



Zoom 6000

Zoom 6000 Field of View Matrix (in mm at nominal W.D.)

Lens Attachment	W.D. (mm)	Camera Format/Parameters	.5X Adapter Low - High	.67X Adapter Low - High	1X Adapter Low - High	1.33X Adapter Low - High	2X Adapter Low - High	3.5X Adapter Low - High	5X Adapter Low - High	Resolve Limit (microns) Low-High	Depth of Field (mm) Low-High
0.25X 0.006 - 0.018 1-6044	356 (nominal) 220-390 (1) W.D. range	Mag.	0.09X - 0.56X	0.12X - 0.75X	0.18X - 1.13X	.24X - 1.5X	0.35X - 2.25X	.63X - 3.95X	0.88X - 5.62X	27.78 - 9.26	13.89 - 1.54
		Field 1/4"	45.70 - 7.12	34.03 - 5.33	22.85 - 3.56	17.18 - 2.68	11.42 - 1.78	6.53 - 1.02	4.54 - 0.72	27.78 - 9.26	13.89 - 1.54
		Field 1/3"	68.64 - 10.64	51.12 - 8.04	34.32 - 5.32	25.80 - 4.0	17.16 - 2.66	9.8 - 1.52	6.88 - 1.08	27.78 - 9.26	13.89 - 1.54
		Field 1/2"	91.36 - 14.16	68.06 - 10.66	45.68 - 7.08	34.34 - 5.32	22.84 - 3.54	13.05 - 2.02	9.12 - 1.44	27.78 - 9.26	13.89 - 1.54
		Field 2/3"	91.40 - 19.52	93.62 - 14.66	62.84 - 9.76	47.25 - 7.34	31.42 - 4.88	17.95 - 2.79	12.56 - 1.96	27.78 - 9.26	13.89 - 1.54
0.5X 0.011 - 0.035 1-60110	175 (nominal) 143-187 (1) W.D. range	Mag.	0.18X - 1.13X	0.24X - 1.50X	0.35X - 2.25X	.46X - 2.99X	0.70X - 4.50X	1.22X - 7.87X	1.75X - 11.25X	15.15 - 4.76	4.13 - 0.41
		Field 1/4"	22.85 - 3.56	17.02 - 2.66	11.42 - 1.78	8.59 - 1.34	5.71 - 0.89	3.26 - .51	2.28 - 0.36	15.15 - 4.76	4.13 - 0.41
		Field 1/3"	34.32 - 5.32	25.56 - 4.0	17.16 - 2.67	12.90 - 2.01	8.58 - 1.33	4.90 - 0.76	3.43 - 0.53	15.15 - 4.76	4.13 - 0.41
		Field 1/2"	45.68 - 7.08	34.03 - 5.33	22.85 - 3.56	17.18 - 2.68	11.42 - 1.77	6.58 - 1.02	4.57 - 0.71	15.15 - 4.76	4.13 - 0.41
		Field 2/3"	45.70 - 9.76	46.81 - 7.33	31.43 - 4.89	23.63 - 3.68	15.71 - 2.44	8.98 - 1.40	6.29 - 0.98	15.15 - 4.76	4.13 - 0.41
0.75X 0.017 - 0.053 1-60111	113 (nominal) 100-119 (1) W.D. range	Mag.	0.27X - 1.69X	0.35X - 2.25X	0.53X - 3.38X	.70X - 4.49X	1.05X - 6.75X	1.85X - 11.83X	2.63X - 16.88X	9.80 - 3.14	1.73-0.18
		Field 1/4"	15.22 - 2.38	11.34 - 1.78	7.61 - 1.19	5.72 - .89	3.81 - 0.59	2.17 - .34	1.52 - 0.24	9.80 - 3.14	1.73-0.18
		Field 1/3"	22.86 - 3.56	17.04 - 2.67	11.43 - 1.78	8.59 - 1.34	5.72 - 0.89	3.26 - .51	2.29 - 0.35	9.80 - 3.14	1.73-0.18
		Field 1/2"	30.46 - 4.74	22.69 - 3.56	15.23 - 2.37	11.45 - 1.78	7.62 - 1.19	4.35 - .68	3.05 - 0.47	9.80 - 3.14	1.73-0.18
		Field 2/3"	30.50 - 6.52	31.21 - 4.89	20.95 - 3.26	15.75 - 2.45	10.48 - 1.63	5.98 - .93	4.19 - 0.65	9.80 - 3.14	1.73-0.18
None 0.023 - 0.071	92 (nominal) 81-93 (1) W.D. range	Mag.	0.35X - 2.25X	0.47X - 3.00X	0.70X - 4.50X	.93X - 5.89X	1.40X - 9.00X	2.45X - 15.75X	3.50X - 22.50X	7.25 - 2.35	0.95 - 0.10
		Field 1/4"	11.42 - 1.78	8.51 - 1.33	5.71 - 0.89	4.29 - .67	2.86 - 0.45	1.63 - .25	1.14 - 0.18	7.25 - 2.35	0.95 - 0.10
		Field 1/3"	17.16 - 2.67	12.77 - 2.01	8.58 - 1.33	6.45 - 1.0	4.29 - 0.67	2.45 - .38	1.72 - 0.27	7.25 - 2.35	0.95 - 0.10
		Field 1/2"	22.85 - 3.56	17.01 - 2.67	11.42 - 1.77	8.59 - 1.33	5.71 - 0.89	3.26 - .50	2.28 - 0.36	7.25 - 2.35	0.95 - 0.10
		Field 2/3"	22.90 - 4.89	23.40 - 3.65	15.71 - 2.44	11.81 - 1.83	7.86 - 1.22	4.49 - .70	3.14 - 0.49	7.25 - 2.35	0.95 - 0.10
1.5X 0.034 - 0.106 1-60112	51 (nominal) 48-52 (1) W.D. range	Mag.	0.53X - 3.38X	0.71X - 4.50X	1.05X - 6.75X	1.40 - 8.98	2.10X - 13.50X	3.67X - 23.62X	5.25X - 33.75X	4.90 - 1.57	0.43 - 0.04
		Field 1/4"	7.61 - 1.19	5.67 - 0.89	3.81 - 0.59	2.86 - .44	1.91 - 0.30	1.09 - .17	0.76 - 0.12	4.90 - 1.57	0.43 - 0.04
		Field 1/3"	11.43 - 1.78	8.52 - 1.33	5.72 - 0.89	4.3 - .67	2.86 - 0.44	1.63 - .25	1.14 - 0.18	4.90 - 1.57	0.43 - 0.04
		Field 1/2"	15.23 - 2.37	11.34 - 1.77	7.62 - 1.19	5.73 - .89	3.81 - 0.59	2.18 - .34	1.52 - 0.24	4.90 - 1.57	0.43 - 0.04
		Field 2/3"	15.00 - 3.26	15.60 - 2.44	10.48 - 1.63	7.88 - 1.22	5.24 - 0.81	2.99 - .46	2.10 - 0.33	4.90 - 1.57	0.43 - 0.04
2.0X 0.040 - 0.142 1-60113	36 (nominal) 34-37 (1) W.D. range	Mag.	0.70X - 4.50X	0.94X - 6.00X	1.40X - 9.00X	1.86X - 11.97X	2.80X - 18.00X	4.9X - 31.5X	7.00X - 45.00X	3.62 - 1.17	0.24 - 0.02
		Field 1/4"	5.71 - 0.89	4.26 - 0.67	2.86 - 0.45	2.15 - .34	1.43 - 0.23	.82 - .13	0.57 - 0.09	3.62 - 1.17	0.24 - 0.02
		Field 1/3"	8.58 - 1.33	6.39 - 1.00	4.29 - 0.67	3.22 - .50	2.15 - 0.33	1.22 - .19	0.86 - 0.13	3.62 - 1.17	0.24 - 0.02
		Field 1/2"	11.42 - 1.77	8.51 - 1.33	5.71 - 0.89	4.29 - .67	2.86 - 0.44	1.63 - .25	1.14 - 0.18	3.62 - 1.17	0.24 - 0.02
		Field 2/3"	11.40 - 2.44	11.70 - 1.83	7.86 - 1.22	5.91 - .92	3.93 - 0.61	2.24 - .35	1.57 - 0.24	3.62 - 1.17	0.24 - 0.02

NOTES:

The above fields of view are measured diagonally in millimeters (Horizontal = Diagonal x 0.8 and Vertical = Diagonal x 0.6).

(1) Working distance range when using 12 mm fine focus. Field of view will change with shorter or longer working distances.

N.A. varies depending in system magnification.

Zoom 6000 Performance Specifications

Zoom 6000 Combinations Lens Attachment + Prime Lens + Adapter	W.D.	System Magnification		N.A.-obj-		Resolve Limit (microns)		Matching Pixel Size (microns)		Depth of Field	
		Low Mag.	High Mag.	Low Mag.	High Mag.	Low Mag.	High Mag.	Low Mag.	High Mag.	Low Mag.	High Mag.
0.25x + 6.5X Zoom + 0.5x	356	0.09	0.56	0.006	0.018	27.78	9.26	2.50	5.19	13.89	1.54
0.25x + 6.5X Zoom + 0.67x	356	0.12	0.75	0.006	0.018	27.78	9.26	3.33	6.95	13.89	1.54
0.25x + 6.5X Zoom + 1.0x	356	0.18	1.13	0.006	0.018	27.78	9.26	5.00	10.46	13.89	1.54
0.25x + 6.5X Zoom + 1.33x	356	0.23	1.51	0.006	0.018	27.78	9.26	6.65	13.91	13.89	1.54
0.25x + 6.5X Zoom + 2.0x	356	0.35	2.25	0.006	0.018	27.78	9.26	9.72	20.84	13.89	1.54
0.25x + 6.5X Zoom + 3.5x	356	0.61	3.98	0.006	0.018	27.78	9.26	17.50	36.61	13.89	1.54
0.25x + 6.5X Zoom + 5.0x	356	0.88	5.62	0.006	0.018	27.78	9.26	24.45	52.04	13.89	1.54
0.5x + 6.5X Zoom + 0.5x	175	0.18	1.13	0.011	0.035	15.15	4.76	2.73	5.38	4.13	0.41
0.5x + 6.5X Zoom + 0.67x	175	0.23	1.50	0.011	0.035	15.15	4.76	3.48	7.14	4.13	0.41
0.5x + 6.5X Zoom + 1.0x	175	0.35	2.25	0.011	0.035	15.15	4.76	5.30	10.71	4.13	0.41
0.5x + 6.5X Zoom + 1.33x	175	0.47	3.03	0.011	0.035	15.15	4.76	7.05	14.24	4.13	0.41
0.5x + 6.5X Zoom + 2.0x	175	0.70	4.50	0.011	0.035	15.15	4.76	10.61	21.42	4.13	0.41
0.5x + 6.5X Zoom + 3.5x	175	1.22	7.93	0.011	0.035	15.15	4.76	18.55	37.49	4.13	0.41
0.5x + 6.5X Zoom + 5.0x	175	1.75	11.25	0.011	0.035	15.15	4.76	26.51	53.55	4.13	0.41
0.75x + 6.5X Zoom + 0.5x	113	0.26	1.69	0.017	0.053	9.80	3.14	2.55	5.32	1.73	0.18
0.75x + 6.5X Zoom + 0.67x	113	0.35	2.25	0.017	0.053	9.80	3.14	3.43	7.08	1.73	0.18
0.75x + 6.5X Zoom + 1.0x	113	0.53	3.38	0.017	0.053	9.80	3.14	5.20	10.63	1.73	0.18
0.75x + 6.5X Zoom + 1.33x	113	0.70	4.54	0.017	0.053	9.80	3.14	6.92	14.13	1.73	0.18
0.75x + 6.5X Zoom + 2.0x	113	1.05	6.75	0.017	0.053	9.80	3.14	10.30	21.23	1.73	0.18
0.75x + 6.5X Zoom + 3.5x	113	1.86	12.06	0.017	0.053	9.80	3.14	18.20	37.21	1.73	0.18
0.75x + 6.5X Zoom + 5.0x	113	2.63	16.88	0.017	0.053	9.80	3.14	25.74	53.09	1.73	0.18
None + 6.5X Zoom + 0.5x	92	0.35	2.25	0.023	0.071	7.25	2.35	2.54	5.28	0.95	0.10
None + 6.5X Zoom + 0.67x	92	0.47	3.00	0.023	0.071	7.25	2.35	3.41	7.04	0.95	0.10
None + 6.5X Zoom + 1.0x	92	0.70	4.50	0.023	0.071	7.25	2.35	5.08	10.55	0.95	0.10
None + 6.5X Zoom + 1.33x	92	0.93	6.05	0.023	0.071	7.25	2.35	6.76	14.03	0.95	0.10
None + 6.5X Zoom + 2.0x	92	1.40	9.00	0.023	0.071	7.25	2.35	10.15	21.11	0.95	0.10
None + 6.5X Zoom + 3.5x	92	2.45	15.93	0.023	0.071	7.25	2.35	17.78	36.93	0.95	0.10
None + 6.5X Zoom + 5.0x	92	3.50	22.50	0.023	0.071	7.25	2.35	25.38	52.76	0.95	0.10
1.5x + 6.5X Zoom + 0.5x	51	0.53	3.38	0.034	0.106	4.90	1.57	2.60	5.32	0.43	0.04
1.5x + 6.5X Zoom + 0.67x	51	0.70	4.50	0.034	0.106	4.90	1.57	3.43	7.09	0.43	0.04
1.5x + 6.5X Zoom + 1.0x	51	1.05	6.75	0.034	0.106	4.90	1.57	5.15	10.63	0.43	0.04
1.5x + 6.5X Zoom + 1.33	51	1.40	9.08	0.034	0.106	4.90	1.57	6.85	14.14	0.43	0.04
1.5x + 6.5X Zoom + 2.0x	51	2.10	13.50	0.034	0.106	4.90	1.57	10.29	21.26	0.43	0.04
1.5x + 6.5X Zoom + 3.5x	51	3.68	23.89	0.034	0.106	4.90	1.57	18.03	37.21	0.43	0.04
1.5x + 6.5X Zoom + 5.0x	51	5.25	33.75	0.034	0.106	4.90	1.57	25.73	53.16	0.43	0.04
2.0x + 6.5X Zoom + 0.5x	36	0.70	4.50	0.046	0.142	3.62	1.17	2.54	5.29	0.24	0.02
2.0x + 6.5X Zoom + 0.67x	36	0.94	6.00	0.046	0.142	3.62	1.17	3.41	7.05	0.24	0.02
2.0x + 6.5X Zoom + 1.0x	36	1.40	9.00	0.046	0.142	3.62	1.17	5.08	10.58	0.24	0.02
2.0x + 6.5X Zoom + 1.33	36	1.86	12.10	0.046	0.142	3.62	1.17	6.76	14.07	0.24	0.02
2.0x + 6.5X Zoom + 2.0x	36	2.80	18.00	0.046	0.142	3.62	1.17	10.15	21.15	0.24	0.02
2.0x + 6.5X Zoom + 3.5x	36	4.90	31.85	0.046	0.142	3.62	1.17	17.78	37.03	0.24	0.02
2.0x + 6.5X Zoom + 5.0x	36	7.00	45.00	0.046	0.142	3.62	1.17	25.38	52.88	0.24	0.02

Assumptions:

1. Minimum resolvable feature size is half of the threshold line pair limit. Calculation = $1/(3000 \times \text{Lens N.A.})$
2. Matching pixel size is that which will permit the minimum feature size to overlap two pixels. Calculation = $1/2(\text{Feature Size} \times \text{System Magnification})$
3. If the matching pixel size is greater than the camera pixel size, the system is "lens limited."
4. If the matching pixel size is less than the camera pixel size, the system is "camera limited."



Zoom 6000

Internal Co-axial Zoom

Navitar's Zoom 6000 with Internal Co-axial Illumination (1-60123) is an ideal solution for applications involving highly reflective surfaces, such as wafers, polished samples, and fluids. Designed to provide even illumination for higher magnification applications, coaxial illumination provides extremely detailed resolution, particularly when a high resolution camera is used.

Zoom 6000 Field of View Matrix for Internal Co-axial Zoom 1-60123 (in mm at nominal W.D.)

Lens Attachment	W.D.(mm)	Camera Format/ Parameters	.5X Adapter Low - High	.67X Adapter Low - High	1X Adapter Low - High	1.33X Adapter Low - High	2X Adapter Low - High	3.5X Adapter Low - High	5X Adapter Low - High
None 0.023- 0.071	92 (nominal)	Mag.	0.35X - 2.25X	0.47X - 3.00X	0.70X - 4.50X	.93X - 6.0X	1.40X - 9.00X	2.45X - 15.75X	3.50X - 22.50X
		Field 1/4"	11.43 - 1.78	8.51 - 1.33	5.71 - 0.89	4.3X - 0.67	2.86 - 0.45	1.63 - 0.25	1.14 - 0.18
	90-93 (1) W.D. range	Field 1/3"	(2) 11.10 - 2.67	(2) 11.40 - 2.01	8.58 - 1.33	6.45 - 1.0	4.29 - 0.67	2.45 - 0.38	1.72 - 0.27
		Field 1/2"	(2) 11.20 - 3.56	(2) 11.46 - 2.62	11.42 - 1.77	8.6 - 1.33	5.71 - 0.89	3.27 - 0.51	2.28 - 0.36
		Field 2/3"	(2) 11.06 - 4.89	(2) 11.54 - 3.60	11.40 - 2.44	11.0 - 1.83	7.86 - 1.22	4.49 - 0.7	3.14 - 0.49
1.5X 0.034- 0.104 1-60112	51 (nominal)	Mag.	0.53X - 3.38X	0.71X - 4.50X	1.05X - 6.75X	1.4X - 9.0X	2.10X - 13.50X	3.7X - 23.6X	5.25X - 33.75X
		Field 1/4"	7.62 - 1.18	5.67 - 0.89	3.81 - 0.59	2.85 - 0.44	1.91 - 0.30	1.08 - 0.17	0.76 - 0.12
	51-53 (1) W.D. range	Field 1/3"	11.32 - 1.78	8.52 - 1.33	5.72 - 0.89	4.29 - 0.67	2.86 - 0.44	1.62 - 0.25	1.14 - 0.18
		Field 1/2"	(2) 11.20 - 2.37	11.34 - 1.77	7.62 - 1.19	5.71 - 0.89	3.81 - 0.59	2.16 - 0.34	1.52 - 0.24
		Field 2/3"	(2) 11.2 - 3.25	(2) 11.20 - 2.44	10.48 - 1.63	7.86 - 1.22	5.24 - 0.81	2.97 - 0.47	2.10 - 0.33
2.0X 0.046- 0.141 1-60113	36 (nominal)	Mag.	0.70X - 4.50X	0.94X - 6.00X	1.40X - 9.00X	1.86X-12.0X	2.80X - 18.00X	4.9X-31.5X	7.00X - 45.00X
		Field 1/4"	5.71 - 0.89	4.26 - 0.67	2.86 - 0.45	2.15 - 0.33	1.43 - 0.23	0.82 - 0.13	0.57 - 0.09
	36-37 (1) W.D. range	Field 1/3"	8.57 - 1.33	6.39 - 1.00	4.29 - 0.67	3.22 - 0.5	2.15 - 0.33	1.22 - 0.19	0.86 - 0.13
		Field 1/2"	(2) 11.2 - 1.77	8.51 - 1.33	5.71 - 0.89	4.30 - 0.67	2.86 - 0.44	1.63 - 0.25	1.14 - 0.18
		Field 2/3"	(2) 11.2 - 2.44	(2) 11.7 - 1.83	7.86 - 1.22	5.91 - 0.92	3.93 - 0.61	2.24 - 0.35	1.57 - 0.24

NOTES:

The internal coax will illuminate a circular area of about 11 mm in diameter. Any field of view larger than 11 mm will have darkened corners.

Low power lens attachments can be used but produce increasing vignetting.

(1) Working distance range when using 3 mm fine focus.

(2) Entire zoom range is not used.



Zoom 6000 UltraZoom

Combine Infinity-Corrected Objectives for Maximum Resolution and Magnification

Navitar's UltraZoom is a high-performance zoom lens system ideal for semiconductor inspection, flow cytometry, or other high magnification applications. Its advanced design offers high resolution and outstanding contrast. This system incorporates infinity corrected, plan-apochromatic objectives providing long working distances and excellent edge flatness and clarity. Resolution varies from 420 to 1,650 lines per mm, depending on the microscope objective used. The UltraZoom is also available with fine focus and/or co-axial illumination.

Zoom 6000 UltraZoom Field of View Matrix for 1-60190, 1-60191, 1-60349 and 1-60350 (in mm)

Objective Lens (Mitutoyo) Long WD	W.D.	Camera Format/ Parameters	1X Adapter Low - High	1.33X Adapter Low - High	2X Adapter Low - High	3.5X Adapter Low - High
5X 0.14 NA* 1-60226	34	Mag.	1.74X - 11.43X	2.3X - 15.0X	3.48X - 22.86X	6.1X - 39.4X
		Field 1/4"	2.30 - 0.35	1.74 - 0.26	1.15 - 0.17	0.65 - 0.1
		Field 1/3"	3.45 - 0.52	2.61 - 0.40	1.72 - 0.26	0.98 - 0.15
		Field 1/2"	(1) 4.05 - 0.70	3.48 - 0.54	2.30 - 0.35	1.31 - 0.20
		Field 2/3"	(1) 4.02 - 0.96	4.0 - 0.74	3.16 - 0.48	1.80 - 0.28
10X 0.28 NA* 1-60227	33	Mag.	3.48X - 22.86X	4.63X - 29.9X	6.96X - 45.72X	12.3X - 78.8X
		Field 1/4"	1.15 - 0.17	0.86 - 0.13	0.57 - 0.09	0.33 - 0.05
		Field 1/3"	1.72 - 0.26	1.30 - 0.20	0.86 - 0.13	0.49 - 0.08
		Field 1/2"	(1) 2.10 - 0.35	1.73 - 0.27	1.15 - 0.17	0.66 - 0.10
		Field 2/3"	(1) 2.10 - 0.48	2.10 - 0.37	1.58 - 0.24	0.9 - 0.14
20X 0.42 NA* 1-60228	20	Mag.	6.96X - 45.72X	9.3X - 59.9X	13.92X - 91.40X	24.5X - 157.6X
		Field 1/4"	0.57 - 0.09	0.43 - 0.07	0.29 - 0.04	0.16 - 0.03
		Field 1/3"	0.86 - 0.13	0.65 - 0.10	0.43 - 0.07	0.25 - 0.04
		Field 1/2"	(1) 1.0 - 0.17	0.86 - 0.14	0.57 - 0.09	0.33 - 0.05
		Field 2/3"	(1) 1.03 - 0.24	1.0 - 0.19	0.79 - 0.12	0.45 - 0.07
50X 0.55 NA* 1-60229	13	Mag.	17.40X - 114.30X	23X-150X	34.80X - 228.60X	61X - 393.8X
		Field 1/4"	0.23 - 0.03	0.17 - 0.03	0.11 - 0.02	0.07 - 0.01
		Field 1/3"	0.30 - 0.05	0.26 - 0.04	0.17 - 0.03	0.10 - 0.015
		Field 1/2"	(1) 0.31 - 0.07	0.30 - 0.05	0.23 - 0.04	0.13 - 0.02
		Field 2/3"	(1) 0.30 - 0.10	0.30 - 0.07	(1) 0.30 - 0.05	0.18 - 0.03

(1) Entire zoom range is not used.
*N.A. at full zoom. N.A. varies with zoom settings.



Image provided courtesy of PVI Systems.