

TL1250 Specification

SL/TL1250 lens family specifications

Focal length	12-50mm
Image circle	Ø9.4mm
Resolution	12.4 megapixel
F/#	F/1.8 @ 12mm – F/2.4 @ 50mm to close
Focus Range	2.5m to infinity
IR Correction	Day/Night
Lens length	< 64mm TTL
Back focal length	BFL 8.2mm (in air)
CRA	< 8°
Distortion	< 10% at 12mm, < 3% at 50mm
Relative illumination	>40% at Ø9.0mm
Lens transmission	>80%
Weight	TBD
Temperature range	-20°C to 50°C

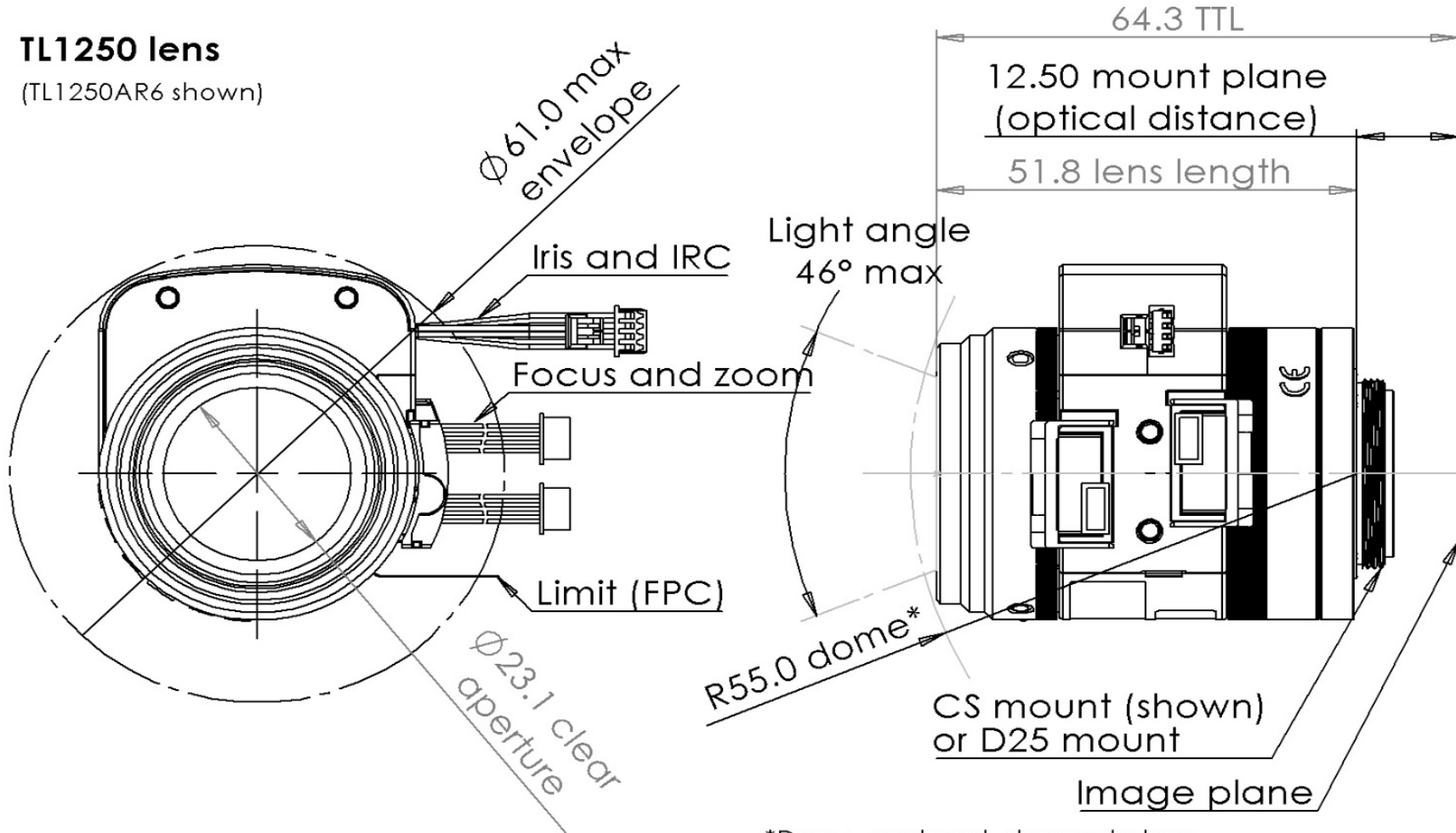
Field of view for sensor sizes

Sensor size	1/1.7"	1/1.8"	1/1.8" 4K* 1/2"	1/2.3"	1/2.5"
Horizontal	36° - 8.6°	36° - 8.6°	35° - 8.5°	30° - 7.4°	27° - 6.7°
Vertical	26° - 6.5°	23° - 5.8°	17° - 4.3°	23° - 5.6°	20° - 5.0°
Diagonal	46° - 11°	44° - 10°	40° - 9.5°	39° - 9.2°	34° - 8.3°

*4K format = 4000 x 2000 pixels

TL1250 Mechanical

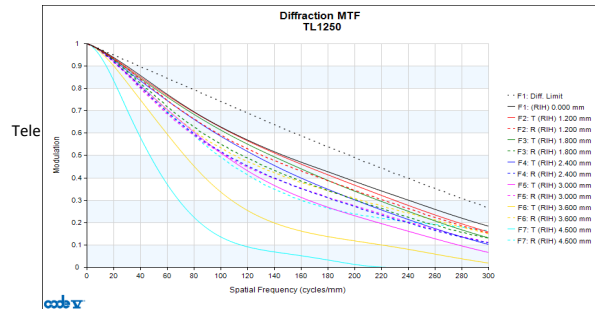
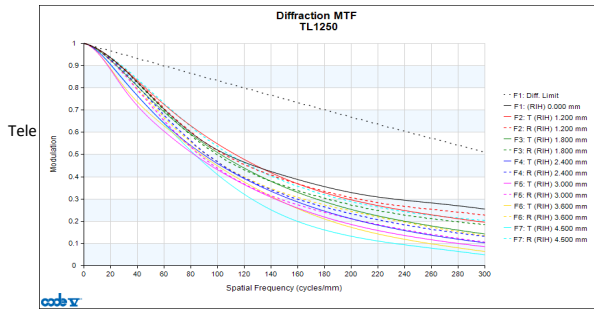
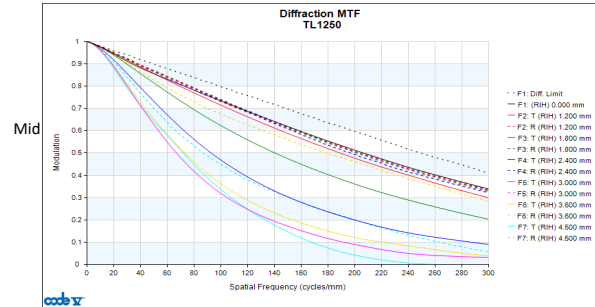
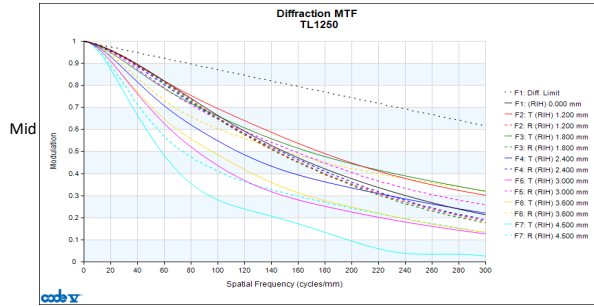
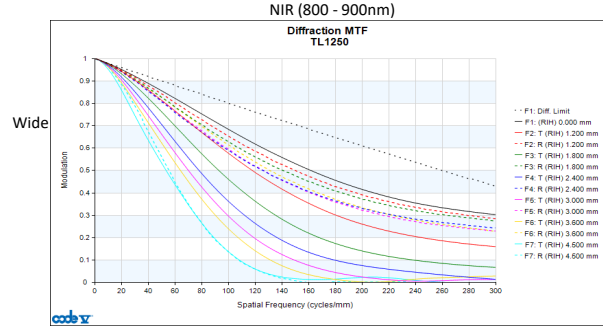
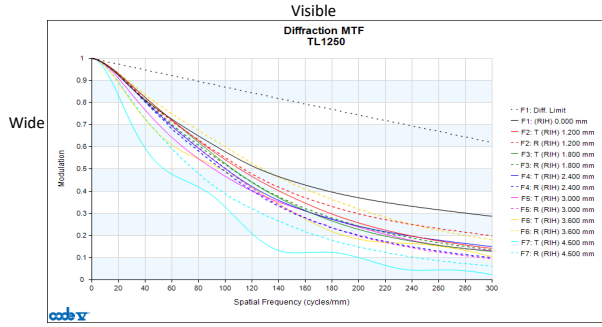
TL1250 lens
(TL1250AR6 shown)



Theia Technologies
MDP 3/30/2015

*Dome centered at mount plane

TL1250 Resolution (MTF)



Thermal shifts for max MTF:

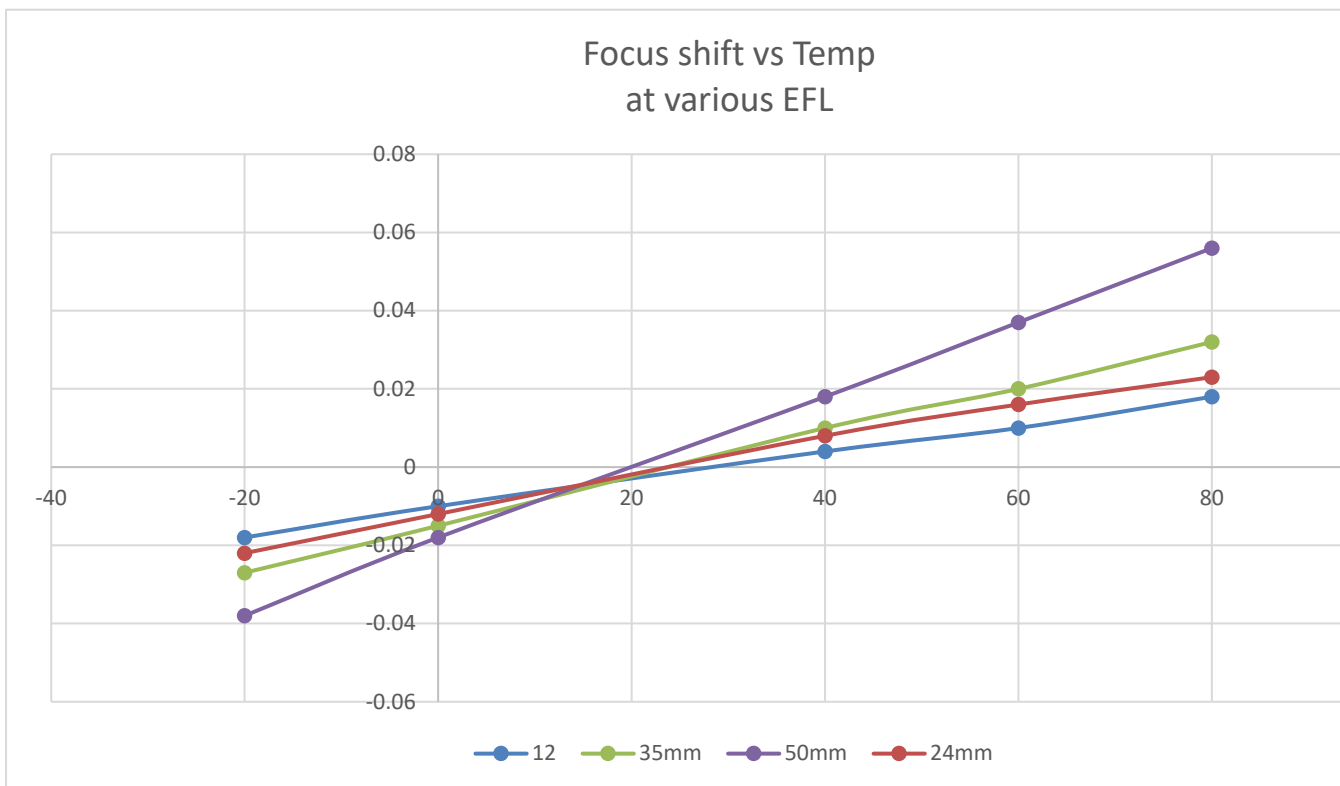
shift of focus

group (mm)

positive shift is moving focus group away from the camera side

Starting temp is 20°C

	Focal Length			
Temp	12	24mm	35mm	50mm
-20	-0.018	-0.022	-0.027	-0.038
0	-0.01	-0.012	-0.015	-0.018
40	0.004	0.008	0.01	0.018
60	0.01	0.016	0.02	0.037
80	0.018	0.023	0.032	0.056



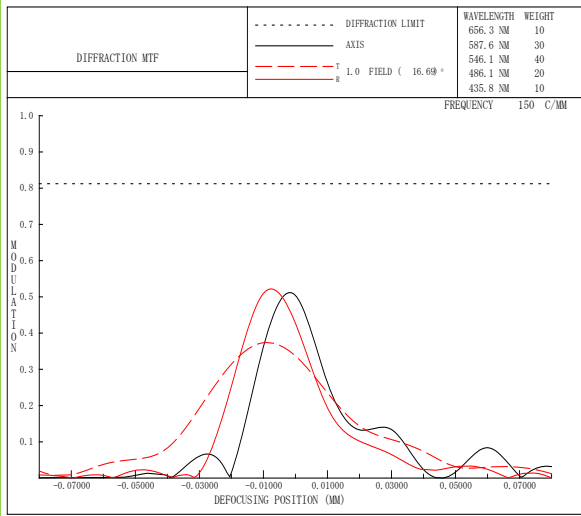


TL1250 MTF vs Temperature

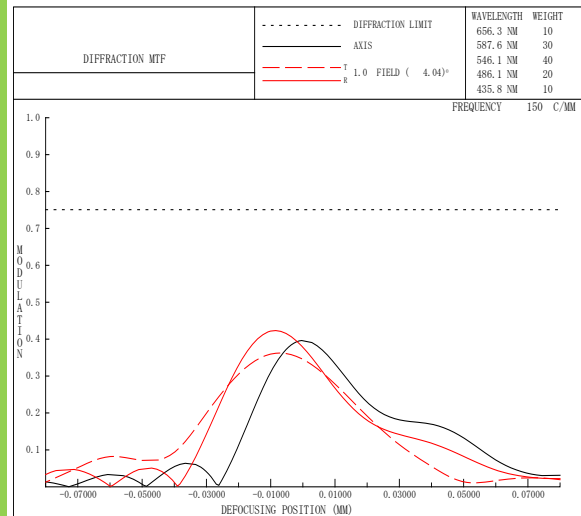
12-50mm

WIDE

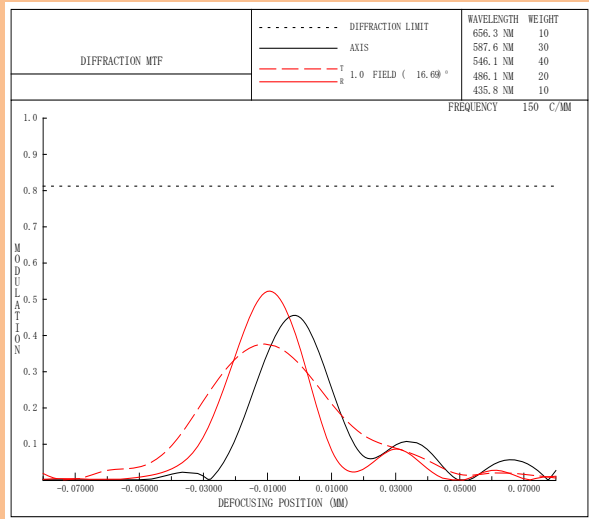
TELE



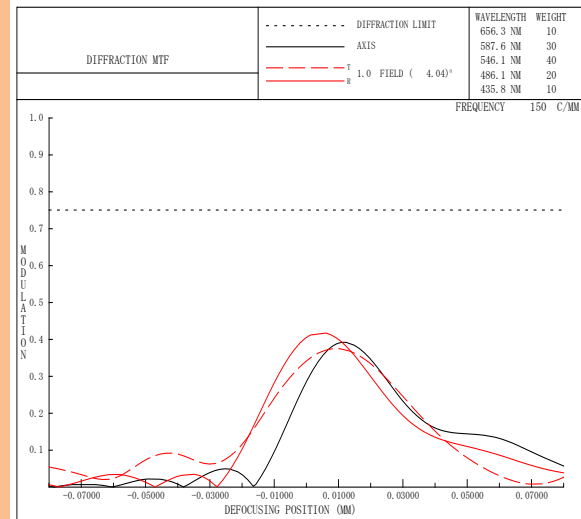
20



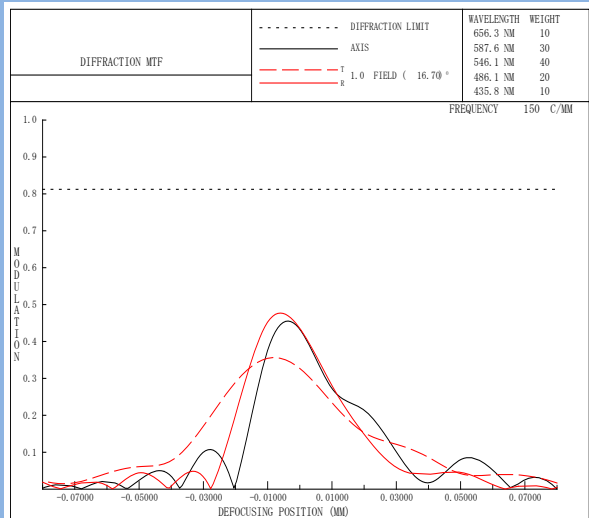
20



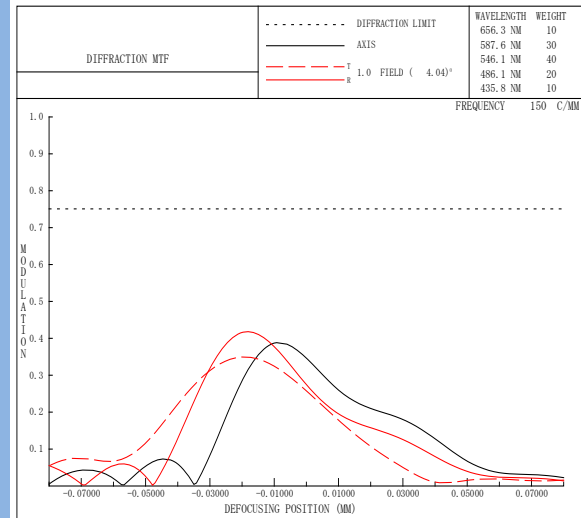
60



60

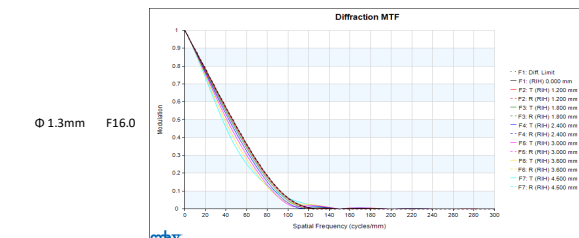
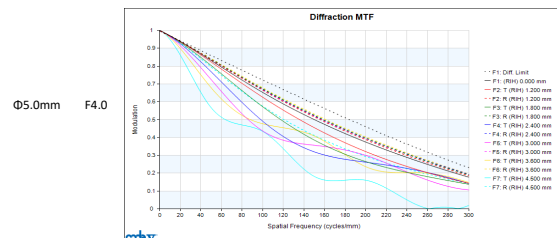
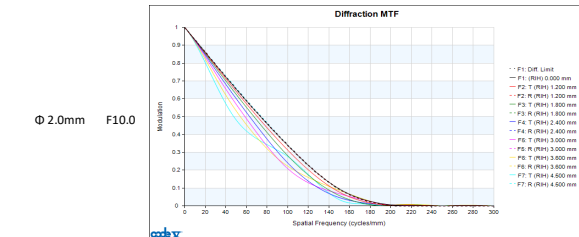
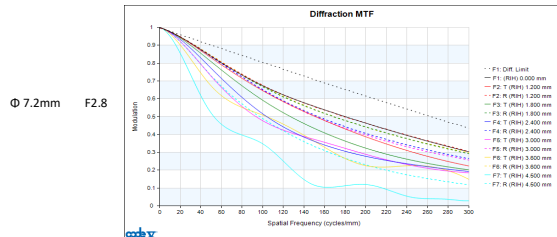
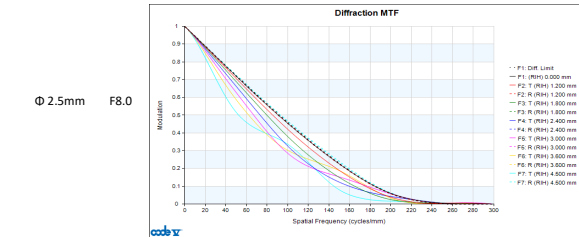
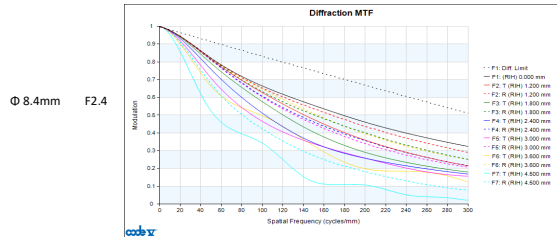
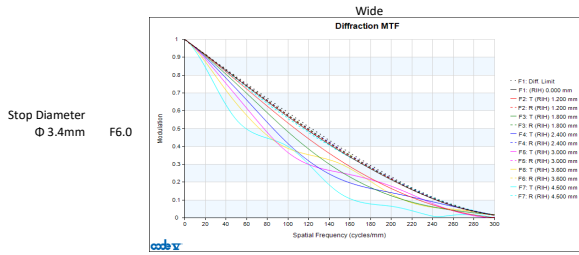
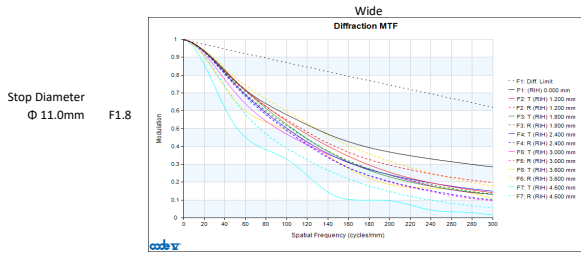
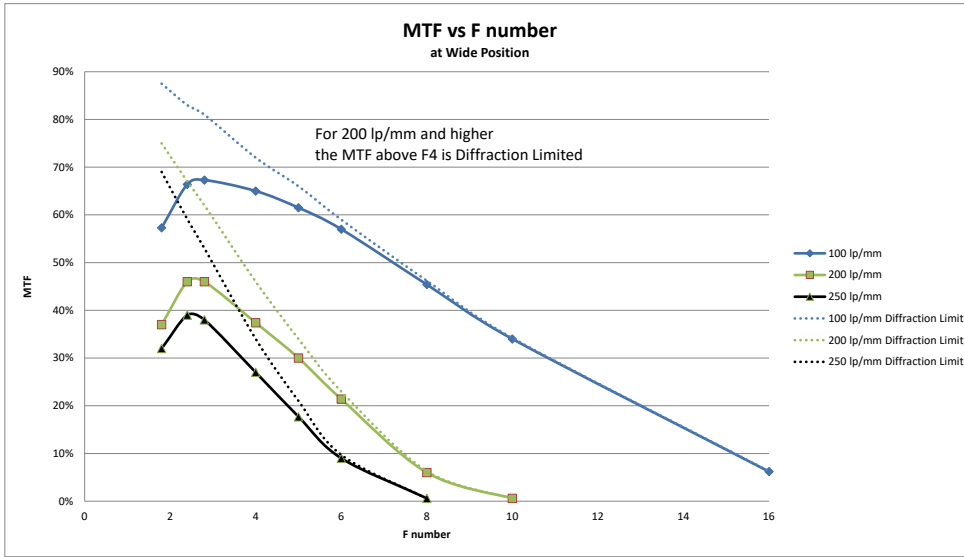


-10



-10

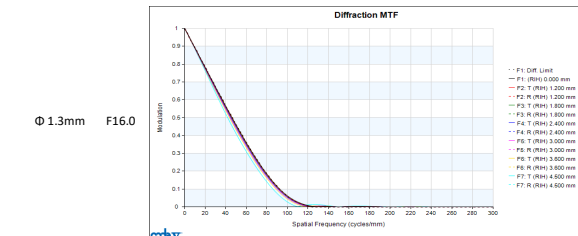
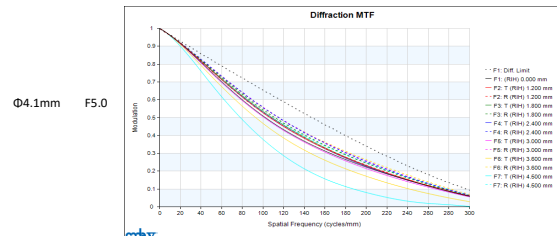
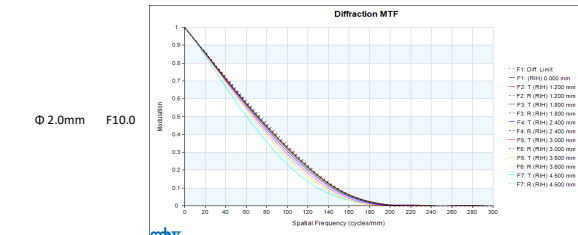
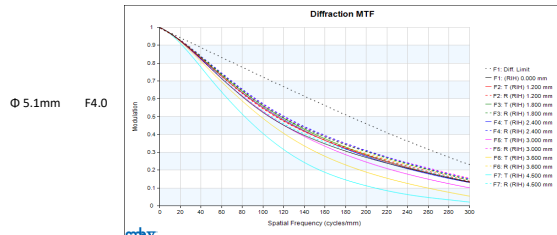
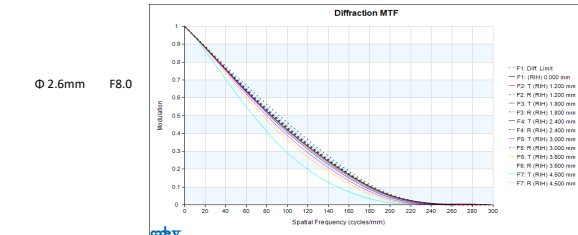
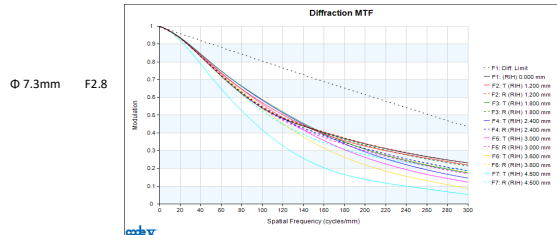
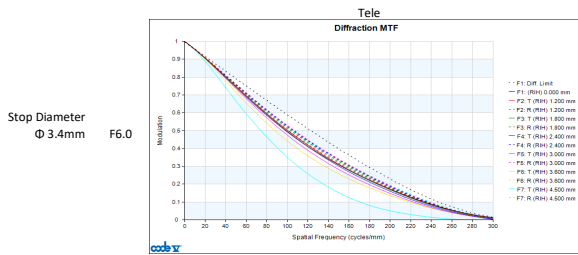
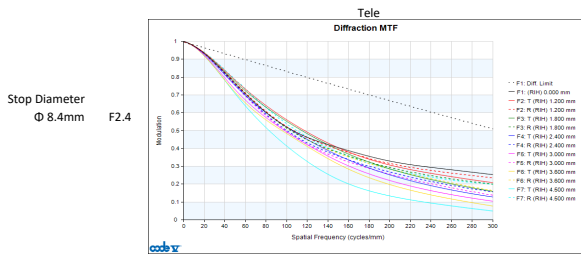
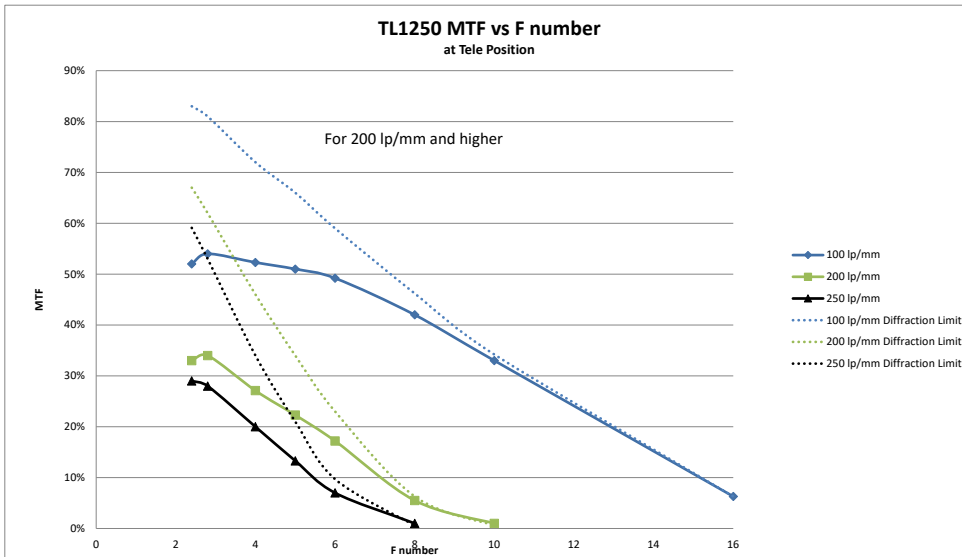
TL1250 MTF vs Fnumber



TL1250 MTF vs Fnumber

MTF vs F#

F#	100 lp/mm	200 lp/mm	250 lp/mm	100 lp/mm Diffraction Limit	200 lp/mm Diffraction Limit	250 lp/mm Diffraction Limit
1.8	57%	37%	32%	88%	75%	69%
2.4	66%	46%	39%	83%	67%	59%
2.8	67%	46%	38%	81%	62%	53%
4	65%	37%	27%	72%	46%	34%
5	62%	30%	18%	66%	34%	21%
6	57%	21%	9%	59%	23%	10%
8	45%	6%	1%	46%	6%	1%
10	34%	1%		34%	1%	
16	6%			6%		

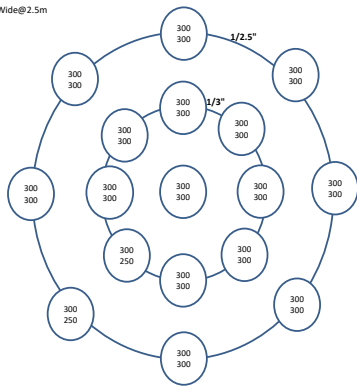


MTF vs F#

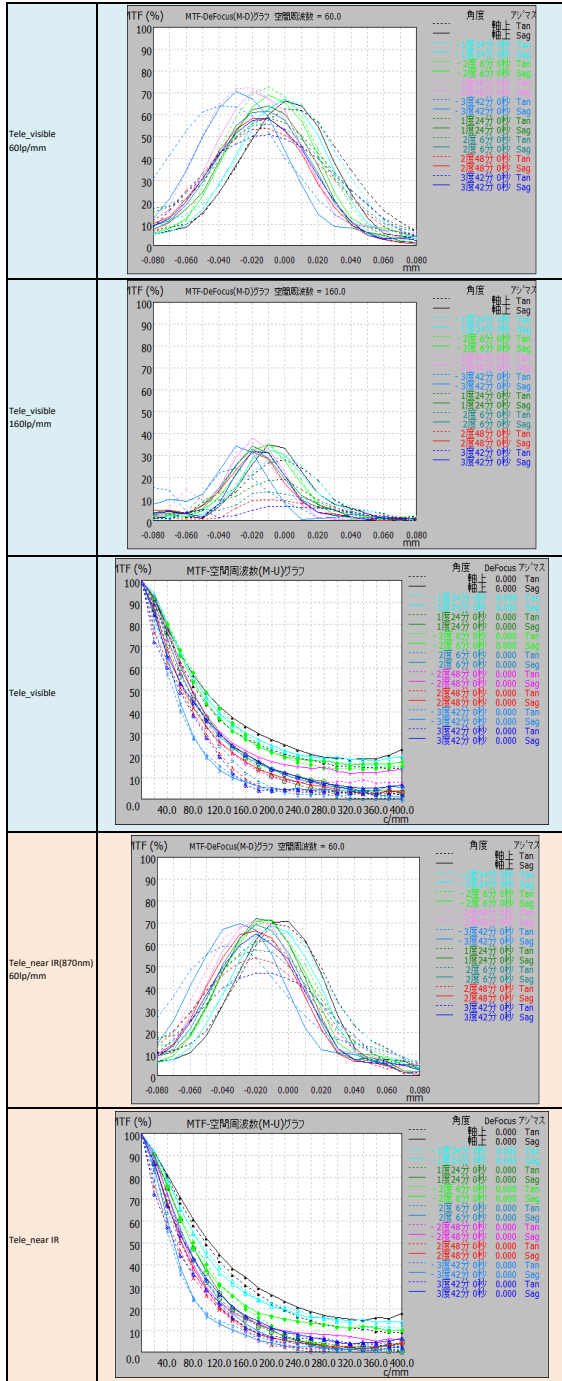
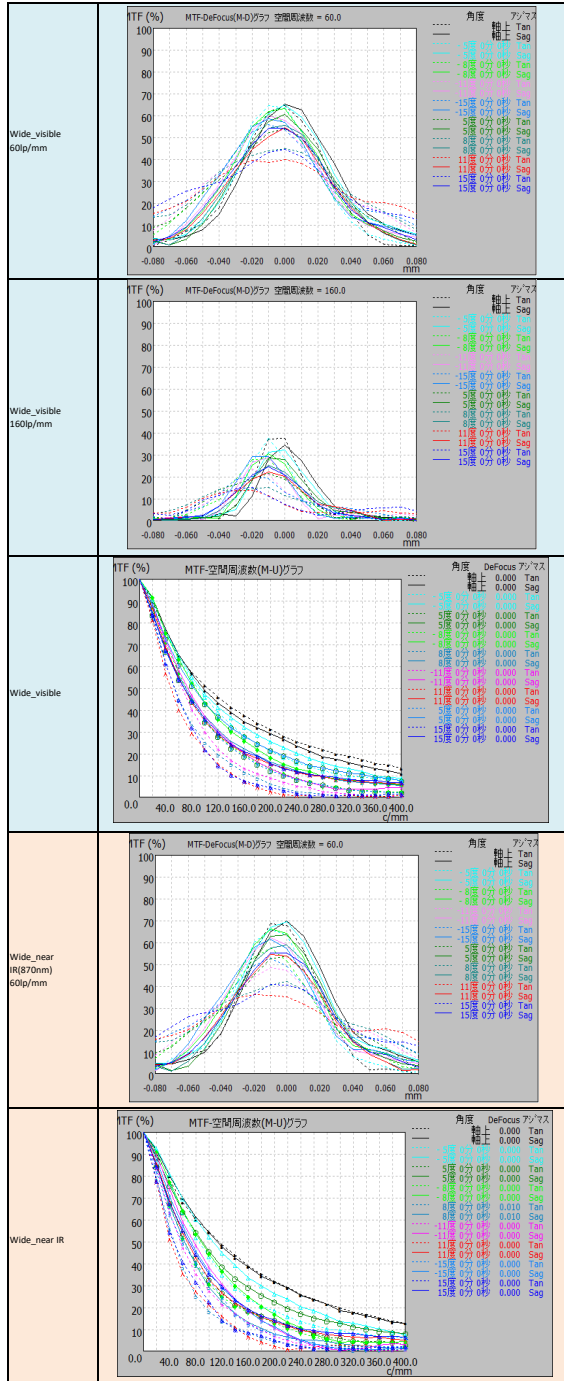
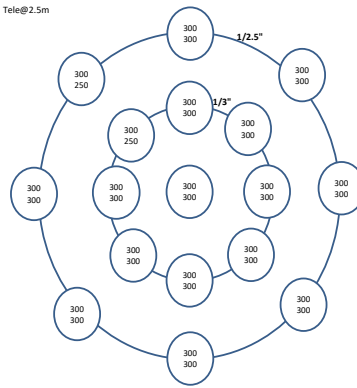
F#	100 lp/mm	200 lp/mm	250 lp/mm	100 lp/mm Diffraction Limit	200 lp/mm Diffraction Limit	250 lp/mm Diffraction Limit
2.4	52%	33%	29%	83%	67%	59%
2.8	54%	34%	28%	81%	62%	53%
4	52%	27%	20%	72%	46%	34%
5	51%	22%	13%	66%	34%	21%
6	49%	17%	7%	59%	23%	10%
8	42%	6%	1%	46%	6%	1%
10	33%	1%		34%	1%	
16	6%			6%		

TL1250 Prototype Resolution

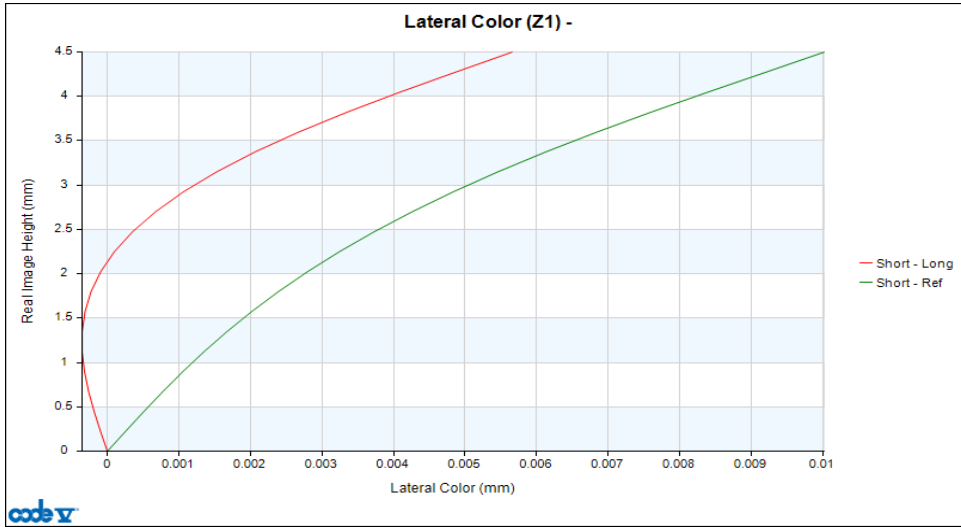
Wide@2.5m



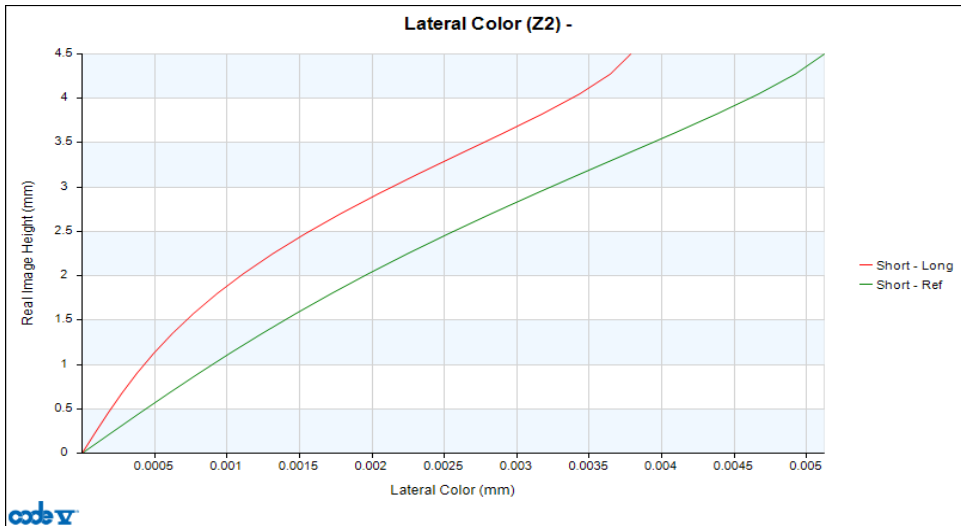
Tele@2.5m



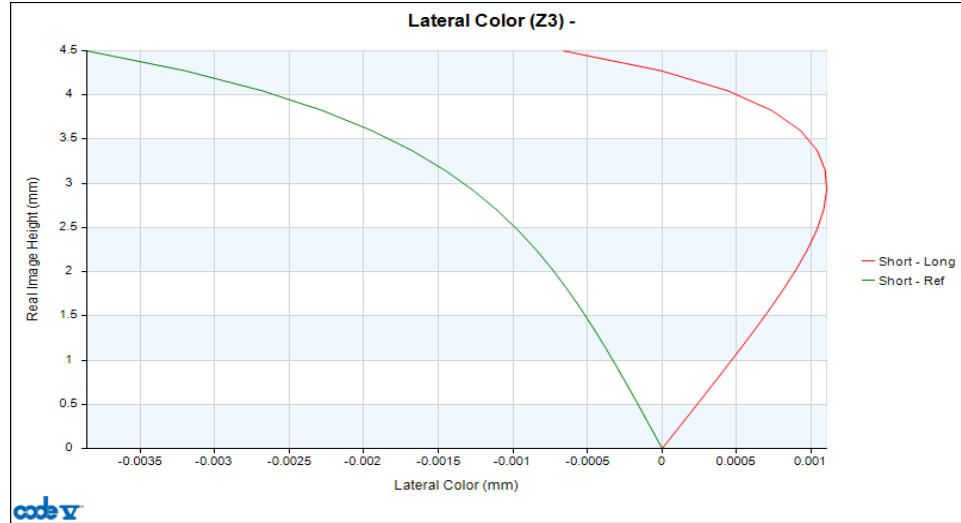
12mm EFL



24mm EFL



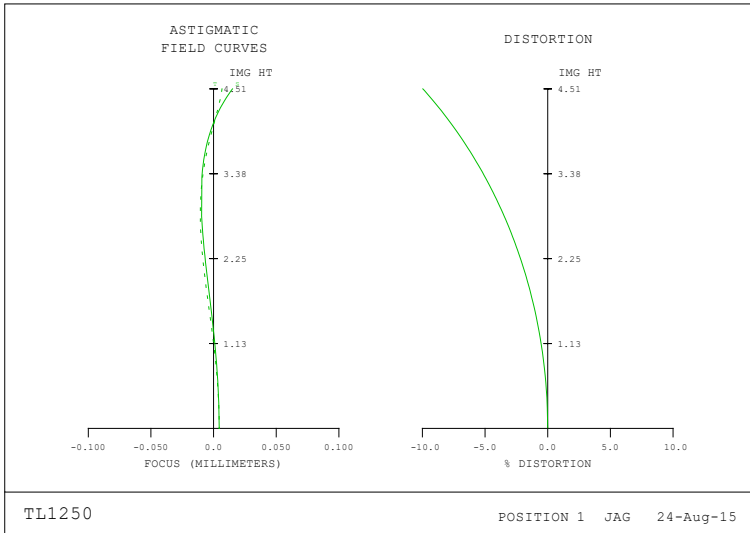
50mm EFL



TL1250 Distortion

Max Distortion
10%

Wide

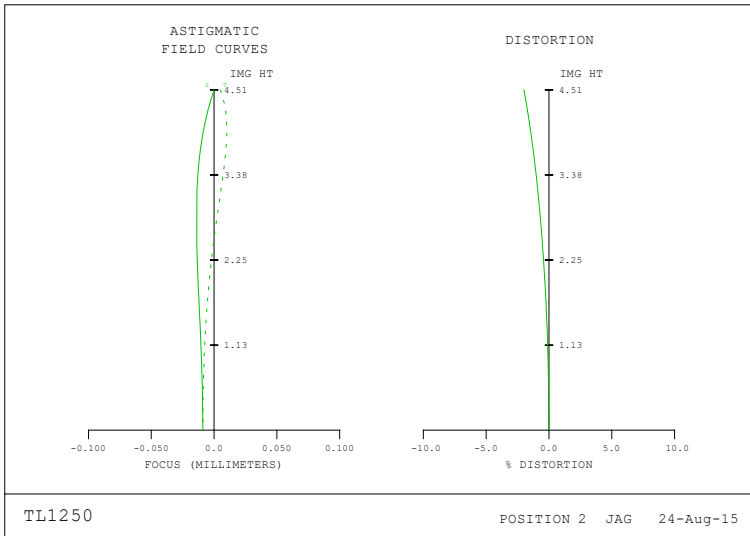


12mm Focal Length

Field Position	mm	Distortion
0	0	0
0.1	0.45	-0.08403
0.2	0.9	-0.33751
0.3	1.35	-0.76475
0.4	1.8	-1.37332
0.5	2.25	-2.17465
0.6	2.7	-3.18515
0.7	3.15	-4.42799
0.8	3.6	-5.93602
0.9	4.05	-7.75711
1	4.5	-9.96437

Mid

2%

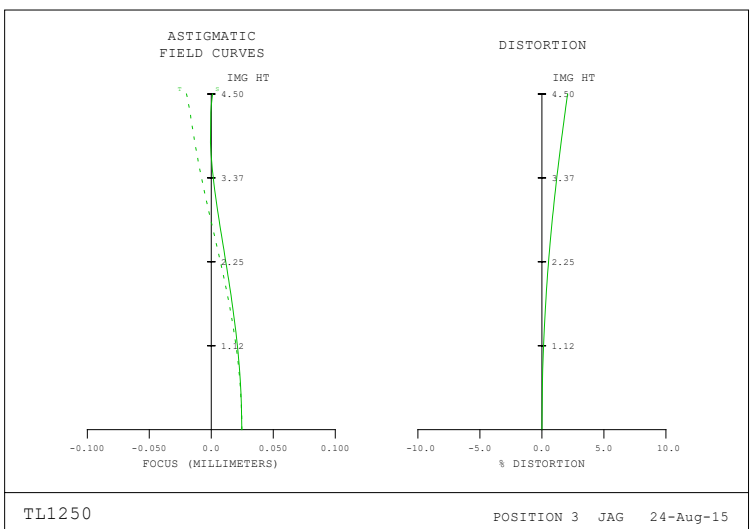


24mm Focal Length

Field Position	mm	Distortion
0	0	0
0.1	0.45	-0.01671
0.2	0.9	-0.06709
0.3	1.35	-0.15196
0.4	1.8	-0.27279
0.5	2.25	-0.43182
0.6	2.7	-0.63238
0.7	3.15	-0.87932
0.8	3.6	-1.17981
0.9	4.05	-1.54461
1	4.5	-1.99063

Tele

2%



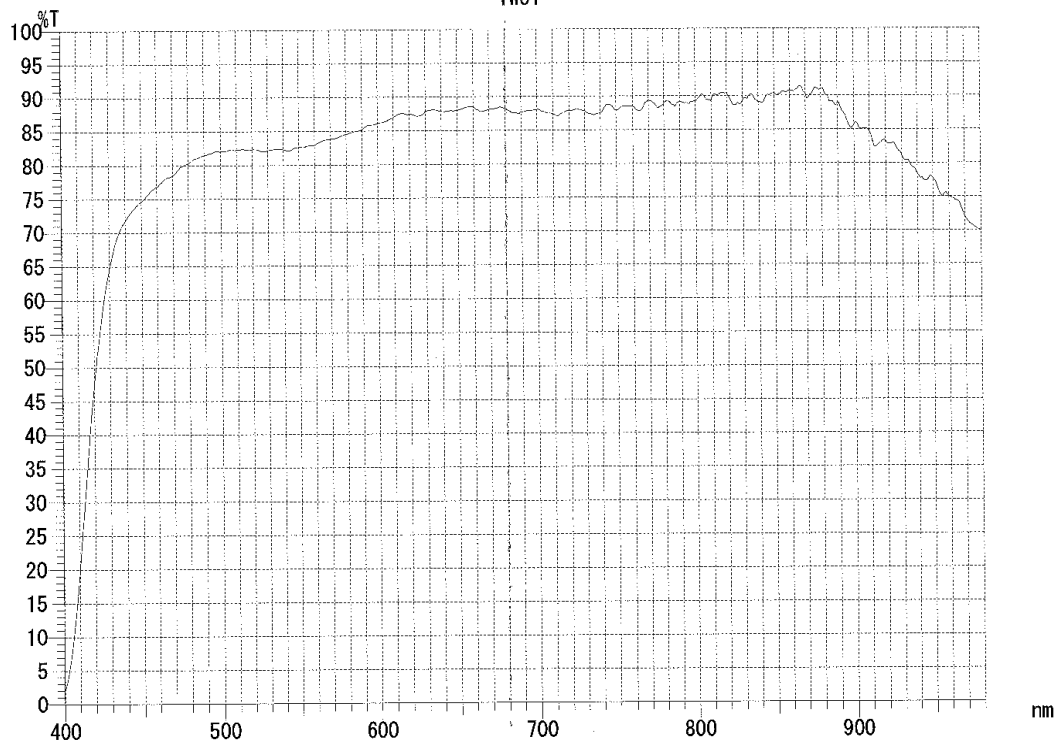
50mm Focal Length

Field Position	mm	Distortion
0	0	0
0.1	0.45	0.02133
0.2	0.9	0.08538
0.3	1.35	0.19226
0.4	1.8	0.34209
0.5	2.25	0.53486
0.6	2.7	0.77017
0.7	3.15	1.04669
0.8	3.6	1.36123
0.9	4.05	1.70656
1	4.5	2.06653

TL1250 Transmittance

レポート: 16:10:56, 06/04/2015

TW51



サンプル: TW51
 ファイル名:
 分析日時: 16:08:31, 06/04/2015
 オペレータ: Administrator
 コメント: without IRcut filter

データリスト

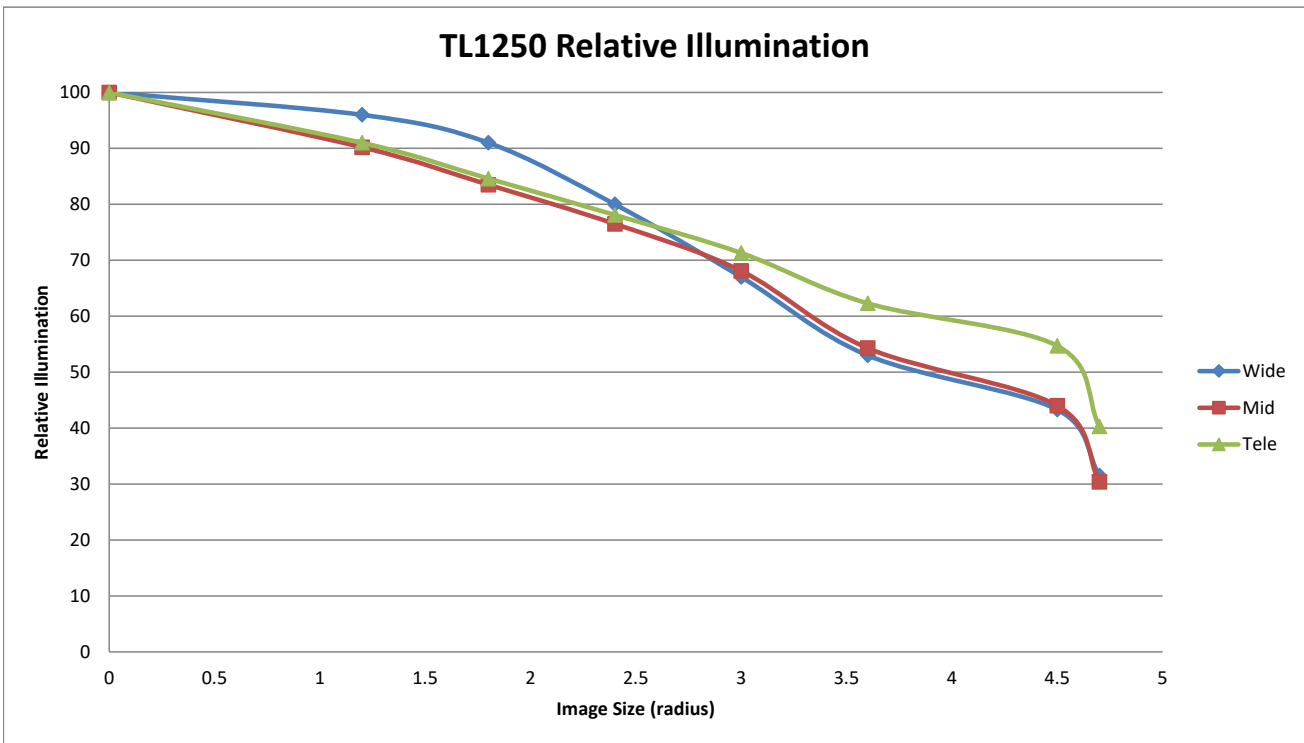
nm	%T	nm	%T	nm	%T
980.00	69.90	970.00	72.00	960.00	75.03
950.00	77.74	940.00	78.37	930.00	81.02
920.00	83.25	910.00	84.74	900.00	85.75
890.00	88.88	880.00	91.11	870.00	90.36
860.00	90.72	850.00	90.35	840.00	88.94
830.00	89.34	820.00	90.45	810.00	89.23
800.00	89.33	790.00	89.18	780.00	88.90
770.00	89.41	760.00	88.50	750.00	87.90
740.00	87.56	730.00	87.93	720.00	87.92
710.00	87.40	700.00	88.11	690.00	87.71
680.00	88.30	670.00	88.13	660.00	88.52
650.00	87.99	640.00	87.86	630.00	87.81
620.00	87.46	610.00	86.93	600.00	86.08
590.00	85.18	580.00	84.57	570.00	83.79
560.00	82.92	550.00	82.65	540.00	82.30
530.00	82.14	520.00	82.34	510.00	82.26
500.00	82.05	490.00	81.47	480.00	80.27
470.00	78.50	460.00	76.79	450.00	74.69
440.00	71.73	430.00	64.53	420.00	47.42
410.00	19.74	400.00	2.23		

TL1250 Relative Illumination

F number 1.4 1.8 2.4

TL1250 Relative Illumination

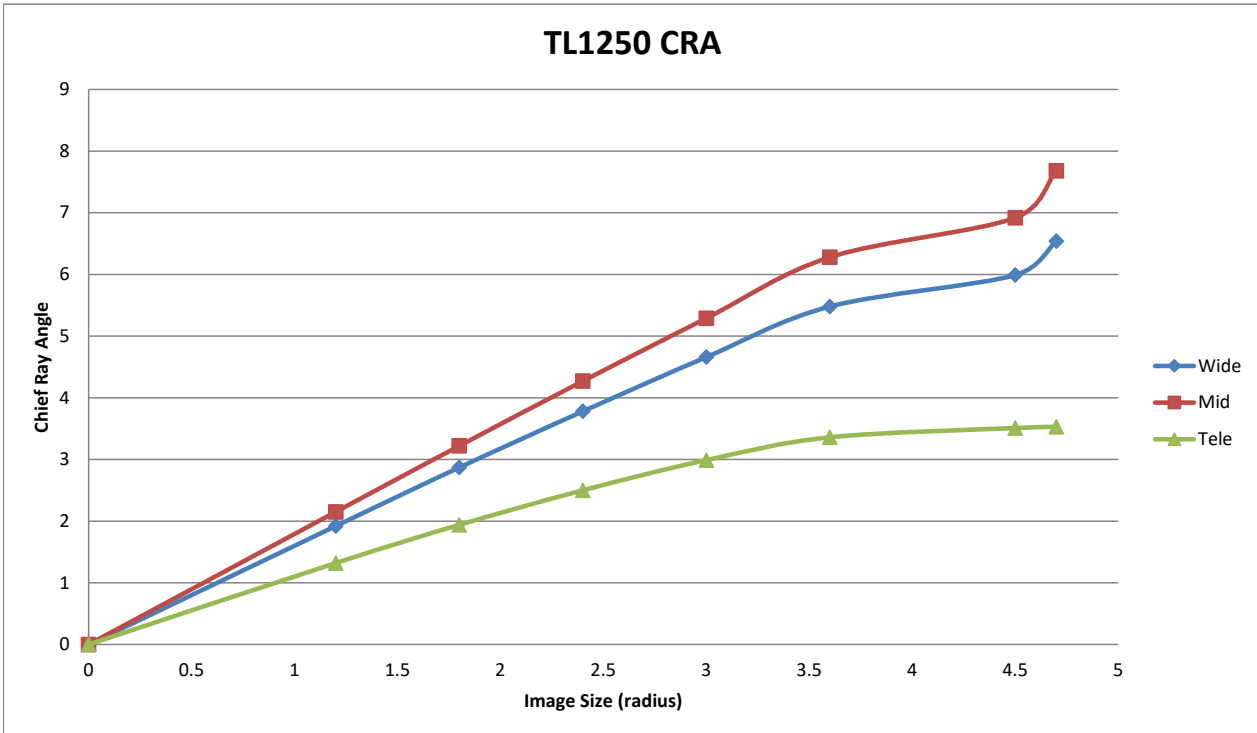
Image Size	Wide	Mid	Tele
0	100	100	100
1.2	96	90.2	91
1.8	91	83.5	84.6
2.4	80	76.5	78.1
3	67	68.1	71.3
3.6	53	54.3	62.3
4.5	43.3	44	54.7
4.7	31.5	30.4	40.3



TL1250 Cheif Ray Angle

TL1250 Chief Ray Angle (CRA)

Image Size	Wide	Mid	Tele	
0	0	0	0	0
1.2	1.92	2.15	1.32	
1.8	2.87	3.22	1.94	
2.4	3.78	4.27	2.5	
3	4.66	5.29	2.99	
3.6	5.48	6.28	3.36	
4.5	5.99	6.92	3.51	
4.7	6.54	7.68	3.53	



TL1250 IR Filter Specification

Optical specifications for IR filter (Day)	
Cut-on wavelength	405nm \pm 10nm
Visible transmission	430-610nm
Cut-off wavelength	650nm \pm 10nm
IR transmission	<1% max 695-800nm <3% max 800-1050nm
Optical specifications for clear filter (Night)	
Visible transmission	400-1050nm

TL1250 Iris Step Size Table

TL1250 Iris Step Aperture Size Table

Jun.2,2015

TL1250 Iris Step Aperture Size Table

Jun.2,2015

OPEN

setp	Aperture Size (mm)	F No.
1	95.033	1.842
2	95.033	1.842
3	93.929	1.852
4	92.384	1.868
5	90.789	1.884
6	89.146	1.901
7	87.455	1.919
8	85.716	1.938
9	83.933	1.958
10	82.101	1.979
11	80.247	2.002
12	78.385	2.025
13	76.518	2.049
14	74.647	2.074
15	72.772	2.100
16	70.892	2.128
17	69.012	2.156
18	67.130	2.186
19	65.249	2.217
20	63.367	2.249
21	61.489	2.283
22	59.614	2.318
23	57.743	2.355
24	55.876	2.393
25	54.017	2.434
26	52.166	2.476
27	50.323	2.513
28	48.488	2.568
29	46.667	2.617
30	44.857	2.669
31	43.061	2.723
32	41.278	2.781
33	39.512	2.842
34	37.764	2.907
35	36.034	2.975
36	34.322	3.048
37	32.632	3.125
38	30.965	3.208
39	29.321	3.296
40	27.701	3.391
41	26.109	3.492
42	24.544	3.601
43	23.009	3.719
44	21.502	3.846
45	20.030	3.985
46	18.591	4.135
47	17.188	4.300
48	15.820	4.482
49	14.493	4.634
50	13.207	4.904
51	11.961	5.153
52	10.762	5.431
53	9.610	5.747
54	8.508	6.107
55	7.456	6.524
56	6.461	7.007
57	5.524	7.578
58	4.650	8.258
59	3.843	9.084
60	3.110	10.097
61	2.458	11.357
62	1.899	12.920
63	1.450	14.785
64	1.117	16.845
65	0.847	19.343
66	0.620	22.608
67	0.428	27.210
68	0.273	34.070
69	0.152	45.659
70	0.066	69.290
71	0.014	150.445
72	0.000	-
73	0.000	-
74	0.000	-
75	0.000	-

CLOSE

Step	Aperture size	F/#
1	95.0	1.84
5	90.8	1.88
10	82.1	1.98
15	72.8	2.10
20	63.4	2.25
25	54.0	2.43
30	44.9	2.67
35	36.0	2.98
40	27.7	3.39
45	20.0	3.98
50	13.2	4.90
55	7.5	6.52
60	3.1	10.10
65	0.8	19.34
70	0.1	69.29
72	0.0 -	