MIDOPT

MIDWEST OPTICAL SYSTEMS, INC.

Where Image Quality Begins

MIDOPT 25 YEARS OF OPTICAL INNOVATION

MidOpt Stock Filters

Part # Prefix	UV Bandpass	Full Width Half Max (50% point) +/- 10 nm
BP250	Deep-to-Near UV Bandpass	170-275nm
BP324	Near UV Bandpass	270-380 nm
BP365	Near UV Bandpass	315-400 nm

Part # Prefix	Visible Bandpass	Full Width Half Max (50% point) +/- 10 nm
BP470	Blue Bandpass	420-500 nm
BP505	Cyan Bandpass	470-560 nm
BP525	Light Green Bandpass	490-570 nm
BP550	Near IR/UV Block-Visible Bandpass	400 nm -700 nm
BP590	Orange Bandpass	550-620 nm
BP635	Light Red Bandpass	600-660 nm
BP660	Dark Red Bandpass	630-690 nm

Part # Prefix	IR Bandpass	Full Width Half Max (50% point) +/- 10 nm
BP695	Infrared Bandpass	665-730 nm
BP735	Infrared Bandpass	695-785 nm
BP800	Infrared Bandpass	725-1040 nm
BP810	Infrared Bandpass	775-840 nm
BP850	Infrared Bandpass	800-1000 nm
BP880	Infrared Bandpass	830-1000 nm

Part # Prefix	Visible Narrow Bandpass	Full Width Half Max (50% point) +/- 10 nm
BN470	Narrow Blue Bandpass	450-495 nm
BN532	Narrow Green Bandpass	515-560 nm
BN595	Narrow Orange Bandpass	570-615 nm
BN630	Narrow Light Red Bandpass	610-650 nm
BN660	Narrow Dark Red Bandpass	640-680 nm

Part # Prefix	Narrow IR Bandpass	Full Width Half Max (50% point) +/- 10 nm
BN740	Narrow Infrared Bandpass	720-770 nm
BN785	Narrow Infrared Bandpass	755-805 nm
BN810	Narrow Infrared Bandpass	780-830 nm
BN850	Narrow Infrared Bandpass	825-872 nm
BN880	Narrow Infrared Bandpass	860-905 nm

Part # Prefix	Dual Bandpass	Full Width Half Max (50% point) +/- 10 nm
DB735	Dual Bandpass Visible + 735 nm IR	Visible 385-650 nm Infrared 705-765 nm
DB850	Dual Bandpass Visible + 850 nm IR	Visible 385-650 nm Infrared 820-880 nm
DB940	Dual Bandpass Visible + 940 nm IR	Visible 385-650 nm Infrared 910-970 nm

Part # Prefix	Visible Neutral Density (ND)	Effective Range
ND030	ND, Absorp. OD = 0.3 (50% trans.)	400-700 nm
ND060	ND, Absorp. OD = 0.6 (25% trans.)	400-700 nm
ND090	ND, Absorp. OD = 0.9 (12.5% trans.)	400-700 nm
ND120	ND, Absorp. OD = 1.2 (6.25% trans.)	400-700 nm
ND200	ND, Absorp. OD = 2.0 (1.0% trans.)	400-700 nm
ND300	ND, Absorp. OD = 3.0 (0.1% trans.)	400-700 nm
ND400	ND, Absorp. OD = 4.0 (0.01% trans.)	400-700 nm

Part # Prefix	Visible + IR Neutral Density (ND)	Effective Range
Ni030	ND, Low Refl. OD = 0.3 (50% trans.)	400-1200 nm
Ni060	ND, Low Refl. OD = 0.6 (25% trans.)	400-1200 nm
Ni090	ND, Low Refl. OD = 0.9 (12.5% trans.)	400-1200 nm
Ni120	ND, Low Refl. OD = 1.2 (6.25% trans.)	400-1200 nm

Part # Prefix	Polarizing Filters	Effective Range
PR032	Linear Polarizer	400-700 nm
PC052	Circular Polarizer	400-700 nm
Pi031	NIR/Vis Linear Polarizer, High Extinction	400-2000 nm
Pi035	NIR/Vis Linear Polarizer, High Transmission	400-2000 nm
PS007	Linear Polarizer Film .007" thk	400-700 nm
PS030	Linear Polarizer Film .030" thk	400-700 nm
PS010	Linear Polarizer Film .010" thk	400-700 nm
Pi005	NIR Linear Polarizer Film (for lighting only)	700-1100 nm

Part # Prefix	Color Shortpass/Notch	Cut-off Wavelength 50% of Peak Transmission
SP510	Blue Shortpass	510 nm
SP570	Blue-Green Shortpass	570 nm
SP585	Cyan Shortpass	585 nm
SP625	Blue-Orange Shortpass	625 nm
NF550	Magenta Dichroic (Green Block)	465 nm - 605 nm

Part # Prefix	IR Block/Visible Pass	Cut-off Wavelength 50% of Peak Transmission
SP645	Near IR/Mid-Red Dichroic Block	645 nm
SP675	Near IR/Deep Red Dichroic Block	675 nm
SP700	Near IR/UV Block-Visible Bandpass	400 nm -700 nm
SP701	Extended Hot Mirror	400 nm -1550 nm
SP705	Near IR/Deep Red Absorp. Block	705 nm
SP730	Near Infrared/Colorless Dichroic Block	730 nm
SP785	Modified NIR Dichroic Block	785 nm

Part # Prefix	Color Longpass	Cut-on Wavelength 50% of Peak Transmission
LP470	Light Yellow Longpass	470 nm
LP500	Yellow Longpass	500 nm
LP515	Yellow-Orange Longpass	515 nm
LP530	Orange Longpass	530 nm
LP550	Orange Longpass	550 nm
LP580	Red-Orange Longpass	580 nm
LP590	Red Longpass	590 nm
LP610	Red Longpass	610 nm
LP630	Red Longpass	630 nm
LP645	Dark Red Longpass	645 nm

Part # Prefix	IR Longpass	Cut-on Wavelength 50% of Peak Transmission
LP665	Dark Red Longpass	665 nm
LP695	Infrared Longpass	695 nm
LP715	Infrared Longpass	715 nm
LP780	Infrared Longpass	780 nm
LP830	Infrared Longpass	830 nm
LP850	Infrared Longpass	850 nm
LP920	Infrared Longpass	920 nm
LP1000	Infrared Longpass	1000 nm

Part # Prefix	Protective Filters (Glass and Acrylic)	Cut-on Wavelength 50% of Peak Transmission
LP330	Protective Window	330 nm
LP340	Protective Window, Broadband Anti-reflection Coated	340 nm
LP415	UV Block	415 nm
AC380	Protective Window, Anti-reflection and Scratch-Resistant Coated Acrylic	380 nm
AC685	Acrylic Infrared Longpass	685 nm
AC700	Acrylic Infrared Longpass	700 nm
AC760	Acrylic Infrared Longpass	760 nm

Part # Prefix	Light Balancing	Effective Range
LA080	Light Balancing (Minus Blue)	400-1200 nm
LA120	Light Balancing (Minus Blue)	400-1200 nm
LB080	Light Balancing (Minus Red)	400-1200 nm
LB120	Light Balancing (Minus Red)	400-1200 nm
FL550	Light Balancing (Minus Green)	400-1200 nm

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

MIDOPT
MIDWEST OPTICAL SYSTEMS, INC.

Welcome to MidOpt

A manufacturer of custom precision optical components and systems since 1988, Midwest Optical Systems is recognized as a leading resource for machine vision filters, lenses and accessories used for industrial imaging. MidOpt has an extensive history in optical component design, fabrication and inspection, and continues to develop innovative new products for industrial imaging that are not found elsewhere. MidOpt is involved in the design and manufacture of optical components used by a diverse variety of industries worldwide.

Improve Contrast and Resolution

Remove Interfering Ambient Light

Provide Insurance for Repeatability and Stability

Mounts Available for any System

Large Stock Readily Available

Extremely Durable Coating

Filters are a Necessity not an Accessory

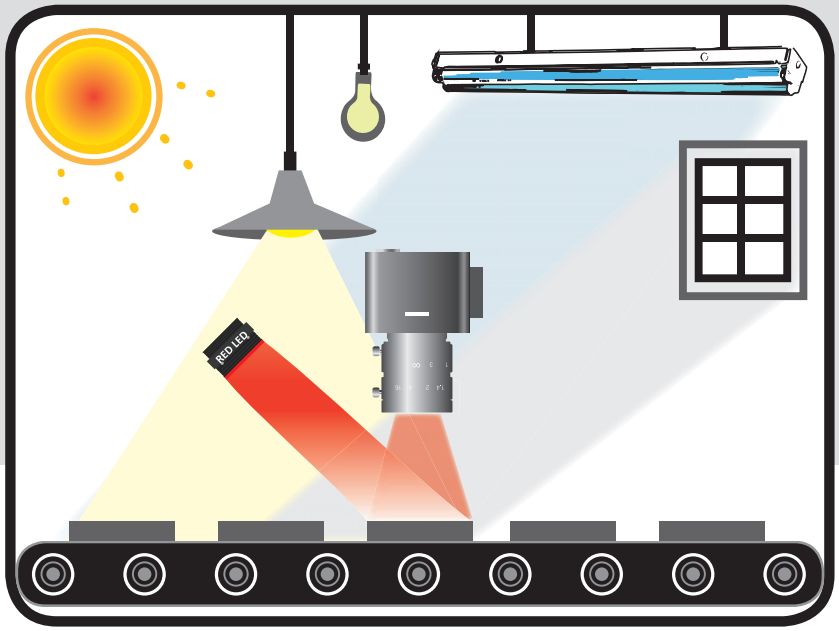
Create Contrast in Non-Visible Wavelengths

Protect the Camera Lens

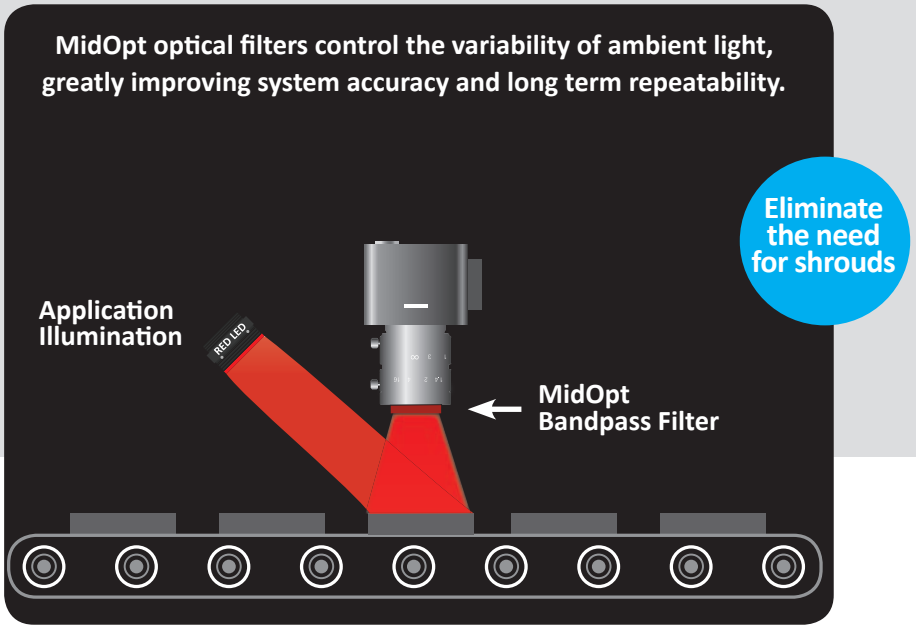
Test the Effects of Monochromatic Illumination

MidOpt Filters – Where Image Quality Begins

MidOpt Filters are the simplest, quickest and most cost effective way to improve repeatability and stability in any machine vision system.



No Filter – Uncontrolled Lighting Variability



MidOpt Filters Eliminate the Variability of Ambient Light to Improve Image Quality

Optical Filters Designed for Machine Vision

MidOpt specifically designs and manufactures filters for use with monochromatic or white LED lighting, fiber optic illumination, structured diode-generated light patterns and other lighting commonly used in machine vision applications. When matched with the correct lighting, filter selection is one of the most important factors controlling the ability of an imaging system to consistently perform optimally.

Insensitive to Wider Angles of Incidence

Traditional bandpass interference filters are highly sensitive to the angle at which all light strikes the filter and usually do not perform as well at shallower angles. Due to the unique hybrid filter design, MidOpt filters have reduced angular dependence.

Extremely Durable Coatings

MidOpt filter coatings are extremely durable and have an almost unlimited life span. MidOpt filters are tough enough to withstand repeated cleaning, solvents, high heat, humidity and vibration without degradation.

Mounts Available for any System

Designed for lenses with and without filter threads, filters can be placed in or on the lens, in front of the camera sensor, or supplied as unmounted filter glass in custom shapes and sizes.

Availability from Stock

MidOpt stocks a wide variety of filter options designed to quickly and securely mount to large and small diameter lenses. Custom sizes are typically available within two weeks.

Design and Performance of MidOpt Filters

Optical Quality

Precision ground and polished glass is used in most MidOpt filter designs. Cosmetic defects are limited to 40-20 scratch-dig while surface flatness and parallelism are controlled to allow for sharp, distortion-free imaging.

Increase Resolution and Contrast

Especially when used with monochromatic LED lighting, filters narrow the spectral range of an image, increasing contrast and improving resolution by reducing the effect of chromatic aberrations. Best focus is a function of wavelength. It is always beneficial to limit the wavelength range of lighting on the subject being imaged, particularly if there is a substantial UV and/or near-infrared component to the light in the surrounding area.

Highest Possible Peak Transmission

MidOpt filters are supplied with an anti-reflection coating to guarantee greater than 90% peak transmission in most cases. Transmission of MidOpt bandpass filters at the desired wavelength(s) is higher, typically creating a 5% to 20% improvement over conventional epoxy-encapsulated bandpass filters.

LED Output

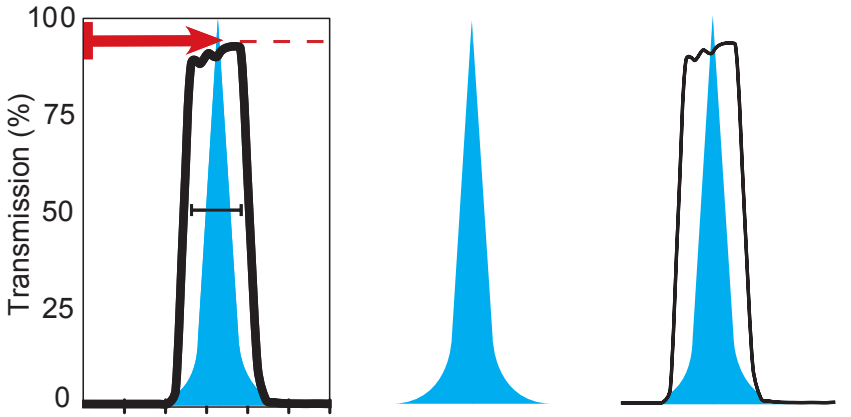
MidOpt filters are designed to emulate the output of common LEDs. Not only do LEDs emit light over a relatively broad wavelength range compared to lasers, manufacturing tolerances result in center wavelengths that can vary by as much as +/- 10nm. The angle of incident light may also vary greatly. MidOpt Bandpass Filters are intentionally designed to provide a passband that is broad enough to accommodate the entire output of the LED.

The performance of a filter is based on what happens to light passing <u>through</u> the filter. Looking <u>at</u> the filter and observing the apparent color of the light reflected off the surface is <u>not</u> a reliable way to judge a filter's capabilities. Intentional batch-to-batch differences in the apparent color of the coatings or filter substrates can often be easily seen when looking at two examples of the same type of filter. We wish to emphasize that such differences are usually not indicative of <u>any</u> disparity in performance.

Improve Contrast up to 100%

Before MidOpt Filter **After MidOpt BP470 Filter**

Bandpass Filters block shorter and longer wavelengths, exceeding 90% peak transmission. This allows for selective control of the light – UV, visible and infrared – that enters the system or camera, creating better control and improving contrast up to 100%.



Highest Possible Peak Transmission

Typical LED Output Spans 60-70 nm

Broad Bandpass Filter Spans 80-90 nm

MidOpt Filter Test Kits

allow you to test before committing to LED lighting. The kits make checking the effectiveness of different colors or wavelength ranges on your system or application cost effective and affordable.

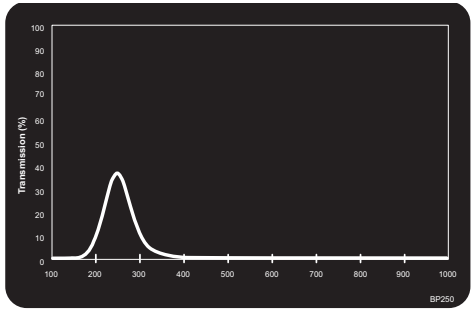
>>See page 20-21.

Bandpass Filters

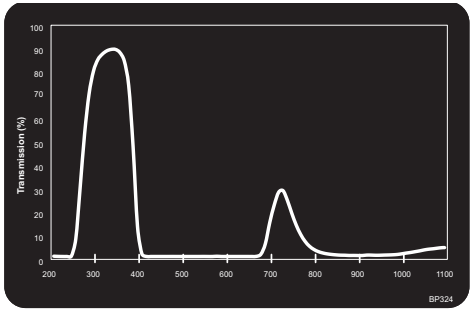
Ultra-Violet Bandpass Filters for UV Imaging

UV Bandpass Filters pass selective ultra-violet wavelength ranges. It is always necessary to use UV pass/visible block filters in applications that involve imaging at UV wavelengths.

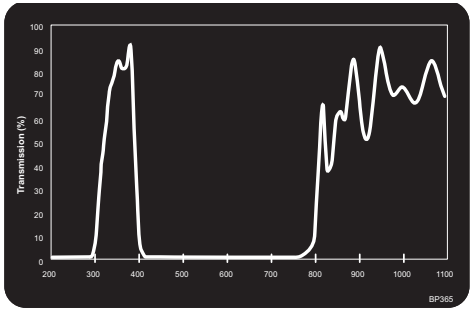
- BP250



- BP324



- BP365



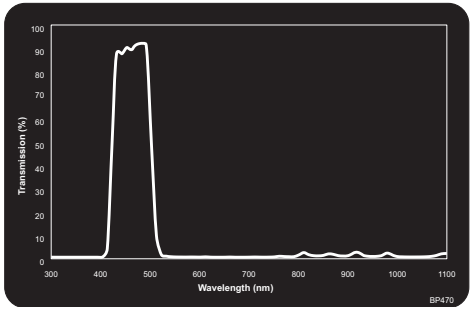
Part # Prefix	Filter Description	Full Width Half Max (50% point) +/- 10 nm	Minimum Peak Transmission	Surface Quality Scratch and Dig	Mount Options
BP250	Deep-to-Near UV Bandpass	170-275 nm	38%	40/20	T,S
BP324	Near UV Bandpass	270-380 nm	90%	40/20	T,S,C,F
BP365	Near UV Bandpass	315-400 nm	90%	40/20	T,S,F

T=Standard Threaded Lens Mount; S=Slip-On Mount; C=C/CS-Camera Mount (M25.4); F=Filter, No Mount

Visible Light Bandpass Filters

- Designed for use with commonly utilized LED light sources/UV-excited fluorescence wavelengths
- Bandwidth 80-90 nm (+/- 10 nm) FWHM
- Shields systems from unwanted ambient light
- Enhance contrast for improved viewing of desired features
- Improve resolution (chromatic aberration correction)
- Test to determine the appropriate lighting for an application
- Suitable for laser diodes

BP470



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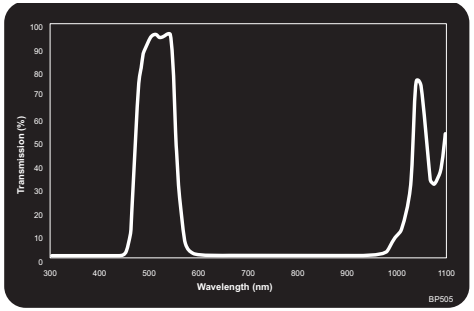
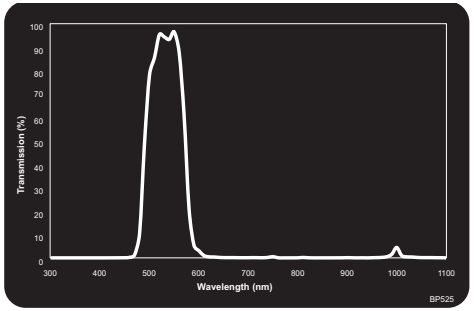
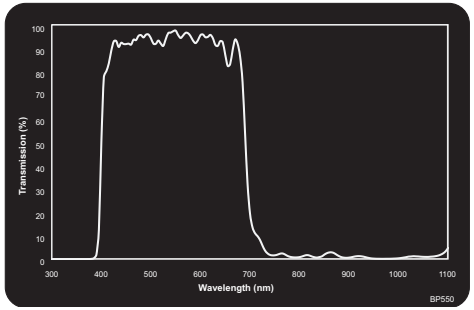


BP525



BP550 (SP700)



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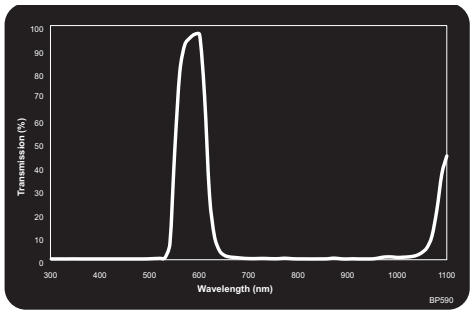

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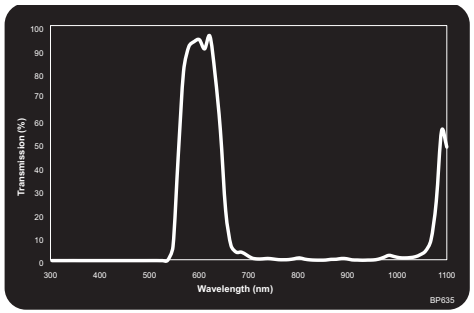
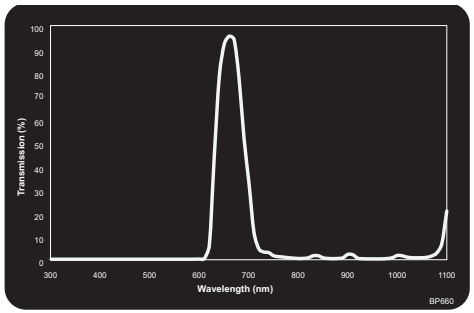


BP660



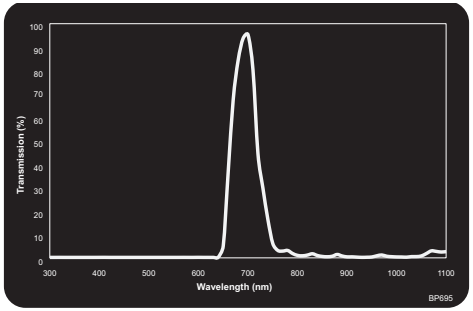
Part # Prefix	Filter Description	Full Width Half Max (50% point) +/- 10 nm	Minimum Peak Transmission	Surface Quality Scratch and Dig	Mount Options
BP470	Blue Bandpass	420-500 nm	90%	40/20	T,S,C,F
BP505	Cyan Bandpass	470-560 nm	90%	40/20	T,S,C,F
BP525	Light Green Bandpass	490-570 nm	90%	40/20	T,S,C,F
BP550	Near IR/UV Block-Visible Bandpass	400 nm -700 nm	90%	40/20	T,S,C,F
BP590	Orange Bandpass	550-620 nm	90%	40/20	T,S,C,F
BP635	Light Red Bandpass	600-660 nm	90%	40/20	T,S,C,F
BP660	Dark Red Bandpass	630-690 nm	90%	40/20	T,S,C,F

Bandpass Filters

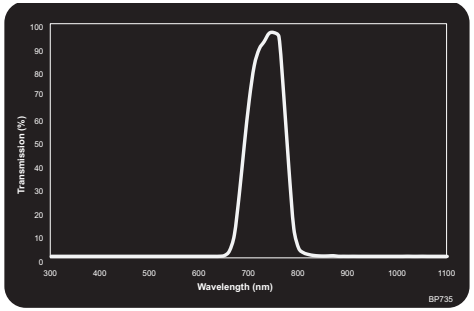
Infrared Bandpass Filters

- Test effects of IR lighting on an application
- Optimize results achieved with IR lighting/ fluorescence
- Block all UV and visible light
- Shields systems from unwanted light
- Enhance contrast for improved viewing of desired features
- Improve resolution in the IR (chromatic aberration correction)
- Suitable for laser diodes

● BP695



● BP735



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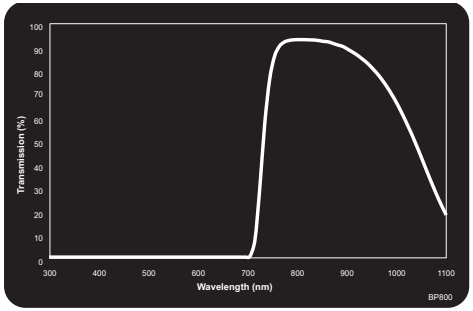

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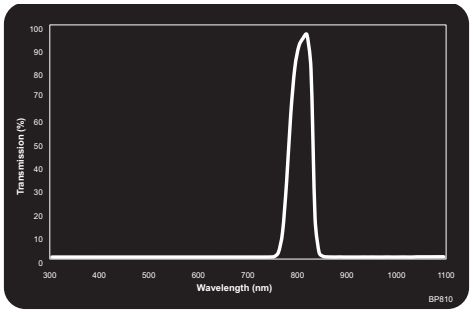

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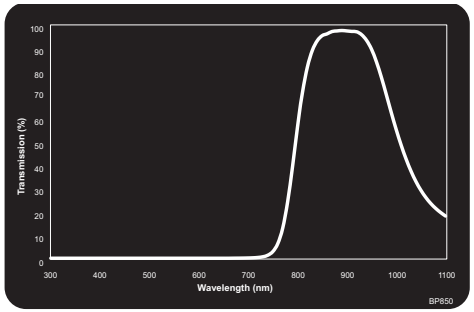

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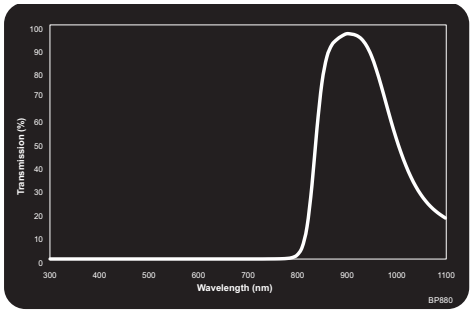


Part # Prefix	Filter Description	Full Width Half Max (50% point) +/- 10 nm	Minimum Peak Transmission	Surface Quality Scratch and Dig	Mount Options
BP695	Infrared Bandpass	665-730 nm	90%	40/20	T,S,C,F
BP735	Infrared Bandpass	695-785 nm	90%	40/20	T,S,C,F
BP800	Infrared Bandpass	725-1040 nm	90%	40/20	T,S,C,F
BP810	Infrared Bandpass	775-840 nm	90%	40/20	T,S,C,F
BP850	Infrared Bandpass	800-1000 nm	90%	40/20	T,S,C,F
BP880	Infrared Bandpass	830-1000 nm	90%	40/20	T,S,C,F

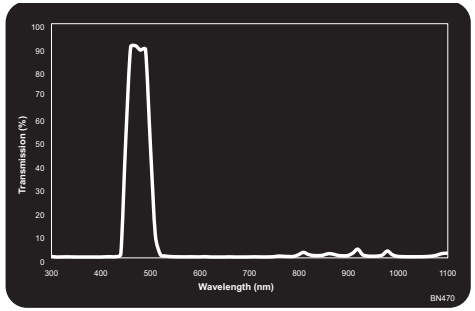
T=Standard Threaded Lens Mount; S=Slip-On Mount; C=C/CS-Camera Mount (M25.4); F=Filter, No Mount

Visible Light Narrow Bandpass Filters

NEW

- Narrow design for overwhelming ambient light conditions
- Bandwidth 40-50 nm (+/- 10 nm) FWHM
- Commonly used in fluorescence applications
- Suitable for laser diodes
- Durable and environmentally stable
- Less sensitive to angle of incidence variations than traditional interference filters

BN470



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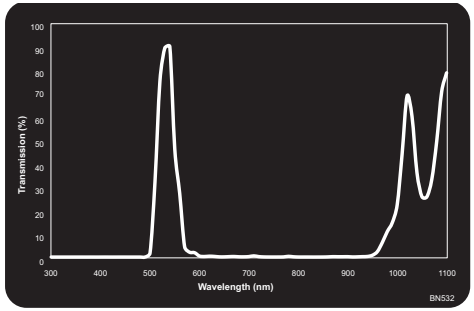

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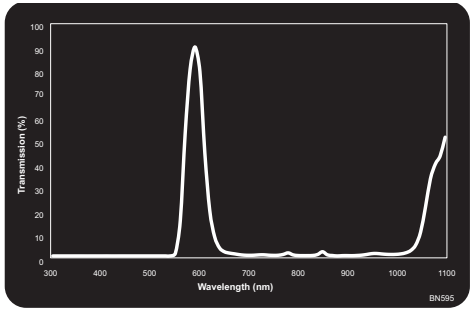

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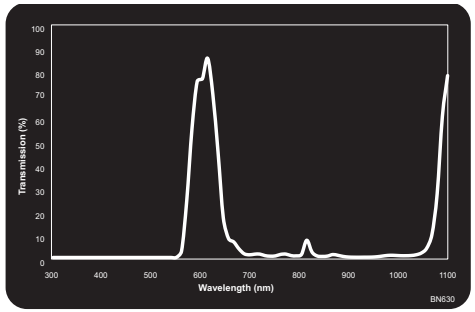

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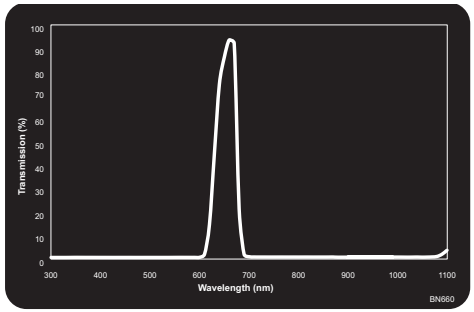


Part # Prefix	Filter Description	Full Width Half Max (50% points) +/- 10 nm	Minimum Peak Transmission	Surface Quality Scratch and Dig	Mount Options
BN470	Narrow Blue Bandpass	450-495 nm	85%	40/20	T,S,C,F
BN532	Narrow Green Bandpass	515-560 nm	85%	40/20	T,S,C,F
BN595	Narrow Orange Bandpass	570-615 nm	85%	40/20	T,S,C,F
BN630	Narrow Light Red Bandpass	610-650 nm	85%	40/20	T,S,C,F
BN660	Narrow Dark Red Bandpass	640-680 nm	85%	40/20	T,S,C,F

T=Standard Threaded Lens Mount; S=Slip-On Mount; C=C/CS-Camera Mount (M25.4); F=Filter, No Mount

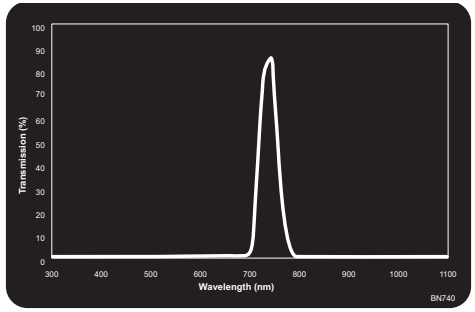
Bandpass Filters

Infrared Narrow Bandpass Filters

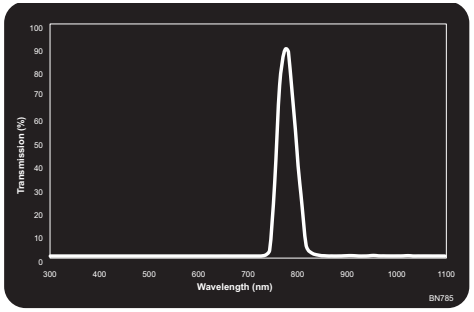
NEW

- Narrow band design for overwhelming ambient light conditions
- Bandwidth 40-50 nm (+/- 10 nm) FWHM
- Available for all commonly used IR illumination wavelengths
- Ideal for security, traffic control and industrial inspection applications
- Suitable for use with laser diodes
- Durable and environmentally stable
- Less sensitive to angle of incidence variations than traditional interference filters

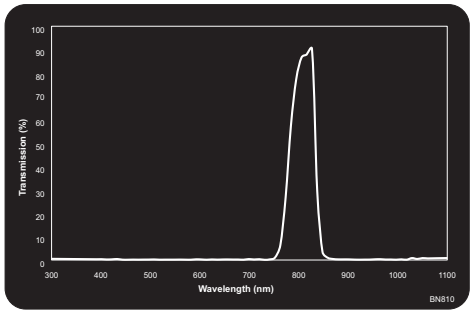
● BN740



● BN785



● BN810



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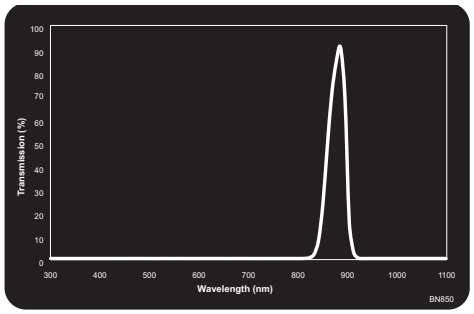
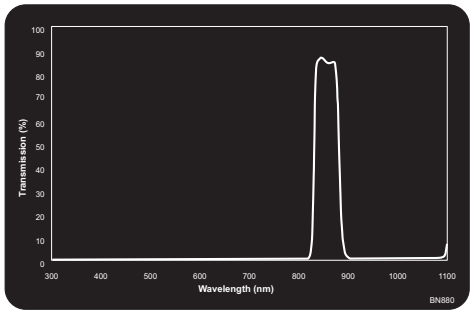


● BN880



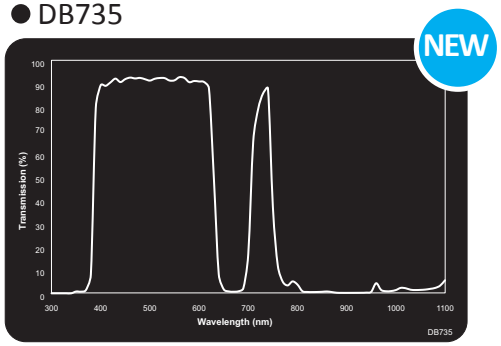
Part # Prefix	Filter Description	Full Width Half Max (50% point) +/- 10 nm	Minimum Peak Transmission	Surface Quality Scratch and Dig	Mount Options
BN740	Narrow Infrared Bandpass	720-770 nm	85%	40/20	T,S,C,F
BN785	Narrow Infrared Bandpass	755-805 nm	85%	40/20	T,S,C,F
BN810	Narrow Infrared Bandpass	780-830 nm	85%	40/20	T,S,C,F
BN850	Narrow Infrared Bandpass	825-870 nm	85%	40/20	T,S,C,F
BN880	Narrow Infrared Bandpass	860-905 nm	85%	40/20	T,S,C,F

T=Standard Threaded Lens Mount; S=Slip-On Mount; C=C/CS-Camera Mount (M25.4); F=Filter, No Mount

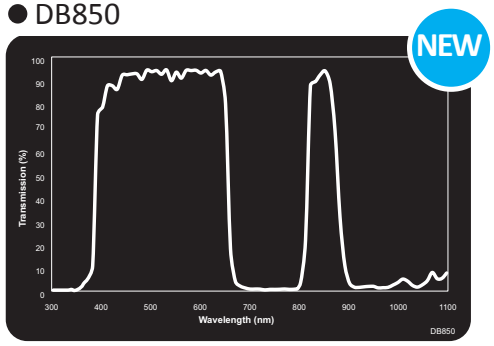
New Products – DB735, DB850 & DB940 Filters

- Ideal for color camera day/night applications
- Passes visible light and a narrow IR band
- Blocks interfering IR wavelength ranges to achieve accurate color rendition
- Makes viewing with appropriate IR illumination possible at night

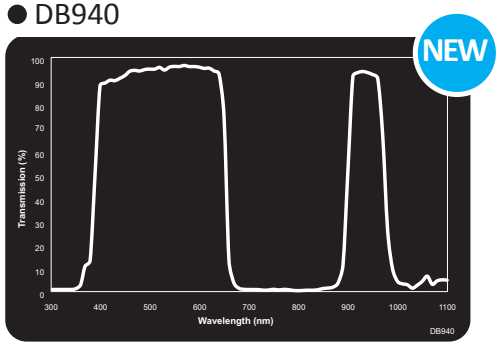
● DB735



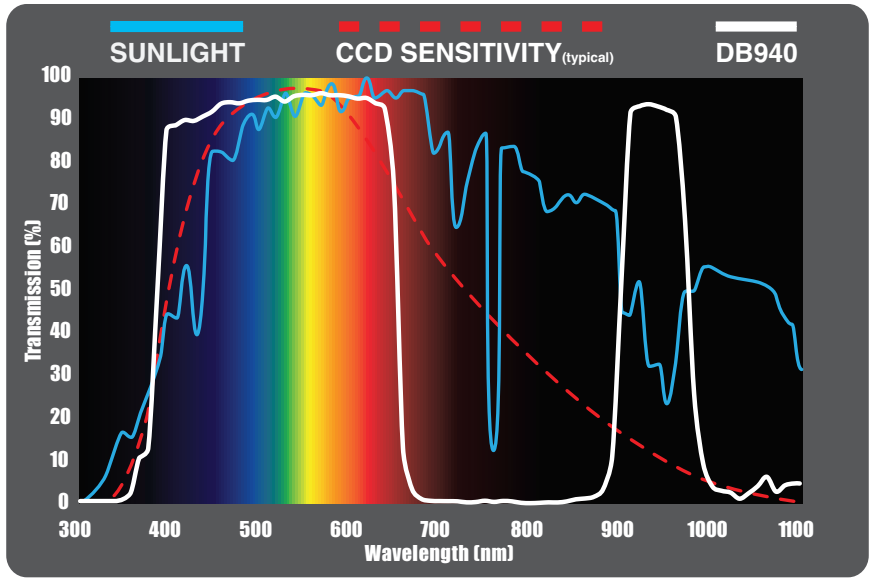
● DB850



● DB940



Dual Bandpass Filters are ideal for applications that use a color camera during the day and are used with IR illumination at night. They ensure that clear, accurate images are acquired under all lighting conditions.



Part # Prefix	Filter Description	Full Width Half Max (50% point) +/- 10 nm	Minimum Peak Transmission	Surface Quality Scratch and Dig	Mount Options
DB735	Dual Bandpass Visible + 735 nm IR	Visible 385-650 nm Infrared 705-765 nm	90%	40/20	T,S,C,F
DB850	Dual Bandpass Visible + 850 nm IR	Visible 385-650 nm Infrared 820-880 nm	90%	40/20	T,S,C,F
DB940	Dual Bandpass Visible + 940 nm IR	Visible 385-650 nm Infrared 910-970 nm	90%	40/20	T,S,C,F

T=Standard Threaded Lens Mount; S=Slip-On Mount; C=C/CS-Camera Mount (M25.4); F=Filter, No Mount

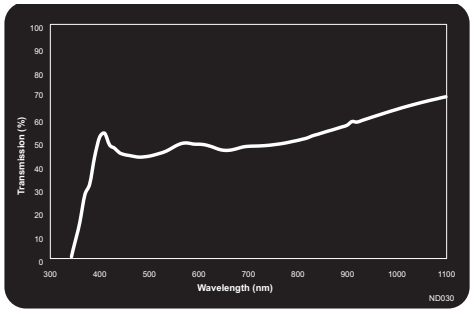
Visible Neutral Density Filters

Visible Light Neutral Density Filters – Absorptive

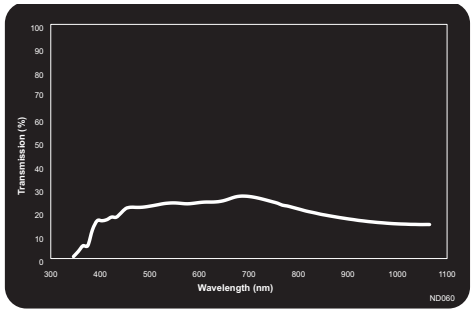
- Neutral Density Filters reduce light intensity in the visible spectrum without affecting color and contrast
- ND filters can be used with monochrome and color cameras in the visible spectrum
- Different optical densities (ODs) equate to an overall decrease in luminous transmission *(see chart below)*
- Mounted ND filters can be stacked to test various optical densities
- Achieve shallow depth of field
- Reduce over-saturation in high heat environments
  (Ex. Hot molten metal and welding applications)

Sunglasses for your System

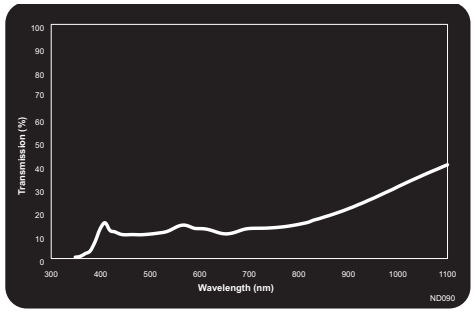
● ND030



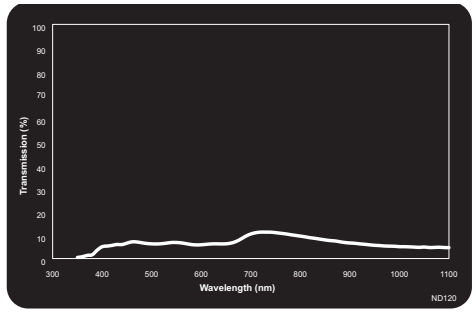
● ND060



● ND090



● ND120



Part # Prefix	Filter Description	Effective Range	Optical Density (Transmission)	Surface Quality	Mount Options
ND030	Neutral Density, Absorp. OD = 0.3 (50% trans.)	400-700 nm	0.3 (50%)	40/20	T,S,C,F
ND060	Neutral Density, Absorp. OD = 0.6 (25% trans.)	400-700 nm	0.6 (25%)	40/20	T,S,C,F
ND090	Neutral Density, Absorp. OD = 0.9 (12.5% trans.)	400-700 nm	0.9 (12.5%)	40/20	T,S,C,F
ND120	Neutral Density, Absorp. OD = 1.2 (6.25% trans.)	400-700 nm	1.2 (6.25%)	40/20	T,S,C,F
ND200	Neutral Density, Absorp. OD = 2.0 (1.0% trans.)	400-700 nm	2.0 (1.0%)	40/20	T,S,C,F
ND300	Neutral Density, Absorp. OD = 3.0 (0.1% trans.)	400-700 nm	3.0 (0.1%)	40/20	T,S,C,F
ND400	Neutral Density, Absorp. OD = 4.0 (0.01% trans.)	400-700 nm	4.0 (0.01%)	40/20	T,S,C,F

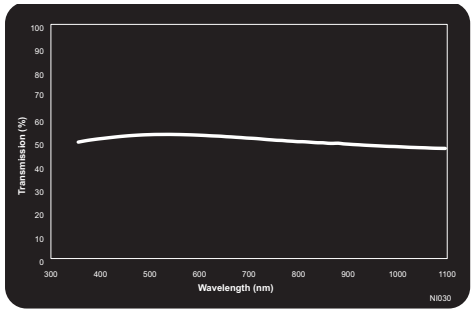
Custom densities available upon request

T=Standard Threaded Lens Mount; S=Slip-On Mount; C=C/CS-Camera Mount (M25.4); F=Filter, No Mount

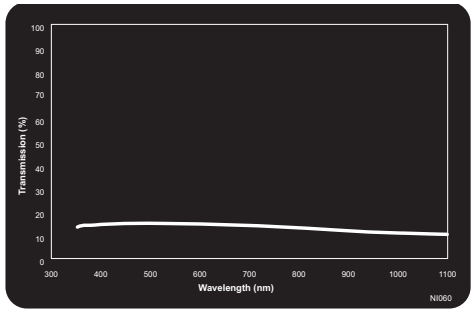
Visible/Near Infrared (Ni) Neutral Density Filters – Low Reflectivity

- Ni filters reduce light intensity neutrally throughout the visible and near IR spectrum without affecting color and contrast
- Ni filters can be used with monochrome and color cameras in the visible spectrum
- Ni filters must be used to reduce intensity in infrared applications

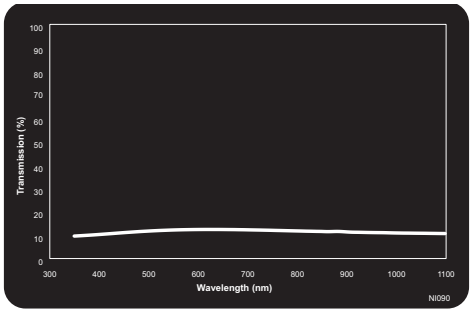
● Ni030



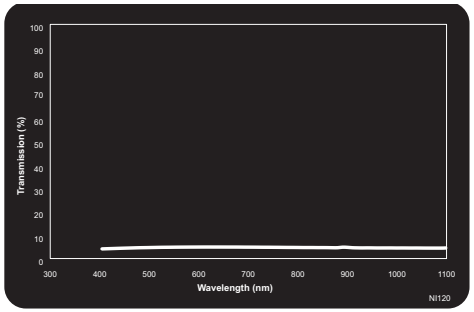
● Ni060



● Ni090



● Ni120



Part # Prefix	Filter Description	Effective Range	Optical Density (Transmission)	Surface Quality	Mount Options
Ni030	Neutral Density, Low Refl. OD = 0.3 (50% trans.)	400-1200 nm	0.3 (50%)	40/20	T,S,C,F
Ni060	Neutral Density, Low Refl. OD = 0.6 (25% trans.)	400-1200 nm	0.6 (25%)	40/20	T,S,C,F
Ni090	Neutral Density, Low Refl. OD = 0.9 (12.5% trans.)	400-1200 nm	0.9 (12.5%)	40/20	T,S,C,F
Ni120	Neutral Density, Low Refl. OD = 1.2 (6.25% trans.)	400-1200 nm	1.2 (6.25%)	40/20	T,S,C,F

Custom densities available upon request

T=Standard Threaded Lens Mount; S=Slip-On Mount; C=C/CS-Camera Mount (M25.4); F=Filter, No Mount

Polarizing Filters

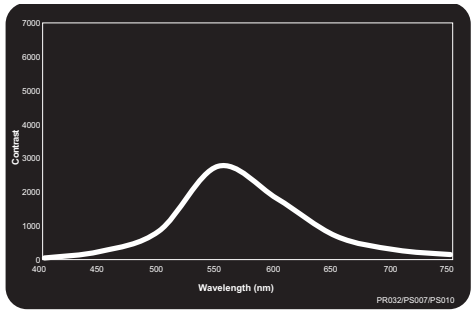
- MidOpt polarizers are equipped with a rotating mount and locking thumb screw
- Polarizers reduce unwanted reflections

Reflections from nonmetallic surfaces such as glass, lacquer, plastic or liquid, result in polarization of the reflected light. Specular glare can be the result of uncontrolled ambient light, but is more often created by the light source chosen for illumination. If the subject is partially obscured by unwanted reflection, a polarizing filter can reduce or eliminate the problem. Glare can be decreased by rotating the filter mounted on the lens. Best results are achieved when a polarizer is used over the lens in conjunction with a polarizer film over the light source.

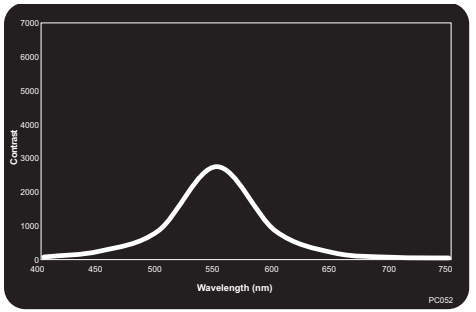
Reduce Specular Glare with Polarizing Filters

The higher the contrast, the better the reduction in glare

PR032



PC052



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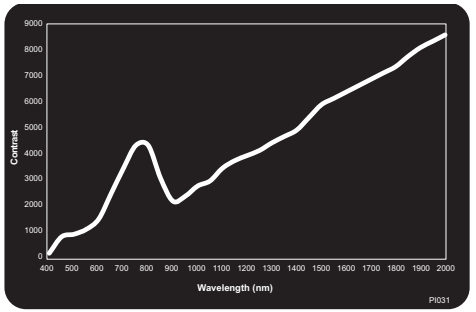
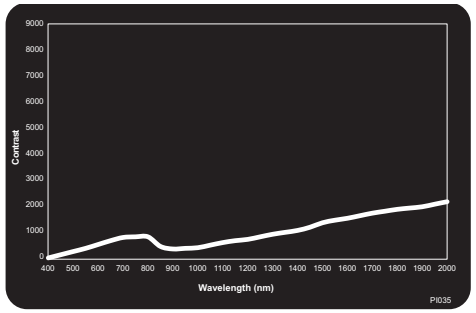
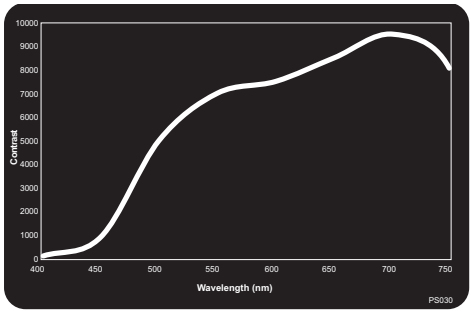


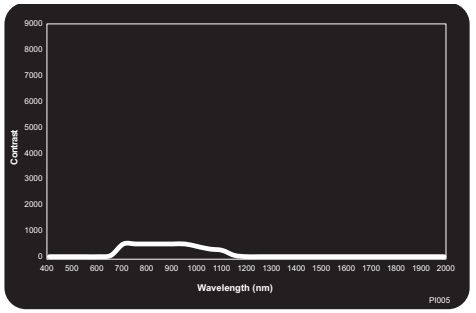
Pi035

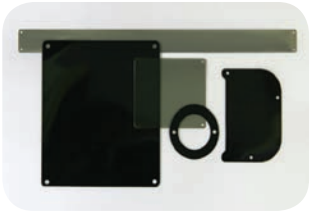


PS030



Pi005





Polarizing Film

Part # Prefix	Filter Description	Effective Range	Contrast Ratio	Transmission	Surface Quality	Mount Options
PR032	Linear Polarizer	400-700 nm	800:1	400-700 nm	40/20	T,S,F
PC052	Circular Polarizer	400-700 nm	700:1	400-700 nm	40/20	T,S,F
Pi031	NIR/Vis Linear Polarizer, High Extinction	400-2000 nm	3000:1	400-2000 nm	40/20	T,S,F
Pi035	NIR/Vis Linear Polarizer, High Transmission	400-2000 nm	500:1	400-2000 nm	40/20	T,S,F
PS007*	Linear Polarizer Film .007” thk	400-700 nm	800:1	400-700 nm	N/A	N/A
PS030	Linear Polarizer Film .030” thk	400-700 nm	6500:1	400-700 nm	N/A	N/A
PS010	Linear Polarizer Film .010” thk	400-700 nm	800:1	400-700 nm	N/A	N/A
Pi005	NIR Linear Polarizer Film (for lighting only)	700-1100 nm	1000:1	700-1100 nm	N/A	N/A

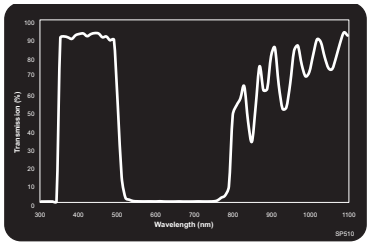
T=Standard Threaded Lens Mount; S=Slip-On Mount; C=C/CS-Camera Mount (M25.4); F=Filter, No Mount

>> *PS007 Linear Polarizer Film is also available with an optional adhesive backing

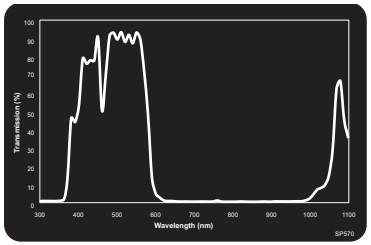
Color Shortpass/Notch

Shortpass filters let shorter wavelengths pass while blocking longer wavelengths. Useful for improving contrast, resolution and separating colors in black/white or color applications, most are typically not recommended for machine vision.

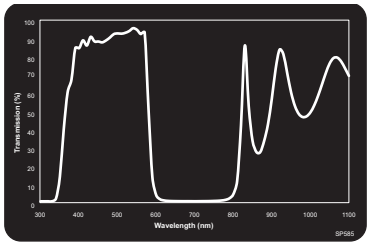
SP510



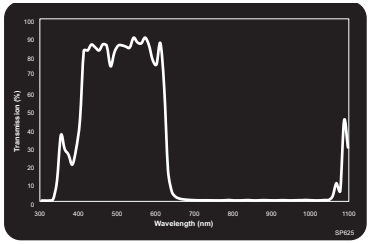
SP570



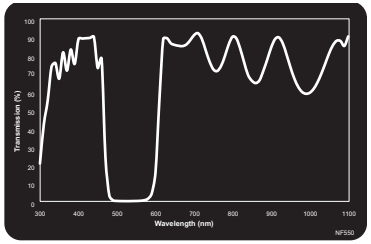
SP585



SP625



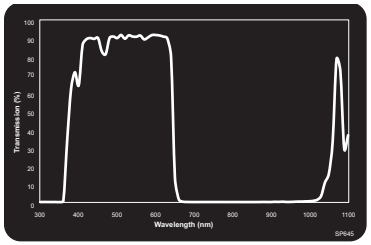
NF550



Part # Prefix	Filter Description	Cut-off Wavelength 50% of Peak Transmission	Average Transmission	Surface Quality Scratch and Dig	Mount Options
SP510	Blue Shortpass	510 nm	90%	40/20	T,S,C,F
SP570	Blue-Green Shortpass	570 nm	90%	40/20	T,S,C,F
SP585	Cyan Shortpass	585 nm	90%	40/20	T,S,C,F
SP625	Blue-Orange Shortpass	625 nm	90%	40/20	T,S,C,F
NF550	Magenta Dichroic (Green Block)	465 nm - 605 nm	90%	40/20	T,S,C,F

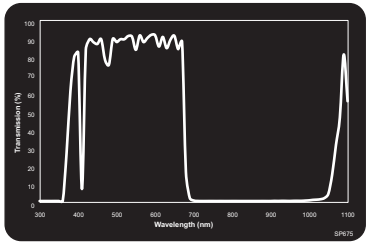
IR Block/Visible Pass Filters

SP645

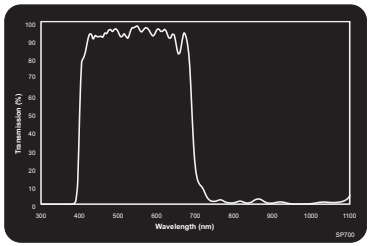


- Block IR light for accurate color rendition in digital cameras
- Commonly placed over the cameras image sensor
- Reduces IR radiation/camera bloom from hot metal/glass extrusion processes

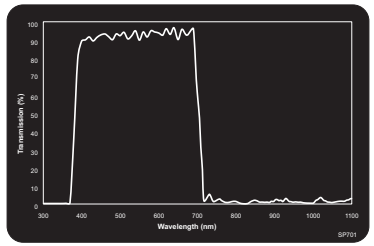
SP675



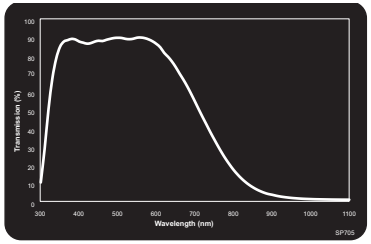
SP700 (BP550)



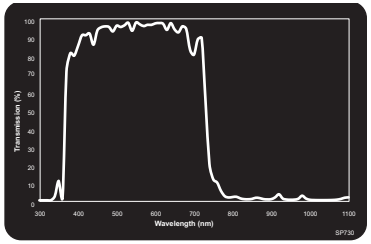
SP701



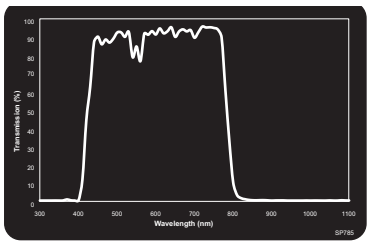
SP705



SP730



SP785

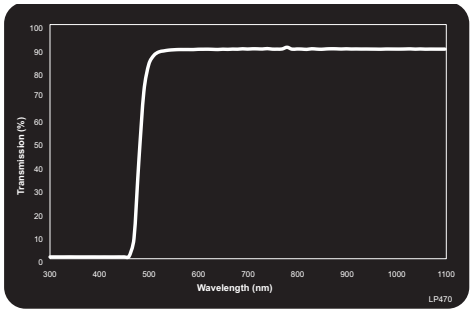


Part # Prefix	Filter Description	Cut-off Wavelength 50% of Peak Transmission	Minimum Visible Transmission	Surface Quality Scratch and Dig	Mount Options
SP645	Near Infrared/Mid-Red Dichroic Block	645 nm	90%	40/20	T,S,C,F
SP675	Near Infrared/Deep Red Dichroic Block	675 nm	90%	40/20	T,S,C,F
SP700	Near IR/UV Block-Visible Bandpass	400 nm - 700 nm	90%	40/20	T,S,C,F
SP701	Extended Hot Mirror	400 nm - 1550 nm	90%	40/20	T,S,C,F
SP705	Near Infrared/Deep Red Absorp. Block	705 nm	85%	40/20	T,S,C,F
SP730	Near Infrared/Colorless Dichroic Block	730 nm	90%	40/20	T,S,C,F
SP785	Modified NIR Dichroic Block	785 nm	90%	40/20	T,S,C,F

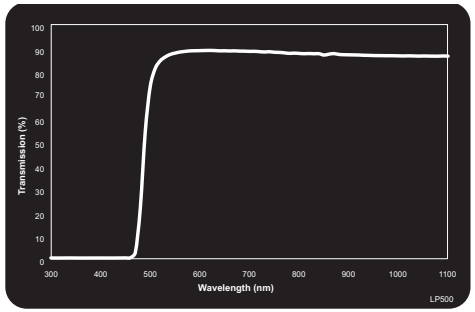
T=Standard Threaded Lens Mount; S=Slip-On Mount; C=C/CS-Camera Mount (M25.4); F=Filter, No Mount

Color Longpass Filters

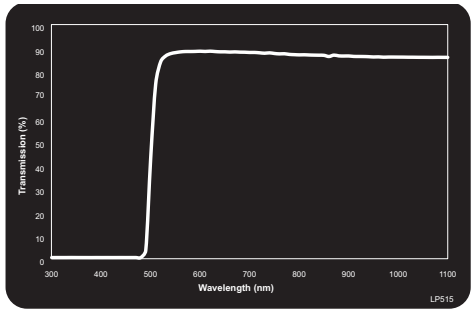
LP470



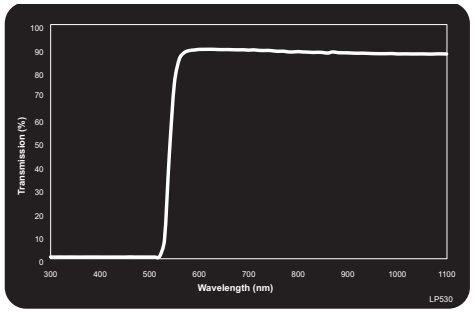
LP500



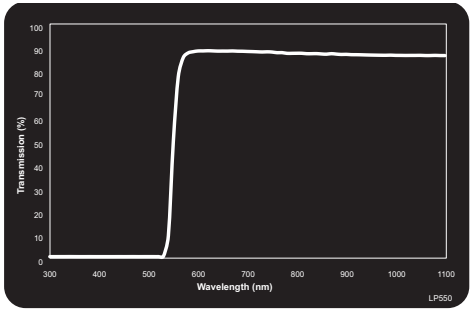
LP515



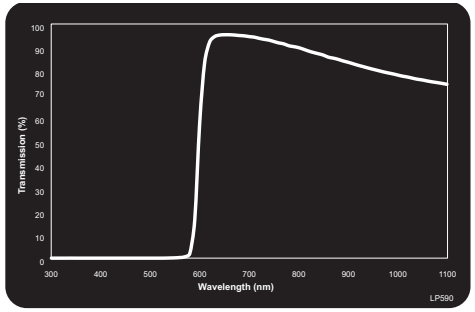
LP530



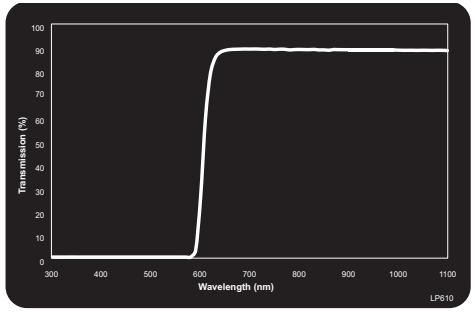
LP550



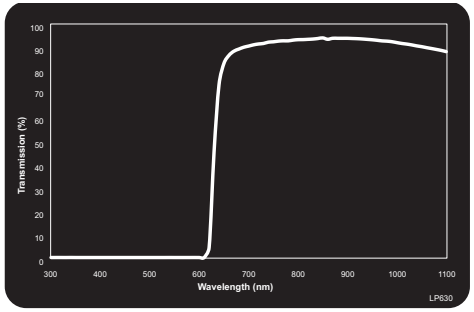
LP590



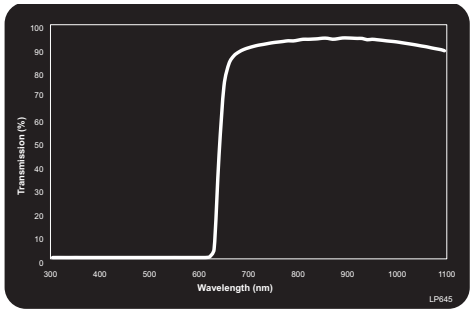
LP610



LP630



LP645

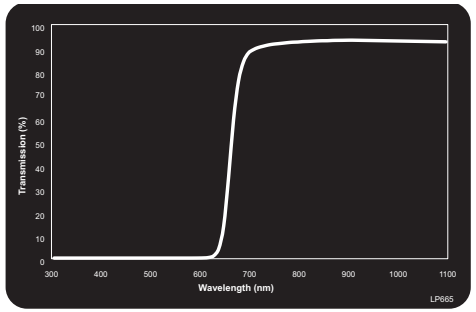


Part # Prefix	Filter Description	Cut-on Wavelength 50% of Peak Transmission	Minimum Transmission	Surface Quality Scratch and Dig	Mount Options
LP470	Light Yellow Longpass	470 nm	90%	40/20	T,S,C,F
LP500	Yellow Longpass	500 nm	90%	40/20	T,S,C,F
LP515	Yellow-Orange Longpass	515 nm	90%	40/20	T,S,C,F
LP530	Orange Longpass	530 nm	90%	40/20	T,S,C,F
LP550	Orange Longpass	550 nm	90%	40/20	T,S,C,F
LP580	Red-Orange Longpass	580 nm	90%	40/20	T,S,C,F
LP590	Red Longpass	590 nm	90%	40/20	T,S,C,F
LP610	Red Longpass	610 nm	90%	40/20	T,S,C,F
LP630	Red Longpass	630 nm	90%	40/20	T,S,C,F
LP645	Dark Red Longpass	645 nm	90%	40/20	T,S,C,F

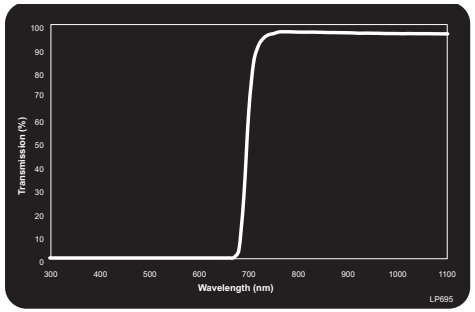
T=Standard Threaded Lens Mount; S=Slip-On Mount; C=C/CS-Camera Mount (M25.4); F=Filter, No Mount

IR Longpass Filters

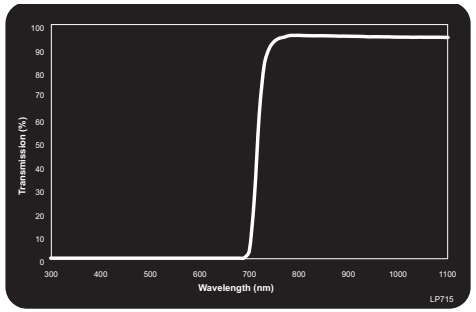
● LP665



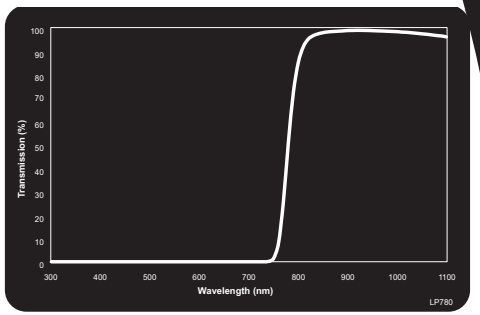
● LP695



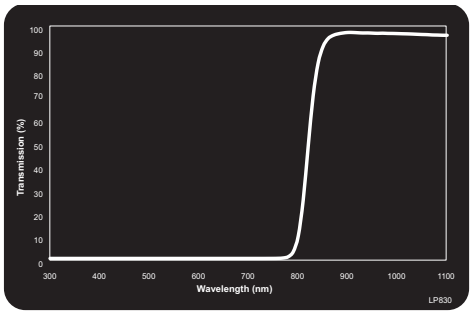
● LP715



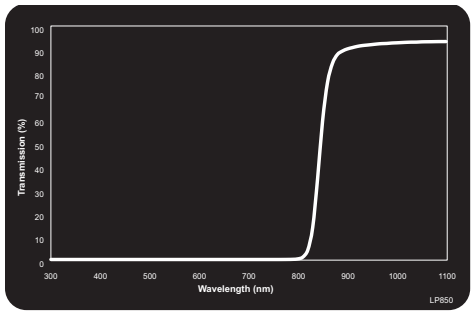
● LP780



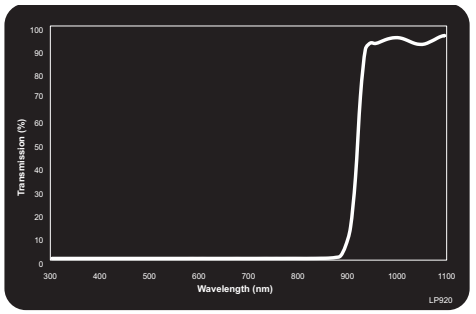
● LP830



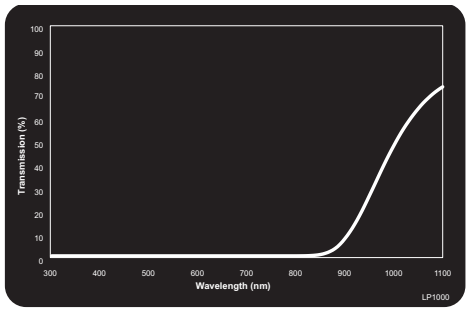
● LP850



● LP920



● LP1000



Part # Prefix	Filter Description	Cut-on Wavelength 50% of Peak Transmission	Minimum Transmission	Surface Quality Scratch and Dig	Mount Options
LP665	Dark Red Longpass	665 nm	90%	40/20	T,S,C,F
LP695	Infrared Longpass	695 nm	90%	40/20	T,S,C,F
LP715	Infrared Longpass	715 nm	90%	40/20	T,S,C,F
LP780	Infrared Longpass	780 nm	90%	40/20	T,S,C,F
LP830	Infrared Longpass	830 nm	90%	40/20	T,S,C,F
LP850	Infrared Longpass	850 nm	90%	40/20	T,S,C,F
LP920	Infrared Longpass	920 nm	90%	40/20	T,S,C,F
LP1000	Infrared Longpass	1000 nm	90%	40/20	T,S,C,F

T=Standard Threaded Lens Mount; S=Slip-On Mount; C=C/CS-Camera Mount (M25.4); F=Filter, No Mount

Protective Filters

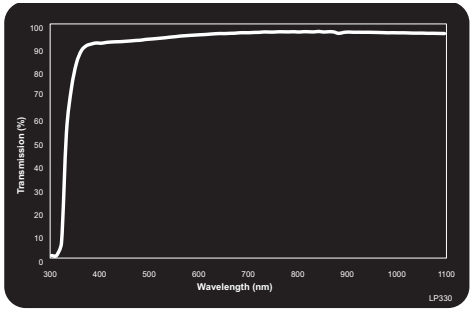
- MidOpt protective filters, manufactured in either glass or acrylic substrates, protect lenses and lighting from impact, dust and harsh environments while also offering shorter wavelength blocking
- Anti-reflection coatings are available on AC380, LP340 and LP415 to maximize transmission
- The AC380 is an abrasion, breakage and solvent resistant acrylic window that is approved for FDA applications

Economical Solution

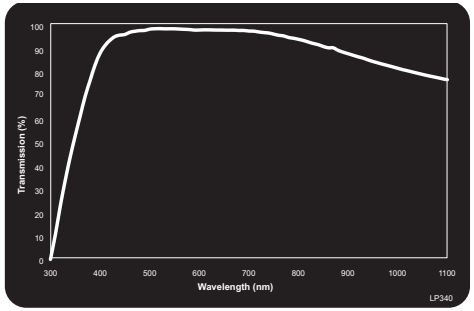
ACRYLIC PROTECTIVE FILTERS *are an economical solution for covering camera enclosures (lighting). They can be manufactured in complex shapes and configurations and are useful for both indoor and outdoor applications.*

GLASS PROTECTIVE FILTERS

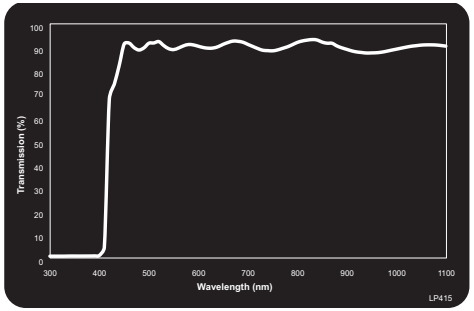
LP330



LP340

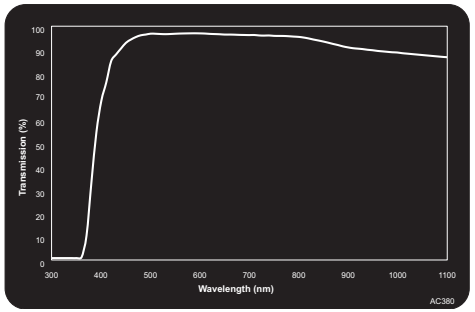


LP415

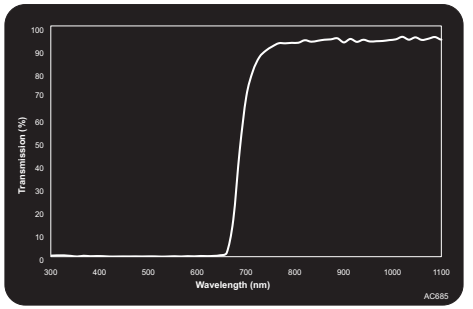


ACRYLIC PROTECTIVE FILTERS

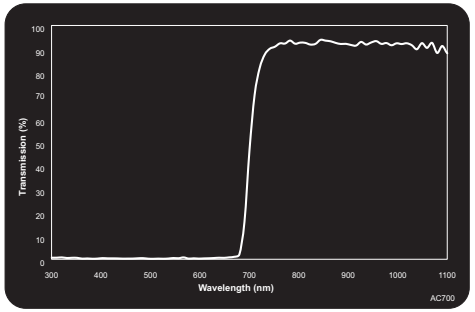
AC380



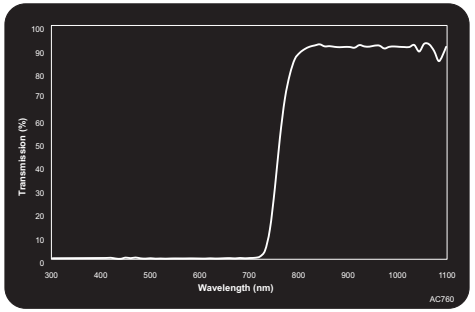
AC685



AC700



AC760



Part # Prefix	Filter Description	Cut-on Wavelength 50% of Peak Transmission	Average Visible Transmission	Mount Options
LP330	Protective Window	330 nm	91%	T,S,C,F
LP340	Protective Window, Anti-reflection Coated	340 nm	98%	T,S,C,F
LP415	UV Block	415 nm	92%	T,S,C,F

T=Standard Threaded Lens Mount; S=Slip-On Mount; C=C/CS-Camera Mount (M25.4); F=Filter, No Mount

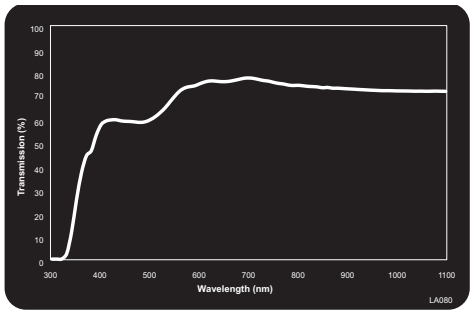
Part # Prefix	Filter Description	Cut-on Wavelength 50% of Peak Transmission	Average Transmission	Mount Options
AC380	Protective Window, Anti-reflection and Scratch-Resistant Coated Acrylic	380 nm	98%	T,S,F
AC685	Acrylic Infrared Longpass	685 nm	90%	T,S,F
AC700	Acrylic Infrared Longpass	700 nm	90%	T,S,F
AC760	Acrylic Infrared Longpass	760 nm	90%	T,S,F

Light Balancing Filters

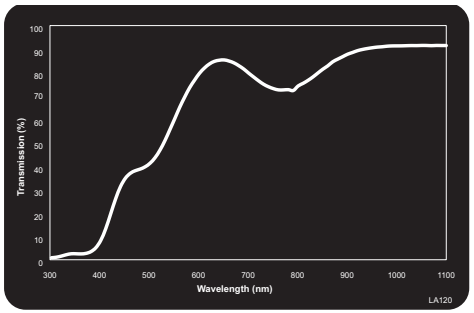
The best image quality is achieved through quality optics, not software processing

- Light Balancing Filters correct artificial lighting so that colors appear more natural
- LA series (amber) reduce blue shading that often strongly predominates in white LED and Xenon strobe lighting
- LB series (blue) reduces the red hue found with some tungsten and halogen lighting
- FL series fluorescent lighting filters and other wavelength enhancing filters are also available

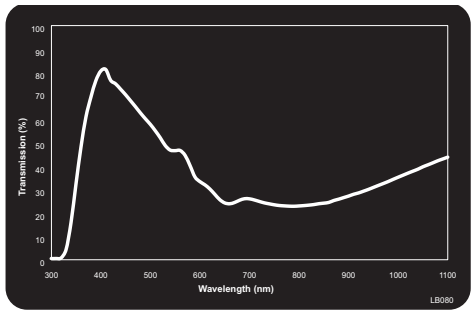
LA080



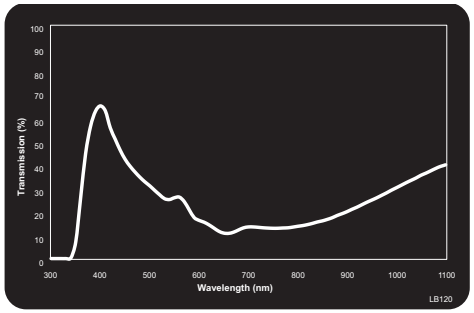
LA120



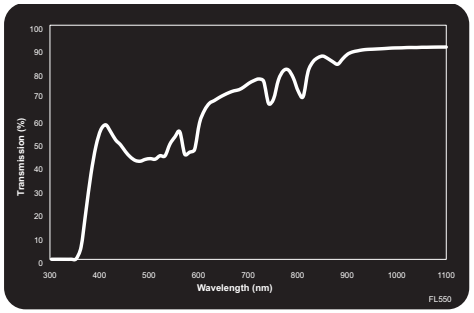
LB080



LB120



FL550



Part # Prefix	Description	Effective Range	Mired Shift Value	Surface Quality	Mount Options
LA080	Light Balancing (Minus Blue)	400-1200 nm	+80±5	40/20	T,S,C,F
LA120	Light Balancing (Minus Blue)	400-1200 nm	+120±5	40/20	T,S,C,F
LB080	Light Balancing (Minus Red)	400-1200 nm	-80±5	40/20	T,S,C,F
LB120	Light Balancing (Minus Red)	400-1200 nm	-120±5	40/20	T,S,C,F
FL550	Light Balancing (Minus Green)	400-1200 nm	N/A	40/20	T,S,F

T=Standard Threaded Lens Mount; S=Slip-On Mount; C=C/CS-Camera Mount (M25.4); F=Filter, No Mount

MidOpt Filter Test Kits

Evaluate & improve image quality with MidOpt Filter Test Kits

- Excellent resource for testing
- Test before investing in hardware: Filters can determine type and color of LED lighting hardware that best satisfies the application's requirements
- Control the variability of ambient light: Once appropriate lighting has been chosen, a complementary filter aids in correcting specific problems and in controlling the variability of ambient lighting conditions
- Applications can be solved quickly
- An essential tool for imaging solutions
- Designed to assist vision integrators and end users to evaluate and improve image quality

Excellent Resource

FK200-27 Compact Machine Vision Filter Test Kit

- Ten most popular UV, Visible and Infrared Machine Vision Filters
- 27mm threaded mount
- Step up and step down rings to fit M25.5 and M30.5 lenses
- Polarizing film for light sources
- Technical booklet with specs and application examples
- Educational material to help in understanding filter use
- Microfiber cleaning cloth
- Compact, impact/static resistant case
- Easy-to-track labeled filter slots

Best Seller

FK200-27	Compact Machine Vision Filter Kit Includes:
BP324-27	Near UV Bandpass
BP470-27	Blue Bandpass
BP505-27	Cyan Bandpass
BP525-27	Light Green Bandpass
BP550-27	Near IR/UV Block-Visible Bandpass
BP590-27	Orange Bandpass
BP635-27	Light Red Bandpass
BP660-27	Dark Red Bandpass
BP850-27	Infrared Bandpass
PR032-27	Linear Polarizer
PS007	Polarizing Film 125mm x 95mm
SU25.5-27	M25.5 Step-Up Adapter
SD30.5-27	M30.5 Step-Down Adapter

FS100 Machine Vision Swatch Filter Test Kit

- QR code to link filter specifications
- Larger size 43mm diameter filters
- Filter transmission curve
- Solve applications on site with the portable swatch kit

>> Also available: NS100

Most Popular

FS100	Machine Vision Swatch Kit Includes:
BP324	Near UV Bandpass
BP470	Blue Bandpass
BP505	Cyan Bandpass
BP525	Light Green Bandpass
BP550	Near IR/UV Block-Visible Bandpass
BP590	Orange Bandpass
BP635	Light Red Bandpass
BP660	Dark Red Bandpass
BP850	Infrared Bandpass
PR032	Linear Polarizer

FK100 Machine Vision Filter Test Kit

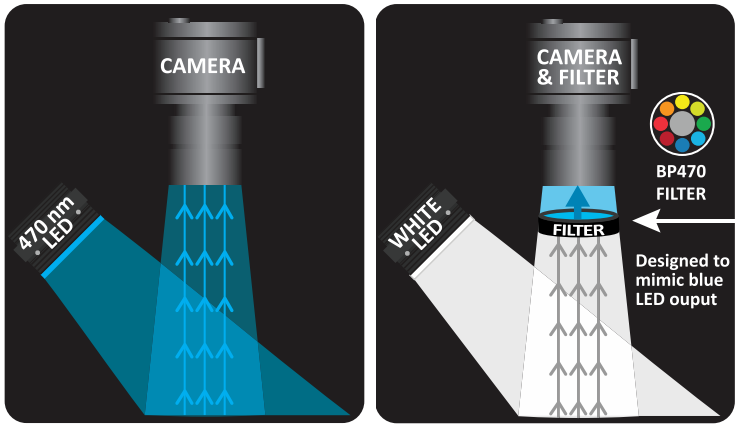
- Choose any size; M22.5-M105
- Ten most popular UV, Visible and Infrared Machine Vision Filters
- Polarizing film for light sources
- Technical data and transmission curves for each filter
- Educational material in durable binder to help in understanding filter use

>> Also available: BK100, UK100, IK100, and NK100 (see page 21)

****Included in the FK100-27 Kit are Step-Up & Step-Down Adapter Rings for M25.5 and M30.5 threaded lenses making, this an excellent starter kit***

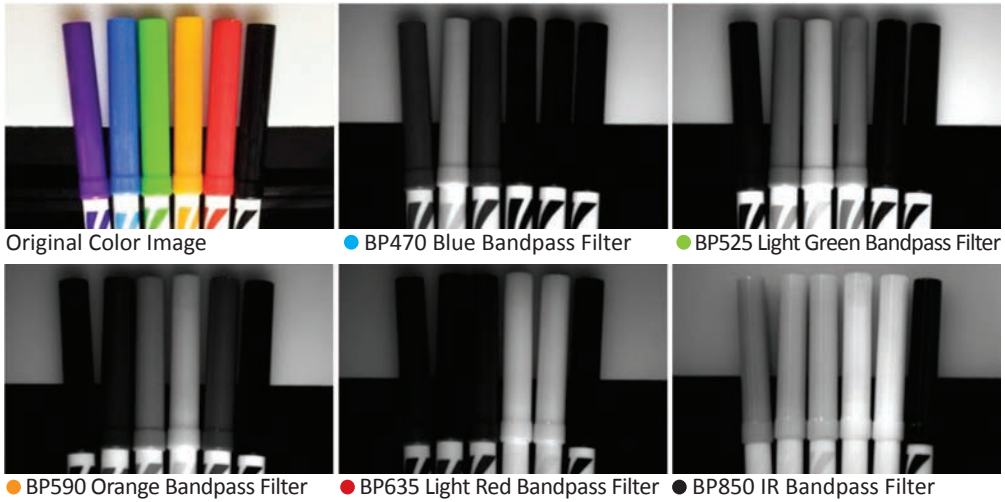
NS100	Neutral Density Swatch Kit Includes:
ND030	Neutral Density, Absorp. OD = 0.3 (50% trans.)
ND060	Neutral Density, Absorp. OD = 0.6 (25% trans.)
ND090	Neutral Density, Absorp. OD = 0.9 (12.5% trans.)
ND120	Neutral Density, Absorp. OD = 1.2 (6.25% trans.)
ND200	Neutral Density, Absorp. OD = 2.0 (1.0 % trans.)
ND300	Neutral Density, Absorp. OD = 3.0 (0.1 % trans.)
ND400	Neutral Density, Absorp. OD = 4.0 (0.01 % trans.)

Test the Effects of Monochromatic Illumination with MidOpt Bandpass Filters



Transmission of white light through a BP470 Filter mimics output from 470 nm LED to enable testing of common color LEDs

Utilize white light with bandpass filters to test and determine the optimal LED wavelength for your application



Original Color Image | BP470 Blue Bandpass Filter | BP525 Light Green Bandpass Filter

BP590 Orange Bandpass Filter | BP635 Light Red Bandpass Filter | BP850 IR Bandpass Filter

MidOpt Bandpass Filters Mimic 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.

FK100	Machine Vision Filter Kit* Includes:
BP324	Near UV Bandpass
BP470	Blue Bandpass
BP525	Light Green Bandpass
BP550	Near IR/UV Block-Visible Bandpass
BP590	Orange Bandpass
BP635	Light Red Bandpass
BP660	Dark Red Bandpass
BP850	Infrared Bandpass
LA120	Light Balancing (Minus Blue)
PR032	Linear Polarizer
Polarizing Sheet 4.5" x 5"	

> Indicate filter size when ordering

BK100	Bandpass Filter Kit Includes:
BP365	Near UV Bandpass
BP470	Blue Bandpass
BP525	Light Green Bandpass
BP590	Orange Bandpass
BP635	Light Red Bandpass
BP660	Dark Red Bandpass
BP695	Infrared Bandpass
BP735	Infrared Bandpass
BP800	Infrared Bandpass
BP880	Infrared Bandpass

> Indicate filter size when ordering

UK100	UV Fluorescence Filter Kit Includes:
BP324	Near UV Bandpass
BP365	Near UV Bandpass
BP470	Blue Bandpass
BP525	Light Green Bandpass
BP590	Orange Bandpass
LP415	UV Block

> Indicate filter size when ordering

IK100	Infrared Filter Kit Includes:
LP695	Infrared Longpass
LP780	Infrared Longpass
BP800	Infrared Longpass
BP850	Infrared Bandpass
LP920	Infrared Bandpass
LP1000	Infrared Longpass

> Indicate filter size when ordering

NK100	Neutral Density Filter Kit Includes:
ND030	Neutral Density, Absorp. OD = 0.3 (50% trans.)
ND060	Neutral Density, Absorp. OD = 0.6 (25% trans.)
ND090	Neutral Density, Absorp. OD = 0.9 (12.5% trans.)
ND120	Neutral Density, Absorp. OD = 1.2 (6.25% trans.)
ND200	Neutral Density, Absorp. OD = 2.0 (1.0 % trans.)
ND300	Neutral Density, Absorp. OD = 3.0 (0.1 % trans.)
ND400	Neutral Density, Absorp. OD = 4.0 (0.01 % trans.)

> Indicate filter size when ordering

Fluorescence and Infrared Imaging

UV Fluorescence applications require a filter that blocks the UV light source, transmitting only the weaker fluorescent emission

UV Excitation

365 nm 395 nm 400 nm

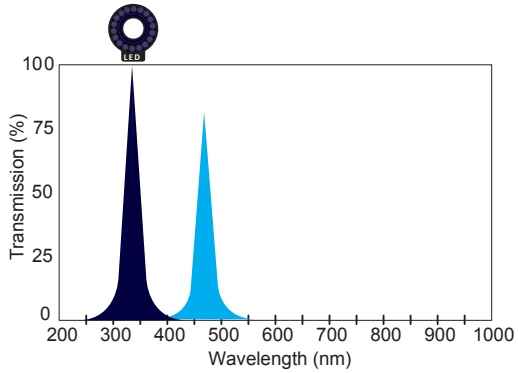
Common Fluorescent Emission

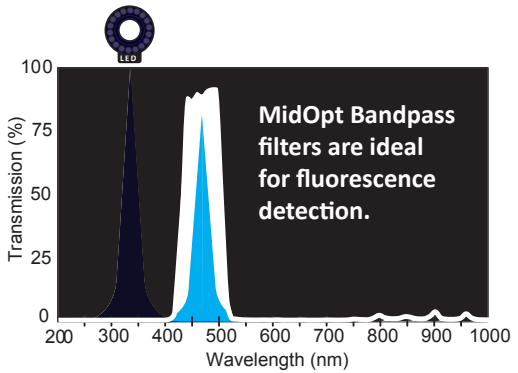
- BP470
- BN470
- BP505
- BP525
- BN532
- BP590
- BN595

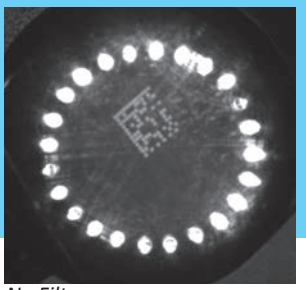
Due to the variables in fluorescent imaging, it is necessary to test with different filters to determine which gives best contrast.

See page 20 for filter test kits

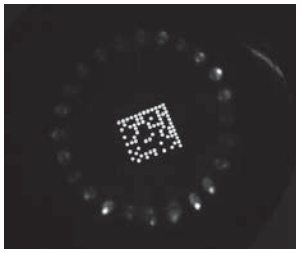
Many materials emit a visible light when excited by a UV light source. This fluorescence emission is usually weak compared to the brighter UV light source and ambient surrounding light. For this reason, it is challenging for any vision system to reliably detect luminescent emissions without proper filtering. **For a system to be successful in a UV fluorescence application, filters must be used to detect the visible emission while blocking the UV light source.**







No Filter



BP470 Blue Bandpass Filter

Infrared Imaging

Contrast in the NIR can be greatly improved depending on the characteristics of the item under inspection. Perhaps 50% of the information captured in NIR images is significantly different than those images captured with white light. While this 50% rule can apply to any given subject, it is often impossible to tell how an image will appear in the NIR without experimenting. As most digital cameras have excellent near-IR sensitivity, such tests can be performed quickly and easily by slipping a visible blocking/IR pass filter over the camera lens.

Increase Contrast and Resolution

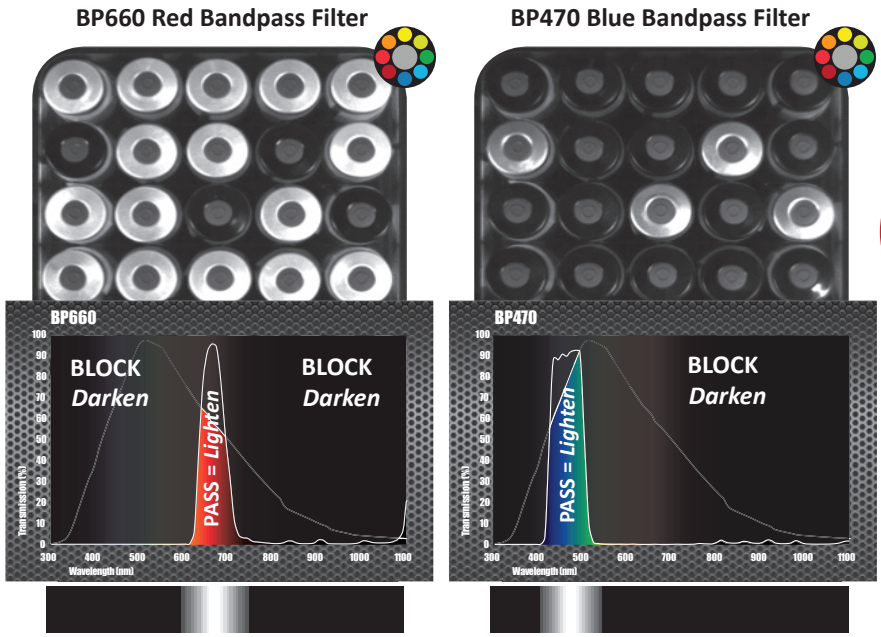
Color Sorting in Black and White with Red and Blue Bandpass Filters

COLOR AND CONTRAST

While color cameras may be a first thought when separating subjects by color, it can be more efficient and effective to use a monochrome camera with a color filter. For example, to brighten or highlight a subject that is predominantly red, transmission in the red portion of the spectrum must be maximized and all other portions of the spectrum blocked. Color bandpass filters can increase contrast by maximizing the amount of light transmitted in at least one wavelength range and minimizing the amount transmitted (or attenuated) in another range, allowing for highly effective color separation.

Original Color Image

No Filter, No Contrast



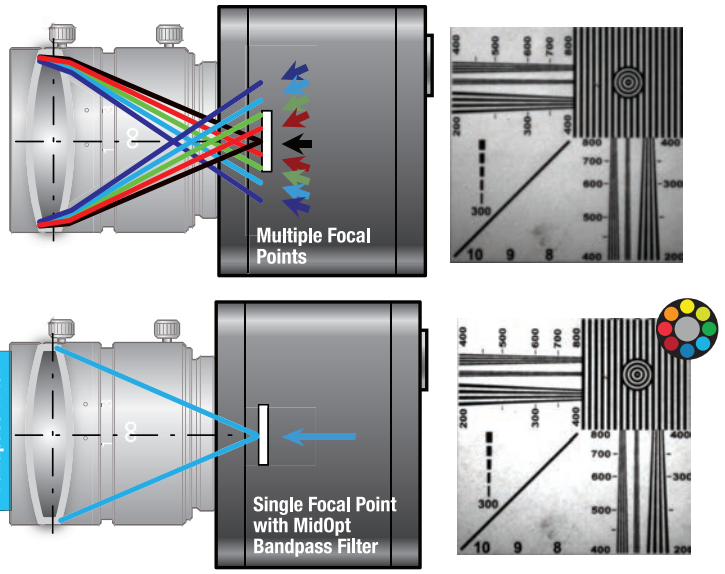
Filters allow you to selectively pass or block light wavelengths which can highlight or darken areas of an image

Recognize & Separate Color with Filters

Increase Resolution and Contrast by Reducing the Color Range Being Imaged

REDUCE CHROMATIC ABERRATIONS

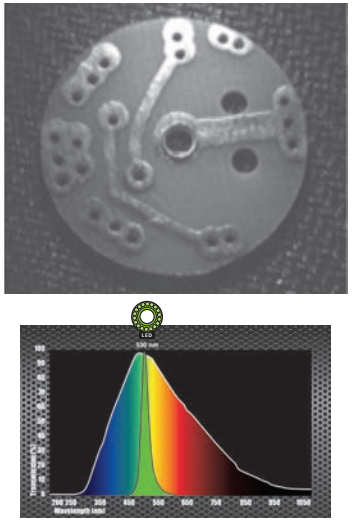
Filters narrow the spectral range of an image, especially when used with monochromatic LED lighting, increasing contrast and improving resolution by reducing the effect of chromatic aberrations. The lens focus is a function of wavelength, so it is always beneficial to limit the wavelength range entering the optics, particularly if there is a substantial UV and/or near-infrared component to the light in the surrounding area. Improvements in off-axis resolution of as much as 20-50% are not unusual. Bandpass filters are recommended in order to achieve this increase.



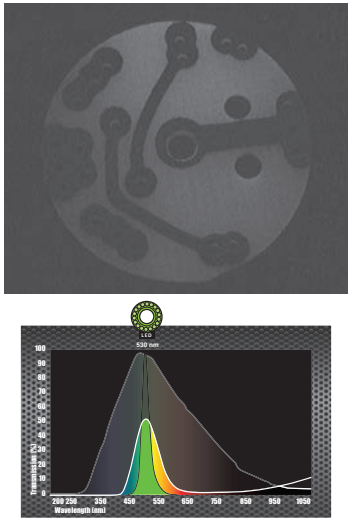
Increase Resolution with Filters

Filter Design

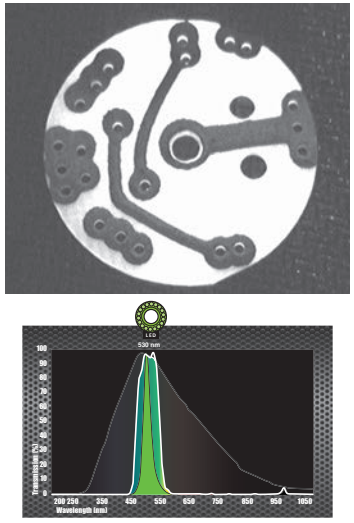
Filters designed for photographic film are not suitable for digital imaging systems



Green Illumination, No Filter

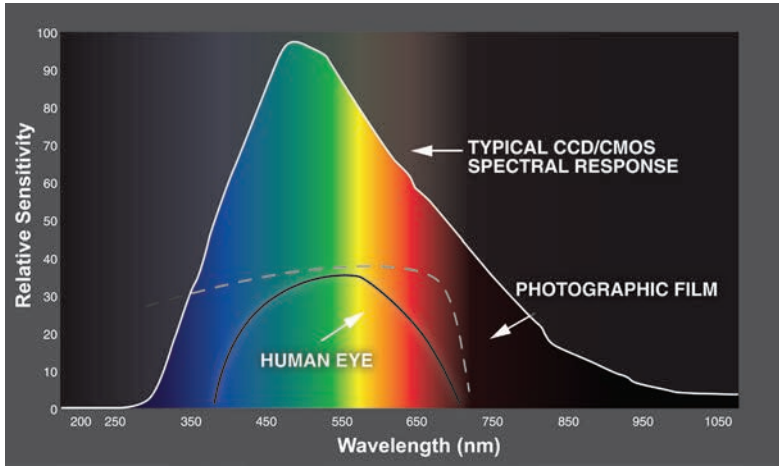


Green Illumination, Photographic Filter (cuts valuable light intensity)



MidOpt BP525 designed to capture output of green LED illumination or green fluorescence

The improvement in contrast and resolution can be significant when a filter designed for industrial vision is used instead of a traditional photographic filter.



The Advantages of using a Machine Vision Filter over a Photographic Filter

Digital cameras record light outside the visible spectrum and have greater sensitivity in low light conditions. To optimize digital cameras for machine vision, optical filters should be employed. MidOpt filters are specifically designed to make full use of digital capabilities by effectively enhancing or eliminating portions of the UV, visible and near-IR spectra.

The ideal machine vision filter should be an immediate solution that provides greater contrast, improves transmission, resolution and assures long-term control over the variability of ambient light.

For over 100 years, photographers have used filters to reduce reflections, balance color in a scene and bring out contrast in black-and-white photos. Seeking similar results, integrators all over the world have tried adapting these filters to industrial vision systems; however photographic filters, designed for film, do not meet the challenges presented by digital cameras.

Film's spectral sensitivity is from 400-700 nm, i.e., the visible spectrum. Almost all CCD/CMOS cameras are sensitive in the ultraviolet (UV), visible and near-infrared (NIR) portions of the spectrum. To control lighting conditions and image quality, digital camera filters must perform well over this entire wavelength range.

Filter Quality Awareness

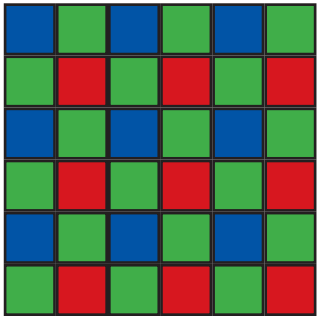
Monochrome or Color

Most color cameras use a Bayer filter array which utilizes red, green and blue filters arranged over what is otherwise a monochrome sensor.

A color camera analyzes each pixel's color information and, combined with that of adjacent pixels, recreates (or essentially guesses at) the full color image.

This process of creating a color image introduces variability. Errors can occur and loss of resolution is inherent.

Resolution loss is most pronounced when detection of a single or a few colors is all that is required.

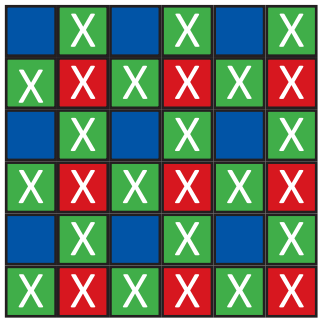


RGB (Color) Sensor

25% Red Pixel
50% Green Pixel
25% Blue Pixel

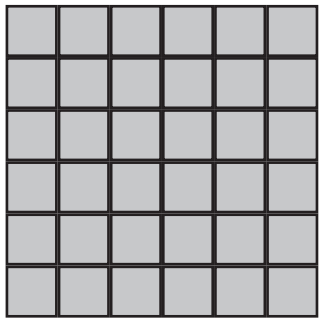
Monochromatic imaging with MidOpt filters significantly increases camera efficiency

Color



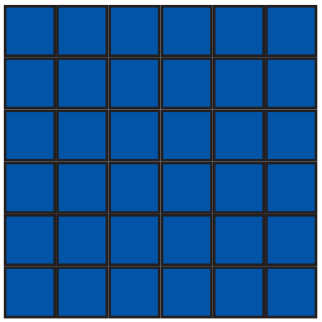
25% Efficient
Red and Green pixels are not utilized when a single color blue is all that is required, decreasing efficiency of the color camera

Monochrome



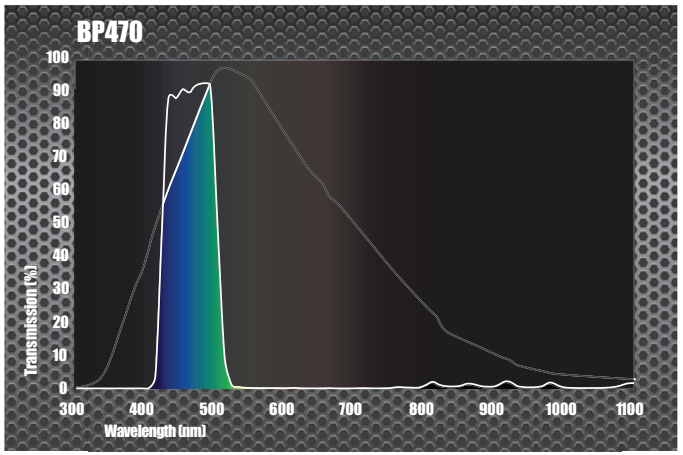
Entire monochrome sensor is used to detect light (color) intensity

Monochrome with Filter



90% Efficient
The MidOpt BP470 Blue Bandpass Filter allows the entire sensor to detect light intensity

MidOpt BP470 Blue Bandpass Filter



Combined with BP470 Blue Bandpass Filter that transmits 90+% of the desired blue spectrum, a monochrome sensor is more efficient (90% vs 25%)

Original color image, excited with UV 395 nm LED, data code emitting blue fluorescence, no filter

Monochrome sensor, blue fluorescence, no filter

Monochrome sensor, blue fluorescence with MidOpt BP470 Blue Bandpass Filter

Mounts available for any system

A variety of threaded filter mounts are stocked from 22.5 mm to 105 mm in diameter.

Larger filters 67 mm to 105 mm in diameter are made to order and are normally not returnable.

Custom thread sizes are available upon request.

Standard Threaded Mounts

Mounted filters for ALL lenses with filter threads

Part Suffix	Thread Dia x Pitch	External Diameter	Aperture Diameter
-22.5	M22.5 x P0.5	24.5	18.5
-25.4	M25.4 x P32TPI	25.2	19.5
-25.5	M25.5 x P0.5	27.5	21
-27	M27 x P0.5	29	23
-30.5	M30.5 x P0.5	32.5	26
-34	M34 x P0.5	36	30
-35.5	M35.5 x P0.5	37	31.5
-37	M37 x P0.75	39	33
-37.5	M37.5 x P0.5	39	33.5
-40.5	M40.5 x P0.5	42	36
-43	M43 x P0.75	45	39.5
-46	M46 x P0.75	48	41.5
-49	M49 x P0.75	51	45
-52	M52 x P0.75	54	47.5
-55	M55 x P0.75	57	50.5
-58	M58 x P0.75	60	53.5
-62	M62 x P0.75	65	57.5
-67	M67 x P0.75	70	62.5
-72	M72 x P0.75	75	67.5
-77	M77 x P0.75	80	73
-82	M82 x P0.75	84	77.5
-86	M86 x P1.0	88	81
-95	M95 x P1.0	98	90
-105	M105 x P1.0	110	100

Slip Mount Adapters

- Designed for lenses without filter threads
- Accommodate standard threaded mounts
- Large diameter design to prevent wide angle lens vignetting
- Locking set screws to secure the mount adapter to the lens

Many varifocal zoom and shorter fixed focal length wide angle lenses are not supplied with filter threads due to the presence of a protruding, strongly convex first lens element. MidOpt slip mount adapters allow standard threaded filters to be fitted securely to a large variety of lenses that are not designed with filter threads.

C/CS Camera Mounts

- Threads directly into any C or CS mount camera between the lens and sensor
- Helpful in applications with space constraints
- Can be used to prevent vignetting in wide angle lenses that do not accept filters at the front end

Unmounted

Custom shapes and sizes are typically fabricated with one to two week lead times

How to Order
Part Number Conventions

BP470-27

Part # Prefix

Filter/Lens Thread Size

Threaded Mount

Select a part # prefix from the product table with a suffix (filter size) from the size chart shown on opposite page.
Ex: BP470-27 for a Blue Bandpass Filter in a M27xP0.5 mount.

BP470-25.4

Part # Prefix

Filter/ C/CS Camera Thread Size

C/CS Camera Mount

Externally threaded mount which screws into any C/CS Mount camera thread so the filter can be placed in between the lens and the sensor.
Ex: BP470-25.4 for a Blue Bandpass Filter in a C/CS Mount.

Unmounted Filter Glass

Available for any MidOpt Filter type. Select a prefix from the product table with a suffix using the desired size in millimeters. Please add "R" + the dimension of the Square or Rectangle or add "D" + the Diameter after the filter prefix. *Rectangle or Square Ex: BP470-R30X15; Diameter Ex: BP470-D19*

Filter, No Mount Rectangle/Square

BP470-R30x15

Part # Prefix

R=Rectangle/Square

Size in mm

or

Filter, No Mount Circular

BP470-D19

Part # Prefix

D=Diameter (Circle)

Size in mm

BP470-S42

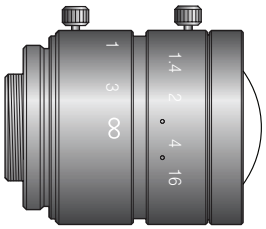
Part # Prefix

S=Slip Mount

Size in mm
Front End Outside Diameter of the Lens

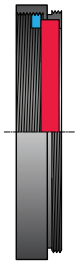
Slip Mount Adapter Assembly for Unthreaded Lenses

Slip Mount adapter assemblies are available if the lens does not have threads for mounting a filter. Select the filter prefix and add an S + the outside diameter of the lens in mm. *(Please note, front end outside diameter measurement must be accurate within +0.2/-0.0 mm)*
Ex: BP470-S42



Lens

Slip Mount + *Standard Threaded Filter Mount*



Filter, Lens and Lighting Accessories

NEW

LE100 CS Mount Lens Enclosure

- Protects the lens
- Fits all CS cameras
- Equipped with a built-in 5mm spacer to accommodate all C-mount lenses
- Anti-reflective coating to maximize transmission
- Easy to clean and tamper resistant
- Accommodates a lens up to 42.5 mm in length and 37.5 mm in diameter including thumbscrews

LE100* Set Includes the Following:
LE254-43: Enclosure mount with built in 5 mm spacer
LE025-43: 25 mm Extension tube
LE010-43: 10 mm Extension tube
LE005-43: 5 mm Extension tube

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

Two Protective Lens Options

LE100-LP340
Glass protective window with an anti-reflection coating.

LE100-AC380
Anti-abrasion acrylic protective window with an anti-reflection coating, approved for FDA applications.

**NOTE: Can be used with C-Mount cameras and CS lens to CS cameras; however, it will affect the minimum object distance.*

Step-Up / Step-Down Rings

Step-up rings allow large filters to be used on lenses with smaller diameter filter threads. Use of step-up rings is often mandatory for shorter focal length lenses in order to prevent vignetting. Step-down rings allow smaller diameter filters to be used on lenses with larger diameter filter threads. The diameter of the filter or lighting to which step-down rings are coupled will be much smaller than the diameter of the lens, often resulting in vignetting.

Extension Rings

The **EXT-S-SET** extension ring set consists of six different rings (0.5, 1.0, 5.0, 10.0, 20.0 and 40.0mm) used to adjust the focal point for C- or CS-mount lenses and increase magnification for close-up applications. Individual rings of various lengths are also sold separately. In particular, the 5mm ring allows CS-mount cameras to accept C-Mount lenses.

Rotating Right Angle Attachments

A rotating right angle attachment screws into lens filter threads and permits viewing at 90º to the optical axis of your lens and camera. Attachments can be adapted to smaller lenses through the use of step-up rings. Filters can also be accommodated.

** For best results use with longer focal length lenses (16 mm or higher).*

Close-Up Lenses

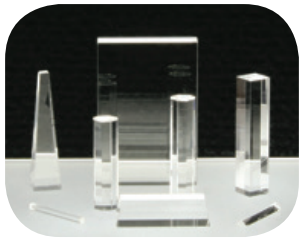
A Close-Up Lens set consists of +1, +2 and +4 diopter lenses. They are available from stock, mounted in threaded, black anodized aluminum rings.

CUSTOM OPTICS

MidOpt supplies custom and stock optical components to manufacturers of machine vision and commercial lighting products.

Examples include:

- precision optical windows
- diffusers
- lens elements
- mirrors
- light pipes
- filters
- polarizers
- prisms
- wedges
- dust covers
- metal components
- beamsplitters

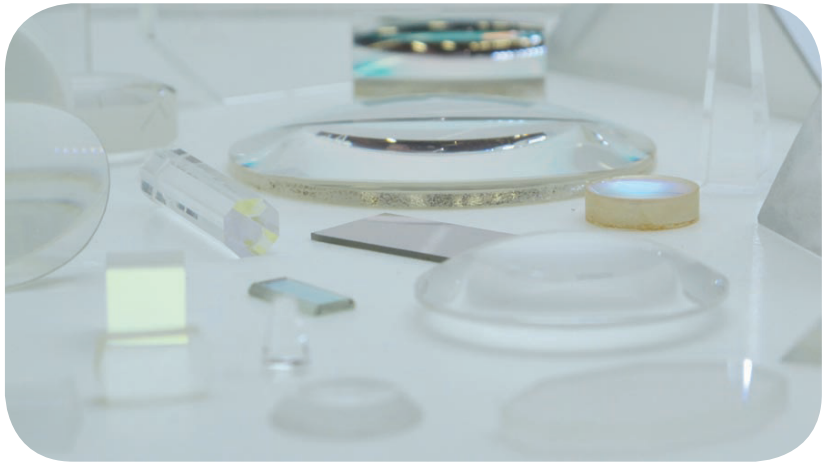


AVAILABLE BEAMSPLITTERS

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 routinely processes orders ranging in size from one to tens of thousands of pieces. State-of-the-art PC-controlled equipment for cutting and shaping even the most complex plastic or glass configurations insures accuracy and quick turn-around. Lead times for newly ordered items are usually one week, with repeat orders frequently shipped from stock.

Larger components used in industrial web processes are a specialty, such as economical UV-transmitting quartz windows, cylindrical and rod light line lenses, reflectors, filters, polarizers and UV hot and cold mirrors.



Test Glass Rental/ Stock Optical Components

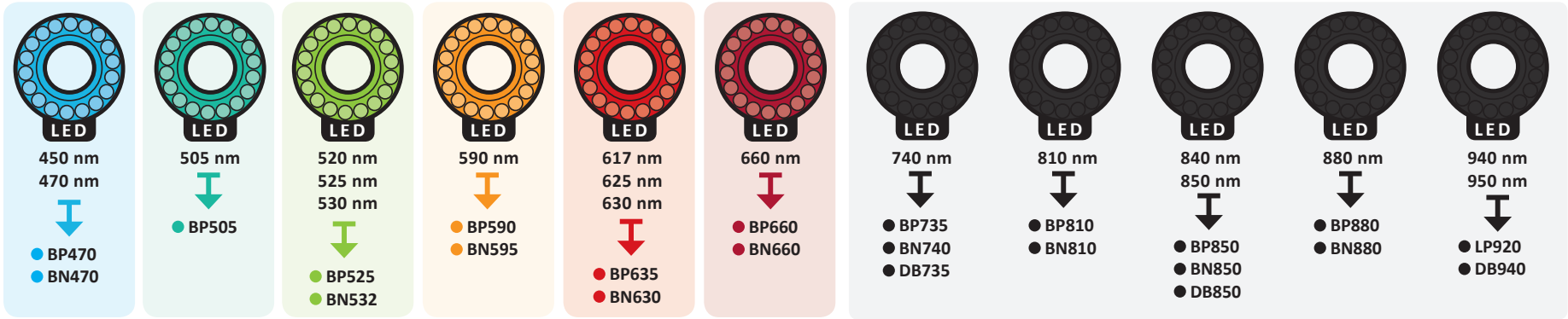
MidOpt has more than 3,000 test glass radii in-house, one of the largest inventories of test glasses in the world. For customers this not only helps to eliminate tooling charges, but it aids greatly in shortening delivery lead times. A complete test glass listing is available on current versions of Zemax and Oslo optical design software.

MidOpt also carries a wide selection of stock optical components and materials. Existing stock can often be more quickly and economically modified to meet specific requirements. An extensive in-house optical metrology and experienced opticians insure the most exacting optical requirements can be achieved and maintained.

MidOpt Filters are Designed for LED Illumination

Monochromatic (single color) LED lighting is the most commonly used application-specific illumination

LEDs omit specific wavelengths over a narrow region of the spectrum. Commonly recommended filters to complement LED Light Sources:



Light-to-Filter Reference

ADVANCED ILLUMINATION

LIGHT	MIDOPT FILTER
365nm*	UV IMAGING BP365
395nm*	UV IMAGING BP365
470nm	BP470; BN470
505nm	BP505
520nm	BP525; BN532
530nm	BP525; BN532
590nm	BP590; BN595
625nm	BP635; BN630
640nm	BP635
660nm	BP660; BN660
695nm	BP695
850nm	BP850; BN850; DB850
880nm	BP880, BN880
940nm	LP920; DB940
950nm	LP920; DB940
WHITE	BP550
RGB	BP550

CCS

LIGHT	MIDOPT FILTER
365nm*	UV IMAGING BP365
470nm	BP470; BN470
525nm	BP525; BN532
625nm	BP635; BN630
630nm	BP635; BN630
660nm	BP660; BN660
850nm	BP850; BN850; DB850
940nm	LP920; DB940
5500K WHITE	BP550
6600K WHITE	LA120

DCM SISTEMES

LIGHT	MIDOPT FILTER
365nm*	UV IMAGING BP365
400nm*	UV IMAGING BP365
470nm	BP470; BN470
525nm	BP525; BN532
630nm	BP635; BN630
880nm	BP880, BN880
940nm	LP920; DB940
RGB	BP550
WHITE	BP550

METAPHASE

LIGHT	MIDOPT FILTER
365nm*	UV IMAGING BP365
395nm*	UV IMAGING BP365
450nm	BP470
470nm	BP470; BN470
530nm	BP525; BN532
630nm	BP635; BN630
850nm	BP850, BN850; DB850
880nm	BP880, BN880
6000K (Cool white)	LA120
RGB	BP550

SCHOTT/MORITEX

LIGHT	MIDOPT FILTER
365nm*	UV IMAGING BP365
405nm*	UV IMAGING BP365
460nm-490nm	BP470; BN470; BP505
520nm-550nm	BP525; BN532
621nm-645nm	BP635; BN630; BP660; BN660
850nm	BP850; BN850; DB850
940nm	LP920; DB940
WHITE 5500K	BP550

SPECTRUM ILLUMINATION

LIGHT	MIDOPT FILTER
365nm*	UV IMAGING BP365
395nm*	UV IMAGING BP365
470nm	BP470; BN470
505nm	BP505
530nm	BP525; BN532
590nm	BP590; BN595
630nm	BP635; BN630
660nm	BP660; BN660
850nm	BP850; BN850; DB850
880nm	BP880, BN880
940nm	LP920; DB940
WHITE 5700-7000K	LA120

SMART VISION LIGHTS

LIGHT	MIDOPT FILTER
365nm*	UV IMAGING BP365
395nm*	UV IMAGING BP365
470nm	BP470; BN470
505nm	BP505
530nm	BP525; BN532
590nm	BP590, BN595
625nm	BP635; BN630
850nm	BP850; BN850; DB850
940nm	LP920; DB940
WHITE	LA120
NEUTRAL WHITE	BP550
WARM WHITE	BP550

MidOpt Filters control the quality and quantity of the light entering the vision system. These filters pass only the output of lighting used for inspection, while blocking all unwanted ambient light, such as sunlight and overhead lighting.

*UV FLUORESCENCE

UV fluorescence applications utilizing 365 nm, 395 nm, 400 nm and 405 nm LEDs commonly use the following MidOpt Bandpass Filters for capturing UV Fluorescence emissions:

See page 22 for more information

Bandpass: BP470, BP505, BP525, BP590
Narrow bandpass: BN470, BN532, BN595

Contact us for technical assistance for fluorescence applications

Lens-to-Filter Reference

FUJINON

LENS	FILTER
HF12.5SA-1	M49 x P0.75
HF16SA-1	M49 x P0.75
HF25SA-1	M49 x P0.75
HF35SA-1	M49 x P0.75
HF50SA-1	M49 x P0.75
HF75SA-1	M49 x P0.75
CF12.5HA-1	M49 x P0.75
CF16HA-1	M49 x P0.75
CF25HA-1	M49 x P0.75
CF35HA-1	M49 x P0.75
CF50HA-1	M49 x P0.75
CF75HA-1	M49 x P0.75
DF6HA-1B	M27 x P0.5
HF9HA-1B	M27 x P0.5
HF12.5HA-1B	M25.5 x P0.5
HF16HA-1B	M25.5 x P0.5
HF25HA-1B	M25.5 x P0.5
HF35HA-1B	M25.5 x P0.5
HF50HA-1B	M25.5 x P0.5
HF75HA-1B	M30.5 x P0.5
TF8DA-8B	M27 x P0.5
TF25DA-8B	M25.5 x P0.5
TF4DA-8	M27 x P0.5
TF15DA-8	M25.5 x P0.5
HF35SR4A-SA1L	M40.5 x P0.5
HF50SR4A-SA1L	M40.5 x P0.5

GOYO

LENS	FILTER
GMZ85900MCN	M48 x P0.75
GMZ8590056MCN	M43 x P0.75
GMZ8048010MCN	M46 x P0.75
GMZ3D85900MCN	M48 x P0.75
GMZ18108	M52 x P0.75
GMZ16100MCN	M58 x P0.75
GMZ11569MCN	M46 x P0.75
GMY45095MCN	M62 x P0.75
GMY42595MCN	M40.5 x P0.5
GMY31795MCN	M40.5 x P0.5
GMXHR38014MCN	M35.5 x P0.5
GMXHR32514MCN	M35.5 x P0.5
GMXHR31614MCN	M35.5 x P0.5
GMV42595MC	M40.5 x P0.5
GMUV57838C-1	M49 x P0.75
GMUV510540C	M49 x P0.75
GMUV42528C	M25.5 x P0.5
GMTHR38014MCN	M27 x P0.5
GMTHR35028MCN	M25.5 x P0.5
GMTHR33520MCN	M25.5 x P0.5
GMTHR32514MCN	M25.5 x P0.5
GMTHR31614MCN	M27 x P0.5
GMTHR31214MCN	M27 x P0.5
GMTHR21614MCN	M25.5 x P0.5
GMT35018MCN	M30.5 x P0.5
GMS5HR39014MCN	M46 x P0.75
GMS5HR31814MCN	M46 x P0.75
GMS5HR312514MCN	M46 x P0.75
GMN38014MCN-1	M27 x P0.5
GMN37525MCN-1	M34 x P0.5
GMN36014MCN-1	S30
GMN35020MCN-1	M30.5 x P0.5
GMN33516MCN-1	M30.5 x P0.5
GMN32516MCN-1	M27 x P0.5

GOYO

LENS	FILTER
GMN31614MCN-1	M27 x P0.5
GMN31214MCN-1	M27 x P0.5
GMN310028MCN-1	M40.5 x P0.5
GMMPZ4411MCN	M43 x P0.75
GMMPZ1040MCN	M49 x P0.75
GMHR65020MCN	M37.5 x P0.5
GMHR63520MCN	M37.5 x P0.5
GMHR62520MCN	M40.5 x P0.5
GMHR61620MCN	M40.5 x P0.5
GMHR61220MCN	M55 x P0.75
GMHR48014MCN	M55 x P0.75
GMHR47518MCN	M46 x P0.75
GMHR45014MCN	M40.5 x P0.5
GMHR43514MCN	M35.5 x P0.5
GMHR42514MCN	M35.5 x P0. 5
GMHR41614MCN	M35.5 x P0.5
GMHR412514MCN	M35.5 x P0.5
GMHR412513MCN	M35.5 x P0.5
GMHR3D26018C	M37 x P0.75
GMHR3D25018C	M35.5 x P0.5
GMHR3D24018C	M46 x P0.75
GMHR3D22518C	M27 x P0.5
GMHR3D21218C	M27 x P0.5
GMHR38014MCN	M27 x P0.5
GMHR35028MCN	M27 x P0.5
GMHR33520MCN	M27 x P0.5
GMHR32514MCN	M27 x P0.5
GMHR31614MCN	M25.5 x P0.5
GMHR31214MCN	M27 x P0.5
GMHR30528MCN*	M40.5 x P0.5
GMHR26014MCN	M30.5 x P0.5
GMHR26012MCN	M30.5 x P0.5
GMHL27516	M15.5 x P0.5
GMHL24018	M15.5 x P0.5
GMHL224025	M15.5 x P0.5
GMHL215018	M15.5 x P0.5
GMG47518MCN	M46 x P0.75
GMG45018MCN	M40.5 x P0.5
GMG42514MCN	M34 x P0.5
GMB5HR38014MCN	M30.5 x P0.5
GMB5HR35028MCN	M30.5 x P0.5
GMB5HR32514MCN	M30.5 x P0.5
GMB5HR31614MCN	M30.5 x P0.5
GMB5HR30528MCN	M40.5 x P0.5
GMA5HR38028MCN	M49 x P0.75
GMA5HR31218MCN	M49 x P0.75
GM5HR33514MCN	M49 x P0.75
GM5HR32514MCN	M49 x P0.75
GM5HR31614MCN	M49 x P0.75
GM45018MC	M40.5 x P0.5
GM42514MC*	M43 x P0.75
GM38013MCN-1	M25.5 x P0.5
GM37527MCN	M30.5 x P0.5
GM35018MCN	M30.5 x P0.5
GM33519MCN	M27 x P0.5
GM32514MCN	M27 x P0.5
GM31614MCN	M27 x P0.5
GM310035MCN	M30.5 x P0.5
GM29090MCN	M43 x P0.75
GM28551MCN	M37.5 x P0.5
GM26552MCN	M43 x P0.75
GM26015MCN	M37.5 x P0.75
GM26014MCN	M27 x P0.5

GOYO

LENS	FILTER
GM24514MCN	S27
GM23514MCN	S27
GM23512MCN	M40.5 x P0.5
GM16539MSN	M37.5 x P0.5
GM150100MSN	M46 x P0.75
GM10HR38518MCN	M34 x P0.5
GM10HR35028MCN	M30.5 x P0.5
GM10HR33520MCN	M34 x P0.5
GM10HR32518MCN	M25.5 x P0.5
GM10HR31628MCN	M34 x P0.5
GM10HR31618MCN	M25.5 x P0.5
GM10HR31218MCN	M25.5 x P0.5
GM10HR30518MCN	M46 x P0.75
GLS5526F	M67 x P0.75
GLS5028F-N	M52 x P0.75
GLS5028F	M46 x P0.75
GLS5014F	M58 x P0.75
GLS3528F-N	M52 x P0.75
GLS3528F	M62 x P0.75
GLS2828F-N	M72 x P0.75
GLS2828F	M58 x P0.75
GLS10028F	M55 x P0.75
GAZ95152M	M86 x P1.0
GAZ80800M	M62 x P0.75
GAZ8048010M	M52 x P0.75
GAZ75120M	M72 x P1.0
GAZ65104M	M86 x P1.0
GAZ16160M	M77 x P0.75
GAZ15825M	M95 x P1.0
GAZ15500M	M105 x P1.0
GAZ13280M	M67 x P0.75
GAZ11569M	M52 x P0.75
GAZ10550M-2X	M95 x P1.0
GAZ10550M	M95 x P1.0
GAZ10330M	M105 x P1.0
GAZ1025018M	M86 x P0.1
GAZ10220M	M67 x P0.75
GAZ10100M	M62 x P0.75

KOWA

LENS	FILTER
LM100JC	M40.5 x P0.5
LM12HC-SW	M35.5 x P0.5
LM12JC	M27 x P0.5
LM12JC10M	M25.5 x P0.5
LM12JCR	M30.5 x P0.5
LM12NCL	M25.5 x P0.5
LM12NCR	M30.5 x P0.5
LM12NHG	M37.5 x P0.5
LM16HC-SW	M35.5 x P0.5
LM16JC	M27 x P0.5
LM16JC10M	M25.5 x P0.5
LM16JCR	M30.5 x P0.5
LM25HC-SW	M35.5 x P0.5
LM25JC	M27 x P0.5
LM25JC10M	M25.5 x P0.5
LM25JCR	M30.5 x P0.5
LM28CLS	M72 x P0.75
LM28LF	M72 x P0.75
LM28LF-48	M72 x P0.75
LM35CLS	M62 x P0.75
LM35HC-SW	M35.5 x P0.5
LM35JC	M30.5 x P0.5

KOWA

LENS	FILTER
LM35JC10M	M34 x P0.5
LM35LF	M52 x P0.75
LM35LF-48	M52 x P0.75
LM4NCL	S27
LM4NCR	S34
LM4PB*	M35.5 x P0.5
LM4PBR	M30.5 x P0.5
LM50-IR-F	M52 x P0.75
LM50-IR-P	M52 x P0.75
LM50CLS	M52 x P0.75
LM50HC-SW	M40.5 x P0.5
LM50JC	M30.5 x P0.5
LM50JC10M	M30.5 x P0.5
LM50LF	M52 x P0.75
LM50LF-48	M52 x P0.75
LM50TC	M37.5 x P0.5
LM5JC10M	M46 x P0.75
LM5NCL	S27
LM5NCR	M30.5 x P0.5
LM6JC	S30
LM6NCL	M25.5 x P0.5
LM6NCR	M30.5 x P0.5
LM75JC	M34 x P0.5
LM8HC-SW	M55 x P0.75
LM8JC	M27 x P0.5
LM8JC10M	M34 x P0.5
LM8JCR	M30.5 x P0.5
LM8PB*	M35.5 x P0.5
LM8PBR	M30.5 x P0.5
LMVZ1040	M49 x P0.75
LMVZ4411	M43 x P0.75
LMVZ510A	M46 x P0.75
LMVZ540	M40.5 x P0.5
LMVZ540A	M40.5 x P0.5
LMVZ580	M46 x P0.75
LMVZ580A	M46 x P0.75
LMVZ655	M43 x P0.75
LMVZ655A	M43 x P0.75
LMVZ990-IR	M43 x P0.75
LMVZ990A-IR	M43 x P0.75
LMZ0812AM-IR	M72 x P0.75
LMZ0812AMDC-IR	M72 x P0.75
LMZ106M3R*	M55 x P0.75
LMZ107M3P*	M55 x P0.75
LMZ107M3R*	M55 x P0.75
LMZ109AMP*	M46 x P0.75
LMZ110AM	M55 x P0.75
LMZ110AMDC	M55 x P0.75
LMZ111AM	M55 x P0.75
LMZ111AMDC	M55 x P0.75
LMZ112AM	M72 x P0.75
LMZ112AMDC	M72 x P0.75
LMZ200AM	M55 x P0.75
LMZ200AMDC	M55 x P0.75
LMZ200M3	M55 x P0.75
LMZ200M3P*	M55 x P0.75
LMZ300AM	M72 x P0.75
LMZ300AMDC	M72 x P0.75
LMZ45T3	M52 x P0.75
LMZ503M*	M48 x P0.75
LMZ50M	M48 x P0.75
LMZ50M-CS	M48 x P0.75
LMZ60M	M43 x P0.75
LMZ68M	M46 x P0.75
LMZ69M	M46 x P0.75

NAVITAR

LENS	FILTER
NMV-8M1	M55 x P0.75
NMV-12M1	M35 x P0.5
NMV-16M1	M35.5 x P0.5
NMV-25M1	M35.5 x P0.5
NMV-35M1	M35.5 x P0.5
NMV-50M1	M40.5 x P0.5
NMV-75M1	M46 x P0.75
NMV-5M23	M40.5 x P0.5
NMV-8M23	M27 x P0.5
NMV-12M23	M27 x P0.5
NMV-16M23	M25.5 x P0.5
NMV-25M23	M27 x P0.5
NMV-35M23	M27 x P0.5
NMV-50M23	M27 x P0.5
NMV-6	S30
NMV-8	M27 x P0.5
NMV-12	M27 x P0.5
NMV-16	M27 x P0.5
NMV-25	M27 x P0.5
NMV-35	M30.5 x P0.5
NMV-50	M30.5 x P0.5
NMV-75	M34 x P0.5
NMV-100	M40.5 x P0.5
NMV-4WA	S27
NMV-5WA	S27
NMV-6WA	M25.5 x P0.5
NMV-12WA	M30.5 x P0.5
Zoom 7000	M52 x P0.75
Zoom 7000E	M49 x P0.75
Zoom 7010	S60
1-19552	M46 x P0.75
1-19553	M34 x P0.5
1-19554	M25.5 x P0.5
1-19555	M25.5 x P0.5
1-19556	M25.5 x P0.5
1-19557	M34 x P0.5
1-19558	M30.5 x P0.5
SWIR-8	M55 x P0.75
SWIR-12	M27 x P0.5
SWIR-16	M35.5 x P0.5
SWIR-25	M35.5 x P0.5
SWIR-35	M35.5 x P0.5
SWIR-50	M40.5 x P0.5
1-19711	M72 x P0.75
1-19712	M52 x P0.75
1-19713	M52 x P0.5
DOZ-11110	M67 x P0.75
DOZ-10X16	M67 x P0.75
TC-5028	M37 x P0.75
DO-1795	M40.5 x P0.5
DO-2595	M40.5 x P0.5
DO-5095	M62 x P0.75

RICOH / PENTAX

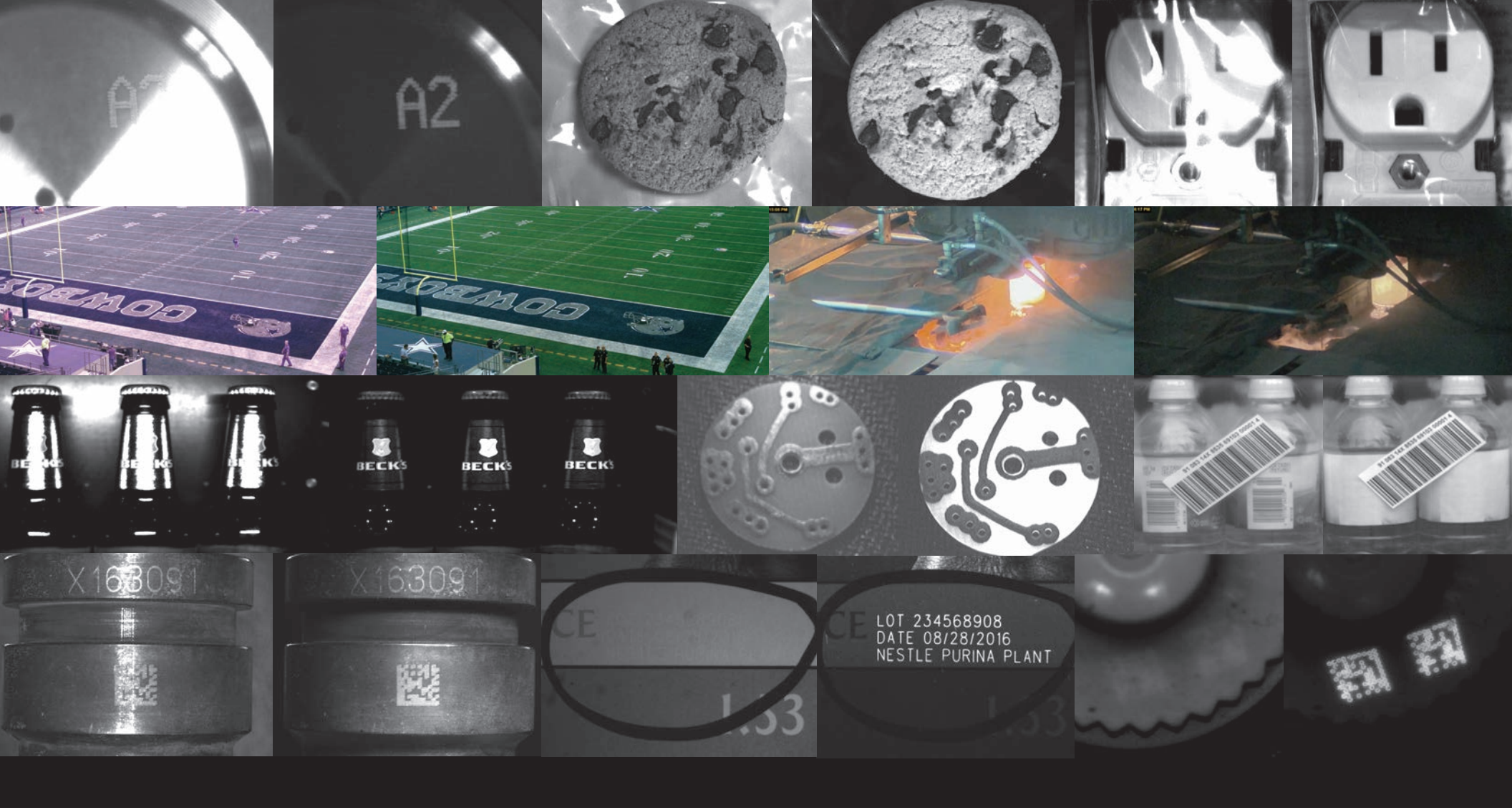
LENS	FILTER
C21211KP	M40.5 x P0.5
C21221	M43 x P0.75
C21228KP	M40.5 x P0.5
C22516KP	M40.5 x P0.5
C22525KP	M27 x P0.5
C25011KP	M46 x P0.75
C30811KP	M40.5 x P0.5
C30823KP	M58 x P0.5
C31204TH	M49 x P0.75
C31211	M49 x P0.75
C31219	M49 x P0.75
C31630KP	M27 x P0.5
C31632	M43 x P0.75
C31632WX	M43 x P0.75
C31634KP	M27 x P0.5
C31635KP	M40.5 x P0.5
C32500KP	M27 x P0.5
C32501KP	M40.5 x P0.5
C33500KP	M27 x P0.5
C35001KP	M27 x P0.5
C35002	M52 x P0.75
C35003	M52 x P0.75
C37500KP	M30.5 x P0.5
C52893F	M62 x P0.75
C52893K	M62 x P0.75
C52915F	M62 x P0.75
C52915K	M62 x P0.75
C52980F	M52 x P0.75
C52981F	M52 x P0.75
C60607KP	M40.5 x P0.5
C60624	M43 x P0.75
C60635DCPS	M30.5 x P0.5
C60636KP	M30.5 x P0.5
C60701	M62 x P0.75
C60702	M62 x P0.75
C60811WX	M55 x P0.75
C60812	M55 x P0.75
C61215KP	M27 x P0.5
C61217	M30.5 x P0.5
C61232KP	M27 x P0.5
C61237MHK	M95 x P1.0
C61237MVV	M95 x P1.0
C61237MWX	M95 x P1.0
C61240MST	M95 x P1.0
C61240MVA	M95 x P1.0
C61240MVV	M95 x P1.0
C61240MWX	M95 x P1.0
C61241MHK	M95 x P1.0
C61241MVH	M95 x P1.0
C61241MVV	M95 x P1.0
C61241MWX	M95 x P1.0
C61244	M105 x P1.0
C61244ST	M105 x P1.0
C62500	M27 x P0.5
C70624	M62 x P0.75
C91698	M49 x P0.75
C91699	M25.5 x P0.5

TAMRON

LENS	FILTER
M118FM50	M25.5 x P0.5
M118FM25	M25.5 x P0.5
M118FM16	M25.5 x P0.5
M118FM08	M25.5 x P0.5
35HB	M25.5 x P0.5
26HA	M40.5 x P0.5
25HB	M25.5 x P0.5
25HA	M25.5 x P0.5
23FM75-L	M25.5 x P0.5
23FM65	M35.5 x P0.5
23FM50SP	M30.5 x P0.5
23FM50-L	M25.5 x P0.5
23FM50	M25.5 x P0.5
23FM35-L	M25.5 x P0.5
23FM25SP	M30.5 x P0.5
23FM25-L	M25.5 x P0.5
23FM25	M25.5 x P0.5
23FM16SP	M30.5 x P0.5
23FM16-L	M25.5 x P0.5
23FM16	M25.5 x P0.5
23FM12-L	M25.5 x P0.5
23FM12	M25.5 x P0.5
23FM08-L	M25.5 x P0.5
23FM08	M25.5 x P0.5
22HA	M35.5 x P0.5
21HC	M25.5 x P0.5
21HA	M25.5 x P0.5
219HB	M25.5 x P0.5
219HA	M25.5 x P0.5
20HC	M25.5 x P0.5
1A1HB	M25.5 x P0.5
17HF	M25.5 x P0.5
17HD	M25.5 x P0.5

QIOPTIQ

LENS	FILTER
266.0012.001.040	M35.5 x P0.5
266.0016.001.040	M35.5 x P0.5
266.0025.001.040	M35.5 x P0.5
266.0035.001.040	M35.5 x P0.5
266.0050.001.040	M35.5 x P0.5
280.0050.001.24	M40.5 x P0.5
280.0050.001.25	M40.5 x P0.5
280.0050.001.26	M40.5 x P0.5
273.0075.001.040	M40.5 x P0.5
273.0075.002.040	M40.5 x P0.5
273.0120.001.040	M40.5 x P0.5
208.0025.001.000	M30.5 x P0.5
208.0035.001.000	M30.5 x P0.5
208.0050.001.000	M40.5 x P0.5
208.0060.001.000	M40.5 x P0.5
208.0075.001.00	M40.5 x P0.5
208.0090.001.000	M40.5 x P0.5
208.0105.001.000	M40.5 x P0.5
270.0028.001.040	M30.5 x P0.5
270.0035.001.000	M40.5 x P0.5
270.0051.001.040	M40.5 x P0.5
270.0060.001.040	M40.5 x P0.5
270.0081.001.040	M40.5 x P0.5
271.0105.00.040	M40.5 x P0.5
271.0135.001.040	M40.5 x P0.5
277.0040.001.040	M40.5 x P0.5
277.0060.001.040	M40.5 x P0.5
277.0080.001.040	M40.5 x P0.5
275.0050.001.040	M40.5 x P0.5
275.0080.001.040	M40.5 x P0.5
275.0105.001.040	M40.5 x PO.5



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