SOLIS-405C - March 4, 2025

Item # SOLIS-405C was discontinued on March 4, 2025. 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 570 mW to 8.75 W**
- **Compatible with Thorlabs' Port Adapters for Cerna®, Nikon, Olympus, Leica, and Zeiss Microscopes**
- **Two Driver Options**

SOLIS-1D
Cold White LED,
8.75 W Output Power (Typical)

Application Idea
A Solis® High-Power LED Installed on the Epi-Illuminator Module of a Cerna Modular Microscope

Hide Overview

OVERVIEW

Features

- Wavelengths Available from UV to NIR (See the Table to the Right for Options)
- Fanless Design Efficiently Dissipates Heat without Introducing Vibrations
- Lightweight Package for Mounting Directly to Microscope Ports, Eliminating the Need for Liquid Light Guides (LLGs)
- Collimated LED Output through Large Ø48.3 mm (1.90") Clear Aperture
- Integrated Electronics Enable Smart Safety Features with Compatible Drivers
- Compatible with Port Adapters for Use with Olympus, Nikon, Leica, Zeiss, and Cerna® Microscopes
  (Sold Separately Below)

Configure Your Solis® LED System

- Solis LED Head
- LED Driver (Choose One, Sold Separately)
  - DC20 Plug-and-Play Driver with External TTL Input
  - DC2200 Touchscreen Driver with Advanced Modulation Functions
- One Microscope Port Adapter (See Table Below for Compatibility Information)

Item #[a]	Color (Click for Spectrum[b])	Dominant Wavelength[c]	Typical Collimated Output Power
SOLIS-365C	UV	365 nm	4.0 W
SOLIS-385C	UV	385 nm	5.1 W
SOLIS-405C	UV	405 nm	5.0 W
SOLIS-415C	Violet	415 nm	7.0 W
SOLIS-445C	Royal Blue	445 nm	7.1 W
SOLIS-470C	Blue	470 nm	3.7 W
SOLIS-505C	Cyan	505 nm	1.5 W
SOLIS-525C	Green	525 nm	3.1 W
SOLIS-565D	Lime	565 nm	8.6 W
SOLIS-590C	Amber	590 nm	570 mW
SOLIS-595C	Amber	595 nm	1.1 W
SOLIS-617C	Orange	617 nm	2.4 W
SOLIS-620D	Red	620 nm	4.72 W
SOLIS-660C	Deep Red	660 nm	2.7 W
SOLIS-740C	Far Red	740 nm	3.3 W
SOLIS-850C	IR	850 nm	3.6 W
SOLIS-940C	IR	940 nm	3.7 W
SOLIS-1D	Cold White	N/A[d]	8.75 W
SOLIS-2C	Warm White	N/A[e]	4.0 W
SOLIS-3C	Day Light White	N/A[f]	4.6 W

a. LED specifications are nominal values. See *Specs* tab for complete specifications.
b. A file with data for the LED spectra can be downloaded here.
c. 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.
d. This LED has a correlated color temperature of 6500 K.
e. This LED has a correlated color temperature of 3000 K.
f. This LED has a correlated color temperature of 5700 K.

Thorlabs' Solis LEDs for microscopy deliver several watts of total output power from a lightweight, vibration-free package. They provide high-power illumination that can be coupled directly to the epi-illumination path on a microscope. Light from the LED is collimated through a large Ø48.3 mm aperture that can be attached via an adapter (available separately below) to the epi-illumination paths of many industry-standard microscopes from Olympus, Nikon, Leica, and Zeiss as well as the six-cube epi-illumination path available on many of Thorlabs' Cerna Microscopes. To install, select one of Thorlabs' microscope port adapters (available separately below), screw it onto the end of the housing, and secure the LED to a compatible microscope. Each Solis LED includes a user-installable diffuser plate (Item # DG20-1500), which can be used to make the output profile of the LED more uniform, and can help to provide even illumination at the sample plane.

The lightweight design features passive cooling instead of an internal fan in order to eliminate vibrations that normally degrade image quality in a microscopy setup. Each LED is mounted to a heatsink inside of a 127.8 mm x 127.8 mm x 162.0 mm vented housing to efficiently dissipate heat. As an added level of protection, the integrated internal memory is programmed to trigger an 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. For more Solis LED performance information when using Solis LEDs, please see the *Performance* tab.

Solis LED Drivers

Click to Enlarge
Thorlabs offers two options for powering a Solis® LED: the plug-and-play DC20 driver (left) and the touchscreen DC2200 driver (right).

We offer two driver options for our Solis LEDs. The DC20 Plug-and-Play Solis LED Driver (available separately below) features a knob that provides LED current control and functions as an LED On/Off switch as well as a BNC input for external TTL modulation signals.

The DC2200 Touchscreen LED Driver (available separately below) has an intuitive, touchscreen interface that supports both basic current control and more advanced modulation functions for the Solis LED head. For example, this driver allows the LED output power to be set at a fraction of the maximum desired brightness, and it control the LED drive current. For users that require modulation control, the driver integrates both internal and external modulation and pulsed modes. Internal modulation modes include settings for sine, square, and triangle waveforms as well as ways to generate rectangular pulse trains. External modulation modes allow this driver to accept an arbitrary waveform from a function generation or external TTL signals for syncing on/off states with other lab equipment.

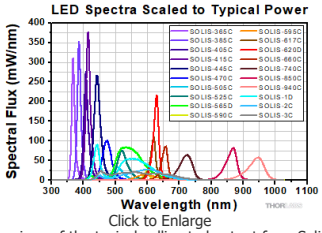
Both drivers automatically read and set the current limit from the Solis LED's internal memory to protect against overdriven currents. A comparison of the two drivers is provided on the *Solis LED Drivers* tab.

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)	Forward Voltage[e]	Bandwidth (FWHM)	Emitter Size	Collimating Optics (Installed)	Typical Lifetime
SOLIS-365C		UV	365 nm	3.0 W	4.0 W	4500 mA	4.0 V	10 nm	2 mm x 2 mm	LB1723-A ACL25416U-A	>12 000 h
SOLIS-385C		UV	385 nm	4.0 W	5.1 W	4500 mA	4.0 V	12 nm	2 mm x 2 mm		>29 000 h
SOLIS-405C		UV	405 nm	5.0 W	3.9 W	4500 mA	4.0 V	12 nm	2 mm x 2 mm		>40 000 h
SOLIS-415C		Violet	415 nm	5.8 W	7.0 W	2000 mA	14.0 V	14 nm	3.5 mm x 3.5 mm		>10 000 h
SOLIS-445C		Royal Blue	445 nm	5.4 W	7.1 W	9000 mA	3.8 V	23 nm	Ø3 mm		>10 000 h
SOLIS-470C		Blue	470 nm	3.0 W	3.7 W	4000 mA	8.0 V	34 nm	2.8 mm x 2.8 mm		>10 000 h
SOLIS-505C		Cyan	505 nm	1.0 W	1.5 W	4000 mA	7.6 V	42 nm	2.8 mm x 2.8 mm		>10 000 h
SOLIS-525C		Green	525 nm	2.4 W	3.1 W	9000 mA	5.0 V	32 nm	Ø3 mm		>10 000 h
SOLIS-565D		Lime	565 nm	5.7 W	8.6 W	4000 mA	13 V (Typ.)	100 nm	3.2 mm x 2.6 mm		>10 000 h
SOLIS-590C		Amber	590 nm	350 mW	570 mW	1000 mA	12.5 V	16.5 nm	3.2 mm x 3.2 mm		>10 000 h
SOLIS-595C		Amber	595 nm	700 mW	1.1 W	700 mA	14.0 V	77 nm	2.8 mm x 2.8 mm		>10 000 h
SOLIS-617C		Orange	617 nm	1.5 W	2.4 W	10 000 mA	4.0 V	17 nm	2.6 x 3.2 mm		>10 000 h
SOLIS-620D		Red	620 nm	3.47 W	4.72 W	10 000 mA	3.35 V (Typ.)	20 nm	3 mm x 3 mm		>10 000 h
SOLIS-660C		Deep Red	660 nm	2.0 W	2.7 W	1000 mA	12.5 V	21 nm	3.2 mm x 3.2 mm		>10 000 h
SOLIS-740C		Far Red	740 nm	2.0 W	3.3 W	1500 mA	13.4 V	45 nm	3.2 mm x 3.2 mm	LB1723-B ACL25416U-B	>10 000 h
SOLIS-850C		IR	850 nm	2.7 W	3.6 W	1000 mA	13.8 V	39 nm	Ø6.5 mm[f]		>40 000 h
SOLIS-940C		IR	940 nm	2.5 W	3.7 W	2000 mA	7.5 V	55 nm	3.2 mm x 3.2 mm		>10 000 h
SOLIS-1D		Cold White	N/A[g]	5.81 W	8.75 W	10 000 mA	4.02 V (Typ.)	N/A	3 mm x 3 mm	LB1723-A ACL25416U-A	>10 000 h
SOLIS-2C		Warm White	N/A[h]	3.2 W	4.0 W	1500 mA	12.5 V	N/A	5 mm x 5 mm		>100 000 h
SOLIS-3C		Day Light White	N/A[i]	3.5 W	4.6 W	10 000 mA	3.5 V	N/A	Ø4.25 mm		>10 000 h

a. LED specifications are nominal values.
b. A file with the LED spectral data can be downloaded here.
c. 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.
d. Measured at the Max Current (CW). The LED output power can be decreased by lowering the current supplied to the LED.
e. Max Value Unless Otherwise Specified
f. This LED is comprised of four emitters with a lens of the specified diameter.
g. This LED has a correlated color temperature of 6500 K.
h. This LED has a correlated color temperature of 3000 K.
i. This LED has a correlated color temperature of 5700 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	
Clear Aperture	Ø48.3 mm (Ø1.90")
Weight	1 kg
Dimensions	127.8 mm x 127.8 mm x 162 mm (5.03" x 5.03" x 6.38")
Operating Temperature (Non-Condensing)	0 to 40 °C
Storage Temperature	-40 to 70 °C

Internal Temperature to Trigger Automatic Shut Off	95 °C
Diffuser (Included)	DG20-1500
Two Retaining Rings (Included)	SM2RR

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 Performance

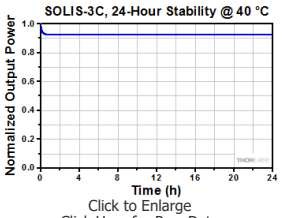
PERFORMANCE

Stability at Elevated Room Temperatures

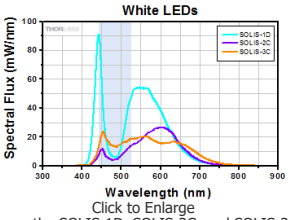
The thermal dissipation performance of these Solis® LEDs has been optimized for stable power output. The heat sink is directly mounted to the LED mount so as to provide optimal thermal contact, prolonging the life of the diode by keeping the junction temperature at the lowest possible minimum.

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 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 4000 mW of output power, 50 of these LEDs can be expected to produce an output power of ≥2000 mW after the specified LED lifetime has elapsed.

Solis LEDs can be operated at room temperatures from 0 to 40 °C. An elevated room temperature can be useful if a sample and microscope needs to be maintained at such temperatures for experiments. The graph at the right shows measurements of the output power for a SOLIS-3C LED at 40 °C over a period of 24 hours; the output power remains stable after the initial warm-up period.



Click to Enlarge
Click Here for Raw Data
The output power remains stable over a 24-hour period. Small dips in the curve are due to slight variations in climate condition (±2 °C).



Click to Enlarge
Shown are the SOLIS-1D, SOLIS-2C, and SOLIS-3C LED spectra scaled to typical power. The region in blue indicates a drop in the spectral flux. The SOLIS-3C provides significantly more power for applications that require strong illumination at these wavelengths, such as excitation of GFPs.

Increased Power for Light-Excited Fluorophores

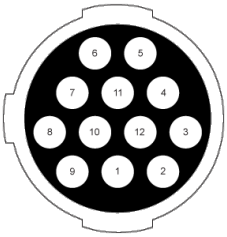
The Solis LED light sources are designed for use in fluorescence microscopy, such as GFP or GFP-derived fluorescent protein imaging. Thorlabs offers LEDs for specific wavelengths as well as white LEDs that cover the entire visible light spectrum. SOLIS-1C, SOLIS-1D, SOLIS-2C, and SOLIS-3C white LEDs provide high-power excitation light for many fluorophores. However, the output power is not the same at every wavelength, as seen in the graph to the right. Most LEDs exhibit a drop in output power from 470 nm to 520 nm. While most imaging applications are unaffected, other light-sensitive applications may require more power in this region.

With a constant output power from 450 nm to 650 nm, the SOLIS-3C LED offers significantly more power in this region compared to the SOLIS-2C LED. To demonstrate this, we measured the irradiance of the SOLIS-3C LED by placing a previous-generation FB480-10 480 nm bandpass filter in front of an S120VC detector at a distance 200 mm on-axis from the LED. The irradiance of the SOLIS-3C LED with the filter was 45 µW/mm^2. Thus, when compared to the SOLIS-2C, the SOLIS-3C is most beneficial when higher power is needed in this wavelength range. Note that this irradiance value is not representative of the irradiance across the whole spectrum, but rather from 470 nm to 490 nm.

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 DIY Mounting

DIY MOUNTING

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 internally SM2 threaded (2.035"-40), which provides compatibility with Thorlabs' SM2 Lens Tubes and 60 mm Cage Systems.

Below are two examples of how a Solis LED can be mounted to an optical table. The top photo shows a Solis LED mounted using a cage plate and Ø1" post. The bottom photo shows a Solis LED mounted using a Ø2" lens tube, lens tube slip rings, Ø1/2" posts, and Ø1/2" post holders. Please refer to the tables to the left for a list of components in each mounting setup.

Click to Enlarge
The SOLIS-1D shown mounted to an optical table using the SM2T2 adapter, a LCP34 60 mm cage plate, and a Ø1" post.

Cage Plate Mounting			
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)	LCP34	LCP34/M	1
Ø1" Pedestal Pillar Post, 8-32 (M4) Taps	Ø1" Post (RS1.5P8E Shown)	Ø25.0 mm Post	1
Clamping Fork, 1/4"-20 (M6) Captive Screw	CF125C or CF175C	CF125C/M or CF175C/M	1

Lens Tube Mounting			
Description	**Imperial Item #**	**Metric Item #**	**Quantity**
Solis® LED for Microscopy	See Below for Options		1
SM2 (2.035"-40) Lens Tube	SM2L15		1
Ø2.20" SM2 Slip Rings, 8-32 (M4) Tap	SM2RC	SM2RC/M	2
Ø1/2" Post, 8-32 (M4) Setscrew	Ø1/2" Post	Ø1/2" Post	2
Ø1/2" Post Holder	Ø1/2" Post Holder	Ø1/2" Post Holder	2
Post Holder Base	BA2	BA2/M	1

Click to Enlarge
The SOLIS-1D shown mounted to an optical table using an SM2L15 lens tube, two SM2RC lens tube mounts, two Ø1/2" posts, and one BA2 post holder base.

Hide Use with Cerna

USE WITH CERNA

Using Solis® in Cerna® Microscope Systems

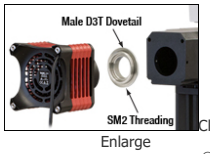
Solis® LEDs, which can have either narrowband or broadband spectra, are useful for a range of applications within Thorlabs' Cerna microscopy platform:

- Fluorescence Microscopy
- Reflected Light Microscopy

Components for Cerna® Compatibility
Epi-Illumination
CSE2100 or CSE2200 Epi-Illuminator Module with Turret for Six Filter Sets
SM2A56 Dovetail Adapter

- Near Infrared/Infrared (NIR/IR) Microscopy

They are recommended as epi-illumination sources for a Cerna microscope, and can be used with the CSE2100 or CSE2200 Epi-Illuminator Modules.



Click to Enlarge
An exploded view of the Solis® LED and its connection with the CSE2100 epi-illuminator module.


Click to Enlarge
Once locked into place, the LED requires no additional support.

Mounting a Solis LED onto an epi-illuminator module requires an externally SM2 (2.035"-40) threaded adapter with a male D3T dovetail (Item # SM2A56). First, thread the adapter securely onto the Solis LED. The adapter utilizes the dovetail to attach to the epi-illuminator module; simply insert the adapter and LED into the back of the module, then secure the dovetail with the side setscrew using a 5/64" (2mm) hex key. See the figures to the right for details, and the epi-illuminator module web presentation for additional information about microscope dovetail connections.

Please contact Technical Support to use a Solis LED in a trans-illumination configuration.

Hide Solis LED Drivers

SOLIS LED DRIVERS

Thorlabs offers two options for driving our Solis® LEDs. The DC20 is a basic option that allows users to control the intensity of their LED using a control knob on the top or via an external TTL signal for modulation. For more advanced applications, our DC2200 drivers provides a touchscreen interface that allows users to control the LED current, select internal or external modulation modes, and more. The table below provides a comparison of key controller features.

Solis® LED Driver Selection Guide		
Item #	**DC20**	**DC2200**
Photo (Click to Enlarge)		
LED Current / Forward Voltage (Max)	1 to 10 A / 5.0 to 14.0 V[a]	1.0 A / 50.0 V[b] 2.0 A / 35.0 V[b] 4.0 A / 15.0 V[b] 5.0 A / 10.0 V[b] 10.0 A / 5.0 V[b]
Noise and Ripple (1 Hz to 10 MHz, RMS, Typical)	<400 µA	<100 µA from 0.0 to 4.0 A <200 µA from 4.0 to 10.0 A
Internal Modulation Modes	-	0.1 Hz to 20 kHz (PWM[c] Mode) 1 µs to 10 s On or Off Time (Pulse Mode) 20 Hz to 100 kHz (Internal Modulation Mode with Sine, Square, Triangle Waveforms)
External Modulation (Arbitrary Waveform)	-	DC - 250 kHz [Small Signal Bandwidth (Sine)][d]
TTL Modulation (External)	DC to 1 kHz (Square Wave, PWM[c])	DC to ≥18 kHz[e]
LED Control Interface	Knob to Control LED Current, BNC Port for TTL Modulation	Easy-to-Navigate Touchscreen Interface, Brightness and Constant Current Operating Modes, Internal and External Modulation Modes, SMA Port for External Modulation Accepts TTL Signal or Waveform from a Function Generator, USB Interface for Remote Control
Current Limit	Automatically Read and Set from the Solis LED's Internal Memory to Protect the LED from Overdriving	
External Software Interface	No	DC2200 GUI
Other Compatible LEDs	-	Mounted Collimated Fiber Coupled MCPCB Mounted[f]

a. The maximum LED current and forward voltage are dependent on each other: the DC20 cannot drive an LED with a 14 V forward voltage at 10 A. The DC20 is compatible with all Solis LEDs and will automatically select the appropriate current/voltage combination for the connected Solis LED.
b. For Solis LEDs connected using Terminal 1. The DC2200 can also be used to drive Thorlabs' mounted, collimated and fiber-coupled LEDs, which use a separate terminal and are subject to different current and voltage limitations. See the complete web presentation for details.
c. PWM = Pulse Width Modulation
d. Small Signal Bandwidth: Modulation not exceeding 20% of full scale current. The driver accepts other waveforms, but the maximum frequency will be reduced.
e. Given for an output current at "High" TTL level not exceeding 10% of the selected current range limit.
f. Requires the CAB-LEDD1 cable.

Hide DC2200 Software

DC2200 SOFTWARE

Software for the DC2200 Driver

The available software can be downloaded by clicking on the link below.

Software

Software Version 1.7 (June 21, 2022)
Firmware Version 1.4.2 (June 21, 2022)

GUI software, firmware, and firmware upgrade wizard downloads for the DC2200.

Software

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						More [+]
Click Photo to Enlarge (Representative; Not to Scale)						
Type	**Unmounted LEDs**	**Pigtailed LEDs**	**LEDs in SMT Packages**	**LED Arrays**	**LED Ring Light**	**Cage-Compatible Diffuse Backlight LED**
Light Emitting Diode (LED) Selection Guide						More [+]
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 Zeiss Axioskop collimation package (Item # Suffix: -C4).
i. Percentage of LED intensity that emits in the blue portion of the spectrum, from 400 nm to 525 nm.

Hide Solis® High-Power LEDs for Microscopy

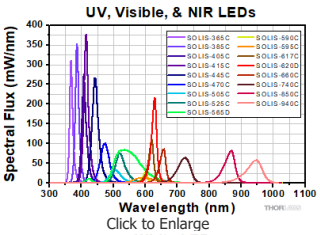
Solis® High-Power LEDs for Microscopy

- Typical Collimated LED Output Powers from 570 mW to 8.75 W
- Wavelengths Available from UV to NIR
- Automatic Shut Off to Prevent Damage from Overheating
- Large Ø48.3 mm (1.90") Clear Aperture
- LED Lifetime: >10 000 Hours
- Compatible with DC20 and DC2200 LED Drivers (Available Below)

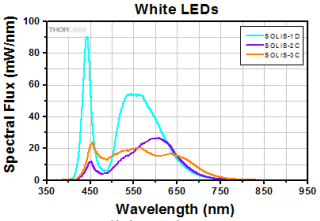

Click to Enlarge
A SOLIS-1D LED mounted on an Olympus microscope via the SM2A13 adapter (available below), driven by the DC2200 Driver (available below).

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 Ø48.3 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.

Most Solis LEDs have a specified dominant wavelength that corresponds to the wavelength that appears brightest to the human eye. Our cold white, warm white, and day light white LEDs feature a broader spectrum that can be described using a 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. These 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 the warm white LEDs. The SOLIS-3C day light LED has improved output power in the 470 - 520 nm wavelength range (see the *Performance* tab for more information).



Click to Enlarge



Click to Enlarge
Excel File with Normalized and Scaled Spectra

The above plots compare the spectral flux of the Solis® LEDs. In order to provide a point of comparison for the relative powers of LEDs with different nominal wavelengths, the spectra 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.

The included diffuser should be installed in front of the collimating lenses using the two included SM2RR Retaining Rings as well as an SPW604 Spanner Wrench (sold separately). The SM2 thread depth is different for each Solis LED. Be sure that the LED is turned off with enough time for the housing to cool before installation, and that the diffuser does not touch the second collimating lens so as to prevent scratching.

While typical applications involve mounting the LED directly to a microscope port via a microscope adapter, an 8-32 and M4 cross-tapped hole is provided at each corner on the back of the housing for custom mounting applications (see the *DIY Mounting* tab for details). These Solis high-power LEDs for microscopy are not intended for use in household illumination applications.

Part Number	Description	Price	Availability
SOLIS-365C	High-Power LED for Microscopy, 365 nm (UV), 3.0 W (Min)	$1,336.41	Today
SOLIS-385C	High-Power LED for Microscopy, 385 nm (UV), 4.0 W (Min)	$1,336.41	2 Weeks
SOLIS-405C	High-Power LED for Microscopy, 405 nm (UV), 3.9 W (Min)	$1,336.41	Lead Time
SOLIS-415C	High-Power LED for Microscopy, 415 nm (Violet), 5.8 W (Min)	$1,577.34	Today
SOLIS-445C	High-Power LED for Microscopy, 445 nm (Royal Blue), 5.4 W (Min)	$1,336.41	Today
SOLIS-470C	Customer Inspired! High-Power LED for Microscopy, 470 nm (Blue), 3.0 W (Min)	$1,464.27	Lead Time
SOLIS-505C	High-Power LED for Microscopy, 505 nm (Cyan), 1.0 W (Min)	$1,464.27	2 Weeks
SOLIS-525C	High-Power LED for Microscopy, 525 nm (Green), 2.4 W (Min)	$1,336.41	Today
SOLIS-565D	High-Power LED for Microscopy, 565 nm (Lime), 5.7 W (Min)	$1,304.20	2 Weeks
SOLIS-590C	Customer Inspired! High-Power LED for Microscopy, 590 nm (Amber), 350 mW (Min)	$1,464.27	Lead Time
SOLIS-595C	High-Power LED for Microscopy, 595 nm (Amber), 700 mW (Min)	$1,464.27	Today
SOLIS-617C	High-Power LED for Microscopy, 617 nm (Orange), 1.5 W (Min)	$1,464.27	2 Weeks
SOLIS-620D	High-Power LED for Microscopy, 620 nm (Red), 3.47 W (Min)	$1,320.46	Today
SOLIS-660C	High-Power LED for Microscopy, 660 nm (Deep Red), 2.0 W (Min)	$1,464.27	Today
SOLIS-740C	High-Power LED for Microscopy, 740 nm (Far Red), 2.0 W (Min)	$1,464.27	Today
SOLIS-850C	High-Power LED for Microscopy, 850 nm (IR), 2.7 W (Min)	$1,287.72	Today
SOLIS-940C	High-Power LED for Microscopy, 940 nm (IR), 2.5 W (Min)	$1,464.27	Today
SOLIS-1D	High-Power LED for Microscopy, 6500 K (Cold White), 5.81 W (Min)	$1,705.66	Today
SOLIS-2C	High-Power LED for Microscopy, 3000 K (Warm White), 3.2 W (Min)	$1,336.41	2 Weeks
SOLIS-3C	High-Power LED for Microscopy, 5700 K (Day Light White), 3.5 W (Min)	$1,336.41	Today

Hide Plug-and-Play Solis® LED Driver

Plug-and-Play Solis® LED Driver

- Designed for Thorlabs' Solis® LEDs for Microscopy
- Easily Control LED Intensity Using the Dial
- Automatically Sets the Current Limit to Protect the LED
- Provides Drive Current up to 10 A
- Supports LED Forward Voltage up to 14 V
- Accepts External TTL Modulation Signal via BNC Connector

DC20 Key Specifications[a]	
LED Current (Max)	1 to 10 A
LED Forward Voltage (Max)	5.0 to 14.0 V
LED Current Limit Accuracy	±(1% + 25 mA)
TTL Modulation Frequency	DC to 1 kHz
Modulation Waveform	Square Wave / PWM

a. See the main DC20 web presentation for complete specifications.

Click to Enlarge
The DC20 is a simple way to power the Solis® LEDs.

Thorlabs' DC20 Driver is designed to provide a simple way to control any of Thorlabs' Solis LEDs. Easy to set up and use, this driver is an ideal solution for users of our Solis LEDs who don't require the more advanced functions provided by the DC2200 Touchscreen LED Driver available below. See the *Solis LED Drivers* tab for a comparison between the DC20 and the DC2200 drivers.

The current provided to the LED is controlled by turning the knob on the top of the driver. The position on the top panel marked LIMIT will correspond to the maximum LED current for the connected Solis LED, as the driver automatically detects and sets the current limit to the value stored in each Solis LED's internal memory to protect it from being overdriven. Pushing on the knob will either switch the LED on at the percentage of the maximum current indicated by the control knob position or turn it off. Alternatively, the LED can be modulated using an external TTL signal connected to a BNC input on the back of the driver's housing. See the *Specs* tab for the TTL signal requirements.

A tri-color LED on the side of the unit indicates the current LED status, including whether the LED is on or off (useful with IR LEDs), whether the LED is operating normally, or if an error has occurred.

Please note that the DC20 driver is designed specifically to work with the internal electronics in Thorlabs' Solis LEDs and should not be used to drive any other type of LED.

Part Number	Description	Price	Availability
DC20	High-Power Driver for Solis® LEDs, 10 A Max, 14.0 V Max	$576.49	Today

Hide Advanced Solis® LED Driver

Advanced Solis® LED Driver

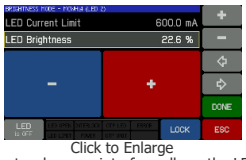
- Driver for Thorlabs' Solis® LEDs
- Operating Modes for Setting LED Current or Brightness
- Internal Modulation and Pulsed Modes
  - * Adjustable Frequency, Duty Cycle, and Pulse Count
  - * Sine, Square, or Triangle Waveforms
- External Trigger and Modulation
- Remote Control via USB Interface

DC2200 Key Specifications[a]	
LED Current / Forward Voltage (Max)[b,c]	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
LED Current Accuracy[c]	±(0.1% + 2 mA) for 0 to 4.0 A ±(0.1% + 4 mA) for 4.0 to 10.0 A
LED Current Resolution	0.1 mA
Internal Modulation	Waveforms: Sine, Square, Triangle Frequency Range: 20 Hz to 100 kHz

The DC2200 LED Driver also provides a touchscreen interface for Thorlabs' Solis High-Power LEDs that incorporates more advanced functions than the DC20

driver available above. It can provide up to 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. The internal modulation and pulsed operation modes that allow the LED intensity to be modulated without the use of an external function generator. An SMA input on the back of the driver accepts either for external modulation signals with an arbitrary waveform or a TTL High/Low input that allows the LED on/off state to be synchronized with other lab equipment.



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 current limit.

In addition to the USB 2.0 port and Solis LED connection terminal, this driver has a second LED connectin terminal to support Thorlabs' Mounted, Collimated, and Fiber-Coupled LEDs*. The back of the housing also includes an interlock circuit that can be connected to a user-supplied emergency off switch and a grounded jack that can be used with ESD protection equipment.

External Modulation Small Signal Bandwidth[d]	DC - 250 kHz
External TTL Modulation Frequency[e]	DC to ≥18 kHz

- See the main DC2200 web presentation for complete specifications.
- 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
- These values apply to the LED1 terminal, which accepts Solis® LEDs. The DC2200 also has a second terminal for Thorlabs' Mounted, Fiber-Coupled, and Collimated LEDs with different limitations.
- Small Signal Bandwidth: Modulation not exceeding 20% of full scale current. The driver accepts other waveforms, but the maximum frequency will be reduced.
- Given for an output current at "High" TTL level not exceeding 10% of the selected current range limit.

For a side-by-side comarison of Thorlabs' DC20 Plug-and-Play Driver for Solis LEDs and the DC2200 touchscreen LED driver, see the *Solis LED Drivers* tab above. Complete specifications can be found on the main page for the DC2200 LED Driver.

*Please note that the driver can only control one LED at a time, regardless of which LED connection terminal is used.

Part Number	Description	Price	Availability
DC2200	High-Power 1-Channel LED Driver with Pulse Modulation, 10.0 A Max, 50.0 V Max	$2,423.37	Lead Time

Hide Microscope Port Adapters

Microscope Port Adapters

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

Please ensure that the dimensions of the Solis housing and your microscope setup will not create mechanical clashing. For example, a Ø2" lens tube at least as long as Item # SM2L05 is needed in conjunction with the SM2A13 adapter to attach a Solis LED to the Olympus IX71 microscope's transmitted illumination port.


Click to Enlarge
A Solis® LED with the SM2A13 Adapter


Click to Enlarge
A Solis LED Installed on an Olympus Microscope's Epi-Fluorescence Port

Recommended Microscope Adapters for Solis® LEDs					
Compatible Microscopes[a]	**Olympus BX & IX**	**Nikon Eclipse Ti and Cerna Microscopes with 6-Cube Epi-Illuminator**	**Nikon Eclipse Ti2**	**Leica DMI**	**Zeiss Axioskop & Examiner**
Adapter Item #	SM2A13	SM2A17	SM2N5	SM2A14	SM2A16
Photo (Click to Enlarge)					

- Please ensure that the dimensions of the Solis housing and your microscope setup will not create mechanical clashing.

Part Number	Description	Price	Availability
SM2A13	Olympus BX and IX Microscope Trans-Illumination Port Adapter, Male D2Y Dovetail, External SM2 Threads, Black Anodized	$109.88	Today
SM2A17	Nikon Eclipse Ti or Upright Microscope Epi-Illumination Module Bayonet Mount Adapter, External SM2 Threads, Black Anodized	$127.09	Today
SM2N5	Nikon Eclipse Ti2 Microscope Epi-Illumination Module Adapter, External SM2 Threads	$132.60	Today
SM2A14	Leica DMI Microscope Lamphouse Port Adapter, External SM2 Threads, Black Anodized	$109.88	Today
SM2A16	Zeiss Axioskop and Examiner Microscope Lamphouse Port Adapter, External SM2 Threads, Black Anodized	$109.88	Today