



User Manual

LDS-VRM 005

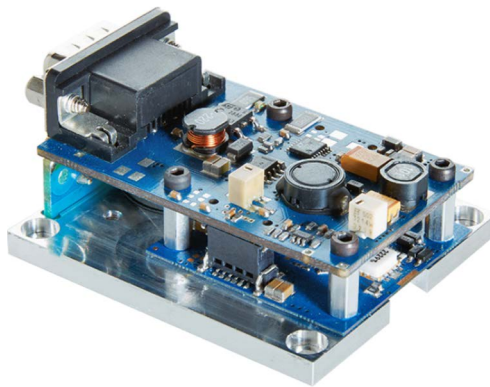


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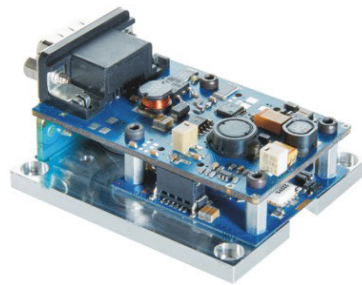
PicoLAS

FOCUSING POWER TO THE POINT

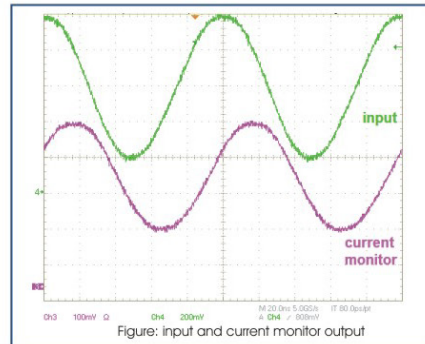
LDS-VRM 005

Highspeed Driver for Laser Diodes

Rev.1905



- Analog modulation from cw up to 1 GHz
- 0 to 0.5 A diode current
- Diode voltage: 0 .. 3 V (cw mode)
- Diode voltage: 0 .. 6 V (pulse mode)
- Single 15 .. 24 V supply



Technical Data*

| | |
|------------------------------------|---|
| Output current | 0 .. 500 mA at 25 °C 0 .. 600 mA max. peak current |
| Diode voltage cw and pulse mode | 0 .. 3 V up to 0.5 A |
| Pulse mode | 0 .. 6 V up to 0.1 A** |
| Analog modulation | cw .. 300 MHz (-3dB) cw .. 750 MHz (-6dB) |
| Modulation inputs | analog 0 .. 1 V; Scale 0.5 A/V |
| Current overshoot | < 1 % |
| Supply unit control | RS-232 |
| Current monitor | Analog, Scale 1.25 A/V (50Ω) |
| Supply voltage | 15 .. 24 V DC, 0.6 A |
| Max. power dissipation | 10 W |
| Dimensions in mm | 69.7 x 54 |
| Weight | < 80 g |
| Operating temperature | 0 to +55 °C |

* Technical data is subject to change without further notice.

** Up to an average current of 100 mA.

Product Description


The LDS-VRM 005 is a highspeed driver for laser diodes. The current can be modulated with an analog input signal. The very high repetition rate up to 750 MHz and the high current of up to 500 mA allow applications in the field of:

- Seeder for fiber lasers and solid state lasers
- Print
- DVD disk mastering
- Communication
- Illumination and vision

The driver consists of a driver unit and a separate remote controllable supply unit. Both parts are operated with a supply voltage of 15 .. 24 V DC. A passively cooling via the base plate of the driver helps to realize a maintenance free operation. Additional cooling is not necessary.

Optional Accessories: PLCS-40

How to use the Manual


 **Remark:** The LDS-VRM 005 described in this manual is a baseplate cooled laser diode driver.

Baseplate cooling: Depending on the final application and operation regime, this unit may stay non-cooled or must be assembled onto a heat sink.

Please refer to section “Cooling” for more details about the thermal power losses during operation.

You may use a passively or an actively air/water cooled device.

Before powering on your unit, read this manual thoroughly and make sure you understood everything.

 Please pay attention to all safety warnings.
If you have any doubt or suggestion, please do not hesitate to contact us!

Absolute maximum Ratings (Destroying Limits)

- All input pins must not exceed the voltage range below zero (GND) and beyond VCC
- VCC Limit: Refer to table in section “Power Supply (#3)”
- Peak output current: 0.5 A
- Max. I_{mon} current: 10 mA
- Operating temperature range: 0 °C .. +60 °C
- Best performance operating temperature range: +10 °C .. +35 °C
- Storage temperature range: -20 °C .. +70 °C

Dos and Don'ts

Never ground any output connector.

Never use any grounded probes at the output.

Do not connect your oscilloscope to the output.

This will immediately destroy the driver and the probe!



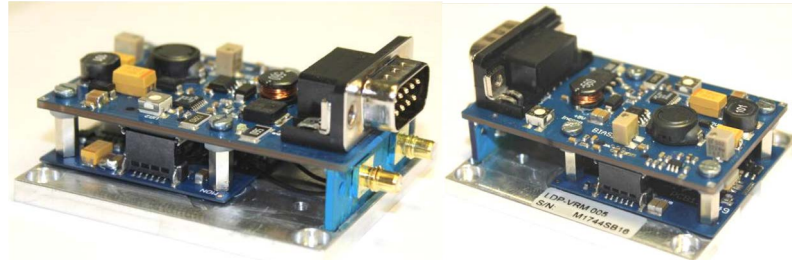
Keep connecting cables between power supply and driver as well as the connection between driver and laser diode as short as possible.


Mount the driver on an appropriate heat sink!




Please be aware that there might be hot surfaces. Be careful not to touch them!

How to get started




 You need an additional fast arbitrary waveform generator (AWG) which has to be connected to the Input MMCX-Terminal. There is no AWG on board of the driver!

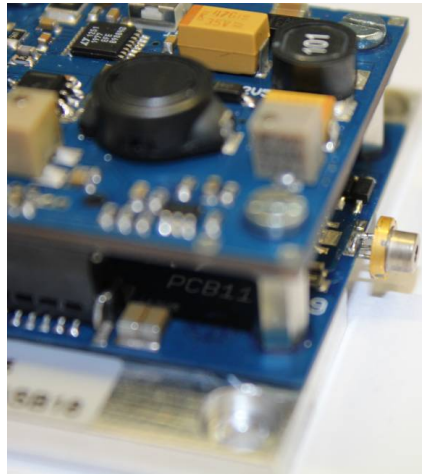
 The PCB is very thin. Mechanical force has to be avoided to prevent damage. Mechanical damages are not covered by warranty.

| Step | What to do | Check |
|------|--|--|
| 1 | Assemble the driver onto an appropriate heat sink. | |
| 2 | Solder a dummy diode between LD+ and LD-pad, alternatively make a short circuit there. | Refer to section "Test Load". |
| 3 | Connect GND, +15 V VCC (power supply disabled). | Required current for this step is around 18 mA. |
| 4 | Connect AWG or pulse generator on input terminal (no pulse before power supply enabled). | Refer to all sections referencing input (connector #1). |
| 5 | Enable the power source for +15 V VCC and feed a pulse on the input terminal. For example 0.5 V amplitude 1 μ s pulse width and 300 μ s repetition rate. | Make sure not to overload the laser diode or the driver. |
| 6 | Check whether the current monitor output pulse shape is similar to the input signal. | On Imon Output (connector #2) you can measure a signal comparable with the input signal. 1.0 V on the input terminal results a current of 500 mA by test diode or bypass and 400 mV on the Imon Output. Use an oscilloscope with a 50 ohm termination. |
| 7 | Disable the input signal and turn the power sources for +15 V VCC. Take out the test diode or bypass. Assemble the final laser diode. | |
| 8 | Turn the power supply for the +15 V VCC on and feed a pulse on the input terminal. | |

Required Laser Diode Pinout

The LDS-VRM 005 is designed for the direct connection of almost any kind of laser diodes. The landing patterns accept 2 and 3 terminal packaged laser diodes.


 Never use cables > 10 nH. This will cause excessive ringing and may damage the LD.




Laser diode connection: the rectangular pads on top (cathode) and bottom (anode).

The dimensions of the rectangular pads are 1 mm x 5 mm.

There is no optical feedback path. The unit is current controlled only.

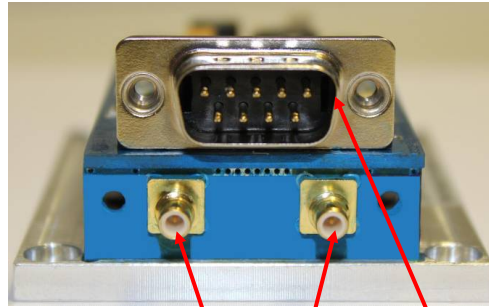
 Please shorten the legs to avoid short circuits inside the driver.

 The maximum internal stray impedance must not exceed ~ 10 nH to achieve best performance.

Required electrical Characteristics of the Laser Diode

| Parameter | Comment | Min. | Typ. | Max. |
|-----------------------------|----------------|------|-------|------|
| Laser diode forward voltage | Pulse mode | 0 V | 1.8 V | 6 V |
| Laser diode forward voltage | cw mode 500 mA | 0 V | 1.8 V | 3 V |

Description of the Connectors of the LDS-VRM 005

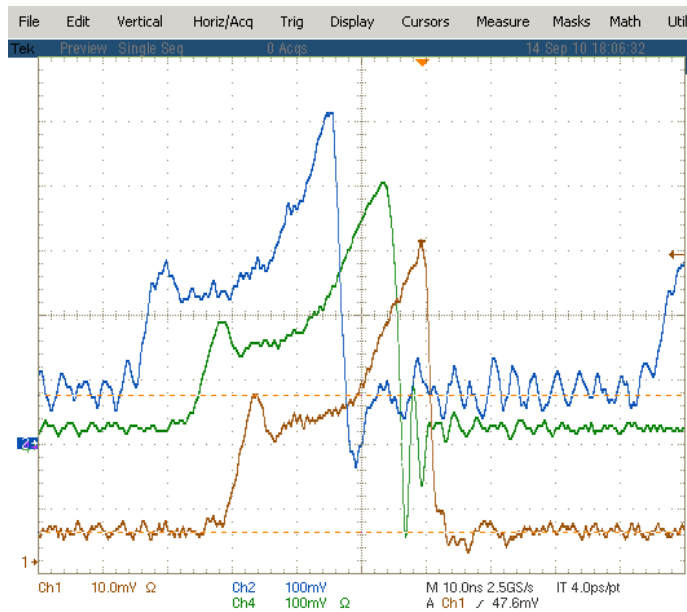
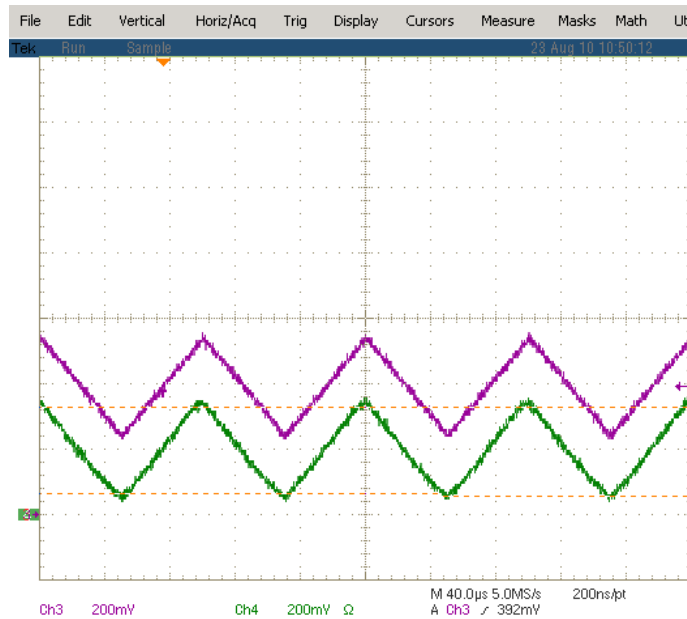


#1 #2 #3

| Connector | Function | Assembled type | You need: |
|-----------|-----------------------------|-----------------------------------|--|
| #1 | Signal input | SMC, male MULTICOMP 1169655 | SMC, female |
| #2 | Current monitor (output) | SMC, male MULTICOMP 1169655 | SMC, female |
| #3 | Power connector | D-SUB 9 male | D-SUB 9 female on cable: Harting 0966118 7500 |

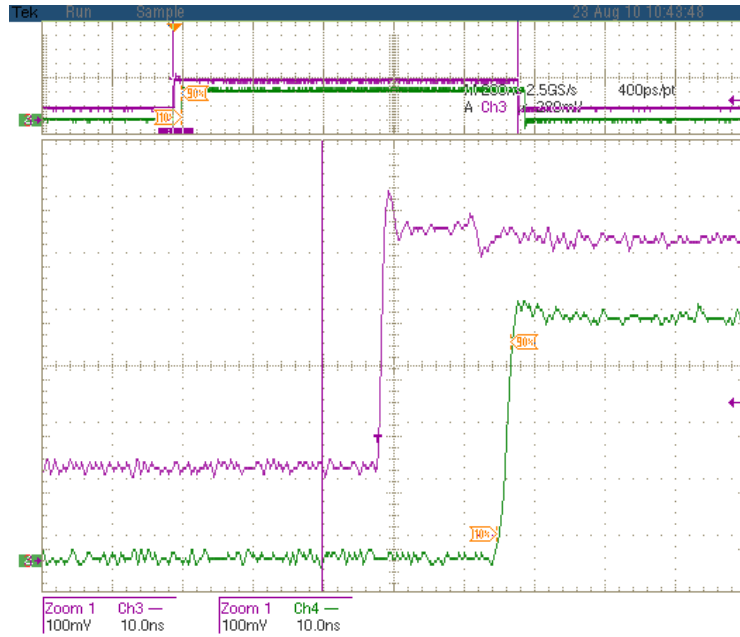
Input (#1) and Current Monitor (#2)

The driving analog signal is provided via connector #1. Please take care to use input signal with 50 Ohm termination as otherwise ringing can occur. The output current is following the input signal within the limitations (bandwidth, max. current, rise time) proportional (refer to section “Linearity”).



Propagation Delay (#1 to #2)

The typical propagation delay from input to start of current flow is typ. 10 ns. Additional 8 ns appear through the internal current monitor.



Description of the SUB-D 9 Connector (#3)

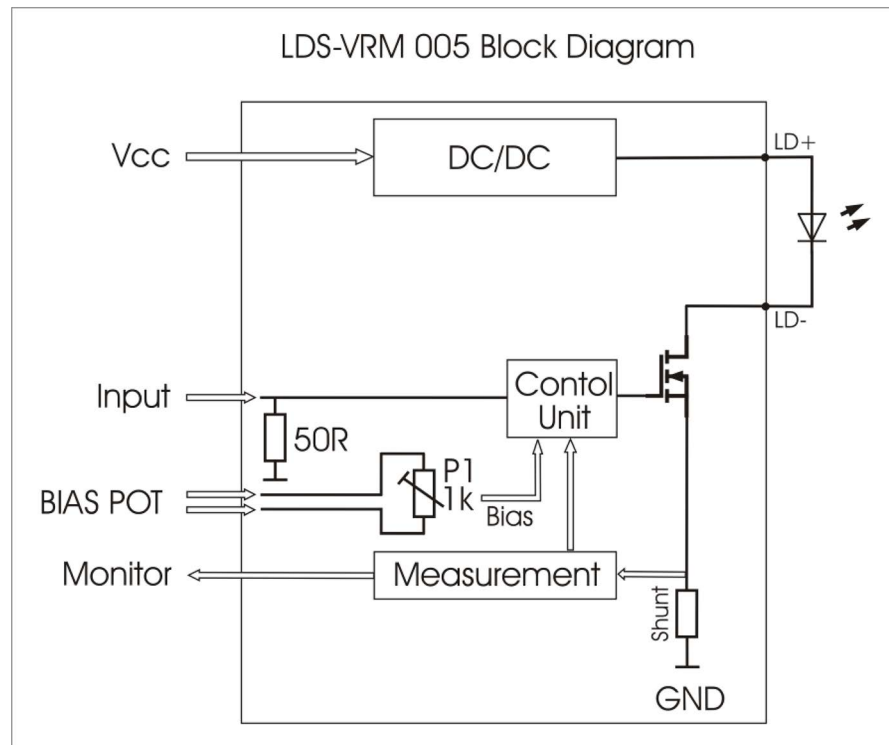
| Pin | SUB-D 9 Connector |
|-----|-------------------|
| 1 | GND |
| 2 | BIAS POT1_2 |
| 3 | BIAS POT1_1 |
| 4 | NC |
| 5 | NC |
| 6 | NC |
| 7 | 15 V VCC |
| 8 | GND |
| 9 | 15 V VCC |

Power Supply (#3) and Supply absolute maximum Ratings

The laser driver supply can be interrupted at any time for e.g. safety reasons.

| Pin of conn. #3 | Allowed range | Best performance | Destroying limit |
|--------------------|---------------|------------------|------------------|
| 7 and 9 (15 V VCC) | 15 V .. 24 V | 15 V | 25 V |
| 1 and 8 (GND) | GND | GND | |

Block Diagram



Description of BIAS POT (#3)

Bias potentiometer P1

P1 Bias



This value of potentiometer P1 is part of the calibration procedure performed at PicoLAS. It must not be changed by the customer. Changes have an impact on the performance of the driver and may damage the LD and the driver. All changes are monitored and will cause the loss of the warranty.

The factory settings for the Bias current is 28 .. 30 mA. This current flows always through the laser diode.

BIAS_POT Connector

To increase the Bias current an additional resistor can be connected externally. Resistance value on pin 2 and pin 3 of connector #3 sets the Bias current for the control unit. Reduction of the total resistance results an increase of the Bias current.



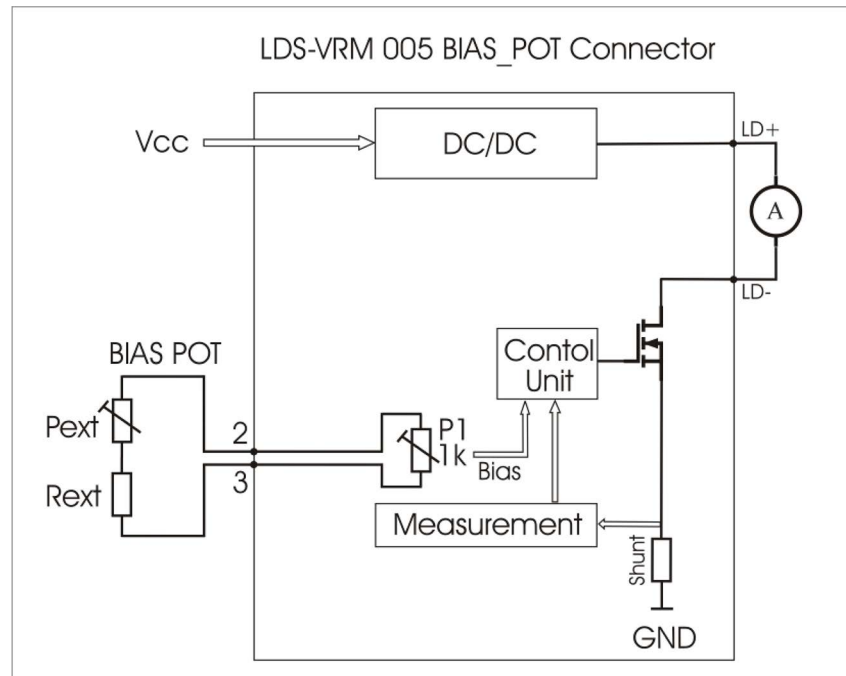
A short circuit between the pin 2 and 3 would increase the Bias current in level of 500 mA.

Use as example a resistor R_{ext} and potentiometer P_{ext} in series.

The resistor R_{ext} sets the maximum and P_{ext} the minimum of Bias current.

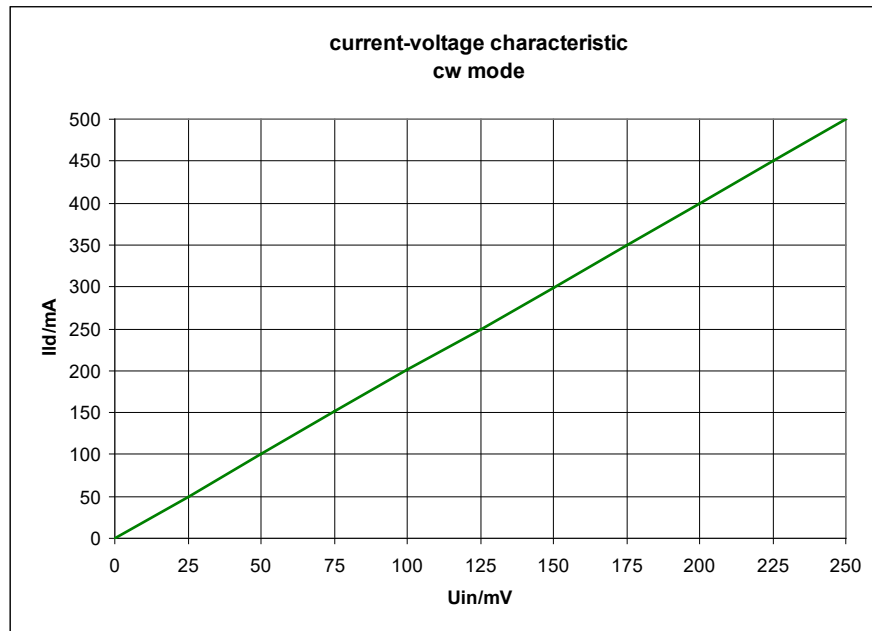
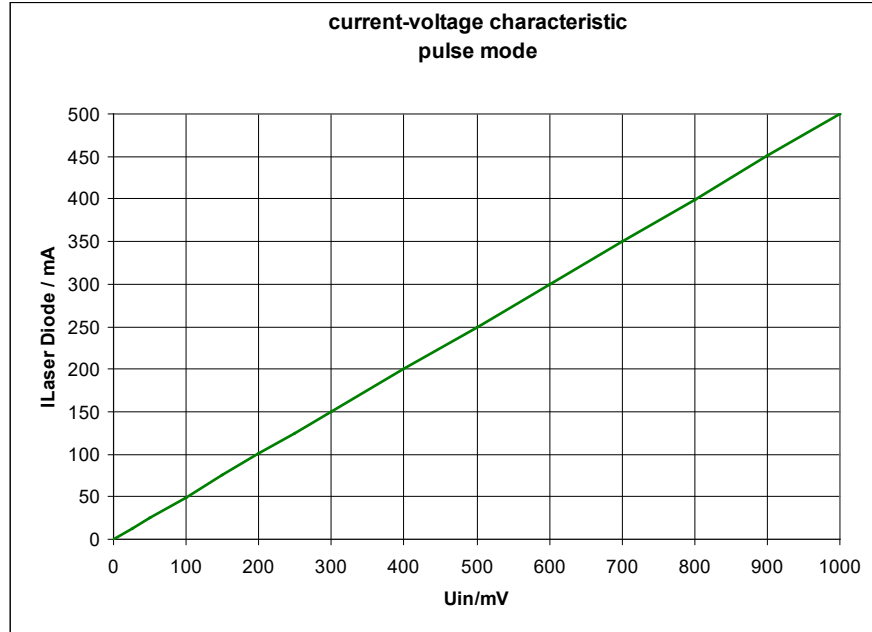
$R_{ext}=1k$ for 150 mA Bias current.

A Bias current smaller than 15 .. 20 mA should not be used.



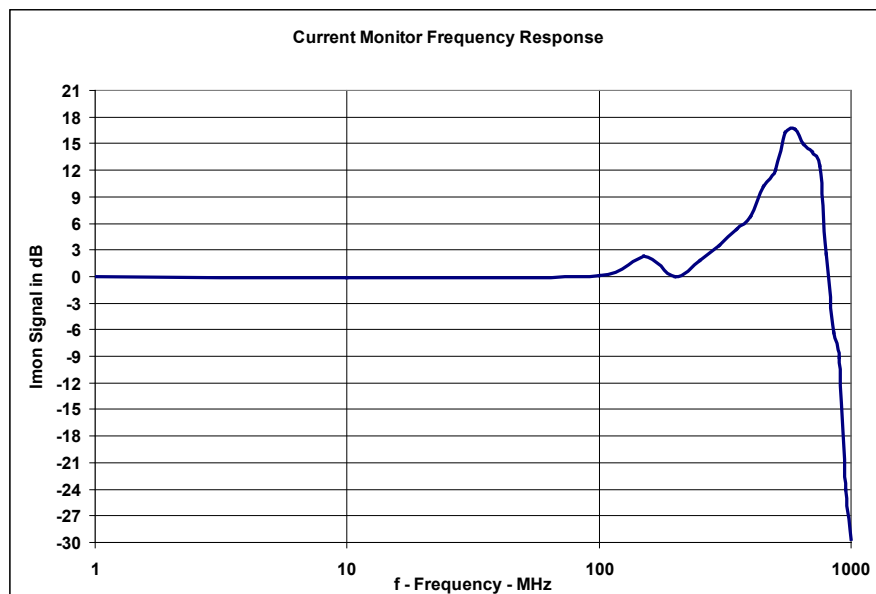
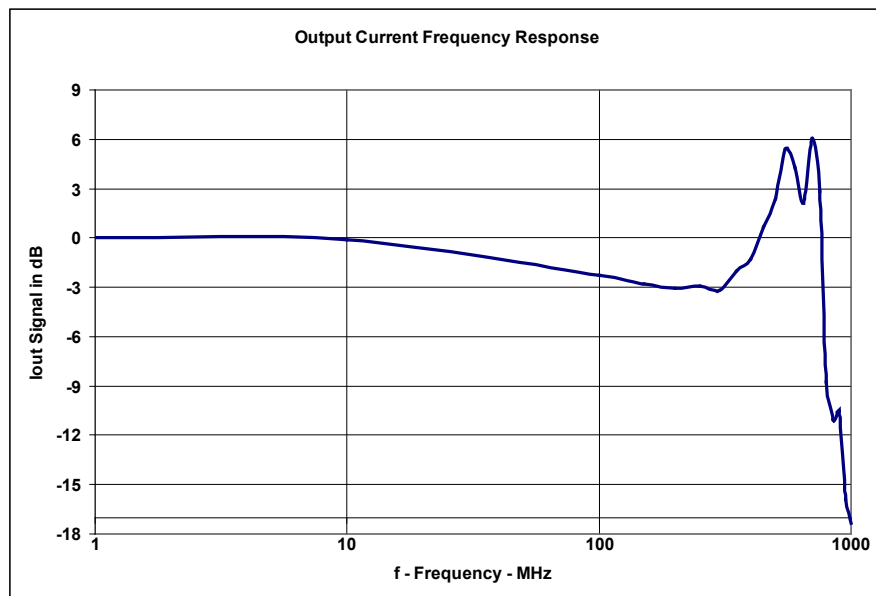
If the increase of Bias current is not necessary let pin 2 and 3 floating.

Linearity



Frequency Response

VCC = 15 V, output current = 125 mA, test load = short circuit.



Cooling

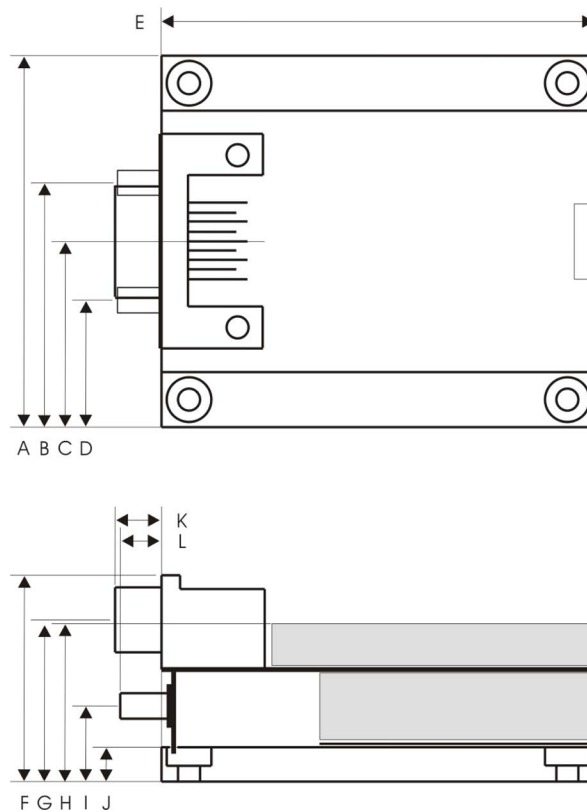
The seed driver is baseplate cooled only. Please assemble the entire unit to a heatsink which is capable to take out the heat. The heatsink is suitable, if the system temperature does not exceed the maximum operating limits. To achieve best performance the baseplate temperature should be kept in the range of +10 °C .. +35 °C. The peak heat load is 10 W.

Test Load

For the first testing a test load may be assembled instead of the laser diode. This test load may be a short circuit or a fast Schottky diode like MBR0540. Please connect the test load only between anode and cathode (LD+ and LD-) and prevent shorts to any other part of the circuit. The connections for LD+ are at the bottom and for LD- on the top side.

Mechanical Dimensions

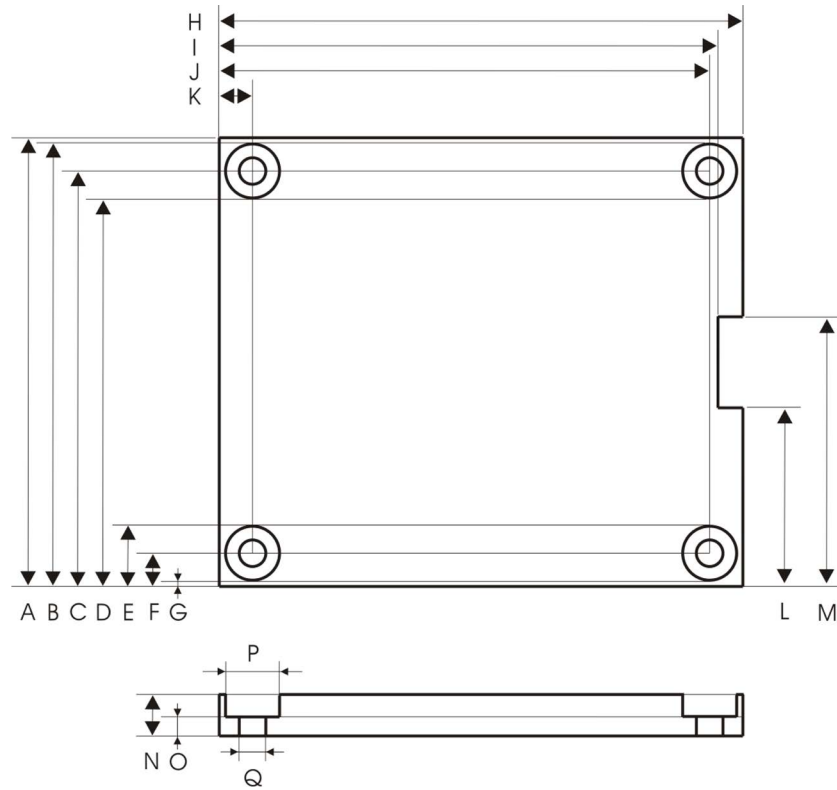
The following dimensions are in millimetres (mm).



| | |
|---|------|
| A | 54 |
| B | 35.5 |
| C | 27 |
| D | 18.5 |
| E | 63 |
| F | 30 |

| | |
|---|------|
| G | 23.5 |
| H | 23 |
| I | 11 |
| J | 5 |
| K | 6.7 |
| L | 6 |

The following dimensions are in millimetres (mm).



| | |
|---|-------|
| A | 54 |
| B | 53.25 |
| C | 50 |
| D | 46.75 |
| E | 7.25 |
| F | 4 |
| G | 0.75 |
| H | 63 |
| I | 60 |
| J | 59 |
| K | 4 |
| L | 21.5 |
| M | 32.5 |
| N | 5 |
| O | 2.3 |
| P | 6.5 |
| Q | 2.3 |