MIDOPT

MIDWEST OPTICAL SYSTEMS, INC.

PRODUCT GUIDE

Optical Filters & Imaging Solutions

Mount Sizes

THREADED

Mount Size	Pitch
M13.25	0.5
M22.5	0.5
M25.5	0.5
M27	0.5
M30.5	0.5
M34	0.5
M35.5	0.5
M37	0.75
M37.5	0.5
M39	0.5
M40.5	0.5
M43	0.75
M46	0.75
M48	0.75
M49	0.75
M52	0.75
M55	0.75
M58	0.75
M62	0.75
M67	0.75
M72	0.75
M77	0.75
M82	0.75
M86	1.0
M95	1.0
M105	1.0

C-MOUNT

M25.4™

SLIP MOUNT

Outside Diameter Range	Threaded Mount
15-19.0	M22.5
19.1-26.5	M30.5
26.6-31.9	M40.5
32.0-40.9	M46
41.0-50.9	M55
51.0-57.9	M62
58.0-68.0	M72
68.1-79.0	M82
79.1-101.0	M105

UNMOUNTED

Custom Shapes & Sizes Available

MOUNTING SOLUTIONS

MOUNTS FOR ANY SYSTEM

Threaded Mount

Designed for Lenses with Filter Threads

- Sizes available: M13.25-M105
- Black anodized aluminum
- Custom thread sizes are available upon request

CREATE PART #
Select a filter and add a mount size (e.g. M27) *Example: BP470-**27***

25.4™ C-Mount

Threads into all C-Mount Cameras

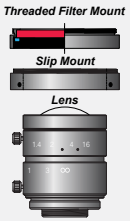
- 25.4™ C-Mount Camera Filter exclusively designed by MidOpt to thread directly into any C-Mount Camera between the lens and sensor
- Recommended for use with wide angle lenses to prevent vignetting and angle shift
- Helpful in applications with space constraints and lenses without filter threads
- Custom installation wrench included

CREATE PART #
Select a filter and add "-25.4" *Example: BP470-**25.4***

Slip Mount

Designed for Wide Angle Lenses Without Filter Threads

- Accommodates standard threaded mounts
- Low profile and oversize diameter design prevents wide angle lens vignetting
- Includes black Delrin® Slip Mount adapter plus Threaded Mount Filter



CREATE PART #
*Select a filter, use "S" for slip and add the outside diameter of lens in mm (e.g. 43mm) Example: BP470-**S43***

Unmounted

- Any MidOpt filter type can be provided as an Unmounted Filter
- Custom shapes and sizes are typically available within a two week lead time with many shipped same day

CREATE PART #
CIRCLE:** Use "D" and add diameter in mm (e.g. 19mm) Example: BP470-**D19
SQUARE:** Use "R" and add side measurement in mm (e.g. 15mm) Example: BP470-**R15
RECTANGLE:** Use "R" and add length in mm (e.g. 30mm) x width in mm (e.g. 15mm) Example: BP470-**R30x15

ACCESSORIES

Extension Rings

Decrease Minimum Object Distance

- Increase magnification for close-up applications
- Available as a 6 Ring Set **EXT-S-SET**, 4 Ring Set **EXT-UL-SET** and individual sizes; 0.5mm-100mm

Step Adapter Rings

Filter and Lens Size Versatility

Step-Up Rings

- Use larger diameter filters on lenses with smaller diameter filter threads
- Available sizes: SU22.5-25.5 – SU77-105

Step-Down Rings

- Use smaller diameter filters on lenses with larger diameter filter threads
- Available sizes: SD27-25.5 – SD72-62

Part #: CK100

Cleaning Kit

For all Optics, Lenses and Lighting

CK100 Contents: Compressed Air Duster, Glass Surface Cleaner, Premium Grade Optical Tissue, Microfiber Cleaning Cloth and Cotton Swabs.

CK100-NA available in a compact version for easy storage and international shipping. Compressed Air Duster is not included.

Lens Enclosure

Protect Your Lens

- Tamper and dust proof
- Fits most CS mount cameras
- Anti-reflection coated to maximize transmission
- Equipped with a built-in 5mm spacer to adapt C-Mount lenses
- Easy to clean

Two A/R Protective Lens Options
LE100-LP340: Glass Protective Window
LE100-AC380: Acrylic Protective Window

LE100* Enclosure Set includes the following to accommodate lenses up to 42.5mm in length and 37.5mm in diameter
LE254-43: Enclosure mount with built in 5mm spacer
Extension Tube Sizes: LE025-43 (25mm), LE010-43 (10mm), LE005-43 (5mm)

**Additional extension tubes in the above sizes are available and can be purchased individually to accommodate longer lenses*

Custom adapters available for various C-mount camera models. Contact us for details.

Close-Up Lens Set

Increase Focus Distance

- Threads onto the front of a lens
- Available from stock, mounted in threaded black anodized aluminum rings, sizes M25.5-M62
- Each set consists of +1, +2 and +4 diopter lenses

Part #: RA034

Part #: RA060

Rotating Right Angle Attachments

Imaging at a 90° angle

- Helpful for applications with space constraints
- Locks in position with a thumbscrew, guarding against movement due to shock or vibration
- Can be used in conjunction with a filter
- Available adjustments through 360° (RA034) and 300° (RA060)

FILTER TEST KITS

Evaluate and Improve Image Quality with MidOpt Filter Test Kits

- Solve applications quickly
- Instantly test the effects of color/wavelength
- Control the variability of ambient light
- Evaluate glare reduction
- Enhance contrast of objects or desired features
- Available with ultraviolet (UV), Visible (VIS) and near-infrared (NIR) passbands

MidOpt Bandpass Filters Emulate the Output of LED Illumination

Testing the effects of monochromatic LED illumination in a system is easily accomplished by using available white light and a MidOpt Filter Kit. When testing, each bandpass filter achieves a similar result as the matching LED wavelength would yield. This aids in determining the appropriate LED wavelength for the application.

Reduce Cost and Lead Time

Being equipped with a large variety of lighting options can be impractical and expensive. Testing with MidOpt filters offers significant savings in time and resources when working toward an optimal lighting solution. Once an appropriate wavelength range has been determined, a bandpass filter is then used to complement the chosen lighting and control potential interference from ambient light.

Quickly Solve Applications On-Site

No Mounting Required

FS100 Machine Vision Swatch Filter Kit

- BP324
- BP470
- BP505
- BP525
- BP550
- BP590
- BP635
- BP660
- BP850
- PR032

43mm size filters

NS100 Neutral Density Swatch Filter Kit

- ND030
- ND060
- ND090
- ND120
- ND200
- ND300
- ND400

43mm size filters

SK100 Filter Kit

The SK100 includes 70 pieces of M27 size filters for UV, VIS and NIR imaging; making it the ultimate resource for testing the effects of color and wavelength when evaluating image quality.

Filter categories included: Bandpass; Dual Bandpass; Longpass; Neutral Density; Shortpass; Polarizing; Light Balancing; Protective and Acrylic.

FK100-*size* Machine Vision Binder Filter Kit

Available in Threaded Mount Sizes: M22.5 - M105

- BP324
- BP470
- BP525
- BP550
- BP590
- BP635
- BP660
- BP850
- LA120
- PR032
- PS007
- SU25.5-27
- SD30.5-27

Also Available: IK100 NIR Machine Vision Filter Kit & NK100 Neutral Density Filter Kit

TO ORDER: Add Threaded Mount size (e.g. 43) to Binder Kit of choice.
Example Part #: FK100-43

**Step Adapter Rings Included in M27 only*

FK400-25.5 Filter Kit

The portable FK400-25.5 Filter Kit economically packs four commonly recommended filters for VIS and NIR industrial imaging applications. For lenses with M25.5 threads.

- BP470-25.5
- BP635-25.5
- BP850-25.5
- PR032-25.5
- PS030

FK200-27 Machine Vision Filter Kit

Ten most popular UV, VIS and NIR machine vision filters. For lenses with M25.5, M27 and M30.5 threads.

- BP324-27
- BP470-27
- BP505-27
- BP525-27
- BP550-27
- BP590-27
- BP635-27
- BP660-27
- BP850-27
- PR032-27
- PS007
- SU25.5-27
- SD30.5-27

FK220-27 BN Series Filter Kit

Reduced bandwidth design for further spectral separation. Recommended for situations where ambient light can be overwhelming. For lenses with M25.5, M27 and M30.5 threads.

- BN470-27
- BN532-27
- BN595-27
- BN630-27
- BN660-27
- BN740-27
- BN810-27
- BN850-27
- BN940-27
- PR032-27
- PS030
- SU25.5-27
- SD30.5-27

› BANDPASS FILTERS

Specially designed for industrial imaging

- Available in UV, VIS and NIR passbands
- Achieve optimal contrast
- Improve system control, repeatability and stability
- Block interfering wavelengths, eliminating the need for shrouds
- Increase resolution by reducing chromatic aberration
- Anti-reflection coated for maximum transmission
- Hard coated, single substrate fabrication
- Exceptional surface quality; 40/20 scratch/dig

MOUNT & SIZE OPTIONS: In-stock, ready to ship Bandpass Filters are available in Threaded Mounts, sizes M13.25 to M105; 25.4™ C-Mount; Slip Mounts; or Unmounted. Custom shapes and sizes are also available.

APPLICATIONS: Bandpass Filters are used in a variety of industries, including machine vision, factory automation, security and surveillance, license plate recognition, medical and life science, agricultural inspection, aerial imaging, motion analysis, photography and cinematography.

BP SERIES Broad Bandwidth

- Designed with a broad, Gaussian passband to mimic and accommodate the entire output of the most common LED wavelengths
- Test the effects of monochromatic illumination
- High transmission ≥90%*
- Superior out-of-band blocking
- StablEDGE™ design reduces angular dependency and minimizes short-shifting effects
- Double-side polished glass for exceptional parallelism and optical flatness
- Available in sizes up to 165mm sq.

APPLICATIONS: BP Series are the most popular filters used in machine vision and factory automation systems and are a critical element in fluorescence imaging.

BN SERIES Narrow Bandwidth

- 45-55nm FWHM*
- Guaranteed peak transmission ≥85%
- Superior out-of-band blocking
- Designed for use with laser diodes and LEDs in applications with overwhelming ambient light
- StablEDGE™ design reduces angular dependency and minimizes short-shifting effects
- Double-side polished glass for exceptional parallelism and transmitted optical wavefront
- Available in sizes up to 165mm sq.

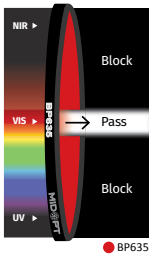
APPLICATIONS: BN Series are popular in outdoor applications where sunlight is present (ex. license plate recognition and security surveillance) and also in fluorescence applications to prevent cross-talk while blocking excitation illumination and ambient light.

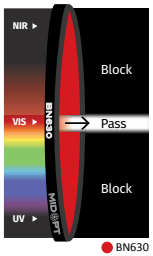
**Applies in most cases*

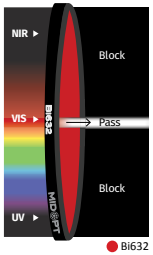
Bi SERIES Narrow Interference Bandwidth

- 20-35nm FWHM; Narrow bandwidth
- High transmission ≥85%
- Designed for use with laser diodes
- Ideal wavelength separation when multiple light sources of similar wavelengths are present
- Reflective, mirror-type surface that helps minimize thermal effects
- Available in sizes up to 79.5mm sq.

APPLICATIONS: Bi Series are popular for life science and laser analysis applications where only discrete wavelengths need to be passed to maximize system performance.





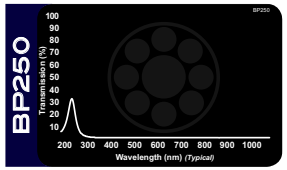


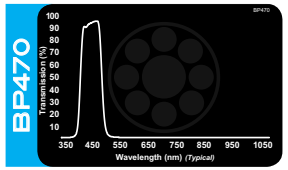
Part #	Description	Useful Range	FWHM (nominal)	Peak Transmission	StablEDGE™
BP SERIES — BROAD BANDWIDTH					
BP250	Deep-to-Near UV Bandpass	230-275nm	70nm	≥30%	
BP324	Near-UV Bandpass	290-365nm	105nm	≥90%	•
BP365	Near-UV Bandpass	335-400nm	80nm	≥85%	•
BP470	Blue Bandpass	425-495nm	85nm	≥90%	
BP500	Green-Blue Bandpass	440-555nm	248nm	≥85%	•
BP505	Cyan Bandpass	485-550nm	90nm	≥90%	•
BP525	Light Green Bandpass	500-555nm	80nm	≥90%	•
PE530	Photopic Response Bandpass	495-565nm	120nm	≥70%	•
BP550	Near-IR/UV-Block Visible Bandpass	410-690nm	300nm	≥90%	
BP590	Orange Bandpass	560-600nm	70nm	≥90%	•
BP635	Light Red Bandpass	615-645nm	60nm	≥90%	•
BP660	Dark Red Bandpass	640-680nm	65nm	≥90%	•
BP695	Near-IR Bandpass	680-720nm	65nm	≥90%	•
BP735	Near-IR Bandpass	715-780nm	90nm	≥90%	•
BP800	Near-IR Bandpass	745-950nm	315nm	≥90%	•
BP850	Near-IR Bandpass	820-910nm	160nm	≥90%	•
BP880	Near-IR Bandpass	845-930nm	130nm	≥90%	•
BN SERIES — NARROW BANDWIDTH					
BN470	Narrow Blue Bandpass	460-490nm	45nm	≥85%	•
BN532	Narrow Green Bandpass	525-550nm	55nm	≥85%	•
BN595	Narrow Orange Bandpass	580-610nm	45nm	≥85%	•
BN630	Narrow Light Red Bandpass	625-645nm	45nm	≥85%	•
BN650	Narrow Red Bandpass	638-672nm	50nm	≥85%	•
BN660	Narrow Dark Red Bandpass	645-675nm	45nm	≥85%	•
BN740	Narrow Near-IR Bandpass	730-755nm	50nm	≥85%	•
BN785	Narrow Near-IR Bandpass	770-790nm	55nm	≥85%	•
BN810	Narrow Near-IR Bandpass	798-820nm	50nm	≥85%	•
BN850	Narrow Near-IR Bandpass	840-865nm	45nm	≥85%	•
BN880*	Narrow Near-IR Bandpass	855-890nm	45nm	≥85%	•
BN940*	Narrow Near-IR Bandpass	928-955nm	55nm	≥90%	
Bi SERIES — NARROW INTERFERENCE BANDWIDTH					
Bi405*	Violet Interference Bandpass	400-415nm	25nm	≥85%	
Bi450*	Blue Interference Bandpass	445-465nm	35nm	≥88%	
Bi520*	Light Green Interference Bandpass	515-525nm	20nm	≥88%	
Bi550*	Green Interference Bandpass	535-558nm	33nm	≥88%	
Bi632*	Light Red Interference Bandpass	625-640nm	28nm	≥88%	
Bi650*	Red Interference Bandpass	643-665nm	30nm	≥85%	
Bi660*	Dark Red Interference Bandpass	650-665nm	28nm	≥88%	
Bi808*	Near-IR Interference Bandpass	798-820nm	35nm	≥85%	
Bi850*	Near-IR Interference Bandpass	845-860nm	33nm	≥88%	

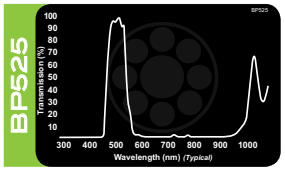
**Available in Threaded Mount sizes: M13.25-M82*

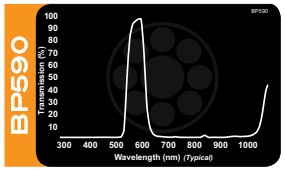
Due to continuous product improvement, specifications are subject to change without notice.

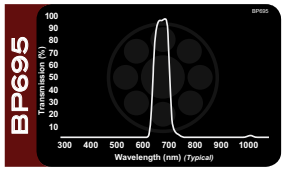
BP SERIES Broad Bandwidth

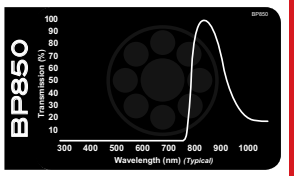


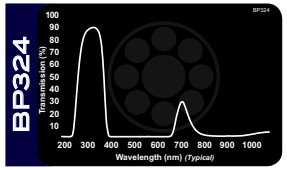


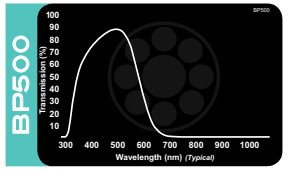


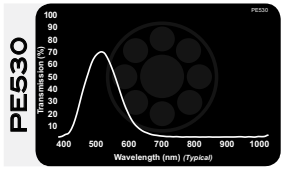


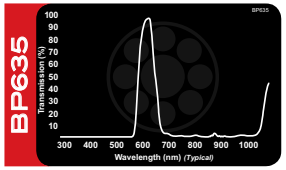


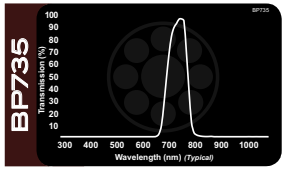


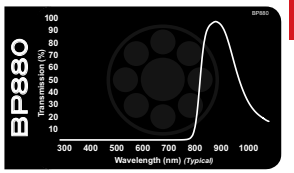


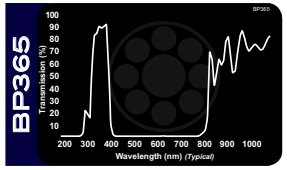


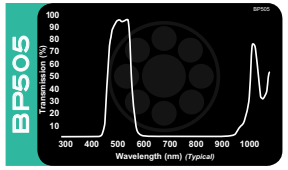


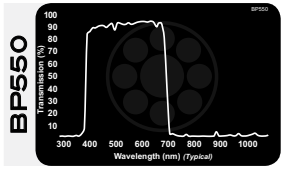


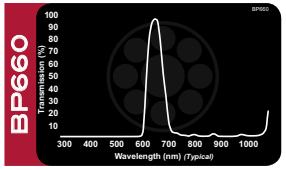


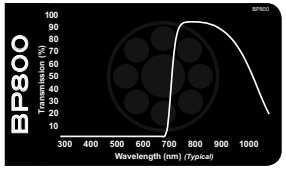




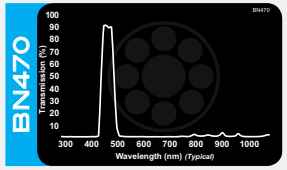


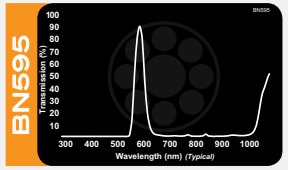


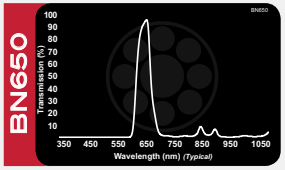


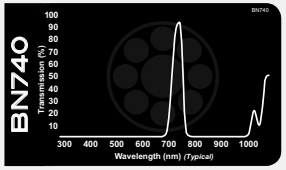


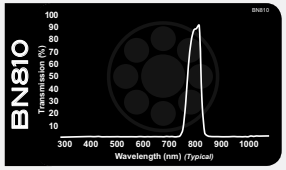
BN SERIES Narrow Bandwidth

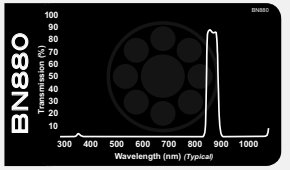


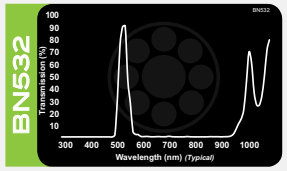


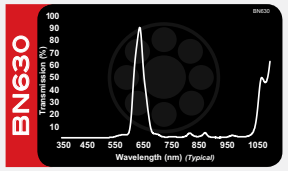


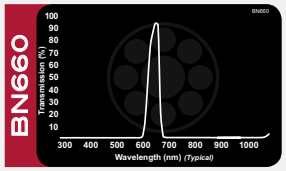


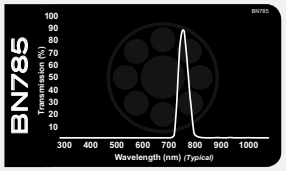


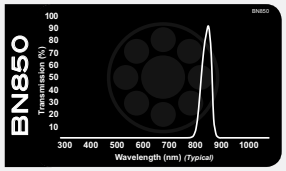


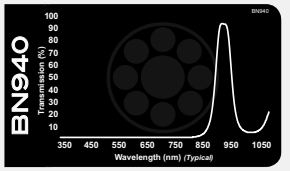




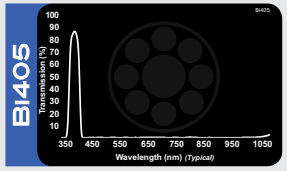


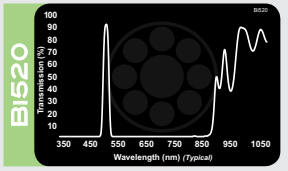


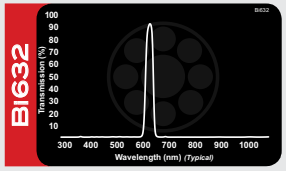


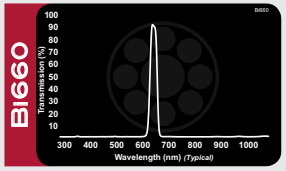


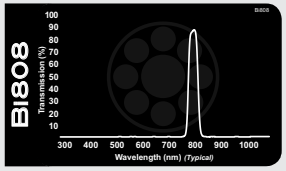
Bi SERIES Narrow Interference Bandwidth

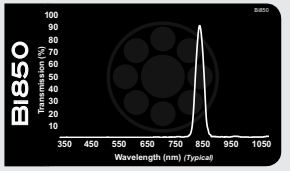


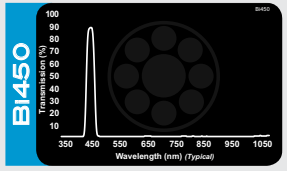


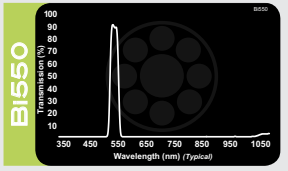


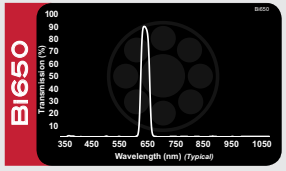












The performance of a filter is based on what happens to light passing through the filter. The apparent color of light reflected off the surface is not a reliable way to judge the filter's capabilities. Batch-to-batch difference in the apparent color of the coatings or filter substrates can often be easily seen when looking at two examples of the same filter type. The color of the coating does not indicate a disparity in performance.

LONGPASS FILTERS

Often referred to as a "sharp-cut" filter, Longpass Filters are specifically designed to pass a broad spectrum of longer wavelength light while blocking shorter wavelengths.

- Economical solution for isolating specific spectral regions
- Peak transmission ≥90%
- StablEDGE™ design reduces angular dependency and minimizes short-shifting effects
- Anti-reflection coated for maximum transmission in VIS and NIR spectrums
- Can be used with Shortpass Filters for a custom, fine-tuned Bandpass Filter
- Double-side polished glass for exceptional parallelism and optical flatness
- Exceptional surface quality; 40/20 scratch/dig
- Available in wavelength ranges from 350nm to 1500nm

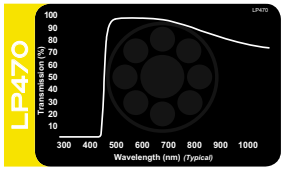
MOUNT & SIZE OPTIONS: In-stock, ready-to-ship Longpass Filters are available in Threaded Mounts, sizes M13.25 to M105; 25.4™ C-Mount; Slip Mounts; or Unmounted. Custom shapes and sizes are also available.

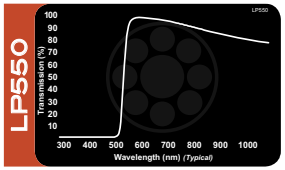
APPLICATIONS: Longpass Filters are often used in fluorescence applications to block an excitation light source or to pass multiple emission wavelengths, improving signal to noise ratio. Longpass Filters are also commonly used in photography and astronomy.

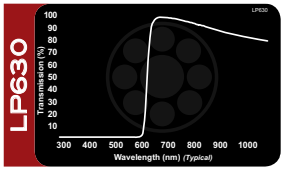
Part #	Description	Useful Range	Cut-on WL 50% T	Peak Transmission	StablEDGE™
LP SERIES — LONGPASS					
LP285*	High Transmission Heat Resistant VIS-NIR A/R Protective Window	350-1100nm	285nm	≥98%	•
LP330*	Protective Window	350-1100nm	330nm	≥90%	•
LP340*	A/R Protective Window	350-800nm	340nm	≥98%	•
LP390*	UV Absorbing Protective Window	410-1100nm	390nm	≥90%	•
LP415*	UV Block A/R Protective Window	415-1100nm	415nm	≥95%	
LP470	Light Yellow Longpass	480-1100nm	470nm	≥90%	•
LP500	Yellow Longpass	510-1100nm	495nm	≥90%	•
LP515	Yellow-Orange Longpass	520-1100nm	515nm	≥90%	•
LP530	Orange Longpass	545-1100nm	530nm	≥90%	•
LP550	Orange Longpass	560-1100nm	550nm	≥90%	•
LP580	Red-Orange Longpass	585-1100nm	580nm	≥90%	•
LP590	Red Longpass	605-1100nm	590nm	≥90%	•
LP610	Red Longpass	620-1100nm	610nm	≥90%	•
LP630	Red Longpass	645-1100nm	630nm	≥90%	•
LP645	Dark Red Longpass	650-1100nm	645nm	≥90%	•
LP665	Dark Red Longpass	680-1100nm	665nm	≥90%	•
LP695	Near-IR Longpass	715-1100nm	695nm	≥90%	•
LP715	Near-IR Longpass	730-1100nm	715nm	≥90%	•
LP780	Near-IR Longpass	800-1100nm	780nm	≥90%	•
LP800	Near-IR Longpass	820-1100nm	800nm	≥90%	•
LP815	Near-IR Longpass	825-1100nm	815nm	≥95%	•
LP830	Near-IR Longpass	845-1100nm	830nm	≥90%	•
LP850	Near-IR Longpass	870-1100nm	850nm	≥90%	•
LP900	Near-IR Longpass	910-1100nm	900nm	≥90%	
LP920	Near-IR Longpass	930-1100nm	920nm	≥90%	
LP1000	Near-IR Longpass	1010-1500nm	1000nm	≥90%	•

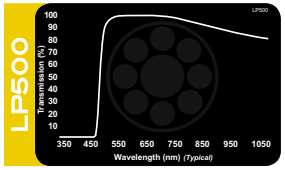
*See page 24 for filter curves

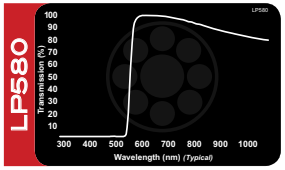
Due to continuous product improvement, specifications are subject to change without notice.

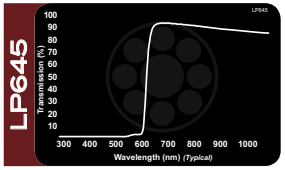


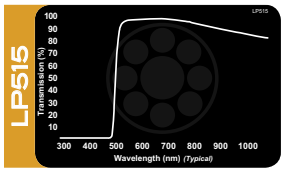


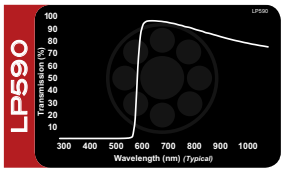


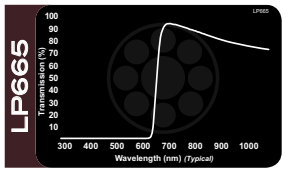


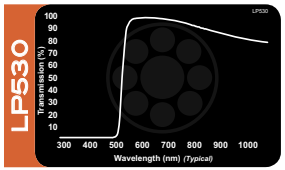


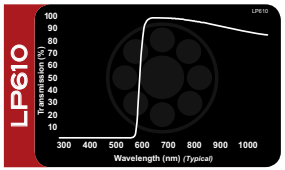


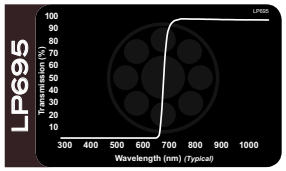


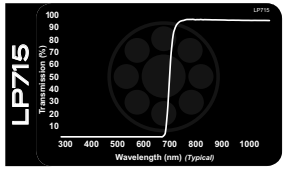


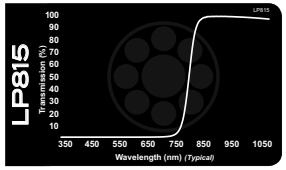


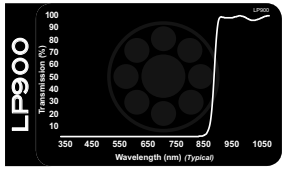


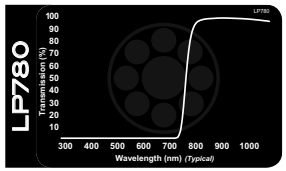


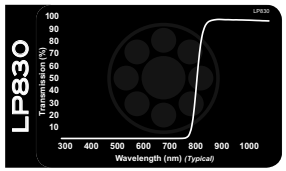


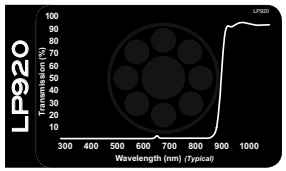


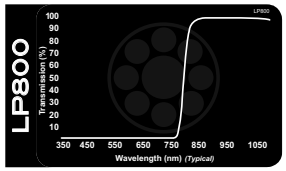


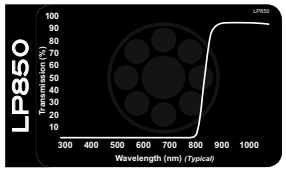


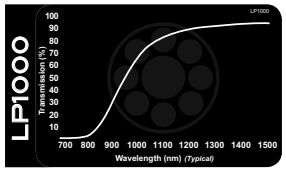












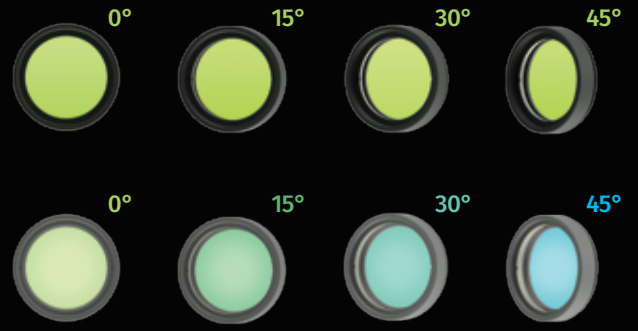
StablEDGE™ *FILTER DESIGN*

MidOpt StablEDGE™ optical filters are specifically designed to be less susceptible to effects from angular shifting seen when optical filters are placed in front of short focal length (<12 mm) camera lenses.

This feature is becoming increasingly important as today's trend in machine vision imaging progresses towards more compact inspection layouts, which utilize less space – forcing the camera and lens closer to the subject. As a result, short focal length lenses are now more widely used than ever before.

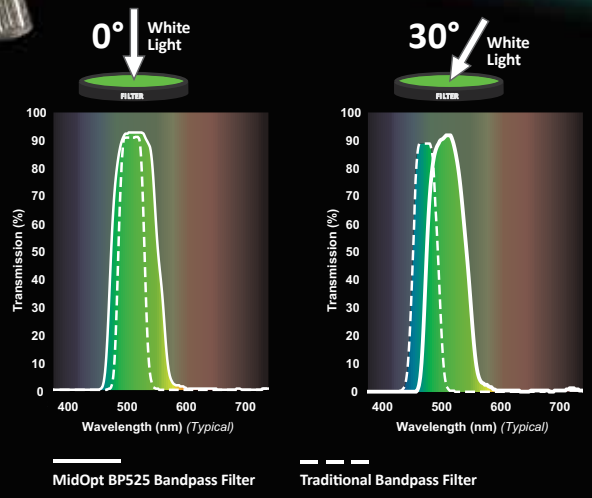
Using a traditional coated interference filter in these more compressed configurations results in contrast loss toward the edges of the image. Because of the angle imposed by the field of view (FOV) of the lens, the passband shifts and allows short wavelength ambient light to overwhelm the subject. Light from LED or laser diode lighting is also cut off. In contrast, peak transmission of MidOpt's StablEDGE™ filters is not significantly altered, and effects due to short shifting are minimized.

SUPERIOR WAVELENGTH CONTROL AT ANY ANGLE



StablEDGE™ filters take advantage of absorptive filter glass to form the leading edge of the filter passband. This assures no shifting in this region, even when the lens FOV exceeds 100°. Filter glasses also offer far superior lower wavelength blocking of ambient light, sharp transition slopes and unmatched durability. MidOpt's StablEDGE™ Filter cut-off slopes utilize interference filter coatings, however the cut-off slope is positioned to be sufficiently broad, and the Gaussian passband profile ensures that excessive ambient light is not allowed to degrade image contrast. Thus, shifting will not significantly encroach into peak transmission, assuring angular insensitivity over the desired range.

Among all machine vision filter manufacturers, MidOpt is unique in incorporating StablEDGE™ technology across a full range of products. StablEDGE™ designs are less angle-of-incidence sensitive, inherently more rugged, environmentally stable, and can be found in MidOpt's BP and BN (Bandpass) series and most LP (Longpass) series filters.



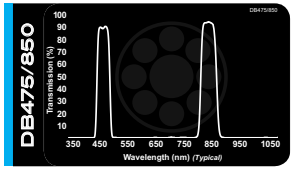
› DUAL BANDPASS FILTERS

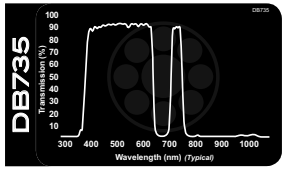
Most commonly used for security and surveillance, intelligent traffic solutions and Normalized Difference Vegetation Index (NDVI) imaging.

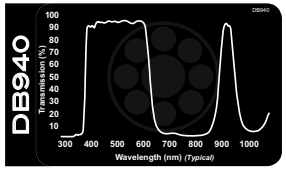
- Pass visible light and a specific portion of the VIS and NIR spectrums
- Ideal for color camera applications that utilize daytime sunlight and NIR illumination at night
- Achieve accurate color rendition by blocking interfering wavelengths
- Eliminate the need for dual sensor imaging
- Anti-reflection coated for maximum transmission
- Hard-coated, single-substrate fabrication
- Exceptional surface quality; 40/20 scratch/dig

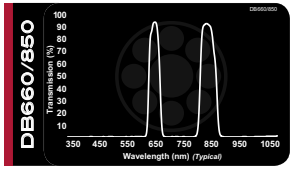
MOUNT & SIZE OPTIONS: In-stock, ready-to-ship Dual Bandpass Filters are available in Threaded Mounts, sizes M13.25 to M82; 25.4™ C-Mount; Slip Mounts; or Unmounted. Dual Bandpass Filters can be optically cemented behind a M12 lens if preferred while custom shapes and sizes are also available.

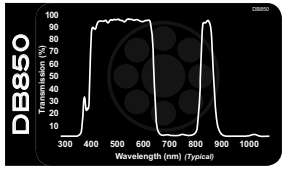
APPLICATIONS: Dual Bandpass Filters are becoming increasingly popular in NDVI aerial drone inspection, allowing for single sensor imaging and reduced operation payload. NDVI, traditionally achieved by satellite imagery, can now be obtained utilizing Dual Bandpass Filters and personal aerial imaging devices.









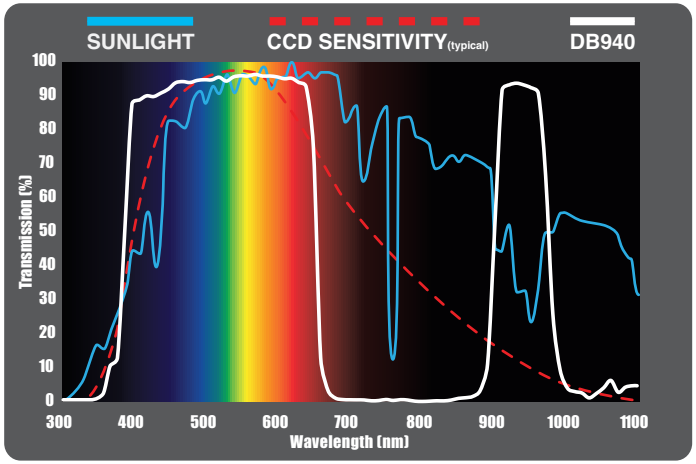


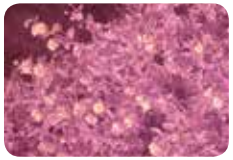
Part #	Description	Useful Range	FWHM (nominal)	Peak Transmission
DB SERIES — DUAL BANDWIDTH				
DB475/850	Dual Bandpass Blue + 850 NIR	VIS 460-490nm, NIR 830-870nm	45nm, 55nm	≥90%
DB660/850	Dual Bandpass Red + 850 NIR	VIS 645-675nm, NIR 830-870nm	40nm, 50nm	≥90%
DB735	Dual Bandpass Visible + 735nm NIR	VIS 405-645nm, NIR 725-755nm	250nm, 50nm	≥90%
DB850	Dual Bandpass Visible + 850nm NIR	VIS 405-645nm, NIR 835-875nm	250nm, 50nm	≥90%
DB940	Dual Bandpass Visible + 940nm NIR	VIS 405-650nm, NIR 925-965nm	250nm, 60nm	≥90%

Due to continuous product improvement, specifications are subject to change without notice.

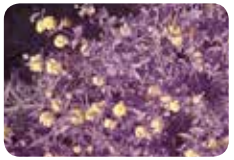
ACHIEVE ACCURATE COLOR RENDITION IN THE DAYLIGHT

Using a DB940 filter with 940nm infrared LED lighting produces virtually no visible signature, while daytime color rendition is uncompromised.





No IR Blocking Filter



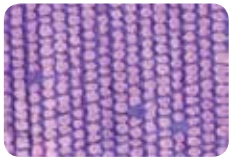
DB850 Dual Bandpass Filter

DB940 Dual Bandpass Filter

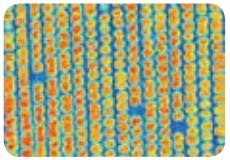
Sunlight contains an almost overwhelming amount of infrared light, however output in the region around 940nm is not as significant. Using a DB940 (Visible/940nm) Filter takes advantage of this phenomena, resulting in greatly improved color rendition compared to Visible/850nm Dual Band Filters.

Normalized Difference Vegetation Index (NDVI) imaging

Visible Light Image



Raw NDVI Image DB475/850



NDVI False Color Processed

SHORTPASS / NIR CUT FILTERS

Often thought of as "IR-cut" filters, Shortpass Filters are specifically designed to pass a broad spectrum of shorter wavelength light, while blocking longer VIS and NIR wavelengths.

- Designed to have a sharp transition between shorter wavelengths (which are passed) and longer wavelengths (which are blocked)
- Peak transmission ≥90%*
- Can be used with Longpass Filters for a custom, fine-tuned Bandpass Filter
- Anti-reflection coated for maximum transmission
- Exceptional surface quality; 40/20 scratch/dig
- Available in wavelength ranges from 340nm to 785nm

**Peak Transmission SP701 = 85%, SP705 = 88%*

SP SERIES - VIS PASS

- Separate colors in monochrome or color applications
- Improve contrast and resolution

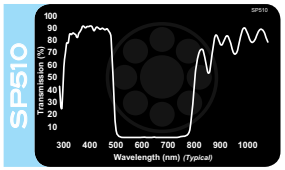
SP SERIES - NEAR-IR BLOCK

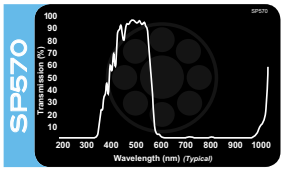
- Commonly placed over the camera's image sensor to block NIR light and achieve natural color rendition
- Used as a hot mirror to reduce unwanted heat build-up caused by IR radiation

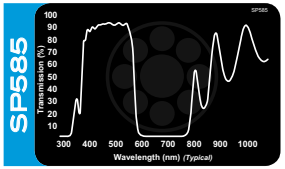
MOUNT & SIZE OPTIONS: In-stock, ready-to-ship Shortpass Filters are available in Threaded Mounts, sizes M13.25 to M105; 25.4™ C-Mount; Slip Mounts; or Unmounted. Custom shapes and sizes are also available.

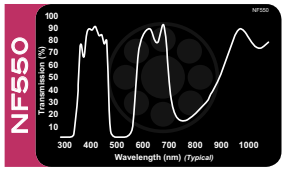
APPLICATIONS: Shortpass Filters are commonly used in color imaging to achieve natural color rendering. They can also be used to protect the sensor from NIR laser damage or to reduce IR radiation or "camera bloom" created during hot metal or glass extrusion processes.

SP SERIES VIS Pass

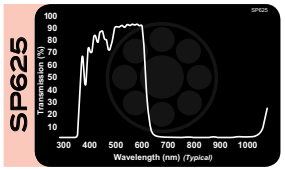


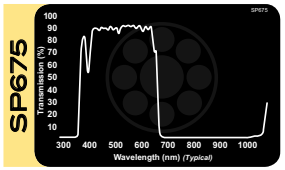


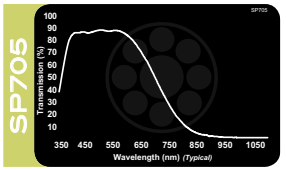


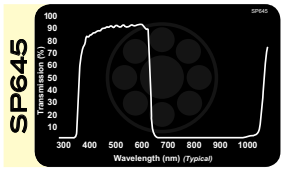


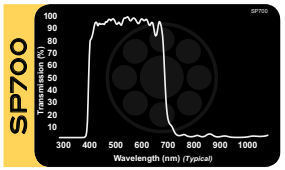
SP SERIES NIR Block

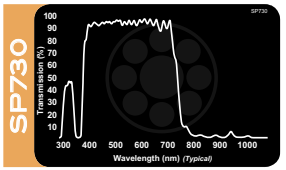


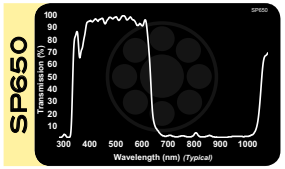


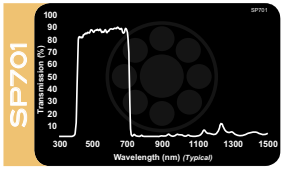


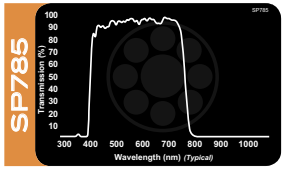












Part #	Description	Useful Range	Cut-off WL 50% T	Peak Transmission	StablEDGE™
SP SERIES — VIS PASS					
SP510	Blue Shortpass	340-500nm	510nm	≥90%	
SP570	Blue-Green Shortpass	410-560nm	570nm	≥90%	
SP585	Cyan Shortpass	395-575nm	585nm	≥90%	
NF550	Magenta Dichroic (Green Block)	395-475nm, 605-700nm	480 / 590nm (cut-off / cut-on)	≥90%	
SP SERIES — NEAR-IR BLOCK					
SP625	Blue-Orange Shortpass	425-620nm	625nm	≥90%	
SP645	Near-IR/Mid-Red Dichroic Block	400-640nm	645nm	≥90%	
SP650	Near-IR/Mid-Red Dichroic Block	400-640nm	650nm	≥90%	
SP675	Near-IR/Deep Red Dichroic Block	420-660nm	675nm	≥90%	
SP700	Near-IR/UV-Block Visible Shortpass	410-690nm	400 / 700nm (cut-on / cut-off)	≥90%	
SP701	Extended Hot Mirror / Reflects up to 1550nm	410-690nm	400 / 705nm (cut-on / cut-off)	≥85%	
SP705	Near-IR/Deep Red Absorp. Block	370-630nm	705nm	≥88%	•
SP730	Near-IR/Colorless Dichroic Block	400-710nm	730nm	≥90%	
SP785	Modified Near-IR Dichroic Block	425-770nm	785nm	≥90%	

Due to continuous product improvement, specifications are subject to change without notice.

›POLARIZING FILTERS & FILM

Polarizers are designed to reduce specular glare by passing only the light polarized in the direction perpendicular to the reflected light (glare). In addition, they help improve contrast, increase color saturation and detect imperfections in transparent materials. MidOpt Polarizing Filters can be easily and securely mounted to your lens and light source for maximum extinction or glare reduction.

POLARIZING FILTERS

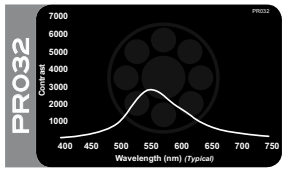
- Contrast ratio of up to 6500:1
- Linear, circular and wire grid polarizers are available for VIS and NIR spectrums
- Rotating mount with locking thumb screw to fine tune glare reduction
- Exceptional surface quality; 40/20 scratch/dig

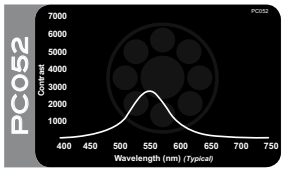
POLARIZING FILM

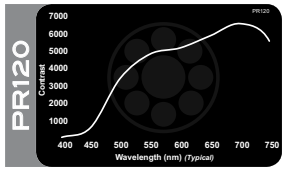
- Achieves optimal glare reduction when placed over light source
- Contrast ratios of up to 10000:1
- Linear polarizers are available for VIS and NIR requirements
- Left and right circular polarizers are available for VIS spectrum applications
- Offered in high-temperature-resistant laminate and glass
- PSA007 material comes standard with self-adhesive backing

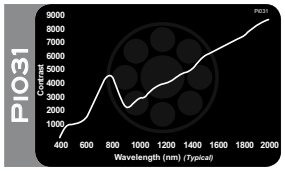
MOUNT & SIZE OPTIONS: Polarizing Filters and Films are available from stock and are ready to ship. Polarizing Filters are available in Threaded Mounts, sizes M22.5 to M105; Slip Mounts; or Unmounted. Polarizing Films are available in multiple thicknesses, and can be custom laser cut to fit any light source with a maximum usable width of 16.5" and length up to 300'.

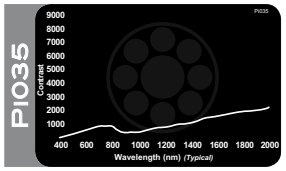
APPLICATIONS: Polarizers are commonly used to reduce glare from non-metallic in objects with smooth surfaces or surfaces covered with grease, oil or liquid. For best results, use an optical-grade Polarizer over the lens and Polarizing Film over the light source. The PR120/PG120 offers ultra-high contrast and an anti-reflection oleophobic coating.











Part #	Description	Useful Range	Contrast Ratio
	POLARIZING FILTERS		
PR032	Linear Polarizer	400-700nm	800:1
PR120	Ultra High Contrast Linear Polarizer	400-700nm	6500:1
PC052	Circular Polarizer	400-700nm	700:1
Pi031	NIR/Vis Wire Grid Linear Polarizer, High Extinction	400-2000nm	3000:1
Pi035	NIR/Vis Wire Grid Linear Polarizer, High Transmission	400-2000nm	500:1
	POLARIZING FILM		
PS007	High Contrast Linear Polarizing Film .007" thk	400-700nm	800:1
PSA007	High Contrast Linear Polarizing Film .007" thk Self Adhesive	400-700nm	800:1
PS010	High Contrast Linear Polarizing Film .010" thk	400-700nm	3000:1
PS030	Ultra High Contrast Linear Polarizing Film .030" thk	400-700nm	6500:1
HT025	High Temperature Linear Polarizing Film .025" thk	400-700nm	5000:1
PG120	Ultra High Contrast Glass Linear Polarizing Film	400-700nm	6500:1
Pi005	NIR High Contrast Linear Polarizing Film .007" thk	700-1100nm	1000:1

Circular Polarizing Sheets available in Left and Right-handed options
Due to continuous product improvement, specifications are subject to change without notice.

LINEAR POLARIZING FILM *(for Light Source)*

LINEAR POLARIZING FILTER *(for Lens) Rotate perpendicular to the axis of polarization of the Linear Polarizing Film for maximum glare reduction.*

No Filter *Polarizing Filter* *Polarizing Filter & Film*

Best results are achieved when Polarizing Film is used over the light source in conjunction with a Polarizing Filter over the camera lens.

MOUNTED POLARIZING FILTERS (for Lens)
Equipped with a rotating mount and locking thumbscrew to maintain orientation when cleaned or exposed to shock and vibration.

POLARIZING FILM (for Light Source)
Can be custom laser cut to fit any light source with a maximum usable width of 16.5” and length up to 300’.

NEUTRAL DENSITY FILTERS

Serves as “sunglasses” for your system and can be used with monochrome or color cameras. Designed to reduce light intensity neutrally over a specific wavelength range without affecting image color or contrast.

- Available in a variety of optical densities
- Reduce light intensity while maintaining a wide aperture and shallow depth of field
- Minimize pixel saturation
- Can be stacked with other Neutral Density Filters to test various optical densities
- Exceptional surface quality; 40/20 scratch/dig

ND Series – Visible (VIS) Spectrum

- Absorptive filter effective from 425-675nm
- Available in optical densities ranging from 0.10-6.0

Ni Series – Broad Spectrum; VIS/NIR

- Low reflectivity filter effective from 400-1100nm
- Available in optical densities ranging from 0.3-1.2
- Coated on low-expansion, heat-resistant Borofloat® glass

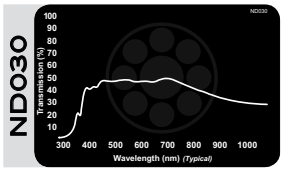
MOUNT & SIZE OPTIONS: In-stock, ready-to-ship Neutral Density Filters are available in Threaded Mounts, sizes M13.25 to M105; 25.4™ C-Mount; Slip Mounts; or Unmounted. Custom shapes and sizes are available.

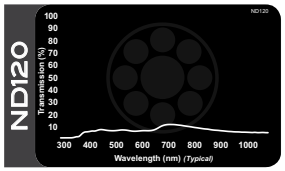
APPLICATIONS: Applications include imaging in intense lighting situations (i.e. molten metal and welding), outdoor aerial imaging and photography. Neutral Density Filters help reduce shutter speed to create blur, preventing a “jello” effect in aerial imaging.

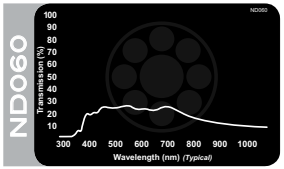
Part #	Description	Useful Range	Optical Density
ND SERIES — VIS			
ND030	Absorptive 50% Transmission	425-675nm	0.3
ND060	Absorptive 25% Transmission	425-675nm	0.6
ND090	Absorptive 12.5% Transmission	425-675nm	0.9
ND120	Absorptive 6.25% Transmission	425-675nm	1.2
ND200	Absorptive 1.0% Transmission	425-675nm	2.0
ND300	Absorptive 0.1% Transmission	425-675nm	3.0
ND400	Absorptive 0.01% Transmission	425-675nm	4.0
Ni SERIES — VIS/NIR			
Ni030	Low Reflectivity 50% Transmission	400-1100nm	0.3
Ni060	Low Reflectivity 25% Transmission	400-1100nm	0.6
Ni090	Low Reflectivity 12.5% Transmission	400-1100nm	0.9
Ni120	Low Reflectivity 6.25% Transmission	400-1100nm	1.2

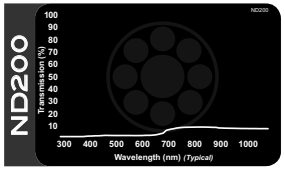
Due to continuous product improvement, specifications are subject to change without notice.

ND SERIES VIS Absorptive

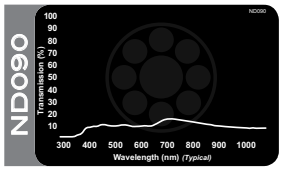


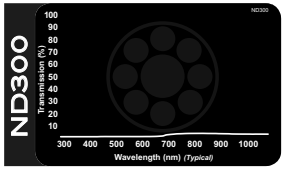


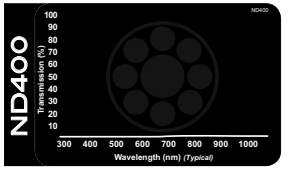




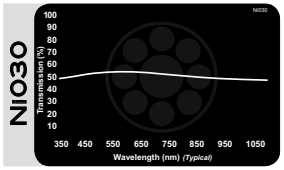
Sunglasses for Your System

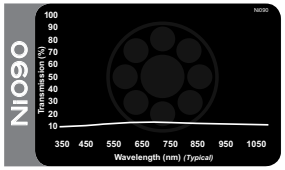


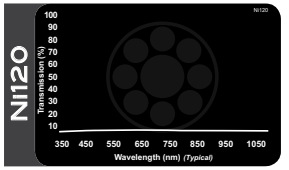


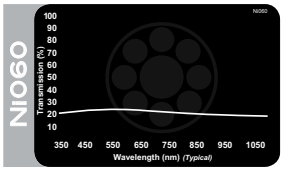


Ni SERIES VIS/NIR Low Reflectivity









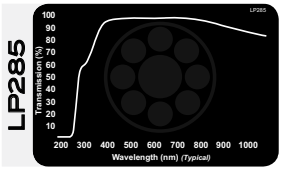
PROTECTIVE FILTERS

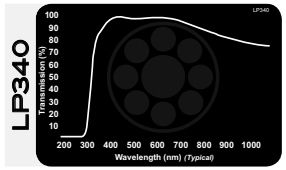
Protective Filters are designed to shield your lens and lighting from dirt, dust, liquids, impact and harsh environments without sacrificing image quality.

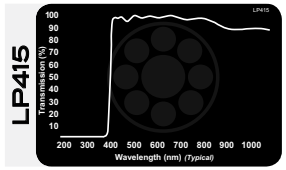
- Economical solution to protect expensive lenses
- Useful for imaging in UV, VIS and NIR spectrums
- Available with a high-efficiency, anti-reflection coating to maximize transmission to 98% or more
- Offered in both glass and acrylic
- Exceptional surface quality; 40/20 scratch/dig

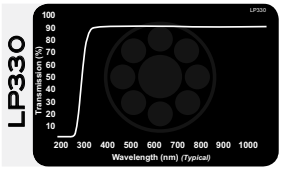
MOUNT & SIZE OPTIONS: In-stock, ready-to-ship Protective Filters are available in Threaded Mounts, sizes M13.25 to M105; 25.4™ C-Mount; Slip Mounts; or Unmounted. Custom shapes and sizes are available.

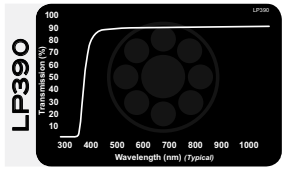
APPLICATIONS: Protective Filters are useful in all imaging applications. The LP285 can withstand high temperatures and is impact resistant (similar qualities to Pyrex).











Part #	Description	Useful Range	Cut-on WL 50% T	Peak Transmission	StablEDGE™
LP SERIES – LENS PROTECTION					
LP285	High Transmission Heat Resistant VIS-NIR A/R Protective Window	350-1100nm	285nm	≥98%	•
LP330	Protective Window	350-1100nm	330nm	≥90%	•
LP340	A/R Protective Window	350-800nm	340nm	≥98%	•
LP390	UV Absorbing Protective Window	410-1100nm	390nm	≥90%	•
LP415	UV-Block A/R Protective Window	415-1100nm	415nm	≥95%	

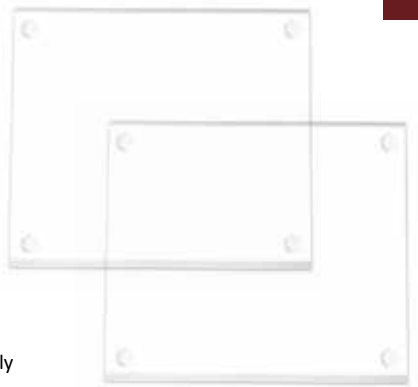
Due to continuous product improvement, specifications are subject to change without notice.

› For economical lens protection, see AC380 on page 25

›ACRYLIC FILTERS

Acrylic Longpass Filters are a durable, lightweight and economical solution for inspection windows. They can protect a lens in environments where broken glass might pose a problem.

- High transmission ranging from 90 to 98%
- Available with an anti-reflection coating for maximum transmission
- Optical-grade acrylic
- Impact-resistant
- Half the weight of glass

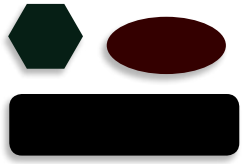


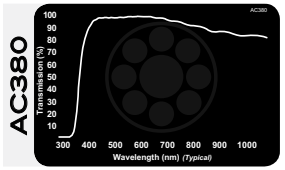
MOUNT & SIZE OPTIONS: In-stock, ready-to-ship Acrylic Filters are available in Threaded Mounts, sizes M13.25 to M105 and in Slip Mounts. Acrylic Filters can be precision laser-cut to a desired size or configuration, and are available for next day delivery.

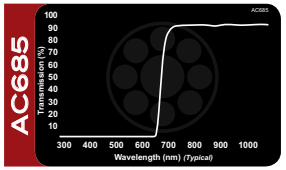
APPLICATIONS: Acrylic Longpass Filters are frequently used as enclosure windows for outdoor applications, as well as over light sources to control the wavelength emission of broad spectrum light sources. Because of their durability, they're commonly used in Food & Drug Administration (FDA) and European Food Safety Authority (EFSA) regulated applications where glass over the inspection area is not permitted.

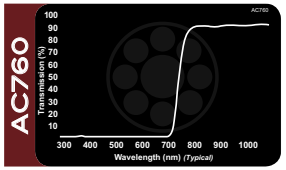
The AC380 offers an anti-abrasion, anti-reflection coating, which can withstand harsh solvents, such as alcohol, acetone or MEK.

Custom cut to match equipment requirements









Part #	Description	Useful Range	Cut-on WL 50% T	Peak Transmission	StablEDGE™
AC SERIES – ACRYLIC LONGPASS					
AC380	A/R Acrylic Protective Window	450-850nm	380nm	≥95%	•
AC685	Acrylic Near-IR Longpass	710-1100nm	685nm	≥90%	•
AC760	Acrylic Near-IR Longpass	780-1100nm	760nm	≥90%	•

Due to continuous product improvement, specifications are subject to change without notice.

LIGHT BALANCING FILTERS

Light Balancing Filters correct artificial lighting so colors appear more natural. These filters balance color, preventing the need for additional software processing. This allows for greater image stability and control.

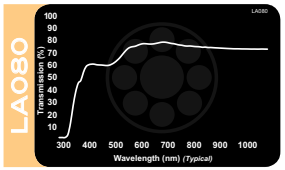
- Achieve accurate color images when using an artificial light source
- Increase contrast by correcting the emission spectrum of various light sources
- Exceptional surface quality; 40/20 scratch/dig
- **LA series:** Reduce blue shading ("warm" the scene) and commonly used with white LED and xenon strobe lighting
- **LB series:** Subdue the reddish hue found with some tungsten, halogen, sodium and other light sources
- **FL series:** Used to reduce the greenish cast created by fluorescent lighting

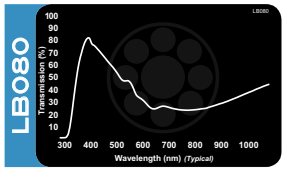
MOUNT & SIZE OPTIONS: In-stock, ready-to-ship Light Balancing Filters are available in Threaded Mounts, sizes M13.25 to M105; Slip Mounts; or Unmounted. Custom shapes and sizes are also available.

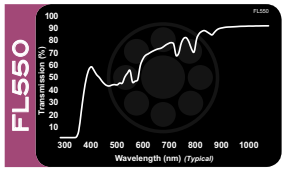
APPLICATIONS: Commonly used in color applications (i.e. machine vision/factory automation, photography, and fluorescence imaging).

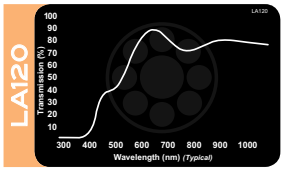
Part #	Description	Useful Range	Mired Shift Value	StablEDGE™
LA080	Light Balancing (Minus Blue)	400-700nm	+80	•
LA120	Light Balancing (Minus Blue)	400-700nm	+120	•
LB080	Light Balancing (Minus Red)	400-700nm	-80	•
LB120	Light Balancing (Minus Red)	400-700nm	-120	•
FL550	Light Balancing (Minus Green)	400-700nm	N/A	•

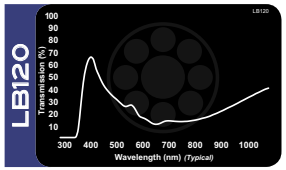
Due to continuous product improvement, specifications are subject to change without notice.











OPTICAL COMPONENTS

MidOpt supplies custom, stock and modified-stock optical components for a variety of applications and end uses. Orders ranging in volume for one to tens of thousands of pieces can be accommodated.

Spherical Lenses

Cylindrical Lenses

Multi-Element Lenses

Windows & Dust Covers

Mirrors

Prisms

Wedges

Light Pipes

Diffusers

Mechanical Parts

Custom Filters

Beamsplitters

MidOpt has more than 3,000 test glass radii in house, one of the largest inventories of test glasses in the world.

Test Glass Rental

Transmission/ Reflection	Thickness
50:50	0.5-3.0 mm
70:30	1.0-2.0 mm
30:70	1.0-2.0 mm
80:20	1.0-2.0 mm
20:80	1.0-2.0 mm

MIDOPT

MIDWEST OPTICAL SYSTEMS, INC.

A manufacturer of custom precision optical components and systems since 1988, Midwest Optical Systems (MidOpt) is recognized as the world's leading resource for off-the-shelf and custom machine vision filters, lenses and accessories used in industrial imaging applications.

MidOpt filters and coatings are extremely durable and tough enough to withstand repeated cleaning, solvents, high heat, humidity and vibration without degradation.

MidOpt has an extensive history in optical component design, fabrication and inspection, and continues to develop innovative new products for industrial imaging that are simply not found elsewhere.

APPLICATIONS/INDUSTRIES SERVED:

› Machine Vision
› Security & Defense
› License Plate Recognition / Intelligent Traffic Solutions
› Medical and Life Science
› Scientific Research
› Agriculture / NDVI (Normalized Difference Vegetation Index)
› Aerial Imaging
› Motion Analysis & Gaming
› Media & Photography