

# Lens Measurement Table

This table contains lens data useful to panoramic and macro photographers.

- Entrance pupil - The "center of perspective" of the lens. It is the center of rotation for panoramic photography. Panoramic photographers sometimes refer to it as the "nodal point", but it's not. This point is the virtual image of the lens's aperture.
- Exit pupil - The point where light radiates from the lens to the film or sensor. Useful if you're doing macro photography with a reversed lens. This point is the virtual image of the lens's aperture, as seen from the back of the lens. This point also tells you how well the lens will work on a digital SLR. If it's close to the sensor (50mm or so) you may see vignetting even on an "APS sized" DSLR. If it's over 90mm, you won't see vignetting, even on a full frame DSLR.
- Front nodal point - The virtual location of the lens, from the object. Used for calculating macro ratios and "effective" f stops in macro photography. This point is not used for panoramic photography, use the "entrance pupil" instead.
- Rear nodal point - The virtual location of the lens, from the image side. Used for calculating macro ratios and "effective" f stops in macro photography.

Note, I typically use the terms "front" and "object side" interchangeably. Also "back" and "image side".

The "value" and "parameter" fields refer to lenses with adjustable attributes, such as zoom settings, macro ratios, the "defocus control" settings of a DC Nikkor.

The "rear motion" field refers to how the rear elements of the lens move. "Zoom" indicates the rear elements move when zooming, typically a large motion that can move substantial quantities of air (and airborne contaminants) into the camera. "Focus" indicates the rear elements move only when focusing, small motions that do not substantially disturb the air. "Fixed" or "sealed" indicate that the rear elements do not move at all, and protect the camera from contamination.

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manufacturer	type	model	serial	value	parameter	entrance pupil (mm)	exit pupil (mm)	front nodal point (mm)	rear nodal point (mm)	relative to	filter to flange (mm)	filter to infinity (mm)	filter to flange, closest (mm)	rear motion	measured by
Cambridge	lens	50mm f3.5 EL Cambron	13XXX			2.0	4.3	6.0	8.8	flange	22.34	22.34	22.34	fixed	Joseph Wisniewski
Leica	lens	24mm f2 Macro Summar				2.0	3.0	2.0	3.0	flange	11.30	11.30	11.30	fixed	Joseph Wisniewski
Leica	lens	42mm f2 Macro Summar				3.5	3.8	3.5	3.8	flange	11.76	11.76	11.76	fixed	Joseph Wisniewski
Leica	lens	25mm f2.5 Photar	16XXX			6.5	9.3	3.8	6.3	flange	15.24	15.24	15.24	fixed	Joseph Wisniewski
Mamiya	lens	65mm f4.5 Mamiya Sekor C	61XXX			140.5	129.0	111.0	67.8	film plane	70.39	70.39	70.39	sealed	Joseph Wisniewski
Mamiya	lens	90mm f3.8 Mamiya Sekor C	70XXX			148.5	126.5	119.3	92.5	film plane	70.39	70.39	70.39	fixed	Joseph Wisniewski
Nikon	lens	105mm f2.5 AI-S	925XXX	center	area	52.8	90.0	74.5	103.0	film plane	69.71	69.71	83.97	focus	Joseph Wisniewski
Nikon	lens	105mm f2.5 AI-S	925XXX	c-e	area	52.8	90.0	70.3	103.0	film plane	69.71	69.71	83.97	focus	Joseph Wisniewski
Nikon	lens	105mm f2.5 AI-S	925XXX	edge	area	52.8	90.0	67.0	103.0	film plane	69.71	69.71	83.97	focus	Joseph Wisniewski
Nikon	lens	105mm f2.8 AF-D Micro	309XXX	infinity	macro ratio	78.5	92.8	94.5	105.5	film plane	104.96	104.96	131.94	sealed	Joseph Wisniewski
Nikon	lens	105mm f2.8 AF-D Micro	309XXX	10	macro ratio	83.0	92.8	104.8	109.8	film plane	108.22	104.96	131.94	sealed	Joseph Wisniewski
Nikon	lens	105mm f2.8 AF-D Micro	309XXX	5	macro ratio	89.3	92.8	115.5	114.0	film plane	111.55	104.96	131.94	sealed	Joseph Wisniewski
Nikon	lens	105mm f2.8 AF-D Micro	309XXX	3	macro ratio	96.0	97.8	125.5	118.5	film plane	115.78	104.96	131.94	sealed	Joseph Wisniewski
Nikon	lens	105mm f2.8 AF-D Micro	309XXX	2	macro ratio	107.5	103.5	136.8	125.5	film plane	120.27	104.96	131.94	sealed	Joseph Wisniewski
Nikon	lens	105mm f2.8 AF-D Micro	309XXX	1.5	macro ratio	117.5	113.0	146.0	133.8	film plane	124.20	104.96	131.94	sealed	Joseph Wisniewski
Nikon	lens	105mm f2.8 AF-D	309XXX	1.2	macro ratio	128.3	121.8	155.8	137.0	film plane	127.98	104.96	131.94	sealed	Joseph Wisniewski



Nikon	lens	200mm f4.0 AF-D Micro	201XXX	2	macro ratio	40.8	142.5	231.3	film plane				sealed	Joseph Wisniewski	
Nikon	lens	200mm f4.0 AF-D Micro	201XXX	1.5	macro ratio		133.0	229.8	film plane				sealed	Joseph Wisniewski	
Nikon	lens	200mm f4.0 AF-D Micro	201XXX	1.2	macro ratio		126.5	219.3	film plane				sealed	Joseph Wisniewski	
Nikon	lens	200mm f4.0 AF-D Micro	201XXX	1	macro ratio		118.8	211.0	film plane				sealed	Joseph Wisniewski	
Nikon	lens	20mm f2.8 AF-D	356XXX	0	deg off axis	68.5	54.3	55.5	21.3	film plane	42.51	42.51	45.16	focus	Joseph Wisniewski
Nikon	lens	20mm f2.8 AF-D	356XXX	5	deg off axis	68.5	54.3	55.5	21.3	film plane	42.51	42.51	45.16	focus	Joseph Wisniewski
Nikon	lens	20mm f2.8 AF-D	356XXX	10	deg off axis	68.5	54.3	55.5	21.3	film plane	42.51	42.51	45.16	focus	Joseph Wisniewski
Nikon	lens	20mm f2.8 AF-D	356XXX	15	deg off axis	68.5	54.3	55.5	21.3	film plane	42.51	42.51	45.16	focus	Joseph Wisniewski
Nikon	lens	20mm f2.8 AF-D	356XXX	20	deg off axis	68.5	54.3	55.5	21.3	film plane	42.51	42.51	45.16	focus	Joseph Wisniewski
Nikon	lens	20mm f2.8 AF-D	356XXX	25	deg off axis	67.5	54.3	55.5	21.3	film plane	42.51	42.51	45.16	focus	Joseph Wisniewski
Nikon	lens	20mm f2.8 AF-D	356XXX	30	deg off axis	67.5	54.3	55.5	21.3	film plane	42.51	42.51	45.16	focus	Joseph Wisniewski
Nikon	lens	20mm f2.8 AF-D	356XXX	35	deg off axis	67.5	54.3	55.5	21.3	film plane	42.51	42.51	45.16	focus	Joseph Wisniewski
Nikon	lens	20mm f2.8 AF-D	356XXX	40	deg off axis	67.0	54.3	55.5	21.3	film plane	42.51	42.51	45.16	focus	Joseph Wisniewski
Nikon	lens	28mm f4.0 PC	181XXX			82.8	64.3	67.5	29.8	film plane	63.75	63.75	67.76	focus	Joseph Wisniewski
Nikon	lens	28-70mm f3.5-4.5 AF-D	3098XXX	28	zoom mm	103.8	56.5	88.0	29.8	film plane	82.61	82.61	90.66	zoom	Joseph Wisniewski
Nikon	lens	28-70mm f3.5-4.5 AF-D	3098XXX	31.5	zoom mm	101.5	57.5	85.8	32.0	film plane	79.13	79.13	87.24	zoom	Joseph Wisniewski
Nikon	lens	28-70mm f3.5-4.5 AF-D	3098XXX	35	zoom mm	99.3	61.0	82.8	35.5	film plane	75.15	75.15	83.29	zoom	Joseph Wisniewski
Nikon	lens	28-70mm f3.5-4.5 AF-D	3098XXX	42.5	zoom mm	97.8	66.3	80.8	42.8	film plane	71.39	71.39	79.49	zoom	Joseph Wisniewski
Nikon	lens	28-70mm f3.5-4.5 AF-D	3098XXX	50	zoom mm	98.8	72.8	81.8	50.5	film plane	70.15	70.15	78.30	zoom	Joseph Wisniewski
Nikon	lens	28-70mm f3.5-4.5 AF-D	3098XXX	60	zoom mm	101.5	79.5	85.3	59.0	film plane	71.57	71.57	79.48	zoom	Joseph Wisniewski
Nikon	lens	28-70mm f3.5-4.5 AF-D	3098XXX	70	zoom mm	106.5	87.3	91.3	68.8	film plane	74.28	74.28	82.02	zoom	Joseph Wisniewski
Nikon	lens	300mm f2.8 AF-I	205XXX			-356.0	174.8			film plane				sealed	Joseph Wisniewski
Nikon	lens	35mm f2.0 AF-D	214XXX			65.8	57.0	53.0	36.5	film plane	43.25	43.25	48.27	focus	Joseph Wisniewski
Nikon	lens	35mm f2.8 PC (old style)	851XXX			83.0	66.0	66.0	37.0	film plane	61.84	61.84	68.52	focus	Joseph Wisniewski
Nikon	lens	35mm f2.8 PC (new style)	901XXX			83.0	66.0	66.5	36.8	film plane	61.55	61.55	68.65	focus	Joseph Wisniewski
Nikon	lens	45mm f2.8 P	206XXX			52.5	52.8	46.0	45.8	film plane	16.94	16.94	23.08	focus	Joseph Wisniewski
Nikon	lens	50mm f1.4 AF (old style)	2075XXX			52.8	76.3	40.8	51.5	film plane	42.23	42.23	42.23	focus	Joseph Wisniewski

Nikon	lens	50mm f1.8 AF (old style)	2058XXX	center	area	48.8	54.5	48.5	51.5	film plane	38.93	38.93	46.89	focus	Joseph Wisniewski
Nikon	lens	50mm f1.8 AF (old style)	2058XXX	c-e	area	48.8	54.5	46.3	51.5	film plane	38.93	38.93	46.89	focus	Joseph Wisniewski
Nikon	lens	50mm f1.8 AF (old style)	2058XXX	edge	area	48.8	54.5	43.8	51.5	film plane	38.93	38.93	46.89	focus	Joseph Wisniewski
Nikon	lens	50mm f2.8 EL	345XXX			3.5	9.5	2.5	7.5	flange	27.78	27.78	27.78	fixed	Joseph Wisniewski
Nikon	lens	55mm f2.8 Micro	505XXX	center	area	57.3	57.3	56.0	55.0	film plane	61.95	61.95	95.01	focus	Joseph Wisniewski
Nikon	lens	55mm f2.8 Micro	505XXX	c-e	area	57.3	57.3	55.0	55.0	film plane	61.95	61.95	95.01	focus	Joseph Wisniewski
Nikon	lens	55mm f2.8 Micro	505XXX	edge	area	57.3	57.3	54.3	55.0	film plane	61.95	61.95	95.01	focus	Joseph Wisniewski
Nikon	lens	55mm f2.8 Micro	505XXX		macro ratio	81.3	85.0	83.3	86.3	film plane	95.01	61.95	95.01	focus	Joseph Wisniewski
Nikon	lens	55mm f3.5 Micro	1063XXX	center	area	48.0	55.5	48.8	54.5	film plane	54.86	54.86	82.56	focus	Joseph Wisniewski
Nikon	lens	55mm f3.5 Micro	1063XXX	c-e	area	48.0	55.5	47.0	54.5	film plane	54.86	54.86	82.56	focus	Joseph Wisniewski
Nikon	lens	55mm f3.5 Micro	1063XXX	edge	area	48.0	55.5	46.5	54.5	film plane	54.86	54.86	82.56	focus	Joseph Wisniewski
Nikon	lens	60mm f2.8 AF Micro	226XXX	infinity	macro ratio	61.5	56.0	65.8	60.3	film plane	74.13	74.13	89.84	sealed	Joseph Wisniewski
Nikon	lens	60mm f2.8 AF Micro	226XXX	10	macro ratio	65.0	58.5	71.8	65.0	film plane	46.39	74.13	89.84	sealed	Joseph Wisniewski
Nikon	lens	60mm f2.8 AF Micro	226XXX	5	macro ratio	66.3	61.3	77.3	70.0	film plane	78.78	74.13	89.84	sealed	Joseph Wisniewski
Nikon	lens	60mm f2.8 AF Micro	226XXX	3	macro ratio	72.5	64.8	84.3	75.0	film plane	82.01	74.13	89.84	sealed	Joseph Wisniewski
Nikon	lens	60mm f2.8 AF Micro	226XXX	2	macro ratio	77.5	69.0	93.0	81.8	film plane	85.90	74.13	89.84	sealed	Joseph Wisniewski
Nikon	lens	60mm f2.8 AF Micro	226XXX	1.5	macro ratio	83.5	73.8	101.8	87.8	film plane	89.94	74.13	89.84	sealed	Joseph Wisniewski
Nikon	lens	60mm f2.8 AF Micro	226XXX	1.2	macro ratio	89.3	78.0	110.8	93.8	film plane	94.23	74.13	89.84	sealed	Joseph Wisniewski
Nikon	lens	60mm f2.8 AF Micro	226XXX	1	macro ratio	95.5	82.3	120.0	99.5	film plane	98.84	74.13	89.84	sealed	Joseph Wisniewski
Nikon	lens	70-200mm f2.8 AF-S VR G	203XXX	70	zoom mm	154.3	147.3	117.3	72.5	film plane	216.00	216.00	216.00	sealed	Joseph Wisniewski
Nikon	lens	70-200mm f2.8 AF-S VR G	203XXX	80	zoom mm	138.0	145.8	101.3	82.0	film plane	216.00	216.00	216.00	sealed	Joseph Wisniewski
Nikon	lens	70-200mm f2.8 AF-S VR G	203XXX	92.5	zoom mm	118.5	146.0	87.3	90.5	film plane	216.00	216.00	216.00	sealed	Joseph Wisniewski
Nikon	lens	70-200mm f2.8 AF-S VR G	203XXX	105	zoom mm	95.3	148.0	71.8	104.3	film plane	216.00	216.00	216.00	sealed	Joseph Wisniewski
Nikon	lens	70-200mm f2.8 AF-S VR G	203XXX	120	zoom mm	79.8	148.0	62.3	114.5	film plane	216.00	216.00	216.00	sealed	Joseph Wisniewski
Nikon	lens	70-200mm f2.8 AF-S VR G	203XXX	135	zoom mm	57.3	147.3	56.5	130.3	film plane	216.00	216.00	216.00	sealed	Joseph Wisniewski
Nikon	lens	70-200mm f2.8 AF-S VR G	203XXX	167.5	zoom mm	31.3	147.3	61.8	151.0	film plane	216.00	216.00	216.00	sealed	Joseph Wisniewski
Nikon	lens	70-200mm f2.8 AF-S VR G	203XXX	200	zoom mm	-5.5	147.3	83.5	186.5	film plane	216.00	216.00	216.00	sealed	Joseph Wisniewski
Nikon	lens	70-210mm f4-5.6 AF	2177XXX	70	zoom mm	102.5	81.5	92.5	72.5	film plane				zoom	Joseph Wisniewski
Nikon	lens	70-210mm f4-5.6 AF	2177XXX	85	zoom mm	88.5	82.3	92.0	85.8	film plane				zoom	Joseph Wisniewski

Nikon	lens	70-210mm f4-5.6 AF	2177XXX	105	zoom mm	75.0	86.0	101.3	105.0	film plane					zoom	Joseph Wisniewski
Nikon	lens	70-210mm f4-5.6 AF	2177XXX	135	zoom mm	61.3	91.8	127.5	134.3	film plane					zoom	Joseph Wisniewski
Nikon	lens	70-210mm f4-5.6 AF	2177XXX	172	zoom mm	53.5	98.3			film plane					zoom	Joseph Wisniewski
Nikon	lens	70-210mm f4-5.6 AF	2177XXX	210	zoom mm	52.0	108.5			film plane					zoom	Joseph Wisniewski
Nikon	lens	80-200mm f2.8 AF-D 2 ring	716XXX	80	zoom mm	128.3	94.8	117.3	83.5	film plane	187.13	187.13	187.13		sealed	Joseph Wisniewski
Nikon	lens	80-200mm f2.8 AF-D 2 ring	716XXX	93	zoom mm	107.0	95.0	106.0	93.3	film plane	187.13	187.13	187.13		sealed	Joseph Wisniewski
Nikon	lens	80-200mm f2.8 AF-D 2 ring	716XXX	105	zoom mm	81.8	95.5	97.3	106.0	film plane	187.13	187.13	187.13		sealed	Joseph Wisniewski
Nikon	lens	80-200mm f2.8 AF-D 2 ring	716XXX	120	zoom mm	56.0	94.5	94.0	116.8	film plane	187.13	187.13	187.13		sealed	Joseph Wisniewski
Nikon	lens	80-200mm f2.8 AF-D 2 ring	716XXX	135	zoom mm	32.5	95.0	98.3	133.3	film plane	187.13	187.13	187.13		sealed	Joseph Wisniewski
Nikon	lens	80-200mm f2.8 AF-D 2 ring	716XXX	165	zoom mm	-8.5	95.5	130.3	155.3	film plane	187.13	187.13	187.13		sealed	Joseph Wisniewski
Nikon	lens	80-200mm f2.8 AF-D 2 ring	716XXX	200	zoom mm	-29.8	94.5	170.0	195.5	film plane	187.13	187.13	187.13		sealed	Joseph Wisniewski
Pentax	lens	50mm f1.4 Super Takumer	1965XXX			57.5	70.5	42.2	50.2	film plane	38.49	38.49	45.92		focus	Joseph Wisniewski
Sigma	lens	14mm f3.5	2002XXX	0	deg off axis	87.8	65.5	76.8	16.5	film plane					sealed	Joseph Wisniewski
Sigma	lens	14mm f3.5	2002XXX	5	deg off axis	87.8	65.5	76.8	16.5	film plane					sealed	Joseph Wisniewski
Sigma	lens	14mm f3.5	2002XXX	10	deg off axis	87.8	65.5	76.8	16.5	film plane					sealed	Joseph Wisniewski
Sigma	lens	14mm f3.5	2002XXX	15	deg off axis	87.8	65.5	76.8	16.5	film plane					sealed	Joseph Wisniewski
Sigma	lens	14mm f3.5	2002XXX	20	deg off axis	87.8	65.5	76.8	16.5	film plane					sealed	Joseph Wisniewski
Sigma	lens	14mm f3.5	2002XXX	25	deg off axis	87.5	65.5	76.8	16.5	film plane					sealed	Joseph Wisniewski
Sigma	lens	14mm f3.5	2002XXX	30	deg off axis	87.0	65.5	76.8	16.5	film plane					sealed	Joseph Wisniewski
Sigma	lens	14mm f3.5	2002XXX	35	deg off axis	86.8	65.5	76.8	16.5	film plane					sealed	Joseph Wisniewski
Sigma	lens	14mm f3.5	2002XXX	40	deg off axis	85.8	65.5	76.8	16.5	film plane					sealed	Joseph Wisniewski
Sigma	lens	14mm f3.5	2002XXX	45	deg off axis	84.5	65.5	76.8	16.5	film plane					sealed	Joseph Wisniewski
Sigma	lens	14mm f3.5	2002XXX	50	deg off axis	82.8	65.5	76.8	16.5	film plane					sealed	Joseph Wisniewski
Sigma	lens	8mm f4.0 fisheye	1001XXX	10	deg off axis	88.8	57.3	81.8	9.0	film plane					focus	Joseph Wisniewski
Sigma	lens	8mm f4.0 fisheye	1001XXX	20	deg off axis	89.5	57.3	81.8	9.0	film plane					focus	Joseph Wisniewski
Sigma	lens	8mm f4.0 fisheye	1001XXX	30	deg off axis	90.3	57.3	81.8	9.0	film plane					focus	Joseph Wisniewski
Sigma	lens	8mm f4.0 fisheye	1001XXX	40	deg off axis	91.0	57.3	81.8	9.0	film plane					focus	Joseph Wisniewski
Sigma	lens	8mm f4.0 fisheye	1001XXX	50	deg off axis	92.3	57.3	81.8	9.0	film plane					focus	Joseph Wisniewski
Sigma	lens	8mm f4.0 fisheye	1001XXX	60	deg off axis	94.0	57.3	81.8	9.0	film plane					focus	Joseph Wisniewski
Sigma	lens	8mm f4.0 fisheye	1001XXX	70	deg off axis	96.3	57.3	81.8	9.0	film plane					focus	Joseph Wisniewski

Sigma	lens	8mm f4.0 fisheye	1001XXX	80	deg off axis	99.3	57.3	81.8	9.0	film plane				focus	Joseph Wisniewski
Sigma	lens	8mm f4.0 fisheye	1001XXX	90	deg off axis	103.5	57.3	81.8	9.0	film plane				focus	Joseph Wisniewski
Tokina	lens	28-70mm f2.8 ATX	8902XXX	28	zoom mm	115.0	81.5	95.0	29.8	film plane	105.15	105.15	108.14	zoom	Joseph Wisniewski
Tokina	lens	28-70mm f2.8 ATX	8902XXX	35	zoom mm	109.0	80.3	87.5	36.0	film plane	97.63	97.63	100.54	zoom	Joseph Wisniewski
Tokina	lens	28-70mm f2.8 ATX	8902XXX	43	zoom mm	105.3	77.8	85.0	42.5	film plane	93.52	93.52	95.98	zoom	Joseph Wisniewski
Tokina	lens	28-70mm f2.8 ATX	8902XXX	50	zoom mm	102.8	75.0	84.0	51.8	film plane	90.85	90.85	93.82	zoom	Joseph Wisniewski
Tokina	lens	28-70mm f2.8 ATX	8902XXX	60	zoom mm	99.0	73.3	86.8	60.5	film plane	90.00	90.00	92.89	zoom	Joseph Wisniewski
Tokina	lens	28-70mm f2.8 ATX	8902XXX	70	zoom mm	98.3	72.5	92.5	68.5	film plane	90.25	90.25	93.71	zoom	Joseph Wisniewski
Tokina	lens	28-80mm f2.8 ATX-PRO	6507XXX	28	zoom mm	128.0	90.5	106.0	30.3	film plane	120.04	120.04	120.04	zoom	Joseph Wisniewski
Tokina	lens	28-80mm f2.8 ATX-PRO	6507XXX	32	zoom mm	124.5	86.8	103.0	33.0	film plane	120.04	120.04	120.04	zoom	Joseph Wisniewski
Tokina	lens	28-80mm f2.8 ATX-PRO	6507XXX	35	zoom mm	121.5	84.0	99.0	36.8	film plane	120.04	120.04	120.04	zoom	Joseph Wisniewski
Tokina	lens	28-80mm f2.8 ATX-PRO	6507XXX	43	zoom mm	117.8	78.5	96.0	42.8	film plane	120.04	120.04	120.04	zoom	Joseph Wisniewski
Tokina	lens	28-80mm f2.8 ATX-PRO	6507XXX	50	zoom mm	113.5	75.8	95.0	52.0	film plane	120.04	120.04	120.04	zoom	Joseph Wisniewski
Tokina	lens	28-80mm f2.8 ATX-PRO	6507XXX	65	zoom mm	109.0	72.3	102.0	66.0	film plane	120.04	120.04	120.04	zoom	Joseph Wisniewski
Tokina	lens	28-80mm f2.8 ATX-PRO	6507XXX	80	zoom mm	106.0	71.5	112.5	81.5	film plane	120.04	120.04	120.04	zoom	Joseph Wisniewski
Zeiss	lens	63mm f4.5 Luminar	2211XXX			16.5	20.0	15.5	18.0	flange	29.37	29.37	29.37	fixed	Joseph Wisniewski

Last Updated on 9/6/2003  
By Joseph S. Wisniewski