

M385D1 - November 15, 2022

Item # M385D1 was discontinued on November 15, 2022. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

LEDS ON METAL-CORE PCBS

- ▶ UV, Visible, IR, and Mid-IR Models Available
- ▶ LED Mounted on Metal-Core Printed Circuit Board
- ▶ Ideal for OEM Applications



M340D4
 340 nm LED,
 ≥45.5 mW Power Output



M1300D3
 1300 nm LED,
 ≥122.8 mW Power Output



M565D2
 565 nm LED,
 ≥880 mW Power Output

[Hide Overview](#)

OVERVIEW

Features

- Nominal Wavelengths Ranging from 265 nm to 4300 nm
- White, Dual-Peak, and Broadband LEDs Also Available
- Minimum Outputs Ranging from 1.1 mW to 2000 mW
- LED Mounted on Metal-Core Printed Circuit Board for Excellent Heat Management
- Long Lifetimes (See Tables Below for Details)

Thorlabs' LEDs on Metal-Core Printed Circuit Boards (MCPCBs) are designed to provide high-power output in a compact package. Each LED package consists of a single LED that has been soldered to an MCPCB. These LEDs are ideal for OEM or custom applications; they should not be used for household illumination.

Thorlabs uses high-thermal-conductivity MCPCB materials. The MCPCB is designed to provide good thermal management. However, the LED must still be mounted onto an appropriate heat sink using thermal paste to ensure proper operation and to maximize operating lifetime. Mounting holes are provided on the MCPCB surface for attaching the LED to a heat sink; the Ø2 mm through holes are compatible with #1 (M2) screws (not included).

The spectrum of each LED and complete specifications can be viewed by clicking on the info icon (i) for each LED below for details. Multiple windows can be opened simultaneously in order to compare LEDs.

Thorlabs also offers mounted LEDs with an integrated heat sink, as well as collimated mounted LEDs, which are compatible with microscopes from major

LED on MCPCB Quick Links

| |
|-----------------------------|
| Deep UV (265 - 340 nm) |
| UV (365 - 405 nm) |
| Cold Visible (415 - 565 nm) |
| Warm Visible (590 - 730 nm) |
| IR (780 - 1650 nm) |
| Mid-IR (3400 - 4300 nm) |
| Purple (455 nm / 640 nm) |
| White (400 - 700 nm) |
| Broadband LEDs |
| LED Connection Cable |

manufacturers. For fiber applications, we also offer fiber-coupled LEDs. For questions on choosing an appropriate LED and to discuss mounting requirements, please contact Tech Support.

Optimized Thermal Management

These LEDs possess good thermal stability properties; hence, degradation of the optical output power due to increased LED temperature is not an issue when the LED is properly mounted to a heat sink using thermal paste, thermal epoxy, or thermally conductive double-sided tape.

White Light, Dual-Peak, and Broadband LEDs

Our warm, neutral, and cold white LEDs feature broad spectra that span several hundred nanometers. The difference in appearance amongst these three LEDs can be described using the correlated color temperature, which indicates that the LEDs color appearance is similar to a black body radiator at that temperature. In general, warm white LEDs offer a spectrum similar to a tungsten source, while cold white LEDs have a stronger blue component to the spectrum; neutral white LEDs provide a more even illumination spectrum over the visible range than warm white or cold white LEDs. Cold white LEDs are more suited for fluorescence microscopy applications or cameras with white balancing, because of a higher intensity at most wavelengths compared to warm white LEDs. Neutral white LEDs are ideal for horticultural applications.

For horticultural applications requiring illumination in both red and blue portions of the spectrum, Thorlabs offers the MPRP1D2. This purple LED features dual peaks at 455 nm and 640 nm, respectively, to stimulate photosynthesis (see graph to compare the absorption peaks of photosynthesis pigments with the LED spectrum). The LED was designed to maintain the red/blue ratio of the emission spectrum over its lifetime to provide high uniformity of plant growth.

The MBB1D1 broadband LED has a relatively flat spectral emission over a wide wavelength range. Its FWHM bandwidth ranges from 500 nm to 780 nm, while its 10 dB bandwidth ranges between 470 nm and 940 nm. The MBB2D1 broadband LED features a spectrum with peaks at approximately 770 nm, 860 nm, and 940 nm.

Soldering

These LEDs have been soldered to a metal core with low thermal resistance. While this feature allows for good thermal management, it can also prevent the metal pads from reaching the appropriate temperature for soldering when the package is connected to a heat sink. To properly solder wires to the pads, first make sure that the metal core is not in contact with a heat sink or a metal surface. We recommend using a small vise or similar device to hold the MCPCB during the soldering process and wires with a minimum gauge of 24 AWG (0.25 mm²).

To solder wires to the MCPCB, first hold the copper bit of the soldering iron on one of the pads for approximately 30 seconds using a soldering temperature of about 350 °C. The soldering iron will heat the entire metal-core PCB, so do not touch the LED package until it has cooled down after the soldering process. Test the temperature by touching tin solder to the pad: the solder will melt and flow evenly over the entire pad at the correct temperature. Coat the other pads with tin solder. Now, solder the wires to the pads. Use tweezers or pliers to remove the MCPCB from the vise and place it on a heat sink or metal surface. The metal-core PCB will cool down in several seconds and is now ready for your application.

For convenient connection of the LEDs to the drivers listed on the *LED Drivers* tab, please order the optional CAB-LEDD1 LED connection cable below.

Driver Options and Pin Assignments

Thorlabs offers four drivers: LEDD1B, DC2200, DC4100, and DC4104 (the latter two require the DC4100-HUB). See the *LED Drivers* tab for compatibility information and a list of specifications. The LEDD1B is capable of providing LED modulation frequencies up to 5 kHz, while DC4100 and DC4104 can modulate the LED at a rate up to 100 kHz. The DC2200 can provide modulation at up to 250 kHz if driven by an external source. Please note that MCPCB LEDs are not compatible with the EEPROM feature of the DC2200, DC4100, and DC4104, which automatically adjusts for the current limits of our mounted LEDs. Therefore, care must be taken not to exceed the current limits of the LEDs offered on this page.

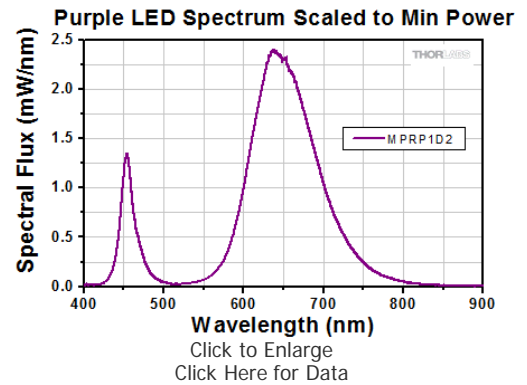
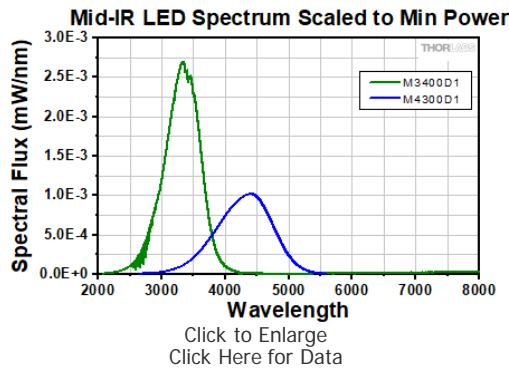
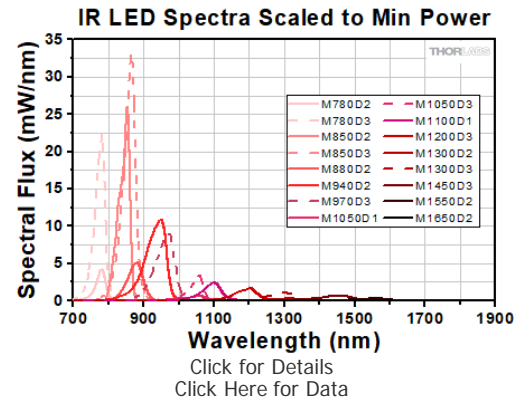
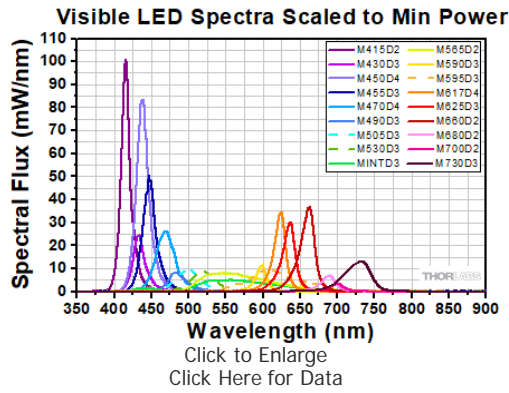
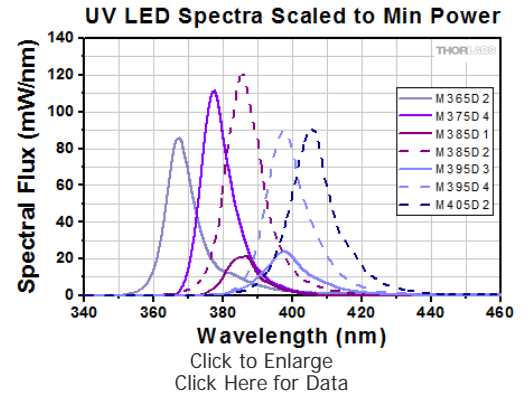
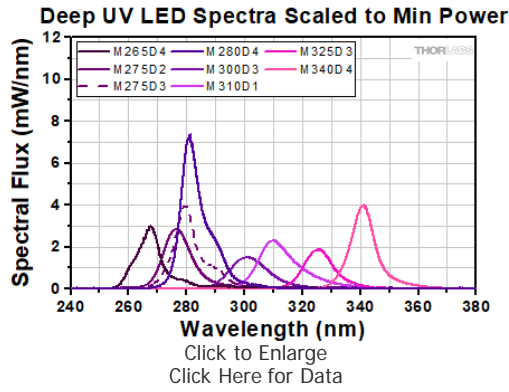
To connect the PCB to a controller, please note that the soldering pad labeled "+" is the Anode (+V), and the pad labeled "-" is the Cathode. Although it is not required to make any connections in order to operate the LED, the EEPROM IO and EEPROM GND connections can be used when any LED listed in the tables below is operated with a Thorlabs LED driver. The soldering pads on different items may be in different locations, but the labels are the same.

[Hide Relative Power](#)

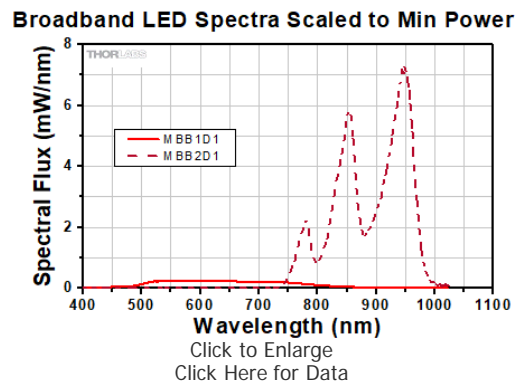
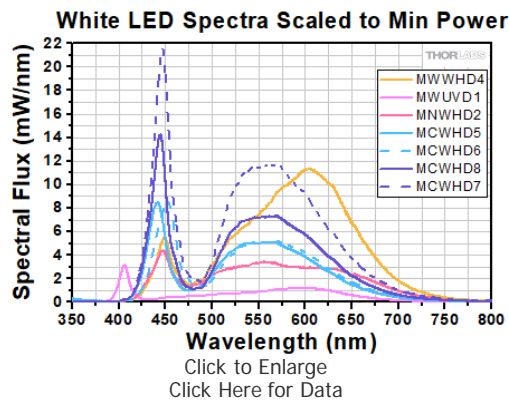
RELATIVE POWER

Relative Power

The actual spectral output and total output power of any given LED will vary due to variations in the manufacturing process and operating parameters, such as temperature and current. Both a typical and minimum output power are specified to help you select an LED that suits your needs. Each metal-core PCB LED will provide at least the minimum specified output power at the maximum current. In order to provide a point of comparison for the relative powers of LEDs with different nominal wavelengths, the spectra in the plots below have been scaled to the minimum output power for each LED. This data is representative, not absolute. Excel files with normalized and scaled spectra for each set of the mounted LEDs can be downloaded by clicking below the graphs.



The spectrum shown for M4300D1 is ideal. Please see the Spec Sheet for more information.



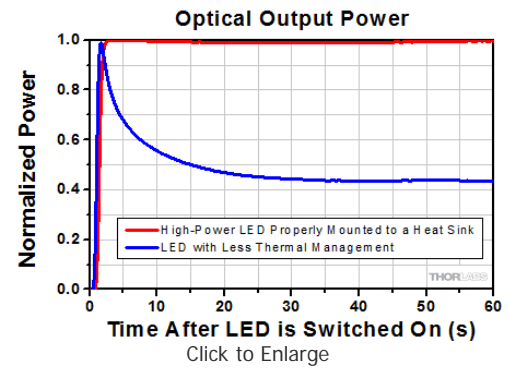
[Hide Stability](#)

STABILITY

LED Lifetime and Long-Term Power Stability

One characteristic of LEDs is that they naturally exhibit power degradation with time. Often this power degradation is slow, but there are also instances where large, rapid

drops in power, or even complete LED failure, occur. LED lifetimes are defined as the time it takes a specified percentage of a type of LED to fall below some power level. The parameters for the lifetime measurement can be written using the notation B_{XX}/L_{YY} , where XX is the percentage of that type of LED that will provide less than YY percent of the specified output power after the lifetime has elapsed. Thorlabs defines the lifetime of our LEDs as B_{50}/L_{50} , meaning that 50% of the LEDs with a given Item # will fall below 50% of the initial optical power at the end of the specified lifetime. For example, if a batch of 100 LEDs is rated for 150 mW of output power, 50 of these LEDs can be expected to produce an output power of ≤ 75 mW after the specified LED lifetime has elapsed.



Optimizing Thermal Management

In order to achieve stable optical output power and maximize lifetime from your LED, the MCPCB must be properly mounted to a heat sink using thermally conductive paste in order to minimize the degradation of optical output power caused by increased LED junction temperature (see the graph to the right).

[Hide LED Drivers](#)

LED DRIVERS

| Compatible Drivers | UPLED ^a | LEDD1B | DC2200 ^a | DC4100 ^{a,b,c} | DC4104 ^{a,b,c} |
|--|--------------------|--|---|--|---|
| Click Photos to Enlarge | | | | | |
| LED Driver Current Output (Max) | 1.2 A | 1.2 A | LED1 Terminal: 10.0 A LED2 Terminal: 2.0 A ^d | 1.0 A per Channel | 1.0 A per Channel |
| LED Driver Forward Voltage (Max) | 8 V | 12 V | 50 V | 5 V | 5 V |
| Modulation Frequency Using External Input (Max) | - | 5 kHz | 250 kHz ^{e,f} | 100 kHz ^f (Simultaneous Across all Channels) | 100 kHz ^f (Independently Controlled Channels) |
| External Control Interface(s) | USB 2.0 | Analog (BNC) | USB 2.0 and Analog (BNC) | USB 2.0 and Analog (BNC) | USB 2.0 and Analog (8-Pin) |
| Main Driver Features | USB-Controlled | Very Compact Footprint 60 mm x 73 mm x 104 mm (W x H x D) | Touchscreen Interface with Internal and External Options for Pulsed and Modulated LED Operation | 4 Channels ^c | 4 Channels ^c |
| EEPROM Compatible: Reads Out LED Data for LED Settings | ✓ | - | ✓ | ✓ | ✓ |
| LCD Display | - | - | ✓ | ✓ | ✓ |




- a. Automatically Adjusts the Driver's Current Limit via EEPROM Readout from LED
- b. The DC4100 and DC4104 can power and control up to four LEDs simultaneously when used with the DC4100-HUB. The LEDs on this page all require the DC4100-HUB and the CAB-LEDD1 cable when used with the DC4100 or DC4104 drivers.

- c. These LED drivers have a maximum forward voltage rating of 5 V and can provide a maximum current of 1000 mA. As a result, they cannot be used to drive LEDs which have forward voltage ratings greater than 5 V. LEDs with maximum current ratings higher than 1.0 A can be driven using this driver, but will not reach full power.
- d. The MCPCB LEDs sold below are compatible with the LED2 Terminal via the CAB-LEDD1 (available separately below).
- e. Small Signal Bandwidth: Modulation not exceeding 20% of full scale current. The driver accepts other waveforms, but the maximum frequency will be reduced.
- f. Several of these LEDs produce light by stimulating emission from phosphor, which limits their modulation frequencies. The M565D2, M595D3, and all purple or white LEDs may not turn off completely when modulated above 10 kHz at duty cycles below 50%. The MBB1D1 LED may not turn off completely when modulated at frequencies above 1 kHz with a duty cycle of 50%. When the MBB1D1 is modulated at frequencies above 1 kHz, the duty cycle may be reduced; for example, 10 kHz modulation is attainable with a duty cycle of 5%.

[Hide Ray Data](#)

RAY DATA & NBSP ;

Ray data for Zemax is available for some of the bare LEDs incorporated into these high-powered light sources. This data is provided in a zipped folder that can be downloaded by clicking on the red document

| Item # | Information File | Available Ray Files | File Size | Click to Download |
|---------------------------|---------------------------|--|-----------|---|
| M385D1 | M385_Info.pdf | 1 Million Rays and 5 Million Rays | 147 MB |  |
| M850D2^a | SFH4715S_100413_info.pdf | 100,000 Rays, 500,000 Rays, and 5 Million Rays | 139 MB |  |
| M940D2^a | SFH_4725S_110413_info.pdf | 100,000 Rays, 500,000 Rays, and 5 Million Rays | 140 MB |  |

- a. A radiometric color spectrum, bare LED CAD file, and sample Zemax file are also available for these LEDs.

icons () next to the part numbers in the pricing tables below. Every zipped folder contains an information file and one or more ray files for use with Zemax:

- Information File:** This document contains a summary of the types of data files included in the zipped folder and some basic information about their use. It includes a table listing each document type and the corresponding filenames.
- Ray Files:** These are binary files containing ray data for use with Zemax.

For the LEDs marked with a superscript "a" in the table to the right, the following additional pieces of information are also included in the zipped folder:

- Radiometric Color Spectrum:** This .spc file is also intended for use with Zemax.
- CAD Files:** A file indicating the geometry of the bare LED. For the dimensions of the high-power mounted LEDs that include the package, please see the support drawings provided by Thorlabs.
- Sample Zemax File:** A sample file containing the recommended settings and placement of the ray files and bare LED CAD model when used with Zemax.

The table to the right summarizes the ray files available for each LED and any other supporting documentation provided.

[Hide LED Selection Guide](#)

LED SELECTION GUIDE

This tab includes all LEDs sold by Thorlabs. Click on *More [+]* to view all available wavelengths for each type of LED pictured below.

| Light Emitting Diode (LED) Selection Guide | | | | | |
|---|---|---|---|---|---|
| Click Photo to Enlarge (Representative; Not to Scale) |  |  |  |  |  |
| Type | Unmounted LEDs | Pigtailed LEDs | LEDs in SMT Packages | LED Arrays | Cage-Compatible Diffuse Backlight LED |
| Light Emitting Diode (LED) Selection Guide | | | | | |
| Click Photo | | | | | |

| | | | | | | |
|---|--|--|--|---|--|--|
| to Enlarge (Representative; Not to Scale) |  |  |  |  |  |  |
| Type | PCB-Mounted LEDs | Heatsink-Mounted LEDs | Collimated LEDs for Microscopy ^b | Fiber-Coupled LEDs ^c | High-Power LEDs for Microscopy | Multi-Wavelength LED Source Options ^d |

- a. Measured at 25 °C
- b. These Collimated LEDs are compatible with the standard and epi-illumination ports on the following microscopes: Olympus BX/IX (Item # Suffix: -C1), Leica DMI (Item # Suffix: -C2), Zeiss Axioskop (Item # Suffix: -C4), and Nikon Eclipse (Bayonet Mount, Item # Suffix: -C5).
- c. Typical power when used with MM Fiber with Ø400 µm core, 0.39 NA.
- d. Our Multi-Wavelength LED Sources are available with select combinations of the LEDs at these wavelengths.
- e. Typical power for LEDs with the Leica DMI collimation package (Item # Suffix: -C2).
- f. Minimum power for the collimated output of these LEDs. The collimation lens is installed with each LED.
- g. Typical power for LEDs with the Olympus BX and IX collimation package (Item # Suffix: -C1).
- h. Typical power for LEDs with the Nikon Eclipse collimation package (Item # Suffix: -C5).
- i. Percentage of LED intensity that emits in the blue portion of the spectrum, from 400 nm to 525 nm.
- j. Typical power for LEDs with the Zeiss Axioskop collimation package (Item # Suffix: -C4).

[Hide Deep UV LEDs \(265 - 340 nm\)](#)

Deep UV LEDs (265 - 340 nm)

Please note that our deep UV LEDs radiate intense UV light during operation. Precautions must be taken to prevent looking directly at the UV light, and UV light protective glasses must be worn to avoid eye damage. Exposure of the skin and other body parts to UV light should be avoided.

| Item # | Info ^{a,b} | Nominal Wavelength | LED Output Power | | Bandwidth (FWHM) | Irradiance ^c | Maximum Current (CW) | Forward Voltage | Viewing Angle (Full Angle at Half Max) | Emitter Size | MCPCB Thickness |
|--------|---|--------------------|------------------|---------|------------------|-------------------------------|----------------------|-----------------|--|-----------------|-----------------|
| | | | Minimum | Typical | | | | | | | |
| M265D4 |  | 265 nm | 38.4 mW | 55.7 mW | 11 nm | 0.5 µW/mm ² | 440 mA | 6.9 V | 120° | 1 mm x 0.75 mm | 1.6 mm |
| M275D2 |  | 275 nm | 45 mW | 80 mW | 11 nm | 0.8 µW/mm ² | 700 mA | 7.3 V | 118° | 2 mm x 2 mm | 1.6 mm |
| M275D3 |  | 275 nm | 47.3 mW | 68.3 mW | 10 nm | 0.5 µW/mm ² | 300 mA | 12 V | 120° | 2.7 mm x 3.3 mm | 1.6 mm |
| M280D4 |  | 280 nm | 78 mW | 114 mW | 10 nm | 1 µW/mm ² | 500 mA | 6.26 V | 114° ^d | 1 mm x 1 mm | 1.6 mm |
| M300D3 |  | 300 nm | 26 mW | 32 mW | 20 nm | 0.3 µW/mm ² | 350 mA | 8.0 V (Max) | 130° | 1 mm x 1 mm | 1.6 mm |
| M310D1 |  | 310 nm | 38.5 mW | 56.5 mW | 30 nm | 0.76 µW/mm ² | 600 mA | 5 V | 120° ^d | 1 mm x 1 mm | 1.6 mm |
| M325D3 |  | 325 nm | 25 mW | 35 mW | 12 nm | 0.44 µW/mm ² (Max) | 600 mA | 5.2 V | 120° | 1 mm x 1 mm | 1.6 mm |
| M340D4 |  | 340 nm | 45.5 mW | 69.2 mW | 10 nm | 0.6 µW/mm ² | 600 mA | 6.6 V | 120° ^d | 1 mm x 1 mm | 2.4 mm |

- a. Click on the blue info icon for complete specifications and LED spectrum.
- b. Due to variations in the manufacturing process and operating parameters such as temperature and current, the actual spectral output of any given LED will vary. These values were measured with the back side of the PCB at 25 °C at the maximum current, unless otherwise noted. Output plots and center wavelength specs are only intended to be used as a guideline. Values are typical unless otherwise stated.
- c. Irradiance is measured at a distance of 200 mm from the LED. Typical value unless otherwise noted.
- d. When driven at a current of 350 mA.

| Part Number | Description | Price | Availability |
|-------------|---|----------|--------------|
| M265D4 | 265 nm, 38.4 mW (Min) LED on Metal-Core PCB, 440 mA | \$358.73 | Today |
| M275D2 | 275 nm, 45 mW (Min) LED on Metal-Core PCB, 700 mA | \$256.90 | Today |
| M275D3 | 275 nm, 47.3 mW (Min) LED on Metal-Core PCB, 300 mA | \$150.32 | Today |

| | | | |
|--------|---|----------|-----------|
| M280D4 | 280 nm, 78 mW (Min) LED on Metal-Core PCB, 500 mA | \$273.06 | 7-10 Days |
| M300D3 | 300 nm, 26 mW (Min) LED on Metal-Core PCB, 350 mA | \$393.63 | Today |
| M310D1 | 308 nm, 38.5 mW (Min) LED on Metal-Core PCB, 600 mA | \$485.61 | Today |
| M325D3 | 325 nm, 25 mW (Min) LED on Metal-Core PCB, 600 mA | \$521.99 | 7-10 Days |
| M340D4 | 340 nm, 45.5 mW (Min) LED on Metal-Core PCB, 600 mA | \$303.35 | Today |

[Hide UV LEDs \(365 - 405 nm\)](#)

UV LEDs (365 - 405 nm)

Please note that our UV LEDs radiate intense UV light during operation. Precautions must be taken to prevent looking directly at the UV light, and UV light protective glasses must be worn to avoid eye damage. Exposure of the skin and other body parts to UV light should be avoided.

| Item # | Info ^{a,b} | Nominal Wavelength | LED Output Power | | Bandwidth (FWHM) | Irradiance (Typical) ^c | Maximum Current (CW) | Forward Voltage | Viewing Angle (Full Angle at Half Max) | Emitter Size | MCPCB Thickness |
|--------|--|--------------------|----------------------|----------------------|------------------|---|----------------------|-----------------|--|-----------------|-----------------|
| | | | Minimum | Typical | | | | | | | |
| M365D2 |  | 365 nm | 1150 mW ^d | 1400 mW ^d | 9 nm | 17.6 $\mu\text{W}/\text{mm}^2$ ^d | 1700 mA | 4.0 V | 120° | 1.4 mm x 1.4 mm | 2.4 mm |
| M375D4 |  | 375 nm | 1270 mW | 1540 mW | 9 nm | 19.2 $\mu\text{W}/\text{mm}^2$ | 1400 mA | 3.6 V | 130° | 1 mm x 1 mm | 2.4 mm |
| M385D1 |  | 385 nm | 270 mW | 430 mW | 10 nm | 11.8 $\mu\text{W}/\text{mm}^2$ | 700 mA | 4.3 V | 120° | 1 mm x 1 mm | 1.6 mm |
| M385D2 |  | 385 nm | 1650 mW | 1830 mW | 12 nm | 23.3 $\mu\text{W}/\text{mm}^2$ | 1700 mA | 3.9 V | 120° | 1.4 mm x 1.4 mm | 2.4 mm |
| M395D3 |  | 395 nm | 400 mW | 535 mW | 16 nm | 6.7 $\mu\text{W}/\text{mm}^2$ | 500 mA | 4.5 V | 126° | 1 mm x 1 mm | 2.4 mm |
| M395D4 |  | 395 nm | 1420 mW | 2050 mW | 11 nm | 22.8 $\mu\text{W}/\text{mm}^2$ | 1400 mA | 4.0 V | 120° | 2.5 mm x 2.5 mm | 2.4 mm |
| M405D2 |  | 405 nm | 1500 mW | 1700 mW | 12 nm | 24.6 $\mu\text{W}/\text{mm}^2$ | 1400 mA | 3.45 V | 120° | 1.4 mm x 1.4 mm | 2.5 mm |

- a. Click on the blue info icon for complete specifications and LED spectrum.
- b. Due to variations in the manufacturing process and operating parameters such as temperature and current, the actual spectral output of any given LED will vary. These values were measured with the back side of the PCB at 25 °C at the maximum current, unless otherwise noted. Output plots and center wavelength specs are only intended to be used as a guideline. Values are typical unless otherwise stated.
- c. Irradiance is measured at a distance of 200 mm from the LED.
- d. When Driven with a Current of 1000 mA

| Part Number | Description | Price | Availability |
|-------------|--|----------|--------------|
| M365D2 | 365 nm, 1150 mW (Min) LED on Metal-Core PCB, 1700 mA | \$217.78 | Today |
| M375D4 | 375 nm, 1270 mW (Min) LED on Metal-Core PCB, 1400 mA | \$62.80 | Today |
| M385D1 | 385 nm, 270 mW (Min) LED on Metal-Core PCB, 700 mA | \$177.02 | Lead Time |
| M385D2 | 385 nm, 1650 mW (Min) LED on Metal-Core PCB, 1700 mA | \$217.78 | Today |
| M395D3 | 395 nm, 400 mW (Min) LED on Metal-Core PCB, 500 mA | \$146.75 | 7-10 Days |
| M395D4 | 395 nm, 1420 mW (Min) LED on Metal-Core PCB, 1400 mA | \$217.78 | Today |
| M405D2 | 405 nm, 1500 mW (Min) LED on Metal-Core PCB, 1400 mA | \$217.78 | Today |

[Hide Single-Color Cold Visible LEDs \(415 - 565 nm\)](#)

Single-Color Cold Visible LEDs (415 - 565 nm)

Please note that the 415 nm (violet), 430 nm (violet), and 450 nm (royal blue) LEDs radiate intense UV light during operation. Precautions must be taken to prevent looking directly at the UV light, and UV light protective glasses must be worn to avoid eye damage. Exposure of the skin and other body parts to the UV light should be avoided.

| Item # | Info ^{a,b} | Nominal Wavelength | LED Output Power | | Bandwidth (FWHM) | Irradiance (Typical) ^c | Maximum Current (CW) | Forward Voltage | Viewing Angle (Full Angle at Half Max) | Emitter Size | MCPCB Thickness |
|--------|---------------------|--------------------|------------------|---------|------------------|-----------------------------------|----------------------|-----------------|--|--------------|-----------------|
| | | | Minimum | Typical | | | | | | | |

| Item # | Info ^{a,b} | Nominal Wavelength ^c | Minimum | Typical | Bandwidth (FWHM) | Irradiance (Typical) ^d | Maximum Current (CW) | Forward Voltage | (Full Angle at Half Max) | Emitter Size | MCPCB Thickness |
|---------------------|---------------------|---------------------------------|-----------|-----------|------------------|-----------------------------------|----------------------|-----------------|--------------------------|-----------------|-----------------|
| M415D2 | | 415 nm | 1640 mW | 1940 mW | 14 nm | 19.5 $\mu\text{W}/\text{mm}^2$ | 2000 mA | 3.15 V | 138° | 1.4 mm x 1.4 mm | 2.4 mm |
| M430D3 | | 430 nm | 529.2 mW | 757.6 mW | 17 nm | 25.7 $\mu\text{W}/\text{mm}^2$ | 500 mA | 3.66 V | 126° ^e | 1 mm x 1 mm | 2.4 mm |
| M450D4 | | 450 nm | 2118.1 mW | 3041.5 mW | 18 nm | 34.2 $\mu\text{W}/\text{mm}^2$ | 2000 mA | 3.2 V | 120° ^f | 1.5 mm x 1.5 mm | 2.4 mm |
| M455D3 | | 455 nm | 1150 mW | 1445 mW | 18 nm | 32 $\mu\text{W}/\text{mm}^2$ | 1000 mA | 3.25 V | 80° | 1 mm x 1 mm | 1.6 mm |
| M470D4 | | 470 nm | 809 mW | 1161.7 mW | 28 nm | 21.4 $\mu\text{W}/\text{mm}^2$ | 1000 mA | 3.8 V | 80° | 1 mm x 1 mm | 1.6 mm |
| M490D3 | | 490 nm | 205 mW | 240 mW | 26 nm | 2.5 $\mu\text{W}/\text{mm}^2$ | 350 mA | 3.8 V (Max) | 128° | 1 mm x 1 mm | 2.4 mm |
| M505D3 | | 505 nm | 400 mW | 520 mW | 37 nm | 5.94 $\mu\text{W}/\text{mm}^2$ | 1000 mA | 3.5 V | 130° | 1 mm x 1 mm | 1.6 mm |
| M530D3 | | 530 nm | 370 mW | 480 mW | 35 nm | 9.46 $\mu\text{W}/\text{mm}^2$ | 1000 mA | 3.6 V | 80° | 1 mm x 1 mm | 1.6 mm |
| MINTD3 | | 554 nm | 650 mW | 815 mW | - | 12.4 $\mu\text{W}/\text{mm}^2$ | 1225 mA | 3.5 V | 120° | 1 mm x 1 mm | 2.4 mm |
| M565D2 ^g | | 565 nm | 880 mW | 979 mW | 104 nm | 11.7 $\mu\text{W}/\text{mm}^2$ | 1000 mA | 3.1 V (Max) | 125° | 1 mm x 1 mm | 1.6 mm |

- a. Click on the blue info icon for complete specifications and LED spectrum.
- b. Due to variations in the manufacturing process and operating parameters such as temperature and current, the actual spectral output of any given LED will vary. These values were measured with the back side of the PCB at 25 °C at the maximum current, unless otherwise noted. Output plots and center wavelength specs are only intended to be used as a guideline. Values are typical unless otherwise stated.
- c. The nominal wavelength indicates the wavelength at which the LED appears brightest to the human eye. The nominal wavelength for visible LEDs may not correspond to the peak wavelength as measured by a spectrometer.
- d. Irradiance is measured at a distance of 200 mm from the LED.
- e. When driven with a Current of 100 mA
- f. When driven with a Current of 700 mA
- g. This LED is phosphor-converted and may not turn off completely when modulated above 10 kHz at duty cycles below 50%.

| Part Number | Description | Price | Availability |
|-------------|--|----------|--------------|
| M415D2 | 415 nm, 1640 mW (Min) LED on Metal-Core PCB, 2000 mA | \$79.93 | Today |
| M430D3 | 430 nm, 529.2 mW (Min) LED on Metal-Core PCB, 500 mA | \$89.45 | Today |
| M450D4 | 450 nm, 2118.1 mW (Min) LED on Metal-Core PCB, 2000 mA | \$66.49 | Today |
| M455D3 | 455 nm, 1150 mW (Min) LED on Metal-Core PCB, 1000 mA | \$56.70 | 7-10 Days |
| M470D4 | 470 nm, 809 mW (Min) LED on Metal-Core PCB, 1000 mA | \$69.29 | 7-10 Days |
| M490D3 | 490 nm, 205 mW (Min) LED on Metal-Core PCB, 350 mA | \$83.27 | Today |
| M505D3 | 505 nm, 520 mW (Typ.) LED on Metal-Core PCB, 1000 mA | \$79.78 | Today |
| M530D3 | 530 nm, 370 mW (Min) LED on Metal-Core PCB, 1000 mA | \$79.78 | Today |
| MINTD3 | 554 nm, 650 mW (Min) LED on Metal-Core PCB, 1225 mA | \$133.02 | Today |
| M565D2 | 565 nm, 880 mW (Min) LED on Metal-Core PCB, 1000 mA | \$67.55 | Today |

[Hide Single-Color Warm Visible LEDs \(590 - 730 nm\)](#)

Single-Color Warm Visible LEDs (590 - 730 nm)

| Item # | Info ^{a,b} | Nominal Wavelength ^c | LED Output Power | | Bandwidth (FWHM) | Irradiance (Typical) ^d | Maximum Current (CW) | Forward Voltage | Viewing Angle (Full Angle at Half Max) | Emitter Size | MCPCB Thickness |
|---------------------|---------------------|---------------------------------|------------------|---------|------------------|-----------------------------------|----------------------|-----------------|--|-----------------|-----------------|
| | | | Minimum | Typical | | | | | | | |
| M590D3 | | 590 nm | 230 mW | 300 mW | 15 nm | 6.0 $\mu\text{W}/\text{mm}^2$ | 1000 mA | 2.5 V | 80° | 1 mm x 1 mm | 1.6 mm |
| M595D3 ^e | | 595 nm | 820 mW | 1217 mW | 64 nm | 13.5 $\mu\text{W}/\text{mm}^2$ | 1500 mA | 3.0 V | 120° | 2.9 mm x 2.9 mm | 2.4 mm |
| M617D4 | | 617 nm | 737.4 mW | 1006.2 | 16 nm | ² | 1000 mA | 2.9 V | ^f | 1 mm x 1 mm | 1.6 mm |







| | | | | | | | | | | | |
|---------------|---|--------|--------|---------|-------|--------------------------------|---------|-------|------|-----------------|--------|
| |  | | | mW | | 19.4 $\mu\text{W}/\text{mm}^2$ | | | 80° | | |
| M625D3 |  | 625 nm | 700 mW | 920 mW | 17 nm | 21.9 $\mu\text{W}/\text{mm}^2$ | 1000 mA | 2.5 V | 80° | 1 mm x 1 mm | 1.6 mm |
| M660D2 |  | 660 nm | 940 mW | 1050 mW | 20 nm | 20.9 $\mu\text{W}/\text{mm}^2$ | 1200 mA | 2.6 V | 120° | 1.5 mm x 1.5 mm | 1.6 mm |
| M680D2 |  | 680 nm | 180 mW | 210 mW | 22 nm | 14.5 $\mu\text{W}/\text{mm}^2$ | 600 mA | 2.5 V | 18° | 1 mm x 1 mm | 2.4 mm |
| M700D2 |  | 700 nm | 80 mW | 125 mW | 20 nm | 1.0 $\mu\text{W}/\text{mm}^2$ | 500 mA | 2.7 V | 128° | 1 mm x 1 mm | 2.4 mm |
| M730D3 |  | 730 nm | 540 mW | 680 mW | 40 nm | 13.1 $\mu\text{W}/\text{mm}^2$ | 1000 mA | 2.9 V | 80° | 1 mm x 1 mm | 1.6 mm |


- a. Click on the blue info icon to view a typical spectrum for the LED.
- b. Due to variations in the manufacturing process and operating parameters such as temperature and current, the actual spectral output of any given LED will vary. These values were measured with the back side of the PCB at 25 °C at the maximum current, unless otherwise noted. Output plots and center wavelength specs are only intended to be used as a guideline. Values are typical unless otherwise stated.
- c. The nominal wavelength indicates the wavelength at which the LED appears brightest to the human eye. The nominal wavelength for visible LEDs may not correspond to the peak wavelength as measured by a spectrometer.
- d. Irradiance is measured at a distance of 200 mm from the LED.
- e. This LED is phosphor-converted and may not turn off completely when modulated above 10 kHz at duty cycles below 50%.
- f. When Driven at the Current of 350 mA

| Part Number | Description | Price | Availability |
|-------------|--|---------|--------------|
| M590D3 | 590 nm, 230 mW (Min) LED on Metal-Core PCB, 1000 mA | \$73.16 | Today |
| M595D3 | 595 nm, 820 mW (Min) LED on Metal-Core PCB, 1500 mA | \$91.49 | Today |
| M617D4 | NEW! 617 nm, 737.4 mW (Min) LED on Metal-Core PCB, 1000 mA | \$68.62 | 7-10 Days |
| M625D3 | 625 nm, 700 mW (Min) LED on Metal-Core PCB, 1000 mA | \$77.60 | Today |
| M660D2 | 660 nm, 940 mW (Min) LED on Metal-Core PCB, 1200 mA | \$75.11 | Today |
| M680D2 | Customer Inspired! 680 nm, 180 mW (Min) LED on Metal-Core PCB, 600 mA | \$89.09 | Today |
| M700D2 | 700 nm, 80 mW (Min) LED on Metal-Core PCB, 500 mA | \$89.09 | Today |
| M730D3 | 730 nm, 540 mW (Min) LED on Metal-Core PCB, 1000 mA | \$83.14 | Today |

[Hide IR LEDs \(780 - 1650 nm\)](#)

IR LEDs (780 - 1650 nm)

| Item # | Info ^{a,b} | Nominal Wavelength | LED Output Power | | Bandwidth (FWHM) | Irradiance (Typical) ^c | Maximum Current (CW) | Forward Voltage | Viewing Angle (Full Angle at Half Max) | Emitter Size | MCPCB Thickness |
|----------------|---|--------------------|------------------|----------|------------------|-----------------------------------|----------------------|-----------------|--|--------------------|-----------------|
| | | | Minimum | Typical | | | | | | | |
| M780D2 |  | 780 nm | 200 mW | 300 mW | 28 nm | 47.3 $\mu\text{W}/\text{mm}^2$ | 800 mA | 2.0 V | 20° | 1 mm x 1 mm | 2.4 mm |
| M780D3 |  | 780 nm | 800 mW | 950 mW | 30 nm | 13.3 $\mu\text{W}/\text{mm}^2$ | 800 mA | 7.8 V | 120° | Ø3 mm (3 Emitters) | 1.6 mm |
| M850D2 |  | 850 nm | 900 mW | 1100 mW | 30 nm | 22.9 $\mu\text{W}/\text{mm}^2$ | 1200 mA | 2.95 V | 90° | 1 mm x 1 mm | 1.6 mm |
| M850D3 |  | 850 nm | 1400 mW | 1600 mW | 30 nm | 19.4 $\mu\text{W}/\text{mm}^2$ | 1500 mA | 3.85 V (Max) | 150° | 1 mm x 1 mm | 1.6 mm |
| M880D2 |  | 880 nm | 300 mW | 350 mW | 50 nm | 5.6 $\mu\text{W}/\text{mm}^2$ | 1000 mA | 1.7 V | 132° | 1 mm x 1 mm | 2.4 mm |
| M940D2 |  | 940 nm | 800 mW | 1000 mW | 37 nm | 19.1 $\mu\text{W}/\text{mm}^2$ | 1000 mA | 2.75 V | 90° | 1 mm x 1 mm | 1.6 mm |
| M970D3 |  | 970 nm | 600 mW | 720 mW | 60 nm | 7.4 $\mu\text{W}/\text{mm}^2$ | 1000 mA | 1.9 V | 130° | 1 mm x 1 mm | 2.4 mm |
| M1050D1 |  | 1050 nm | 50 mW | 70 mW | 60 nm | 1.9 $\mu\text{W}/\text{mm}^2$ | 700 mA | 1.5 V | 120° | 1 mm x 1 mm | 2.4 mm |
| M1050D3 |  | 1050 nm | 160 mW | 210 mW | 37 nm | 3.7 $\mu\text{W}/\text{mm}^2$ | 600 mA | 1.6 V (Max) | 128° | 1 mm x 1 mm | 2.4 mm |
| M1100D1 |  | 1100 nm | 168 mW | 252 mW | 50 nm | 18.1 $\mu\text{W}/\text{mm}^2$ | 1000 mA | 1.4 V | 18° | 1 mm x 1 mm | 2.4 mm |
| M1200D3 |  | 1200 nm | 136 mW | 200 mW | 65 nm | 2.6 $\mu\text{W}/\text{mm}^2$ | 1000 mA | 2.2 V | 130° | 1 mm x 1 mm | 2.4 mm |
| M1300D2 |  | 1300 nm | 25 mW | 30 mW | 80 nm | 0.6 $\mu\text{W}/\text{mm}^2$ | 500 mA | 1.4 V | 134° | 1 mm x 1 mm | 2.4 mm |
| M1300D3 |  | 1300 nm | 122.8 mW | 182.1 mW | 80 nm | 1.6 $\mu\text{W}/\text{mm}^2$ | 1000 mA | 1.7 V | 130° | 1 mm x 1 mm | 2.4 mm |



| | | | | | | | | | | | |
|---------|---|---------|---------|----------|--------|-------------------------------|---------|--------|------|-------------|--------|
| M1450D3 |  | 1450 nm | 81.8 mW | 120.7 mW | 95 nm | 1.5 $\mu\text{W}/\text{mm}^2$ | 700 mA | 1.88 V | 130° | 1 mm x 1 mm | 2.4 mm |
| M1550D2 |  | 1550 nm | 31 mW | 36 mW | 102 nm | 0.5 $\mu\text{W}/\text{mm}^2$ | 1000 mA | 1.35 V | 136° | 1 mm x 1 mm | 2.4 mm |
| M1650D2 |  | 1650 nm | 13 mW | 16 mW | 120 nm | 1.2 $\mu\text{W}/\text{mm}^2$ | 600 mA | 1.1 V | 20° | 1 mm x 1 mm | 2.4 mm |

- a. Click on the blue info icon for complete specifications and LED spectrum.
- b. Due to variations in the manufacturing process and operating parameters such as temperature and current, the actual spectral output of any given LED will vary. These values were measured with the back side of the PCB at 25 °C at the maximum current, unless otherwise noted. Output plots and center wavelength specs are only intended to be used as a guideline. Values are typical unless otherwise stated.
- c. Irradiance is measured at a distance of 200 mm from the LED.

| Part Number | Description | Price | Availability |
|-------------|---|----------|--------------|
| M780D2 | 780 nm, 200 mW (Min) LED on Metal-Core PCB, 800 mA | \$67.55 | 7-10 Days |
| M780D3 | 780 nm, 800 mW (Min) LED on Metal-Core PCB, 800 mA | \$121.12 | Today |
| M850D2 | 850 nm, 900 mW (Min) LED on Metal-Core PCB, 1200 mA | \$67.55 | Today |
| M850D3 | 850 nm, 1400 mW (Min) LED on Metal-Core PCB, 1500 mA | \$131.61 | Today |
| M880D2 | 880 nm, 300 mW (Min) LED on Metal-Core PCB, 1000 mA | \$67.55 | Today |
| M940D2 | 940 nm, 800 mW (Min) LED on Metal-Core PCB, 1000 mA | \$67.55 | 7-10 Days |
| M970D3 | 970 nm, 600 mW (Min) LED on Metal-Core PCB, 1000 mA | \$85.64 | Today |
| M1050D1 | 1050 nm, 50 mW (Min) LED on Metal-Core PCB, 700 mA | \$79.78 | Today |
| M1050D3 | 1050 nm, 160 mW (Min) LED on Metal-Core PCB, 600 mA | \$190.68 | Today |
| M1100D1 | 1100 nm, 168 mW (Min) LED on Metal-Core PCB, 1000 mA | \$208.78 | Today |
| M1200D3 | NEW! 1200 nm, 136 mW (Min) LED on Metal-Core PCB, 1000 mA | \$162.21 | Today |
| M1300D2 | Customer Inspired! 1300 nm, 25 mW (Min) LED on Metal-Core PCB, 500 mA | \$123.87 | Today |
| M1300D3 | 1300 nm, 122.8 mW (Min) LED on Metal-Core PCB, 1000 mA | \$165.78 | Today |
| M1450D3 | 1450 nm, 81.8 mW (Min) LED on Metal-Core PCB, 1000 mA | \$159.99 | Today |
| M1550D2 | Customer Inspired! 1550 nm, 31 mW (Min) LED on Metal-Core PCB, 1000 mA | \$146.75 | Today |
| M1650D2 | 1650 nm, 13 mW (Min) LED on Metal-Core PCB, 600 mA | \$205.52 | Today |

[Hide Mid-IR LEDs \(3400 - 4300 nm\)](#)

Mid-IR LEDs (3400 - 4300 nm)

| Item # | Info ^{a,b} | Nominal Wavelength | LED Output Power | | Bandwidth (FWHM) | Maximum Current (CW) | Forward Voltage | Viewing Angle (Full Angle at Half Max) | Emitter Size | MCPCB Thickness |
|---------|---|--------------------|------------------|---------|------------------|----------------------|-----------------|--|---------------|-----------------|
| | | | Minimum | Typical | | | | | | |
| M3400D1 |  | 3400 nm | 2.2 mW | 3.3 mW | 800 nm | 200 mA | 4.1 V | 130° | 0.8 mm x 1 mm | 1.6 mm |
| M4300D1 |  | 4300 nm | 1.1 mW | 1.67 mW | 800 nm | 200 mA | 3.9 V | 130° | 0.8 mm x 1 mm | 1.6 mm |


- a. Click on the blue info icon for complete specifications and LED spectrum.
- b. Due to variations in the manufacturing process and operating parameters such as temperature and current, the actual spectral output of any given LED will vary. These values were measured with the back side of the PCB at 25 °C at the maximum current, unless otherwise noted. Output plots and center wavelength specs are only intended to be used as a guideline. Values are typical unless otherwise stated.

| Part Number | Description | Price | Availability |
|-------------|---|------------|--------------|
| M3400D1 | 3400 nm, 2.2 mW (Min) LED on Metal-Core PCB, 200 mA | \$1,159.07 | Today |
| M4300D1 | 4300 nm, 1.1 mW (Min) LED on Metal-Core PCB, 200 mA | \$1,159.07 | Today |

[Hide Purple LED \(455 nm / 640 nm\)](#)

Purple LED (455 nm / 640 nm)

Our dual-peak LED was designed for applications requiring illumination in both red and blue portions of the spectrum, such as horticulture. This purple LED features dual peaks at 455 nm and 640 nm, respectively, to stimulate photosynthesis (see graph to compare the absorption peaks of photosynthesis pigments with the LED spectrum). The LED was designed to maintain the red/blue ratio of the emission spectrum over its lifetime to provide high uniformity of plant growth.

| Item # | Info ^{a,b} | Nominal Wavelength | LED Output Power | | Bandwidth (FWHM) | Irradiance (Typical) ^c | Maximum Current (CW) | Forward Voltage | Viewing Angle (Full Angle at Half Max) | Emitter Size | MCPCB Thickness |
|----------------------|---|---------------------------------------|------------------|---------|------------------|-----------------------------------|----------------------|-----------------|--|--------------|-----------------|
| | | | Minimum | Typical | | | | | | | |
| MPRP1D2 ^d |  | 455 nm (12.5% ^e) / 640 nm | 275 mW | 325 mW | N/A | 3.7 $\mu\text{W}/\text{mm}^2$ | 300 mA | 3.1 V | 115° | 1 mm x 2 mm | 1.6 mm |








- a. Click on the blue info icon for complete specifications and LED spectrum.
- b. Due to variations in the manufacturing process and operating parameters such as temperature and current, the actual spectral output of any given LED will vary. These values were measured with the back side of the PCB at 25 °C at the maximum current, unless otherwise noted. Output plots and center wavelength specs are only intended to be used as a guideline. Values are typical unless otherwise stated.
- c. Irradiance is measured at a distance of 200 mm from the LED.
- d. This LED is phosphor-converted and may not turn off completely when modulated above 10 kHz at duty cycles below 50%.
- e. Percentage of LED intensity that emits in the blue portion of the spectrum, from 400 nm to 525 nm. Click on the blue info icon for details.

| Part Number | Description | Price | Availability |
|-------------|---|---------|--------------|
| MPRP1D2 | 455 nm (12.5%) / 640 nm, 275 mW (Min) LED on Metal-Core PCB, 300 mA | \$46.82 | Today |

[Hide White LEDs \(400 - 700 nm Wavelength Range\)](#)

White LEDs (400 - 700 nm Wavelength Range)

Our warm, neutral, and cold white LEDs feature broad spectra that span several hundred nanometers. The difference in appearance among these LEDs can be described using the correlated color temperature, which indicates that the LEDs color appearance is similar to a black body radiator at that temperature. In general, warm white LEDs offer a spectrum similar to a tungsten source, while cold white LEDs have a stronger blue component to the spectrum; neutral white LEDs provide a more even illumination spectrum over the visible range than warm white or cold white LEDs. Cold white LEDs are more suited for fluorescence microscopy applications or cameras with white balancing, because of a higher intensity at most wavelengths compared to warm white LEDs. Neutral white LEDs are ideal for horticultural applications.

| Item # | Info ^{a,b} | Correlated Color Temperature | LED Output Power | | Bandwidth (FWHM) | Irradiance (Typical) ^c | Maximum Current (CW) | Forward Voltage | Viewing Angle (Full Angle at Half Max) | Emitter Size | MCPCB Thickness |
|----------------------|---|------------------------------|------------------|-----------|------------------|-----------------------------------|----------------------|-----------------|--|--------------|-----------------|
| | | | Minimum | Typical | | | | | | | |
| MWWHD4 ^d |  | 3000 K | 1713 mW | 2499 mW | N/A | 27.2 $\mu\text{W}/\text{mm}^2$ | 700 mA | 12.1 V | 135° | Ø3.6 mm | 1.6 mm |
| MWUVD1 ^d |  | 4000 K ^e | 235 mW | 338 mW | N/A | 4.0 $\mu\text{W}/\text{mm}^2$ | 125 mA | 6.3 V | 120° ^f | 2 mm x 1 mm | 1.6 mm |
| MNWHHD2 ^d |  | 4900 K | 740 mW | 880 mW | N/A | 7.7 $\mu\text{W}/\text{mm}^2$ | 1225 mA | 2.9 V | 150° | 1 mm x 1 mm | 2.4 mm |
| MCWHD5 ^d |  | 6500 K | 930 mW | 1370 mW | N/A | 25.9 $\mu\text{W}/\text{mm}^2$ | 1300 mA | 3.3 V | 80° | 1 mm x 1 mm | 1.6 mm |
| MCWHD6 ^d |  | 6500 K | 942 mW | 1353 mW | N/A | 11.8 $\mu\text{W}/\text{mm}^2$ | 1300 mA | 4.51 V | 150° | 1 mm x 1 mm | 1.6 mm |
| MCWHD8 ^d |  | 6500 K | 1300.9 mW | 1882.0 mW | N/A | 22.5 $\mu\text{W}/\text{mm}^2$ | 2000 mA | 3.6 V | 125° | Ø3 mm | 1.6 mm |
| MCWHD7 ^d |  | 6500 K | 2064.8 mW | 2998.0 mW | N/A | 33.3 $\mu\text{W}/\text{mm}^2$ | 700 mA | 12.9 V | 135° | Ø3.7 mm | 1.6 mm |

- a. Click on the blue info icon for complete specifications and LED spectrum.
- b. Due to variations in the manufacturing process and operating parameters such as temperature and current, the actual spectral output of any given LED will vary. These values were measured with the back side of the PCB at 25 °C at the maximum current, unless otherwise noted. Output plots and center wavelength specs are only intended to be used as a guideline. Values are typical unless otherwise stated.
- c. Irradiance is measured at a distance of 200 mm from the LED.
- d. This LED is phosphor-converted and may not turn off completely when modulated above 10 kHz at duty cycles below 50%.
- e. Neutral White LED Spectrum with a Peak at 406 nm



- f. When Driven with a Pulsed Forward Current of 75 mA

| Part Number | Description | Price | Availability |
|-------------|--|---------|--------------|
| MWWHD4 | 3000 K, 1713 mW (Min) LED on Metal-Core PCB, 700 mA | \$80.60 | Today |
| MWUVD1 | 4000 K, 235 mW (Min) LED on Metal-Core PCB, 125 mA | \$58.79 | Today |
| MNWHHD2 | 4900 K, 740 mW (Min) LED on Metal-Core PCB, 1225 mA | \$51.38 | Today |
| MCWHD5 | 6500 K, 930 mW (Min) LED on Metal-Core PCB, 1300 mA | \$68.39 | Today |
| MCWHD6 | 6500 K, 942 mW (Min) LED on Metal-Core PCB, 1300 mA | \$66.99 | Today |
| MCWHD8 | 6500 K, 1300.9 mW (Min) LED on Metal-Core PCB, 2000 mA | \$72.42 | Today |
| MCWHD7 | 6500 K, 2064.8 mW (Min) LED on Metal-Core PCB, 700 mA | \$84.48 | Today |

[Hide Broadband LEDs](#)

Broadband LEDs

The MBB1D1 broadband LED has a relatively flat spectral emission over a wide wavelength range. Its 10 dB bandwidth ranges between 470 nm and 850 nm. The MBB2D1 broadband LED features a spectrum with peaks at approximately 770 nm, 860 nm, and 940 nm.

| Item # | Info ^{a,b} | Wavelength | LED Output Power | | Bandwidth (FWHM) | Irradiance (Typical) ^c | Maximum Current (CW) | Forward Voltage | Viewing Angle (Full Angle at Half Max) | Emitter Size | MCPCB Thickness |
|---------------------|---|---|------------------|---------|------------------|-----------------------------------|----------------------|-----------------|--|--------------|-----------------|
| | | | Minimum | Typical | | | | | | | |
| MBB1D1 ^d |  | 470 - 850 nm (10 dB Bandwidth) | 70 mW | 80 mW | 280 nm | 0.9 $\mu\text{W}/\text{mm}^2$ | 500 mA | 3.6 V | 120° | 1 mm x 1 mm | 2.4 mm |
| MBB2D1 |  | 770 nm, 860 nm & 940 nm (Peak Wavelengths) | 740 mW | 1090 mW | N/A | 13.5 $\mu\text{W}/\text{mm}^2$ | 1000 mA | 4.8 V | 120° | 1 mm x 1 mm | 1.6 mm |

- a. Click on the blue info icon for complete specifications and LED spectrum.
- b. Due to variations in the manufacturing process and operating parameters such as temperature and current, the actual spectral output of any given LED will vary. These values were measured with the back side of the PCB at 25 °C at the maximum current, unless otherwise noted. Output plots and center wavelength specs are only intended to be used as a guideline. Values are typical unless otherwise stated.
- c. Irradiance is measured at a distance of 200 mm from the LED.
- d. The LED may not turn off completely when modulated at frequencies above 1 kHz with a duty cycle of 50%, as the broadband emission is produced by optically stimulating emission from phosphor. For modulation at frequencies above 1 kHz, the duty cycle may be reduced. For example, 10 kHz modulation is attainable with a duty cycle of 5%

| Part Number | Description | Price | Availability |
|-------------|---|----------|--------------|
| MBB1D1 | 470 - 850 nm Broadband LED, 70 mW (Min) on Metal-Core PCB, 500 mA | \$435.57 | Today |
| MBB2D1 | IR Broadband LED (770 nm, 860 nm & 940 nm), 740 mW (Min) on Metal-Core PCB, 1000 mA | \$482.55 | 7-10 Days |

[Hide LED Connection Cable](#)

LED Connection Cable

- ▶ 4-Pin M8 Connector on One Side
- ▶ 4 Bare Wires on Other Side
- ▶ 2 m Long, 24 AWG Wires

The 4-Pin M8 connection cable can be used to connect the LEDs on metal-core PCBs to the following Thorlabs LED drivers: LEDD1B, DC2100, DC4100, and DC4104 (the latter two require

| Pin | Description | Wire Color |
|-----|-------------|------------|
| 1 | LED Anode | Brown |
| 2 | LED Cathode | White |
| 3 | EEPROM GND | Black |
| | | |



Male M8x1 Connector

the DC4100-HUB).

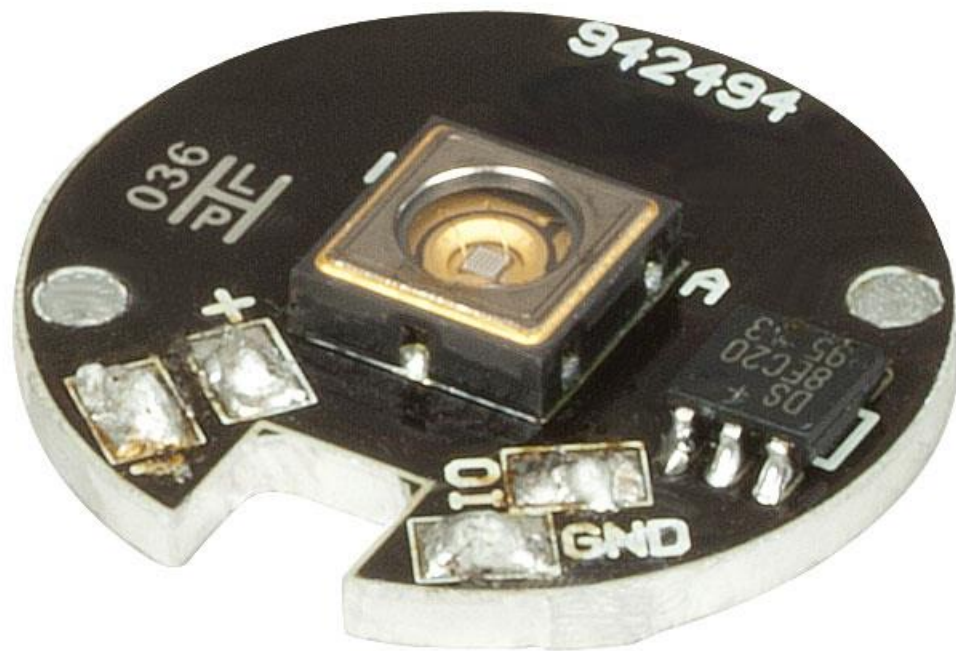
| | | | |
|--|---|-----------|------|
| | 4 | EEPROM IO | Blue |
|--|---|-----------|------|

Pin Connections

The diagram above shows the male connector for use with the above Thorlabs LED drivers. The connector is a standard M8x1 sensor circular connector. Pins 1 and 2 are the connection to the LED. Please note that the bare PCB board LEDs shown on this page do not include an EEPROM like our mounted LEDs; hence pins 3 and 4 should not be connected. Also, note that the pin connection diagram shown here may not be valid for third-party LED drivers.

For customers using their own power supplies, we also offer a female 4-pin M8 connector cable (item # CON8ML-4).

| Part Number | Description | Price | Availability |
|-------------|--|---------|--------------|
| CAB-LEDD1 | LED Connection Cable, 2 m, M8 Connector, 4 Wires | \$18.52 | 7-10 Days |



Spectrum

Specs

M385D1 Characteristics^a

| Optical Specifications^b | MIN | TYP | MAX | UNIT |
|--|------------|------------|------------|---------------------------|
| Nominal Wavelength | - | 385 | - | nm |
| Peak Wavelength ^c | 380 | 385 | 390 | nm |
| Bandwidth (FWHM) | - | 10 | - | nm |
| LED Output Power | 270 | 430 | - | mW |
| Irradiance ^d | - | 11.8 | - | $\mu\text{W}/\text{mm}^2$ |
| Viewing Angle (Full Angle at Half Max) | - | 120 | - | deg. |
| Electrical Specifications^b | | | | |
| Current (CW) | - | - | 700 | mA |
| Forward Voltage | - | 4.3 | - | V |
| Electrical Power | - | 3010 | - | mW |

General Specifications

| Characteristic | Value |
|-----------------------|--------------------|
| Emitter Size | 1 mm x 1 mm |
| MCPCB Thickness | 1.6 mm |
| Color | UV |
| Lifetime | >10 000 h |
| Operating Temperature | 0 to 40 °C |
| Storage Temperature | -40 to 70 °C |
| Risk Group | RG0 - Exempt Group |

- a. This LED radiates intense UV light during operation. Precautions must be taken to prevent looking directly at the UV light and UV light protective glasses must be worn to avoid eye damage. Exposure of the skin and other body parts to the UV light should be avoided.
- b. Due to variations in the manufacturing process and operating parameters such as temperature and current, the actual spectral output of any given LED will vary. These values were measured with the back side of the PCB at 25 °C at the maximum current, unless otherwise noted. Output plots and center wavelength specs are only intended to be used as a guideline.
- c. When driven with a current of 500 mA.
- d. Irradiance is measured at a distance of 200 mm from the LED.

UV LED Spectra Scaled to Min Power

