the driver's behaviour the following scope screenshot shows the current monitor signal while the LD output is shorted.

The scaling of the current monitor Imon is 0.05 V/A or 20 A/V

Recommended Operating Conditions

Supply voltages	Min.	Typ.	Max.	Unit
HV+	-	-	+190	V
+20 V	+20	+24	+25	V

Trigger input	Min.	Typ.	Max.	Unit
HIGH level input voltage @ Zin=50 Ω	2.8	5	+5.2	V
LOW level input voltage @ Zin=50 Ω	0	0	+0.8	V
Pulse width	4	-	100	ns
Repetition rate	-	-	250	kHz

Absolute maximum Ratings (destroying limits)

Supply voltages	Min.	Max.	Unit
HV+	0	+190	V
+20 V	0	+25	V

Trigger input	Min.	Max.	Unit
Trigger signal voltage, unterminated	0	+5.2	V

Trigger Signal:

Note that the maximum ratings for both pulse width and repetition rate depend on the actual high voltage supply (HV+). See section “Power Dissipation” for guidance. Since the internal gate driver’s pulse width is limited to 20 ns minimum, shorter pulses than 20 ns will not give any performance benefit. However, longer pulse widths than 20 ns will add to the power loss (see section “Recommended Operating Conditions” above).

The driving signal to the pulse input should be kept low while the +5 V supply voltage is down.

Dimension of Heat Sink and PCB

M2

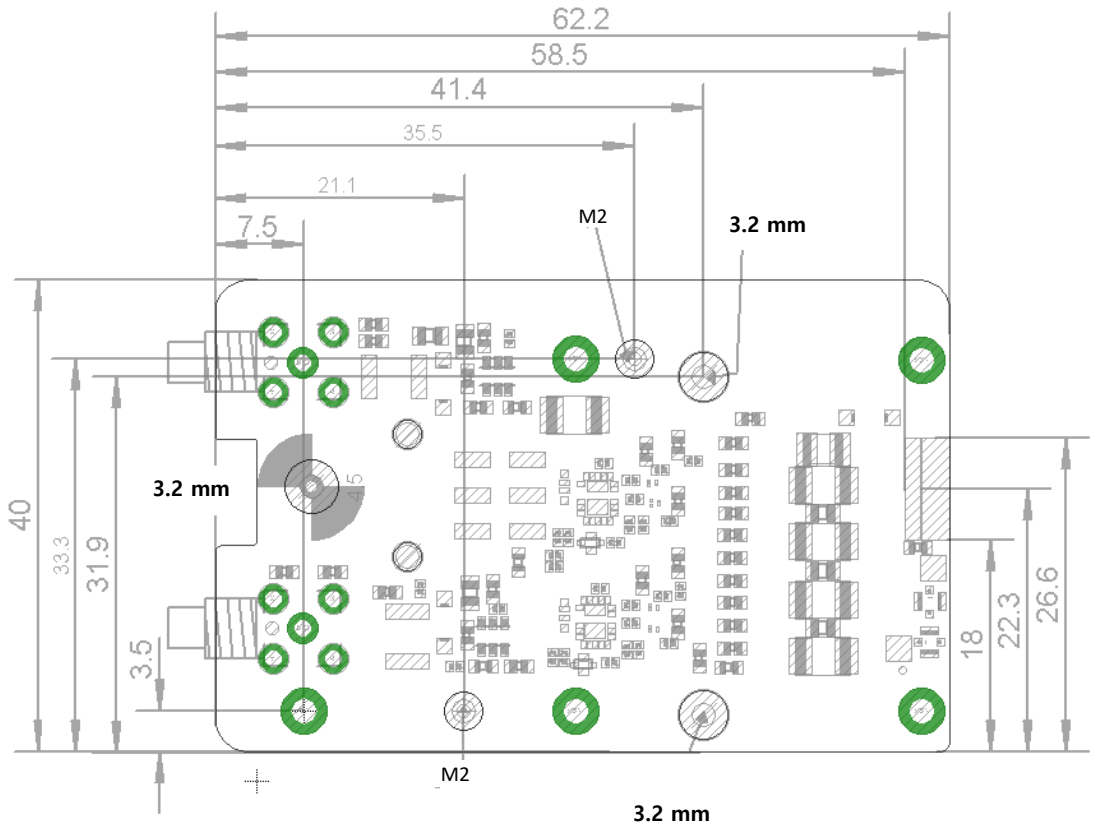

Figure 4: Dimension of heat sink and PCB

Position of Connectors and Mounting Holes

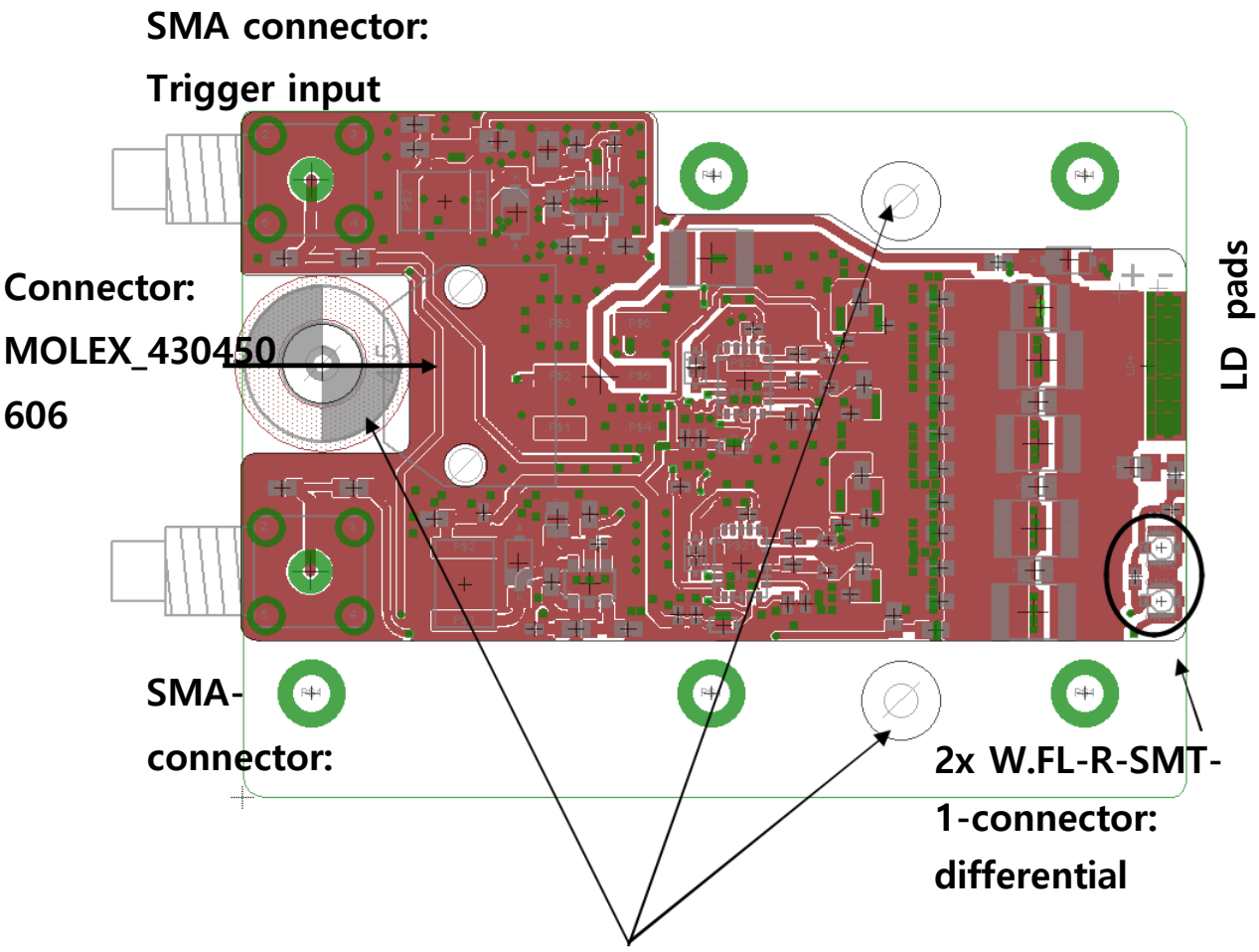

Figure 5: Position of connectors and mounting holes