

DLD 008-xx SERIES HIGH POWER LASERDIODE-DRIVER

OPERATING INSTRUCTIONS

1. Preface

This application note contains user information for the Laser Diode Driver Series DLD080-xx. These Drivers are OEM products for integration into other equipment and have for this reason no CE certification according to the current regulations by law. Thus the end user is responsible for any certification applicable to the respective equipment.

2. Mounting instructions for the power elements

To become familiar with the special properties of the driver it is strongly recommended to replace the laserdiode for the first time by a dummy load.

This dummy can be build up by a series connection of 3 standard silicon rectifiers with a sufficient power rating.

For laser currents up to 3 A the resulting forward voltage should be in the order of 2 V (1.6 to 2.2 V), the rated power for the single rectifier should be at least 2 W.

Please use a fast recovery type, if the laser current has to be modulated with a high repetition rate.

To use the full current range of the driver also in CW-mode of operation, the power transistor as well as the sense resistor have to be mounted on a heatsink.

The resulting power dissipated both in transistor and sense resistor calculates approximately as

$$P = \{U_B - 2,0\} \cdot I$$

where

P	dissipated power (W)
U_B	supply voltage (V)
I	laser current (A)

Thus for example the total dissipated power is 9 W, if the operating voltage is 5 V and the laser current is adjusted to 3 ADC.

Under these conditions the thermal resistance of the heatsink used should be in the order of 3 °C/W, to limit the temperature rise (heatsink to ambient) to around 30 °C.

!!! The Power transistor has to be isolated using an appropriate thermal conductive, electrically isolating foil between the transistor and the mounting surface on the heatsink.

!!! Any conducting path between the transistor and the heatsink can lead to the immediate destruction of the laserdiode (if the heatsink is grounded for example).

3. Basic wiring instructions

The driver is designed for a nominal operating voltage of $5\text{ V} \pm 10\%$.

The connections to the external dc power supply are made via two screw terminals (designated as +BAT resp. GND on the lower board, see also fig.1).

+BAT	→	+5 V	positive terminal of the supply
GND	→	5 V RTN	negative terminal of the supply

The wiring of the **D-SUB-Connector** mounted on the upper board has to be arranged individually according to the special needs of the customer.

A basic proposal for constant current mode and manual start/stop-operation is enclosed as well as a signal description for each pin.

Please contact the manufacturer for additional information if necessary.

The **laser dummy** has to be connected to the screw terminals as indicated in fig. 1 (**black wire = cathode / red wire = anode terminal**).

The length of the cabling should be as short as possible, if a high modulation bandwidth is desired. For CW operation the cable length can extend up to 2 m, if the total resistance remains below $0,1\ \Omega$.

As the supply voltage is applied, the **multicolor status-LED STDBY/LASER ON** indicates for a short time of around 150 msec the power on reset procedure (**red** color) and subsequently the standby mode of operation (**green** color).

The laser current is zero until now.

Pressing the **start/stop button** once activates the laser current. At the same time the color of the status-LED changes to **yellow**.

To **observe the actual laser current**, the user can insert a sense resistor of $0,1 \Omega$ in the laser current loop or monitor the voltage on pin 17 of the D-SUB-Connector (referenced to AGND / Pin 22 / D-SUB-Connector).

A voltage of **1,0 V reflects the full scale current**, i.e. 1 V on this monitor pin indicates an laser current of 3,0 Amps for the DLD 080-03.

This monitor output shows also the ac components of the laser current within a bandwidth of approximately 100 kHz and is useful especially for modulation purposes.

The **trimming potentiometers P1 and P2**, located on the base board define the level for the actual laser current as well as the limiting current.

P1 defines the actual laser current from 0 (CCW-position) to the maximum possible current (CW), e.g. 3 Amps for the DLD 080-03.

P2 allows the user to set a limiting current, individually matched to the limits of the laser diode used.

The limiting current can be set anywhere in the range from 0 (CCW-position) to the maximum current (CW-position).

The limiting current can be observed also in the standby mode of operation via pin 16 of the D-Sub-Connector (referenced to AGND/Pin 22 D-SUB-Connector).

As for the actual laser current a voltage of 1,0 V corresponds again to fullscale output.

The limiting current can never be surpassed by the actual laser current.

If the actual current reaches the given limit, the status-LED ILIM on the upper board is activated.

The return to the standby-mode of operation is possible anytime, simply by pressing the start/stop button once again.

If the laser current is interrupted (by a poor contact or wire break for example), the driver switches off immediately without any transient within 1 usec and returns to the standby mode.

This holds also for only very short interruptions in the order of 100 nsec or less.

The failure is signaled by the **BREAK-LED** on the upper board.

Powering up the laser current is only possible after the power supply is removed for a short time.

If the power supply voltage drops below 4,15 V, the driver is switched off in the same manner as described before.

4. Connecting the laser diode

To install the laser diode the driver has to be disconnected from the power supply. The user has to connect the laser diode **strictly observing the ESD handling instructions** given by the laser diode supplier.

The anode of the laser diode has to be connected to the screw terminal designated as LDA on the driver board (already equipped with a red cable) and the cathode to the screw terminal LDK (a black cable is already fastened to it).

!!! Connecting the laser diode in opposite direction can lead to the immediate destruction.

Frequently one of the two laser diode terminals is connected to the case (normally the anode).

For this reason it is strongly recommend, to isolate also the laser diode electrically from the mounting surface.

As soon as the laser diode is connected to the driver terminals, no damage affected by electrostatic discharge (ESD) can occur.

This is made sure by a normally closed relay contact, which only opens if the active laser mode is addressed.

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Pin-Assignment D-SUD-Connector

Pin-No.	Signal	Description
1	P2 EXT WHIP	Pin 2 of an external trimming potentiometer for ILIM (Pin 1 to AGND)
2	P2 EXT HIGH	Pin 3 of an external trimming potentiometer for ILIM (Pin1 to AGND)
3	NTC IN	terminal for an NTC-sensor 10 k Ω ref. to AGND (Pin 22)
4	REF IN	input for the external control of laser current resp. optical power
5	EXT OUT	buffered output of ANA IN (Pin 18)
6	DISABLE 2	disable input 2, e.g. for interlock purposes / TTL-compatible
7	DISABLE 1	disable input 1, e.g. for interlock purposes / TTL-compatible
8	TTL-	negative terminal of the optoisol. mod.-input / TTL-compatible
9	TTL+	positive terminal of the optoisol. mod.-input / TTL-compatible
10	LED 1 AG	terminal anode green for LED STDBY/LASER ON
11	LED 1 AR	terminal anode red for LED STDBY/LASER ON
12	START/STOP	terminal for start/stop-button ref. to +5 V (Pin 13)
13	+5 V	auxiliary +5 V output (e.g. for start/stop-button)
14	P1 EXT WHIP	Pin 2 of an external trimming potentiometer for IL (Pin1 to AGND)
15	P1 EXT HIGH	Pin 3 of an external trimming potentiometer for IL (Pin1 to AGND)
16	MON ILIM	monitor output for the current limit (1,0 V = full scale)
17	MON IL	monitor output for the actual laser current (1,0 V = full scale)
18	ANA IN	input for analog modulation up to 100 kHz
19	MON REF	monitor output for preadjustment of the laser current on standby-mode
20	FAIL OUT	output for summing fail signal (0 = fail) / TTL-compatible
21	\LASER ON	status output / TTL-compatible / 0 = LASER ON
22	AGND	reference potential for all control signals (analog ground)
23	CP	actual control loop signal for constant power mode
24	CC	actual control loop signal for constant current mode
25	FB	feedback node control loop

BASIC WIRING CONFIGURATION D-SUB-CONNECTOR DLD 080

- constant current mode / external control
- manual start/stop operation
- supply voltage 5 VDC

