

**M395F2 - May 4, 2015**

Item # M395F2 was discontinued on May 4, 2015. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

**FIBER-COUPLED HIGH-POWER LEDs**

- ▶ UV, Visible, and NIR Versions
- ▶ Optimized Heat Management Results in Stable Output
- ▶ Integrated Chip Stores LED Operating Parameters
- ▶ SMA Fiber Connector



[Hide Overview](#)

**OVERVIEW**

**Fiber-Coupled LED Features**

- Nominal Wavelengths Ranging from 365 nm to 1050 nm
- Warm White, Cold White, and Broadband LEDs Also Available
- Integrated Identification Chip (EEPROM) Stores LED Operating Parameters
- Optimized Thermal Properties Lead to Stable Output Power
- SMA Connectors are Ideal for use with Multimode Fiber Optic Patch Cables

Each fiber-coupled LED consists of a single, high-power LED that is coupled to the optical fiber using the butt-coupling technique. During this process, the fiber connector is positioned so that the end of the fiber will be as close as possible to the emitter, thereby minimizing losses at the fiber input and maximizing output power. The coupling efficiency is primarily dependent on the core diameter and the numerical aperture (NA) of the connected fiber. Larger core diameters and higher NA values give rise to reduced losses and increased output power at the end of the fiber.

Item #	Color (Click for Spectrum) <sup>a</sup>	Nominal Wavelength <sup>a,b</sup>	Ø200 µm Core Fiber Output (Typ.) <sup>c</sup>	Ø400 µm Core Fiber Output (Typ.) <sup>d</sup>
M365F1	UV	365 nm	1.0 mW	4.1 mW
M385F1	UV	385 nm	2.68 mW	10.7 mW
M395F2	UV	395 nm	3.51 mW	6.7 mW
M405F1	UV	405 nm	0.93 mW	3.7 mW
M420F2	Violet	420 nm	8.91 mW	16.2 mW
M455F1	Royal Blue	455 nm	2.75 mW	11.0 mW
M470F1	Blue	470 nm	2.53 mW	10.1 mW
M490F2	Blue	490 nm	0.42 mW	2.0 mW
M505F1	Cyan	505 nm	2.0 mW	8.0 mW
M530F1	Green	530 nm	1.3 mW	5.1 mW
M565F1	Green Yellow	565 nm	0.50 mW	2.0 mW
M590F1	Amber	590 nm	0.80 mW	3.2 mW
M617F1	Orange	617 nm	2.70 mW	10.8 mW
M625F1	Red	625 nm	2.53 mW	10.1 mW
M660F1	Deep Red	660 nm	3.63 mW	14.5 mW
M740F2	Far Red	740 nm	2.1 mW	6.0 mW
M780F2	IR	780 nm	1.15 mW	7.5 mW
M850F2	IR	850 nm	3.35 mW	13.4 mW

### Optimized Thermal Management

These high-power, fiber-coupled LEDs possess good thermal stability properties. The large, passively cooled heat sink is in direct contact with the metal core circuit board on which the LED is mounted. This minimizes the degradation of optical output power caused by increased LED junction temperature.

### Broadband LED Option

The MBB1F1 fiber-coupled 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. For more information on the spectrum of this broadband source, please see the table to the right.

### Driver Options

Each LED is equipped with an integrated EEPROM (read-only memory) chip storing information about the LED (e.g., current limit, wavelength, and forward voltage) that can be read by Thorlabs' DC2100, DC4100, and DC4104 Controllers (the latter two require the DC4100-HUB). These drivers, which can modulate the LED at a rate of up to 100 kHz, can automatically adjust the maximum current setting based on the information stored in the EEPROM chip to protect the connected LED. A fourth driver, the LEDD1B, is capable of providing LED modulation frequencies up to 5 kHz, but is not capable of reading information from the EEPROM chip. For more information about all of these LED drivers, see the [LED Drivers](#) tab.

### Optogenetics Applications

Our fiber-coupled LEDs are ideal light sources for optogenetics applications. They feature a variety of wavelength choices and a convenient interconnection to optogenetics patch cables. Additionally, up to four different light sources can be driven and modulated simultaneously with our DC4100 controller and DC4100-HUB hub. Click here for our entire line of optogenetics products.

<b>M880F2</b>	IR	880 nm	0.58 mW	3.4 mW
<b>M940F1</b>	IR	940 nm	1.6 mW	6.5 mW
<b>M970F2</b>	IR	970 nm	0.04 mW	0.3 mW
<b>M1050F1</b>	IR	1050 nm	0.35 mW	1.4 mW
<b>MBB1F1<sup>e</sup></b>	Broadband	470 - 850 nm <sup>f</sup>	0.30 mW	1.2 mW
<b>MWWHF1<sup>g</sup></b>	Warm White	3000 K <sup>h</sup>	1.8 mW	7.0 mW
<b>MCWHF1<sup>g</sup></b>	Cold White	5600 K <sup>h</sup>	1.8 mW	7.0 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. Output plots and nominal wavelength specs are only intended to be used as a guideline.
- For LEDs with a 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 spectrometer.
- Typical Power for MM Fiber with Ø200 µm core, 0.39 NA. See the *Output Power* tab for more output power test data.
- Typical Power for MM Fiber with Ø400 µm core, 0.39 NA. See the *Output Power* tab for more output power test data.
- The MBB1F1 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.
- The MWWHF1 and MCWHF1 LEDs may not turn off completely when modulated at frequencies above 5 kHz, as the white light is produced by optically stimulating emission from phosphor.
- Correlated Color Temperature

[Hide Output Power](#)

## OUTPUT POWER

### Output Power with Connected Multimode Patch Cables

The table below lists the minimum optical power values measured at the output of different fibers that were coupled to a M530F1 LED driven at 1000 mA. In conjunction with the output powers listed in the *Specs* tab, this can be used as an estimate for the usable power for all the fiber-coupled LEDs sold below when connected to a multimode patch cable.

Patch Cable Item #	Fiber	Core Size	NA	Min. Power
M14L0x	FG050LGA	Ø50 µm	0.22	0.022 mW
M15L0x	FG105LCA	Ø105 µm	0.22	0.09 mW
M16L0x	FG050LGA	Ø50 µm	0.22	0.02 mW
M18L0x	FG105LCA	Ø105 µm	0.22	0.097 mW
M19L0x	UM22-200	Ø200 µm	0.22	0.52 mW
M22L0x	UM22-400	Ø400 µm	0.22	1.54 mW
M25L01	UM22-400	Ø200 µm	0.22	1.34 mW
M25L02	FG200LCC	Ø200 µm	0.22	1.2 mW
M25L05	FG200LCC	Ø200 µm	0.22	0.95 mW
M28L01	FT400EMT	Ø400 µm	0.39	3.99 mW
M28L02	FT400EMT	Ø400 µm	0.39	3.34 mW
M28L05	FT400EMT	Ø400 µm	0.39	3.58 mW
M29L0x	FT600EMT	Ø600 µm	0.39	7.34 mW

M35L0x	FT1000EMT	Ø1000 µm	0.39	17.61 mW
M37L0x	FG550LEC	Ø550 µm	0.22	6.86 mW
M38L0x	FT200EMT	Ø200 µm	0.39	0.861 mW
M40L0x	BFL48-400	Ø400 µm	0.48	5.06 mW
M41L01	BFL48-600	Ø600 µm	0.48	10.66 mW
M41L02	BFL48-600	Ø600 µm	0.48	9.73 mW

[Hide LED Drivers](#)

## LED DRIVERS

Compatible Drivers	LEDD1B <sup>a</sup>	DC2100 <sup>b</sup>	DC4100 <sup>b, c, d</sup>	DC4104 <sup>b, c, d</sup>
Click Photos to Enlarge				
Max LED Driver Current Output	1.2 A	2.0 A	1.0 A per Channel	1.0 A per Channel
Max LED Driver Forward Voltage	12 V	24 V	5 V	5 V
Max Modulation Frequency Using External Input	5 kHz <sup>e</sup>	100 kHz <sup>e, f</sup>	100 kHz <sup>e, f</sup> (Simultaneous Across all Channels)	100 kHz <sup>e, f</sup> (Independently Controlled Channels)
Interface	Analog	USB 2.0	USB 2.0	USB 2.0
Main Driver Features	Very Compact Footprint 60 mm x 73 mm x 104 mm (W x H x D)	Individual Pulse Width Control	4 Channels <sup>d</sup>	4 Channels <sup>d</sup>
EEPROM Compatible: Reads Out LED Data for LED Settings	-	x	x	x
LCD Display	-	x	x	x

- The pictured cord is included for custom applications, and is not required for fiber-coupled LEDs.
- Automatically limits to LEDs max current via EEPROM readout.
- LED sources with a forward voltage of greater than 5 V, such as the M340F2, are not compatible with DC4100 or DC4104.
- The DC4100 or 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 when used with the DC4100 or DC4104.
- The MBB1F1 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%.
- The MWWHF1 and MCWHF1 LEDs may not turn off completely when modulated at frequencies above 5 kHz, as the white light is produced by optically stimulating emission from phosphor.

Note: The LEDs sold on this page are not compatible with the DC3100 driver sold with our Modulated LEDs for FLIM Microscopy kits.

[Hide Pin Diagram](#)

## PIN DIAGRAM

### Pin Connection

The diagram to the right shows the male connector of the fiber-coupled LED assembly. It is a standard M8 x 1 sensor circular connector. Pins 1 and 2 are the connection to the LED. Pin 3 and 4 are used for the internal EEPROM (electrically erasable programmable read-only memory) in these LEDs. If using an LED driver that was not purchased from Thorlabs, be careful that the appropriate connections are made to Pin 1 and Pin 2 and that you do not attempt to drive the LED through the EEPROM pins.



Pin	Specification	Color
1	LED Anode	Brown
2	LED Cathode	White
3	EEPROM GND	Black
4	EEPROM IO	Blue

## Fiber-Coupled High-Power LEDs



- Integrated EEPROM for Automated LED Settings with Compatible Thorlabs Controllers
- Long Lifetimes  $\geq 10,000$  Hours (See *Specs* Tab for Details)
- Output can be Modulated with Suitable Controller (See *LED Drivers* Tab)
- Stable Output Intensity by Optimized Thermal Management
- SMA Fiber Connector

These fiber-coupled LEDs consist of a high-power LED butt-coupled to an SMA fiber connector and mounted to a heatsink. They can be easily integrated into your optical setup using one of our SMA-connectorized multimode fiber patch cables. For compatible drivers to power these LEDs, please see the *LED Drivers* tab.

Part Number	Description	Price	Availability
M365F1	UV (365 nm) Fiber-Coupled LED, SMA, 700 mA	\$530.00	Today
M385F1	UV (385 nm) Fiber-Coupled LED, SMA, 700 mA	\$520.00	Today
M395F2	UV (395 nm) Fiber-Coupled LED, SMA, 1000 mA	\$438.00	Today
M405F1	Customer Inspired!UV (405 nm) Fiber-Coupled LED, SMA, 500 mA	\$438.00	Today
M420F2	Violet (420 nm) Fiber-Coupled LED, SMA, 1000 mA	\$438.00	Today
M455F1	Royal Blue (455 nm) Fiber-Coupled LED, SMA, 1000 mA	\$377.00	Today
M470F1	Blue (470 nm) Fiber-Coupled LED, SMA, 1000 mA	\$377.00	Today
M490F2	Blue (490 nm) Fiber-Coupled LED, SMA, 350 mA	\$377.00	Today
M505F1	Cyan (505 nm) Fiber-Coupled LED, SMA, 1000 mA	\$377.00	Today
M530F1	Green (530 nm) Fiber-Coupled LED, SMA, 1000 mA	\$377.00	Today
M565F1	Customer Inspired!Green (565 nm) Fiber-Coupled LED, SMA, 500 mA	\$648.00	Today
M590F1	Amber (590 nm) Fiber-Coupled LED, SMA, 1000 mA	\$377.00	Today
M617F1	Orange (617 nm) Fiber-Coupled LED, SMA, 1000 mA	\$377.00	Today
M625F1	Red (625 nm) Fiber-Coupled LED, SMA, 1000 mA	\$377.00	Today
M660F1	Deep Red (660 nm) Fiber-Coupled LED, SMA, 1000 mA	\$377.00	Today
M740F2	Far Red (740 nm) Fiber-Coupled LED, SMA, 800 mA	\$438.00	Today
M780F2	IR (780 nm) Fiber-Coupled LED, SMA, 800 mA	\$377.00	Today
M850F2	IR (850 nm) Fiber-Coupled LED, SMA, 1000 mA	\$377.00	Today
M880F2	IR (880 nm) Fiber-Coupled LED, SMA, 1000 mA	\$377.00	Today
M940F1	IR (940 nm) Fiber-Coupled LED, SMA, 1000 mA	\$377.00	Today
M970F2	IR (970 nm) Fiber-Coupled LED, SMA, 600 mA	\$377.00	Today
M1050F1	IR (1050 nm) Fiber-Coupled LED, SMA, 700 mA	\$438.00	Today
MBB1F1	Broadband (470 - 850 nm) Fiber-Coupled LED, SMA, 500 mA	\$670.00	Today
MWWHF1	Warm White Fiber-Coupled LED, SMA, 1000 mA	\$377.00	Today
MCWHF1	Cold White Fiber-Coupled LED, SMA, 1000 mA	\$377.00	Today

## Mounted LED Mating Connector



CON8ML-4

- Pico (M8) Receptacle
- Female 4-Pin for Front Mounting
- 0.5 m Long, 24 AWG Wires
- M8 x 0.5 Panel Mount Thread
- IP 67 and NEMA 6P Rated

The CON8ML-4 connector can be used to mate mounted LEDs featured on this page to user-supplied power supplies. We also offer a male 4-Pin M8 connector cable.

Pin	Color	Specification
1	Brown	LED Anode
2	White	LED Cathode
3	Black	EEPROM GND
4	Blue	EEPROM IO



CON8ML-4 Shown Connected to the 4-Pin M8 Plug of Mounted LED

Part Number	Description	Price	Availability
CON8ML-4	4-Pin Female Mating Connector for Mounted LEDs	\$30.00	Today

Visit the [Fiber-Coupled High-Power LEDs](http://www.thorlabs.com/newgroupage9.cfm?objectgroup_id=5206) page for pricing and availability information:  
[http://www.thorlabs.com/newgroupage9.cfm?objectgroup\\_id=5206](http://www.thorlabs.com/newgroupage9.cfm?objectgroup_id=5206)