



LED Assemblies

MxxxL2 Series Operation Manual



2012

2 MxxxL2 Series

Version: 7.2

Date: 30. Mar. 2012

Revision History

Revision	Date	Summary
1	01.04.09	Initial Issue
2	07.07.09	MxLED Series added
3	25.09.09	Series Harmonization
4	31.03.10	Update to L2 Series
5	18.06.10	Update
6	25.10.10	Update
7	18.01.12	M505L2 added
7.1	03.02.12	M420L2, M490L2, M565L2 and M1050L2 added
7.2.	30.03.12	M420L2 spec change

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We aim to develop and produce the best solution for your application in the field of optical measurement technique. To help us to come up to your expectations and develop our products permanently we need your ideas and suggestions. Therefore, please let us know about possible criticism or ideas. We and our international partners are looking forward to hearing from you.

Thorlabs

WARNING

Sections marked with this heading explain dangers that might result in personal injury or death. Always read the associated information carefully before performing the indicated procedure.

ATTENTION

Paragraphs preceded by this symbol in the manual explain hazards that could damage the instrument and connected equipment or may cause loss of data.

NOTE

This manual also contains "NOTES" and "HINTS" written in this form.

1 General Information

1.1 Safety

Attention

All statements regarding safety of operation and technical data in this instruction manual will only apply when the unit is operated correctly as it was designed for.

The mounted LED of the MxxxLx series must not be operated in explosion endangered environments!

The mounted LED of the MxxxLx series must only be connected with duly shielded connection cables.

Only with written consent from *Thorlabs* may changes to single components be carried out or components not supplied by *Thorlabs* be used.

This precision device is only transportable if duly packed into the complete original packaging. If necessary, ask for a replacement package.

Do not remove covers!

Refer servicing to qualified personal!

WARNING

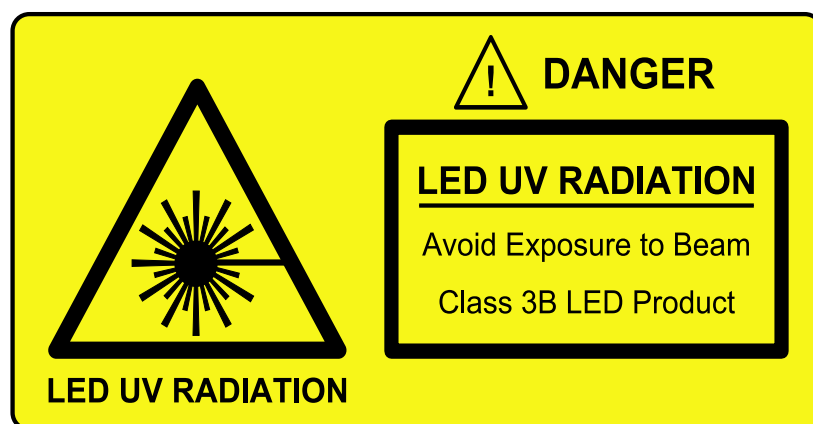
Inappropriate use of any Thorlabs High Power LED product could result in permanent eye damage.

To prevent injury, these products must be used in accordance with the International Standard "Photobiological Safety of Lamps & Lamp Systems" CEI IEC 62471.

When Thorlabs high power LED's are used in microscope applications as a replacement for mercury Vapor lamps, the same precautions should be taken as those applying to mercury Vapor lamps.

When Thorlabs High Power LED's are used in other applications, they should be used in accordance with CEI IEC 62471.

WARNING



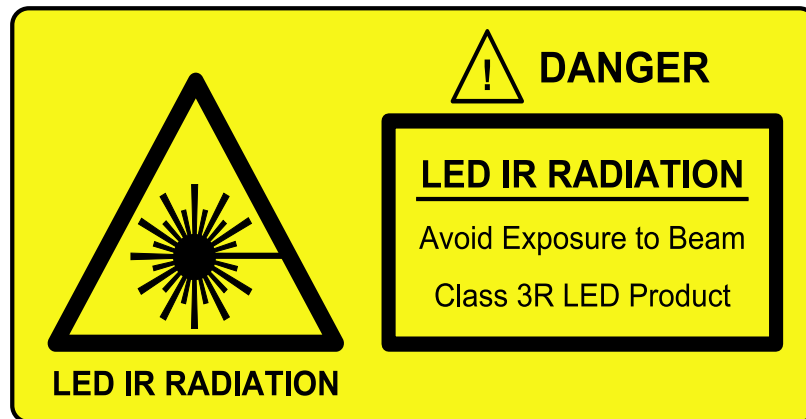
The M365L2, the M385L2 and the M405L2 contain an UV light LED! The LED radiates intense UV light during operation. Precautions must be taken to prevent looking directly at the UV light with unprotected eyes.

Do not look directly into the UV light or look through the optical system during operation of the device. This can be harmful to the eyes even for brief periods due to the high intensity of UV light.

If there is a possibility of reflection of the UV light, UV light protective glasses must be used to prevent the UV light entering the eye.

If viewing the UV light is necessary, UV light protective glasses must be worn to avoid eye damage by the UV light.

WARNING



The M780L2, M850L2 and M940L2 contains an IR light LED! The LED radiates intense IR light during operation. Precautions must be taken to prevent looking directly at the IR light with unprotected eyes.

Do not look directly into the IR light or look through the optical system during operation of the device. This can be harmful to the eyes even for brief periods due to the high intensity of IR light.

If there is a possibility of reflection of the IR light, IR light protective glasses must be used to prevent the IR light entering the eye.

CAUTIONS

During normal operations, the casing temperature of Thorlabs High Power LED products will rise by up to 25°C (45°F) above ambient temperature.

To prevent higher case temperatures, the products should be operated without hindrance to air movement surrounding the convective cooling fins.

2 Getting started

2.1 Unpacking

Inspect the shipping container for damage.

If the shipping container seems to be damaged, keep it until you have inspected the contents and you have inspected the MxxxLx mechanically and electrically.

Verify that you have received the following items:

- MxxxLx Mounted LED assembly
- Operation Manual

2.2 Preparation

Prior to connect the LED to a LED driver, check if the LED can handle the maximum LED current or the LED current limit is configured correctly. The MxxxLx features an EEPROM, which contains the maximum LED current, wavelength and forward voltage of the LED.

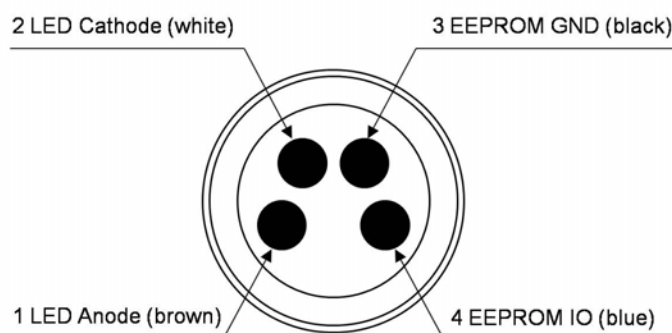
1. Connect the MxxxL2 to the LED driver.
2. Check the current limit.
3. Switch on the LED driver

2.3 Physical Overview



Mounted LED Assembly

The following picture shows the male connector of the MxxxLx mounted LED assembly. It is a standard M8x1 sensor circular connector. Pin 1 and 2 are the connection to the LED. Pin 3 and 4 are used for the internal EEPROM in the MxxxLx series. Do not use these connections when using a different LED driver than the Thorlabs series of LED drivers.



Male Connector of the MxxxLx

The LEDC series consists of the MxxxLx mounted LED and a collimation assembly compatible for one of the following microscopes:

- Olympus BX and IX microscopes
- Leica DMI microscopes
- Nikon Eclipse (F-Mount) Microscopes
- Zeiss Axioskop Microscopes

	Olympus	Leica	Nikon	Zeiss
365nm	M365L2-C1	M365L2-C2	M365L2-C3	M365L2-C4
385nm	M385L2-C1	M385L2-C2	M385L2-C3	M385L2-C4
405nm	M405L2-C1	M405L2-C2	M405L2-C3	M405L2-C4
420nm	M420L2-C1	M420L2-C2	M420L2-C3	M420L2-C4
455nm	M455L2-C1	M455L2-C2	M455L2-C3	M455L2-C4
470nm	M470L2-C1	M470L2-C2	M470L2-C3	M470L2-C4
490nm	M490L2-C1	M490L2-C2	M490L2-C3	M490L2-C4
505nm	M505L2-C1	M505L2-C2	M505L2-C3	M505L2-C4
530nm	M530L2-C1	M530L2-C2	M530L2-C3	M530L2-C4
565nm	M565L2-C1	M565L2-C2	M565L2-C3	M565L2-C4
590nm	M590L2-C1	M590L2-C2	M590L2-C3	M590L2-C4
617nm	M617L2-C1	M617L2-C2	M617L2-C3	M617L2-C4
625nm	M625L2-C1	M625L2-C2	M625L2-C3	M625L2-C4
660nm	M660L2-C1	M660L2-C2	M660L2-C3	M660L2-C4
735nm	M735L2-C1	M735L2-C2	M735L2-C3	M735L2-C4
780nm	M780L2-C1	M780L2-C2	M780L2-C3	M780L2-C4
850nm	M850L2-C1	M850L2-C2	M850L2-C3	M850L2-C4
940nm	M940L2-C1	M940L2-C2	M940L2-C3	M940L2-C4
1050nm	M1050L2-C1	M1050L2-C2	M1050L2-C3	M1050L2-C4
Cold White	MCWHL2-C1	MCWHL2-C2	MCWHL2-C3	MCWHL2-C4

3 Operating the MxxxL2 LED assemblies

3.1 Thorlabs LED Drivers

Thorlabs offers a wide range of LED drivers. The following table gives an overview about the different LED drivers.

Model	Max. current	Max. fwd. voltage	channels	Current Limit Capability	Notes
LEDD1B	1200 mA	11 V	1	Yes	T-Cube LED Driver
DC2100	2000 mA	24 V	1	Yes	High Power LED Driver
DC4100	1000 mA	5 V	4	Yes	4 Channel LED Driver

3.2 Operation

If one of the a.m. Thorlabs LED current drivers is used, please follow the instructions in the driver's User Manual.

If using a 3rd party current source, make sure

- about correct connection (see page 8) - use only pin 1 and 2!
- that the current source delivers at nominal LED current a sufficient forward voltage
- that the max. LED current (see Technical Data on p. 6) is not exceeded

4 Maintenance and Repair

Protect the MxxxL2 Series from adverse weather conditions, they are not water resistant.

MxxxL2 Series does not contain any serviceable by the user parts. Do not open the enclosure.

If your fiber MxxxL2 needs repair, please contact Thorlabs for return instructions, see section [Thorlabs Worldwide Contacts](#)

5 Technical Data

5.1 M365L2

Wavelength (nominal)	365 nm
Optical Beam Power (LED Output)	190 – 310 mW
Optical Beam power (Collimated Beam)	120 mW
Maximum LED Current	700 mA
LED Forward Voltage (nominal)	4.4 V
Lifetime	>10,000 hours

5.2 M385L2

Wavelength (nominal)	385 nm
Optical Beam Power (LED Output)	270 - 390 mW
Optical Beam power (Collimated Beam)	170 mW
Maximum LED Current	700 mA
LED Forward Voltage (nominal)	4.3 V
Lifetime	>10,000 hours

5.3 M405L2

Wavelength (nominal)	405 nm
Optical Beam Power (LED Output)	410 - 1000 mW
Optical Beam power (Collimated Beam)	440 mW
Maximum LED Current	1000 mA
LED Forward Voltage (nominal)	3.8 V
Lifetime ¹⁾	100,000 hours

¹⁾ 90% Radiant Flux Maintenance on constant current of 700 mA and with junction temperature at or below 115°C.

5.4 M420L2

Wavelength (nominal)	420 nm
Optical Beam Power (LED Output)	min. 250 mW, typ. 290 mW
Maximum LED Current	500 mA
LED Forward Voltage (nominal)	3.6 V
Lifetime ¹⁾	>10,000 hours

5.5 M455L2

Wavelength (nominal)	455 nm
Optical Beam Power (LED Output)	900 - 1800 mW
Optical Beam power (Collimated Beam)	410 mW
Maximum LED Current	1600 mA
LED Forward Voltage (nominal)	3.5 V
Lifetime	>50,000 hours

5.6 M470L2

Wavelength (nominal)	470 nm
Optical Beam Power (LED Output)	830 - 1560 mW
Optical Beam power (Collimated Beam)	400 mW
Maximum LED Current	1600 mA
LED Forward Voltage (nominal)	3.5 V
Lifetime	>50,000 hours

5.7 M490L2

Wavelength (nominal)	490 nm
Optical Beam Power (LED Output)	min. 200 mW; typ. 235 mW
Maximum LED Current	350 mA
LED Forward Voltage (nominal)	3.5 V
Lifetime	>10,000 hours

5.8 M505L2

Wavelength (nominal)	505 nm
Optical Beam Power (LED Output)	335 - 620 mW
Optical Beam power (Collimated Beam)	170 mW
Maximum LED Current	1000 mA
LED Forward Voltage (nominal)	3.3 V
Lifetime	> 50,000 hours

5.9 M530L2

Wavelength (nominal)	530 nm
Optical Beam Power (LED Output)	220 - 475 mW
Optical Beam power (Collimated Beam)	170 mW
Maximum LED Current	1600 mA
LED Forward Voltage (nominal)	3.5 V
Lifetime	>50,000 hours

5.10 M565L2

Wavelength (nominal)	565 nm
Optical Beam Power (LED Output)	min. 100 mW; typ. 150 mW
Maximum LED Current	500 mA
LED Forward Voltage (nominal)	3.2 V
Lifetime	>10,000 hours

5.11 M590L2

Wavelength (nominal)	590 nm
Optical Beam Power (LED Output)	150 - 340 mW
Optical Beam power (Collimated Beam)	70 mW
Maximum LED Current	1600 mA
LED Forward Voltage (nominal)	2.5 V
Lifetime	>50,000 hours

5.12 M617L2

Wavelength (nominal)	617 nm
Optical Beam Power (LED Output)	390 - 840 mW
Optical Beam power (Collimated Beam)	240 mW
Maximum LED Current	1600 mA
LED Forward Voltage (nominal)	2.5 V
Lifetime	>50,000 hours

5.13 M625L2

Wavelength (nominal)	625 nm
Optical Beam Power (LED Output)	440 - 950 mW
Optical Beam power (Collimated Beam)	280 mW
Maximum LED Current	1600 mA
LED Forward Voltage (nominal)	2.5 V
Lifetime	>50,000 hours

5.14 M660L2

Wavelength (nominal)	660 nm
Optical Beam Power (LED Output)	270 - 650 mW
Optical Beam power (Collimated Beam)	480 mW
Maximum LED Current	1500 mA
LED Forward Voltage (nominal)	3.0 V
Lifetime ¹⁾	100,000 hours

¹⁾ 90% Radiant Flux Maintenance on constant current of 1000 mA and with junction temperature at or below 110°C.

5.15 M735L2

Wavelength (nominal)	735 nm
Optical Beam Power (LED Output)	260 - 410 mW
Optical Beam power (Collimated Beam)	250 mW
Maximum LED Current	1500 mA
LED Forward Voltage (nominal)	2.5 V
Lifetime ¹⁾	100,000 hours

¹⁾ 90% Radiant Flux Maintenance on constant current of 1000 mA and with junction temperature at or below 110°C.

5.16 M780L2

Wavelength (nominal)	780 nm
Optical Beam Power (LED Output)	160 - 280 mW
Optical Beam power (Collimated Beam)	220 mW
Maximum LED Current	1000 mA
LED Forward Voltage (nominal)	2.0 V
Lifetime	>10,000 hours

5.17 M850L2

Wavelength (nominal)	850 nm
Optical Beam Power (LED Output)	320 - 800 mW
Optical Beam power (Collimated Beam)	190 mW
Maximum LED Current	1000 mA
LED Forward Voltage (nominal)	2.4 V
Lifetime	100,000 hours

5.18 M940L2

Wavelength (nominal)	940 nm
Optical Beam Power (LED Output)	320 - 1000 mW
Optical Beam power (Collimated Beam)	200 mW
Maximum LED Current	1000 mA
LED Forward Voltage (nominal)	1.8 V
Lifetime	100,000 hours

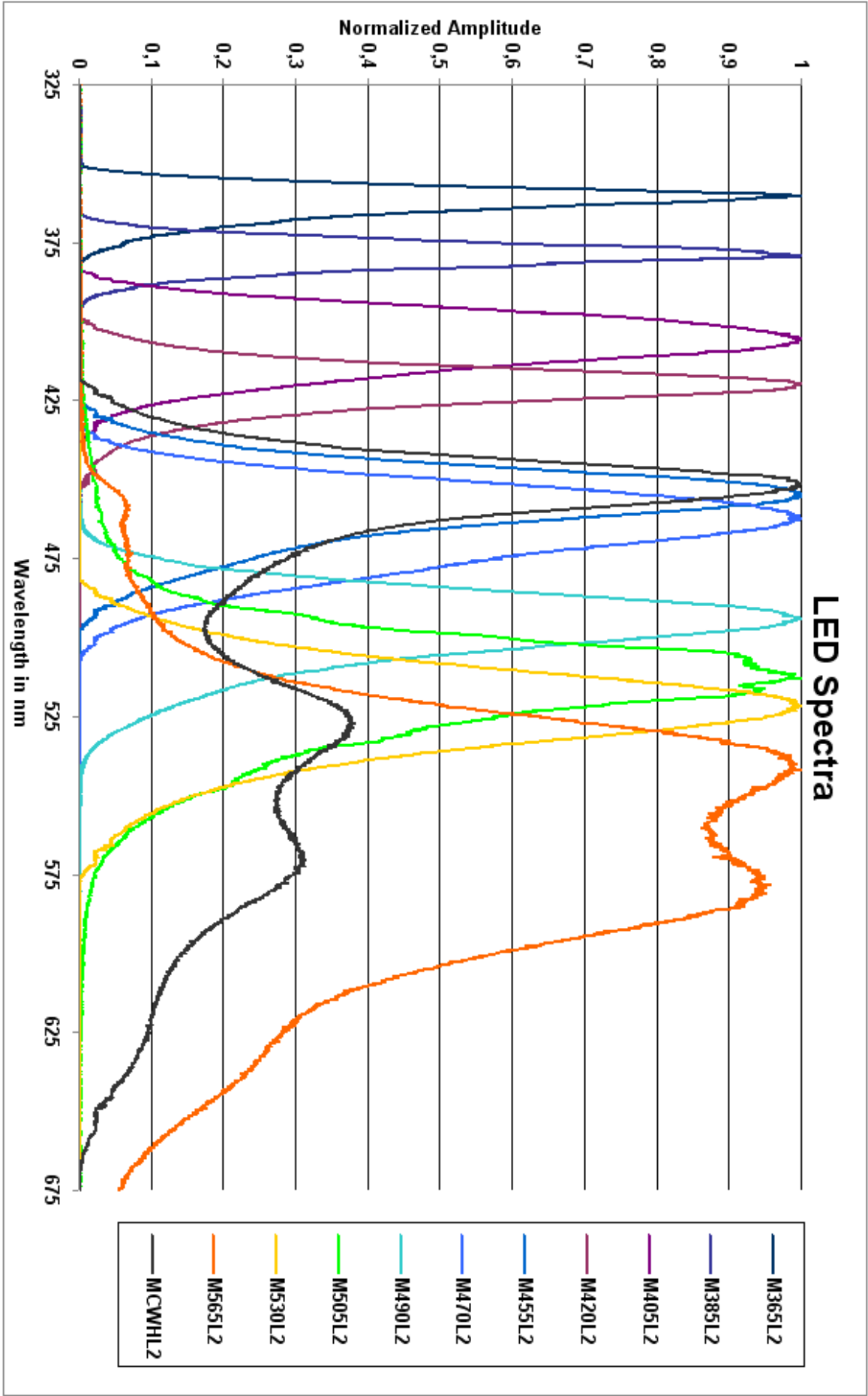
5.19 M1050L2

Wavelength (nominal)	1050 nm
Optical Beam Power (LED Output)	min. 50 mW; typ. 70 mW
Maximum LED Current	700 mA
LED Forward Voltage (nominal)	1.5 V
Lifetime	>10,000 hours

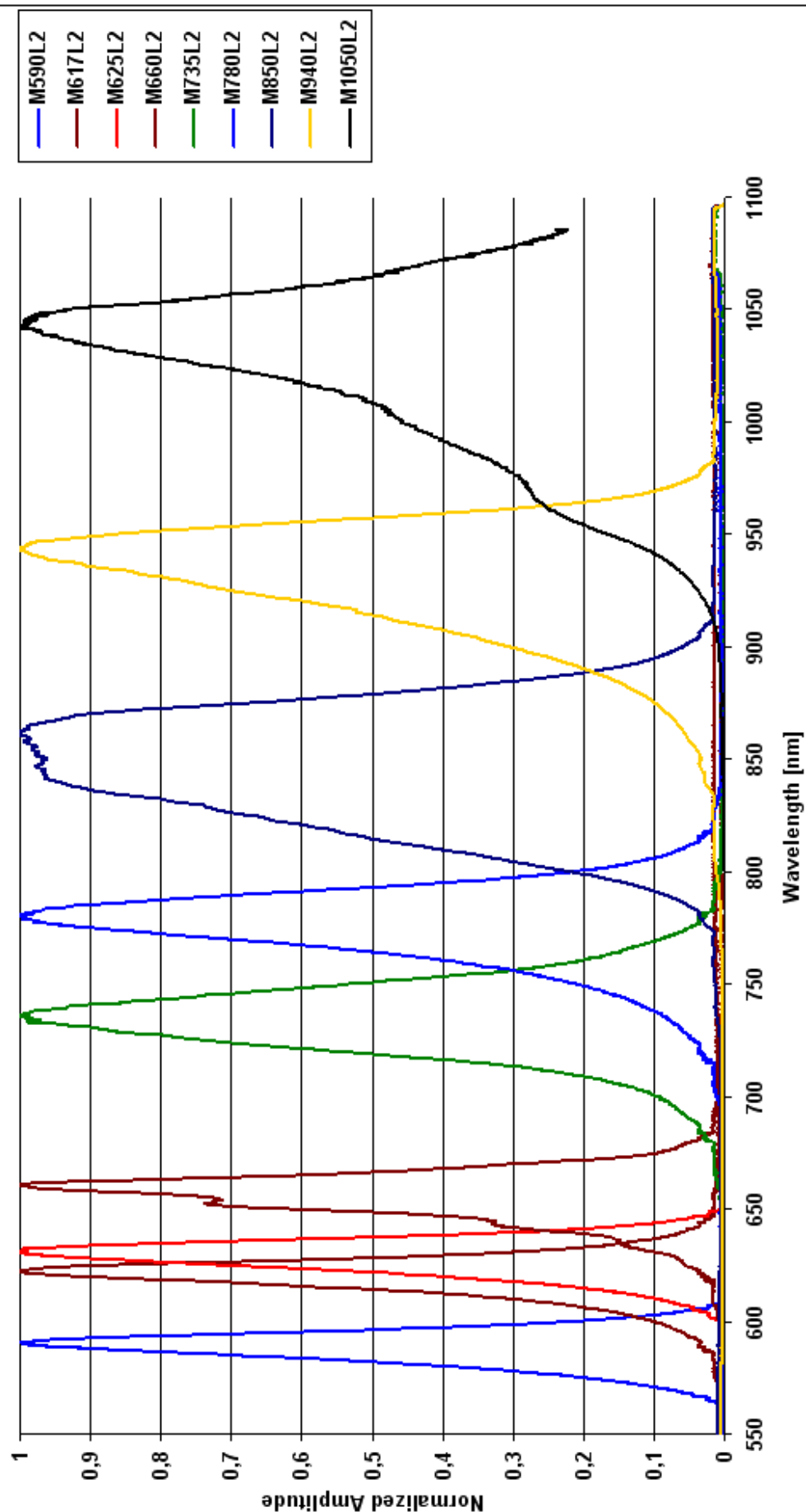
5.20 MCWHL2

Wavelength (color temperature)	6500 K
Optical Beam Power (LED Output)	650 - 1300 mW
Optical Beam power (Collimated Beam)	300 mW
Maximum LED Current	1600 mA
LED Forward Voltage (nominal)	3.5 V
Lifetime	>50,000 hours

5.21 LED Spectra

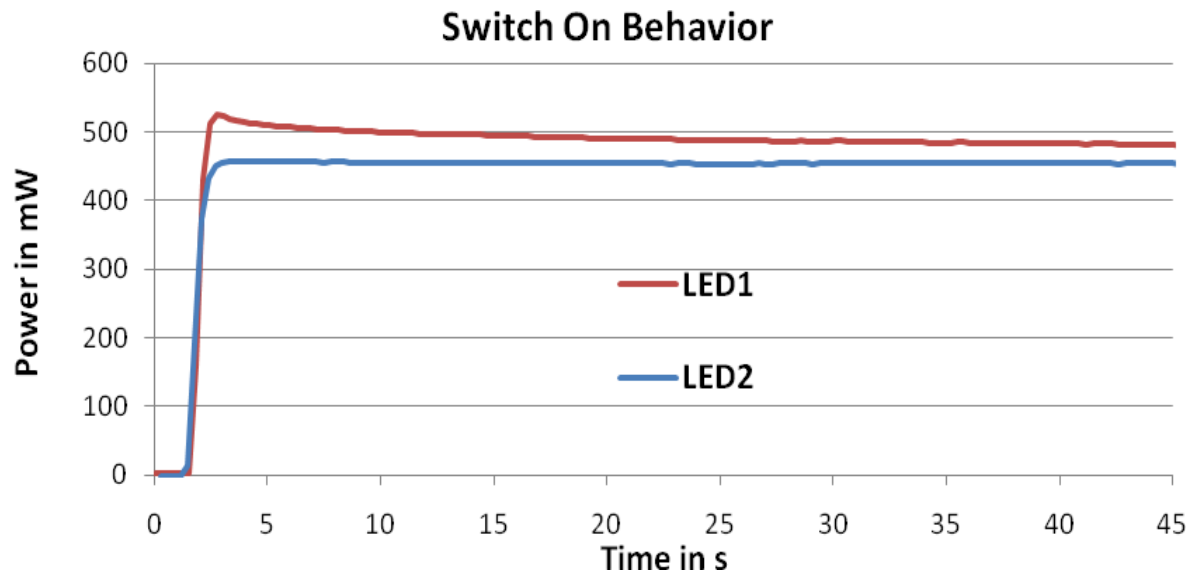


LED Spectra



5.22 Switch-on Behavior

Each LED has a characteristic switch-on behavior, which depends on LED properties and environmental conditions. An important criterion is the heat dissipation. Thorlabs mounted LEDs of the MxxxL2 series feature a unique thermal design in order to reduce the power decay to a minimum. The following diagram shows typical switch on behaviors of two different LEDs.



Switch On behavior of LEDs

6 Warranty

Thorlabs warrants material and production of the MxxxL2 Series for a period of 24 months starting with the date of shipment. During this warranty period *Thorlabs* will see to defaults by repair or by exchange if these are still entitled to warranty. For warranty repairs or service the unit must be sent back to *Thorlabs Germany* or to a place determined by *Thorlabs*. The customer will carry the shipping costs back to *Thorlabs*, in case of warranty repairs *Thorlabs* will carry the shipping costs back to the customer. If no warranty repair is applicable the customer will also carry the costs for back shipment. If the unit is sent back to *Thorlabs* from abroad the customer will carry all shipping costs, duties etc. which should arise for sending the goods back to *Thorlabs*.

Thorlabs warrants the hardware and software determined by *Thorlabs* for this unit to operate without fault provided that they are handled according to our statements. However, *Thorlabs* does not warrant a fault free or uninterrupted operation of the unit, of the software or firmware for special applications nor this operation manual to be fault free. We will not carry responsibility for ensuing damages.

Restriction of warranty

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

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

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

7 Copyright

Thorlabs GmbH has taken every possible care in preparing this Operation Manual. We however assume no liability for the content, completeness or quality of the information contained therein. The content of this manual is regularly updated and adapted to reflect the current status of the software. We furthermore do not guarantee that this product will function without errors, even if the stated specifications are adhered to.

Under no circumstances can we guarantee that a particular objective can be achieved with the purchase of this product.

Insofar as permitted under statutory regulations, we assume no liability for direct damage, indirect damage or damages suffered by third parties resulting from the purchase of this product. In no event shall any liability exceed the purchase price of the product.

Please note that the content of this User Manual is neither part of any previous or existing agreement, promise, representation or legal relationship, nor an alteration or amendment thereof. All obligations of *Thorlabs GmbH* result from the respective contract of sale, which also includes the complete and exclusively applicable warranty regulations. These contractual warranty regulations are neither extended nor limited by the information contained in this User Manual. Should you require further information on this product, or encounter specific problems that are not discussed in sufficient detail in the User Manual, please contact your local *Thorlabs* dealer or system installer.

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8 Thorlabs “End of Life” Policy (WEEE)

As required by the WEEE (Waste Electrical and Electronic Equipment Directive) of the European Community and the corresponding national laws, Thorlabs 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 electrical and electronic equipment

- sold after August 13th 2005
- marked correspondingly with the crossed out “wheelie bin” logo (see 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 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.).

If you wish to return a Thorlabs unit for waste recovery, please contact Thorlabs or your nearest dealer for further information.

Waste treatment on your own responsibility

If you do not return an “end of life” unit to Thorlabs, 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.

Ecological background

It is well known that WEEE 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 live products will thereby avoid negative impacts on the environment.



Crossed out “wheelie bin” symbol

9 Thorlabs Worldwide Contacts

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