Laser Peak Lasers from the Alps.

# LPDD625 - Zimba V2.2

3 x 2 channel laser diode driver and TEC driver with heating and cooling capability

## Manual


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## Features

- Up to 48V operating voltage
- Up to 960W output power in a tiny form factor of only 111.5x50x18mm
- Very high efficiency of up to 97.5% due to integrated step-down converters for each laser channel and the TEC driver
- 2.2Mhz -3db modulation frequency (1)
- 350ns rise, 500ns fall time (1)
- 3 modulation channels
- each offering configurable output channels - 5A or 2x 2.5A
- Up to 10 green laser diodes per channel e.g., capable of powering a 60W green module
- Integrated TEC driver with heating and cooling
- Standard NTC 10k Beta: 3977 compatible
- 5-48V @ 5A TEC drive capability per driver
- Power reduction feature reducing laser output at excessive and subnormal temperatures
- fully LP-BUS compatible
- Dual Voltage Technology (DVT)
- TEC booster compatible (240W/48V @ 5A per booster)

(1) Measured with square wave and 2 parallel output channels with 1A Ithr and 5A Imax with NUBM-44 as load.

## Applications

● Efficient operation of multi-element diode lasers

## Description

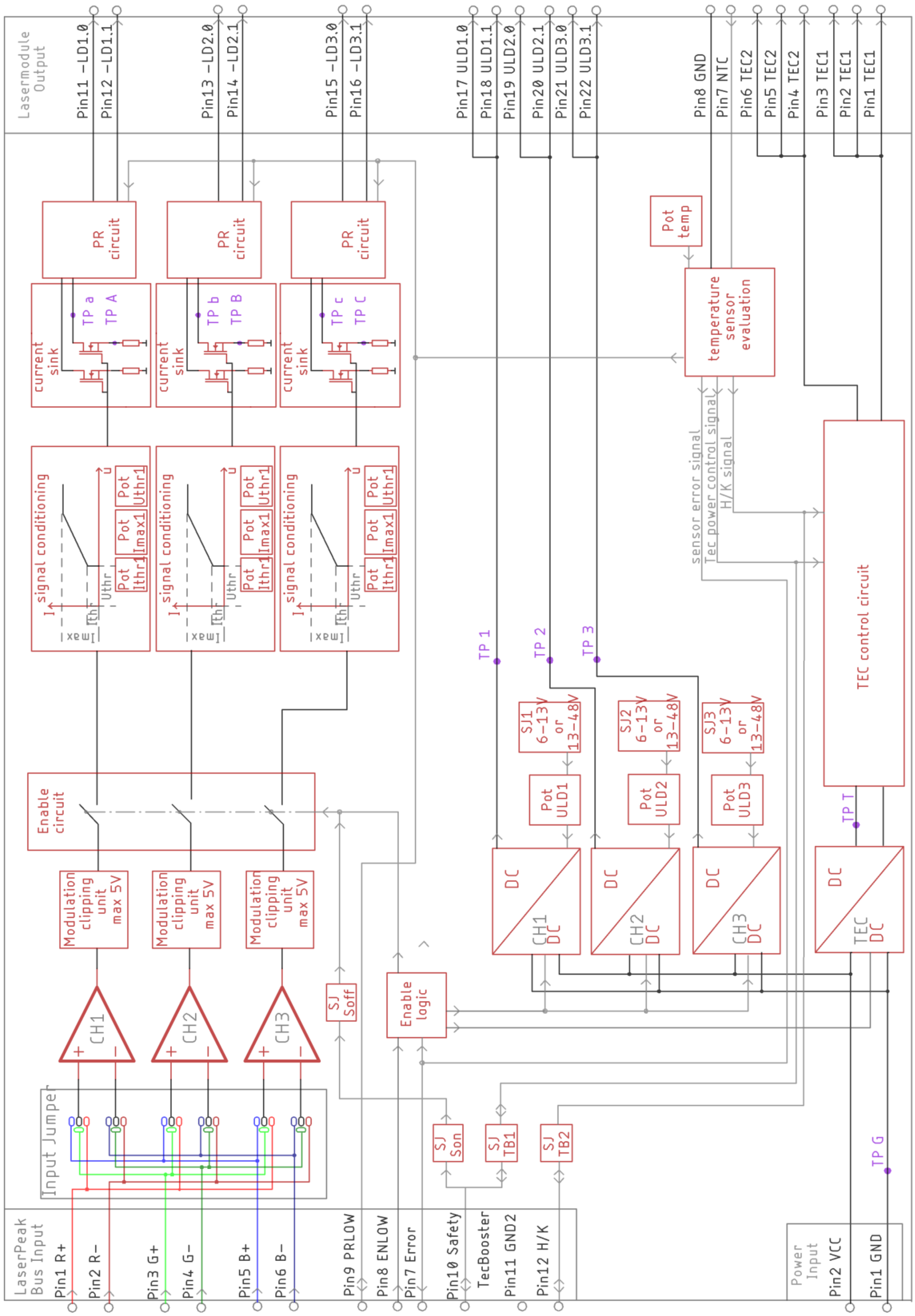
The diode driver LPDD625 – Zimba is designed to be efficient and versatile.
It supports a high operation voltage and offers stable, and fast current regulation in a small, easy to integrate form factor.
The LPDD625 – Zimba offers 720W maximum output power for laser diodes and 240W for TECs. The TEC power can be extended to 1200W with the use of our TEC booster technology.
TEC boosters enable to drive up to 48V @ 25A TECs with minimal cost and maximum efficiency.
A temperature-good output (power reduction) enables easy integration of the driver in any system. It offers the possibility to check if the TEC driver has reached the desired temperature, i.e. if everything is working as it should. The driver also features an NTC sensor error detection.
The drivers are fully compatible with our LP-BUS system.
The LP-BUS allows connecting everything in a tidy way and furthermore uses the power reduction (PR) output (temp ok) to command a reduced drive current from the LP diode drivers in order to protect the laser diodes in case a TEC should fail.

## Information

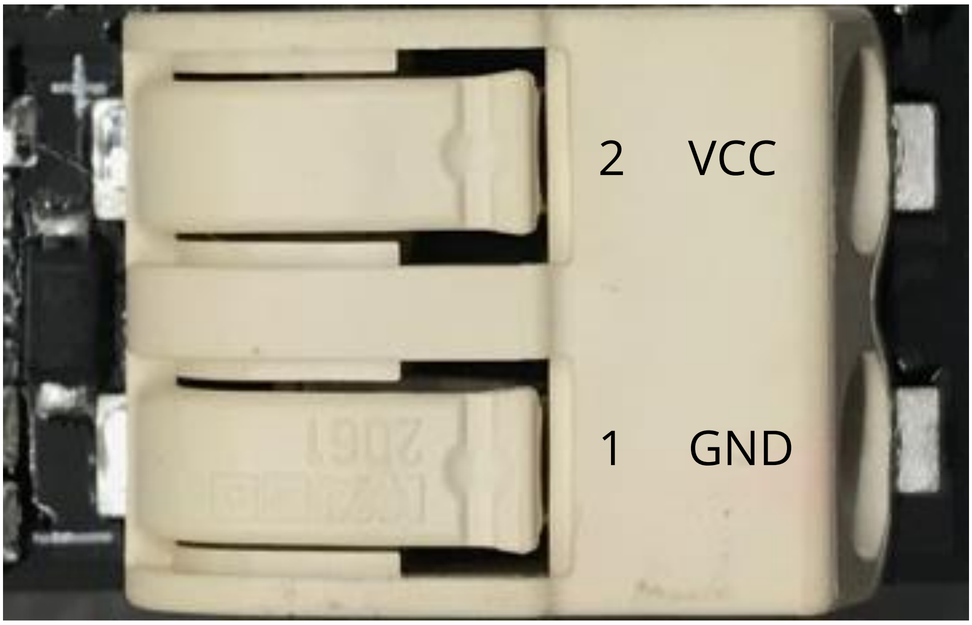
Every driver is designed and manufactured in Austria to meet our high standards at Laser Peak.
Drivers are shipped ready to use.
The diode drivers come with all needed connectors.
For more information, please contact Laser Peak.

Laser Peak Lasers from the Alps.

## Functional block diagram



## Power input connector



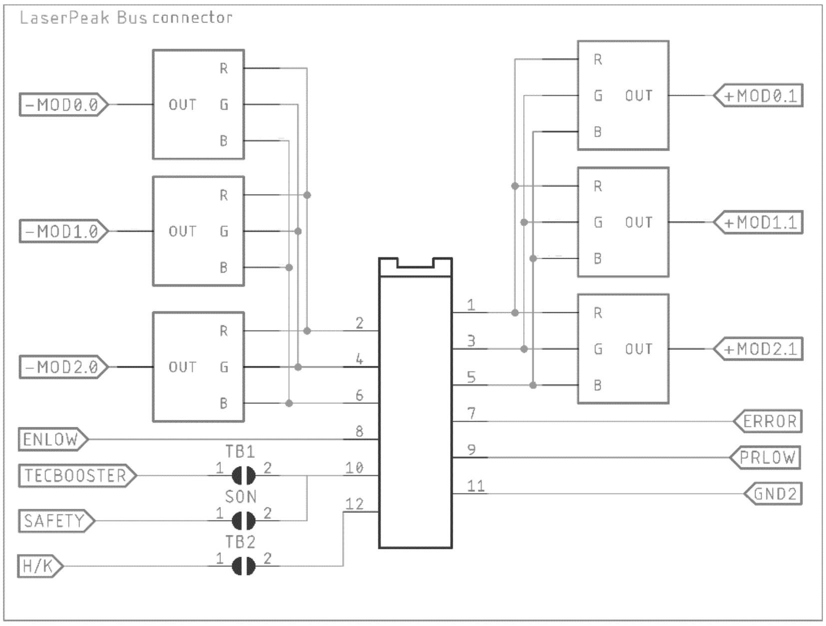

Power input connector

| Pin | | I/O | Description |
|---|---|---|---|
| No. | Name | | |
| 1 | GND<br>( - ) | I | Negative supply voltage,<br>0.5 - 1.5mm² / 20 - 16 AWG conductors |
| 2 | VCC<br>( + ) | I | Positive supply voltage,<br>0.5 - 1.5mm² / 20 - 16 AWG conductors |

### Power input considerations

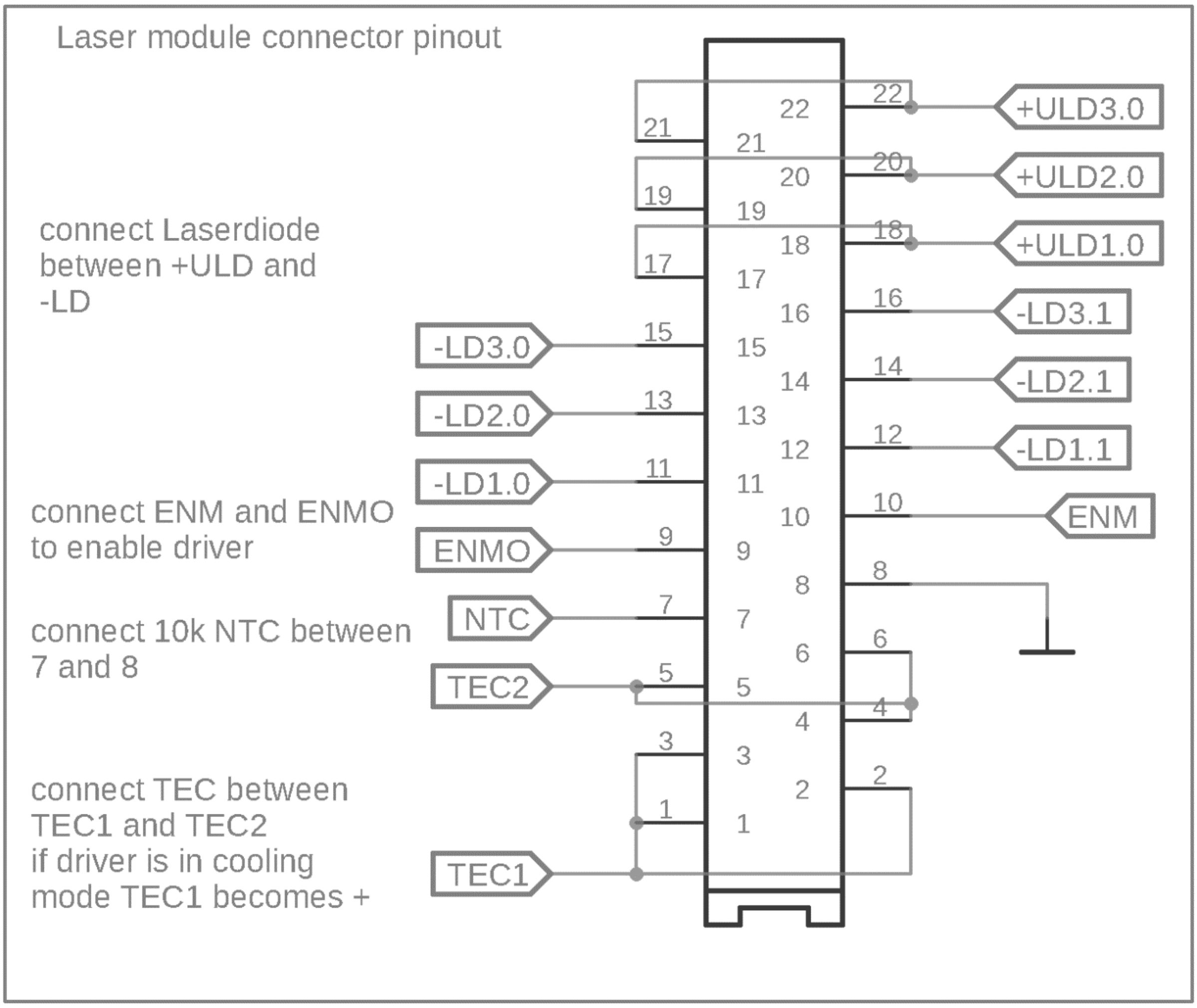
The power supply input connector uses a spring-loaded clamping mechanism. Make sure to strip the wires 7 - 10mm / 0.28 - 0.39 inch before inserting them into the connector. To release the conductor, push down the lever on the corresponding terminal and pull out the wire. The PCB has markings for negative and positive connections. You need to use low impedance connections, e.g., use short wires that can withstand the current that your application requires. The driver has limited reverse polarity and surge protection. The voltage surge protection is only useful against transients, so please make sure you use power supplies of good quality from a reputable brand only. You can also contact Laser Peak for advice on choosing the right power supply for your application.

# Modulation input connector configuration and function



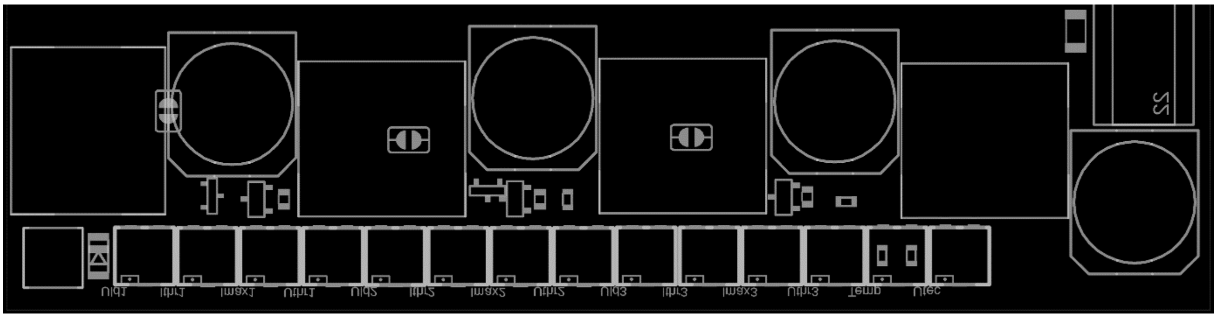

| Pin | | I/O | Description |
|---|---|---|---|
| No. | Name | | |
| 1 | R+ | I | Positive modulation input red channel |
| 2 | R- | I | Negative modulation input red channel |
| 3 | G+ | I | Positive modulation input green channel |
| 4 | G- | I | Negative modulation input green channel |
| 5 | B+ | I | Positive modulation input blue channel |
| 6 | B- | I | Negative modulation input blue channel |
| 7 | Error | O | Will be pulled to GND2 if NTC is shorted or open, and driver will be deactivated |
| 8 | EnLow | I | Enable input, connect to GND2 to enable laser driver |
| 9 | PrLow | I/O | Power reduction pin. If the driver detects a temperature problem with the module, this pin gets internally connected to GND2. |
| 10 | Safety/ TecBooster | I/O | Configurable as safety or TEC booster pin<br>If you configure the pin as safety, you need to connect it to GND2. If you don't pull it low, the driver shuts off the laser current.<br>If TEC boosters are connected, you must configure the pin as TEC booster.<br>The master driver sends the control power needed to reach the set temperature over this pin, -5V if 100% power needed, 5V if 0% power is needed. |
| 11 | GND2 | - | Return pin for all control signals. **Do not connect to GND!** |
| 12 | H/K | O | Output pin for TEC boosters: high if the driver is in cooling mode, low if the driver is in heating mode. |

## Driver output connector pinout



| Pin | | I/O | Description |
|---|---|---|---|
| No. | Name | | |
| 1 | TEC1 | O | Output pin for TEC, if the driver is in cooling mode, this becomes positive. |
| 2 | TEC1 | O | Output pin for TEC, if the driver is in cooling mode, this becomes positive. |
| 3 | TEC1 | O | Output pin for TEC, if the driver is in cooling mode, this becomes positive. |
| 4 | TEC2 | O | Output pin for TEC, if the driver is in cooling mode, this becomes negative. |
| 5 | TEC2 | O | Output pin for TEC, if the driver is in cooling mode, this becomes negative. |
| 6 | TEC2 | O | Output pin for TEC, if the driver is in cooling mode, this becomes negative. |
| 7 | NTC | I | Temperature sense pin<br>Connect one lead from NTC to this pin. Do not connect anything else. |
| 8 | GND | - | GND pin<br>Connect one lead from the NTC to this pin. Do not connect anything else. |
| 9 | EnMo | I | Enable input. This pin is used to detect a connected laser module. The module connects EnMo and EnM. |
| 10 | EnM | O | Enable output. This pin is at +4.5V if the driver is enabled through the modulation input connector. |
| 11 | -LD 1.0 | I | Current sink for 1.0 laser driver channel. Use voltage from ULD 1. |
| 12 | -LD 1.1 | I | Current sink for 1.1 laser driver channel. Use voltage from ULD 1. |
| 13 | -LD 2.0 | I | Current sink for 2.0 laser driver channel. Use voltage from ULD 2. |
| 14 | -LD 2.1 | I | Current sink for 2.1 laser driver channel. Use voltage from ULD 2. |
| 15 | -LD 3.0 | I | Current sink for 3.0 laser driver channel. Use voltage from ULD 3. |
| 16 | -LD 3.1 | I | Current sink for 3.1 laser driver channel. Use voltage from ULD 3. |
| 17 | +ULD 1 | O | Laser diode supply voltage 1, use both pin 17 and 18 if you need more than 2.5A. |
| 18 | +ULD 1 | O | Laser diode supply voltage 1, use both pin 17 and 18 if you need more than 2.5A. |
| 19 | +ULD 2 | O | Laser diode supply voltage 2, use both pin 19 and 20 if you need more than 2.5A. |
| 20 | +ULD 2 | O | Laser diode supply voltage 2, use both pin 19 and 20 if you need more than 2.5A. |
| 21 | +ULD 3 | O | Laser diode supply voltage 3, use both pin 21 and 22 if you need more than 2.5A. |
| 22 | +ULD 3 | O | Laser diode supply voltage 3, use both pin 21 and 22 if you need more than 2.5A. |

# Potentiometer configuration and function



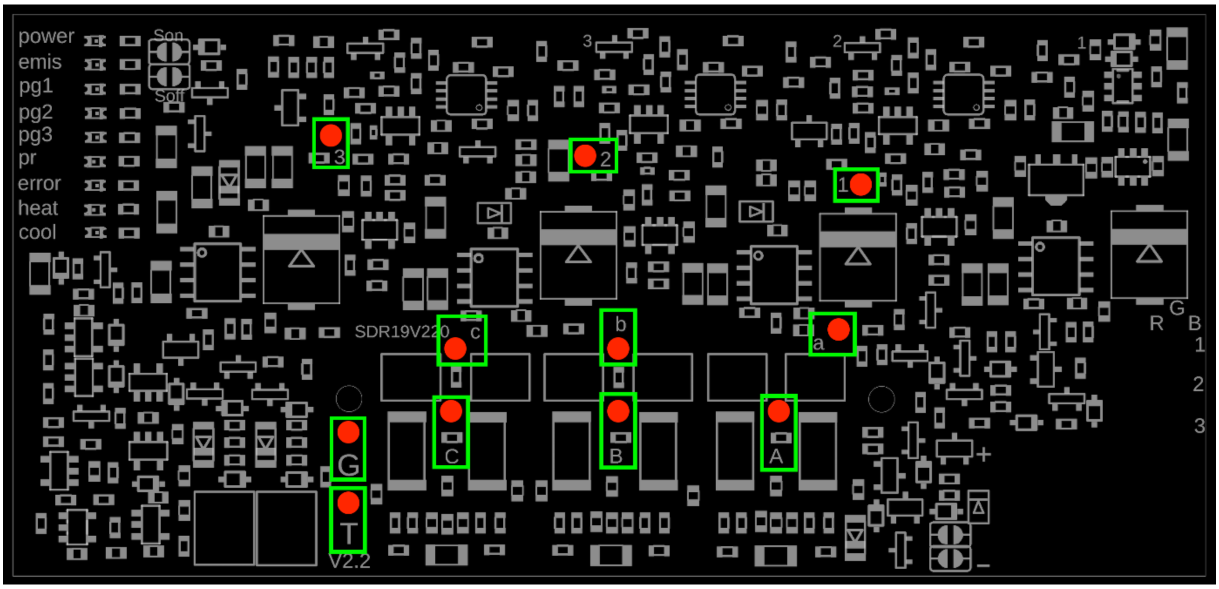
| Potentiometer<br>(Left to right on connector side) | | Min | Max | Unit |
|---|---|---|---|---|
| **Uld1** | Voltage for 1.0 and 1.1 current sink | 5 | 48 | V |
| **Ithr1** | Threshold current for 1.0 and 1.1 current sink | 0 | 50 % | Imax |
| **Imax1** | Highest current possible for current sink 1.0 and 1.1 | 0 | 2.5 | A |
| **Uthr1** | Threshold current cut off voltage for 1.0 and 1.1 | 0 | 0.5 | V |
| **Uld2** | Voltage for 2.0 and 2.1 current sink | 5 | 48 | V |
| **Ithr2** | Threshold current for 2.0 and 2.1 current sink | 0 | 50 % | Imax |
| **Imax2** | Highest current possible for 2.0 and 2.1 | 0 | 2.5 | A |
| **Uthr2** | Threshold current cut off voltage for 2.0 and 2.1 | 0 | 0.5 | V |
| **Uld3** | Voltage for 3.0 and 3.1 current sink | 5 | 48 | V |
| **Ithr3** | Threshold current for 3.0 and 3.1 current sink | 0 | 50 % | Imax |
| **Imax3** | Highest current possible for 3.0 and 3.1 | 0 | 2.5 | A |
| **Uthr3** | Threshold current cut off voltage for 3.0 and 3.1 | 0 | 0.5 | V |
| **TEMP** | Set temperature | -15 | +30 | °C |
| **UTEC** | Voltage for TEC | 3 | 48 | V |

## Potentiometer considerations

Each potentiometer increases the value counterclockwise (CCW) and decreases the value clockwise (CW).

Please be careful with your adjustment tool. The potentiometers can easily break away from the PCB when excessive force is being used!

# Probe point configuration and function

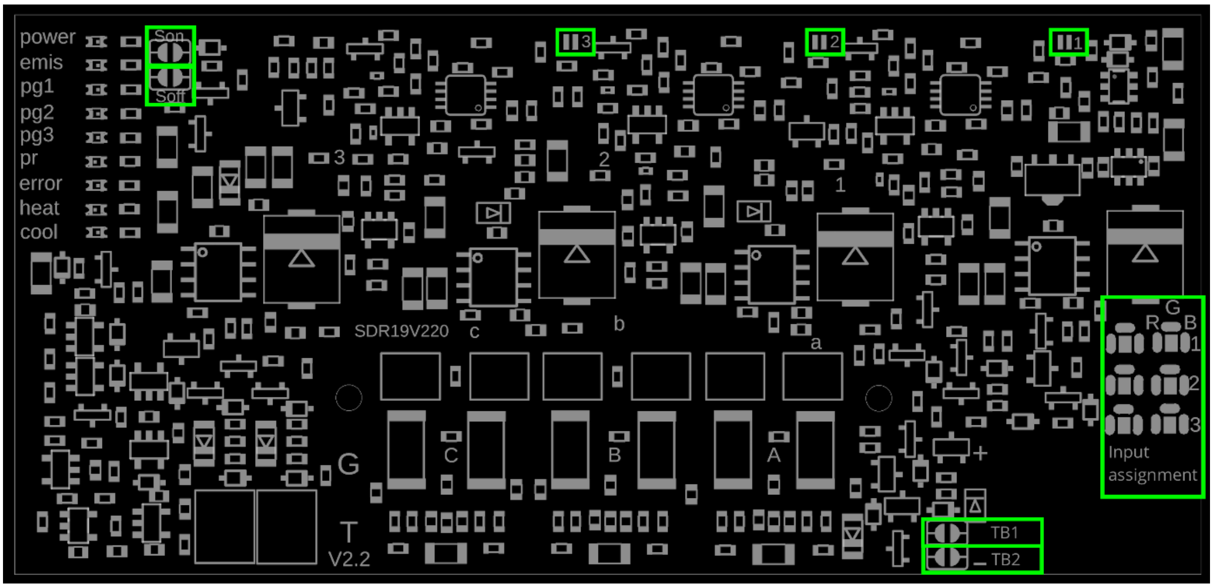



| Measurement Point | | Min | Max | Unit |
|---|---|---|---|---|
| **G** | GND | 0 | 0 | V |
| **T** | T-G supply voltage TEC | 3 | 48 | V |
| **1** | 1-G supply voltage +ULD 1 | 5 | 48 | V |
| **2** | 2-G supply voltage +ULD 2 | 5 | 48 | V |
| **3** | 3-G supply voltage +ULD 3 | 5 | 48 | V |
| **a** | a-A voltage over output stage FET 1.1 | | | V |
| | a-1 compliance voltage over laser diode LD 1.1 | 2 | 46 | V |
| **A** | A-G Laser diode Current 75mV / A | 0 | 187.5 | mV |
| **b** | b-B voltage over output stage FET 2.1 | | | V |
| | a-2 compliance voltage over laser diode LD 2.1 | 2 | 46 | V |
| **B** | B-G Laser diode Current 75mV / A | 0 | 187.5 | mV |
| **c** | c-C voltage over output stage FET 3.1 | | | V |
| | c-3 compliance voltage over laser diode LD 3.1 | 2 | 46 | V |
| **C** | C-G Laser diode Current 75mV / A | 0 | 187.5 | mV |

## Probe Points

The probe points are labeled on the PCB. Use a V meter for all measurements. Make sure the meter has a high input impedance. Otherwise, the measurements will be inaccurate. Every probe point is protected against short circuits.

# Jumper




## Solder Jumpers

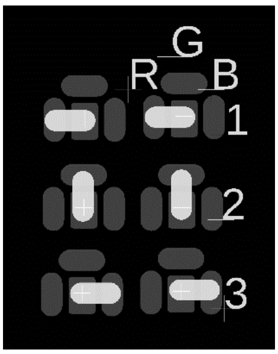
The solder jumpers (SJ) are needed to configure the driver to your specific application.
SJ 1/2/3 select the respective ULD potentiometer range. Bridged: 5-13V Open: 13-48V

Son and Soff are used for activating the safety input.

TB1 and TB2 need to be bridged if you want to use a TEC booster with this driver. If both are bridged, the connected TEC booster receives the temperature data from the main driver and regulates accordingly.
You can find more information about the jumpers in the LP-BUS section of this document.

## Input Assignment

All channels can be mapped onto the LP-BUS as desired. The input assignment jumpers are located above the supply voltage connector.
A picture of an example configuration for an RGB module can be found below. In this example, the R input channel is mapped to the first output channel. G is mapped to the second output channel and B to the third. It is possible to map two or three output channels to one input channel. You cannot map two input channels to one output, though.



# Absolut Maximum Ratings

| | Min | Max | Unit |
|---|---|---|---|
| Supply voltage (VCC) | -0.3 | 50 | V |
| Input common-mode voltage range (Vcm) | -50 | 50 | V |
| Output transistor power dissipation | | 6 | W |
| Storage temperature range (non-condensing)[2] | -40 | 100 | °C |
| Operating temperature range (measured on mounting bracket) (non-condensing)[2] | -10 | 65 | °C |
| TEC output current | | 5.5 | A |
| Diode output current (each double channel) | | 5 | A |

( 2 ) Only to be used in a non-condensing environment. Values outside those limits may cause damage to the driver.

# Electrical Characteristics

| | | Min | Max | Unit |
|---|---|---|---|---|
| **VCC** | | | | |
| Input supply voltage | | 12 | 48 | V |
| Standby power consumption | | 1.3 | 2 | W |
| Undervoltage lockout | Driver will be disabled below | 10.5 | 11.8 | V |
| **EnLow** | | | | |
| Current source | One driver enabled | 49.5 | 50.5 | uA |
| Enable threshold | Voltage needs to be lower than this value compared to GND2 | 1 | 2 | V |
| **Color Input** | | | | |
| Vcm | Common mode input range | -31 | 31 | V |
| Vdm | Differential mode input range | 0 | 5 | V |
| Rin diff | Differential input resistance | 112.2 | 112.6 | K |
| Rin + | Input resistance positive terminal | 68.2 | 68.4 | K |
| Rin - | Input resistance negative terminal | 56.2 | 56.2 | K |
| **Output** | | | | |
| Rise | | | 360 | ns |
| Fall | | | 550 | ns |
| THD | 20khz at 1A Ithr with 2.5A Imax with NUBM-44 | 0.04 | | % |
| Imax | Imax per channel, 2 channels can be in parallel | | 2.5 | A |
| Ithr | Ithr range depends on Imax | 0 | 50 | % |
| Softstart | Time from enable to full output current | 60 | 70 | ms |
| Compliance voltage | Maximum laser diode (string) forward voltage | | VCC - 3V | |
| VG-a / VG-b / VG-c | Voltage across output stage for proper regulation | (Idiode*0.15)+0.65V=VG-a | | |

## Status LEDs

| LED Label | Color | Function | Status if lit | Status if off | Problem/ Solution |
|---|---|---|---|---|---|
| **Power** | Green | Shows power status of the driver | Driver is connected to VCC | Input voltage too low | Check VCC |
| | | | | Driver faulty | Contact Laser Peak |
| **emis** | Yellow | Indicates readiness of laser output<br><br>Caution if lit, laser output possible | Driver is enabled and no error condition is detected | ENM and ENMO pins on output connector not connected | Enable driver by connecting the appropriate pins on input/output connector |
| | | | | ENLOW and GND2 pins on input connector not connected | |
| | | | | Error condition detected | NTC shorted/open or temperature of module out of range |
| **Pg1** | Green | Power-good signal for channel 1 | DCDC converter of channel 1 working | Driver not enabled | Check emis |
| | | | | DCDC converter faulty | Contact Laser Peak |
| **Pg2** | Green | Power-good signal for channel 2 | DCDC converter of channel 2 working | Driver not enabled | Check emis |
| | | | | DCDC converter faulty | Contact Laser Peak |
| **Pg3** | Green | Power-good signal for channel 3 | DCDC converter of channel 3 working | Driver not enabled | Check emis |
| | | | | DCDC converter faulty | Contact Laser Peak |
| **Pr** | Orange | Lights up when current NTC temperature not near set temperature | Laser driver in power reduction mode, output current halved to protect laser diodes from over/under temperature | OK | Check TEC voltage/power/ set temperature and module mounting. Module gets too hot. |
| **Error** | Red | Shows NTC error | NTC short/open or current temperature out of range (-10°C - 60°C) | OK | Check NTC wiring and module temperature |
| **Heat** | Red | Indicates heating power applied | Driver delivers power to TEC to heat module | No power applied | Does not light up if temperature is correct |
| **Cool** | Blue | Indicates cooling power applied | Driver delivers power to TEC to cool module | No power applied | |

## Dual Voltage Technology

The LPDD625 - Zimba makes it easy to use symmetrical power supplies (+-24V with GND).
The color input (e.g., +-R/G/B) supports a high CMIR. High CMIR enables you to power the driver with +24V and -24V in conjunction with ground-based modulation signals. You can use 48V to drive many laser diodes in series and do not need to change the modulation signal. Every other function except the TEC booster is DVT compatible.

## LP-BUS

LP-BUS gives you the possibility to connect two or more laser drivers and TEC drivers/boosters. LP-BUS makes it easy to expand the power capabilities of the drivers to drive even more diodes and TECs. LP-BUS also reduces the amount of wiring needed. You can use a long ribbon cable with multiple connectors crimped on, to get all control signals wired between the drivers.

### Power Reduction

The PR signal is used to protect the diodes in an over/under temperature condition.
If a TEC driver (also the one integrated in LPDD625 – Zimba) detects a bad temperature condition, this signal gets sent. Each LPDD625 - Zimba responds with a 50% reduced diode drive current to protect the diodes.
The signal gets distributed across the LP-BUS to all connected drivers, even if you connect one to -24V and GND and the other driver to GND and +24V.

### EnLow

The EnLow signal is an interlock signal. This signal needs to be pulled to GND2. Every driver connected to the LP-BUS checks this pin. If not connected to GND2, the driver responds with disabled DCDC converters. It also disables the modulation signal flow. It is thus providing a safe way to disable the laser current entirely. If an error occurs, for example, a broken output stage, it would still disable the current into the diode.

### Safety (only without TEC booster)

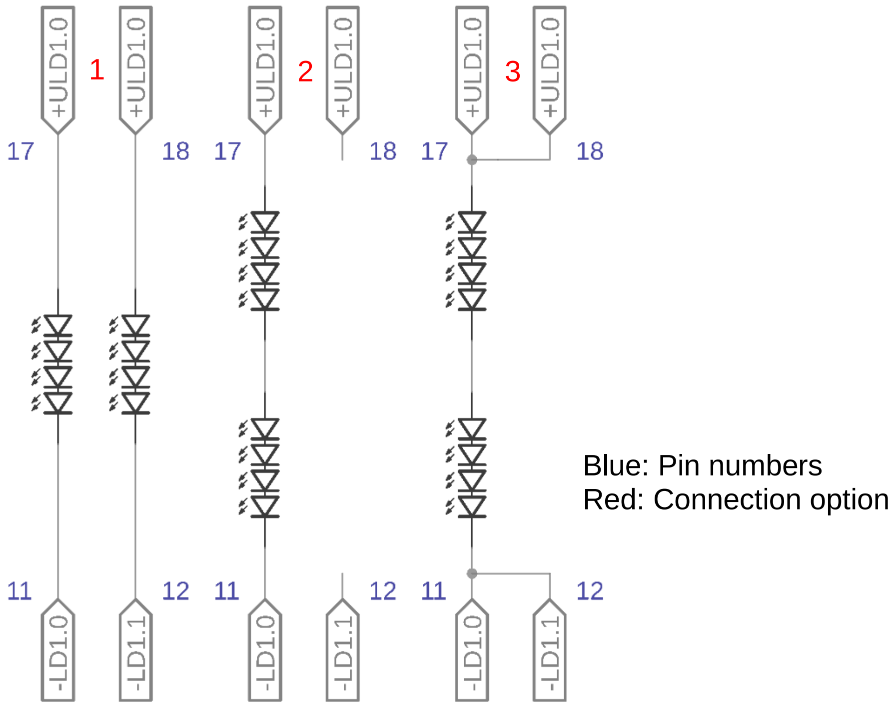
Pin 10 can be configured to act as a safety pin or to control a TEC booster.
If you want to switch the output current for the laser diodes on/off in a fast way, you will need to use the safety pin. Therefore you will need to bridge the Son SJ, open the Soff SJ and the TB1/2 SJ. This configures pin 10 at the LP-BUS connector as a safety input.
If you pull the pin to GND2, the driver will activate. If you leave the pin floating or connect it to VCC, the driver will become disabled.

### TEC booster

If you want to use a TEC booster to get more power for your TECs, you will need to connect SJ TB1 and TB2. This configures the LPDD625 – Zimba as a bus master. The bus master sends the thermal information to other connected TEC boosters. All slave TEC boosters need to be connected to the same GND. The VCC voltage can be different. You can use up to 4 TEC boosters with one master driver.
If you want to have more than one master driver on the LP-BUS then you will need to break pin 10 and pin 12 between the master drivers.

# Connecting Laser Diodes

Laser diode connection planning needs to be done carefully to maximize efficiency.
If you want to connect laser diodes that need more than 2.5A, it is necessary to use two output channels from one input channel in conjunction. Paralleling two output channels gives you 5A total drive current. You can only parallel two output channels that share a modulation channel e.g. -LD1.0 and -LD1.1 or -LD2.0 and -LD2.1 or -LD3.0 and -LD3.1. You cannot parallel -LD1.x with -LD2.x.
If you only need 2.5A or below, the driver makes it possible to drive two strings of diodes per modulation channel.
Example: 8x 2A 5.5V laser diode
There are multiple ways to connect the diodes, but only one way is the most efficient and should, therefore, be used.

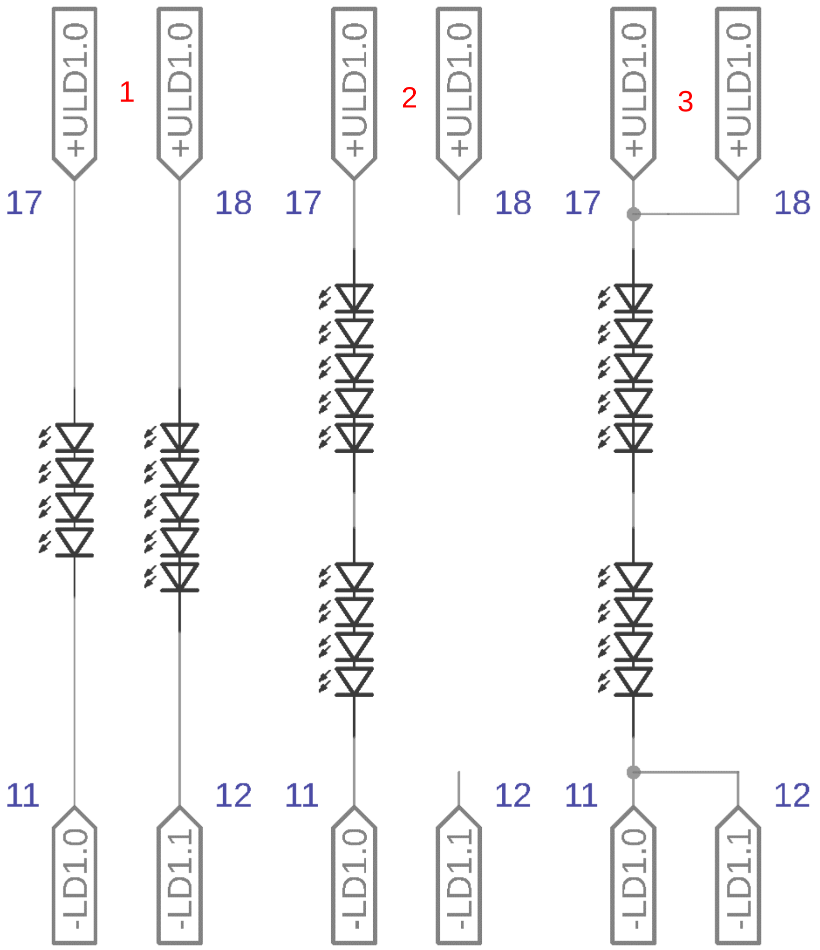



Option 1 uses both channels to drive eight diodes. Because of the four diodes per string arrangement, the driver only needs (5V*4)+3V= 23V VCC min. The disadvantage is increased overall current, resulting in less efficient operation.

Option 2 uses one channel to drive eight diodes. Because of the eight diodes per string arrangement, the driver needs (5V*8)+3V= 44V VCC min. The disadvantage is that the laser diode current is sinked by only one output transistor, resulting in more voltage drop across the shunt resistor and transistor, thus less efficient operation.

Option 3 uses two channels to drive eight diodes. Because of the eight diodes per string arrangement, the driver needs (5V*8)+3V= 44V VCC min. There are no disadvantages: The laser diode current is sinked by two output transistors, resulting in a reduced voltage drop across the shunt resistor and transistor. Thus the highest efficiency possible is achieved.
**Be careful:** if you use both output stages in parallel, the current you are measuring is half of the actual output current.

Example two: 9x laser diodes 250mA 3V




Option 1 uses both channels to drive nine diodes. Because of the four/five diodes per string arrangement, the driver only needs (3V*5)+3V= 18V VCC min. The different number of laser diodes also causes trouble; each diode uses 3V 0.25A, thus using 0.75W. The voltage difference of each string produces extra heat at the output stage (12V vs. 15V @ 0.25A). This example works because the extra 0.75W in stage 1.1 does not exceed the capability of 7W maximum power dissipation but reduces the efficiency significantly. Connect the higher laser diode count to the higher channel e.g. 1.1 instead of 1.0.
Therefore, you can drive different amounts of laser diodes per string, but you need to respect the maximum dissipation of the output stage.

Option 2 uses one channel to drive 9 diodes. Because of the 9 diodes per string arrangement, the driver needs (3V*9)+3V= 30V VCC min. The disadvantage is that the laser diode current is sinked by only one output transistor, resulting in more voltage drop across the shunt resistor and transistor, thus less efficient operation.

Option 3 uses two channels to drive 9 diodes. Because of the 9 diodes per string arrangement, the driver needs (3V*9)+3V= 30V VCC min. There are no disadvantages: The laser diode current is sinked by two output transistors, resulting in a reduced voltage drop across the shunt resistor and transistor. Thus the highest efficiency possible is achieved. Be careful, if you use both output stages in parallel, the current you are measuring is half of the actual output current.

# Tuning the Driver

Please make sure you have read and understood the whole section completely before attempting to tune the driver!

Driver tuning needs several steps. The first step is tuning the TEC temperature regulation.
Even if it is not intended to use a TEC, the TEC driver still needs to be set up.

Close the interlock loop on the output connector to enable the driver.
The input connector does not need a closed interlock loop to tune the TEC.
If you do not want to use temperature regulation or protection you can connect a 10k resistor to the NTC input. Otherwise, an NTC with 10k at 25°C and a beta of 3977 should be used.
The NTC needs to be thermally connected with the thermal mass that should be controlled or protected.

After all connections are made, the driver can be powered up.
If the error LED lights up, the NTC or resistor is not connected properly or has a short.

Next, you need to tune the TEC voltage and the set temperature with the UTEC and Temp pot.
First, the TEC voltage needs to be tuned. Measure the voltage on test points T-G.
Use the Temp pot to get the driver in full TEC output power state by turning it clockwise until the PR LED lights up. Now it’s time to set the TEC voltage by turning the UTEC pot.
After the TEC voltage is set the temperature can be set with the Temp pot.

If you don’t use a TEC, set the TEC voltage to a minimum and turn the Temp pot until the drivers heating, cooling, and PR LEDs are off.

The second step is tuning the laser diode driver. This manual only describes the procedure to set up channel one, the following steps need to be executed for each channel in use. Be careful to use the right pots to tune the other channels.

Connect a voltage source that is capable to be adjusted between 0-5V to the modulation input and set it to 5V.
After determining the right laser diode connection scheme (see the previous page), you can connect the diodes to the driver.
Close the input connector interlock loop to activate the laser diode driver.
Calculate the needed compliance voltage of the connected laser diodes, use the typical voltage provided in your diode’s datasheet.
If you are unsure about your diode’s compliance voltage, you need to be very careful. You cannot use the steps provided below to adjust the driver. However, you can still adjust the driver but you should first read the following section „Compliance Voltage“.

If all connections are made properly, the driver can be powered up.

Now you need to adjust the compliance voltage with the ULD1 pot.
Measure the voltage at test points G-1.

After the compliance voltage is set the drive current can be adjusted.

Measure the G-A voltage, this voltage corresponds to the current that's flowing through the diodes.
Tune the Imax1 pot to reach the desired current, be careful to adjust the right current and don't overshoot it. If you are using two channels in parallel to drive more than 2.5A you need to divide the needed current by two!

If you cannot reach the desired current your diodes need more compliance voltage than currently set with ULD1.
To fix this turn the current down with Imax until the current drops, increase the compliance voltage by 1V, and start to tune Imax1 again.

Now you need to adjust the compliance voltage again for maximum efficiency.
Measure the voltage drop across the outputs stage with the measurement points a-A.
This voltage multiplied by the drive current cannot exceed 6W or the driver will get damaged. If you use both channels in parallel, the channels share the power dissipation.
The measured voltage needs to be set with the ULD1 pot to a calculated value.
Use the following equation to calculate the voltage.

$$\boldsymbol{LD}_{current} * 0.2 + 0.5V = \boldsymbol{V}_{testpoint}$$

$\boldsymbol{LD}_{current}$ is the maximum laser diode drive current and $\boldsymbol{V}_{testpoint}$ is the voltage measured at test points a-A.
Imax and ULD1 are now set correctly and do not need to be changed anymore.

Step 3 includes setting the modulation curve.
LPDD625 – Zimba includes stand-by beam suppression and threshold current.
Any change in threshold current does not influence Imax or ULD, it can be set fully independently.

To set the threshold current, reduce the modulation voltage to a lower value like 0.15V.
Tune the Ithr pot to a desired laser diode brightness or current.
To adjust the stand-by beam suppression you need to use the Uthr pot to adjust the modulation voltage below the driver cuts the current completely.
Set 0.14V modulation voltage and turn the Uthr pot until the diode current shuts off.

Repeat the steps for each channel. LPDD625 - Zimba is now perfectly adjusted.

## Compliance Voltage

The compliance voltage further known as laser diode forward voltage needs to be set precisely. If you don't know the value you need to start tuning the driver with ULD1 set to the lowest voltage possible.

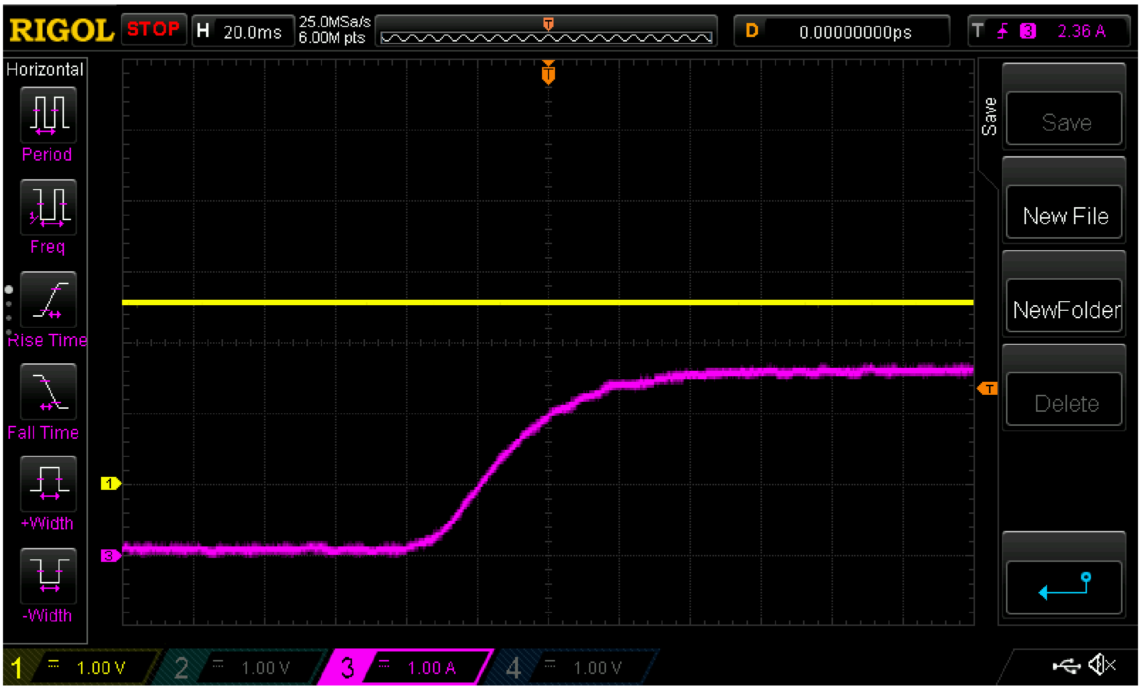
You can try to increase the laser diode current, if the current cannot be adjusted to your desired value, you need to turn the Imax pot down until the current decreases (A-G).
After that increase the compliance voltage (1-G) with the ULD1 pot by 1V.
Repeat this until you reach your desired drive current.
Now tune the voltage drop across the output stage like previously mentioned.

If you are using different laser diodes or different numbers of diodes on one channel e.g.
Two diodes on 1.0 and three diodes on 1.1 then you need to work with the higher compliance voltage. However, calculate the power dissipation of the output stage beforehand and make sure you don't exceed it.

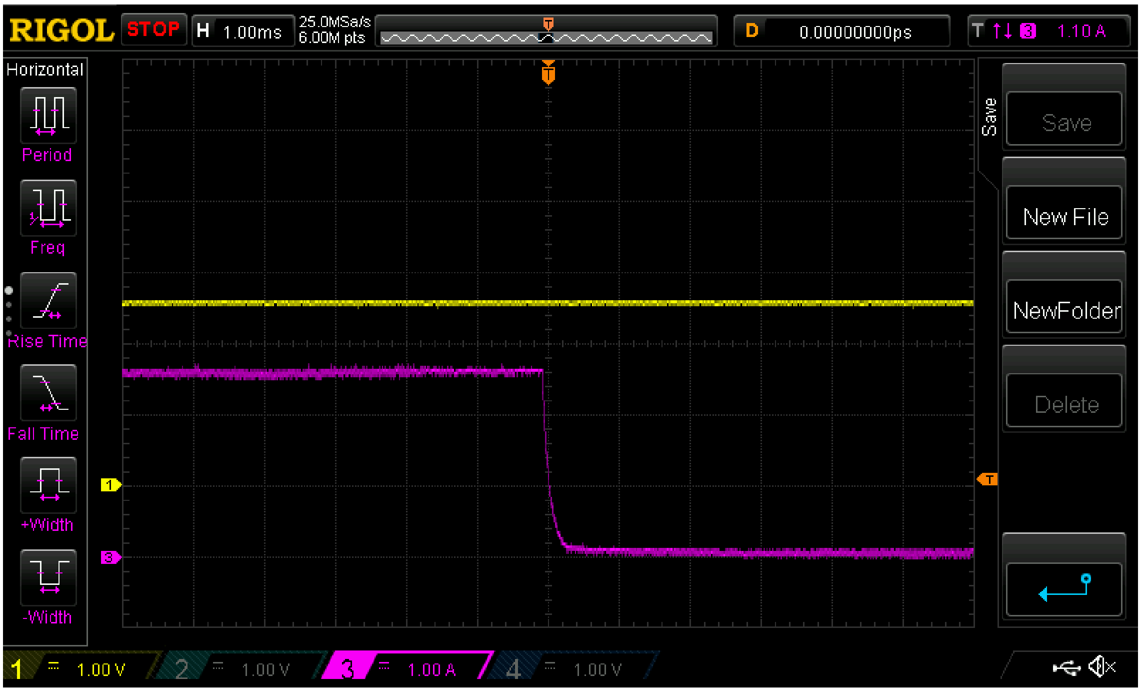
All other steps remain the same.

# Waveforms

All Waveforms recorded with Rigol DS1104
Yellow: Modulation Input
Violett: Current Output




Turn on event e.g. connecting 48V to tuned driver with modulation signal already in place with 2.5V modulation signal and Imax tuned to 5A.
No overshoot and 65ms softstart time




Turn off event e.g. disconnecting the power supply
with 2.5V modulation signal and Imax tuned to 5A.


Square wave 2App


Sine wave 2.2Mhz 1.5App

Notes