

LP190 SAPPHIRE PROTECTIVE WINDOW

MidOpt Protective Filters

MidOpt specializes in manufacturing custom made Protective Windows, which can be designed for nearly any type or size application at any wavelength range requirement. MidOpt custom windows can be manufactured from different substrates and include various coatings depending on the application requirements.

- Glass, acrylic, polycarbonate, sapphire and other substrates
- Oleophobic, anti-reflection, anti-smudge, anti-fog and hydrophobic coatings available
- Chemically strengthened glass options, including Gorilla Glass®
- Wavelength and polarization filtering
- Adhesive backing for easy fastening
- Custom silk screening service for borders, masking, fiducial marks, logos or patterns
- Available with various mounting configurations based on need



Protective Filter Applications

MidOpt Protective Filters are used to protect expensive or fragile optical elements from environmental hazards such as liquids, dust, dirt, and other debris.

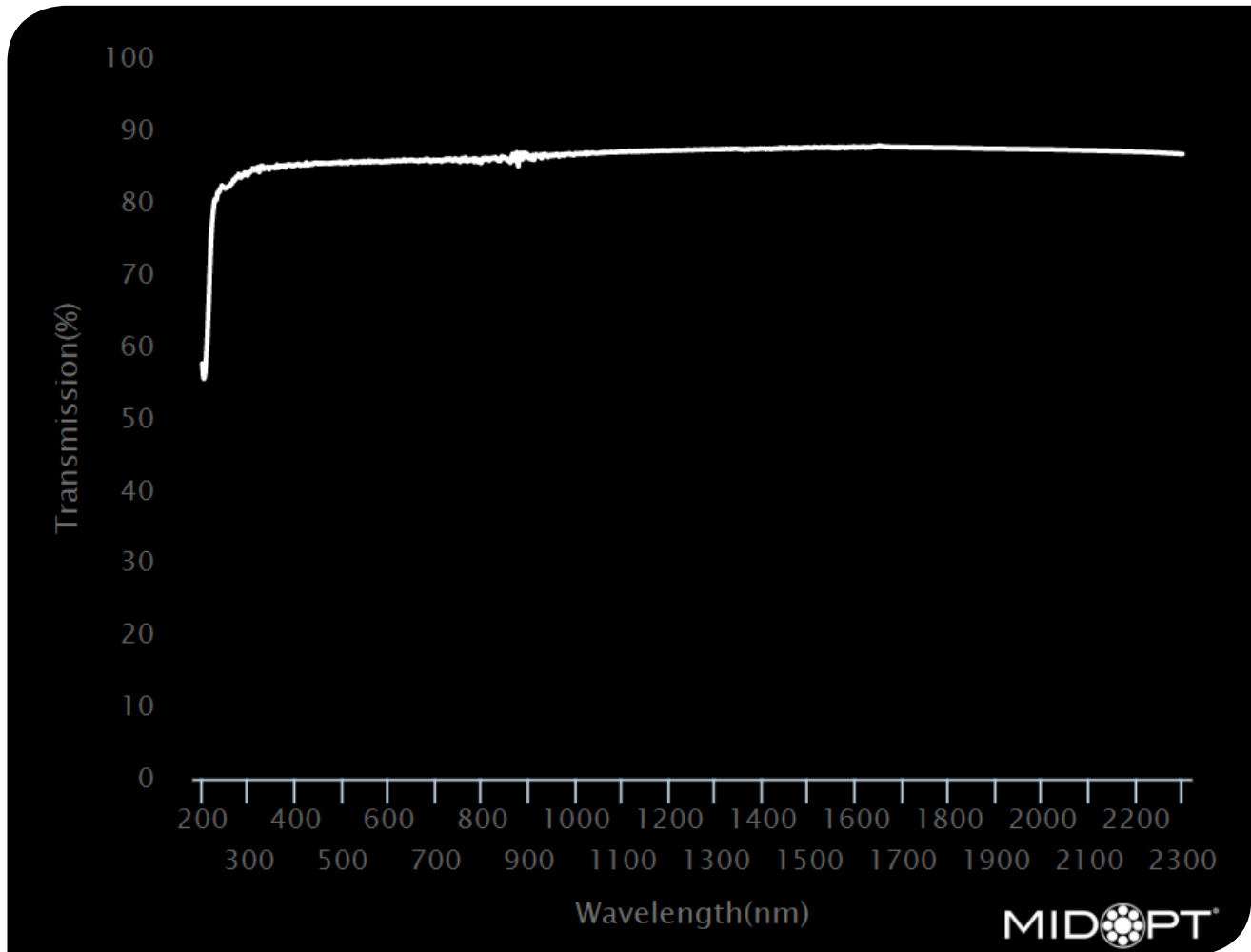
LP Series - Protective Filters

- Variety of materials available with different physical properties
- Sapphire option for weld resistance
- Fused Silica option for low thermal expansion and high shock resistance
- Borofloat option for excellent strength, thermal, mechanical and solar properties (similar to that of Pyrex)
- Glass options for low-cost protection where dust covers are required
- Anti-Reflective coated glass offers low cost dust protection with improved optical properties
- UV Absorptive and Blocking Options to protect UV sensitive imagers from damaging Ultra-Violet light
- Germanium option for thermal imaging and LWIR (long-wave infrared)

APPLICATIONS: Protective filters are useful in nearly all imaging and sensing applications where optical protection is necessary from environmental contaminants

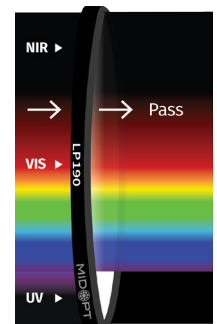
LP190

Protective Filters



Useful Range:	250-2300nm
Tolerance:	+/- 10nm
Peak Transmission:	≥90%
Surface Quality:	80/50
STABLEEDGE:	Yes

The LP190 Sapphire Protective Window is stronger than standard glass windows. It has a highly-durable surface to withstand harsh environments and is resistant to high impact, chemicals and alkalis. The LP190 Sapphire transmits wavelengths ranging from UV, VIS and short-wave infrared (SWIR).



LP190 TRANSMISSION DATA (TYPICAL)

Wavelength (nm)	Transmission (%)
2300	86.63
2290	86.68
2280	86.72
2270	86.76
2260	86.78
2250	86.82
2240	86.85
2230	86.89
2220	86.92
2210	86.93
2200	86.96
2190	86.98
2180	86.98
2170	87.01
2160	87.03
2150	87.04
2140	87.08
2130	87.10
2120	87.11
2110	87.12
2100	87.13
2090	87.15
2080	87.17
2070	87.18
2060	87.20
2050	87.22
2040	87.24
2030	87.25
2020	87.27
2010	87.27
2000	87.28

Wavelength (nm)	Transmission (%)
1990	87.29
1980	87.30
1970	87.31
1960	87.32
1950	87.32
1940	87.34
1930	87.34
1920	87.36
1910	87.36
1900	87.37
1890	87.38
1880	87.39
1870	87.41
1860	87.43
1850	87.45
1840	87.47
1830	87.49
1820	87.50
1810	87.51
1800	87.52
1790	87.53
1780	87.54
1770	87.55
1760	87.56
1750	87.57
1740	87.58
1730	87.59
1720	87.60
1710	87.61
1700	87.62
1690	87.63

Wavelength (nm)	Transmission (%)
1680	87.64
1670	87.68
1660	87.72
1650	87.83
1640	87.69
1630	87.64
1620	87.58
1610	87.56
1600	87.63
1590	87.65
1580	87.57
1570	87.57
1560	87.47
1550	87.49
1540	87.58
1530	87.51
1520	87.52
1510	87.56
1500	87.52
1490	87.57
1480	87.46
1470	87.53
1460	87.46
1450	87.44
1440	87.37
1430	87.38
1420	87.37
1410	87.36
1400	87.36



LP190 TRANSMISSION DATA (TYPICAL)

Wavelength (nm)	Transmission (%)
1390	87.31
1380	87.32
1370	87.23
1360	87.22
1350	87.33
1340	87.40
1330	87.34
1320	87.31
1310	87.28
1300	87.27
1290	87.28
1280	87.30
1270	87.24
1260	87.23
1250	87.20
1240	87.18
1230	87.19
1220	87.18
1210	87.12
1200	87.11
1190	87.10
1180	87.14
1170	87.13
1160	87.07
1150	87.07
1140	87.03
1130	86.97
1120	86.94
1110	86.98
1100	87.01
1090	86.96

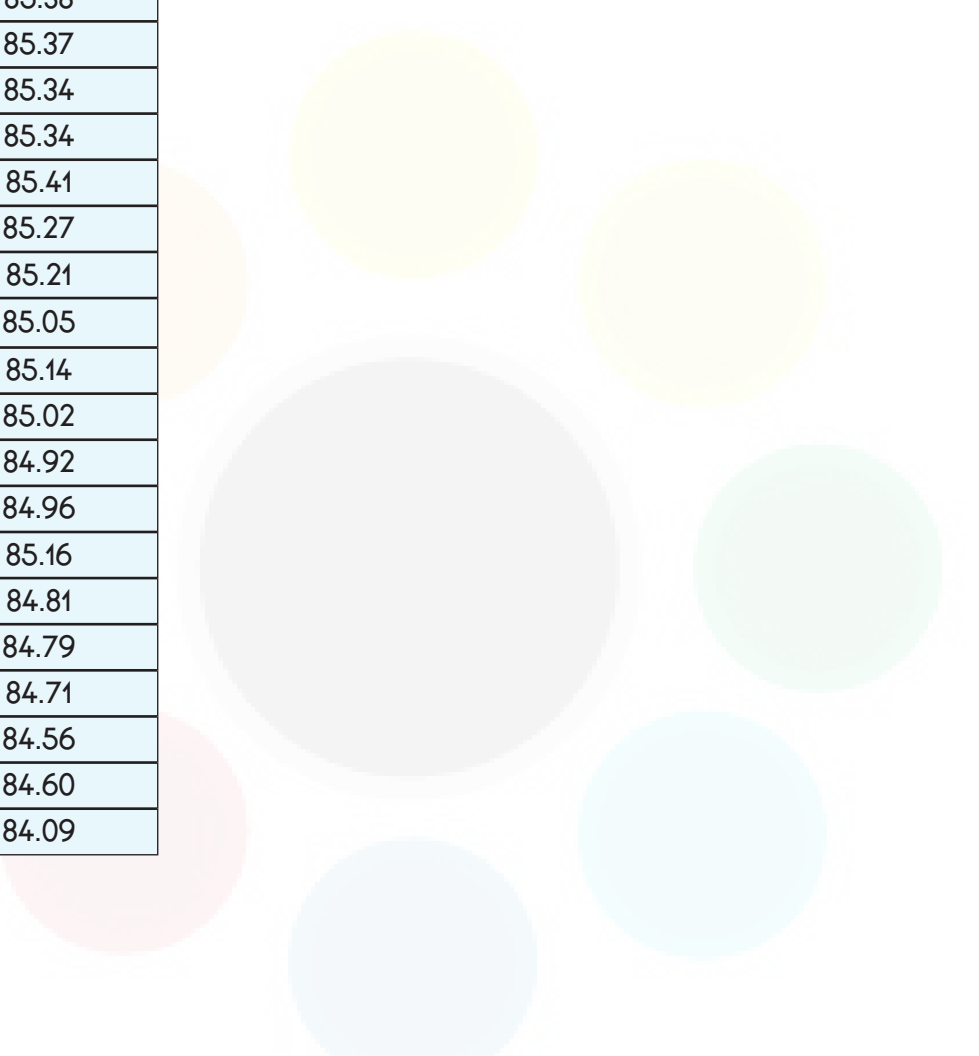
Wavelength (nm)	Transmission (%)
1080	86.90
1070	86.90
1060	86.80
1050	86.78
1040	86.76
1030	86.74
1020	86.85
1010	86.74
1000	86.69
990	86.55
980	86.64
970	86.52
960	86.62
950	86.54
940	86.30
930	86.57
920	86.36
910	85.97
900	86.02
890	86.82
880	85.97
870	85.75
860	85.46
850	85.99
840	86.00
830	85.94
820	86.04
810	85.86
800	85.93
790	85.71
780	85.99

Wavelength (nm)	Transmission (%)
770	85.68
760	85.74
750	85.73
740	85.97
730	85.94
720	85.87
710	85.80
700	85.73
690	85.59
680	85.93
670	85.78
660	85.71
650	85.80
640	85.74
630	85.76
620	85.76
610	85.65
600	85.66
590	85.59
580	85.61
570	85.59
560	85.51
550	85.54
540	85.55
530	85.56
520	85.65
510	85.46
500	85.46
490	85.52



LP190 TRANSMISSION DATA (TYPICAL)

Wavelength (nm)	Transmission (%)
480	85.38
470	85.37
460	85.34
450	85.34
440	85.41
430	85.27
420	85.21
410	85.05
400	85.14
390	85.02
380	84.92
370	84.96
360	85.16
350	84.81
340	84.79
330	84.71
320	84.56
310	84.60
300	84.09

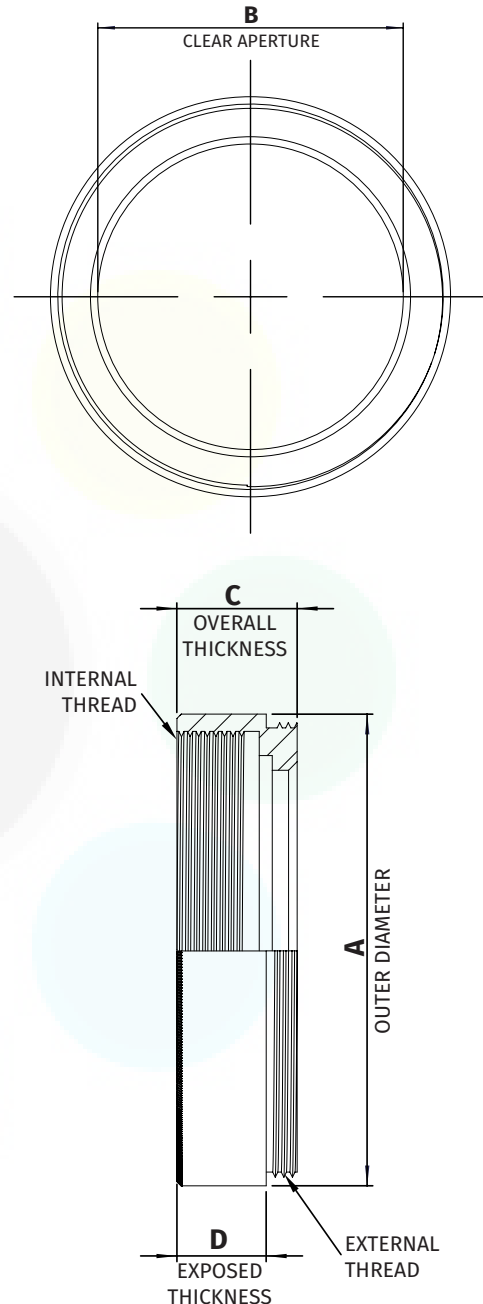


STANDARD THREADED MOUNT DIMENSIONS

NOTES:

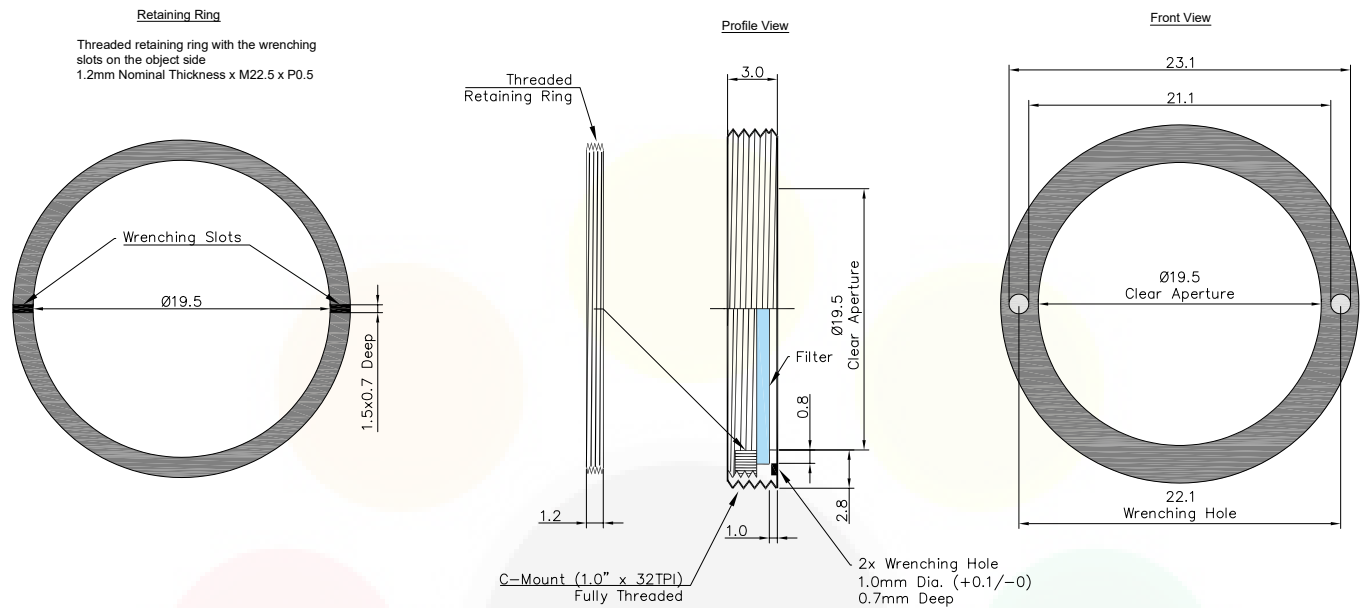
1. Inner and outer threads are of the same size and pitch.
2. Filter mount and retaining ring are black anodized aluminum.
3. All dimensions indicated in mm.
4. Tolerance: +/-0.3mm.

Mount Size	A	B	C	D
M13.25 x P0.5	14.3	10.6	7.5	5.7
M22.5 x P0.5	24	18.5	7	5.2
M25.5 x P0.5	27.5	21	7	5.2
M27 x P0.5	29	22.5	7	5.2
M30.5 x P0.5	32.5	25.5	7	5.2
M34 x P0.5	36	29	7	5.2
M35.5 x P0.5	37.5	30.5	7	5.2
M37 x P0.75	39	31.9	6.5	4.5
M37.5 x P0.5	39.5	32.5	7.2	5.2
M39 x P0.5	41	34	7	5.2
M40.5 x P0.5	42.5	35.5	7	5.2
M43 x P0.75	45	38	7	5.2
M46 x P0.75	48	41	7	5.2
M48 x P0.75	50	43	7	5.1
M49 x P0.75	51	44	7	5.2
M52 x P0.75	54	47	7	5.2
M55 x P0.75	57	50	7	5.2
M58 x P0.75	60	52.9	6.5	4.5
M62 x P0.75	64	57.1	7	5.2
M67 x P0.75	70	61.8	6.5	4.5
M72 x P0.75	75	66.9	6.5	4.5
M77 x P0.75	80	71.9	6.5	4.5
M82 x P0.75	85	76.8	6.5	4.5
M86 x P1.0	89	80.8	6.5	4.5
M95 x P1.0	98.2	89.9	10	7.1
M105 x P1.0	109.8	100	11	8



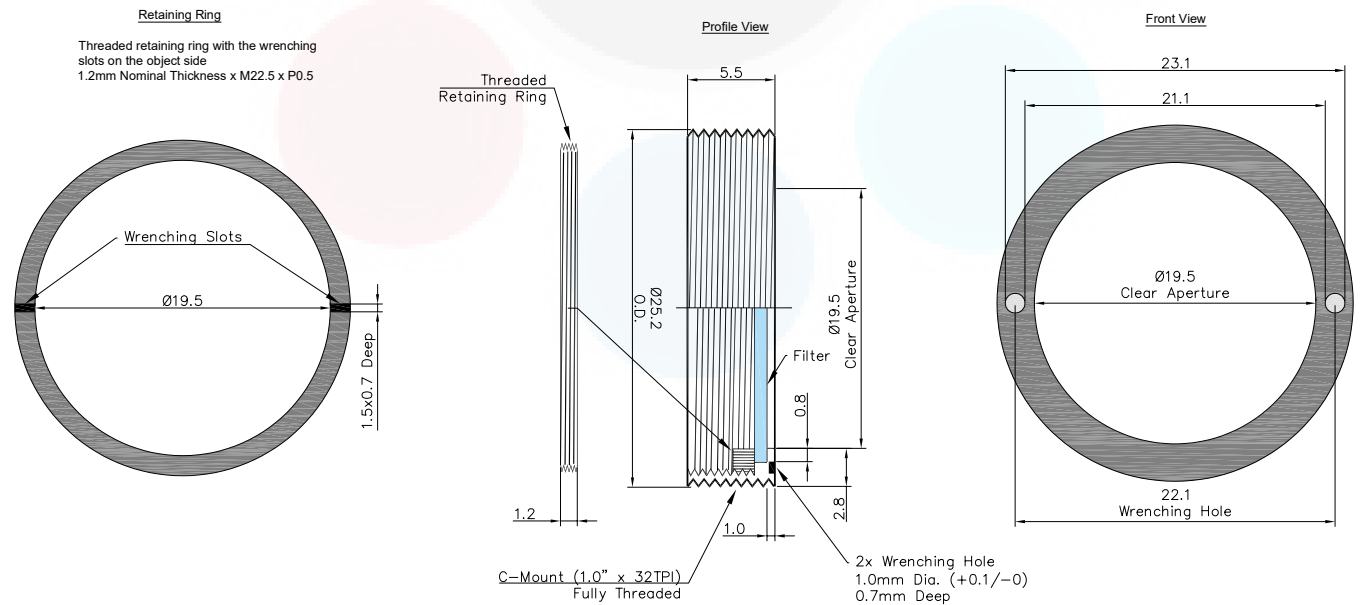
C-MOUNT DIMENSIONS (-25.4)

C-Mount is available on filters with a substrate thickness of 1mm or less



C-MOUNT SIS DIMENSIONS (-25.4-SIS)

C-Mount SIS is available on filters with a substrate thickness greater than 1mm and less than or equal to 3.5mm



MOUNTS FOR ANY SYSTEM



Midwest Optical Systems is the world's leading resource in machine vision filters and optical solutions. MidOpt's innovative filter designs ensure flawless control, dependable results and unmatched image quality. Mounting solutions are available for any system for lenses with and without filter threads, the exclusively designed 25.4™ C-Mount, and custom fabrication of unmounted shapes and sizes.

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
15.1-19.0	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

› **M12 MOUNT**

Outside Diameter Range	Part #
13.2-14.2	S14A
14.3-15.0	S15A



› **THREADED MOUNT** *Designed for Lenses with Filter Threads*

- MidOpt offers the largest variety of filters in-stock and ready to ship
- 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

› **CUSTOM SOLUTIONS FOR M12 MOUNT LENSES**

- Offered in aluminum slip mount over the lens
- Can be optically cemented behind the lens



HOW TO ORDER

To order a filter with a threaded mount, first select a filter (e.g. BP470) and add the mount size (e.g. M27) to build your part number (e.g. BP470-27).

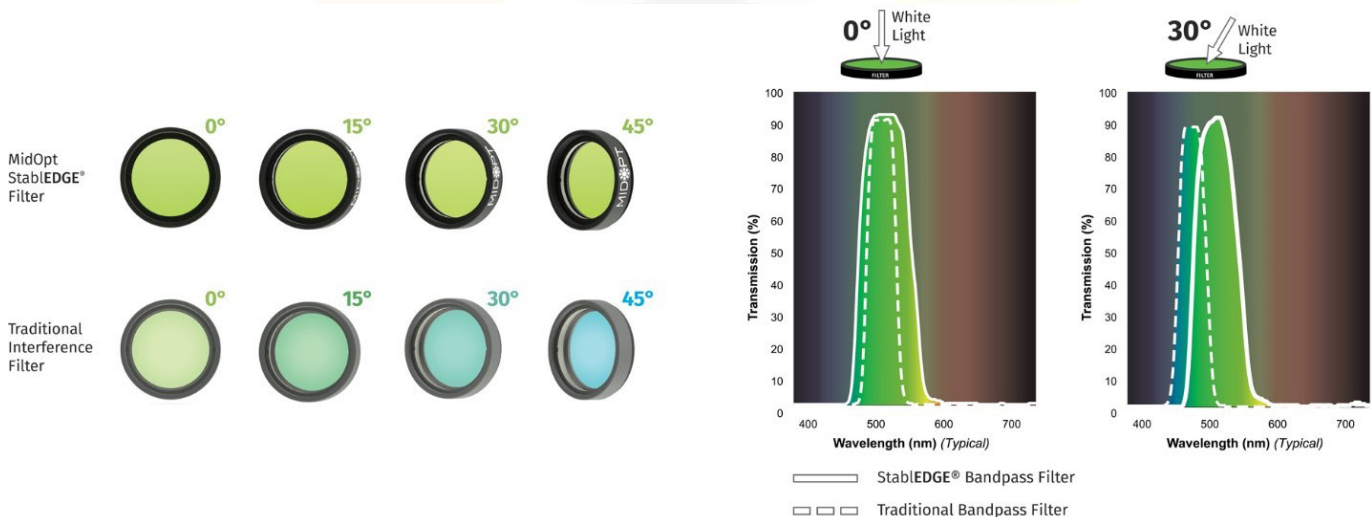


MIDOPT STABLEDGE®

Minimize the Effects of Short Shifting

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 (<12mm) 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.



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, and are environmentally stable.

