



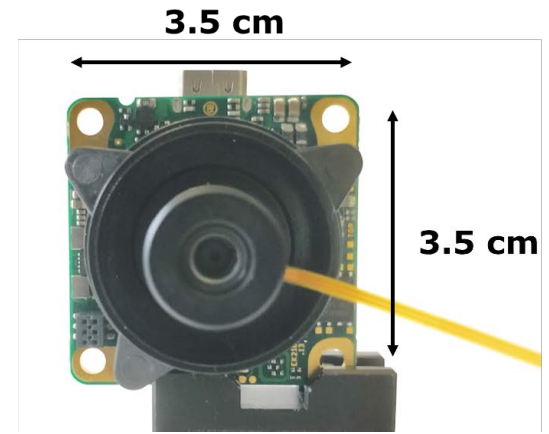
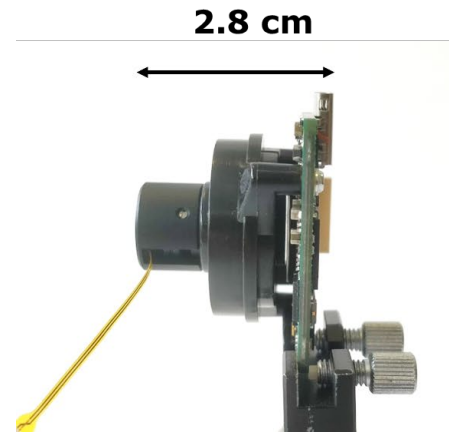
5 mm lens with integrated EL-3-10

Test report of ELM-5-5.0-7-S (Evetar E3250C)

Compact, cost effective lens for many applications

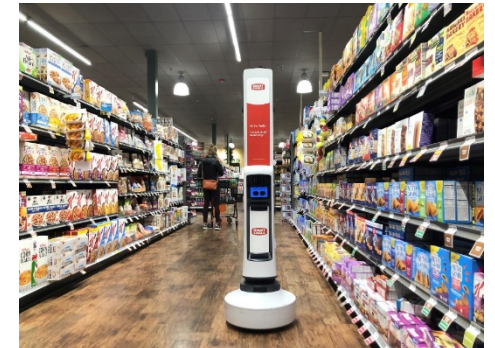
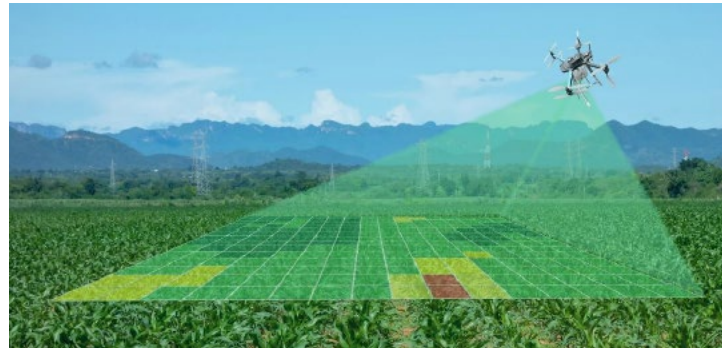
➤ In combination with board level camera, a **full imaging system with:**

- ✓ **Ultra compact form factor**
- ✓ **Ultra light weight (~20 grams)**
- ✓ **Autofocus**
- ✓ **Large Working distance range**
- ✓ **Large Field of View**



➤ **Cost effective** solution for many applications:

- ✓ **Drones**
- ✓ **Robot Vision**
- ✓ **Packet sorting**
- ✓ **Bin picking**



Summary

➤ Large Field of View and large working distance (WD) range

- From 50 mm to infinity

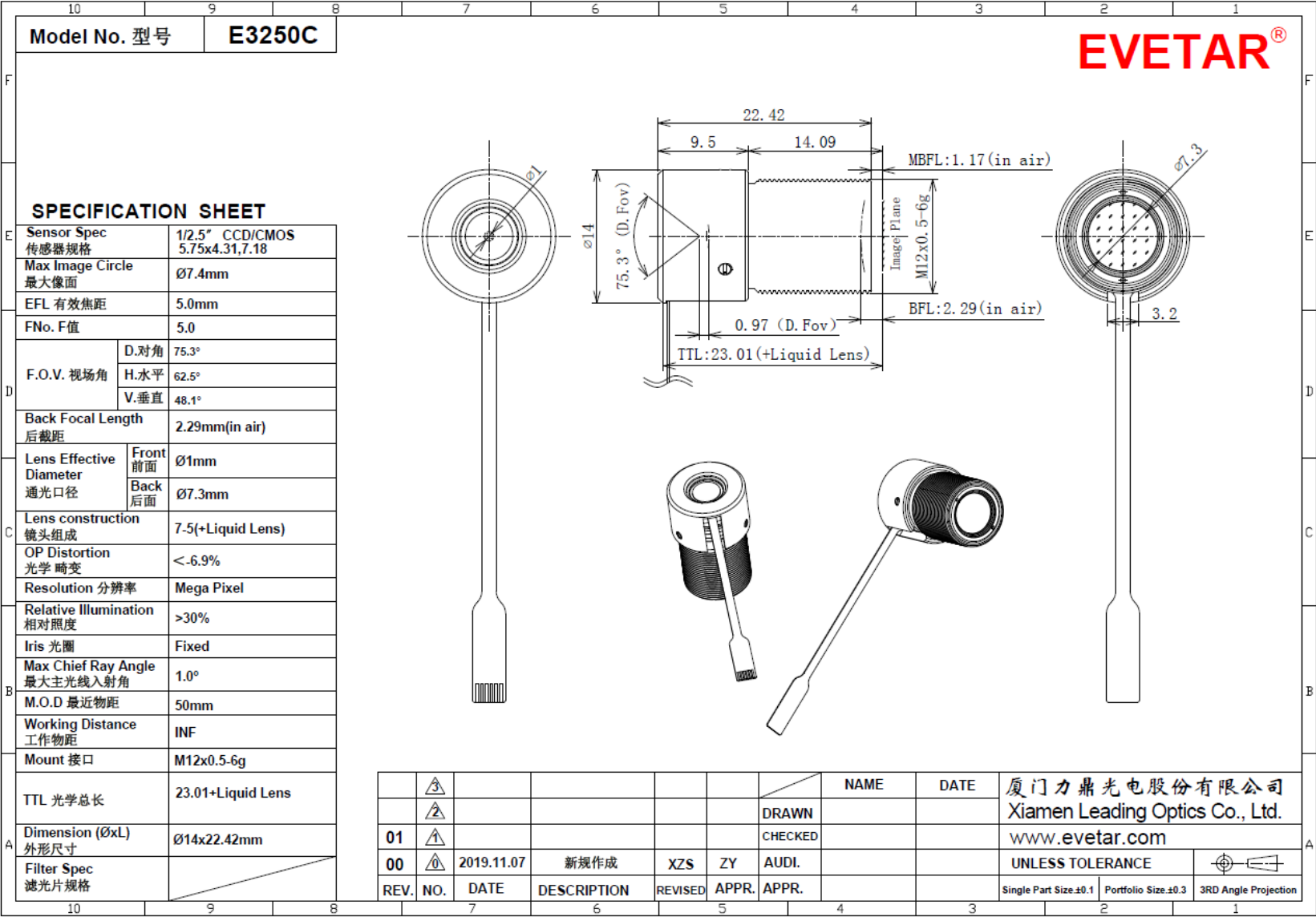
WD AFOV	500 mm	130 mm	60 mm
Width	57°	60°	61°
Height	53°	56°	56°
Diagonal	74°	76°	77°

➤ High resolution for 2.4 μm pixels:

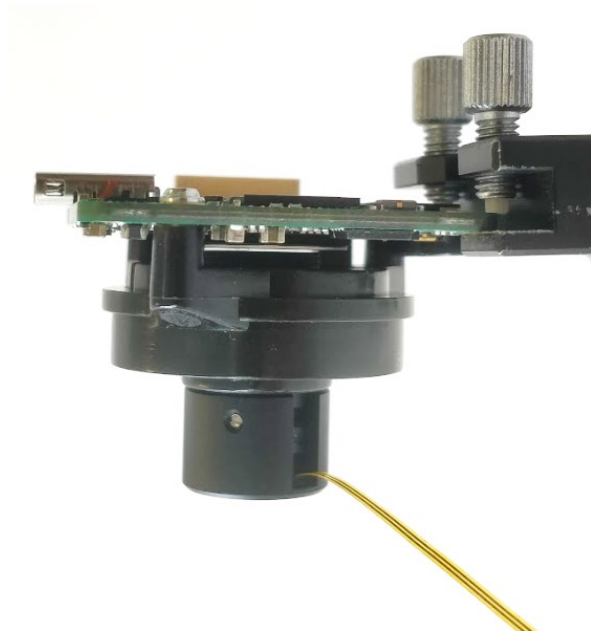
- **Nyquist limit** (up to 208 lp/mm) in the center of the FOV
- Corners and edges between 113-159 lp/mm

➤ Field curvature on the edges and corners **can be compensated** by **changing the optical power of the liquid lens**

ELM-5-5.0-7-S datasheet



Test setup



Camera: 1/1.8" cropped to 1/2.5", 2250 x 2076 px,
Pixel size = 2.4 μm

Model: IDS UI-3881LE-M-GL

Lens: ELM-5-5.0-7-S with EL-3-10-VIS-26D-FPC
embedded

Driver: Optotune Lens Driver 4i

Target: USAF chrome target, transparent

Light: Red backlight

Large field of view with 1/2.5" sensor

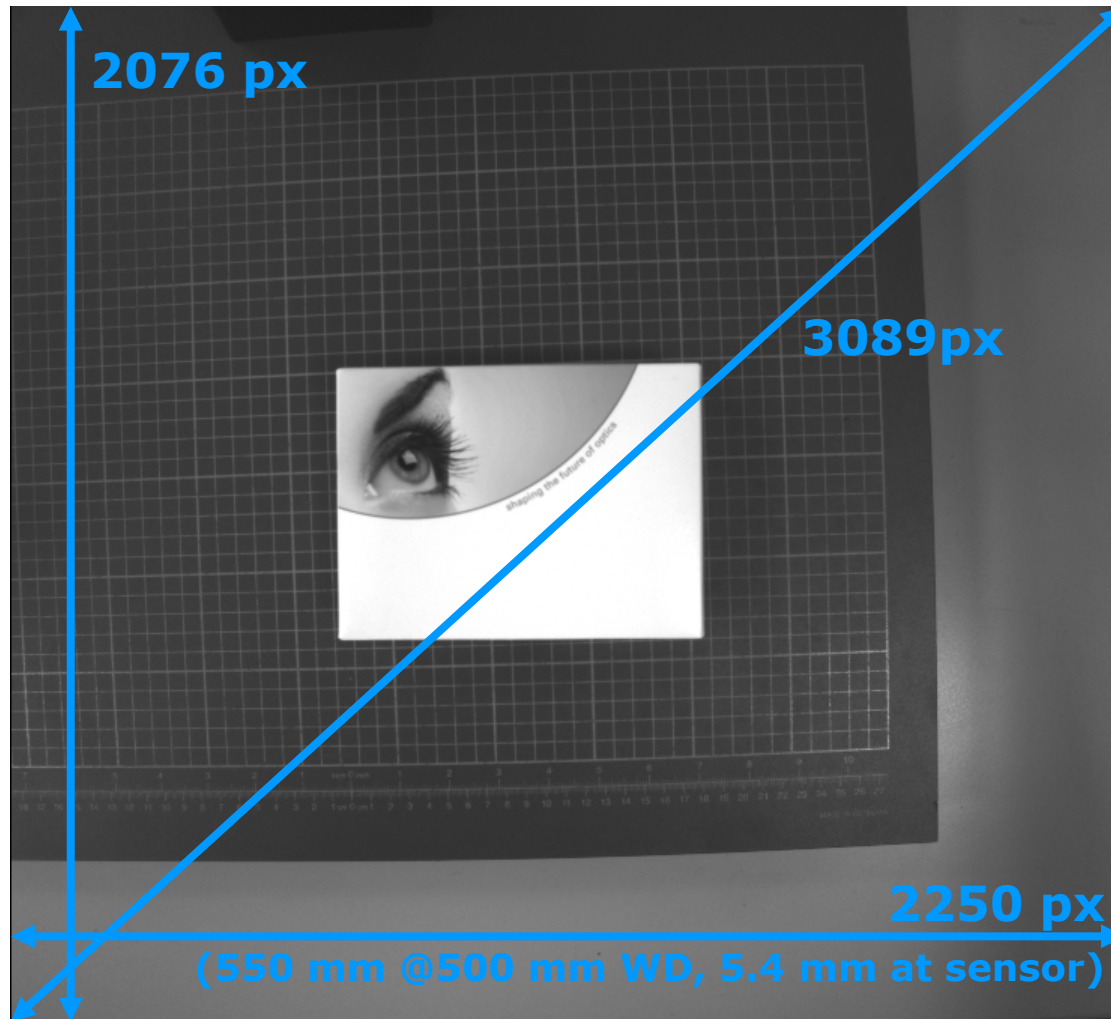
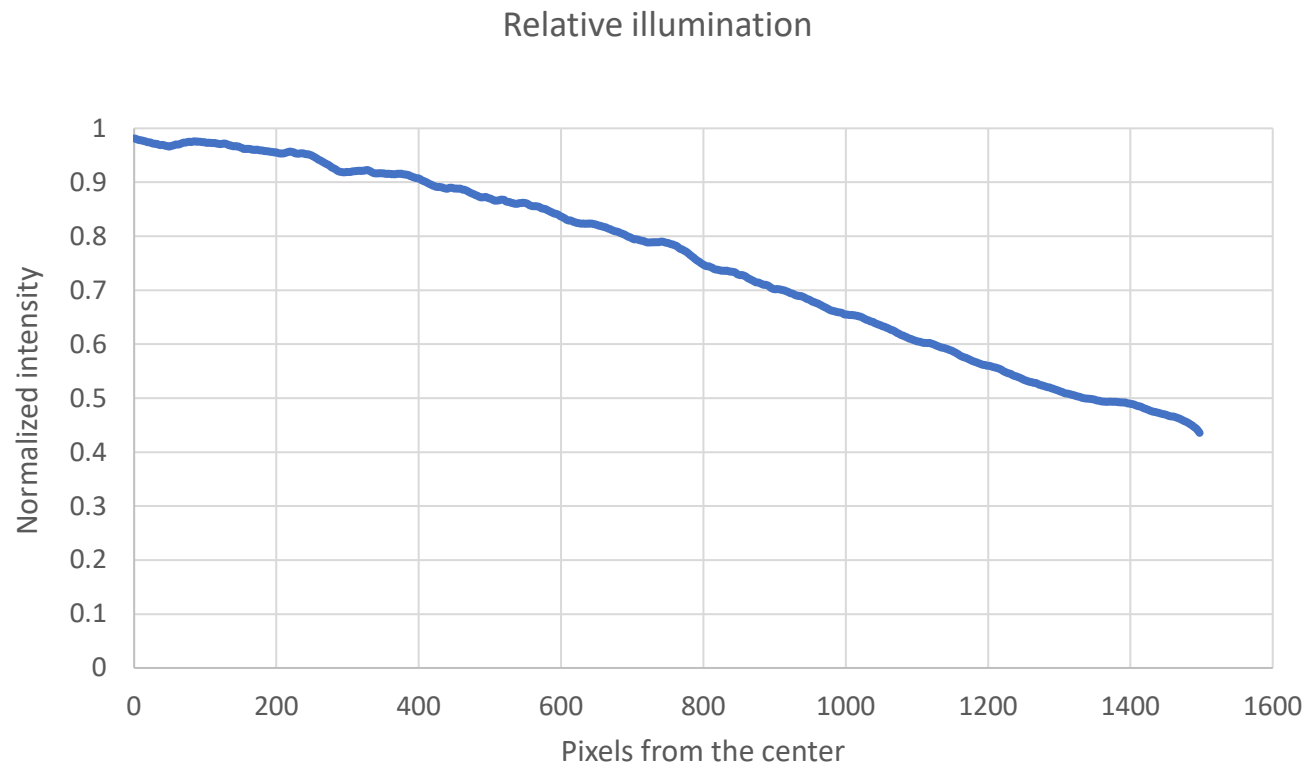


Image size (2.4 μm px):

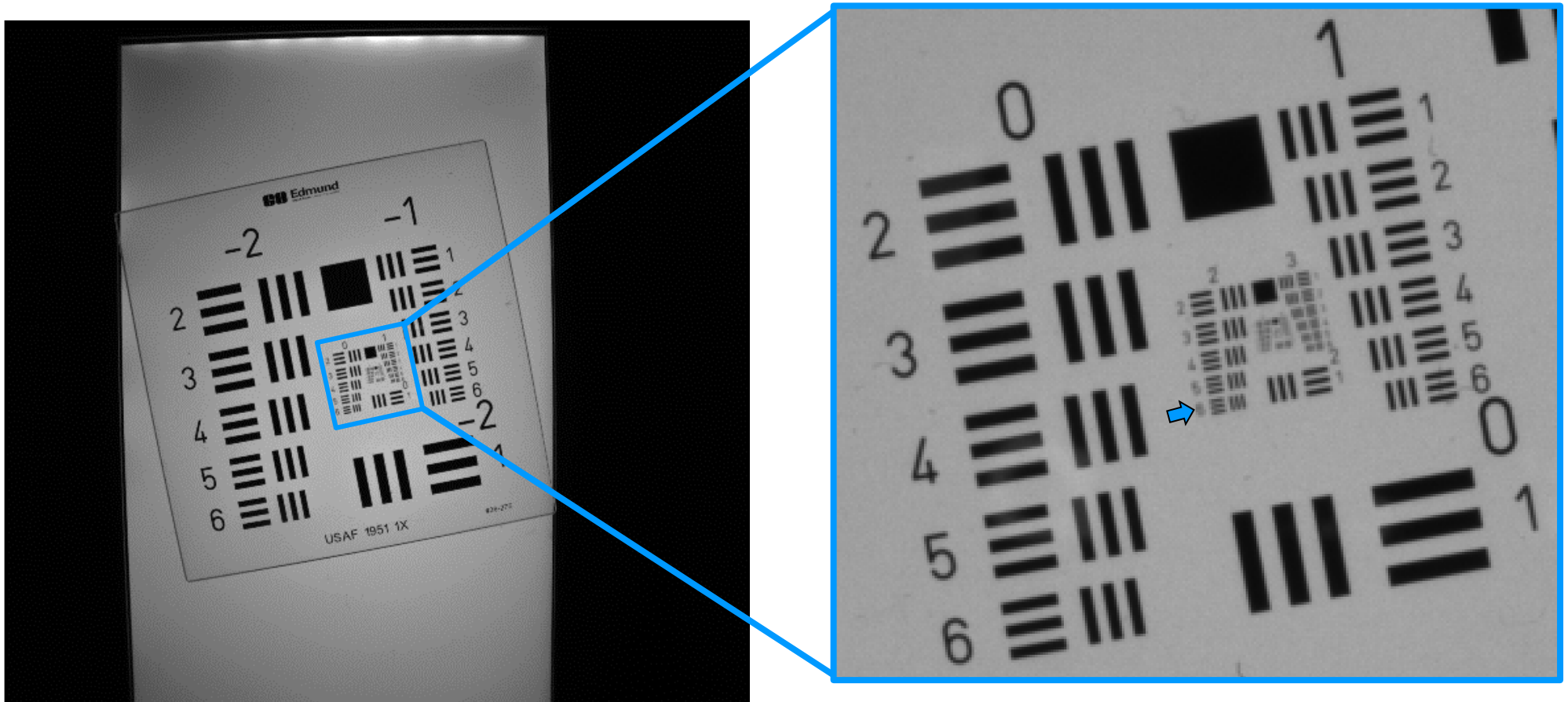
- Width = 5.4 mm
- Height = 5 mm
- Diagonal = 7.4 mm

Relative illumination > 40%



Method for image evaluation

- After acquisition, images are zoomed in to show resolution limited element



WD 500 mm, Nyquist limited in the center

Camera

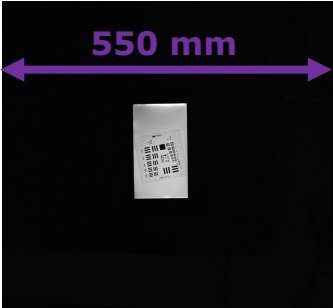
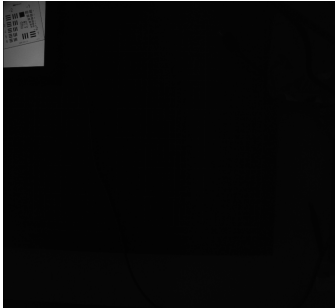
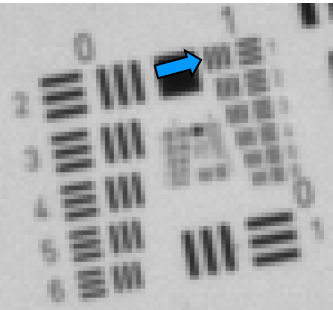
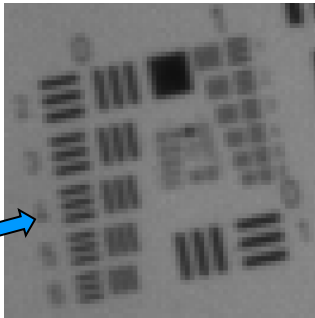
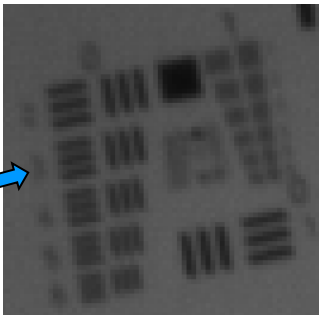
Sensor size = 2250 x 2076 px

Nyquist limit = 208 lp/mm

Pixel size = 2.4 μm

Light

Red background illumination

	Center	Edge	Corner
			
	12 mA	2 mA*	2 mA*
			
USAF element:	1/1	0/4	0/3
Line width (μm):	250	353.55	396.85
Lp/mm (object):	2	1	1
Magnification:	0.010	0.010	0.010
Lp/mm (image):	203	144	128

WD 130 mm, Nyquist limited in the center

Camera

Sensor size = 2250 x 2076 px

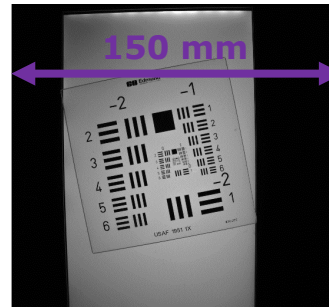
Nyquist limit = 208 lp/mm

Pixel size = 2.4 μm

Light

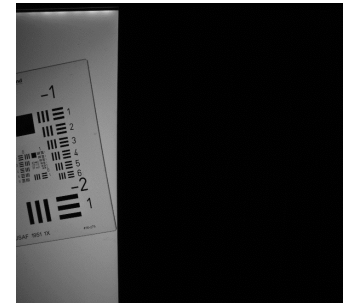
Red background illumination

Center



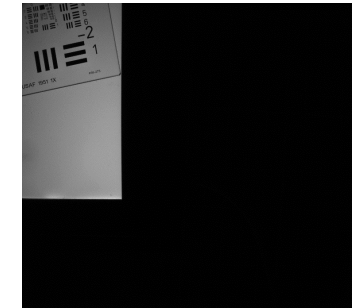
40 mA

Edge

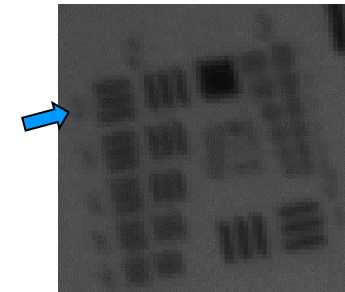
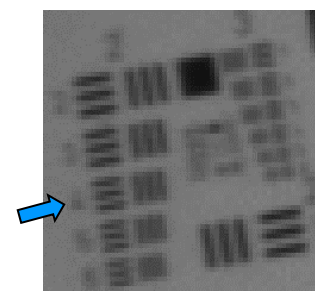
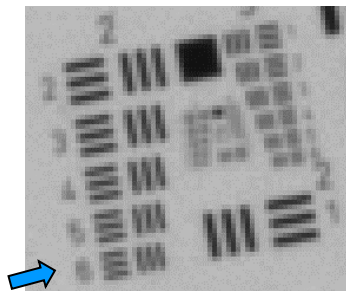


26 mA*

Corner



22 mA*



USAF element: 2/6
Line width (μm): 70.15
Lp/mm (object): 7
Magnification: 0.036
Lp/mm (image): 197

2/4
88.39
6
0.036
157

2/2
111.36
4
0.036
124

WD 60 mm, Nyquist limited in the center

Camera

Sensor size = 2250 x 2076 px

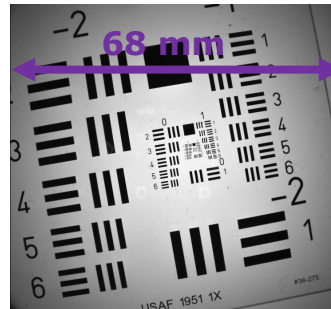
Nyquist limit = 208 lp/mm

Pixel size = 2.4 μm

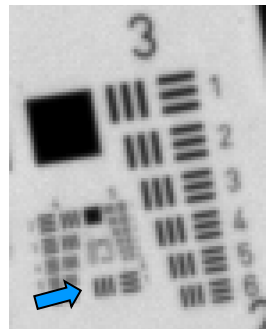
Light

Red background illumination

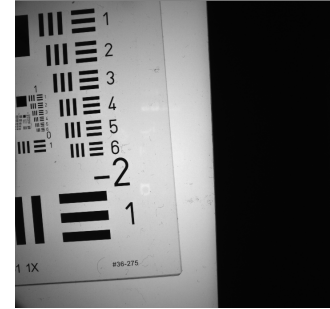
Center



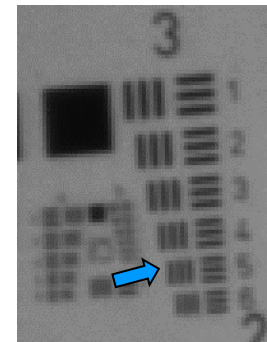
20 mA



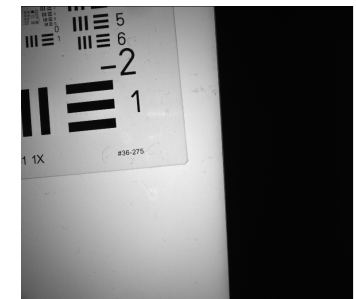
Edge



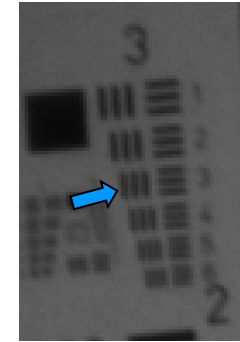
10mA*



Corner



6mA*

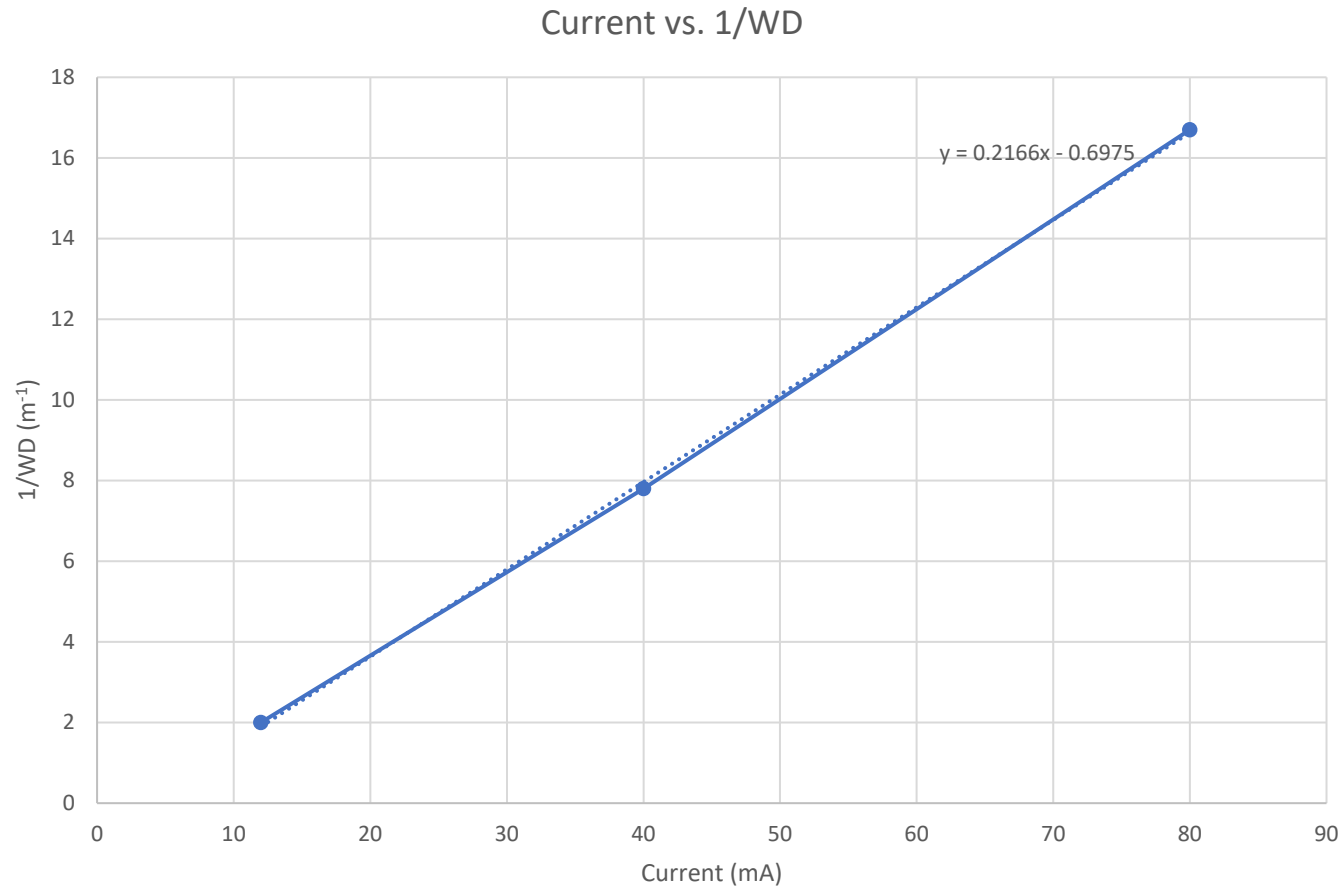


USAF element: 4/1
Line width (μm): 31.25
Lp/mm (object): 16
Magnification: 0.080
Lp/mm (image): 201

3/5
39.37
13
0.080
159

3/3
49.61
10
0.080
126

Linear relationship Current vs. $1/WD$



- Optical leverage: 6.28 mm/mA (30 mm/dpt) in the 500 to 60 mm range
- Hyperfocal distance $\approx$ 500 mm