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THORLABS

SOLIS-460A - Jan. 21, 2016

Item # SOLIS-460A was discontinued on Jan. 21, 2016. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

SOLIS HIGH-POWER LEDS FOR MICROSCOPY

- **High-Power LEDs Designed for Microscopy Applications**
- **Typical Collimated Output Powers from 1.0 to 4.7 W**
- **Compatible with Thorlabs' Lamphouse Port Adapters for Nikon, Olympus, Leica, and Zeiss Microscopes**

SOLIS-1A
Cold White LED,
≥3.0 W Output Power

Application Idea

A Solis™ High-Power LED Installed on the Epi-Illuminator of a Cerna Modular Microscope

Hide Overview

OVERVIEW

Features

- Nine Wavelengths Available (See the Table to the Right for Options)
- Fanless Design Efficienctly Dissipates Heat without Introducing Vibrations
- Light-Weight Package for Mounting Directly to Microscope Ports, Eliminating the Need for LLGs
- Collimated LED Output
- Intelligent, Feature-Rich Electronics
- DC2200 Driver Provides an Intutitive Touchscreen Control Interface (Sold Separately Below)
- Compatible with Port Adapters for Use with Olympus, Nikon, Leica, and Zeiss Microscopes (Sold Separately Below)

Click to Enlarge
Cerna Microscope Configured for Electrophysiology with a Solis LED Controlled by the DC2200 Driver

Item #[a]	Color (Click for Spectrum[b])	Dominant Wavelength[c]	Typical Collimated Output Power
SOLIS-365A(/M)	UV	365 nm	1.0 W
SOLIS-385A(/M)	UV	385 nm	1.6 W
SOLIS-405A(/M)	UV	405 nm	1.8 W
SOLIS-460A(/M)	Royal Blue	460 nm	4.7 W
SOLIS-525A(/M)	Green	525 nm	1.8 W
SOLIS-623A(/M)	Red	623 nm	2.9 W
SOLIS-850A(/M)	IR	850 nm	1.95 W
SOLIS-1A(/M)	Cold White	N/A[d]	3.6 W
SOLIS-2A(/M)	Warm White	N/A[e]	2.3 W

- LED specifications are nominal values. See *Specs* tab for complete specifications.
- A file with data for the LED spectra can be downloaded here.
- For LEDs in the visible spectrum, the dominant wavelength indicates the wavelength at which the LED appears brightest to the human eye. For UV and IR LEDs, the dominant wavelength corresponds to the peak wavelength. The dominant wavelength for visible LEDs may not correspond to the peak wavelength as measured by a spectrograph.
- This LED has a correlated color temperature of 6500 K.
- This LED has a correlated color temperature of 3000 K.

Select Your System

- One Solis LED Head
- One DC2200 Touchscreen LED Driver
- One Microscope Port Adapter (See Table Below for Compatibility Information)

The Solis™ LEDs deliver several watts of total output power from a lightweight, vibration-free package, providing high-power illumination that

can be coupled directly to the epi-illumination path for high light throughput.
Light from the LED is collimated through a large Ø43 mm aperture that can be attached via an adapter (available below) to the epi-illumination paths of many industry-standard microscopes such as Olympus, Nikon, Leica, and Zeiss, as well as the six-cube epi-illumination path available on many of Thorlabs' Cerna Microscopes. Simply select one of Thorlabs' microscope port adapters (available separately below), screw it onto the end of the housing, and install the LED on a compatible microscope.

The lightweight design features passive cooling instead of an internal fan in order to eliminate vibrations that might degrade image quality in a microscopy setup: each LED is mounted to a heatsink inside of a 127.7 mm x 127.7 mm x 99.5 mm (5.03 " x 5.03" x 3.92") vented housing to efficiently dissipate heat. As an added level of protection, the integrated internal memory is programmed to trigger automatic shutdown if the LED internal temperature reaches 95 °C, preventing damage from overheating. The LED will restart after it has cooled to a temperature below 95 °C.

In addition to a collimating lens, each Solis LED also includes a diffuser plate (Item # DG20-1500), which can be used to make the output profile of the LED more uniform. Installation instructions are provided on the *Diffuser Install* tab.

The DC2200 driver (available separately below) has an intuitive, touchscreen interface that supports easy plug-and-play operation of the Solis LED head. The driver allows the LED output power to be set as a fraction of the maximum desired brightness or controlled by setting the LED drive current, sufficient for the majority of applications. For users that require additional control, the driver also includes modulated and pulsed modes that use internally programmed functions, as well as the ability to control the LED output via an external signal. Further details on the driver functions are provided on the *LED Driver* tab.

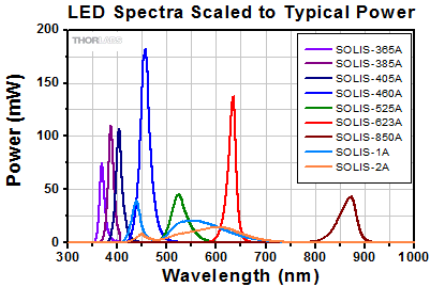
While typical applications involve mounting the LED directly to a microscope port via a microscope adapter, a 1/4"-20 (M6) tapped hole is provided at each corner on the back of the housing for custom mounting applications. The lens tube can also be easily removed to adjust the lens-to-LED distance if necessary; lens tube removal is described on the *Diffuser Install* tab.

Hide Specs

SPECS

Item #[a]	Info		Color (Click for Spectrum[b])	Dominant Wavelength[c]	Minimum Collimated Output Power[d]	Typical Collimated Output Power[d]	Max Current (CW)	Max Forward Voltage	Bandwidth (FWHM)	Emitter Size	Collimating Optic (Installed)	Typical Lifetime
	Imperial	Metric										
SOLIS-365A(/M)			UV	365 nm	0.85 W	1.0 W	4500 mA	4.0 V	10 nm	2 mm x 2 mm	ACL5040U-A	>12 000 h
SOLIS-385A(/M)			UV	385 nm	1.3 W	1.6 W	4500 mA	4.0 V	12 nm	2 mm x 2 mm	ACL5040U-A	>29 000 h
SOLIS-405A(/M)			UV	405 nm	1.6 W	1.8 W	4500 mA	4.0 V	12 nm	2 mm x 2 mm	ACL5040U-A	>40 000 h
SOLIS-460A(/M)			Royal Blue	460 nm	4.1 W	4.7 W	9000 mA	3.5 V	20 nm	3 mm x 3 mm	ACL5040U-A	>10 000 h
SOLIS-525A(/M)			Green	525 nm	1.6 W	1.8 W	9000 mA	4.9 V	36 nm	3 mm x 3 mm	ACL5040U-A	>10 000 h
SOLIS-623A(/M)			Red	623 nm	2.5 W	2.9 W	9000 mA	4.8 V	17 nm	3 mm x 3 mm	ACL5040U-A	>10 000 h
SOLIS-850A(/M)			IR	850 nm	1.7 W	1.95 W	1000 mA	12.8 V	39 nm	Ø6.5 mm[e]	ACL5040U-B	>40 000 h
SOLIS-1A(/M)			Cold White	N/A[f]	3.0 W	3.6 W	9000 mA	4.5 V	N/A	3 mm x 3 mm	ACL5040U-A	>10 000 h
SOLIS-2A(/M)			Warm White	N/A[g]	2.0 W	2.3 W	1500 mA	12.5 V	N/A	Ø5 mm[e]	ACL5040U-A	>100 000 h

- LED specifications are nominal values.
- A file with the LED spectral data can be downloaded here.
- For LEDs in the visible spectrum, the dominant wavelength indicates the wavelength at which the LED appears brightest to the human eye. For UV and IR LEDs, the dominant wavelength corresponds to the peak wavelength. The dominant wavelength for visible LEDs may not correspond to the peak wavelength as measured by a spectrograph.
- Measured at the Max Current (CW). The LED output power can be decreased by lowering the current supplied to the LED.
- These LEDs comprise of four emitters with a lens of the specified diameter.
- This LED has a correlated color temperature of 6500 K.
- This LED has a correlated color temperature of 3000 K.



Click to Enlarge
A comparison of the typical collimated output for a Solis LED. The actual spectra will vary from LED to LED within specifications.

General Specifications	
Diffuser (Included)	DG20-1500
Clear Aperture	Ø48.3 mm (Ø1.90")
Weight	1 kg
Dimensions	127.7 mm x 127.7 mm x 138.5 mm (5.03" x 5.03" x 5.45")
Operating Temperature (Non-Condensing)	0 to 40 °C
Storage Temperature	-40 to 70 °C
Internal Temperature to Trigger Automatic Shut Off	95 °C

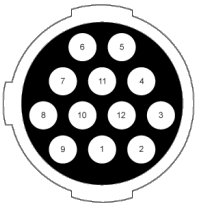
LED Output Power

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 Solis high-power 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 plot to the right have been scaled to the typical collimated output power for each LED. The intensities shown in this graph are representative, not absolute. An excel file with normalized and scaled spectra for all of the mounted high-power LEDs can be downloaded here.

Hide Pin Diagram

PIN DIAGRAM

Solis LED Pin Diagram



Male 12 Pin Neutrik MiniCON Connector

Pin	Connection
1	LED Cathode
2	LED Cathode
3	Not Used
4	LED Anode
5	LED Anode
6	LED Anode
7	LED Anode
8	LED Cathode
9	LED Cathode
10	Not Used
11	EEPROM (Data) I/O
12	EEPROM (Data) Ground

Hide LED Driver

LED DRIVER

Features

Selected Specifications	

- Two LED Connection Terminals Support Many of Thorlabs' LEDs
  - Terminal LED1 for High-Power Solis LEDs
  - Terminal LED2 for Mounted, Collimated, and Fiber-Coupled LEDs
  - MCPCB-Mounted LEDs Compatible with LED2 Terminal Using the Included CAB-LEDD1 Cable
- Operating Modes to Set Brightness or Constant Current
- Internal Pulse Mode
  - Adjustable Frequency, Duty Cycle, and Pulse Count
  - Sine, Square, or Triangle Waveforms
- External Trigger and Modulation
- Remote Control via USB Interface
- Interlock Circuit Accessible on Back of Housing for Use with User Provided Emergency Switch

The DC2200 LED Driver is designed to power many of Thorlabs' LEDs, including the Solis High-Power LEDs for Microscopy, Mounted LEDs, and Fiber-Coupled LEDs. The driver can provide a maximum LED current of up to 10 A and maximum forward voltage of up to 50 V. A list of current / forward voltage combinations outlined in the table to the right.

Item #		DC2200	
LED Terminal		**LED1**	**LED2**
LED Current / Max LED Forward Voltage[a]		1.0 A / 50.0 V 2.0 A / 35.0 V 4.0 A / 15.0 V 5.0 A / 10.0 V 10.0 A / 5.0 V	1.5 A / 50.0 V 2.0 A / 35.0 V
LED Current Accuracy	**0.0 - 2.0 A**	-	±(0.1% + 1 mA)
	0.0 - 4.0 A	±(0.1% + 2 mA)	-
	4.0 - 10.0 A	±(0.1% + 4 mA)	-
LED Current Resolution		0.1 mA	
Internal Modulation	**Waveforms**	Sine, Square, Triangle	
	Frequency Range	20 Hz to 100 kHz	
External Modulation Small Signal Bandwidth[b]		DC - 250 kHz	

- For drive currents up to 1 A, the DC2200 is guaranteed to support a maximum voltage of 50 V; for drive currents up to 2 A, the DC2200 is guaranteed to support a maximum voltage of 35 V; etc.
- Small Signal Bandwidth: Modulation not exceeding 20% of full scale current. The driver accepts other waveforms, but the maximum frquency will be reduced.

The back panel includes two LED connection terminals for compatibility with all of Thorlabs' high-power and mounted LEDs. The LED1 terminal is a female 12-pin Neutrik MiniCON connector that accommodates high-power Solis LEDs that require drive currents up to 10 A. The LED2 terminal has a female 4-pin M8x1 connector designed for lower-power LEDs that require drive currents of ≤2 A. While two LEDs can be connected to the driver, only one LED can be driven at a time. For cases where two LEDs are connected simultaneously, the front panel of the driver can be used to select which LED receives the drive current.

The driver can either be controlled locally via the device front panel, as shown in the screenshot above, or from a PC using the USB 2.0 port on the back of the device and the included software package. The main menu of the front panel's touch screen display allows the user to select between operating the LED in constant current mode or brightness mode, internally or externally pulsed modes, and TTL modulation. In addition to reading data stored in the EEPROM memory of LEDs with this feature, the driver can also initiate a test procedure to measure the LED forward voltage, from which it can determine the maximum current limit.

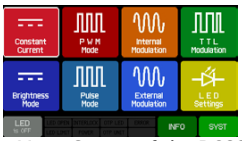
In addition to the USB 2.0 port and LED connection terminals, the back of the housing includes an SMA input for the external modulation signals, an interlock circuit that can be connected to a user-supplied emergency off switch, and grounded jack that can be used with ESD protection equipment.

For more information on driver features, visit the main DC2200 web presentation.

LED Driver Display and Operating Modes

Contant Current and Brightness Modes

These modes allow the LED to be driven at a constant current either entered directly by the user or calculated as a percentage of the total LED brightness. In both modes, the driver will automatically detect the factory set LED current limit. Alternatively, a lower, user-defined current limit can also be entered. In Brightness mode, 100% brightness corresponds to the current limit.



Main Menu Screen of the DC2200 LED Driver

Pulse and Modulation Modes: Internal and External

The DC2200 offers several methods for generating pulsed or modulated LED output, either driven internally by the DC2200 or controlled by an external signal. Each mode uses a different set of user inputs, allowing the LED driver to be easily adapted to different applications. The five options are outlined below.

Pulse Width Modulation (PWM) Mode (Internal): This mode generates a train of rectangular pulses to modulate the current supplied to the LED. The driver current when the LED is switched "ON", frequency, duty cycle, and pulse count are all user selectable.

Pulse Mode (Internal): This mode operates using rectangular pulses to modulate the drive current, but allows the user to specify a different set of the LED parameters than in PWM mode. The pulse characteristics are controlled by a user-selected LED brightness, ON time, OFF Time, and Pulse Count.

Internal Modulation Mode (Internal): For applications requiring more than simply switching the LED on and off, this mode allows the LED current to be modulated using either a sine, square, or triangle waveform. Both the minimum and maximum LED currents can be set. Modulation frequencies from 20 Hz to 100 kHz are supported in this mode.

External Modulation Mode (External): For more demanding applications, an external modulation signal can be applied via the SMA connector on the rear

panel of the driver, which accepts input from 0 to 5 V. This terminal supports up to 250 kHz modulation of the LED current for sine wave functions that do not exceed 20% of the full current scale.

TTL Modulation Mode: This mode allows simple ON/OFF modulation of the LED to be integrated with signals from other equipment in the lab via the SMA connector on the rear panel of the DC2200.

Software

The DC2200 Can also be operated remotely via a PC. The control software is available at the link below:

Software

Software Version 1.0 (July 31, 2015)

Software package for the DC2200 LED Driver

Software

Hide Diffuser Install

DIFFUSER INSTALL

Lens Tube Removal and Diffuser Installation

The SOLIS LEDs are designed so that the lens tube with the aspheric condenser lens can be easily removed from the front of the housing, allowing the included diffuser to be installed behind the lens. Diffusers are useful for creating a more even intensity distribution across the clear aperture of the output.

Click to Enlarge
Figure 1: Remove the two screws holding the lens tube in place using a 2.5 mm hex key or balldriver.

Click to Enlarge
Figure 2: Twist counter-clockwise to loosen the bayonet locking mechanism.

Click to Enlarge
Figure 3: Lift the lens tube away from the LED housing.


Click to Enlarge

Figure 4: Place the diffuser into the bottom of the lens tube, on top of the retaining ring holding the lens in place.


Click to Enlarge

Figure 5: Insert the SM2RR retaining ring.

Click to Enlarge

Figure 6: Use an SPW604 spanner wrench to lock the diffuser in place and re-install the lens tube onto the SOLIS housing by locking the bayonet mount in place and replacing the two screws.

Hide DIY Mounting

DIY MOUNTING


Click to Enlarge

The SOLIS-1A shown mounted to an optical table using the SM2T2 adapter, a LCP01 60 mm cage plate, and a Ø1" post.

Do-It-Yourself Mounting Options

While the Solis LEDs are designed to mount easily to a microscope port, they can also be mounted to an optical table or breadboard. A 1/4"-20 (M6) tapped hole is provided at each corner on the back of the housing for custom mounting applications. The front aperture is SM2 (2.035"-40) threaded, which provides compatibility with Thorlabs' SM2 Lens Tubes and 60 mm Cage Systems. The photo to the right shows one example of how a Solis LED can be mounted to an optical table using a cage plate and Ø1" post. A list of components is provided in the table below.

Description	Imperial Item #	Metric Item #	Quantity
Solis LED for Microscopy	See Below for Options		1
SM2 (2.035"-40) Coupler, External Threads	SM2T2		1
60 mm Threaded Cage Plate, 0.5" Thick (Two SM2RR Retaining Rings Included)	LCP01	LCP01/M	1
Ø1" Pedestal Pillar Post, 8-32 (M4) Taps	Ø1" Post (RS1.5P8E Shown)	Ø1" Post	1
Clamping Fork, 1.76" Counterbored Slot, 1/4"-20 Captive	CF125C or CF175C	CF125C/M or CF175C/M	1

Screw			
LED Driver (Not Shown)	DC2200 (Available Below)		1

Hide LED Selection Guide

LED SELECTION GUIDE

Light Emitting Diode (LED) Selection Guide

(Click Representative Photo to Enlarge; Not to Scale)									
Type	**Unmounted LEDs**	**PCB-Mounted LEDs**	**Heatsink-Mounted LEDs**	**Collimated LEDs for Microscopy (Item # Prefix[a])**	**Fiber-Coupled LEDs[b]**	**High-Power LEDs for Microscopy**	**4-Wavelength LED Source Options[c]**	**Modulated LEDs for FLIM Microscopy**	**LED Arrays**
Wavelength									
245 nm	LED245W (0.07 mW)	-	-	-	-	-	-	-	-
255 nm	LED255J (1 mW Min)	-	-	-	-	-	-	-	-
260 nm	LED260W (0.3 mW) LED260J (1 mW Min)	-	-	-	-	-	-	-	-
265 nm	LED265W (0.3 mW)	M265D2 (10 mW Min)	M265L3 (10 mW Min)	-	-	-	-	-	-
275 nm	LED275W (0.8 mW) LED275J (1 mW Min)	-	-	-	-	-	-	-	-
280 nm	LED280J (1 mW Min)	M280D2 (25 mW Min)	M280L3 (25 mW Min)	-	M280F2 (323 µW)	-	-	-	-
285 nm	LED285W (0.8 mW)	-	-	-	-	-	-	-	-
290 nm	LED290W (0.8 mW)	-	-	-	-	-	-	-	-
300 nm	LED300W (0.5 mW)	-	-	-	-	-	-	-	-
310 nm	-	M310D2 (25 mW Min)	M310L3 (25 mW)	-	-	-	-	-	-
315 nm	LED315W (0.6 mW)	-	-	-	-	-	-	-	-
340 nm	LED341W (0.33 mW)	M340D3 (53 mW Min)	M340L4 (53 mW Min)	-	M340F2 (1.57 mW)	-	-	-	-
365 nm	-	M365D1 (190 mW Min)	M365L2 (190 mW Min)	M365L2 (60 mW)[d]	M365F1 (4.1 mW)	SOLIS-365A(/M) (850 mW)[e]	Available (85 mW)	DC3100-365	LIU365A (31 mW)
		M365D2 (1150 mW Min)	M365LP1 (1150 mW Min)	M365LP1 (350 mW)[d]	M365FP1 (15.5 mW)				
370 nm	LED370E (2.5 mW)	-	-	-	-	-	-	-	-
375 nm	-	M375D2 (387 mW Min)	M375L3 (387 mW Min)	-	M375F2 (4.23 mW)	-	-	-	-
		M385D1	M385L2						

385 nm	-	(270 mW Min)	(270 mW Min)	M385L2 (90 mW)[d]	M385F1 (10.7 mW)	SOLIS-385A(/M) (1300 mW)[e]	Available (95 mW)	-	-
		M385D2 (1650 mW Min)	M385LP1 (1650 mW Min)	M385LP1 (520 mW)[d]	M385FP1 (23.2 mW)				
395 nm	-	M395D3 (400 mW Min)	M395L4 (400 mW Min)	-	M395F3 (6.8 mW)	-	-	-	-
405 nm	LED405E (10 mW)	M405D1 (410 mW Min)	M405L2 (410 mW Min)	M405L2 (260 mW)[d]	M405F1 (3.7 mW)	SOLIS-405A(/M) (1800 mW)[e]	Available (95 mW)	DC3100-405	-
		M405D2 (1500 mW Min)	M405LP1 (1500 mW Min)	M405LP1 (450 mW)[d]	M405FP1 (24.3 mW)				
420 nm	-	M420D2 (750 mW Min)	M420L3 (750 mW Min)	-	M420F2 (16.2 mW)	-	Available (290 mW)	-	-
450 nm	-	M450D3 (1850 mW Min)	M450LP1 (1850 mW Min)	-	-	-	-	-	-
455 nm	-	M455D2 (900 mW Min)	M455L3 (900 mW Min)	M455L3 (360 mW)[d]	M455F1 (11.0 mW)	-	Available (310 mW)	-	-
460 nm	-	-	-	-	-	SOLIS-460A(/M) (4175 mW)[e]			
465 nm	LED465E (20 mW)	-	-	-	-	-	-	-	-
470 nm	LED470L (170 mW)	M470D2 (650 mW Min)	M470L3 (650 mW Min)	M470L3 (250 mW)[d]	M470F1 (10.1 mW)		Available (250 mW)	DC3100-470	LIU470A (253 mW)
490 nm	-	M490D2 (200 mW Min)	M490L3 (200 mW Min)	-	M490F2 (2.0 mW)		Available (50 mW)	-	-
505 nm	-	M505D2 (400 mW Min)	M505L3 (400 mW Min)	M505L3 (150 mW)[d]	M505F1 (8.0 mW)		Available (170 mW)	-	-
525 nm	LED525E (2.6 mW Max) LED528EHP (7 mW)	-	-	-	-	SOLIS-525A(/M) (1650 mW)[e]	-	-	LIU525A (111 mW)
530 nm	-	M530D2 (350 mW Min)	M530L3 (350 mW Min)	M530L3 (130 mW)[d]	M530F1 (5.1 mW)	-	Available (100 mW)	-	-
565 nm	-	M565D2 (880 mW Min)	M565L3 (880 mW Min)		M565F1 (2.0 mW)	-	Available (106 mW)	-	-
590 nm	LED591E (2 mW)	M590D2 (160 mW Min)	M590L3 (160 mW Min)	M590L3 (60 mW)[d]	M590F1 (3.2 mW)	-	Available (65 mW)	-	LIU590A (109 mW)
595 nm	-	M595D2 (445 mW Min)	M595L3 (445 mW Min)	-	-	-	-	-	-
617 nm	-	M617D2 (600 mW Min)	M617L3 (600 mW Min)	M617L3 (230 mW)[d]	M617F1 (10.8 mW)	-	Available (210 mW)	-	-
623 nm	-	-	-	-	-	SOLIS-623A(/M) (2530 mW)[e]	-	-	-
		M625D2	M625L3	M625L3	M625F1		Available		

625 nm	-	(700 mW Min)	(700 mW Min)	(270 mW)[d]	(10.1 mW)	-	(240 mW)	-	-
630 nm	-	-	-	-	-	-	-	DC3100-630	LIU630A (208 mW)
635 nm	LED631E (4 mW) LED635L (170 mW)	-	-	-	-	-	-	-	-
639 nm	LED630E (7.2 mW)	-	-	-	-	-	-	-	-
660 nm	-	M660D2 (940 mW Min)	M660L4 (940 mW Min)	M660L4 (400 mW)[d]	M660F1 (14.5 mW)	-	Available (210 mW)	-	-
730 nm	-	M730D2 (515 mW Min)	M730L4 (515 mW Min)	M730L4 (165 mW)[d]	-	-	-	-	-
740 nm	-	-	-	-	M740F2 (6.0 mW)	-	-	-	-
780 nm	LED780E (18 mW)	M780D2 (200 mW Min)	M780L3 (200 mW Min)	M780L3 (130 mW)[d]	M780F2 (7.5 mW)	-	-	-	LIU780A (315 mW)
810 nm	-	M810D2 (325 mW Min)	M810L3 (325 mW Min)	M810L3 (210 mW)[d]	M810F2 (6.5 mW)	-	-	-	-
850 nm	LED851W (8 mW) LED851L (13 mW)	M850D2 (900 mW Min)	M850L3 (900 mW Min)	M850L3 (330 mW)[d]	M850F2 (13.4 mW)	SOLIS-850A(/M) (1700 mW)[e]	-	-	LIU850A (322 mW)
870 nm	LED870E (22 mW)	-	-	-	-	-	-	-	-
880 nm	-	M880D2 (300 mW Min)	M880L3 (300 mW Min)	-	M880F2 (3.4 mW)	-	-	-	-
910 nm	LED910E (12 mW)	-	-	-	-	-	-	-	-
940 nm	LED940E (18 mW)	M940D2 (800 mW Min)	M940L3 (800 mW Min)	M940L3 (320 mW)[d]	M940F1 (6.5 mW)	-	-	-	-
970 nm	-	M970D2 (35 mW Min)	M970L3 (35 mW Min)	-	M970F2 (0.3 mW)	-	-	-	-
1050 nm	LED1050E (2.5 mW)	M1050D1 (50 mW Min)	M1050L2 (50 mW Min)	-	M1050F1 (1.4 mW)	-	-	-	-
1070 nm	LED1070E (7.5 mW)	-	-	-	-	-	-	-	-
1200 nm	LED1200E (2.5 mW)	M1200D2 (30 mW Min)	M1200L3 (30 mW Min)	-	-	-	-	-	-
1300 nm	LED1300E (2 mW)	M1300D2 (25 mW Min)	M1300L3 (25 mW Min)	-	-	-	-	-	-
1450 nm	LED1450E (2 mW)	M1450D2 (31 mW Min)	M1450L3 (31 mW Min)	-	-	-	-	-	-
1550 nm	LED1550E (2 mW)	M1550D2 (31 mW Min)	M1550L3 (31 mW Min)	-	-	-	-	-	-
1650 nm	LED1600P (1.2 mW)	-	-	-	-	-	-	-	-
1750 nm	LED1700P (1.2 mW Quasi-CW, 30 mW Pulsed)	-	-	-	-	-	-	-	-
	LED1800P								

1850 nm	(0.9 mW Quasi-CW, 20 mW Pulsed)	-	-	-	-	-	-	-	-
1950 nm	LED1900P (1.0 mW Quasi-CW, 25 mW Pulsed)	-	-	-	-	-	-	-	-
2050 nm	LED2050P (1.1 mW Quasi-CW, 28 mW Pulsed)	-	-	-	-	-	-	-	-
2350 nm	LED2350P (0.8 mW Quasi-CW, 16 mW Pulsed)	-	-	-	-	-	-	-	-
4200 nm	LED4300P (0.01 mW Quasi-CW, 0.2 mW Pulsed)	-	-	-	-	-	-	-	-
4500 nm	LED4600P (0.006 mW Quasi-CW, 0.12 mW Pulsed)	-	-	-	-	-	-	-	-
467.5 nm, 525 nm, and 627.5 nm	LEDRGBE (5.8 mW, 6.2 mW, and 3.1 mW)	-	-	-	-	-	-	-	-
470 - 850 nm	-	MBB1D1 (70 mW Min)	MBB1L3 (70 mW Min)	-	MBB1F1 (1.2 mW)	-	-	-	-
6500 K (Cold White)	LEDWE-15 (13 mW)	MCWHD2 (800 mW Min)	MCWHL5 (800 mW Min)	MCWHL5 (320 mW)[d]	-	SOLIS-1A(/M) (3070 mW)[e]	-	-	LIUCWHA (250 mW)
		MCWHD3 (2350 mW Min)	MCWHLP1 (2350 mW Min)						
5600 K (Cold White)		-	-	-	MCWHF1 (7.0 mW)		-	-	
3000 K (Warm White)	-	MWWHD1 (500 mW Min)	MWWHL3 (500 mW Min)	-	MWWHF1 (7.0 mW)	SOLIS-2A(/M) (2000 mW)[e]	-	-	-
		MWWHD3 (2000 mW Min)	MWWHLP1 (2000 mW Min)						

- 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).
- Typical power when used with MM Fiber with Ø400 µm core, 0.39 NA.
- Our LED4D 4-Wavelength LED Source is available with select combinations of the LEDs at these wavelengths.
- Typical power for LEDs with the Leica DMI collimation package (Item # Suffix: -C2).
- Minimum power for the collimated output of these LEDs. The collimation lens is installed with each LED.

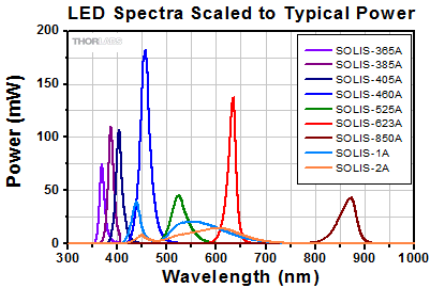
Hide Solis High-Power LEDs for Microscopy

Solis High-Power LEDs for Microscopy

- Typical Collimated LED Output Powers from 1.0 to 4.7 W
- Nine Wavelengths Available
- Automatic Shut Off to Prevent Damage from Overheating
- LED Lifetime At Least 10 000 Hours
- Compatible with DC2200 LED Driver

Click to Enlarge
A SOLIS-1A LED mounted on an Olympus microscope via the SM2A13 adapter (available below), driven by the DC2200 Driver (available below).

The Solis LEDs are high-power LEDs designed for microscopy applications. The lightweight package features a vibration-free, fanless design that can be mounted directly to a microscope port using one of Thorlabs' microscope lamphouse port adapters (available below). Each LED includes a collimating optic in a lens tube with a large Ø43 mm aperture. An integrated EEPROM chip stores important LED operating information, such as wavelength and max current, and controls the LED automatic shutoff features; at internal temperatures above 95 °C, the LED will automatically shut down to prevent damage.



Click to Enlarge
Excel File with Normalized and Scaled Spectra
In order to provide a point of comparison for the relative powers of LEDs with different nominal wavelengths, the spectra in the plot above have been scaled to the typical output power for each LED. This data is representative, not absolute. An Excel file with normalized and calculated scaled spectra for all of the Solis high-power LEDs can be downloaded by clicking on the link above.

Most Solis LEDs feature a dominant wavelength that corresponds to the wavelength that appears brightest to the human eye. Our cold white and warm white LEDs feature a broader spectrum that can be described using the correlated color temperature (i.e., color appearance 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. 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.

These Solis high-power LEDs for microscopy are not intended for use in household illumination applications.

Part Number	Description	Price	Availability
SOLIS-365A/M	**High-Power LED for Microscopy, 365 nm (UV), 0.85 W (Min), Metric**	**$998.89**	**Today**
SOLIS-385A/M	**High-Power LED for Microscopy, 385 nm (UV), 1.3 W (Min), Metric**	**$998.89**	**Today**
SOLIS-405A/M	**High-Power LED for Microscopy, 405 nm (UV), 1.6 W (Min), Metric**	**$998.89**	**Today**
SOLIS-460A/M	**High-Power LED for Microscopy, 460 nm (Royal Blue), 4.1 W (Min), Metric**	**$998.89**	**Today**
SOLIS-525A/M	**High-Power LED for Microscopy, 525 nm (Green), 1.6 W (Min), Metric**	**$998.89**	**3-5 Days**
SOLIS-623A/M	**High-Power LED for Microscopy, 623 nm (Red), 2.5 W (Min), Metric**	**$998.89**	**Today**
SOLIS-850A/M	**High-Power LED for Microscopy, 850 nm (IR), 1.7 W (Min), Metric**	**$964.44**	**Today**
SOLIS-1A/M	**High-Power LED for Microscopy, 6500 K (Cold White), 3.0 W (Min), Metric**	**$998.89**	**Today**
SOLIS-2A/M	**High-Power LED for Microscopy, 3000 K (Warm White), 2.0 W (Min), Metric**	**$998.89**	**Today**
SOLIS-365A	**High-Power LED for Microscopy, 365 nm (UV), 0.85 W (Min), Imperial**	**$998.89**	**Today**
SOLIS-385A	**High-Power LED for Microscopy, 385 nm (UV), 1.3 W (Min), Imperial**	**$998.89**	**Today**
SOLIS-405A	**High-Power LED for Microscopy, 405 nm (UV), 1.6 W (Min), Imperial**	**$998.89**	**Today**
SOLIS-460A	**High-Power LED for Microscopy, 460 nm (Royal Blue), 4.1 W (Min), Imperial**	**$998.89**	**Today**
SOLIS-525A	**High-Power LED for Microscopy, 525 nm (Green), 1.6 W (Min), Imperial**	**$998.89**	**Today**
SOLIS-623A	**High-Power LED for Microscopy, 623 nm (Red), 2.5 W (Min), Imperial**	**$998.89**	**Today**
SOLIS-850A	**High-Power LED for Microscopy, 850 nm (IR), 1.7 W (Min), Imperial**	**$964.44**	**Today**
SOLIS-1A	**High-Power LED for Microscopy, 6500 K (Cold White), 3.0 W (Min), Imperial**	**$998.89**	**Today**
SOLIS-2A	**High-Power LED for Microscopy, 3000 K (Warm White), 2.0 W (Min), Imperial**	**$998.89**	**Today**

Hide LED Driver

LED Driver

- Driver for Thorlabs' Solis LEDs
- Operating Modes for Setting LED Current or Brightness
- Internal Pulse Mode
  - Adjustable Frequency, Duty Cycle, and Pulse Count
  - Sine, Square, or Triangle Waveforms
- External Trigger and Modulation
- Remote Control via USB Interface

Click to Enlarge
The touchscreen interface allows the LED brightness to be adjusted. In Brightness Mode, the LED is at 100% brightness when it is driven at the

The DC2200 LED Driver is designed to provide easy plug-and-play operation for Thorlabs' Solis High-Power LEDs. It can provide up 10.0 A of current and a maximum forward voltage of 50 V. The driver can either be controlled locally via the device front panel, visible in the photo to the left, or from a PC using the USB 2.0 port on the back of the device. The main menu of the graphical user interface allows the user to select between operating the LED in constant current mode, brightness mode, internally or externally pulsed modes, and TTL modulation.

current limit.

In addition to the USB 2.0 port and LED connection terminals, the back of the housing includes an SMA input for the external modulation signals, an interlock circuit that can be connected to a user-supplied emergency off switch, and grounded jack that can be used with ESD protection equipment.

Additional information is available on the *LED Drivers* tab above. Complete specifications can be found on the main page for the DC2200 LED Driver.

Part Number	Description	Price	Availability
DC2200	**High-Power, 1-Channel, LED Driver with Pulse Modulation, 10.0 A, 50.0 V**	**$1,995.00**	**Lead Time**

Hide Microscope Lamphouse Port Adapters

Microscope Lamphouse Port Adapters

The Solis LEDs are compatible with Thorlabs' externally SM2-threaded lamphouse port adapters for Olympus, Nikon, Leica, and Zeiss microscopes. Microscope compatibility information is provided in the table below.

Click to Enlarge
A Solis LED with the SM2A13 Adapter

Click to Enlarge
A Solis LED Installed on an Olympus Microscope

Recommended Microscope Adapters for SOLIS LEDs				
Compatible Microscopes	**Olympus BX & IX**	**Nikon Eclipse Ti and Cerna Microscopes with 6-Cube Epi-Illuminator**	**Leica DMI**	**Zeiss Axioskop**
Adapter Item #	SM2A13	SM2A17	SM2A14	SM2A16
(Click Image to Enlarge)				

Part Number	Description	Price	Availability
SM2A13	**Olympus BX or IX Microscope Lamphouse Port Adapter, External SM2 Threads, Black Anodized**	**$90.60**	**Today**
SM2A17	**Nikon Eclipse Ti Microscope Lamphouse Port Adapter, External SM2 Threads, Black Anodized**	**$104.00**	**Today**
SM2A14	**Leica DMI Microscope Lamphouse Port Adapter, External SM2 Threads, Black Anodized**	**$90.60**	**Today**
SM2A16	**Zeiss Axioskop Microscope Lamphouse Port Adapter, External SM2 Threads, Black Anodized**	**$90.60**	**Today**