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M285D2 - July 11, 2017

Item # M285D2 was discontinued on July 11, 2017. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

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

M340D3
340 nm LED, Power Output ≥ 53 mW

M1300D2
1300 nm LED, Power Output ≥ 25 mW

M565D2
565 nm LED, Power Output ≥ 880 mW

Hide Overview

OVERVIEW

Features

- Nominal Wavelengths Ranging from 265 nm to 1650 nm
- White, Dual-Peak, and Broadband LEDs Also Available
- Minimum Outputs Ranging from 10 mW to 2350 mW
- LED Mounted on Metal-Core Printed Circuit Board for Excellent Heat Management
- Long Lifetimes (See *Specs* Tab 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 associated data file can be viewed by clicking on the links in the table to the right. 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 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

Item #	Color (Click for Spectrum)[a]	Nominal Wavelength[a,b]	Minimum LED Power Output[a]
M265D2[c]	Deep UV	265 nm	10 mW
M285D2[c]	Deep UV	285 nm	45 mW
M300D3[c]	Deep UV	300 nm	40 mW
M340D3[c]	Deep UV	340 nm	53 mW
M365D1[c]	UV	365 nm	190 mW
M365D2[c]	UV	365 nm	1150 mW
M375D2[c]	UV	375 nm	387 mW
M385D1[c]	UV	385 nm	270 mW
M385D2[c]	UV	385 nm	1650 mW
M395D3[c]	UV	395 nm	400 mW
M405D2[c]	UV	405 nm	1500 mW
M420D2[c]	Violet	420 nm	750 mW
M430D2[c]	Violet	430 nm	490 mW
M450D3	Royal Blue	450 nm	1850 mW
M455D2[d]	Royal Blue	455 nm	900 mW
M470D2[d]	Blue	470 nm	650 mW
M490D3	Blue	490 nm	255 mW
M505D2[d]	Cyan	505 nm	400 mW
M530D2[d]	Green	530 nm	350 mW
M565D2[e]	Lime	565 nm	880 mW
M590D2[d]	Amber	590 nm	160 mW
M595D2[e]	Amber	595 nm	445 mW
M617D2[d]	Orange	617 nm	600 mW
M625D2[d]	Red	625 nm	700 mW
M660D2	Deep Red	660 nm	940 mW
M680D2	Deep Red	680 nm	180 mW
M700D2	Deep Red	700 nm	80 mW
M730D2[d]	Far Red	730 nm	515 mW
M780D2	IR	780 nm	200 mW
M780D3	IR	780 nm	800 mW
M810D2	IR	810 nm	325 mW
M850D2	IR	850 nm	900 mW
M850D3	IR	850 nm	1400 mW

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 been designed to have relatively flat spectral emission over a wide wavelength range. Its FWHM bandwidth ranges from 500 nm to 780 nm, while the 10 dB bandwidth ranges between 470 nm and 850 nm. To view a plot of the spectrum of this broadband source, please see the table to the right.

M880D2	IR	880 nm	300 mW
M940D2	IR	940 nm	800 mW
M970D2	IR	970 nm	35 mW
M1050D1	IR	1050 nm	50 mW
M1200D2	IR	1200 nm	30 mW
M1300D2	IR	1300 nm	25 mW
M1450D2	IR	1450 nm	31 mW
M1550D2	IR	1550 nm	31 mW
M1650D2	IR	1650 nm	13 mW
MPRP1D2[e]	Purple	455 nm (12.5%[f]) / 640 nm	275 mW
MBB1D1[g]	Broadband	470 - 850 nm[h]	70 mW
MWWHD3[e]	Warm White	3000 K[i]	2000 mW
MNWHD2[e]	Neutral White	4900 K[i]	740 mW
MCWHD2[d,e]	Cold White	6500 K[i]	800 mW
MCWHD3[e]	Cold White	6500 K[i]	2350 mW

- 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. Output plots and nominal wavelength specs are only intended to be used as a guideline.
- For LEDs in the visible spectrum, 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 spectrograph.
- Our 265 nm to 430 nm 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.
- These LEDs use a high-thermal-conductivity MCPCB material from SinkPAD, while the rest of the MCPCB LEDs use a high-thermal-conductivity MCPCB material from Bergquist.
- These LEDs are phosphor-converted and may not turn off completely when modulated above 10 kHz at duty cycles below 50%.
- Percentage of LED intensity that emits in the blue portion of the spectrum, from 400 nm to 525 nm. See spectrum graph for details.
- The MBB1D1 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%.
- 10 dB Bandwidth
- Correlated Color Temperature

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 mm^2).

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. The other two pads ("IO" and "GND") do not need to be connected and are reserved for future use. The soldering pads on different items may be in different locations, but the labels are the same.

Hide Specs

SPECS

Item #	Color (Click for Spectrum and Data)[a]	Nominal Wavelength[a,b]	LED Output Power[a]		Maximum Current (CW)	Forward Voltage	Bandwidth (FWHM)	Irradiance (Typical)[c]	Electrical Power	Typical Lifetime	Viewing Angle (Full Angle at Half Max)	Emitter Size	MCPCB Thickness
			Minimum	Typical									
M265D2[d]	Deep UV	265 nm	10 mW	12 mW	350 mA	6.8 V	11 nm	-	2.380 W	>1 000 h	130°	1 mm x 1 mm	2.5 mm
M285D2[d]	Deep UV	285 nm	45 mW	55 mW	500 mA	6.2 V	12 nm	0.5 µW/mm²	3.100 W	>10 000 h	120°	1 mm x 1 mm	1.6 mm
M300D3[d]	Deep UV	300 nm	40 mW	47 mW	350 mA	8.0 V	20 nm	0.3 µW/mm²	2.800 W	>10 000 h	130°	1 mm x 1 mm	1.6 mm
M340D3[d]	Deep UV	340 nm	53 mW	65 mW	700 mA	4.6 V	11 nm	2.22 µW/mm²	0.322 W	>3 000 h	110°	1 mm x 1 mm	2.4 mm
M365D1[d]	UV	365 nm	190 mW	360 mW	700 mA	4.4 V	7.5 nm	8.9 µW/mm²	3.080 W	>10 000 h	120°	1 mm x 1 mm	1.6 mm
M365D2[d]	UV	365 nm	1150 mW	1400 mW	1400 mA	3.75 V	9 nm	17.6 µW/mm²	5.250 W	>10 000 h	120°	1.4 mm x 1.4 mm	2.5 mm
[d]													

M375D2	UV	375 nm	387 mW	470 mW	700 mA	3.8 V	9 nm	14.1 µW/mm²	2.660 W	>10 000 h	110°	1 mm x 1 mm	2.4 mm
M385D1[d]	UV	385 nm	270 mW	430 mW	700 mA	4.3 V	10 nm	11.8 µW/mm²	3.010 W	>10 000 h	120°	1 mm x 1 mm	1.6 mm
M385D2[d]	UV	385 nm	1650 mW	1830 mW	1400 mA	3.65 V	12 nm	23.3 µW/mm²	5.110 W	>10 000 h	120°	1.4 mm x 1.4 mm	2.5 mm
M395D3[d]	UV	395 nm	400 mW	535 mW	500 mA	4.5 V	16 nm	6.7 µW/mm²	2.250 W	>10 000 h	126°	1 mm x 1 mm	2.4 mm
M405D2[d]	UV	405 nm	1500 mW	1700 mW	1400 mA	3.45 V	12 nm	24.6 µW/mm²	4.830 W	>10 000 h	120°	1.4 mm x 1.4 mm	2.5 mm
M420D2[d]	Violet	420 nm	750 mW	820 mW	1000 mA	3.5 V	15 nm	13.1 µW/mm²	3.500 W	>10 000 h	125°	1 mm x 1 mm	2.4 mm
M430D2[d]	Violet	430 nm	490 mW	600 mW	500 mA	3.8 V	15 nm	35.3 µW/mm²	1.900 W	>10 000 h	22°	1 mm x 1 mm	2.4 mm
M450D3	Royal Blue	450 nm	1850 mW	2100 mW	2000 mA	3.5 V	18 nm	35.6 µW/mm²	7.000 W	1 000 h	120°	1.5 mm x 1.5 mm	1.6 mm
M455D2[e]	Royal Blue	455 nm	900 mW	1020 mW	1000 mA	3.2 V	18 nm	31.2 µW/mm²	3.200 W	100 000 h	80°	1 mm x 1 mm	1.6 mm
M470D2[e]	Blue	470 nm	650 mW	710 mW	1000 mA	3.2 V	25 nm	21.9 µW/mm²	3.200 W	100 000 h	80°	1 mm x 1 mm	1.6 mm
M490D3	Blue	490 nm	255 mW	300 mW	350 mA	3.8 V	26 nm	3.88 µW/mm²	1.330 W	>10 000 h	128°	1 mm x 1 mm	2.4 mm
M505D2[e]	Cyan	505 nm	400 mW	440 mW	1000 mA	3.3 V	30 nm	11.1 µW/mm²	3.300 W	100 000 h	80°	1 mm x 1 mm	1.6 mm
M530D2[e]	Green	530 nm	350 mW	370 mW	1000 mA	3.2 V	33 nm	9.5 µW/mm²	3.200 W	100 000 h	80°	1 mm x 1 mm	1.6 mm
M565D2[f]	Lime	565 nm	880 mW	979 mW	1000 mA	3.1 V	104 nm	11.7 µW/mm²	3.100 W	50 000 h	125°	1 mm x 1 mm	1.6 mm
M590D2[e]	Amber	590 nm	160 mW	170 mW	1000 mA	2.2 V	18 nm	5.3µW/mm²	2.200 W	100 000 h	80°	1 mm x 1 mm	1.6 mm
M595D2[f]	Amber	595 nm	445 mW	502 mW	700 mA	3.05 V	80 nm	6.9 µW/mm²	2.135 W	50 000 h	125°	1 mm x 1 mm	1.6 mm
M617D2[e]	Orange	617 nm	600 mW	650 mW	1000 mA	2.2 V	18 nm	15.7 µW/mm²	2.200 W	100 000 h	80°	1 mm x 1 mm	1.6 mm
M625D2[e]	Red	625 nm	700 mW	770 mW	1000 mA	2.2 V	18 nm	18.0 µW/mm²	2.200 W	100 000 h	80°	1 mm x 1 mm	1.6 mm
M660D2	Deep Red	660 nm	940 mW	1050 mW	1200 mA	2.6 V	20 nm	20.88 µW/mm²	3.120 W	>10 000 h	120°	1.5 mm x 1.5 mm	1.6 mm
M680D2	Deep Red	680 nm	180 mW	210 mW	600 mA	2.5 V	22 nm	14.5 µW/mm²	1.500 W	>10 000 h	18°	1 mm x 1 mm	2.4 mm
M700D2	Deep Red	700 nm	80 mW	125 mW	500 mA	2.7 V	20 nm	1.0 µW/mm²	1.350 W	>10 000 h	128°	1 mm x 1 mm	2.4 mm
M730D2[e]	Far Red	730 nm	515 mW	595 mW	1000 mA	2.3 V	37 nm	13.2 µW/mm²	2.300 W	>10 000 h	80°	1 mm x 1 mm	1.6 mm
M780D2	IR	780 nm	200 mW	300 mW	800 mA	2.0 V	28 nm	47.3 µW/mm²	1.600 W	>10 000 h	20°	1 mm x 1 mm	2.4 mm
M780D3	IR	780 nm	800 mW	950 mW	800 mA	7.8 V	30 nm	13.3 µW/mm²	6.240 W	>10 000 h	120°	Ø3 mm (3 Emitters)	1.6 mm
M810D2	IR	810 nm	325 mW	375 mW	500 mA	3.6 V	25 nm	61.8 µW/mm²	1.800 W	>10 000 h	20°	1 mm x 1 mm	1.6 mm
M850D2	IR	850 nm	900 mW	1100 mW	1000 mA	2.9 V	30 nm	22.9 µW/mm²	2.900 W	100 000 h	90°	1 mm x 1 mm	1.6 mm
M850D3	IR	850 nm	1400 mW	1600 mW	1500 mA	3.85 V	30 nm	19.4 µW/mm²	5.770 W	>10 000 h	150°	1 mm x 1 mm	1.6 mm
M880D2	IR	880 nm	300 mW	350 mW	1000 mA	1.7 V	50 nm	5.6 µW/mm²	1.700 W	>10 000 h	128°	1 mm x 1 mm	2.4 mm
M940D2	IR	940 nm	800 mW	1000 mW	1000 mA	2.75 V	37 nm	19.1 µW/mm²	2.750 W	100 000 h	90°	1 mm x 1 mm	1.6 mm
M970D2	IR	970 nm	35 mW	50 mW	600 mA	1.4 V	50 nm	0.7 µW/mm²	0.840 W	>10 000 h	124°	1 mm x 1 mm	2.4 mm
Item #	**Color (Click for Spectrum and Data)[a]**	**Nominal Wavelength[a,b]**	**LED Output Power[a]**		**Maximum Current (CW)**	**Forward Voltage**	**Bandwidth (FWHM)**	**Irradiance (Typical)[c]**	**Electrical Power**	**Typical Lifetime**	**Viewing Angle (Full Angle at Half Max)**	**Emitter Size**	**MCPCB Thickness**
			Minimum	**Typical**									
M1050D1	IR	1050 nm	50 mW	70 mW	700 mA	1.5 V	60 nm	1.9 µW/mm²	1.050 W	>10 000 h	120°	1 mm x 1 mm	2.4 mm
M1200D2	IR	1200 nm	30 mW	35 mW	700 mA	1.4 V	80 nm	0.7 µW/mm²	0.980 W	>10 000 h	134°	1 mm x 1 mm	2.4 mm
M1300D2	IR	1300 nm	25 mW	30 mW	500 mA	1.4 V	80 nm	0.6 µW/mm²	0.700 W	>10 000 h	134°	1 mm x 1 mm	2.4 mm
M1450D2	IR	1450 nm	31 mW	36 mW	700 mA	1.15 V	80 nm	0.4 µW/mm²	0.805 W	>10 000 h	136°	1 mm x 1 mm	2.4 mm
M1550D2	IR	1550 nm	31 mW	36 mW	700 mA	1.1 V	102 nm	0.5 µW/mm²	1.050 W	>10 000 h	136°	1 mm x 1 mm	2.4 mm
M1650D2	IR	1650 nm	13 mW	16 mW	600 mA	1.1 V	120 nm	1.2 µW/mm²	660 mW	>10 000 h	20°	1 mm x 1 mm	2.4 mm
MPRP1D2[f]	Purple	455 nm (12.5%[g]) / 640 nm	275 mW	325 mW	300 mA	3.1 V	N/A	3.7 µW/mm²	930 mW	>10 000 h	115°	1 mm x 2 mm	1.6 mm
MBB1D1[h]	Broadband	470 - 850 nm[i]	70 mW	80 mW	500 mA	3.6 V	280 nm	12.5 µW/mm²	1.800 W	10 000 h	120°	1 mm x 1 mm	1.6 mm
MWWHD3[f]	Warm White	3000 K[j]	2000 mW	2300 mW	700 mA	11.7 V	N/A	37.0 µW/mm²	8.200 W	>100 000 h	125°	3.5 mm x 3.5 mm	1.6 mm
MNWHD2[f]	Neutral White	4900 K[j]	740 mW	880 mW	1225 mA	2.9 V	N/A	7.7 µW/mm²	3.553 W	>10 000 h	150°	1 mm x 1 mm	2.4 mm
MCWHD2[e,f]	Cold White	6500 K[j]	800 mW	840 mW	1000 mA	3.2 V	N/A	24.8 µW/mm²	3.200 W	100 000 h	80°	1 mm x 1 mm	1.6 mm
MCWHD3[f]	Cold White	6500 K[j]	2350 mW	2700 mW	700 mA	11.7 V	N/A	41.3 µW/mm²	8.200 W	>100 000 h	125°	3.5 mm x 3.5 mm	1.6 mm

- 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. Output plots and center wavelength specs are only intended to be used as a guideline.
- For LEDs in the visible spectrum, 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 spectrograph.
- Irradiance is measured at a distance of 200 mm from the LED.
- Our 265 nm to 430 nm 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.
- These LEDs use a high-thermal-conductivity MCPCB material from SinkPAD, while the rest of the MCPCB LEDs use a high-thermal-conductivity MCPCB material from Bergquist.
- These LEDs are phosphor-converted and may not turn off completely when modulated above 10 kHz at duty cycles below 50%.
- Percentage of LED intensity that emits in the blue portion of the spectrum, from 400 nm to 525 nm. See spectrum graph for details.
- The MBB1D1 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%.
- 10 dB Bandwidth
- Correlated Color Temperature

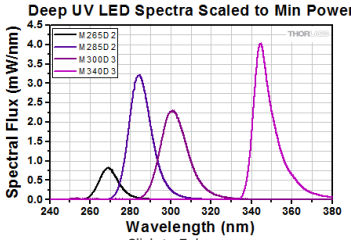
Hide Relative Power

RELATIVE POWER

Relative Power

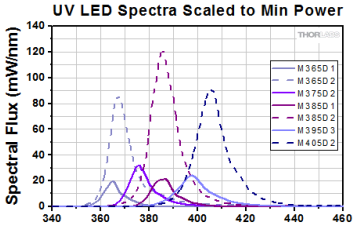
The actual spectral output and total output power of any given LED will vary due to variations in the manufacturing process and operating parameters, such as temperature and current. Both a typical and minimum output power are specified to help you select an LED that suits your needs. Each metal-core 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. An excel file with normalized and scaled spectra for all of the unmounted LEDs can be downloaded here.

Deep UV LED Spectra Scaled to Min Power



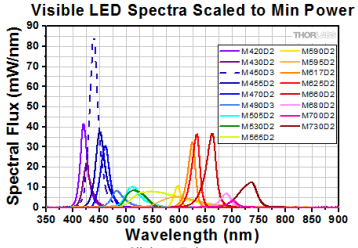
Click to Enlarge

UV LED Spectra Scaled to Min Power



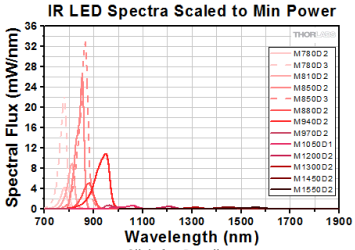
Click to Enlarge

Visible LED Spectra Scaled to Min Power



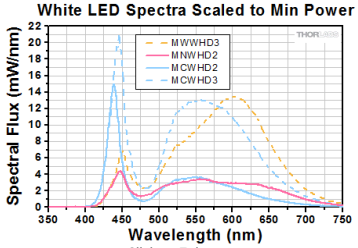
Click to Enlarge

IR LED Spectra Scaled to Min Power



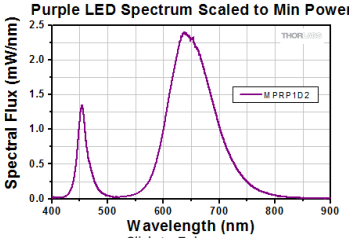
Click for Details

White LED Spectra Scaled to Min Power



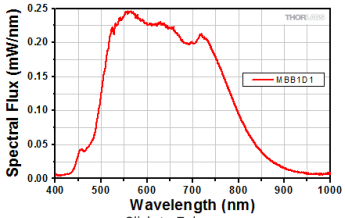
Click to Enlarge

Purple LED Spectrum Scaled to Min Power



Click to Enlarge

Broadband LED Spectrum Scaled to Min Power



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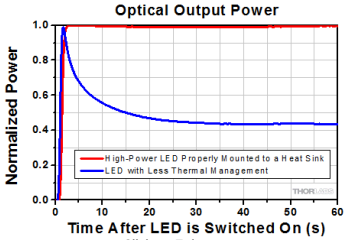
Hide Stability

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.

Optical Output Power



Click to Enlarge

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	LEDD1B	DC2200[a]	DC4100[a,b,c]	DC4104[a,b,c]

Click Photos to Enlarge				
LED Driver Current Output (Max)	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)	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)	Analog (BNC)	USB 2.0 and Analog (BNC)	USB 2.0 and Analog (BNC)	USB 2.0 and Analog (8-Pin)
Main Driver Features	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	-	✓	✓	✓

- Please note that the EEPROM readout feature that automatically adjusts the driver's current limit for our mounted LEDs is not compatible with our LEDs on MCPCB.
- 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.
- 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.
- The MCPCB LEDs sold below are compatible with the LED2 Terminal via the CAB-LEDD1 (available separately below).
- Small Signal Bandwidth: Modulation not exceeding 20% of full scale current. The driver accepts other waveforms, but the maximum frequency will be reduced.
- Several of these LEDs produce light by stimulating emission from phosphor, which limits their modulation frequencies. The M565D2, M595D2, MPRP1D2, MWWHD1, MNWHD2, and MCWHD2 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

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 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:

Item #	Information File	Available Ray Files	File Size	Click to Download
M365D1	M365_Info.pdf	100,000 Rays and 1 Million Rays	27.4 MB	
M385D1	M385_Info.pdf	1 Million Rays and 5 Million Rays	148 MB	
M450D3[a]	LD_CQAR_20150731_info.pdf	100,000 Rays, 500,000 Rays, and 5 Million Rays	123 MB	
M455D2[a,b]	LD_CQ7P_290311_info.pdf	100,000 Rays, 500,000 Rays, and 5 Million Rays	125 MB	
M505D2[a]	LV_CK7P_191212_info.pdf	100,000 Rays, 500,000 Rays, and 5 Million Rays	123 MB	
M850D2[a]	SFH4715S_100413_info.pdf	100,000 Rays, 500,000 Rays, and 5 Million Rays	140 MB	
M940D2[a]	SFH_4725S_110413_info.pdf	100,000 Rays, 500,000 Rays, and 5 Million Rays	140 MB	

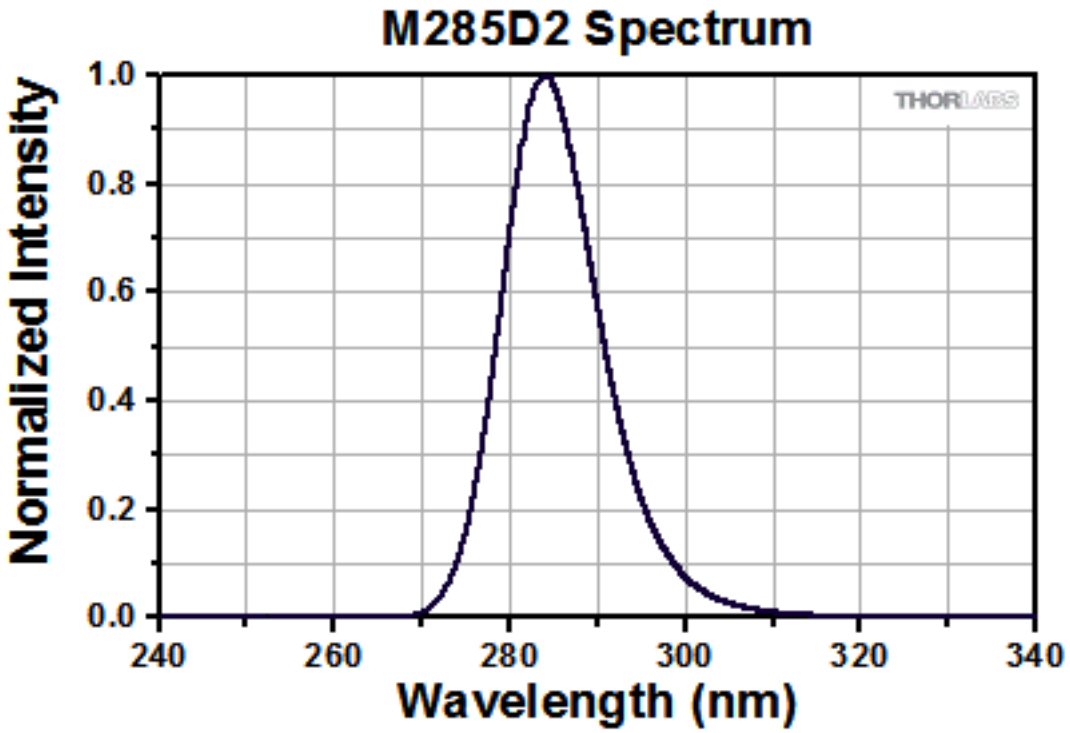
- A radiometric color spectrum, bare LED CAD file, and sample Zemax file are also available for these LEDs.
- The ray data files for the M455D2 can be used for the M470D2 as well by manually resetting the source wavelength in Zemax. Wavelength-specific data and files, such as the radiometric color spectrum and sample Zemax files, only apply to the M455L3.
- The ray data files for the M617D2 can be used for the M590D2 and M625D2 as well by manually resetting the source wavelength in Zemax. Wavelength-specific data and files, such as the radiometric color spectrum and sample Zemax files, only apply to the M617D2.

- **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 an 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 LEDs on Metal-Core Printed Circuit Boards

LEDs on Metal-Core Printed Circuit Boards

Part Number	Description	Price	Availability
M265D2	265 nm, 10 mW (Min) LED on Metal-Core PCB, 350 mA	$1,135.00	Today
M300D3	300 nm, 40 mW (Min) LED on Metal-Core PCB, 350 mA	$338.00	Today

M340D3	340 nm, 53 mW (Min) LED on Metal-Core PCB, 700 mA	$187.00	Today
M365D1	365 nm, 190 mW (Min) LED on Metal-Core PCB, 700 mA	$152.00	Today
M365D2	365 nm, 1150 mW (Min) LED on Metal-Core PCB, 1400 mA	$187.00	Today
M375D2	Customer Inspired!375 nm, 387 mW (Min) LED on Metal-Core PCB, 700 mA	$129.00	Today
M385D1	385 nm, 270 mW (Min) LED on Metal-Core PCB, 700 mA	$152.00	Today
M385D2	385 nm, 1650 mW (Min) LED on Metal-Core PCB, 1400 mA	$187.00	Today
M395D3	395 nm, 400 mW (Min) LED on Metal-Core PCB, 500 mA	$126.00	Today
M405D2	405 nm, 1500 mW (Min) LED on Metal-Core PCB, 1400 mA	$187.00	Today
M420D2	420 nm, 750 mW (Min) LED on Metal-Core PCB, 1000 mA	$126.00	Today
M430D2	NEW! 430 nm, 490 mW (Min) LED on Metal-Core PCB, 500 mA	$55.00	Today
M450D3	450 nm, 1850 mW (Min) LED on Metal-Core PCB, 2000 mA	$64.50	Today
M455D2	455 nm, 900 mW (Min) LED on Metal-Core PCB, 1000 mA	$68.50	Today
M470D2	470 nm, 650 mW (Min) LED on Metal-Core PCB, 1000 mA	$68.50	3-5 Days
M490D3	490 nm, 255 mW (Min) LED on Metal-Core PCB, 350 mA	$71.50	Today
M505D2	505 nm, 400 mW (Min) LED on Metal-Core PCB, 1000 mA	$68.50	Today
M530D2	530 nm, 350 mW (Min) LED on Metal-Core PCB, 1000 mA	$68.50	Today
M565D2	565 nm, 880 mW (Min) LED on Metal-Core PCB, 1000 mA	$58.00	Today
M590D2	590 nm, 160 mW (Min) LED on Metal-Core PCB, 1000 mA	$52.75	Today
M595D2	595 nm, 445 mW (Min) LED on Metal-Core PCB, 700 mA	$58.00	Today
M617D2	617 nm, 600 mW (Min) LED on Metal-Core PCB, 1000 mA	$52.75	3-5 Days
M625D2	625 nm, 700 mW (Min) LED on Metal-Core PCB, 1000 mA	$52.75	Today
M660D2	660 nm, 940 mW (Min) LED on Metal-Core PCB, 1200 mA	$64.50	Today
M680D2	Customer Inspired!680 nm, 180 mW (Min) LED on Metal-Core PCB, 600 mA	$76.50	Today
M700D2	700 nm, 80 mW (Min) LED on Metal-Core PCB, 500 mA	$76.50	Today
M730D2	730 nm, 515 mW (Min) LED on Metal-Core PCB, 1000 mA	$53.00	Today
M780D2	780 nm, 200 mW (Min) LED on Metal-Core PCB, 800 mA	$58.00	Today
M780D3	780 nm, 800 mW (Min) LED on Metal-Core PCB, 800 mA	$104.00	Today
M810D2	810 nm, 325 mW (Min) LED on Metal-Core PCB, 500 mA	$62.50	Today
M850D2	850 nm, 900 mW (Min) LED on Metal-Core PCB, 1000 mA	$58.00	Today
M850D3	850 nm, 1400 mW (Min) LED on Metal-Core PCB, 1500 mA	$113.00	Today
M880D2	880 nm, 300 mW (Min) LED on Metal-Core PCB, 1000 mA	$58.00	Today
M940D2	940 nm, 800 mW (Min) LED on Metal-Core PCB, 1000 mA	$58.00	3-5 Days
M970D2	970 nm, 35 mW (Min) LED on Metal-Core PCB, 600 mA	$58.00	Today
M1050D1	1050 nm, 50 mW (Min) LED on Metal-Core PCB, 700 mA	$68.50	Today
M1200D2	Customer Inspired!1200 nm, 30 mW (Min) LED on Metal-Core PCB, 700 mA	$126.00	Today
M1300D2	Customer Inspired!1300 nm, 25 mW (Min) LED on Metal-Core PCB, 500 mA	$126.00	Today
M1450D2	1450 nm, 31 mW (Min) LED on Metal-Core PCB, 700 mA	$126.00	Today
M1550D2	Customer Inspired!1550 nm, 31 mW (Min) LED on Metal-Core PCB, 700 mA	$126.00	Today
M1650D2	1650 nm, 13 mW (Min) LED on Metal-Core PCB, 600 mA	$180.00	3-5 Days
MPRP1D2	455 nm (12.5%) / 640 nm, 275 mW (Min) LED on Metal-Core PCB, 300 mA	$41.00	Today
MBB1D1	Broadband (470 - 850 nm), 70 mW (Min) LED on Metal-Core PCB, 500 mA	$374.00	3-5 Days
MWWHD3	3000 K, 2000 mW (Min) LED on Metal-Core PCB, 700 mA	$76.50	Today
MNWHD2	4900 K, 740 mW (Min) LED on Metal-Core PCB, 1225 mA	$45.00	Today
MCWHD2	6500 K, 800 mW (Min) LED on Metal-Core PCB, 1000 mA	$52.75	Today
MCWHD3	6500 K, 2350 mW (Min) LED on Metal-Core PCB, 700 mA	$76.50	Today

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 the DC4100-HUB).

Male M8x1 Connector

Pin	Description	Wire Color
1	LED Anode	Brown
2	LED Cathode	White
3	EEPROM GND	Black
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	$15.90	Today