

Ni060 NEUTRAL DENSITY FILTER LOW REFLECTIVITY 25% TRANSMISSION

MidOpt Neutral Density Filters

- Available in a variety of optical densities
- Reduce light intensity while maintaining a wide aperture and shallow depth of field. Every 0.3 density increment equals one f-stop
- Minimize pixel saturation
- Can be stacked with other Neutral Density Filters to test various optical densities
- Exceptional surface quality; 40/20 scratch/dig

Neutral Density Filter Information

MidOpt Neutral Density Filters serves as “sunglasses” for your system and can be used with monochrome or color cameras.

Ni Series - VIS/SWIR Filters

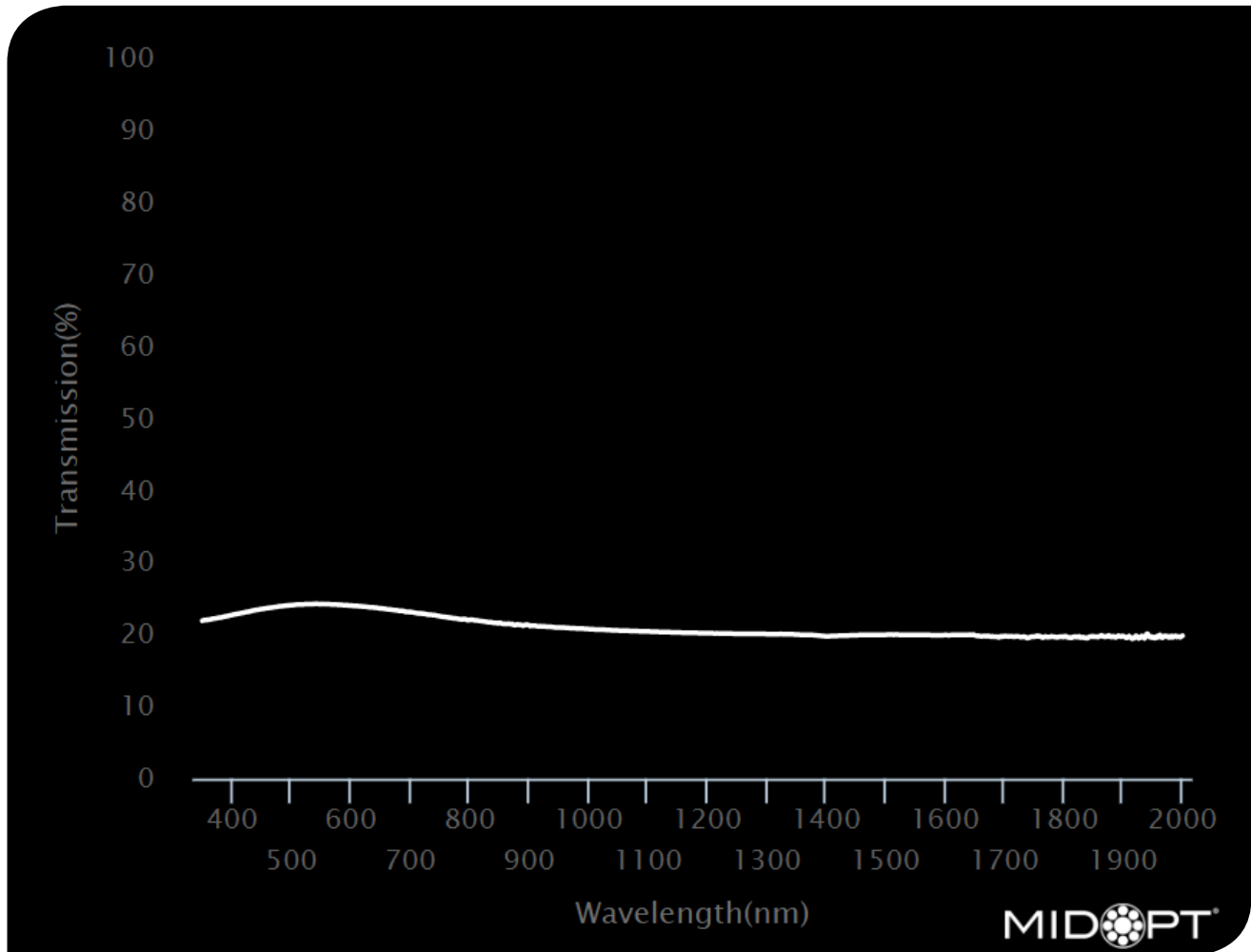
- Low reflectivity filter effective from 400-2000nm
- Available in optical densities ranging from 0.3-2.0
- Coated on low-expansion, heat-resistant Borofloat glass

APPLICATIONS: MidOpt Neutral Density filters are used to reduce light intensity neutrally over a specific wavelength range without affecting image color or contrast. Typical applications include welding,



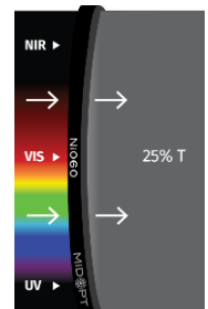
Ni060

Neutral Density Filter



Useful Range:	400-2000nm
Optical Density:	0.6
Average Transmission:	25%
Tolerance:	+/- 3.0%
Surface Quality:	40/20

Ni060 filters are used to restrict visible and/or near-IR light, reducing the amount reaching the camera sensor, thus allowing for longer exposure times and reduced depth of field. This technique can improve the separation of subject matter from the background. Ni060 transmission is approximately 25% while reflected light averages about 20% over the 400-1100nm wavelength range. These filters include identical male and female threads on either end so that they can be stacked with other ND filters to achieve various optical densities.



Ni060 TRANSMISSION DATA (TYPICAL)

Wavelength (nm)	Transmission (%)
2000	19.81
1990	19.66
1980	19.71
1970	19.78
1960	19.84
1950	19.54
1940	20.08
1930	19.64
1920	19.63
1910	19.76
1900	19.76
1890	19.68
1880	19.71
1870	19.69
1860	19.72
1850	19.72
1840	19.48
1830	19.61
1820	19.68
1810	19.59
1800	19.69
1790	19.62
1780	19.72
1770	19.68
1760	19.71
1750	19.66
1740	19.51
1730	19.63
1720	19.73
1710	19.72
1700	19.73

Wavelength (nm)	Transmission (%)
1690	19.60
1680	19.73
1670	19.76
1660	19.76
1650	19.89
1640	19.95
1630	19.93
1620	19.93
1610	19.91
1600	19.91
1590	19.89
1580	19.89
1570	19.91
1560	19.92
1550	19.93
1540	19.94
1530	19.94
1520	19.96
1510	19.96
1500	19.95
1490	19.95
1480	19.93
1470	19.91
1460	19.91
1450	19.89
1440	19.86
1430	19.84
1420	19.81
1410	19.76
1400	19.74
1390	19.81

Wavelength (nm)	Transmission (%)
1380	19.89
1370	19.94
1360	19.94
1350	19.99
1340	20.02
1330	20.05
1320	20.04
1310	20.04
1300	20.05
1290	20.07
1280	20.08
1270	20.09
1260	20.09
1250	20.10
1240	20.11
1230	20.13
1220	20.15
1210	20.15
1200	20.18
1190	20.19
1180	20.22
1170	20.23
1160	20.24
1150	20.27
1140	20.29
1130	20.31
1120	20.34
1110	20.37
1100	20.40



Ni060 TRANSMISSION DATA (TYPICAL)

Wavelength (nm)	Transmission (%)
1090	20.43
1080	20.46
1070	20.49
1060	20.53
1050	20.55
1040	20.58
1030	20.63
1020	20.66
1010	20.69
1000	20.74
990	20.79
980	20.83
970	20.87
960	20.94
950	20.96
940	21.02
930	21.07
920	21.13
910	21.20
900	21.25
890	21.22
880	21.39
870	21.41
860	21.46
850	21.58
840	21.61
830	21.72
820	21.83
810	21.96
800	22.01
790	22.14

Wavelength (nm)	Transmission (%)
780	22.17
770	22.30
760	22.40
750	22.53
740	22.69
730	22.73
720	22.89
710	22.96
700	23.10
690	23.20
680	23.31
670	23.41
660	23.51
650	23.62
640	23.72
630	23.78
620	23.88
610	23.93
600	24.00
590	24.05
580	24.13
570	24.15
560	24.19
550	24.23
540	24.23
530	24.21
520	24.16
510	24.15
500	24.06
490	23.98
480	23.89

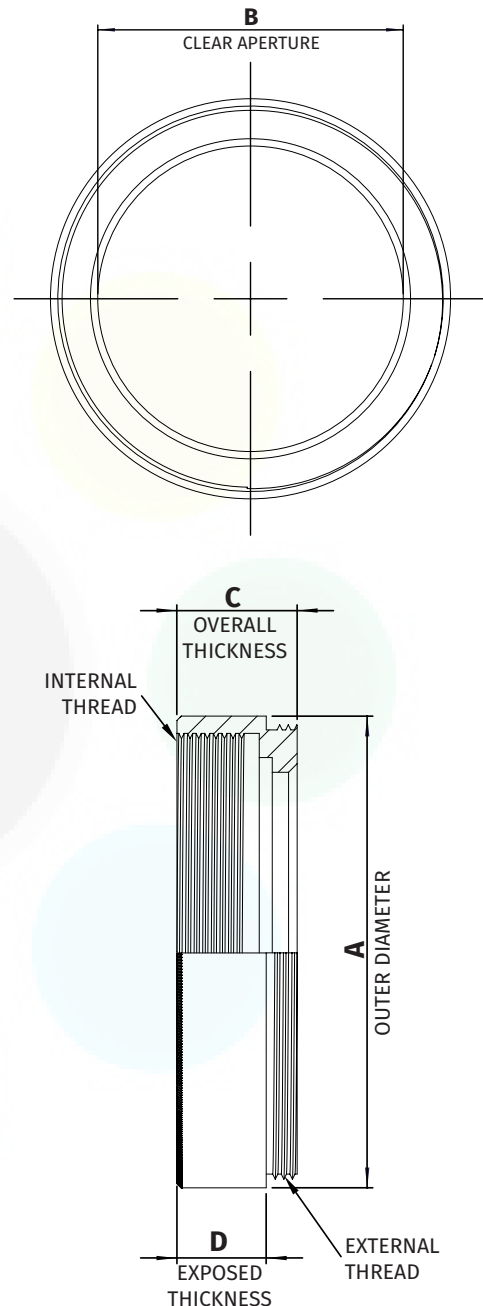
Wavelength (nm)	Transmission (%)
470	23.77
460	23.65
450	23.52
440	23.38
430	23.19
420	23.03
410	22.86
400	22.70
390	22.51
380	22.34
370	22.19
360	22.03
350	21.90

STANDARD THREADED MOUNT DIMENSIONS

NOTES:

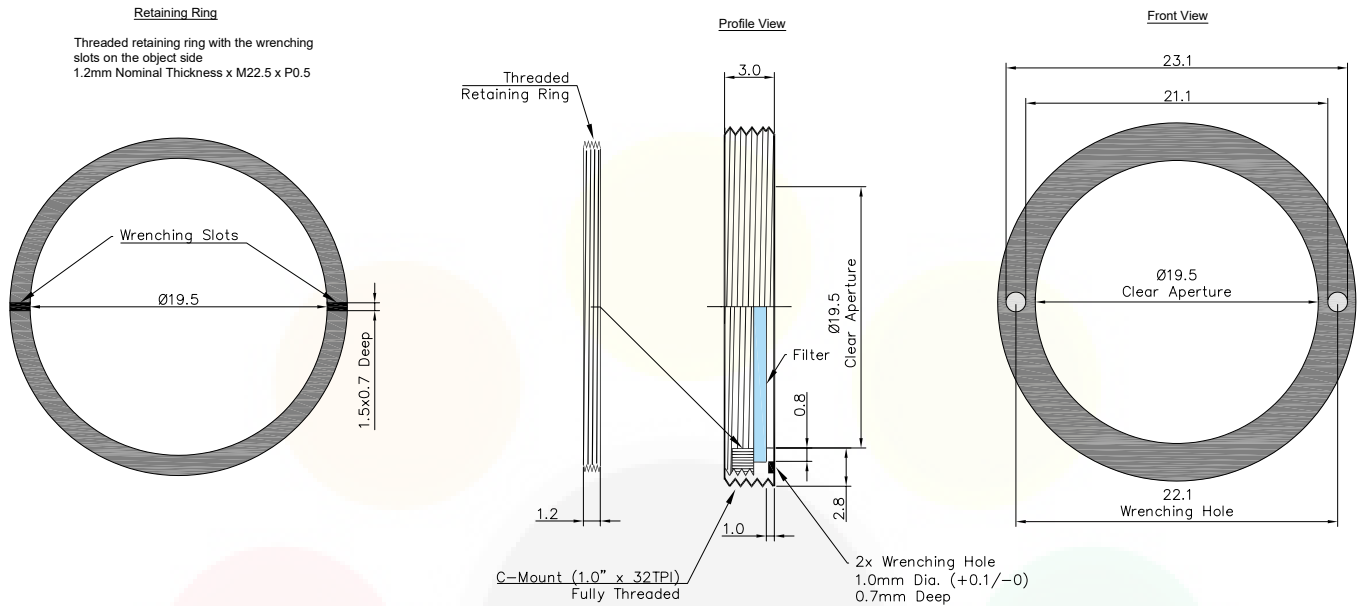
1. Inner and outer threads are of the same size and pitch.
2. Filter mount and retaining ring are black anodized aluminum.
3. All dimensions indicated in mm.
4. Tolerance: +/-0.3mm.

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



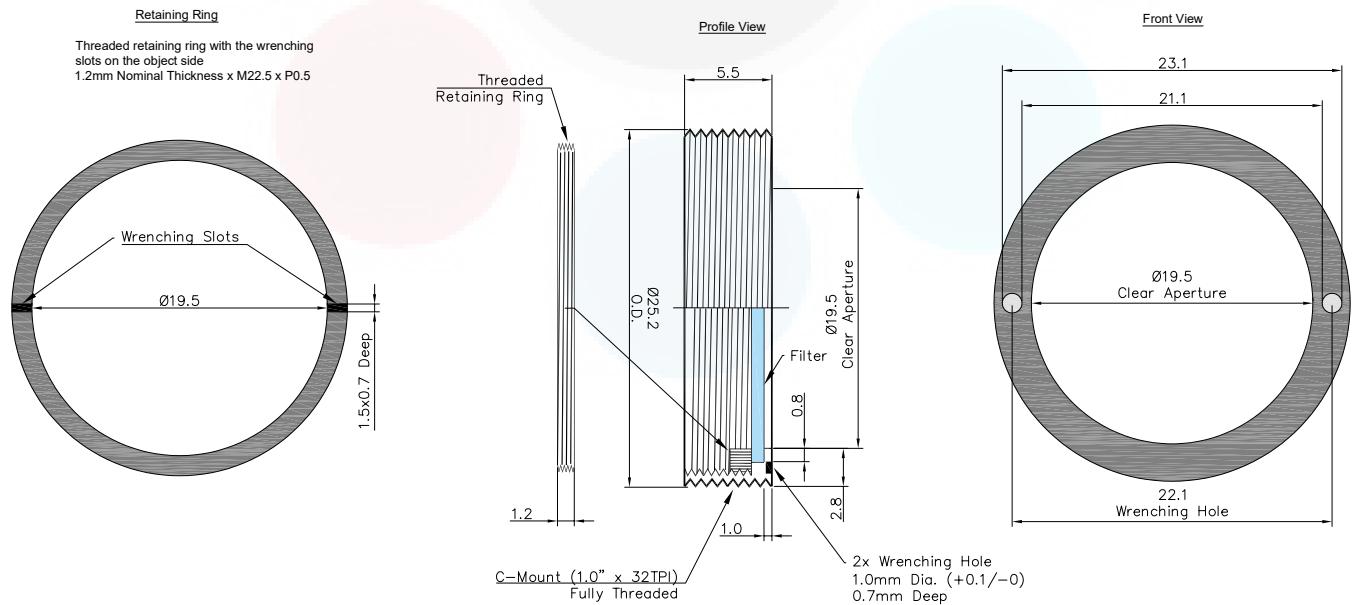
C-MOUNT DIMENSIONS (-25.4)

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).

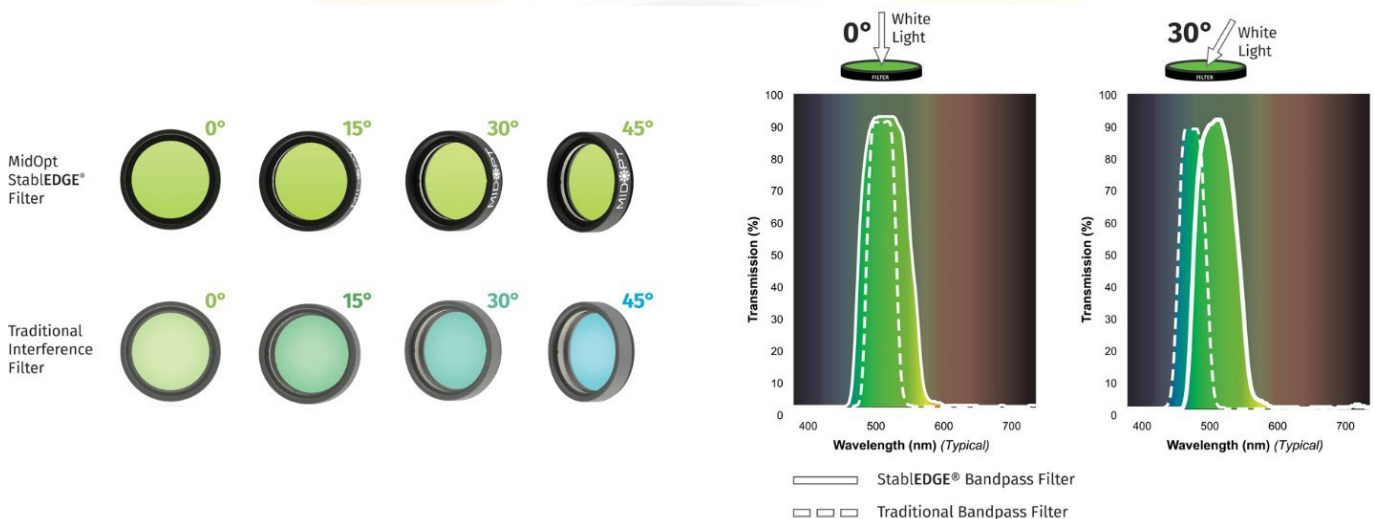


MIDOPT STABLEDGE®

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.

