Data Sheet
Miniature Laser Driver MLD203CLN

Features

- Low cost, highly integrated, high-precision laser diode driver with small footprint
- Simple driver for TO can lasers and others
- Small SMT footprint, enabling machine assembly
- Soft start and brownout protection for protection of the laser from current transients
- Up to 200 mA LD current at a maximum 3 V LD voltage
- Laser current setting configurable as fixed setpoint or adjustable with potentiometer
- Low Noise Operation

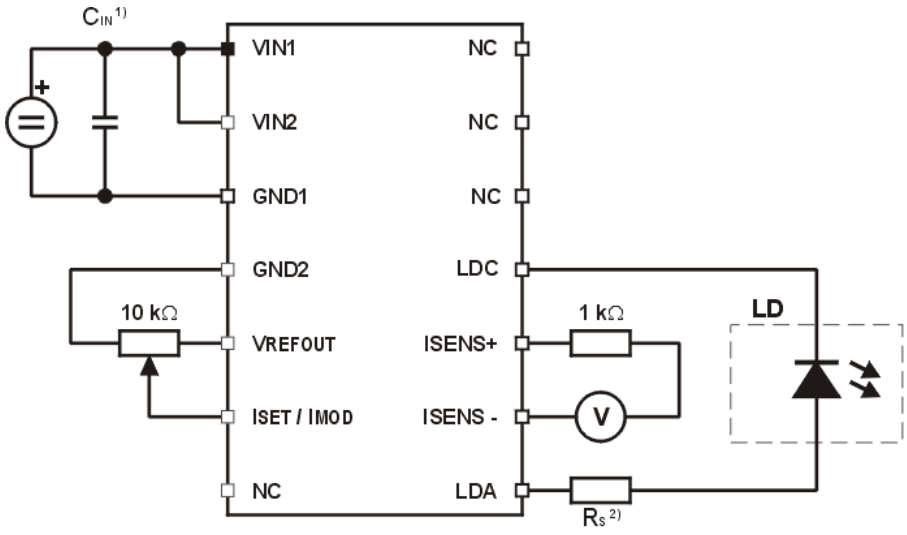
Applications

- Driving low-power laser diodes at
  - Fixed setpoint without external circuitry
  - Adjustable setpoint with external potentiometer or setpoint voltage
- Suitable for laser applications where small size is required, e.g.:
  - Laser pointers
  - Pilot lasers in adjustment applications etc.

Short Description and Typical Application Diagram

The MLD203CLN Miniature Laser Driver allows Constant Current operation. The operating setpoint of the laser diode can be defined by one external resistor (fixed setpoint). For an adjustable setpoint, an external potentiometer or an external control voltage from 0 to 2.5 V is required.
A soft start and a brownout protection prevents the laser from unwanted current transients.
The MLD203CLN supports laser diodes of any pin code.

It features a low current noise below 3 µA.



MLD203CLN Typical External Circuit

Revision History

Revision	Changes with respect to previous revision
1.0	Initial Release

Contents

1 Pin Configuration and Functions

MLD203CLN Pin Configuration

Pin	Name	Description
1	VIN1	Supply Voltage Input 1
2	VIN2	Supply Voltage Input 2
3	GND1	Supply Voltage Ground
4	GND2	Return Pin (Ground) for Pin 6 (ISET / IMOD)
5	VREFOUT	Reference Voltage (+2.5 V) Output
6	ISET	Input Voltage for Set Current
	IMOD	Input Modulation Voltage
7	NC	No Connection
8	NC	No Connection
9	NC	No Connection
10	NC	No Connection
11	LDC	Laser Diode Cathode
12	ISENS+	Laser Diode Current Sensor Output (Voltage)
13	ISENS-	
14	LDA	Laser Diode Anode

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2 Technical Data

2.1 Absolute Maximum Ratings

Supply Voltage	6 V
Power Dissipation	750 mW
Operating Temperature	-25 °C to + 90 °C
Storage Temperature	-40 °C to +100 °C

Note

Stresses beyond those listed above may cause permanent damage to the product. These are stress ratings only; functional operation of the MLD203CLN at these or any other conditions beyond those indicated under *Recommended Operating Conditions* and *Electrical Characteristics* is not implied.

Operation beyond the maximum rated conditions for extended periods may affect product reliability.

2.2 Recommended Operating Conditions

Supply Voltage	4.5 to 5.5 V
Operating Temperature	-20 to + 70 °C

2.3 Electrical Characteristics

Features	
Supported Laser Pin Codes	All
Operating Mode	Constant Current (CC)
Current Control	
Control Range of Laser Current	0 to 200 mA
Compliance Voltage (5 V Supply Voltage)	3.0 V
Accuracy (full scale)	± (2% + 1 mA) typ.
Repeatability (full scale)	± 0.1%
Noise (10 Hz to 10 MHz, rms)	3 µA [1])
Drift (30 min, 0 to 10 Hz, T_{amb} = 25 °C)	20 µA
Temperature Coefficient	100 ppm/°C
Analog Modulation / Current Setpoint Input	
Input Resistance	1 MΩ
Input Voltage Range	0 to 2.5 V
Input Voltage Offset	90 mV typ.
3 dB Bandwidth	DC to 1 kHz [1])
Modulation Coefficient	80 mA/V ± 5%
Measurement Output	
Laser Current (1 Ω Measurement Series Resistor)	1 mV/mA
Measurement Accuracy (with Load ≥ 10 kΩ)	1%
General Data	
Storage Temperature	-40°C to +100 °C [2])
Warm-Up Time for Rated Accuracy	10 min
Dimensions (W x H x D)	10 x 2.8 x 17 mm³
Approx. Weight	1 g

[1]) Measured with a 10 Ω load resistor
[2]) non-condensing

All technical data are valid at 23 ±5 °C and 45 ±15% rel. humidity (non condensing)

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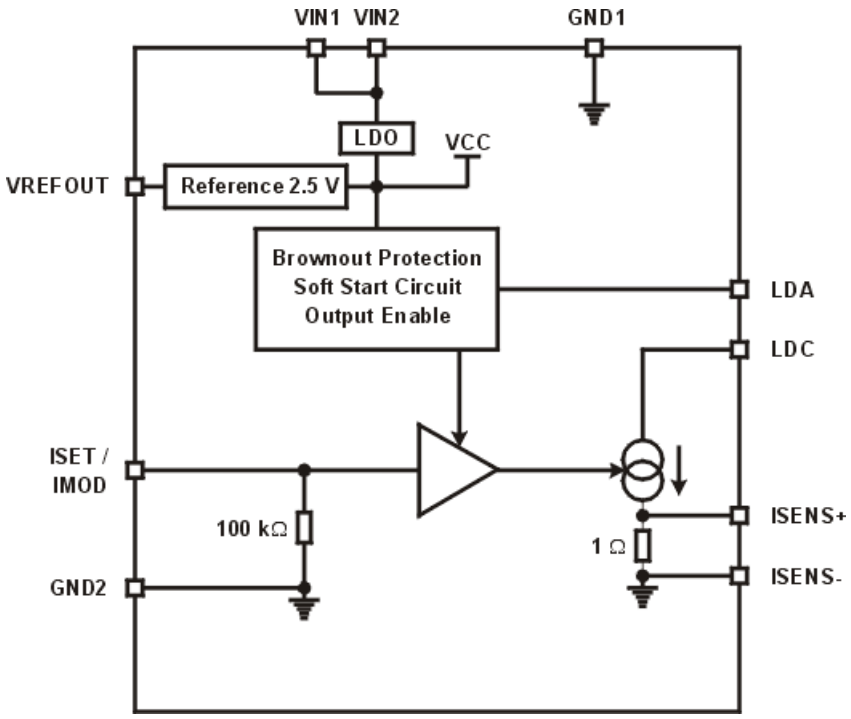
3 Functional Block Diagram



Functional Block Diagram MLD203CLN

Functional Description

The MLD203CLN is a laser diode driver module that operates in CC (Constant Current) mode. In CC mode the laser current is maintained constant.

The MLD203CLN delivers up to 200 mA at 3 V compliance voltage. It operates with laser diodes of any pin codes.

Power Supply

The supply voltage **VIN** ranges from 4.75 V to 5,25 V. From VIN, a stable internal supply voltage for the laser current source and the control circuits is derived by the internal LDO (low-dropout regulator). Further, a reference voltage is generated (**VREFOUT**; 2.5 V).

Laser Diode Control

The laser diode is connected between **LDA** (anode) and **LDC** (cathode). Internal protection circuits provide a safe switch-on of the laser diode during transition conditions after applying the supply voltage. The Brownout Protection blocks the enabling of the laser diode current output until the supply voltage transient is completed and reached a minimum of 4.75 V. The Soft Start enables then the output current with a defined ramp that efficiently avoids laser current transients that might destroy the laser diode.

The voltage between the **ISENS+** and **ISENS+** pins is proportional to the laser diode current and can be calculated by

$$I_{LD}\ [mA] = \frac{U_{SENS}\ [mV]}{1\ \Omega}$$

Laser Current Control

The MLD203CLN operates in Constant Current Mode. A constant current source provides a stable injection current.

Setting the Laser Injection Current

ISET / IMOD is the control voltage input to control the laser current - it can be used to design a fixed setpoint an/or to modulate the laser current.

The input voltage U_{ISET} ranges from 0 to +2.5 V. The control voltage can be applied from an external source or from the **VREFOUT** reference voltage output (2.5 V) via a potentiometer or fixed voltage divider.

The relation between laser diode current I_{LD} and setpoint control voltage U_{ISET} is expressed by the formulas

$$I_{LD}\ [mA] = \frac{U_{ISET}\ [V]}{12.5\ k\Omega}$$

$$U_{ISET}\ [V] = I_{LD}\ [mA]\ x\ 12.5\ k\Omega$$

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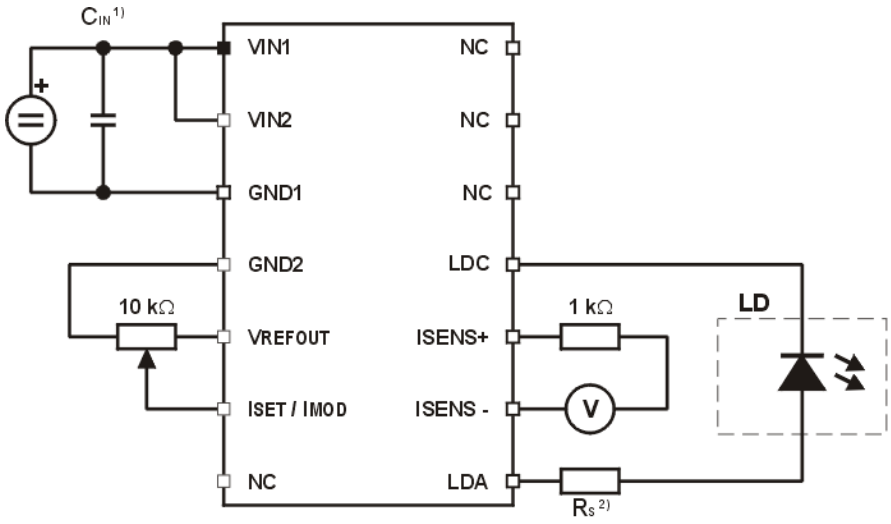
4 Typical Application



Typical Application MLD203CLN

Remarks:

1) C_{IN}: Optional ceramic capacitor for reduction of power supply ripple

2) R_S: Optional resistor for laser current limitation

5 Troubleshooting

The MLD203CLN has an imprinted Data Matrix code, that contains manufacturing information:

Please scan this code with your smartphone, and submit the DataMatrix code information to Thorlabs.

Compatible Android apps are:

QR & Barcode Scanner **QRbot** by TeaCapps. This scanner allows to share the scanned code directly by email.
(https://play.google.com/store/apps/details?id=net.qrbot&hl=de)

QR Droid Code Scanner QRDroid by DroidLa.
(https://play.google.com/store/apps/details?id=net.qrbot&hl=de)

Compatible iOS apps:

QR & Mobile Barcode Scanner **NeoReader®** by NeoMedia Technologies.
(https://itunes.apple.com/de/app/neoreader-qr-mobile-barcode/id284973754?mt=8)

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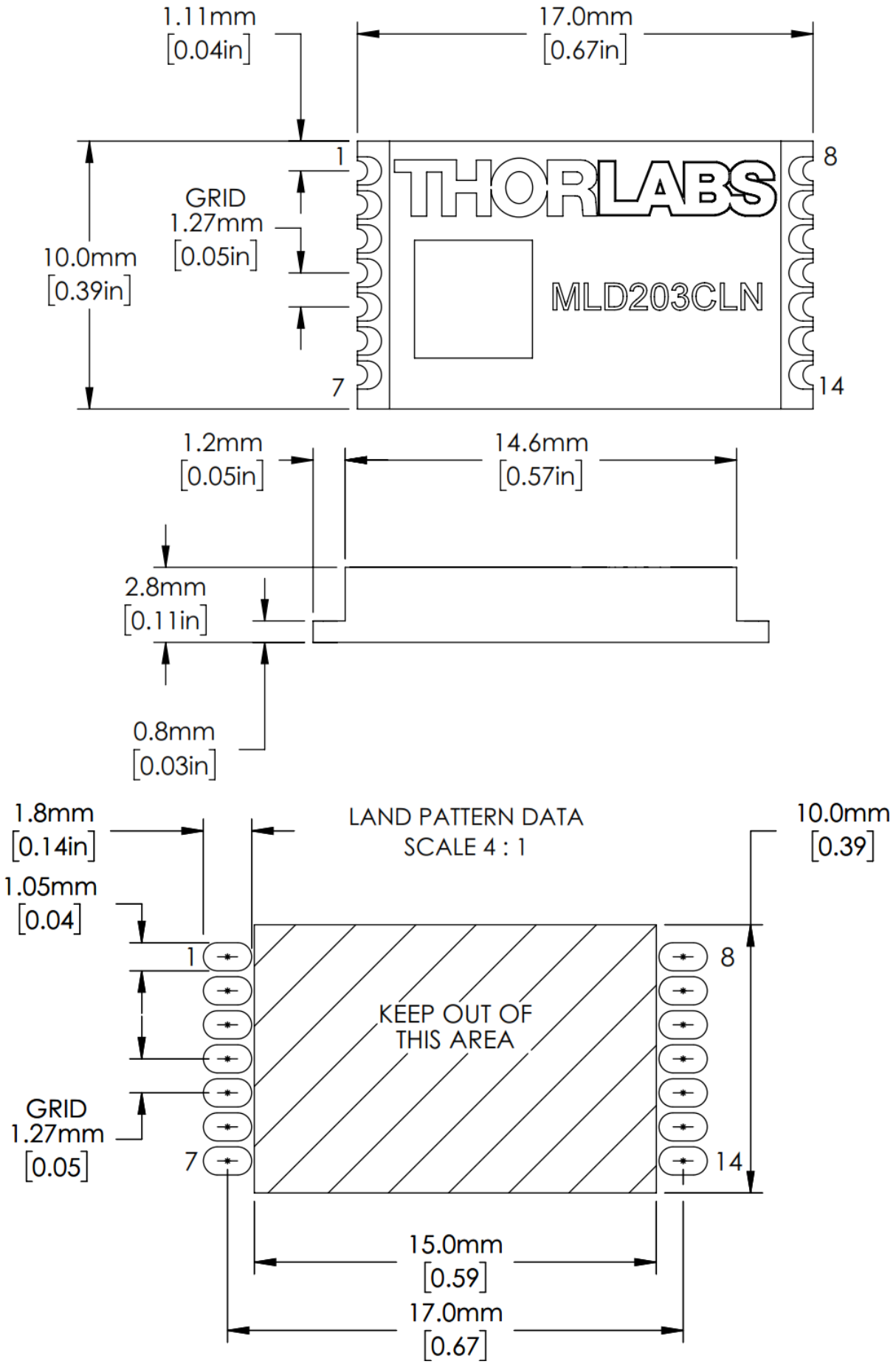
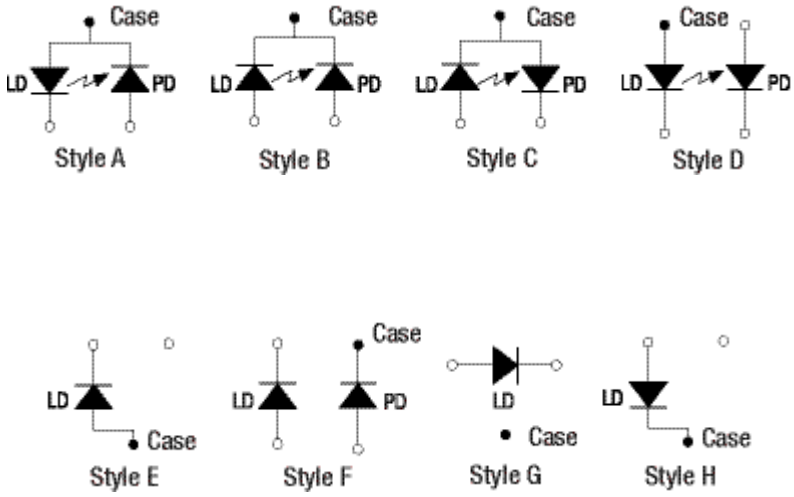
6 Drawing


1.11mm
[0.04in]
17.0mm
[0.67in]
1
8
GRID
1.27mm
[0.05in]
10.0mm
[0.39in]
THORLABS
MLD203CLN
7
14
1.2mm
[0.05in]
14.6mm
[0.57in]
2.8mm
[0.11in]
0.8mm
[0.03in]
1.8mm
[0.14in]
LAND PATTERN DATA
SCALE 4 : 1
10.0mm
[0.39]
1.05mm
[0.04]
1
8
KEEP OUT OF
THIS AREA
GRID
1.27mm
[0.05]
7
14
15.0mm
[0.59]
17.0mm
[0.67]

7 Laser Diode Pin Codes

This document refers to the laser diode pin codes **A** to **F** as per the figures below:



Laser Diode Pin Diagrams - Bottom View
(Bold dots indicate case connection)

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8 List of Acronyms

The following acronyms and abbreviations are used in this manual:

AC	Alternating Current
DC	Direct Current
ESD	Electrostatic discharges
GND	Ground
GUI	Graphic User Interface
I²C	Inter-Integrated Circuit
LD	Laser Diode
µC	Micro-Controller
NR	Noise Reduction (filter)
LDO	Low-Dropout Regulator
OA	Operational Amplifier
PCB	Printed Circuit Board
PD	Photo Diode
SCPI	Standard Commands for Programmable Instruments
SMT	Surface Mounted Technology
TEC	Thermoelectric cooler
TIA	Transimpedance Amplifier
USB	Universal Serial Bus
USB TMC	USB Test and Measurement Class (device)
VVA	Voltage-to-Voltage Amplifier

9 Warranty

Thorlabs GmbH warrants material and production of the MLD203CLN for a period of 24 months starting with the date of shipment. During this warranty period Thorlabs GmbH will see to defaults by repair or by exchange if these are entitled to warranty.

For warranty repairs or service the unit must be sent back to Thorlabs GmbH. The customer will carry the shipping costs to Thorlabs GmbH, in case of warranty repairs Thorlabs GmbH will carry the shipping costs back to the customer.

If no warranty repair is applicable the customer also has to carry the costs for back shipment.

In case of shipment from outside EU duties, taxes etc. which should arise have to be carried by the customer.

Thorlabs GmbH warrants the hard- and/or software determined by Thorlabs GmbH for this unit to operate fault-free provided that they are handled according to our requirements. However, Thorlabs GmbH does not warrant a fault free and uninterrupted operation of the unit, of the software or firmware for special applications nor this instruction manual to be error free. Thorlabs GmbH is not liable for consequential damages.

Restriction of warranty

The warranty mentioned before does not cover errors and defects being the result of improper treatment, software or interface not supplied by us, modification, misuse or operation outside the defined ambient stated by us or unauthorized maintenance.

Further claims will not be consented to and will not be acknowledged. Thorlabs GmbH does explicitly not warrant the usability or the economical use for certain cases of application.

Thorlabs GmbH reserves the right to change this instruction manual or the technical data of the described unit at any time.

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10 Copyright and Exclusion of Reliability

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11 Thorlabs 'End of Life' Policy

As required by the WEEE (Waste Electrical and Electronic Equipment Directive) of the European Community and the corresponding national laws, Thorlabs GmbH offers all end users in the EC the possibility to return “end of life” units without incurring disposal charges.

This offer is valid for Thorlabs GmbH electrical and electronic equipment

- sold after August 13th 2005
- marked correspondingly with the crossed out “wheelie bin” logo (see figure below)
- sold to a company or institute within the EC
- currently owned by a company or institute within the EC
- still complete, not disassembled and not contaminated

As the WEEE directive applies to self contained operational electrical and electronic products, this “end of life” take back service does not refer to other Thorlabs GmbH products, such as

- pure OEM products, that means assemblies to be built into a unit by the user (e. g. OEM laser driver cards)
- components
- mechanics and optics
- left over parts of units disassembled by the user (PCB’s, housings etc.).

Waste treatment on your own responsibility

If you do not return an “end of life” unit to Thorlabs GmbH, you must hand it to a company specialized in waste recovery. Do not dispose of the unit in a litter bin or at a public waste disposal site.

WEEE Number (Germany) : DE97581288

Ecological background

It is well known that waste treatment pollutes the environment by releasing toxic products during decomposition. The aim of the European RoHS Directive is to reduce the content of toxic substances in electronic products in the future.

The intent of the WEEE Directive is to enforce the recycling of WEEE. A controlled recycling of end-of-life products will thereby avoid negative impacts on the environment.

Crossed out
"Wheelie Bin" symbol

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