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THORLABS

FKB-VIS-10 - February 21, 2022

Item # FKB-VIS-10 was discontinued on February 21, 2022. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

BANDPASS FILTER KITS

- **10 Mounted Bandpass Filters in Each Kit**
- **Visible 10 nm Bandpass: Cut-Offs from 350 nm to 800 nm**
- **Visible 40 nm Bandpass: Cut-Offs from 400 nm to 850 nm**
- **IR 10 nm Bandpass: Cut-Offs from 850 nm to 1600 nm**

FKB-VIS-40

FKB-VIS-10

FB550-40

FB600-40

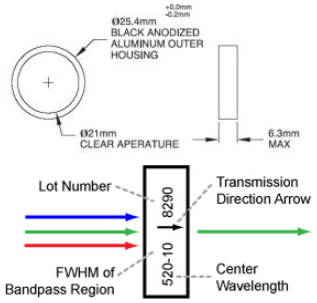
Each Lens is Clearly Marked

OVERVIEW

Features

- Central Wavelengths from 350 nm to 1600 nm
- 10 nm and 40 nm Bandpass Regions
- Edge-Scribed for Superb Long Term Stability
- Engraved Filter Mount with 1" Outer Diameter
- Clear Aperture is 21 mm

Click to Enlarge
FB550-40 Filter Mounted in a TRF90 Flip Mount Using a Retaining Ring



Thorlabs' Bandpass Filter Kits each contain 10 mounted bandpass filters that can be used to transmit a well-defined wavelength band in the visible or IR, while rejecting other unwanted radiation. Each filter is mounted in an unthreaded Ø1" black anodized aluminum ring that can be placed into our selection of Ø1" lens tubes and filter mounts using retaining rings, as shown to the right. The filter kit comes in a convenient plastic box for storage and transportation purposes. Please see the *Tutorial* tab for more information about the structure of the filter and the transmission direction arrow.

Thorlabs also offers a wide range of individually sold bandpass filters. To inquire about our custom bandpass filter options, including the possibility of alternative central wavelengths or bandwidths, please contact Tech Support. Please note that there is a significant lead time and tooling cost associated with custom filters that makes the purchase of only
a few pieces fairly costly.

Additional Bandpass Filters				
UV/Visible Bandpass Filters	NIR Bandpass Filters	MIR Bandpass Filters	Premium Bandpass Filters	Bandpass Filter Kits

340 - 694.3 nm CWLs	700 - 1650 nm CWLs	1750 - 9500 nm CWLs	300 - 1550 nm CWLs	
We also offer custom bandpass filters with other central wavelengths or FWHM. To request a quote, contact Tech Support.				

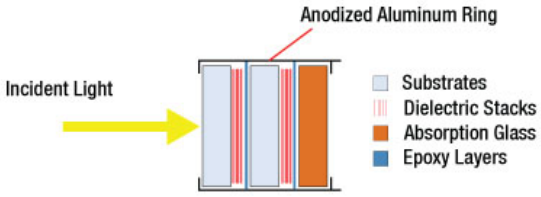
SPECS

Specifications	
Out of Band Transmission	<0.01% from 200 nm to 3.0 µm (10 nm and 12 nm) <0.01% from 200 nm to 1150 nm (40 nm)
Minimum Clear Aperture	Ø21 mm
Thickness	<6.3 mm
Optimum Operating Temperature	23°C
Edge Treatment	Mounted in Black Anodized Aluminum Ring
Edge Markings	Center Wavelength, FWHM, Lot Number, Arrow (↑) Indicating the Transmission Direction
Surface/Coating Quality	80/50 Per Mil-0-13830A
Operating Temperature	-50°C to +80°C
Substrates	Schott Borofloat & Soda Lime

TUTORIAL

Bandpass Filter Structure

A bandpass filter is created by depositing layers of material on the surface of the substrate. Typically, there are several dielectric stacks separated by spacer layers. The dielectric stack is composed of a large number of alternating layers of low-index and high-index dielectric material. The thickness of each layer in the dielectric stack is λ/4, where λ is the central wavelength of the bandpass filter (i.e. the wavelength with the highest transmittance through the filter). The spacer layers are placed in between the dielectric stacks and have a thickness of (nλ)/2, where n is an integer. The spacer layers can be formed from colored glass, epoxy, dyes, metallic, or dielectric layers. A Fabry-Perot cavity is formed by each spacer layer sandwiched between dielectric stacks. The filter is mounted in an engraved metal ring for protection and ease of handling.



Click to Enlarge

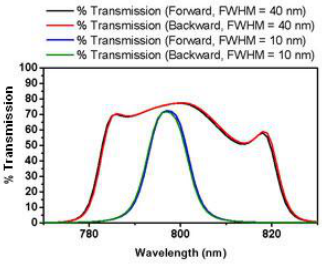
The number of layers shown in this schematic is not indicative of the number of layers in an actual bandpass filter. Also the drawing is not to scale.

Filter Operation Overview

The constructive interference conditions of a Fabry-Perot cavity allow light at the central wavelength, and a small band of wavelengths to either side, to be transmitted efficiently, while destructive interference prevents the light outside the passband from being transmitted. However, the band of blocked wavelengths on either side of the central wavelength is small. In order increase the blocking range of the filter, materials with broad blocking ranges are used for or coated onto the spacer layers and the substrate. Although these materials effectively block out of band transmission of incident radiation they also decrease the transmission through the filter in the passband.

Filter Orientation

An engraved arrow on the edge of the filter is used to indicate the recommended direction for the transmission of light through the filter. Although the filter will function with either side facing the source it is better to place the coated side toward the source. This will minimize any thermal effects or possible thermal damage that blocking intense out-of-band radiation might caused due to the absorption of the out-of-band radiation by the substrate or colored glass filter layers. The plot to the right was made by illuminating the filter with a low intensity broadband light and measuring the transmission as a function of wavelength. The plot shows that the transmission direction through the filter has very little effect on the intensity and the spectrum of the light transmitted through the filter. The minimal variation between the forward and backward traces is most likely due to a small shift in the incident angle of the light on the filter introduced when the filter was removed, flipped over, and replaced in the jig.



FB800-10 and FB800-40 filters were used to make the measurement that resulted in the plot above.

The filter is intended to be used with collimated light normally incident on the surface of the filter. For uncollimated light or light striking the surface and an angle not normally incident to the surface the central wavelength (wavelength corresponding to peak transmission) will shift toward lower wavelengths and the shape of

the transmission region (passband) will change. Varying the angle of incidence by a small amount can be used to effectively tune the passband over a narrow range. Large changes in the incident angle will cause larger shifts in the central wavelength but will also significantly distort the shape of the passband and, more importantly, cause a significant decrease in the transmittance of the passband.

Filter Temperature

The central wavelength of the bandpass filter can be tuned slightly (~1 nm over the operating range of the filter) by changing the temperature of the filter. This is primarily due to the slight thermal expansion or contraction of the layers.

Visible Bandpass Filter Kit, 10 nm FWHM

Item #	Central Wavelength	FWHM	T(min)[a]	Transmission Data[b]
FB350-10	350 ± 2 nm	10 ± 2 nm	25%	
FB400-10	400 ± 2 nm	10 ± 2 nm	37%	
FB450-10	450 ± 2 nm	10 ± 2 nm	45%	
FB500-10	500 ± 2 nm	10 ± 2 nm	50%	
FB550-10	550 ± 2 nm	10± 2 nm	50%	

Item #	Central Wavelength	FWHM	T(min)[a]	Transmission Data[b]
FB600-10	600 ± 2 nm	10 ± 2 nm	50%	
FB650-10	650 ± 2 nm	10 ± 2 nm	50%	
FB700-10	700 ± 2 nm	10 ± 2 nm	50%	
FB750-10	750 ± 2 nm	10 ± 2 nm	50%	
FB800-10	800 ± 2 nm	10 ± 2 nm	50%	

a. Minimum Transmission at Center Wavelength
b. Please note that transmission is only guaranteed for the specified center wavelength and that the data in the plots is typical. Performance may vary from lot to lot.

Part Number	Description	Price	Availability
FKB-VIS-10	Visible Bandpass Filter Kit (10 nm FWHM), Mounted, Set of 10	$1,660.00	7-10 Days

Visible Bandpass Filter Kit, 40 nm FWHM

Item #	Central Wavelength	FWHM	T(min)[a]	Transmission Data[b]
FB400-40	400 ± 8 nm	40 ± 8 nm	45%	
FB450-40	450 ± 8 nm	40 ± 8 nm	45%	
FB500-40	500 ± 8 nm	40 ± 8 nm	70%	
FB550-40	550 ± 8 nm	40 ± 8 nm	70%	
FB600-40	600 ± 8 nm	40 ± 8 nm	70%	

Item #	Central Wavelength	FWHM	T(min)[a]	Transmission Data[b]
FB650-40	650 ± 8 nm	40 ± 8 nm	70%	
FB700-40	700 ± 8 nm	40 ± 8 nm	70%	
FB750-40	750 ± 8 nm	40 ± 8 nm	70%	
FB800-40	800 ± 8 nm	40 ± 8 nm	70%	
FB850-40	850 ± 8 nm	40 ± 8 nm	70%	

a. Minimum Transmission at Center Wavelength
b. Please note that transmission is only guaranteed for the specified center wavelength and that the data in the plots is typical. Performance may vary from lot to lot.

Part Number	Description	Price	Availability
FKB-VIS-40	Visible Bandpass Filter Kit (40 nm FWHM), Mounted, Set of 10	$1,550.00	7-10 Days

IR Bandpass Filter Kit

Item #	Central Wavelength	FWHM	T(min)[a]	Transmission Data[b]

Item #	Central Wavelength	FWHM	T(min)[a]	Transmission Data[b]

FB850-10	850 ± 2 nm	10 ± 2 nm	50%	
FB900-10	900 ± 2 nm	10 ± 2 nm	50%	
FB1000-10	1000 ± 2 nm	10 ± 2 nm	45%	
FB1100-10	1100 ± 2 nm	10 ± 2 nm	40%	
FB1200-10	1200 ± 2 nm	10 ± 2 nm	40%	

FB1300-12	1300 ± 2.4 nm	12 ± 2.4 nm	40%	
FB1400-12	1400 ± 2.4 nm	12 ± 2.4 nm	35%	
FB1500-12	1500 ± 2.4 nm	12 ± 2.4 nm	35%	
FB1550-12	1550 ± 2.4 nm	12 ± 2.4 nm	50%	
FB1600-12	1600 ± 2.4 nm	12 ± 2.4 nm	50%	

a. Minimum Transmission at Center Wavelength
b. Please note that transmission is only guaranteed for the specified center wavelength and that the data in the plots is typical. Performance may vary from lot to lot.

Part Number	Description	Price	Availability
FKB-IR-10	**IR Bandpass Filter Kit (10 nm FWHM), Mounted, Set of 10**	**$1,550.00**	**Today**

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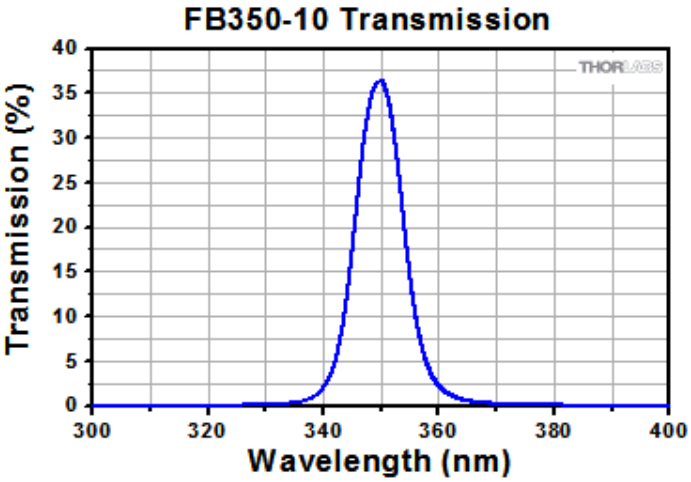

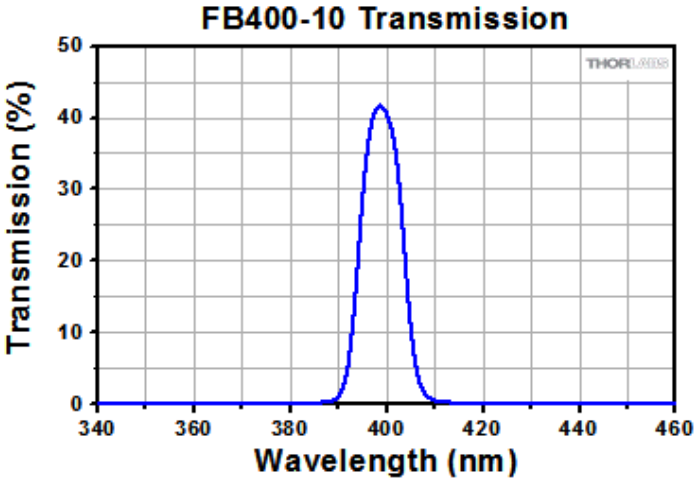

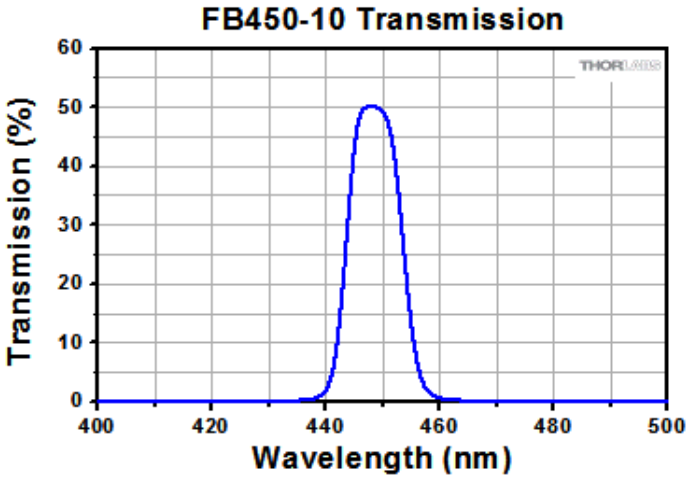

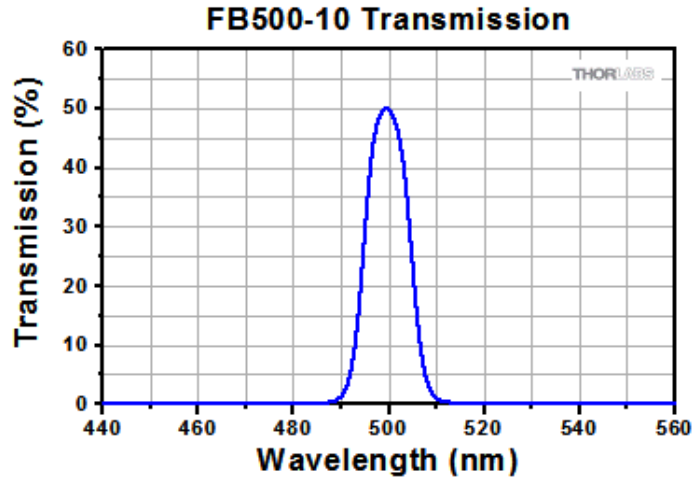

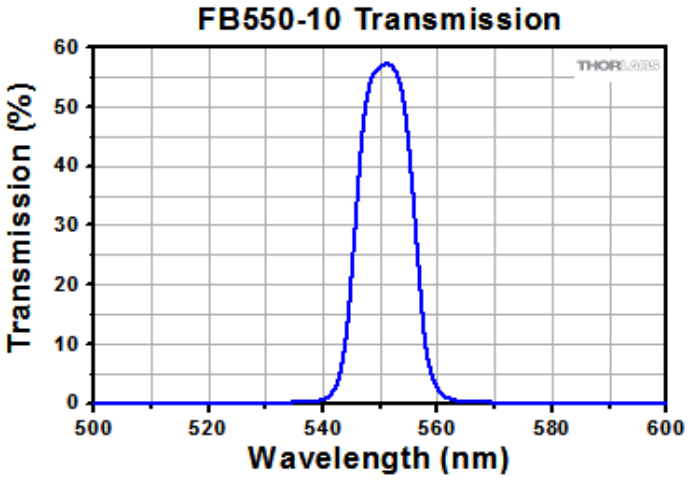

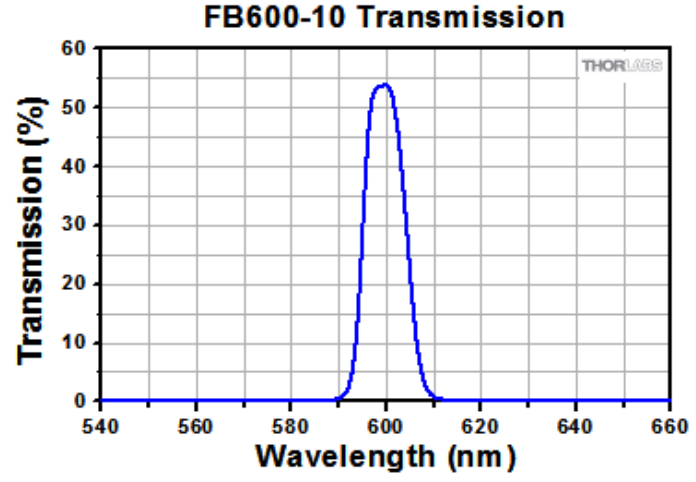

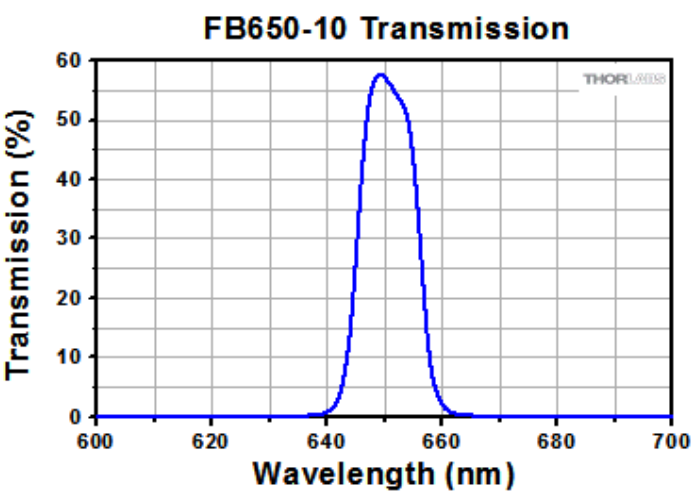

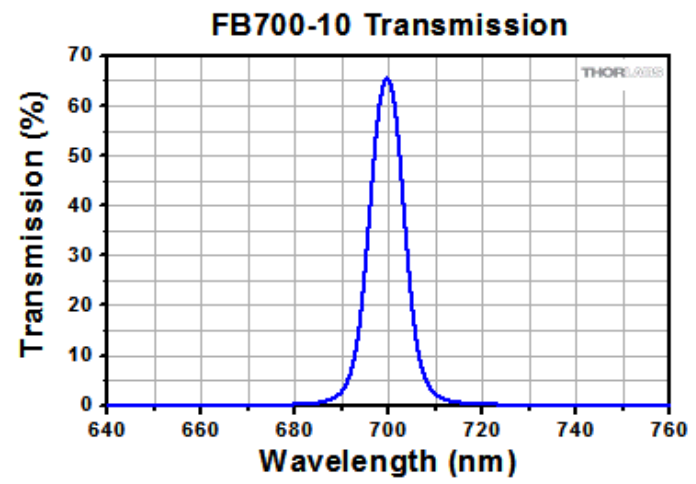

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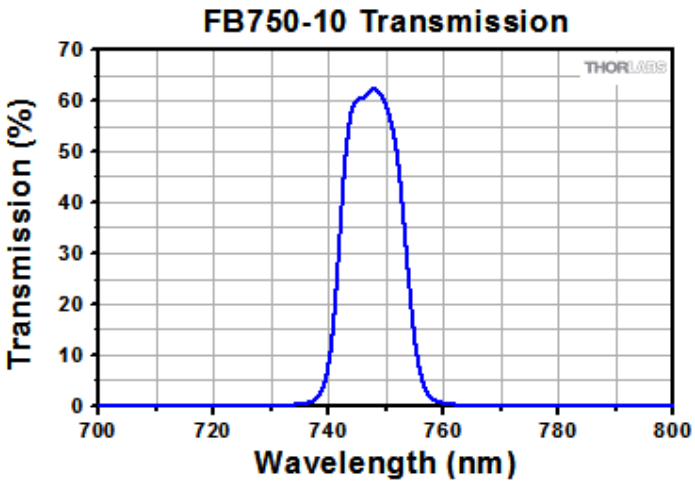
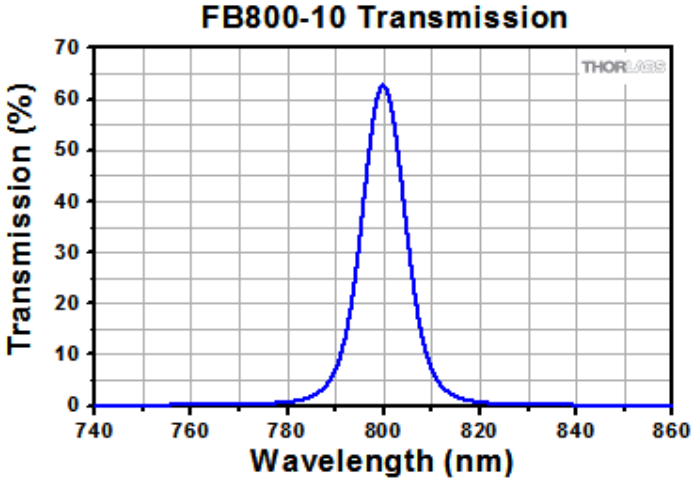
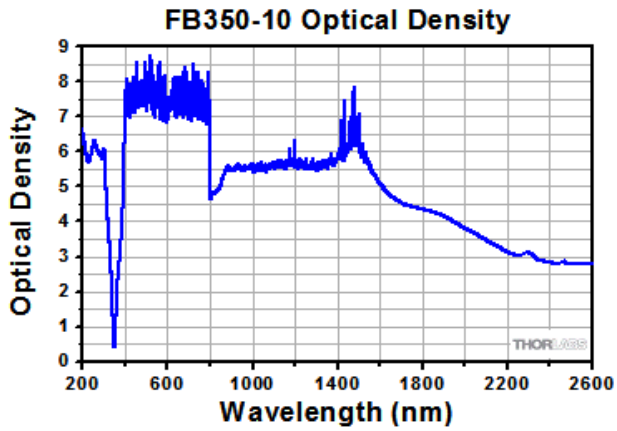
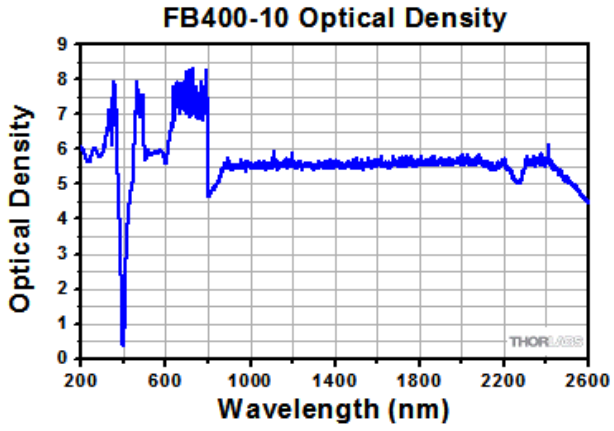
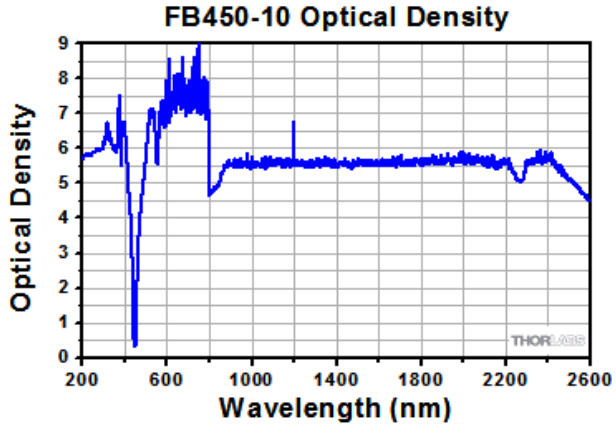


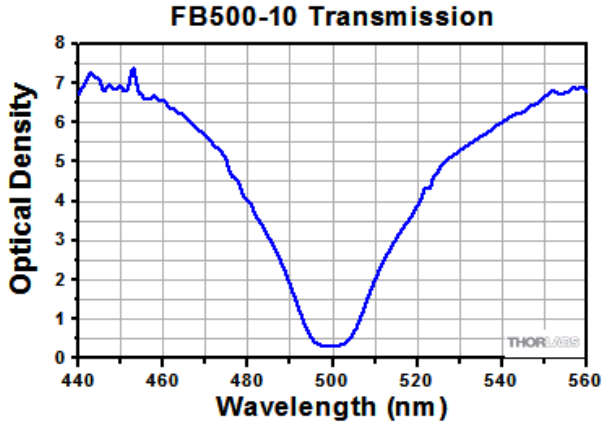


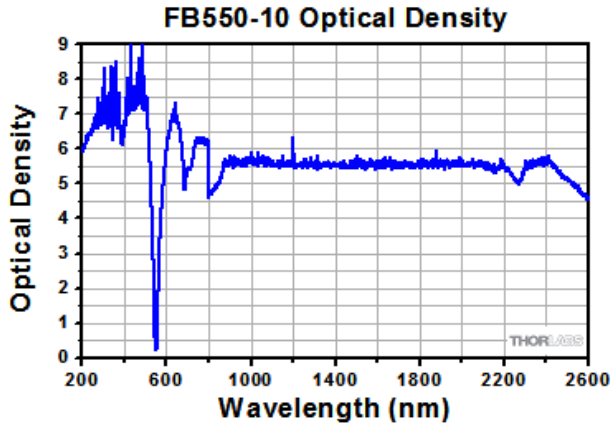
Please note that optical density is only guaranteed over the blocking region, that the data for the plots are typical, and performance may vary from lot to lot.

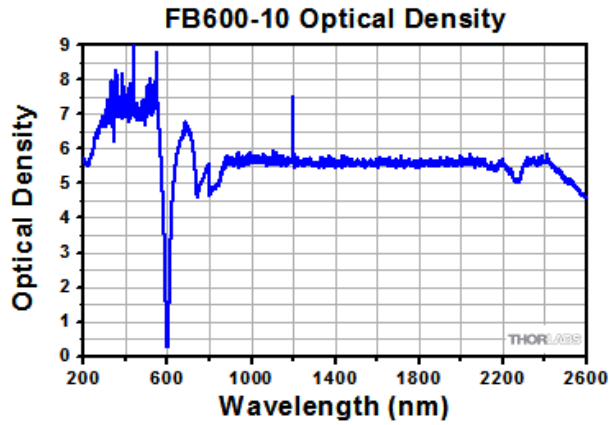


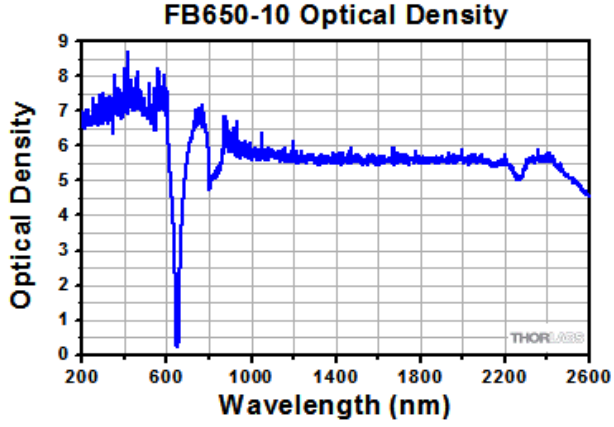


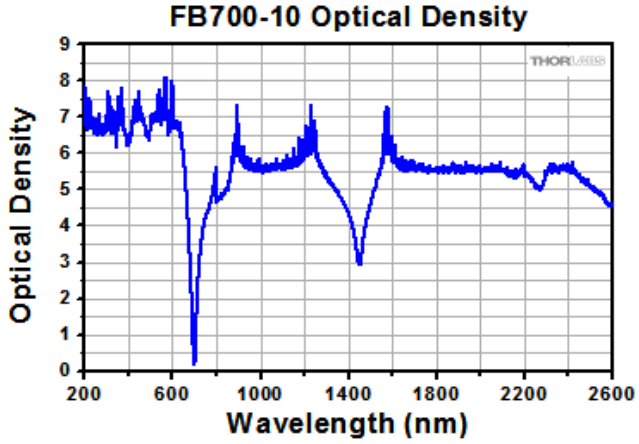












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