

Cool & Control Series

CC-S Single-Mode laser diode driver



Table of contents

1.	Front panel view of the device	3
2.	Rear panel view of the device	3
3.	Top view of the device	4
4.	Installation	5
5.	Getting started.....	6
6.	Setting the limits	8
7.	Operating modes	9
8.	Pulse parameters	10
9.	Offset/DC current	11
10.	Temperature	12
11.	Laser enable	12
12.	Menu bar	12
13.	Technical Specifications	13
14.	Supported laser diodes*	14

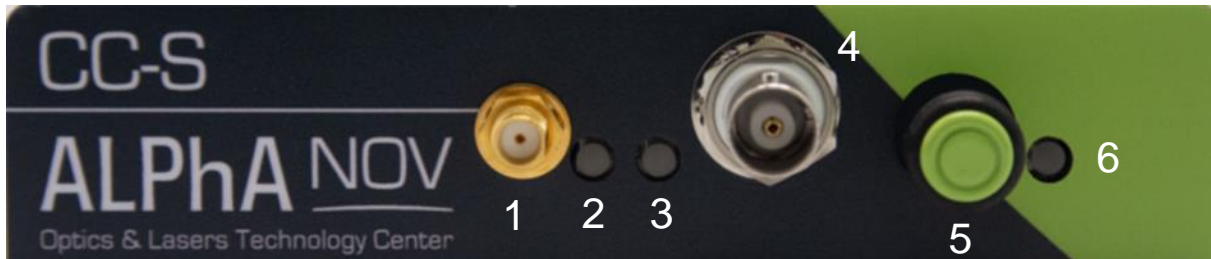
WARNING

Always wear protective goggles and observe the safety instructions provided by the laser diode supplier when using the CC-S driver with your laser diode.

Do not try to open or remove the cover of the CC-S module.

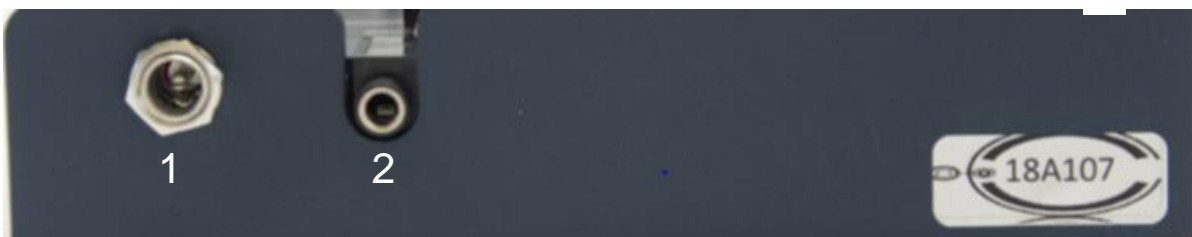
Use only the genuine power supply and check before connecting to mains power that the earth ground is connected. Improper grounding may lead to electric shock.

1. Front panel view of the device



- 1. TTL/LVTTL input pulse command/trigger**
SMA TTL/LVTTL input voltage connector. The signal must be between 0 and +3.3V max.
- 2. Power alarm indicator**
Red LED indicates that the maximum peak current level is reached. If the red light is on, reduce the current level using the software or with #6 / #7 control.
- 3. Temperature alarm indicator**
Red LED indicates that the laser diode temperature is not reached
- 4. Signal peak power adjustment (analog input)**
BNC input voltage connector (0 to +5V) for peak power adjustment.
- 5. Signal peak power adjustment (manual knob)**
Knob for peak power adjustment.
- 6. Power ON indicator**
Blue LED indicates that the device is powered.

2. Rear panel view of the device



- 1. DC power input (+12 V / +24 V)**
Input connector for DC power. Use only the provided DC power supply.
- 2. USB input**
3.5mm input jack used to connect the CC-S driver with the PC. Use the USB-specific cable which is supplied with your device.

3. Top view of the device

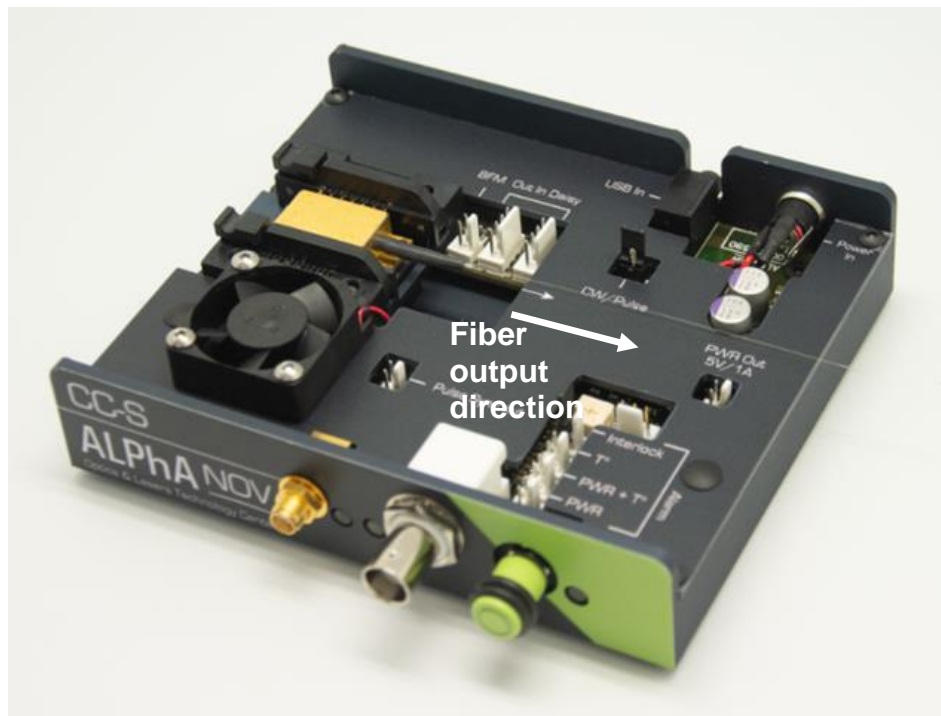


- 1. Pulse Sync out**
Synchronization output signal. This Molex output is a LVTTTL copy of the CC-S logical driving signal.
- 2. Pulse/CW selector**
2-configurations controls the operating mode. CW mode with jumper and Pulse mode without jumper. It can be switched at any time (no need to power off the module).
- 3. Out In Daisy**
Molex connectors used to chain multiple CC-S drivers or any other ALPhANOV product from the same family (CC-M, PDM, Central etc.). Daisy IN on the left and Out on the right.
- 4. Back facet monitor connector**
Molex connector for the laser diode back facet monitor output.
- 5. Interlock**
Input connector for interlock control. It must have the jumper in order to have a laser emission.
- 6. Alarm monitor**
Molex connector for alarm status (Temperature - Power and Temperature - Power) monitor. The signal is an inverse TTL, so a +5 V output voltage level corresponds to alarm OFF.

4. Installation

- Laser diode installation

The CC-S driver is dedicated to drive butterfly laser diodes (14 pins) with internal monitoring photodiode and thermoelectric cooler. The laser diode output fiber must go through the CC-S package.



- Software installation

The CC-S USB specific cable should be unplugged during the installation.

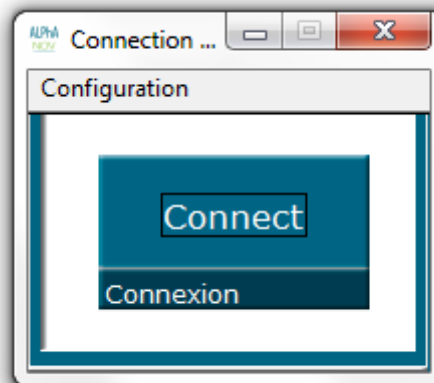
Double-click on setup.exe to run the installer. The control software will be installed, as well as the driver for the USB cable. A computer restart may be required to complete the installation.

5. Getting started

- When the software is installed, plug the USB cable into a USB port of your computer.
- Next, plug the 3,5 mm jack into the USB input female jack of the CC-S.
- Plug-in the CC-S power supply to turn on the CC-S laser diode driver

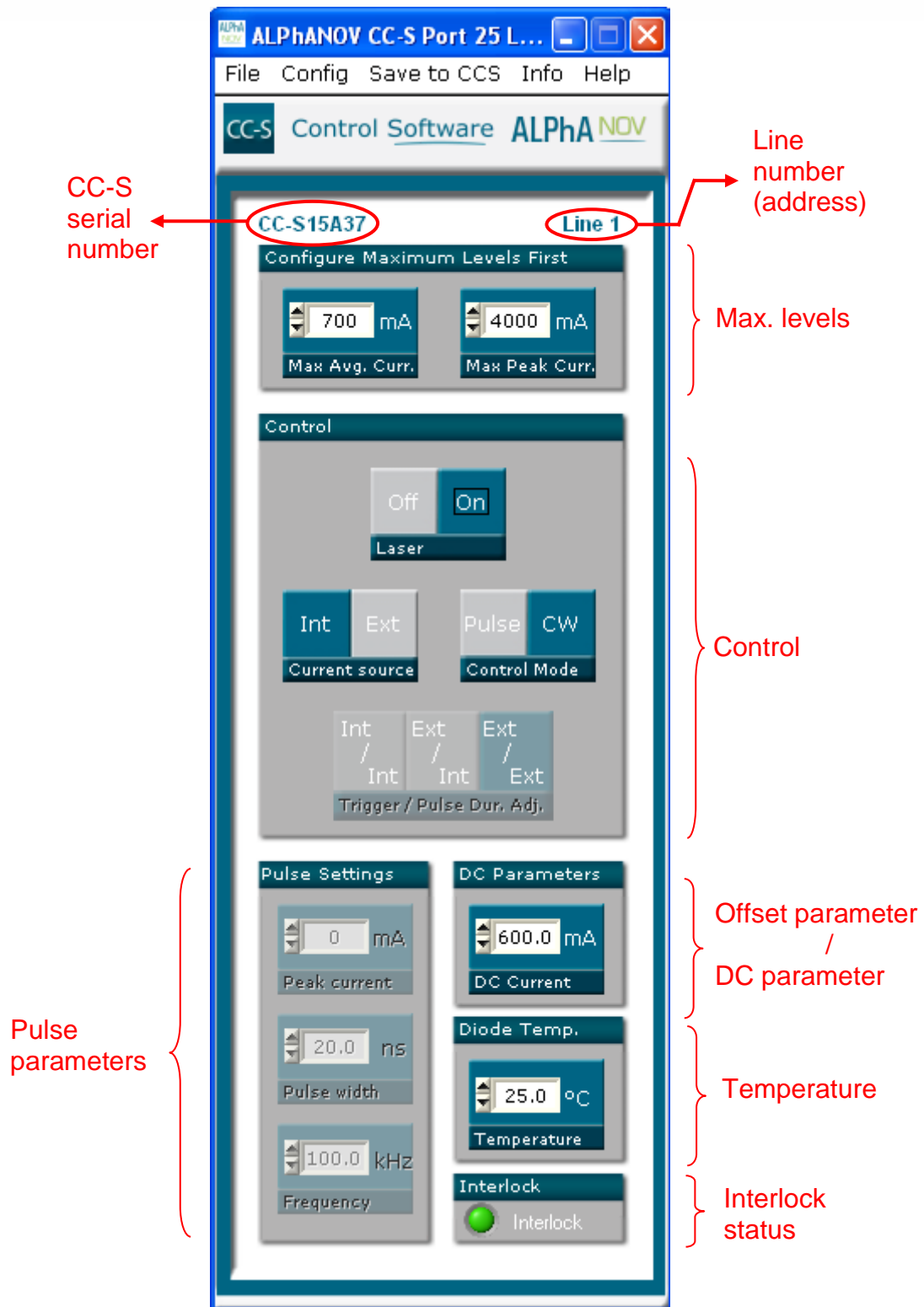
Click on the item “ALPhANOV Control Software” located in the Start Menu to run the CC-S control software.

A window will appear:



Click on Connect to start the CC-S hardware detection. The software will automatically detect any USB-connected CC-S.

A new window will appear for each CC-S driver.



The window is divided in six parts:

- The average and peak current maximum values are settable in the **Max levels** part. These parameters must be correctly chosen in accordance to the laser diode specifications and maximum ratings. If the Max Peak Current is lower than Max Average Current, the CW operation is not possible
- Triggers in the **Control** part are used to select the operating mode

- Numeric boxes in the **Pulse Parameters** part are used to configure the pulse width, amplitude and repetition rate
- The **Offset parameter** (pulsed mode only) or the **DC parameter** (CW only) are used to configure the DC current (offset in pulse mode)
- The **Temperature** numeric box is used to set the laser diode temperature
- The **Interlock** status is ON (green) when the interlock connector is plugged

The product serial number is written on the top left of the window. The line number (address) is on the top right.

6. Setting the limits

The CC-S laser diode driver includes a hardware overcurrent protection which requires to be set up before driving the laser diode. This protection is active for:

- The average current value
- The peak current value

Before plugging your laser diode into the CC-S socket, please configure these values to the maximum values recommended by the laser diode supplier. **By default, these values are set to zero so the driver will not supply current.** You have to change these values for enabling the driver output.

The average current protection sets the maximum value of the laser diode average current output. This protection is based on an hardware measurement of the average current passing through the laser diode.

The driver output current is temporary halted when the average current level reaches the maximum entered value. In this case, the alarm output level is low (protection is active). Then, as no current is passing through the diode, the average current is measured to be zero and the laser emission will be rearmed automatically.

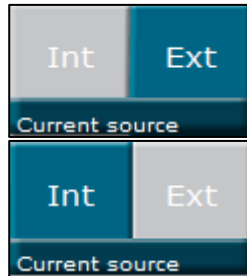
So, if a parameter (current, pulse-width or frequency) is not changed (smaller), the laser diode emission will be a succession of enable/disable.

The peak current protection limits the laser diode maximum peak current value.

7. Operating modes

7.1. Current source

This two positions switch controls the current source.

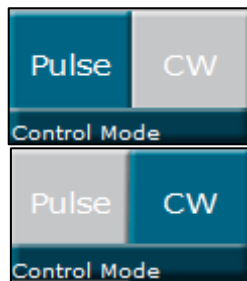


External source
(BNC or manual knob)

Internal source
(software)

7.2. Control mode

This two positions read the operating mode from jump position (see paragraph 3)

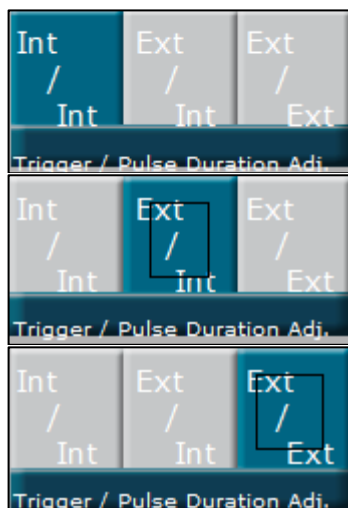


Pulsed operation

CW operation
(DC current only)

7.3. Trigger and pulse width selection

This three positions switch controls the trigger and the pulse width adjustment. It is only effective in pulsed operation.



Internal trigger
Internal pulse width adjustment
(all software)

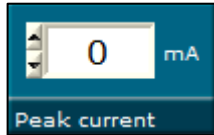
External trigger (SMA)
Internal pulse width adjustment

External trigger
External pulse width adjustment
(all from SMA)

- If Int/Int is selected, the frequency and pulse width are configured from the software.
- If Ext/Int is selected, the signal is externally triggered by a digital signal on the SMA input. The pulse width is configured from the software.
- If Ext/Ext is selected, the output optical signal is controlled by the digital input signal on the SMA connector.

8. Pulse parameters

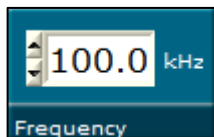
The pulse parameters can be modified only when the Pulsed operation is selected (see §4.2).



Peak current in mA
This item can only be modified when the internal current source is selected



Pulse width
Click on the unity (ps, ns or μ s) to change it.
This item can only be modified with an internal pulse width adjustment

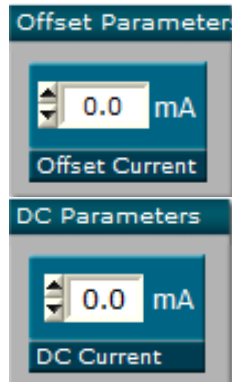


Frequency (repetition rate)
Click on the unity (Hz, kHz or MHz) to change it.
This item can only be modified when the internal trigger is active

The values which can be entered in these numerical boxes are limited. The limits mainly depend on various parameters such as the wavelength and the maximum allowed optical power.

9. Offset/DC current

This item is settable in pulsed and CW operation. It rules the continuous current flowing through the laser diode.



Offset current

This is the offset current which can be superimposed to the pulsed current in pulsed operation

DC current

In CW operation, this item sets the DC current amplitude

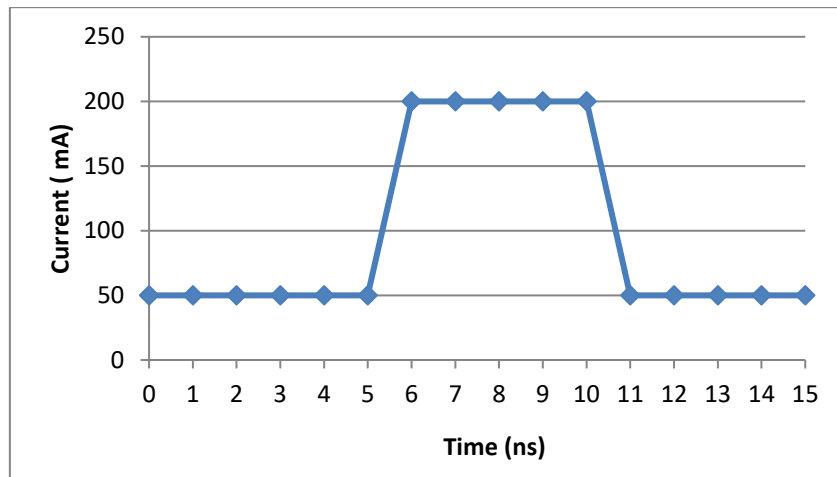
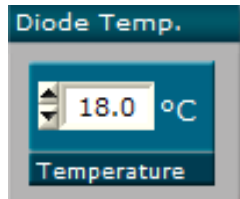


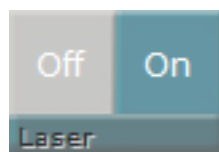
Figure 1 : Diagram of the current passing through the diode (software parameters : Offset current = 50mA, Peak current = 150mA, Pulse width = 5ns)

10. Temperature



This item configures the internal temperature of the laser diode (on the range 15°C/50°C)

11. Laser enable



Enables/Disables the laser emission

12. Menu bar

- File
 - o Load parameters
Click on this item to load a .txt file which contains the operating parameters.
 - o Save parameters
Click on this item to save the current parameters into a .txt file. This file can be loaded using the "Load parameters" menu item.
 - o Exit
Close the window. A confirmation is asked before shutting down the software: the laser state can be either active or inactive after the software is stopped.
- Config
Restricted access to internal configuration parameters. Please use only this when asked by ALPhANOV.
- Save to CCS
Click on this menu item to save the current operating parameters into the CC-S internal memory. These parameters will be saved as default parameters in the flash memory and will be retrieved by the driver at the next power on (even if the CC-S driver is not connected to the PC).
Please note that if the laser state is active and parameters saved into memory, the lasing will be effective after a shutdown.
- Info
Displays information about the current version and the internal parameters.
- Help
Load this help file.



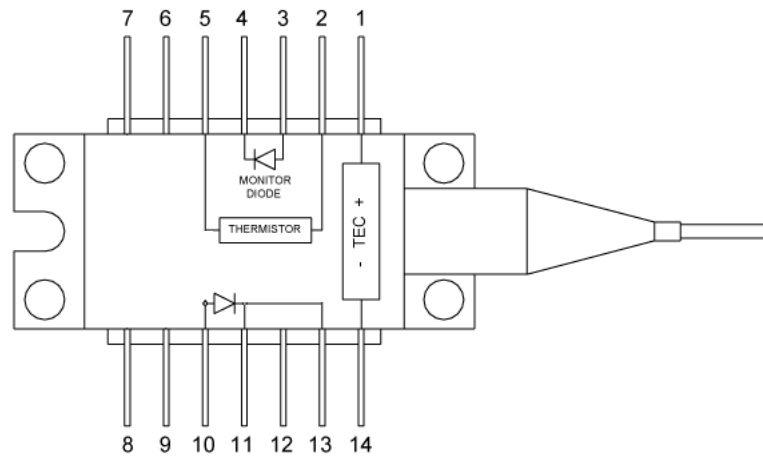
13. Technical Specifications

CCS	Min	Max	Resolution	Impedance	Bandwidth
Power supply	10 V	24 V			
Output current for CW mode	0 A	500mA/ 800 mA depends on product version	12 bits		
Output current for pulse mode	1500mA or 3500mA depends on product version		12 bits		
Offset (DC) current	0 A	150 mA	36 μ A		
Pulse width (for internal generation)	0,2 ns	510 ns (1275ns on special request)	For 0 to 10ns : 10ps For > 10ns : 2 ns		
Frequency	1 Hz	4 MHz / 250 MHz (depends on product version)	1 Hz		
Typical delays between trigger EXT and optical pulse	<p style="text-align: center;"><u>For Ext/Int Mode :</u></p> <ul style="list-style-type: none"> • 0 to 10ns pulse duration : 70ns typ. • > 10ns pulse duration : 85ns typ. <p style="text-align: center;"><u>For Ext/Ext Mode :</u></p> <p style="text-align: center;"><30ns typ.</p>				
Laser Diode Temperature	15°C	50°C	0,1°C		
Trigger In level	LVTTL (2,2 V)	LVTTL (3,3 V)		50 Ohm	250 MHz
Sync Out	LVTTL			50 Ohm	250 MHz
BNC peak power adjustment	0 V	5 V		47 KOhm	15 Hz
Alarms	0 V (active)	5 V (Not active)		1 KOhm	

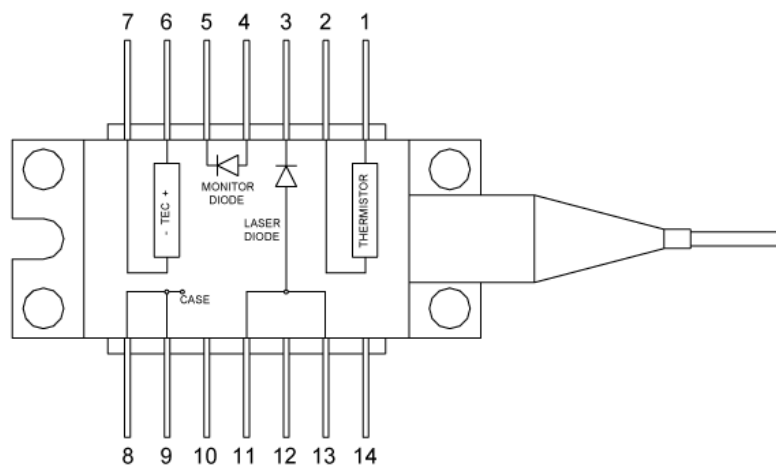
14. Supported laser diodes*

*The choice of type depends on chosen ordered product

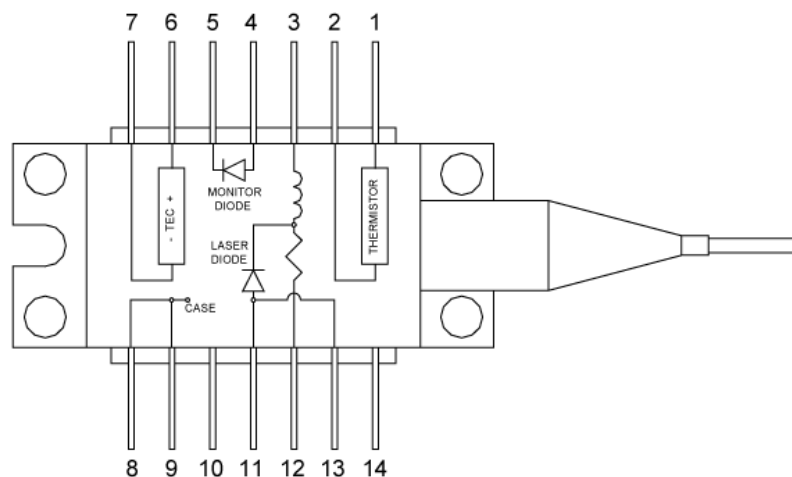
Type 1



Type 2



Type 2 with Bias-T



In case of anode grounded diode, the laser diode must be electrically isolated from the mechanical part