PDD-01 : Pulsed laser diode driver

User manual

Read carefully this document before start operations

Overview / Applications

PDD-01 is a pulsed diode driver with the distinguished feature of the relatively high output voltage – up to 150V. The output current is limited with 50A.

Since a lot of modifications different with the peak power and pulse energy are possible, we ask you to specify:
1. maximal output current I_{MAX} (up to 50A)
2. maximal compliance voltage V_{MAX} (up to 150V)
3. maximal pulse width needed T_{MAX} (up to 300us typically, other by request)
4. maximal repetition rate F_{MAX} (up to 10kHz)
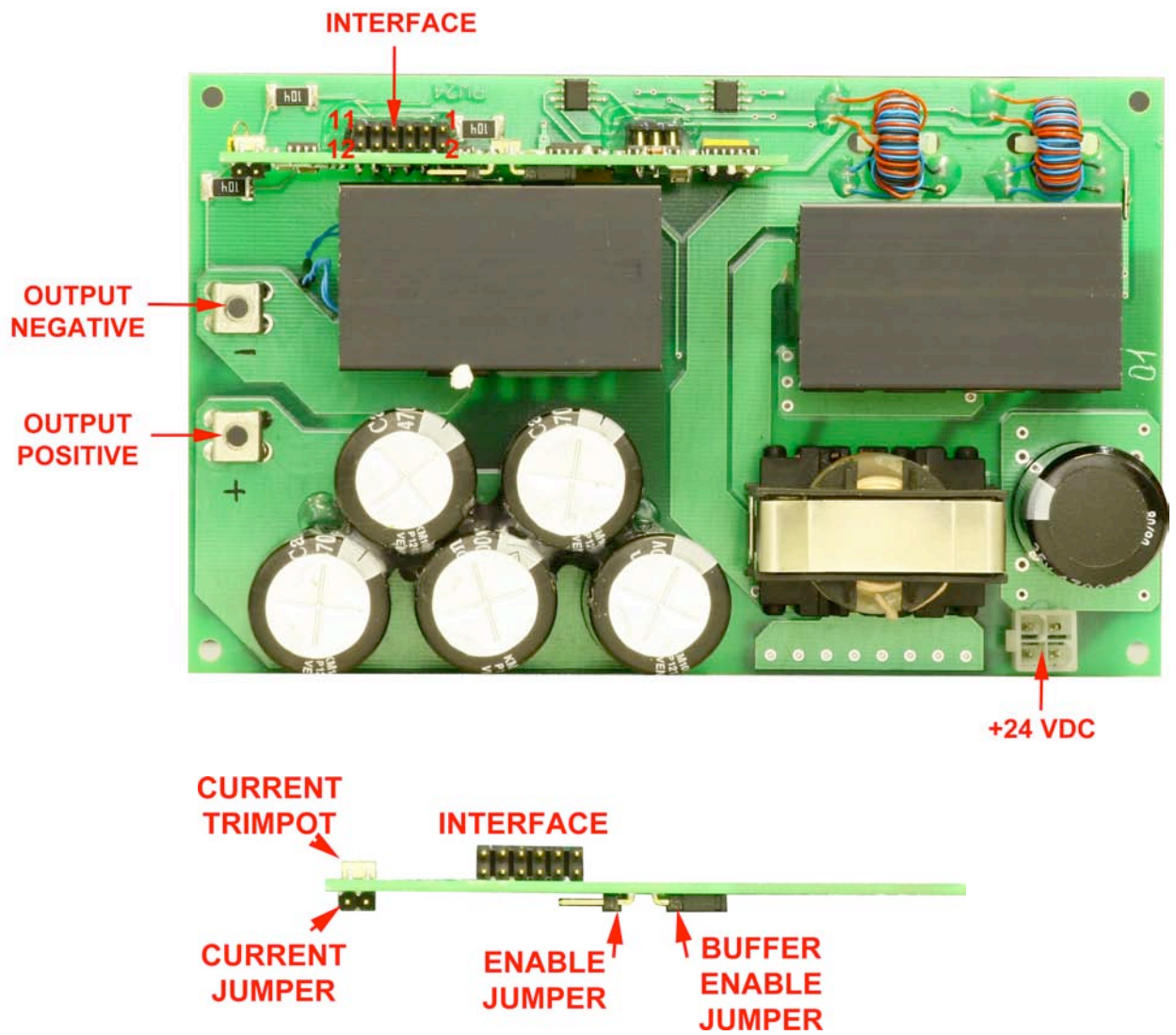
Example: PDD-01-50A-150V-300us-100Hz

Cooling / coverage case

Module is supplied as a printed board sandwich. Neither coverage nor fans are supplied by default. Nevertheless the forced air cooling is needed in dependence on your operating regimes.

Appearance

INTERFACE

11
12
1
2

OUTPUT
NEGATIVE

OUTPUT
POSITIVE

+

+24 VDC

CURRENT
TRIMPOT

INTERFACE

CURRENT
JUMPER

ENABLE
JUMPER

BUFFER
ENABLE
JUMPER

Connections, signals, signal descriptions

+24 VDC: 4 PIN MOLEX MINIFIT

4 3 2 1	**Input type connector** Feeds interface circuits of the module

PIN (color)	DESCRIPTION
1, 2 (red)	+24 VDC positive
3, 4 (blue)	+24 VDC negative (return)

OUTPUT: 2x SOCKETS WITH M4 THREAD

	Output type connector Connects the driver to the laser diode

PIN (color)	DESCRIPTION
output positive (red)	to laser diode anode
output negative (blue)	to laser diode cathode

INTERFACE: 12 PIN connector (Fischer Elektronik SL 4 025–12)

PIN (type, color)	DESIGNATION	DESCRIPTION
1 (output)	+15V OUT	Auxiliary 15 VDC output. The current capability is 100mA.
2 (output)	Fault *	If module is *enabled* and some trouble has occurred, module automatically stops operations and sets *Fault* status (*Fault* loop is "closed"). In case of normal operations *Fault* loop is "opened". Maximal allowed current in *Fault* loop is 50mA.
3 (output)	I OUT monitor	The voltage at this pin is a monitor signal proportional to the measured value of output current 0V at PIN3 corresponds to 0A 4V at PIN3 corresponds to I_{MAX}
4 (input)	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
5, 6 (common)	Interface Return	Return of all interface circuits
7 (input)	Buffer Voltage	Sets buffer voltage (the supplier recommends the buffer voltage to apply in dependence on diode's voltage and the desired electrical pulse energy)
8 (input)	Buffer Enable	Once 5V are applied to the Buffer Enable pin, the internal energy buffer (capacitors) is charged to the voltage determined with Buffer Voltage signal.
9 (output)	V OUT monitor	The voltage at this pin is a monitor signal proportional to the measured value of output voltage 0V at PIN9 corresponds to 0V 4V at PIN9 corresponds to V_{MAX}
10 (input)	Enable	Apply +5V DC on this pin to *enable* work of PDD-01. 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.
11 (output)	T monitor	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.
12 (input)	I program	The voltage applied to this pin sets the output current. 0-4V DC are linear with 0-I_{MAX}

* see also **Faults** section

ENABLE JUMPER:

Use ENABLE JUMPER instead of ENABLE signal of INTERFACE (pin 10).
Don't use ENABLE JUMPER and ENABLE signal at the same time.
By default this jumper is set off.

BUFFER ENABLE JUMPER:

Use BUFFER ENABLE JUMPER instead of BUFER ENABLE signal of
INTERFACE (pin 8).
Don't use BUFFER ENABLE JUMPER and BUFFER ENABLE signal at the same time.
By default this jumper is set on.

CURRENT JUMPER AND CURRENT TRIMPOT:

Use CURRENT JUMPER instead of IPROGRAM signal of INTERFACE (pin 12). 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.
By default this jumper is set off.

Operations

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

To power down PDD-01
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:

- *overheating* (temperature of the module exceeds 70+/–2 °C level).
- *load mismatch* (output voltage is either too low (<75% of V_{MAX}) or too high (>100% of V_{MAX})).

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 too frequent pulses (> 110% of F_{MAX}). These protections don't cause *Fault*.

Specification

ELECTRICAL SPECIFICATION

INPUTS	
DC	+24 VDC, 5A max
OUTPUT	
Max. output power (W_{MAX})	100-150W
Max. output current (I_{MAX})	User selectable in 5A-50A range
Current adjustment range	30% of $I_{MAX} - I_{MAX}$
Max. compliance voltage (V_{MAX})	User selectable in 2V-150V range
Compliance voltage	75% of $V_{MAX} - V_{MAX}$
Max. pulse width (T_{MAX})	User selectable in 20us-300us range (longer pulses are available by request)
Max. pulse repetition rate	User selectable up to 10kHz (higher on request)
Rise/fall time	< 20us (down to 10us on request)
Current regulation accuracy	< 1% of I_{MAX}
Current ripple	< 1% of I_{MAX}
Current overshoot	< 5% of I_{MAX}
ENVIRONMENT	
Operation temperature	+10 … +40 °C
Storage temperature	-20 … +60 °C
Humidity	90%, non-condensing

MECHANICAL SPECIFICATION

dimensions	155 x 95 x 50 mm
weight	0.5 kg
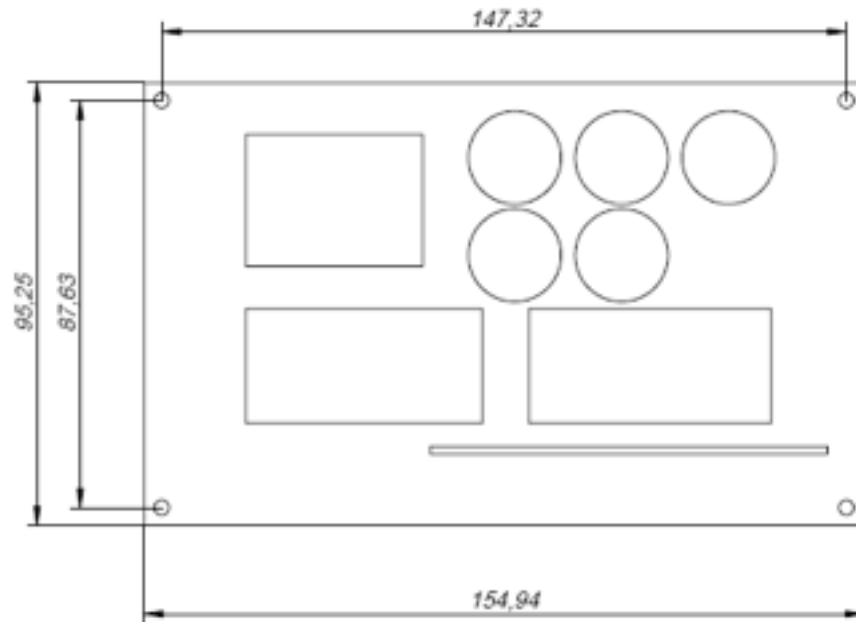
Typical output
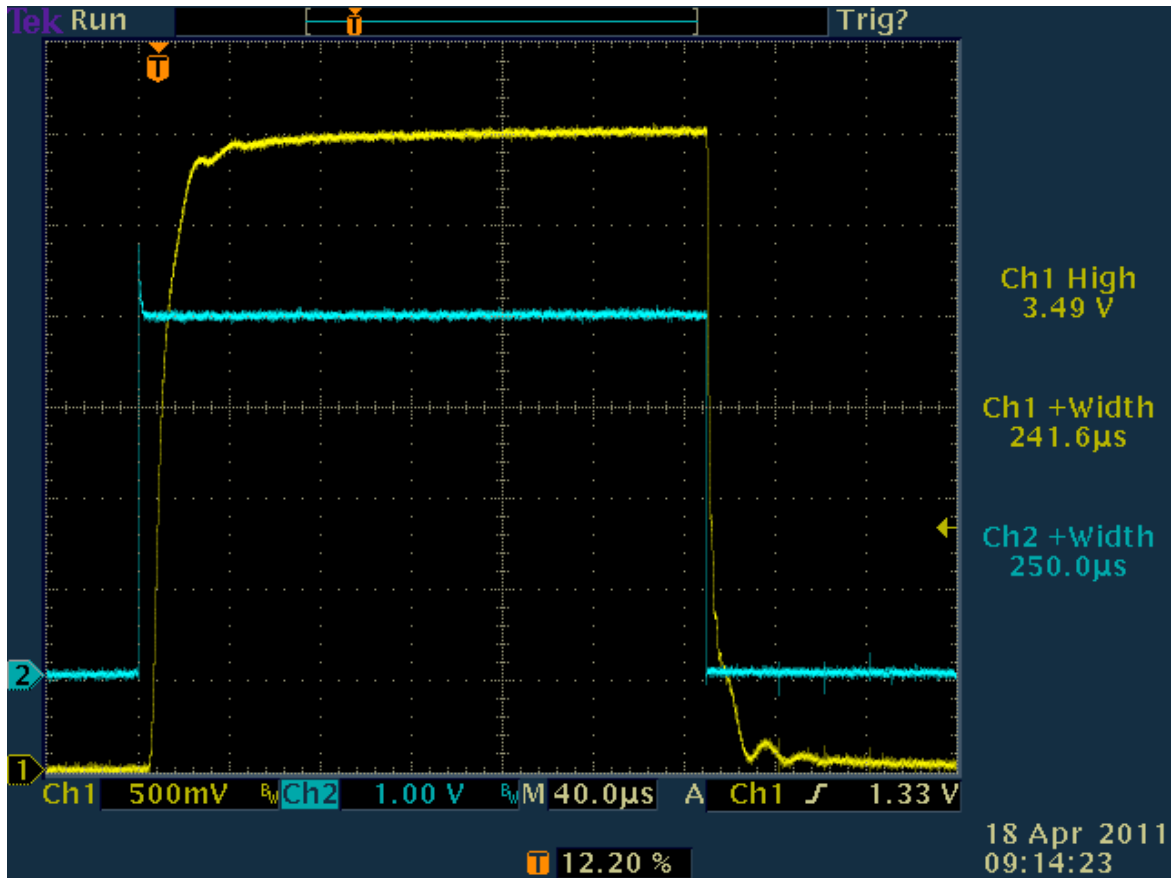
Yellow curve depicts output current,
cyan curve depicts *PULSE* signal applied to the module.

Working mode is 35A, 120V, 250us. Timescale is 40us/div