

shaping the future of optics



Linkhou TCPLP23-0.36-115 + EL-16-40-TC-VIS-5D-C

Test report

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Summary



- Working Distance : 124mm @ 0 dpt
- Working Range: 107 - 124mm @ 3 dpt range (datasheet*)
- Working Range: 107 - 134mm @ 5 dpt range (full range)
- Horizontal Field of View on 2/3" sensor: 23.536 mm @ 0 dpt
- Optical leverage: 5.67 mm/dpt (over 3 dpt range)
- Magnification change per mm z-range: 0.17%/mm (over 3 dpt range)
- Magnification range: 0.360~0.371 (datasheet)
- Magnification range: 0.355~0.371 (full range)
- Resolution (Center): 137-143 lp/mm
- Resolution (Corner): 97-112 lp/mm

* Although results are good over the full 5 dpt tuning range of the EL-16-40 Linkhou prefers to limit the nominal specification to the 0-3dpt range

Test setup

- Camera : UI-3280CP-M 2/3" sensor, 3.45 μ m pixel size
- Lens: TCPLP23-0.36-115 (A)
- EL-16-40-TC-VIS-5D-C at center
- Lens: TCPLP23-0.36-115 (B)
- USAF target positive chrome on glass
- White backlight

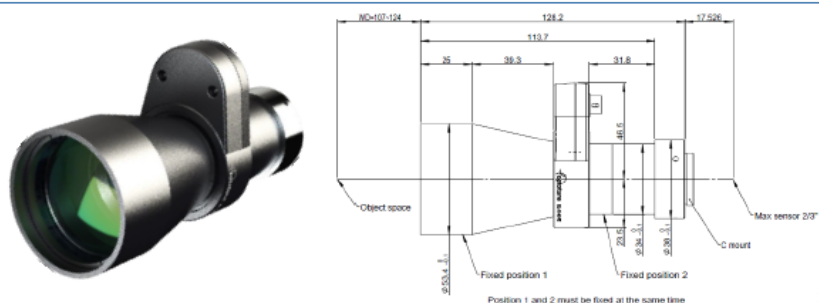




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Datasheet

TCALP23-036-115 Adaptive BI-Telecentric Series



Features of TCALP Series

- ◆ Fast focus in milliseconds
- ◆ Focus without mechanical movement
- ◆ High resolution, Large depth of field
- ◆ Excellent telecentricity, Ultra low distortion
- ◆ Design for high-end inspection and precision measurement

Optical Specifications

Magnification $\beta(x)$	0.36
Object Circle $\varnothing(\text{mm})$	30.6
Working Distance (mm)	107.0~124.0
Resolution (μm)	8.7
TV Distortion (%)	≤ 0.1
Telecentricity ($^\circ$)	≤ 0.1
Object-image Distance (mm)	252.7~269.7
Effective F Number	4.5

Field of View

Detector type	Object field of view
2/3" (8.45×7.07mm)	23.47×19.64mm
1/1.8" (7.16×5.44mm)	19.89×15.11mm
1/2" (6.40×4.80mm)	17.78×13.33mm

Mechanical Specifications

Mount	C
Dimensions (mm)	$\varnothing 53.4 \times 128.2$
Weight (g)	616



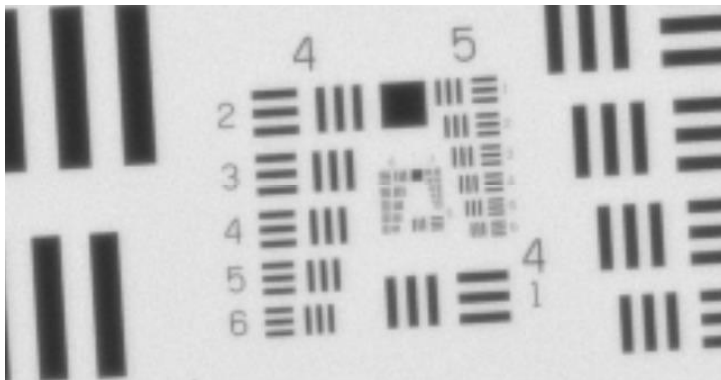
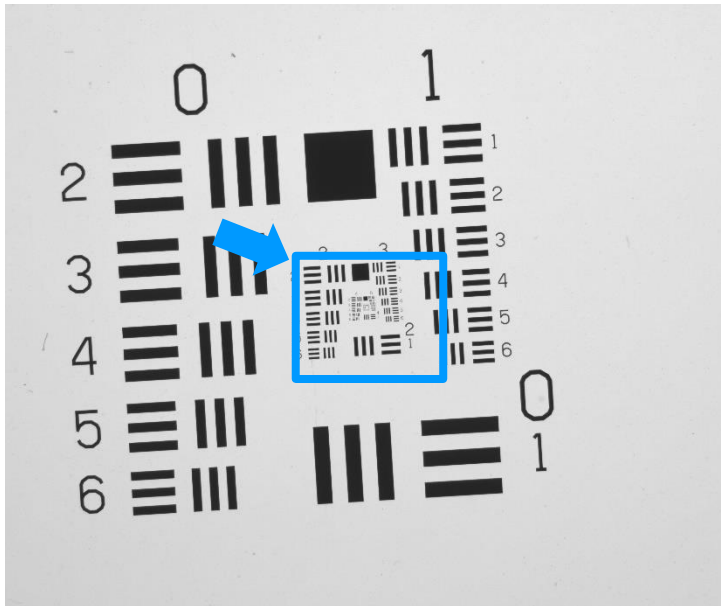
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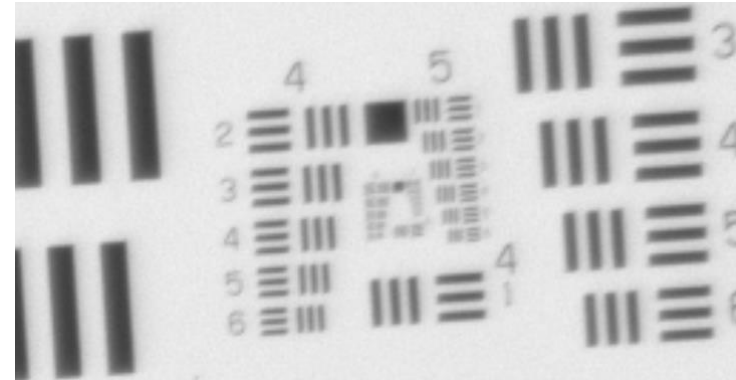
Full image with 2/3" Sensor HFOV 23.6mm @ 0 dpt



Center



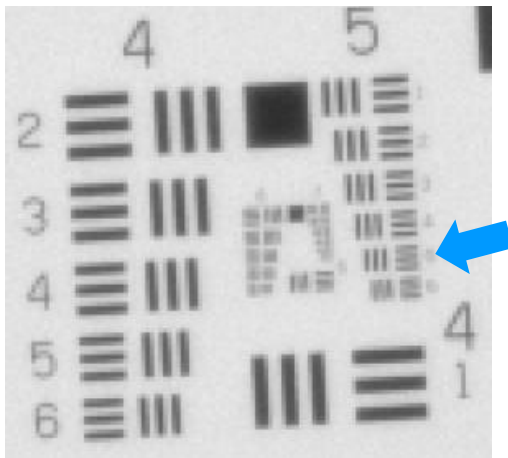
Corner



Resolution maintained across nominal tuning range of 0 to 3 dpt (Center)

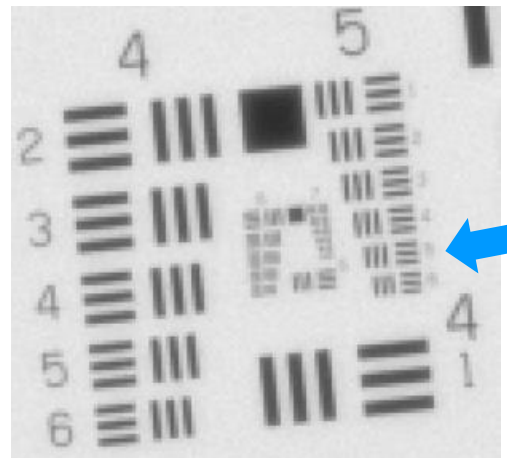


0 dpt Center WD=124mm



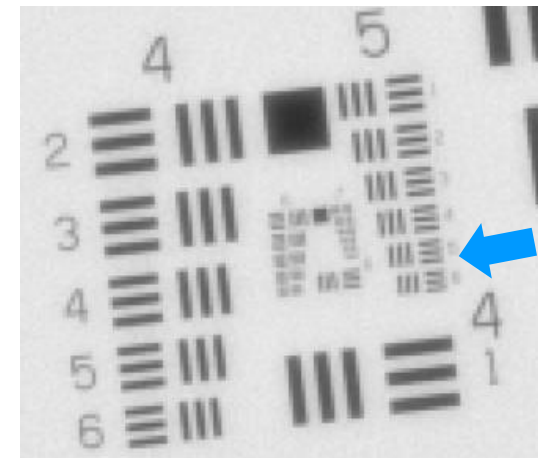
USAF element: 5/5
 Line width (um): 9.84
 Lp/mm (object): 51
 Magnification: 0.360
Lp/mm (image): 141
 Nyquist limit: 145
 Pixel size (um): 3.45

2 dpt Center



USAF element: 5/5
 Line width (um): 9.84
 Lp/mm (object): 51
 Magnification: 0.365
Lp/mm (image): 139
 Nyquist limit: 145
 Pixel size (um): 3.45

3 dpt Center

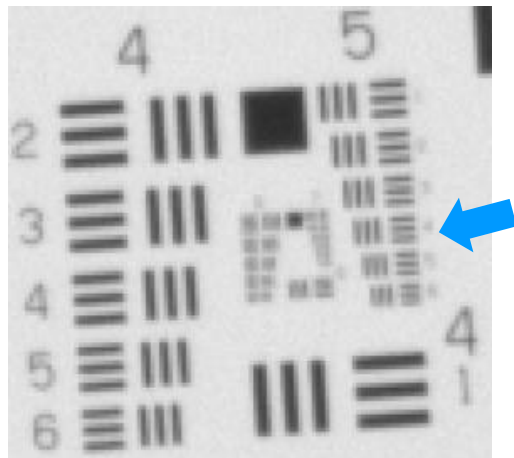


USAF element: 5/5
 Line width (um): 9.84
 Lp/mm (object): 51
 Magnification: 0.371
Lp/mm (image): 137
 Nyquist limit: 145
 Pixel size (um): 3.45

Resolution maintained across extended tuning range of -2 to +3 dpt (Center)

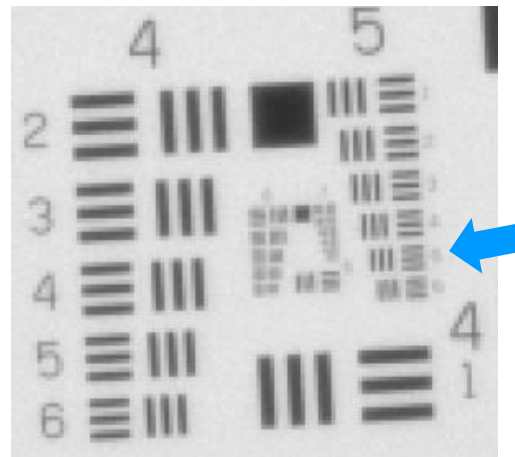


-2 dpt Center



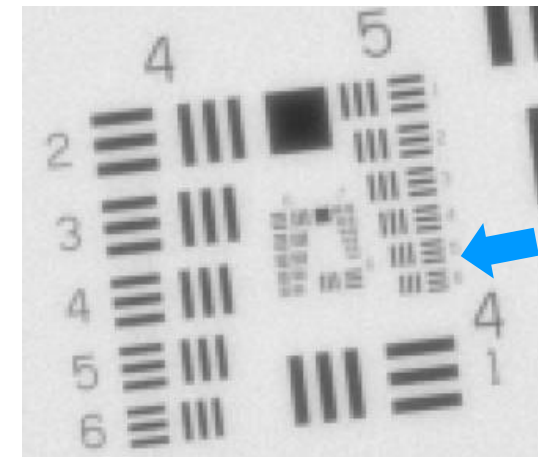
USAF element: 5/5
Line width (um): 9.84
Lp/mm (object): 51
Magnification: 0.355
Lp/mm (image): 143
Nyquist limit: 145
Pixel size (um): 3.45

0 dpt Center



USAF element: 5/5
Line width (um): 9.84
Lp/mm (object): 51
Magnification: 0.360
Lp/mm (image): 141
Nyquist limit: 145
Pixel size (um): 3.45

+3 dpt Center

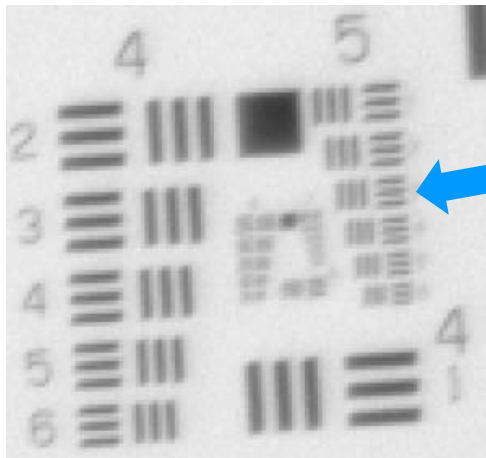


USAF element: 5/5
Line width (um): 9.84
Lp/mm (object): 51
Magnification: 0.371
Lp/mm (image): 137
Nyquist limit: 145
Pixel size (um): 3.45

Resolution drops slightly in the corners

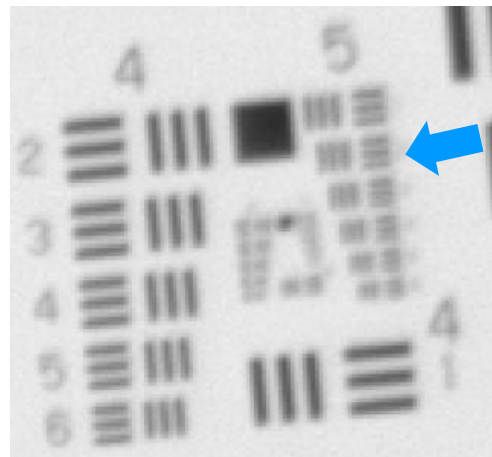


0 dpt Corner



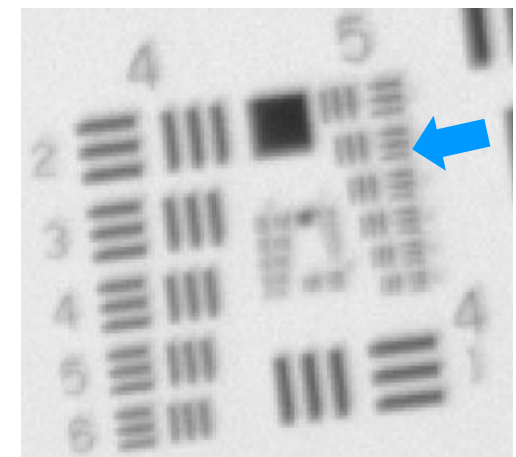
USAF element: 5/3
Line width (um): 12.4
Lp/mm (object): 40
Magnification: 0.360
Lp/mm (image): 112
Nyquist limit: 145
Pixel size (um): 3.45

+2 dpt Corner



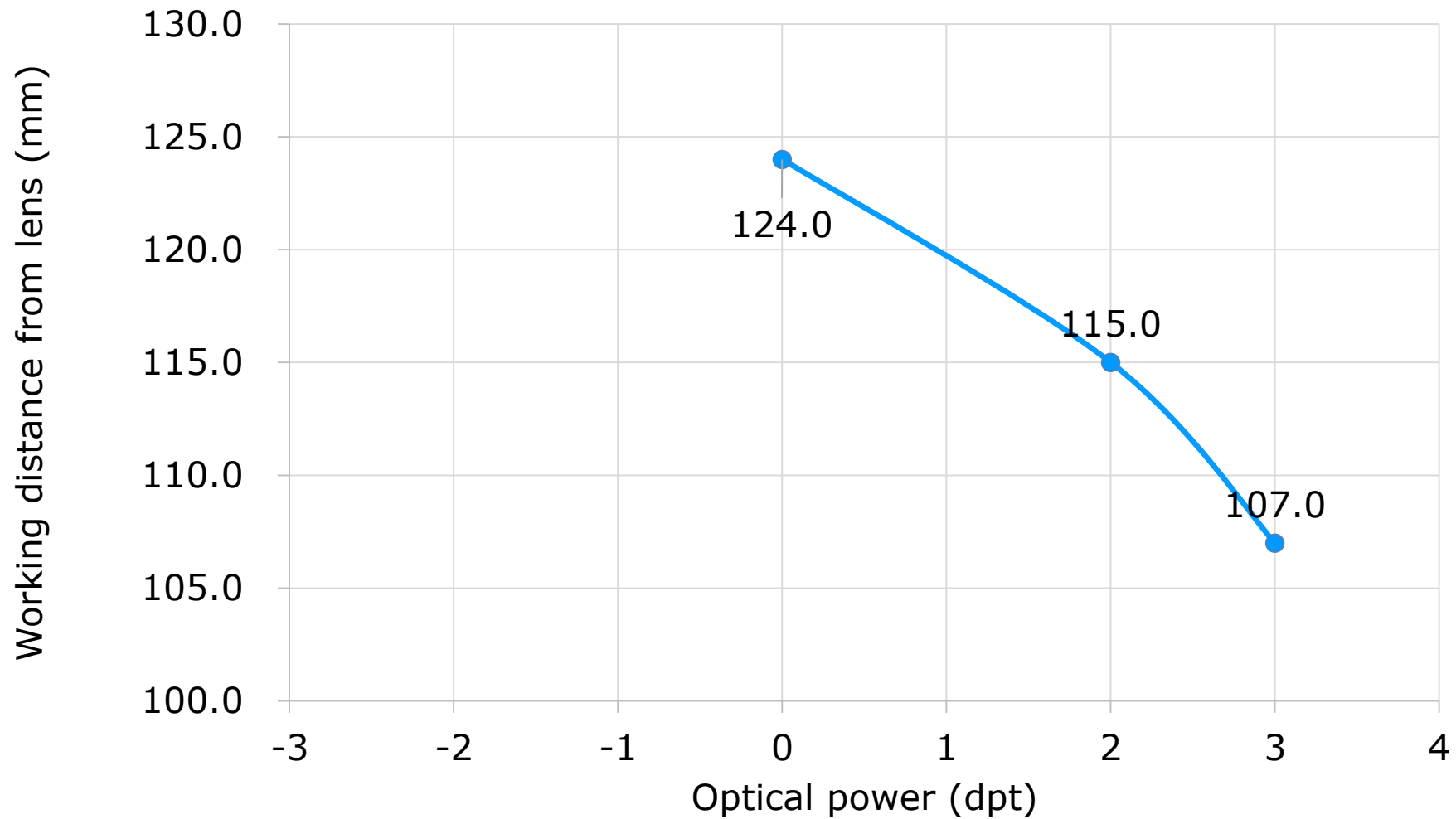
USAF element: 5/2
Line width (um): 13.92
Lp/mm (object): 36
Magnification: 0.365
Lp/mm (image): 98
Nyquist limit: 145
Pixel size (um): 3.45

+3 dpt Corner



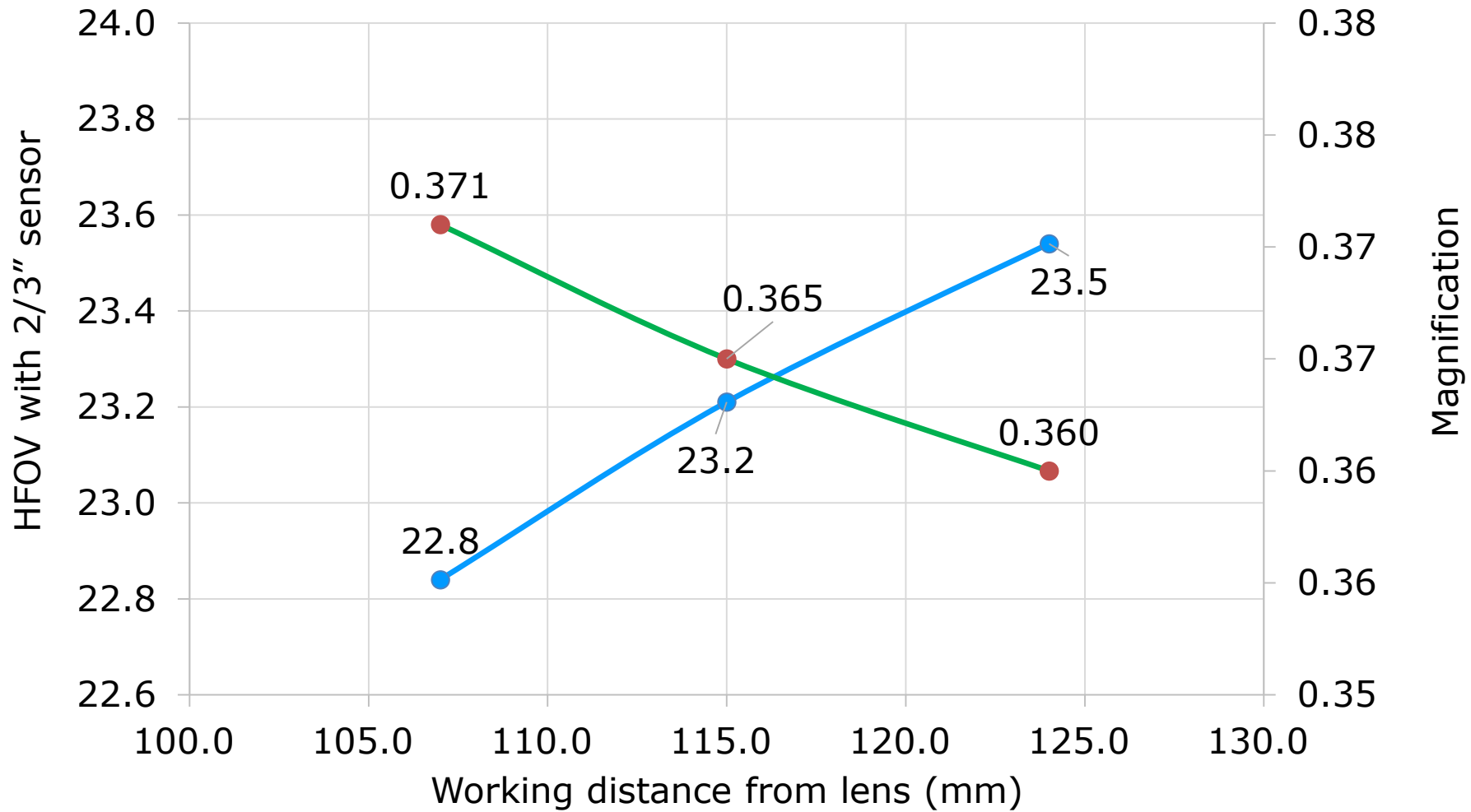
USAF element: 5/2
Line width (um): 13.92
Lp/mm (object): 36
Magnification: 0.371
Lp/mm (image): 97
Nyquist limit: 145
Pixel size (um): 3.45

Working distance of 17mm over 3 dpt range



Optical leverage: ~ 5.67 mm per diopter

Magnification change of 3% over 3 dpt range



Magnification change: 0.17 %/mm Working Distance