Laser diode and TEC driver

Organisation: KDI Kunze Digital Instrumentation
Fröbelstraße 11
26127 Oldenburg

Autor: Dipl.-Ing. (FH) Martin Kunze

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➢ General overview

The purpose of this Laser diode and TEC element driver is to supply pump laser diodes for fiber amplifiers using high efficient constant current sources and TEC cooler.

A high efficient solution is given by this Laser diode and TEC element driver for constant current driven laser diodes in connection with a high efficient TEC element driver. Both are switched devices with a highly optimized low noise output filter.

Controlling the laser diode current can be done using internal or external adjustments. The output filter of the laser diode driver is optimized in a way that the output is a very low noise output. This combined with a low inrush current ensures a soft start of the laser diode.

The TEC element driver is designed in a way that the laser diode temperature can be adjusted with an accuracy of min 0.0001K. The Maximum current and voltage of the TEC can also be adjusted.

Design properties:

- Most of the device parameters shall be adjustable by internal or extenal controls
    - Laser diode and TEC driver shall have a 12V DC voltage supply input
    - Laser diode and TEC element current is switchalble (ON / OFF)
    - The laser diode current is adjustable between 0 and 1.3A
        - The output current has no spikes
    - The TEC element voltage and current is adjustable
    - For external control purposes some voltage signals are available
        - TEC current
        - TEC voltage
        - LOW temp. and HIGH temp. alarm
- For testing purposes are test points on the PCB available
- The device has a very small footprint 60 x 73 mm2 and four 3.2mm mounting holes

The diode current can be adjusted using potentiometer R20. The maximum output voltage is 4,8V in case of a not connected or broken laser diode. External control of the laser diode current is possible by switching SW1 from internal to ext. current control. The external voltage can be between 0V and 1.64V likewise 0A to 1,3A.

➢ Enable / disable of the Laser diode driver

Using the enable input of the laser diode driver allows to switch the laser diode driver ON or OFF. SW3 is used to decide whether the Laser diode driver is enabled internally or externally. In case of using an external enable signal a low level TTL (0 – 3.3V) must be used. The voltage input is protected by TVS diodes.

➢ Thermoelectric cooler (TEC)

The TEC element driver is a bi directional device. It can cool down and heat up the laser diode via the TEC element. The temperature of the laser diode is measured via a thermistor that is part of the Laser diode device. The laser diode temperature is adjustable and controlled by the TEC driver via a PID regulator.

➢ Enable / Disable of the TEC element controller

With SW2 it is possible to switch the TEC element driver ON or OFF. If SW2 is in the switched OFF position the TEC driver can be controlled via an external low level TTL signal.

➢ Adjustable TEC element parameters

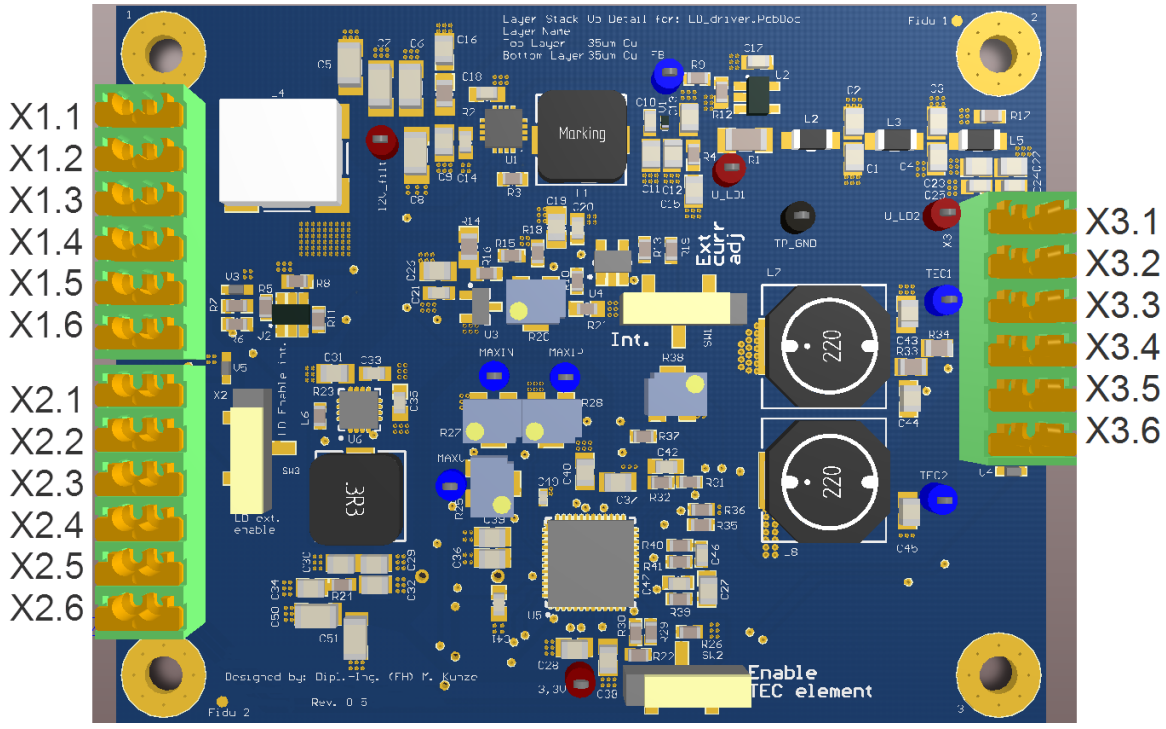
Maximum TEC element output voltage 0 – 6V can be adjusted with R25 (eleven turns)

Maximum TEC element negative current 0 – 3A can be adjusted with R27 (eleven turns)

Maximum TEC element positive current 0 – 3A can be adjusted with R28 (eleven turns)

➢ Terminal configuration

On the left side the inputs for power supply and external control and monitoring of the device are located.



Drawing 1: Input and output connectors

Table 1: Left hand side input connector assignments

	Marking	Function			Marking	Function
X1.1	+12V DC	Power supply		X2.1	TEC Ext Enable	Input LVTTL
X1.2	GND	GND		X2.2	Not connected	
X1.3	Enable_LD	Input LVTTL		X2.3	UT\	Low temp. alarm out voltage

X1.4	LD_Ref_Volt	5V output		X2.4	OT\	High temp. alarm out voltage
X1.5	Curr_Adj_ext	Input		X2.5	U_Temp	Thermistor temp. out voltage
X1.6	En_Adj_GND	GND after filter		X2.6	ITEC	TEC element current out (proportional voltage)

On the right hand side of the module are outputs for the laser diode and TEC element and inputs for the thermistor located.

Table 2: Output connector assignments

	Marking	Function
X3.1	LD_out	Laser diode current output + (anode)
X3.2	GND	Laser diode current output - (cathode)
X3.3	TEC_1 => COOL	TEC-Element -
X3.4	TEC_2 => HEAT	TEC-Element +
X3.5	Thrmstr_1	Thermistor connector 1
X3.6	Thrmstr_2	Thermistor connector 2