

MBE74100 - June 22, 2016

Item # MBE74100 was discontinued on June 22, 2016. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

CERNA COMPONENTS: EPI-ILLUMINATION

- ▶ Lamps and LEDs for Illuminating the Field of View Through the Objective
- ▶ Epi-Illuminator Modules Condition the Illumination and Hold Filter Cubes
- ▶ Filter Sets for Targeted Fluorophore Stimulation
- ▶ Breadboard Top for System Developers



WFA2001
Single-Cube
Epi-Illuminator



Cerna Rig with Filter Cube
Turret for Visible Epi-
Fluorescence Studies



TLV-U-MF2
Filter Cube

CSA3000
Breadboard Top



[Hide Overview](#)

OVERVIEW

Features

- Epi-Illuminator Modules Hold One or up to Six Filter Cubes
- Breadboard Top for User-Designed Epi-Illuminators
- X-Cite Lamps for Broadband Illumination Throughout the Visible
- Thorlabs' LEDs Provide Intense Narrowband Illumination
- Filter Sets Optimized for the Excitation and Detection of Common Fluorophores

Several components are used to construct the epi-illumination path of a Cerna microscope: the epi-illuminator module, the illumination source, filter cubes, and filter sets. These accessories guide light through the objective and aid in the generation of intense illumination across the field of view.

Epi-Illuminator Modules

Epi-illuminator modules couple light emitted by the illumination source into the optical path and onto the sample. To satisfy a range of experimental demands and budgets, we offer an epi-illuminator module that holds one filter cube as well as one that can accommodate up to six filter cubes. For system developers, we offer a breadboard top with 1/4"-20 or M6 x 1.0 taps for mounting your own epi-illumination designs.

Illumination Sources

Many illumination sources are compatible with Cerna systems, including DC-coupled, liquid light guide

Cerna Application Support

[Contact Us](#)

Thorlabs has engineers, application specialists, and a sales team available to discuss the various Cerna options and to work with you to create a system that is optimized for your unique experimental requirements. If you would like to be contacted by a member of our team, please let us know by emailing ImagingSales@thorlabs.com.

Quick Links
Epi-Illuminators
Epi-Illuminator Modules
Breadboard Top for Custom Epi-Illuminators
Filter Cubes
Filter Sets
Illumination Sources
Liquid Light Guide Lamps
Broad-Spectrum LED Lamp

[Hide Epi-Illuminator Modules and Filter Cubes](#)

Epi-Illuminator Modules and Filter Cubes

- ▶ Couple Light from the Epi-Illumination Source into the Optical Path
- ▶ Tune Illumination Conditions at Sample using Field Stop, Aperture Stop, and Filter Cubes
- ▶ Single-Cube Epi-Illuminator: Targeted Illumination of a Single Fluorophore
- ▶ Six-Cube Epi-Illuminator: Visualize Multiple Fluorophores by Rotating a Turret

Cerna epi-illuminator modules are positioned on top of the microscope body, placing them in the optical path after the epi-illumination source and before the objective. They contain a port on the back that accepts either a lamp or an LED.

Single-Cube Epi-Illuminator

The WFA2001 Epi-Illuminator holds one filter cube (sold separately), making it best suited for setups that only require epi-fluorescence at a single wavelength. It is compatible with Thorlabs' LEDs with SM1 (1.035"-40) mounting threads, as well as with lamps that have Ø3 mm liquid light guides, such as the X-CITE 200. Its aperture and field stops are adjusted by rotating the knurled rings on the exterior of the housing, shown in the image to the right.

Six-Cube Epi-Illuminator

For setups that require the flexibility to target multiple fluorophores, we recommend the MBE74100 Epi-Illuminator, which houses a turret that readily switches between up to six filter cubes (sold separately). It is compatible with lamps that have a Nikon bayonet mount, such as the X-CITE 200 and X-CITE120LED. Its aperture and field stops are adjusted by pushing and pulling the tabs on the side of the housing, shown in the image to the right.

Compatibility

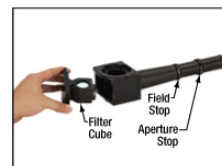
Please note that the WFA2001 single-cube and MBE74100 six-cube epi-illuminator modules are not compatible with all of our illumination sources. The table below shows which illumination sources the epi-illuminators will accept. These epi-illuminators also accept different filter cube models, so refer to the table for compatibility.

We offer Thorlabs-manufactured filter cubes and OEM filter cubes. Thorlabs' Filter Cubes are interchangeable with the OEM filter cubes and offer a number of design improvements, including simplified optic mounting and reduced dichroic mirror stress for improved imaging. Note that the OEM filter cubes utilize plastic in their construction, while Thorlabs' filter cubes have aluminum bodies. If Thorlabs and OEM cubes are mixed in a filter cube turret, it is important to place matching filter cubes opposing each other to maintain balance and prevent unnecessary wear.

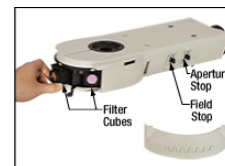
If you would like to perform DIC imaging, choose the six-cube epi-illuminator (Item # MBE74100), as the single-cube epi-illuminator is not compatible with DIC imaging.

Installation

The top of the epi-illuminator module contains a D1N female dovetail and an M4 setscrew (2 mm hex) that together accept either trinoculars (Item # WFA4000) or



[Click for Details](#)
Filter Cube in Single-Cube Epi-Illuminator



[Click for Details](#)
Filter Cube Turret in Six-Cube Epi-Illuminator

Installation of a Filter Set and Filter Cube into the Single-Cube Epi-Illuminator

a camera tube (Item # WFA4100, WFA4101, or WFA4102). The bottom of the epi-illuminator module contains a D1N male dovetail that is secured to the Cerna microscope body, which contains a mating D1N female dovetail and an M4 setscrew (2 mm hex) to lock the dovetails together. Details on the installation of illumination sources are given below.

Options	WFA2001	MBE74100
Photo (Click to Enlarge)		
Number of Filter Cubes (Filter Cubes Sold Separately)	One	Up to Six
Interfaces for Illumination Sources	SM1 Threads Ø3 mm Hole	Nikon Eclipse Bayonet Mount
Compatible Illumination Sources (Sold Below)	Thorlabs' LEDs Liquid Light Guide Lamps	Broad-Spectrum LED Lamps Liquid Light Guide Lamps
Compatible with DIC Imaging	No	Yes
Compatible Filter Cube Item #	Thorlabs: TLV-U-MF2 OEM: MDFM-MF2	Thorlabs: TLV-TE2000 OEM: MDFM-TE2000

Part Number	Description	Price	Availability
WFA2001	Single-Cube Epi-Illuminator (Filter Cube Not Included)	\$1,661.18	Today
MBE74100	Nikon D-FL Epi-Illuminator for Six Filter Cubes (Filter Cubes Not Included)	\$2,797.00	Lead Time
TLV-U-MF2	Customer Inspired!Microscopy Cube Assembly for Olympus AX, BX2, IX2	\$441.00	Lead Time
TLV-TE2000	Customer Inspired!Microscopy Cube Assembly for Nikon TE2000, Eclipse Ti	\$398.00	Today
MDFM-MF2	OEM Microscopy Cube Assembly for Olympus AX, BX2, IX2	\$473.89	Today
MDFM-TE2000	OEM Microscopy Cube Assembly for Nikon TE2000, Eclipse Ti	\$466.60	Today

[Hide Breadboard Top for Custom Epi-Illuminators](#)

Breadboard Top for Custom Epi-Illuminators



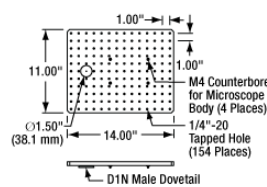
- ▶ Build Your Own Epi-Illumination Pathway
- ▶ Ø1.5" Through Hole Centered on Optical Path
- ▶ 14" x 11" (350 mm x 275 mm) Surface Area

These anodized aluminum breadboard tops allow system developers to integrate a custom-designed optical pathway

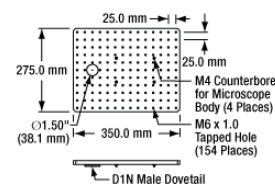
into the top of a Cerna microscope. They can be used as an alternative to the WFA2001 and MBE74100 epi-illuminator modules, or they can be stacked on top of those modules. Each breadboard contains a Ø1.5" through hole that is centered on the microscope's optical path. The imperial version (Item # CSA3000) contains 154 1/4"-20 tapped holes at 1" spacings, while the metric version (Item # CSA3001) contains 154 M6 x 1.0 tapped holes at 25 mm spacings.

Installation

A D1N male dovetail and four M4 counterbored holes align the breadboard top to the Cerna microscope body. The microscope body contains a mating D1N female



Click for Details
Drawing of Imperial Breadboard Top



Click for Details
Drawing of Metric Breadboard Top

dovetail and an M4 setscrew (2 mm hex) to lock the dovetails together. The counterbored holes are not used when stacking the breadboard on top of an epi-illuminator module.

Part Number	Description	Price	Availability
CSA3001	Breadboard Top, M6 x 1.0 Taps	\$992.15	Lead Time
CSA3000	Breadboard Top, 1/4"-20 Taps	\$992.15	Today

[Hide LEDs for Single-Cube Epi-Illuminator](#)

LEDs for Single-Cube Epi-Illuminator



- ▶ Long Lifetimes (>10,000 Hours for LEDs Shown Here)
- ▶ Stable Output Intensity via Optimized Thermal Management
- ▶ Output can be Modulated with Suitable Driver
- ▶ Integrated EEPROM for Automated Driver Configuration
- ▶ Only Compatible with WFA2001 Single-Cube Epi-Illuminator

These LEDs emit at important visible and NIR wavelengths and represent our most popular LEDs for the life sciences. We offer a much wider range of LEDs than the five presented here, at wavelengths from 280 nm to 1550 nm, all of which are compatible with Cerna rigs. For our full selection, please see their full web presentation.

Required Accessories

Please note that a driver, sold separately, is required to power the LED. Please refer to the LED Drivers section below for more information.

Compatibility with Epi-Illuminators

Our single-cube epi-illuminator module (Item # WFA2001) was specifically designed to accommodate these LEDs. These LEDs are not compatible with the six-cube epi-illuminator module (Item # MBE74100).

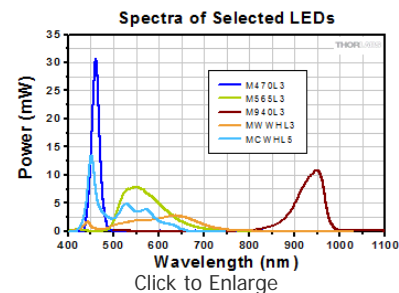
Installation

The LED housing and the WFA2001 epi-illuminator both have internal SM1 (1.035"-40) threads. To connect the LED to the epi-illuminator, we provide with the WFA2001 an externally threaded SM1 coupler (Item # SM1T10), which includes two knurled locking rings that are tightened by hand.

Item # ^a	Color ^{b,c}	Output Power (Typical) ^b	Compatible Drivers
M470L3	Blue (470 nm)	710 mW	LEDD1B DC2200 DC4100 DC4104 (See Below for Details)
M565L3	Lime (565 nm)	979 mW	
M940L3	IR (940 nm)	1000 mW	
MWWHL3	Warm White (3000 K ^d)	550 mW	
MCWHL5	Cold White (6500 K ^d)	840 mW	

[Full Web Presentation for LEDs](#)

- We offer a much wider range of LEDs than the four presented here, at wavelengths from 280 nm to 1550 nm, all of which are compatible with Cerna rigs. For our full selection, please see their full web presentation.
- Output power 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.
- Correlated Color Temperature.



Part Number	Description	Price	Availability
M470L3	Blue (470 nm) Mounted LED, 1000 mA, 650 mW (Min)	\$268.00	Today
M565L3	Lime (565 nm) Mounted LED, 1000 mA, 880 mW (Min)	\$211.00	Today
M940L3	IR (940 nm) Mounted LED, 1000 mA, 800 mW (Min)	\$211.00	Today
MCWHL5	Cold White Mounted LED, 1000 mA, 800 mW (Min)	\$193.00	Today

[Hide LED Drivers](#)

LED Drivers

These drivers supply intensity control and current for Thorlabs' LEDs.



[Click to Enlarge](#)

LEDD1B Features

- ▶ Sufficient Current and Voltage to Drive *Most* of Thorlabs' LEDs
- ▶ Allows Intensity Modulation of a Single LED
- ▶ Very Compact Footprint: 60 mm x 73 mm x 104 mm (W x H x D)



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DC2200 Features

- ▶ Sufficient Current and Voltage to Drive *Any* of Thorlabs' LEDs
- ▶ Allows Intensity Modulation of a Single LED
- ▶ Provides Automated LED Current Control
- ▶ Touchscreen Display



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DC4100 Features

- ▶ Sufficient Current and Voltage to Drive *Most* of Thorlabs' LEDs
- ▶ Allows Intensity Modulation of 4 LEDs Together
- ▶ Provides Automated LED Current Control
- ▶ LCD Display



[Click to Enlarge](#)

DC4104 Features

- ▶ Sufficient Current and Voltage to Drive *Most* of Thorlabs' LEDs
- ▶ Allows Independent Intensity Modulation of 4 LEDs
- ▶ Provides Automated LED Current Control
- ▶ LCD Display

Specifications				
Item #	LEDD1B	DC2200	DC4100	DC4104
Number of LEDs	One	One	Up to Four	Up to Four
Current Output	1.2 A (Max)	10.0 A (Max)	1.0 A per Channel (Max)	1.0 A per Channel (Max)
Voltage Output	12 V (Max)	50.0 V (Max)	5 V (Max)	5 V (Max)
Modulation Frequency Using External Input	5 kHz (Max)	250 kHz (Max)	100 kHz (Max) (Simultaneous Across all Channels)	100 kHz (Max) (Independently Controlled Channels)
External Control Interface(s)	Analog (BNC)	USB 2.0 and Analog (SMA) (Includes SMA to BNC Cable)	USB 2.0 and Analog (BNC)	USB 2.0 and Analog (8-Pin)
Automated LED Configuration	No	Yes	Yes	Yes
Display	None	Touchscreen	LCD	LCD
Link to Full Web Presentation	Full Web Presentation	Full Web Presentation	Full Web Presentation	Full Web Presentation
Required Accessories	KPS101 Power Supply	None	DC4100-HUB Connector Hub	

Part Number	Description	Price	Availability
LEDD1B	T-Cube LED Driver, 1200 mA Max Drive Current (Power Supply Not Included)	\$293.00	Today
KPS101	15 V, 2.4 A Power Supply Unit for One K-Cube or T-Cube	\$25.71	Today
DC2200	High-Power 1-Channel LED Driver with Pulse Modulation, 10.0 A Max, 50.0 V Max	\$1,995.00	Lead Time
DC4100	4-Channel LED Driver, 1 Modulation Input, 1 A, 5 V	\$2,580.00	Today
DC4104	Customer Inspired!4-Channel LED Driver, 4 Modulation Inputs, 1 A, 5 V	\$2,840.00	Today
DC4100-HUB	Single LED Connector Hub for DC4100	\$309.00	Today

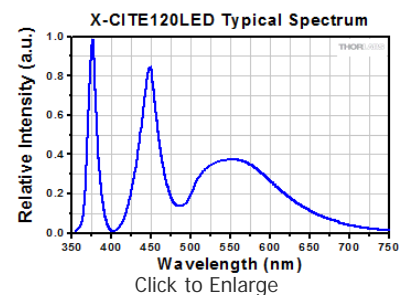
[Hide Broad-Spectrum LED Lamp for Six-Cube Epi-Illuminator](#)

Broad-Spectrum LED Lamp for Six-Cube Epi-Illuminator



- ▶ Long Lifetime (>25,000 Hours for LED)
- ▶ Stable Output Intensity and Automated Thermal Management
- ▶ Output can be Modulated via BNC Input, RS-232, or USB
- ▶ Only Compatible with MBE74100 Six-Cube Epi-Illuminator

The X-CITE120LED is a broad-spectrum LED lamp that emits from 370 to 700 nm. Its broadband emission makes it best suited for setups that require the flexibility to stimulate fluorophores whose absorption wavelengths are spectrally separated. It is designed to be used in combination with filter cubes loaded into the MBE74100 six-cube epi-illuminator, which help condition the light from the lamp to target specific fluorophores. An output spectrum provided by the manufacturer is shown to the right.



A knobbed controller is included with this lamp for manual intensity control. The lamp will also accept external modulation signals provided via BNC, RS-232, or USB.

Compatibility with Epi-Illuminators

To use this lamp with a Cerna microscope, the MBE74100 six-cube epi-illuminator module is required. Our single-cube epi-illuminator module is not compatible with this lamp.

Installation

The lamphouse port is equipped with a Nikon Eclipse bayonet mount that is inserted into the MBE74100 epi-illuminator. The mating port on the epi-illuminator has a knurled locking ring that is rotated to lock the lamphouse in place.

Part Number	Description	Price	Availability
X-CITE120LED	Broad-Spectrum LED Lamp	\$6,495.00	Lead Time

[Hide Liquid Light Guide Lamps for Epi-Illuminators](#)

Liquid Light Guide Lamps for Epi-Illuminators

These lamps use flexible cables known as liquid light guides (LLGs) to deliver broad-spectrum visible light into the epi-illuminator. Their broadband emission makes them best suited for setups that require the flexibility to stimulate fluorophores whose absorption wavelengths are spectrally separated. They are designed to be used in combination with filter cubes loaded into the epi-illuminator, which help condition the light from the lamp to target specific fluorophores.

Compatibility with Epi-Illuminators

The lamps shown here are compatible with both the WFA2001 single-cube and MBE74100 six-cube epi-illuminator modules.



Click to Enlarge



Click to Enlarge

HPLS243 Features

- ▶ Output Spectrum: 400 - 700 nm
- ▶ Intensity is Variable from 0% to 100% via Soft-Touch Front Panel
- ▶ External Control via USB 2.0
- ▶ >10,000 Hour Lifetime (After 10,000 Hours, the Intensity will be 50% of the Original Intensity)
- ▶ Includes Ø3 mm, 1.2 m (4') Long LLG
- ▶ Requires LLG3A5-A Collimating Adapter when used with MBE74100 Epi-Illuminator
- ▶ [Link to Full Web Presentation](#)

Installation

Our WFA2001 single-cube epi-illuminator ships with an adapter that directly accepts the LLG; simply insert the LLG and secure it using the included thumbscrew.

The back of the MBE74100 six-cube epi-illuminator contains a port that accepts Nikon Eclipse bayonet mounts. Connect our LLG3A5-A collimating adapter (sold separately) to the LLG, securing the adapter with the included 4-40 setscrew (0.050" hex). Then insert the adapter to the mating port on the epi-illuminator, rotating the knurled ring to lock it in place.

X-CITE 200 Features

- ▶ Output Spectrum: 340 - 800 nm
- ▶ Intensity is Variable from 0% to 100% Using Knob
- ▶ External Control via BNC Input
- ▶ >2,000 Hour Minimum Lifetime; >2,500 Hour Typical Lifetime
- ▶ Includes Ø3 mm, 5' (1.5 m) Long LLG

Installation

Our WFA2001 single-cube epi-illuminator ships with an adapter that directly accepts the LLG; simply insert the LLG and secure it using the included thumbscrew.

The back of the MBE74100 six-cube epi-illuminator contains a port that accepts Nikon Eclipse bayonet mounts. Connect the collimating adapter included with the X-CITE 200 to the LLG, securing the adapter with the provided thumbscrew. Then insert the adapter to the mating port on the epi-illuminator, rotating the knurled ring to lock it in place.

Part Number	Description	Price	Availability
HPLS243	Plasma Light Source with Ø3 mm, 4 ft (1.2 m) Liquid Light Guide	\$3,920.00	Today
X-CITE 200	DC-Coupled Lamp with Liquid Light Guide	\$6,495.00	Today
LLG3A5-A	Ø3 mm LLG Collimating Adapter, Nikon Eclipse Ti, ARC: 350-700 nm	\$407.00	Today

Hide Filter Sets

Filter Sets



- ▶ Used for Epi-Fluorescence Studies
- ▶ Tune Light from the Illumination Source to Detect Specific Fluorophores with Widefield Viewing
- ▶ Each Set Consists of an Excitation Filter, an Emission Filter, and a Dichroic Mirror
- ▶ Available Target Fluorophores: BFP, Alexa Fluor® 488/GFP, mCherry, and tdTomato
- ▶ Other Filter Sets at our Complete Web Presentation

Epi-fluorescence filter sets are inserted into filter cubes (sold above) to condition the light emitted by the illumination source for the detection of specific fluorophores. The filters shown here are designed for four popular fluorophores: BFP, Alexa Fluor® 488, mCherry, or tdTomato. Each set consists of an excitation filter, an emission filter, and a dichroic filter. Their transmission curves are given in the table to the right.

Our filters come in the industry-standard sizes. For excitation and emission filters, the standard dimensions are Ø25 mm, while for dichroic mirrors, the standard dimensions are 25 mm x 36 mm. This allows Cerna microscopes to be compatible with filters from all major manufacturers.

It is important to install the filters in the right position in the filter cube to maximize signal generation and collection efficiency. The excitation filter should face horizontally, toward the epi-illuminator module; the emission filter should face vertically, toward the trinoculars and/or scientific camera; and the side of the dichroic filter with the dichroic coating, which is marked at the factory, should be oriented downward, toward the sample.

Filter Transmission Spectra		
Item #	Target Fluorophore	Transmission Graph (Click for Plot)
MDF-BFP	BFP	
MDF-GFP2	Alexa Fluor® 488 GFP	
MDF-MCHA ^a	mCherry	
MDF-MCHC ^b	mCherry	
MDF-TOM	tdTomato	

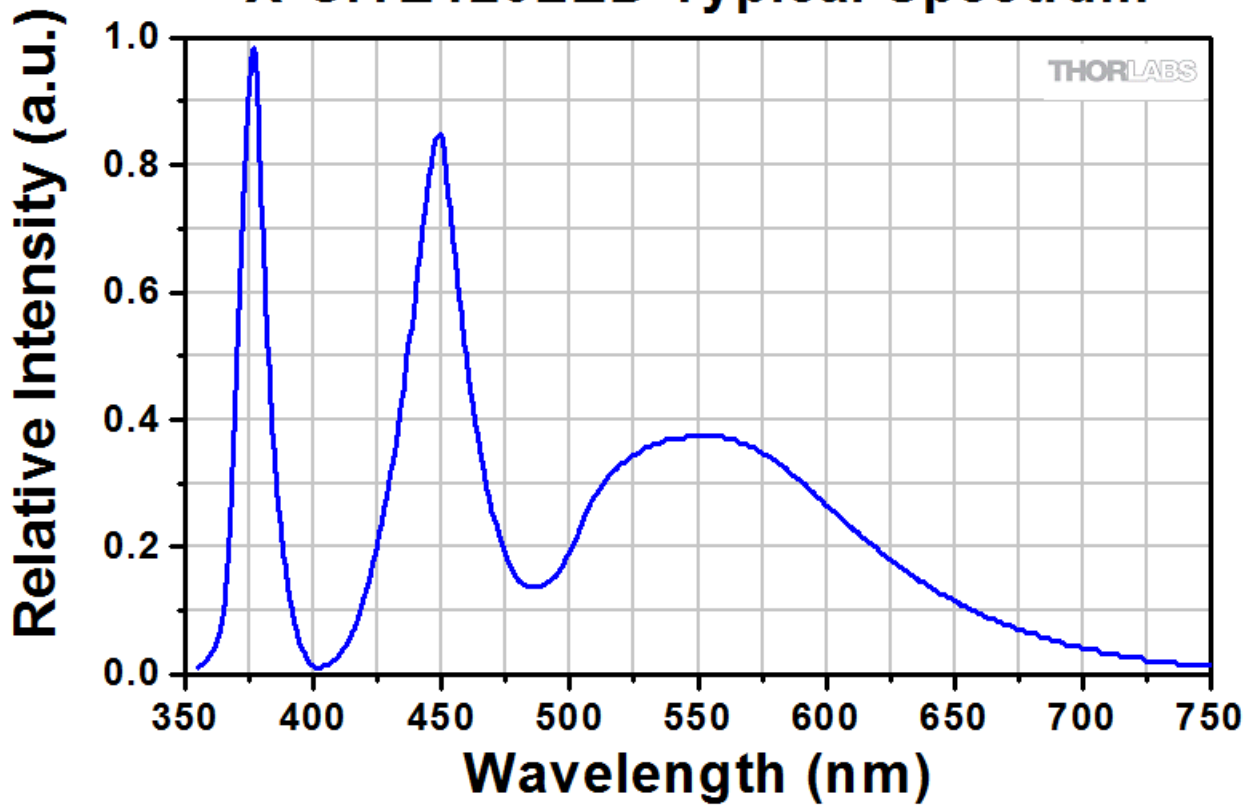
- This filter set's excitation range is centered around 578 nm, making it well matched to typical LEDs.
- This filter set's excitation range is centered around 562 nm, making it well matched to typical lamps.

Part Number	Description	Price	Availability
MDF-BFP	BFP Excitation, Emission, and Dichroic Filters (Set of 3)	\$625.00	Today
MDF-GFP2	Alexa Fluor® 488 Excitation, Emission, and Dichroic Filters (Set of 3)	\$785.00	Today
MDF-MCHA	mCherry-A Excitation, Emission, and Dichroic Filters for LEDs (Set of 3)	\$785.00	Today
MDF-MCHC	mCherry-C Excitation, Emission, and Dichroic Filters for Lamps (Set of 3)	\$785.00	Today
MDF-TOM	tdTomato Excitation, Emission, and Dichroic Filters (Set of 3)	\$785.00	Today

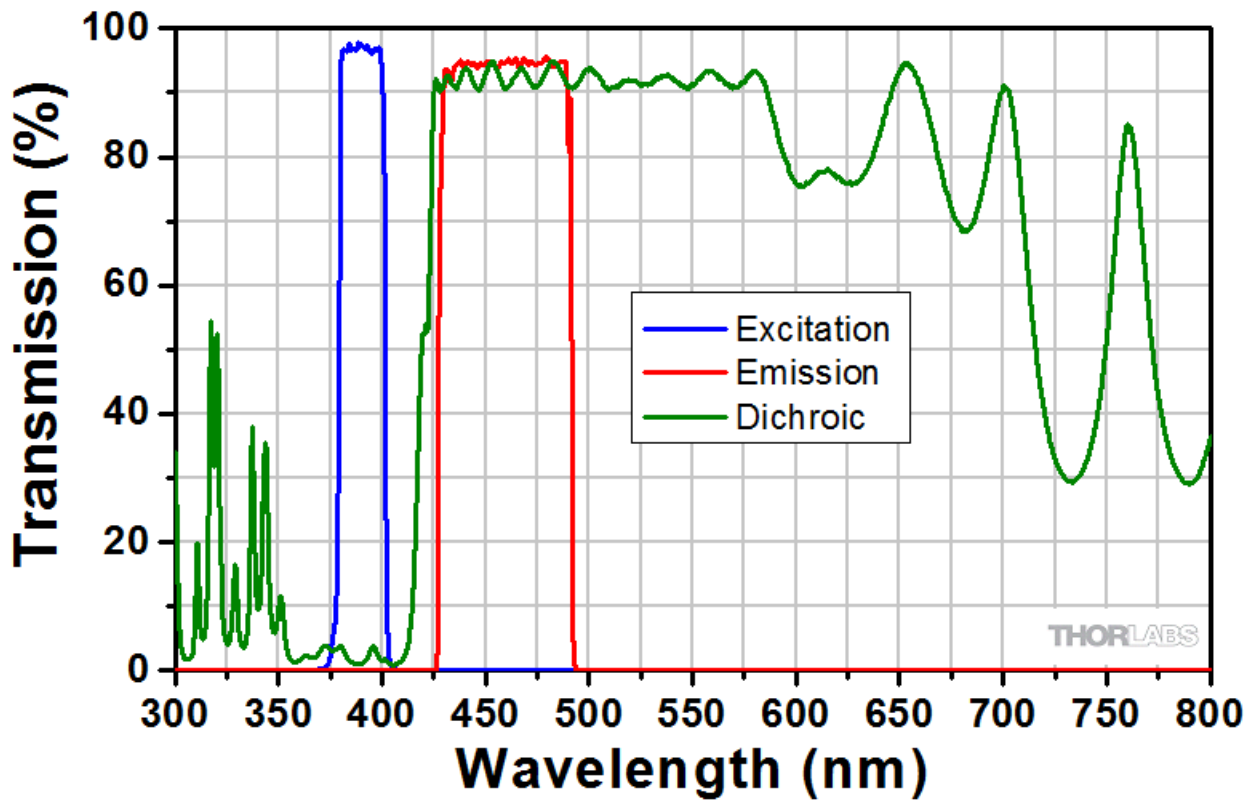
Visit the *Cerna Components: Epi-Illumination* page for pricing and availability information:

https://www.thorlabs.com/newgrouppage9.cfm?objectgroup_id=8565

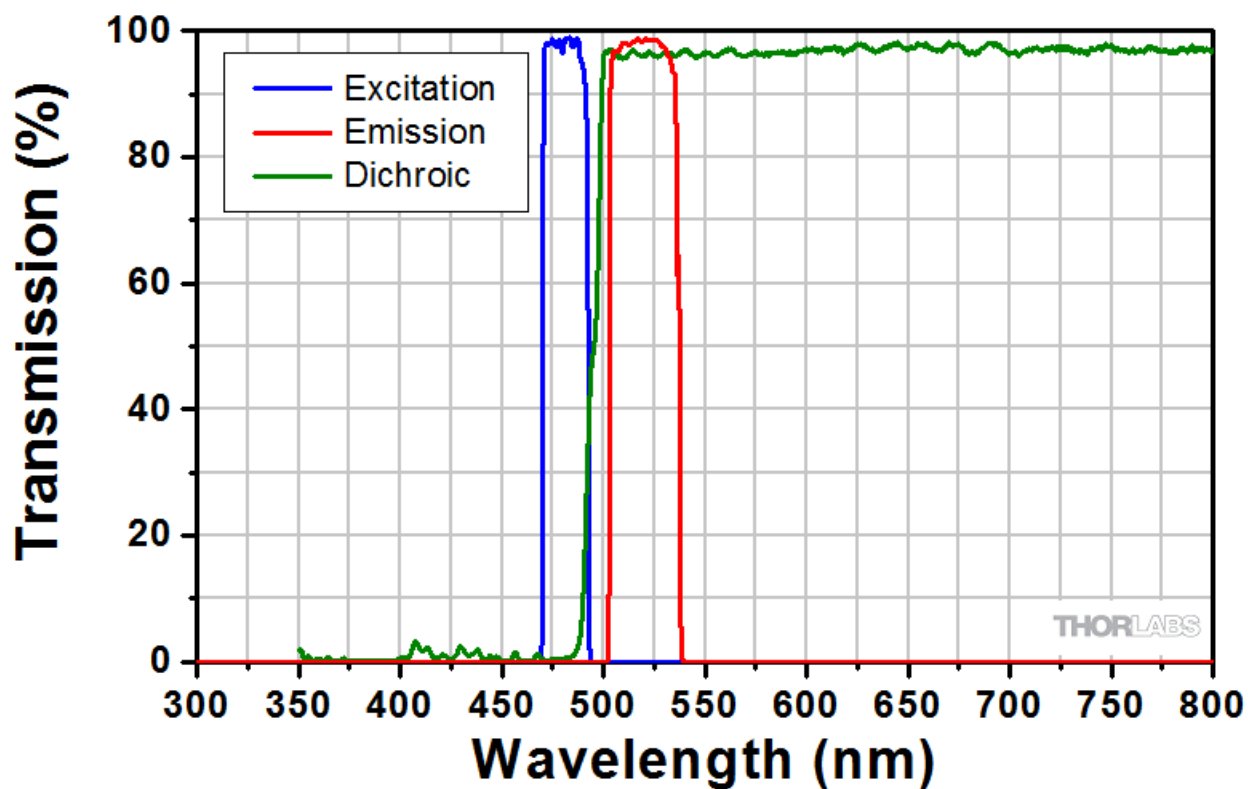
X-CITE120LED Typical Spectrum



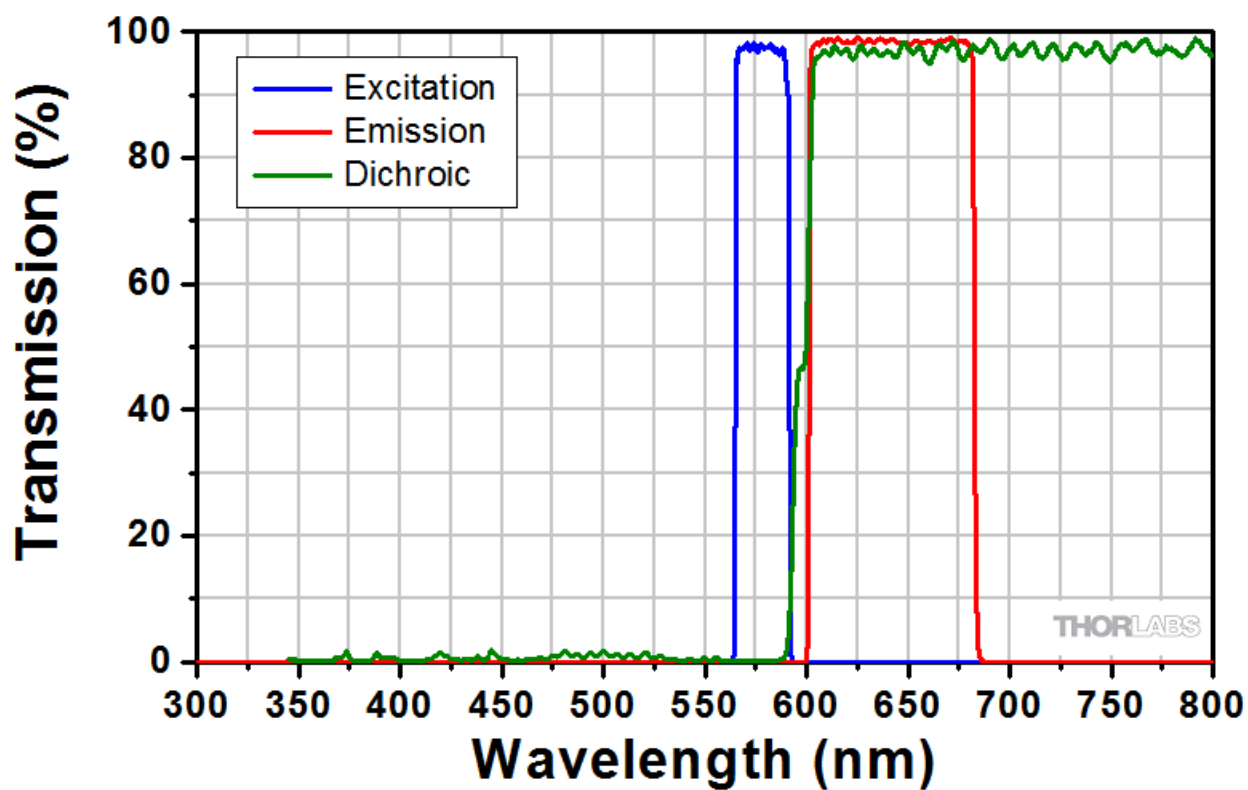
MDF-BFP Transmission



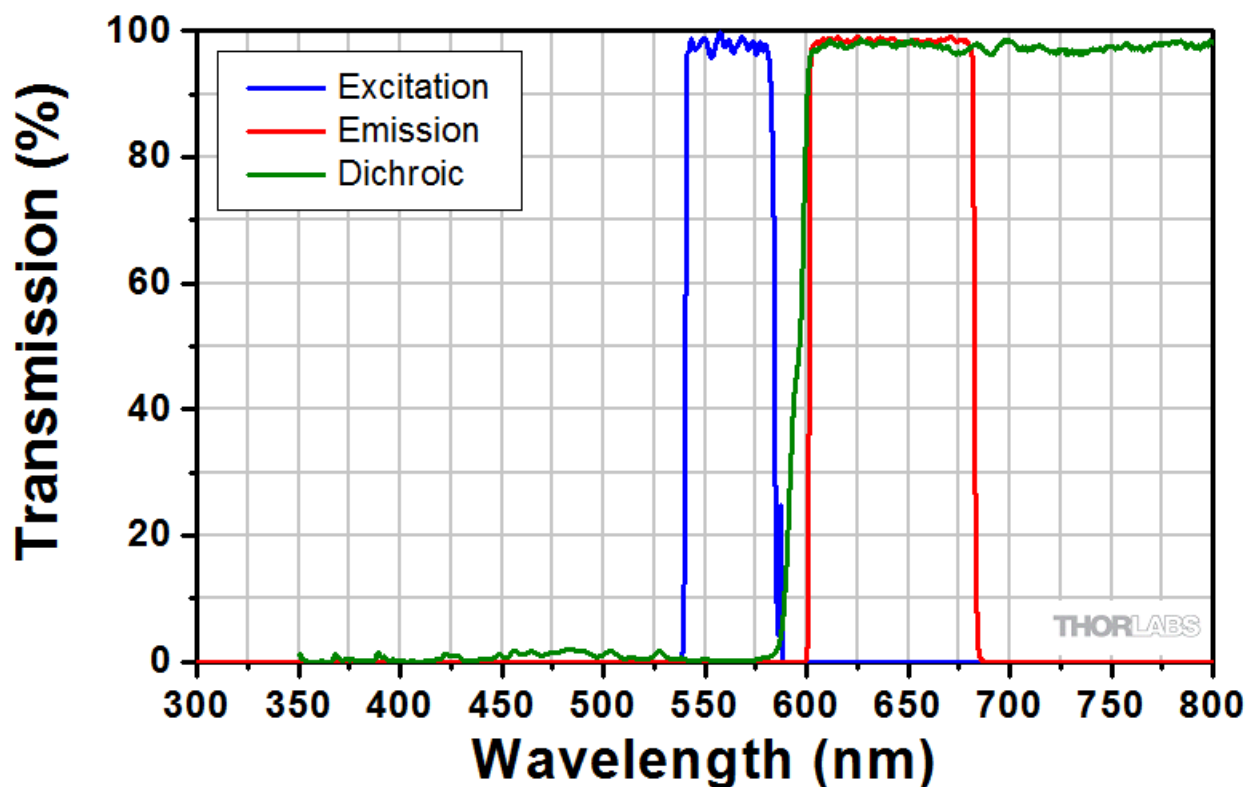
MDF-GFP2 Transmission



MDF-MCHA Transmission



MDF-MCHC Transmission



MDF-TOM Transmission

