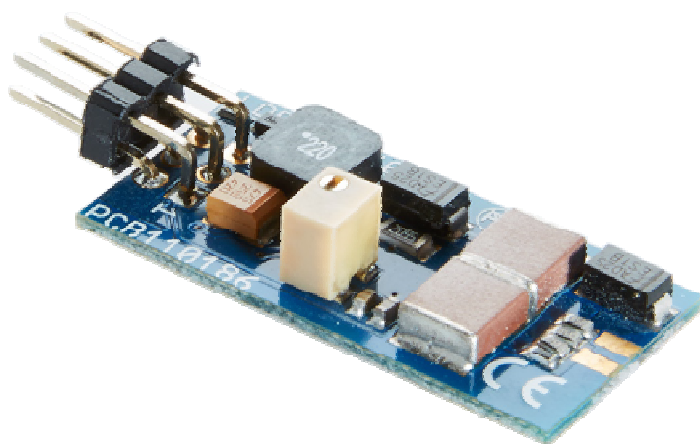




User Manual

LDP-AV 40-70



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Please pay Attention to all Safety Warnings!

Symbols used in this manual:

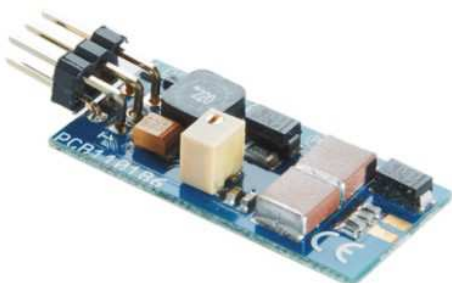
	Risk of electrical hazard
	Please pay special attention
	Do not
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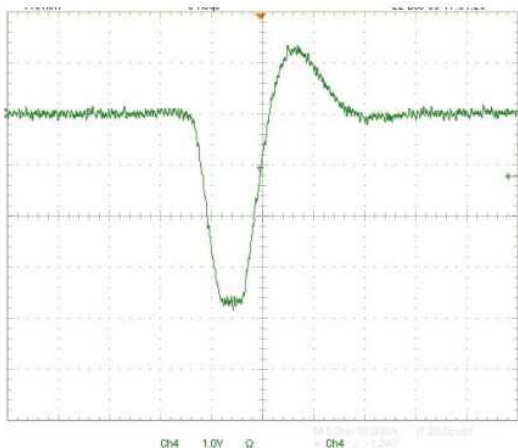
LDP-AV 40-70

Rev.1905

Ultra compact Driver Module for pulsed Lasers



- Ultra compact OEM module: 32 x 15 mm
- 8 to 40 A output current
- Fixed pulse duration
- Rep. rates from single shot to 100 kHz
- Single +15 V supply
- Current monitor
- Applications: LIDAR, Measurements, Ignition, Rangefinding, Biochemistry, ...



Product Description

The LDP-AV 40-70 is the smallest available source for nanosecond pulses. The device is optimized for size and functionality, integrating a HV-DC source and the pulsing stage into only 4.8 cm². Its typical application is driving pulsed laser diodes. Those can be mounted directly onto the LDP-AV, eliminating the need for strip lines. The diode must be electrically isolated from earth (chassis) ground.

Despite its small size, the LDP-AV is designed for ease of use. It eliminates the need for multiple peripheral supply units. A single 15 V DC supply and a triggering signal are all which is required for operation.

Technical Data*

Output current	8 .. 40 A Single LD
Max. output voltage	15 .. 70 V, 0.1 A, 3 W
Int. high voltage	
Trigger delay	Typ. 36 ns, max. 40 ns
Pulse duration	Fixed (standard is N50 = 5 ns)
Trigger range	Single shot to 100 kHz** (refer to diagram with operating limits)
Max. duty factor	0.1 %
Trigger input	5 V into 50 Ω
Current monitor	20 A / V into 50 Ω
Supply voltage	+15 V 0.2 A
Max. power dissipation	2 W
Dimensions in mm	32 x 15 x 8
Weight	4 g
Operating temperature	-20 to +55 °C

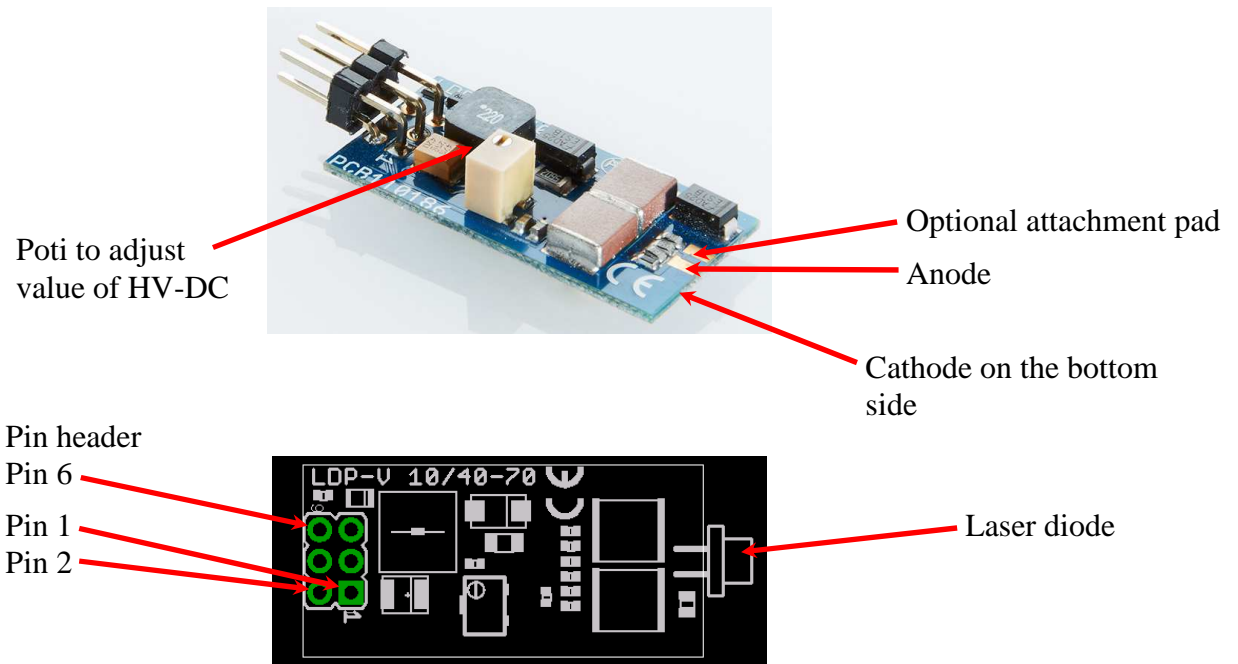
* Measured into a short instead of laser diode. Technical data is subject to change without further notice.

** See manual for detailed information.

How to get started

Step	What to do	Check
1	Unpack your device.	
2	Make a short at the output.	
3	Turn the high voltage to the lowest value (turn poti fully counterclockwise).	
4	Connect a pulse source with the desired pulse width to the triggering input.	E.g. 100 ns, 100 Hz rep. rate.
5	Connect your scope to the current monitor output.	Select 50 Ohm termination, trig on neg. falling edge, 200 mV/div.
6	Apply the supply voltage. Security advice: Do not touch any leads of the output or the output capacitors as they are connected to a high voltage of up to 75 V.	Connect a 15 V DC power supply to the pin header. See page 5 for details. Note: Some supplies have a voltage overshoot during turn on/turn off. This may damage the device.
7	Adjust the value of the desired pulse current (turn the poti clockwise until the current reaches the desired level.)	
8	Disconnect the supply, remove the short at the output and assemble the laser diode.	Pay attention to correct polarity (anode: top, cathode: bottom).
9	Reconnect the supply and check the optical output of your laser diode.	Note: The actual current is always some percent lower than the value of step 7. Adjust the current by means of the poti.

How to connect the LPD-AV 40-70



Connections via Pin header:

Pin	Name	Description
1	I_mon	Current monitor output into 50 Ohm. Scale: 20 A/V
2	GND	Ground return
3	Trigger_In	Trigger input into 50 Ohm
4	GND	Ground return
5	+15V	Supply voltage, connect to a power supply
6	U_HV_Ctrl	External HV setpoint input allows control over the internal HV-DC source

Trigger Input:

The trigger input requires a signal level of 5 V and is terminated with 50 Ohm.



Trigger Level Low -> High: Min. 2.4 V
Trigger Level High -> Low: Max. 0.8 V

Current Monitor Output:

The current monitor output has a scale of 20 A/V with a negative signal output. It has a source impedance of 50 Ohm and must be terminated with 50 Ohm to achieve the correct scale.

Laser Diode Connection:

The laser diode connection is designed for 3-pin housing (e.g. TO-52). The pad for the cathode connection is located on the bottom side of the driver and the anode pad is on top. The third pad is not connected.



Security Advice: Do not touch any leads of the output or the output capacitors as they are connected to a high voltage of up to 75 V.



Setting the HV: The poti is a 10-turn unit without a mechanical endpoint. The poti is not for daily use. For frequent changes of the high voltage, pin 6 must be used.

Maximum Duty Cycle vs. Output Current

The following tables show the maximum allowable duty cycle depending on a given output current.

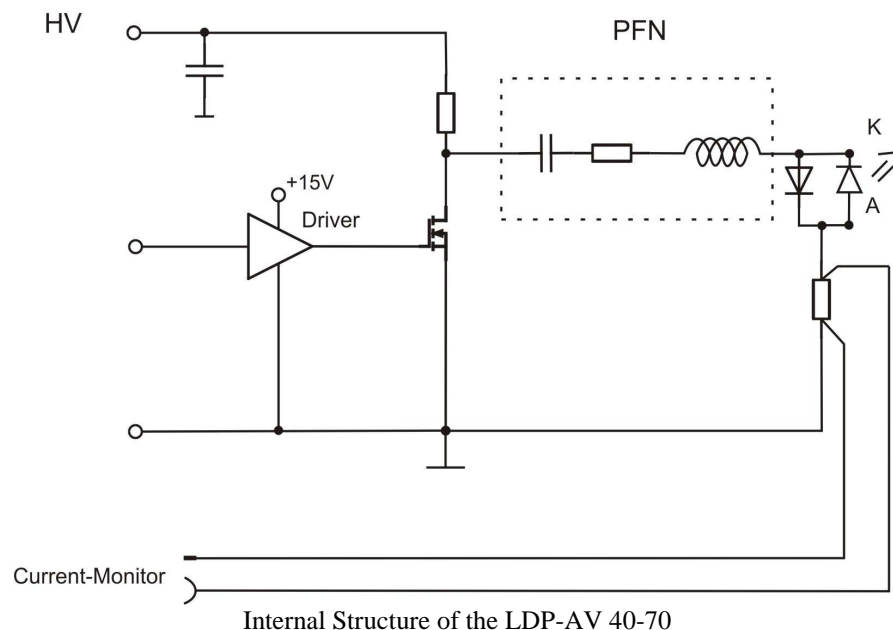
LDP-AV 40-70:

Output current in A	Max. duty cycle with int. HV	Typical high voltage in V
8	0,0098	17,2
10	0,0063	20,6
15	0,0028	29,2
20	0,0016	37,7
25	0,0010	46,3
30	0,0007	54,8
40	0,0004	71,9

The typical HV is depending on the LD and the –Nxx suffix of the driver.

Internal Structure of the LDP-AV

The LDP-AV generates the pulses by a simple but efficient principle. First, the capacitors C_x are charged over R_x , whether through the internal HV-DC supply or an external high voltage source. When a pulse is applied at the trigger input, the high speed MOSFET T_1 closes and the current flows from the capacitor through the laser diode, MOSFET, Coil and resistors. C_x generates an oscillating circuit with the coil and the resistors. Due to the constant values of these elements the oscillating frequency and thereby the pulse width is kept constant. The output pulse is not affected by the length of the trigger input pulse. The generated current depends on the applied high voltage, the laser diode compliance voltage and its differential resistance. The time that T_1 is open is not relevant for the pulse length. Certainly the input pulse of the trigger input has to be minimal 10 ns. For longer input pulses the output pulse form is not changing but the stress of the driver increases. So the duty cycle of the input pulse is limited to $d=0.2$. Applications with very high frequencies have special specifications (also see section “Operating Range”). The following diagram shows the output current (at current monitor, measured with a short at the output) for different high voltages.



How to use the internal HV-DC Supply

The LDP-AV 40-70 provides an internal high voltage supply (up to 2.5 W / 0.1 A / 70 V). To adjust the laser diode current to the desired value follow the steps below:

1. Turn the poti fully counterclockwise
2. Apply the 15 V supply voltage
3. Start pulses
4. Measure the diode current
5. Adjust the level of the high voltage supply (hence the level of the current) by turning the poti clockwise

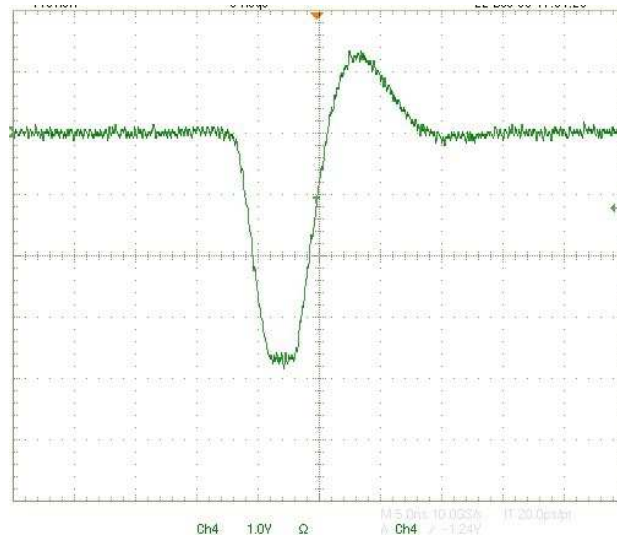
The HV-DC supply can also be controlled through an external setpoint signal on pin 6 of the pin header (U_HV_Ctrl): A signal level of 0 V equals the high voltage which is currently adjusted by the internal poti, a signal level of 10 V equals the minimum high voltage.

Security Advice:

Do not touch any leads of the output or the output capacitors as they are connected to a high voltage of up to 75 V.

Pulse Output

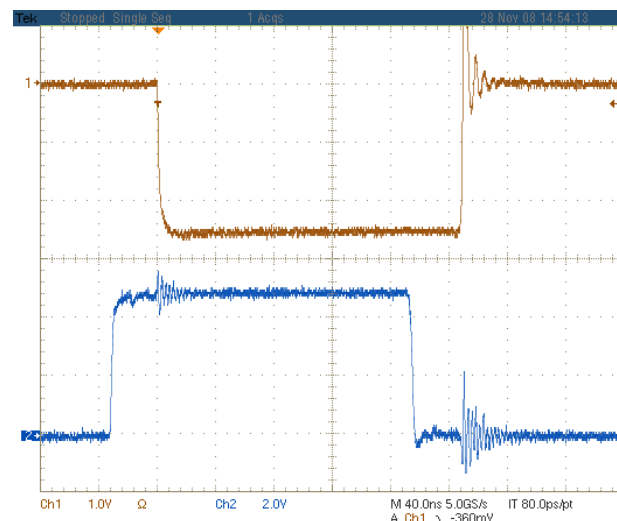
The LDP-AV provides ultra rapid pulse rise- and fall times in the region of several ns. However, pulse rise and fall depend on the parasitic stray inductance of the cabling to the laser diode. Direct connection without any kind of wires to the module is absolutely necessary for best results. For detailed information about the effect of the laser diode connection on the pulse shape please refer to PicoLAS Application Notes “Impedance of Diodes” and “LD-Connections”.



Typical Pulse

Trigger Input

The trigger input on the pin header is terminated with 50 Ω to ground. The trigger source has to be able to provide a signal level of 5 V with a 50 Ω load. The delay between triggering signal and load current is very low around 36 ns and very constant. The pulse-to-pulse jitter is very stable below 1 ns if the supply voltage and temperature are kept constant.



Typical trigger delay of LDP-AV 40-70

Absolute Maximum Ratings

Supply voltage range: 12 .. 18 V
Max. voltage at HV pin: 75 V
Input voltage range U_HV_Ctrl: 0 .. 10 V
Input voltage range trigger input: 0 .. 10 V
Storage temperature: -20 .. +85 °C non-condensing