Drone Benchmark Report

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www.nomicam.com

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NomiCam

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  - Conclusion
  - Objective results
    - Color, Noise, Resolution, Exposure, Dynamic range
  - Subjective analysis
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Tested devices

Device	Camera resolution
Skydio 2	12MP
DJI Mavic 2 Zoom	12MP
DJI Mavic 2 Pro	20MP
DJI Mavic Air	12MP

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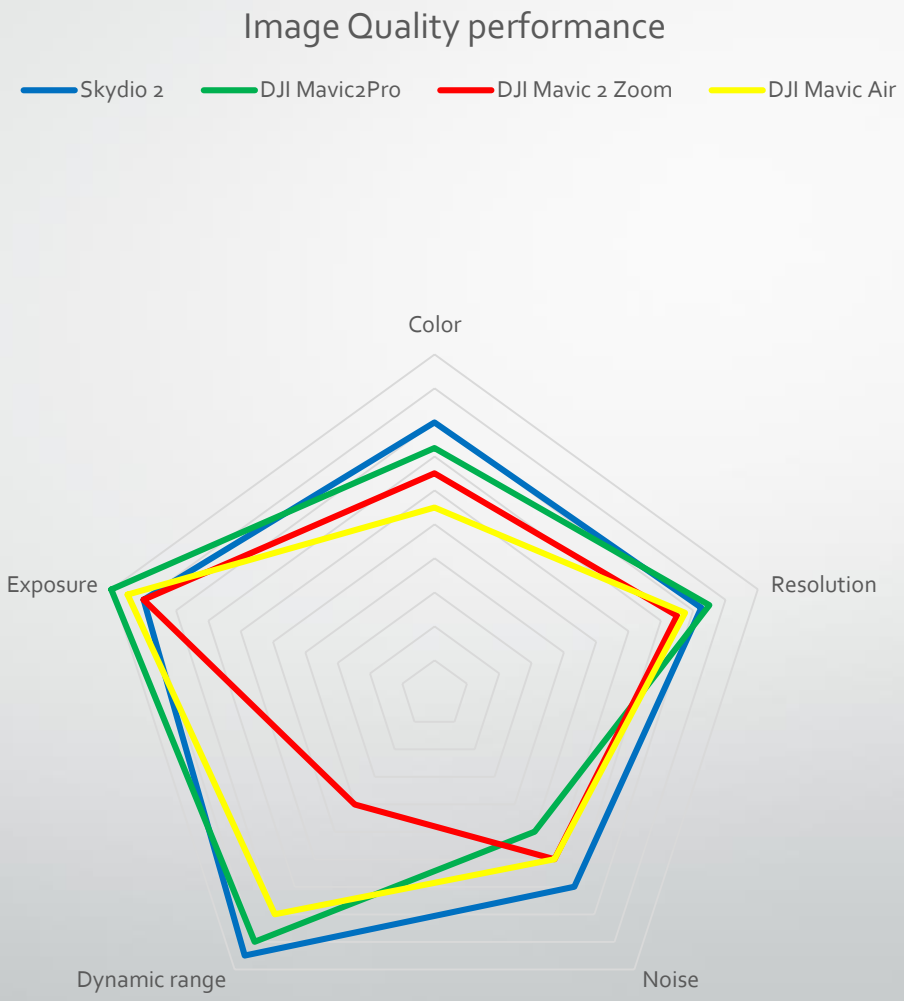
Conclusion



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Objective testing results

Poor quality

OK quality

Good quality

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COLOR (Auto mode)

Daylight	Delta E	Delta C
Skydio 2	5.1	1.0
DJI Mavic 2 Zoom	5.8	0.5
DJI Mavic 2 Pro	8.7	1.4
DJI Mavic Air	8.6	4.1

Fluorescent	Delta E	Delta C
Skydio 2	8.5	3.4
DJI Mavic 2 Zoom	7.1	5.2
DJI Mavic 2 Pro	9.1	4.7
DJI Mavic Air	10.6	7.8

Halogen	Delta E	Delta C
Skydio 2	9.2	8.7
DJI Mavic 2 Zoom	12.4	9.8
DJI Mavic 2 Pro	11.8	7.6
DJI Mavic Air	17.4	13.4

Delta E >15, Delta C>5
Delta E <15, Delta C<5
Delta E <10, Delta C<2

- Delta E is the total color error calculated from all color checker patches
- Delta C is calculated from neutral patches→ measures white balance performance

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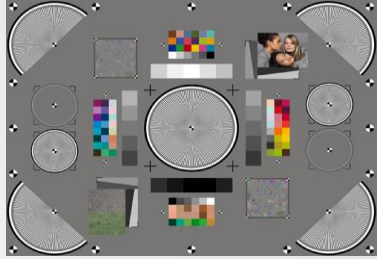
NOISE (Auto mode)



Daylight	SNR (dB)
Skydio 2	35.5
DJI Mavic 2 Zoom	26.1
DJI Mavic 2 Pro	25.5
DJI Mavic Air	27.2

Indoor	SNR (dB)
Skydio 2	34.6
DJI Mavic 2 Zoom	28.0
DJI Mavic 2 Pro	26.3
DJI Mavic Air	27.0

Low light	SNR (dB)
Skydio 2	33.3
DJI Mavic 2 Zoom	27.8
DJI Mavic 2 Pro	24.8
DJI Mavic Air	26.9

SNR < 25
SNR > 25
SNR > 35

- Higher SNR value means less noise in the image

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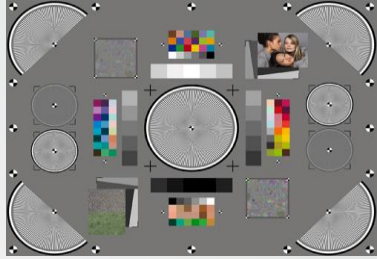
RESOLUTION 1m (Auto mode)

Device	Nyqvist freq (LP/PH)
Skydio 2	1520
DJI Mavic 2 Zoom	1500
DJI Mavic 2 Pro	1824
DJI Mavic Air	1520



Daylight	MTF 10 (center)	MTF 10 (corner)
Skydio 2	1660	1092
DJI Mavic 2 Zoom	1387	1088
DJI Mavic 2 Pro	1746	1438
DJI Mavic Air	1407	1015

Indoor	MTF 10 (center)	MTF 10 (corner)
Skydio 2	1538	1028
DJI Mavic 2 Zoom	1358	1061
DJI Mavic 2 Pro	1769	1418
DJI Mavic Air	1400	990

Lowlight	MTF 10 (center)	MTF 10 (corner)
Skydio 2	1280	916
DJI Mavic 2 Zoom	1287	1019
DJI Mavic 2 Pro	1697	1359
DJI Mavic Air	1355	965

- MTF 10 (center) is measured in the center of the image and MTF 10 (corner) in the corner of the image

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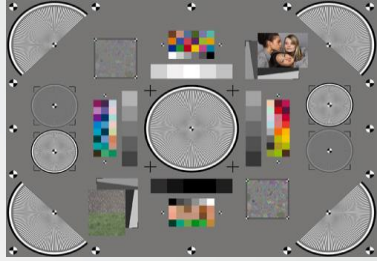
RESOLUTION 1m, % of Nyqvist (Auto mode)



Daylight	MTF 10 (center)	MTF 10 (corner)
Skydio 2	111%	73%
DJI Mavic 2 Zoom	92%	73%
DJI Mavic 2 Pro	96%	79%
DJI Mavic Air	94%	68%

Indoor	MTF 10 (center)	MTF 10 (corner)
Skydio 2	103%	69%
DJI Mavic 2 Zoom	91%	71%
DJI Mavic 2 Pro	97%	78%
DJI Mavic Air	93%	66%

Lowlight	MTF 10 (center)	MTF 10 (corner)
Skydio 2	85%	61%
DJI Mavic 2 Zoom	86%	68%
DJI Mavic 2 Pro	93%	75%
DJI Mavic Air	90%	64%

MTF10 (center) < 80%
MTF10 (center) >80%
MTF10 (center) >90%

MTF10 (corner) <60%
MTF10 (corner) >60%
MTF10 (corner) > 80%

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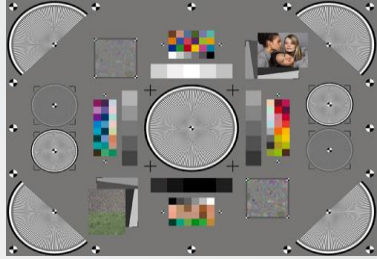
EXPOSURE, TE42 (Auto mode)



Daylight	Delta L
Skydio 2	-2.2
DJI Mavic 2 Zoom	-0.2
DJI Mavic 2 Pro	3.7
DJI Mavic Air	1.3

Indoor	Delta L
Skydio 2	-2.3
DJI Mavic 2 Zoom	-1.6
DJI Mavic 2 Pro	3.6
DJI Mavic Air	-1.3

Low light	Delta L
Skydio 2	-3.8
DJI Mavic 2 Zoom	-3.3
DJI Mavic 2 Pro	0.8
DJI Mavic Air	-3.9

abs Delta L > 6
2 < abs Delta L < 6
abs Delta L < 2

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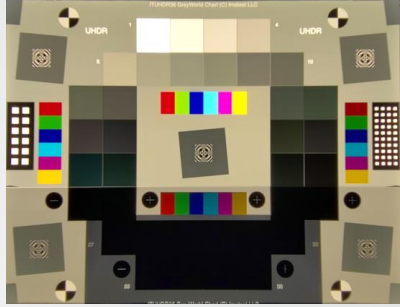
EXPOSURE, IDTR-36 UHDR



LED 30000Lux	Exposure error (f-stops)
Skydio 2 (auto-mode)	1.72
Skydio 2 (HDR-mode)	1.36
DJI Mavic 2 Zoom (auto-mode)	1.82
DJI Mavic 2 Pro (auto-mode)	2.16
DJI Mavic 2 Pro (-2EV)	1.81
DJI Mavic 2 Pro (HDR-mode)	2.15
DJI Mavic 2 Pro (HDR -1EV)	1.84
DJI Mavic Air (auto-mode)	2.15
DJI Mavic Air (-2EV)	1.64
DJI Mavic Air (HDR-mode)	2.13
DJI Mavic Air (HDR -1EV)	1.59

F-stops > 2
F-stops <2
F-stops < 1

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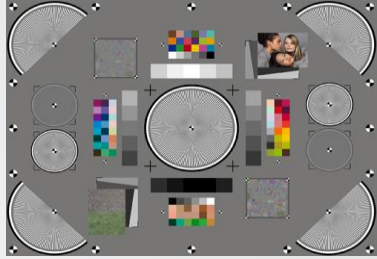
DYNAMIC RANGE, TE42 (Auto mode)



Daylight	DR (f-stops)
Skydio 2	10.0
DJI Mavic 2 Zoom	7.1
DJI Mavic 2 Pro	7.9
DJI Mavic Air	7.4

Indoor	DR (f-stops)
Skydio 2	9.7
DJI Mavic 2 Zoom	6.9
DJI Mavic 2 Pro	6.9
DJI Mavic Air	7.2

Low light	DR (f-stops)
Skydio 2	9.4
DJI Mavic 2 Zoom	6.3
DJI Mavic 2 Pro	6.6
DJI Mavic Air	6.7

F-stops < 7
7<F-stops <9
F-stops > 9

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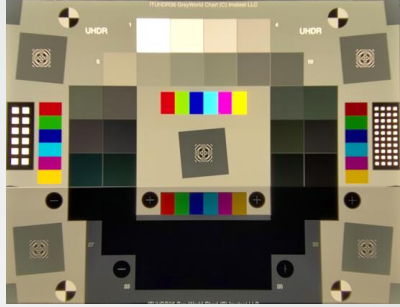
DYNAMIC RANGE, IDTR-36 UHDR



LED 30000Lux	DR (f-stops)
Skydio 2 (auto-mode)	13
Skydio 2 (HDR-mode)	14.4
DJI Mavic 2 Zoom (auto-mode)	10.2
DJI Mavic 2 Pro (auto-mode)	11.6
DJI Mavic 2 Pro (-2EV)	8.3
DJI Mavic 2 Pro (HDR-mode)	14.2
DJI Mavic 2 Pro (HDR -1EV)	14.1
DJI Mavic Air (auto-mode)	10.9
DJI Mavic Air (-2EV)	8.8
DJI Mavic Air (HDR-mode)	13
DJI Mavic Air (HDR -1EV)	13.5

F-stops < 11
11<F-stops <13
F-stops > 13

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Subjective analysis

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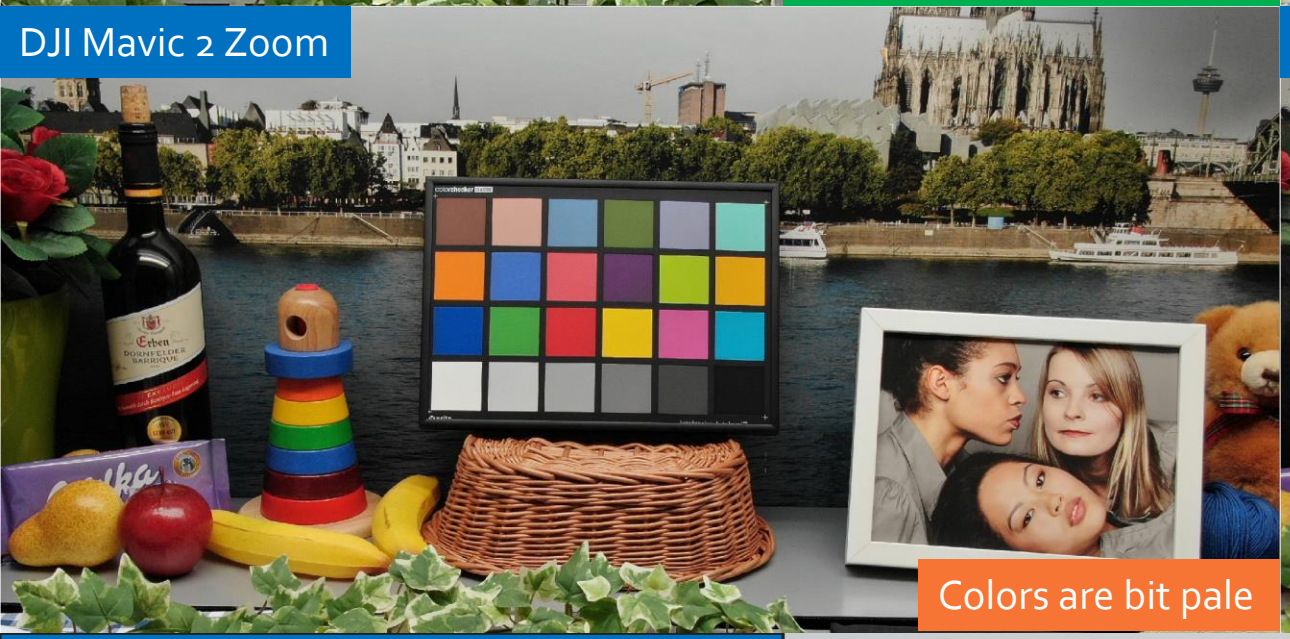

Colors: Daylight

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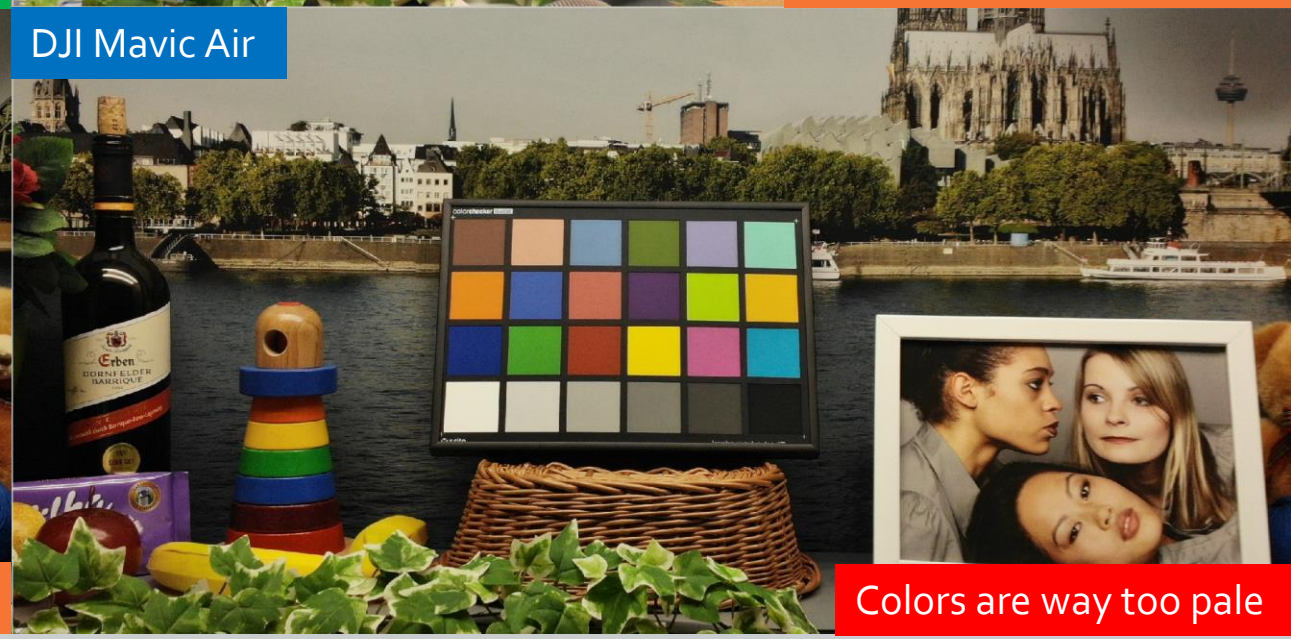
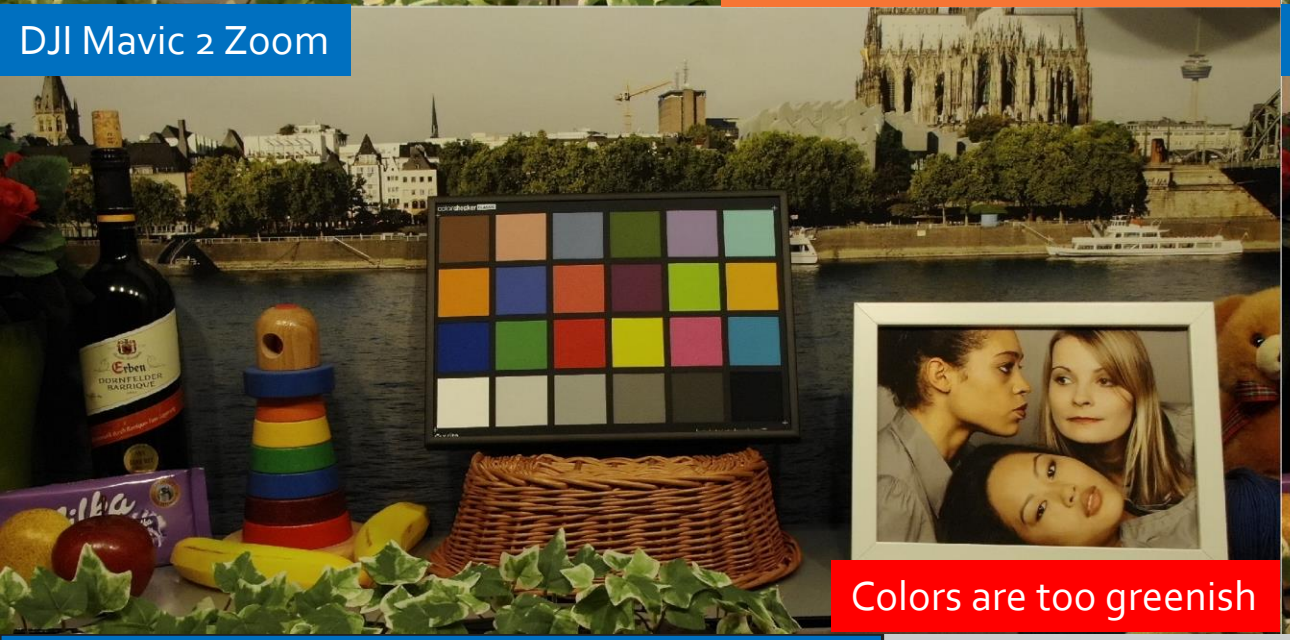
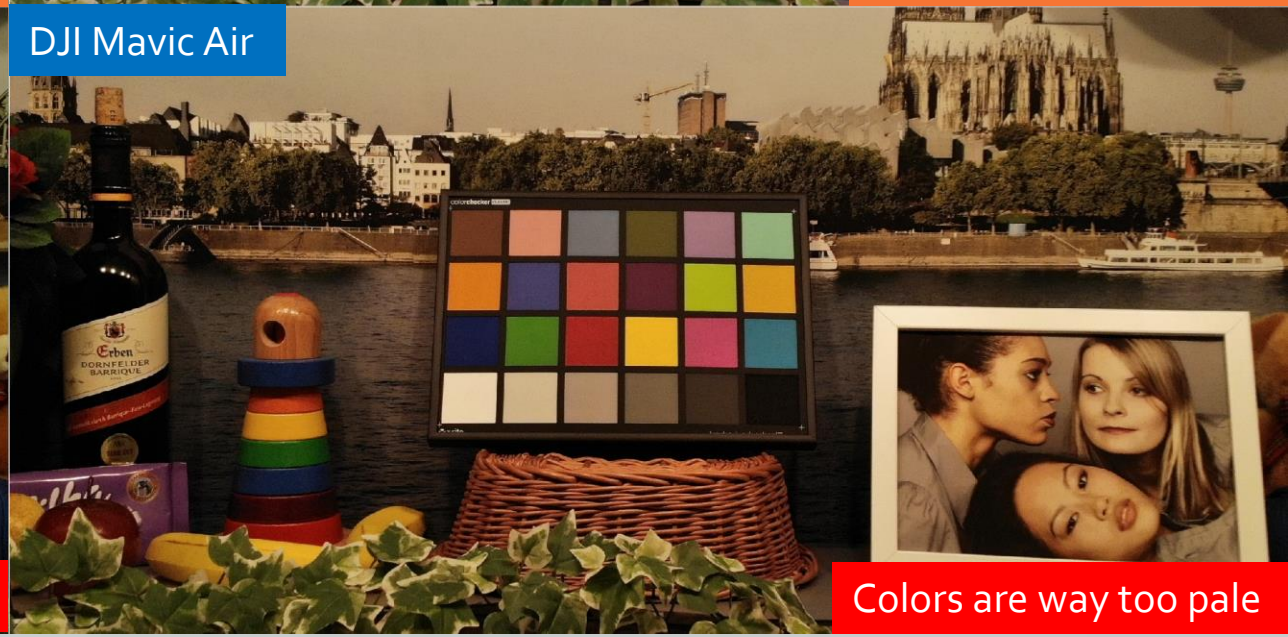


Colors: Fluorescent

NomiCam





Colors: Halogen

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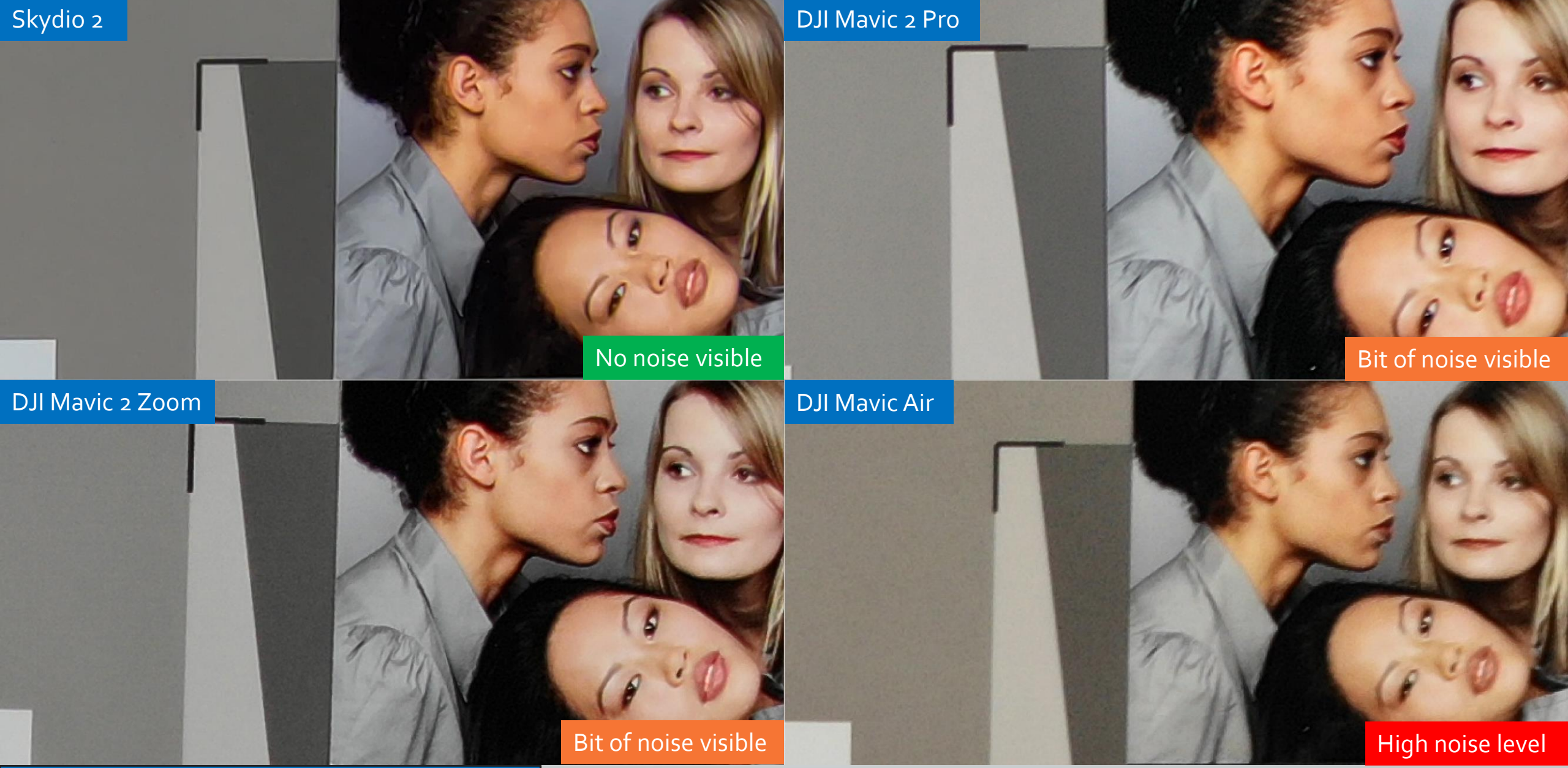

Noise: Daylight

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Noise: Indoor

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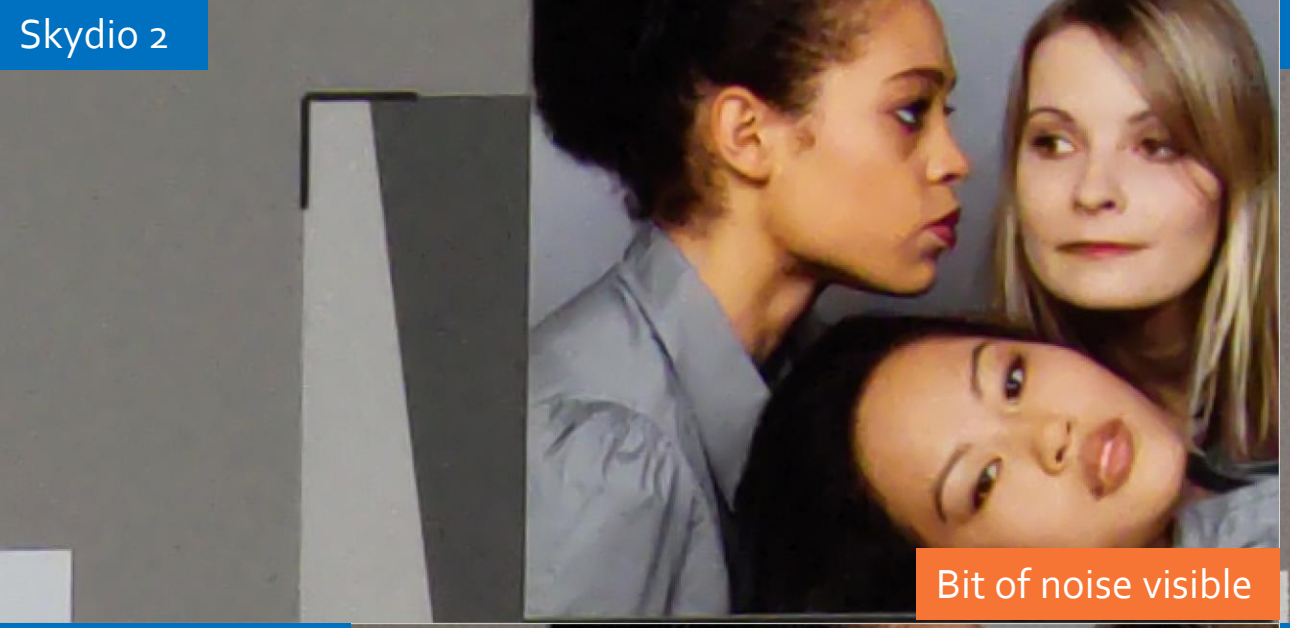
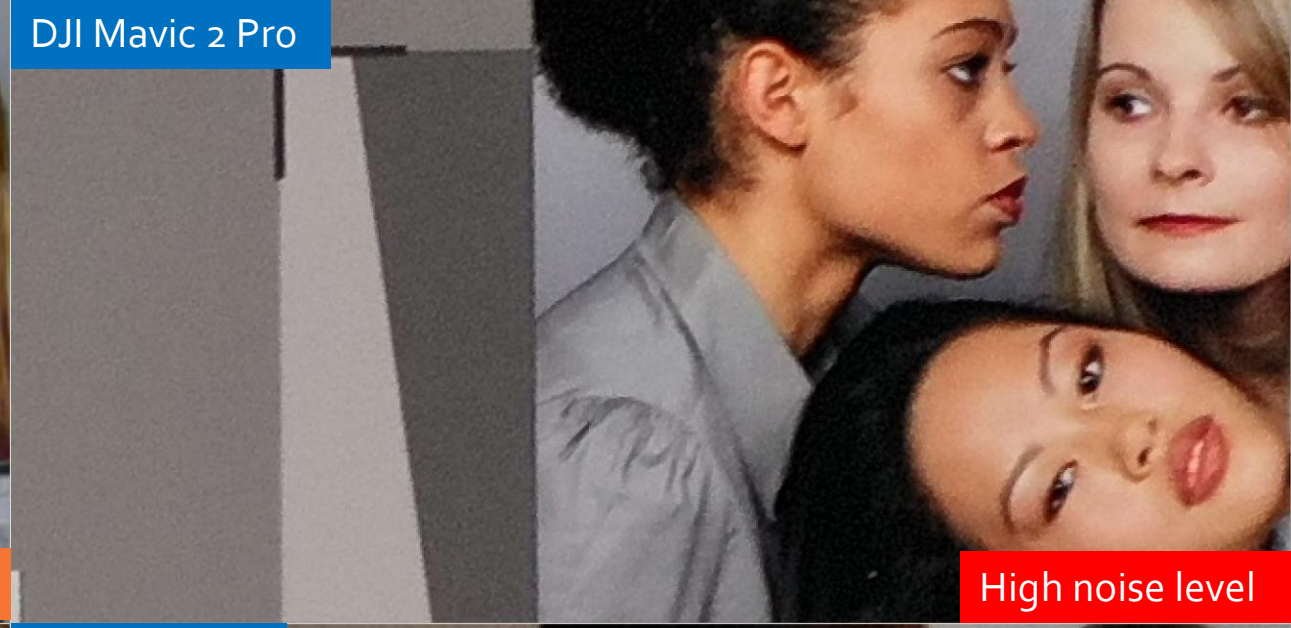
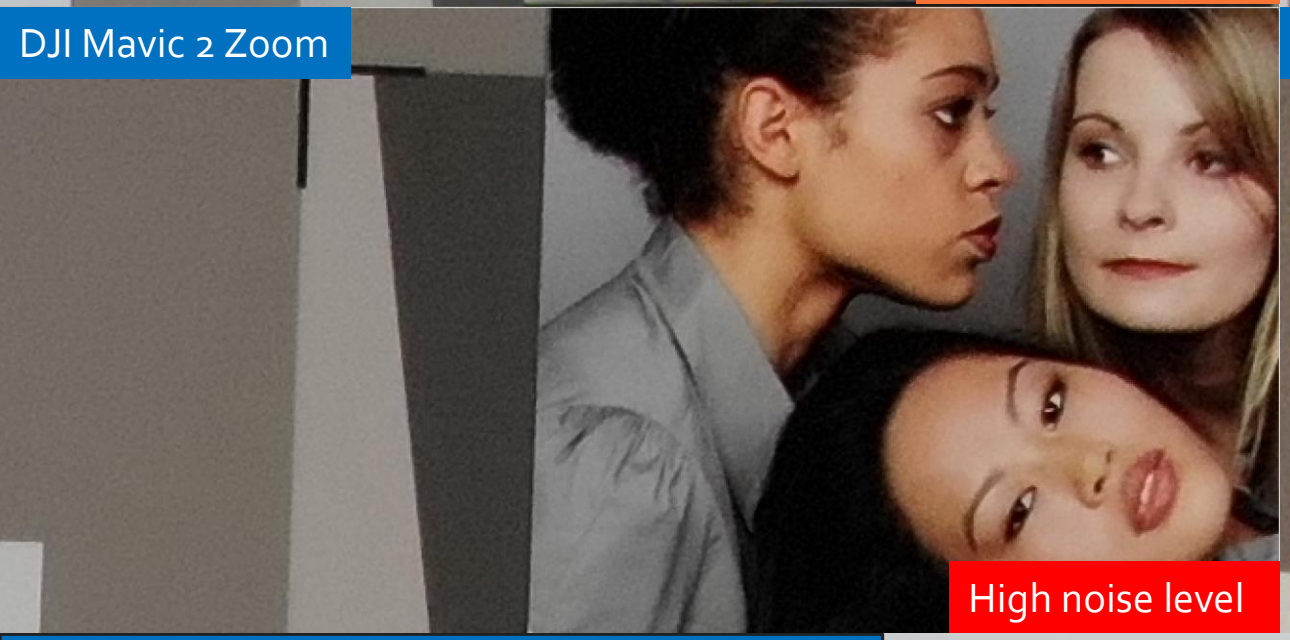
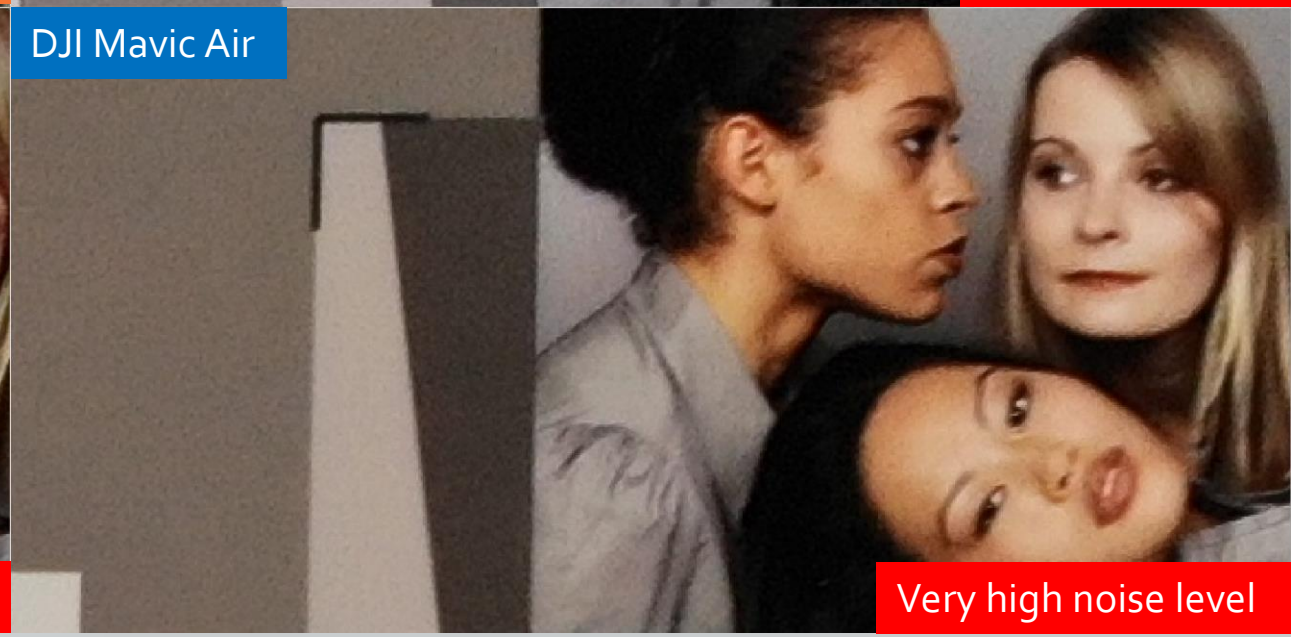


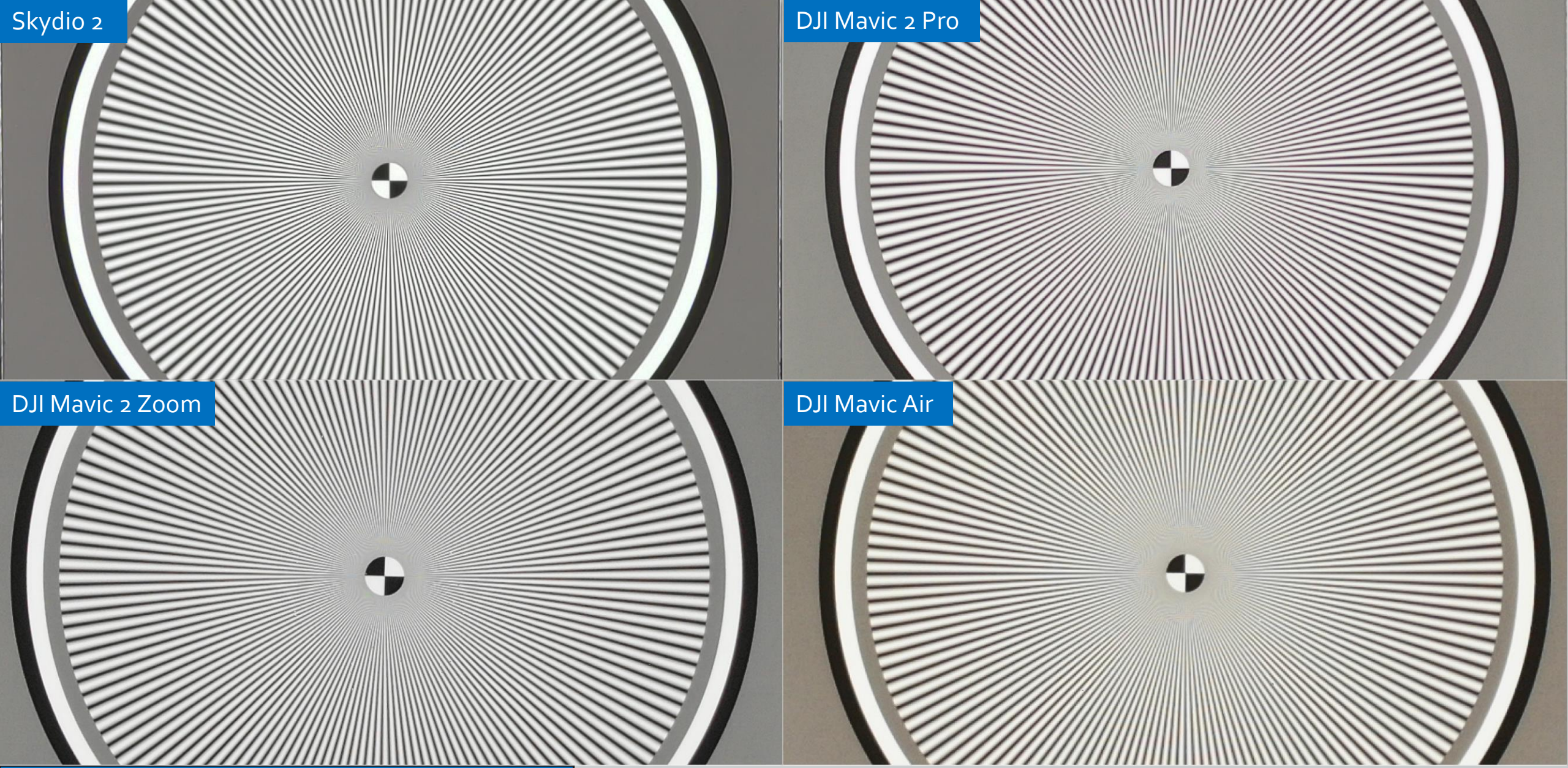






Noise: Low light

NomiCam



Resolution: Daylight

- All drones have good resolution

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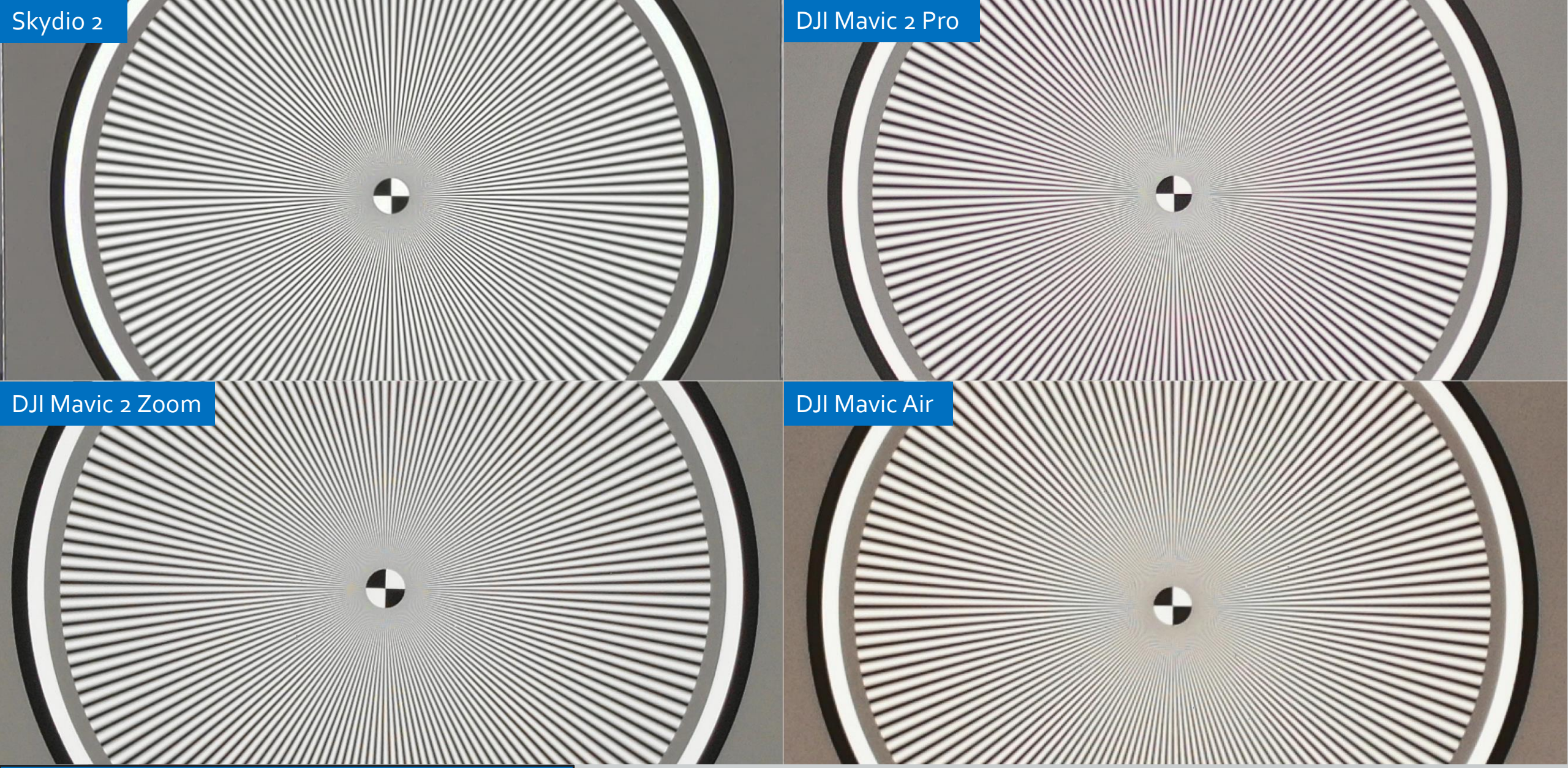
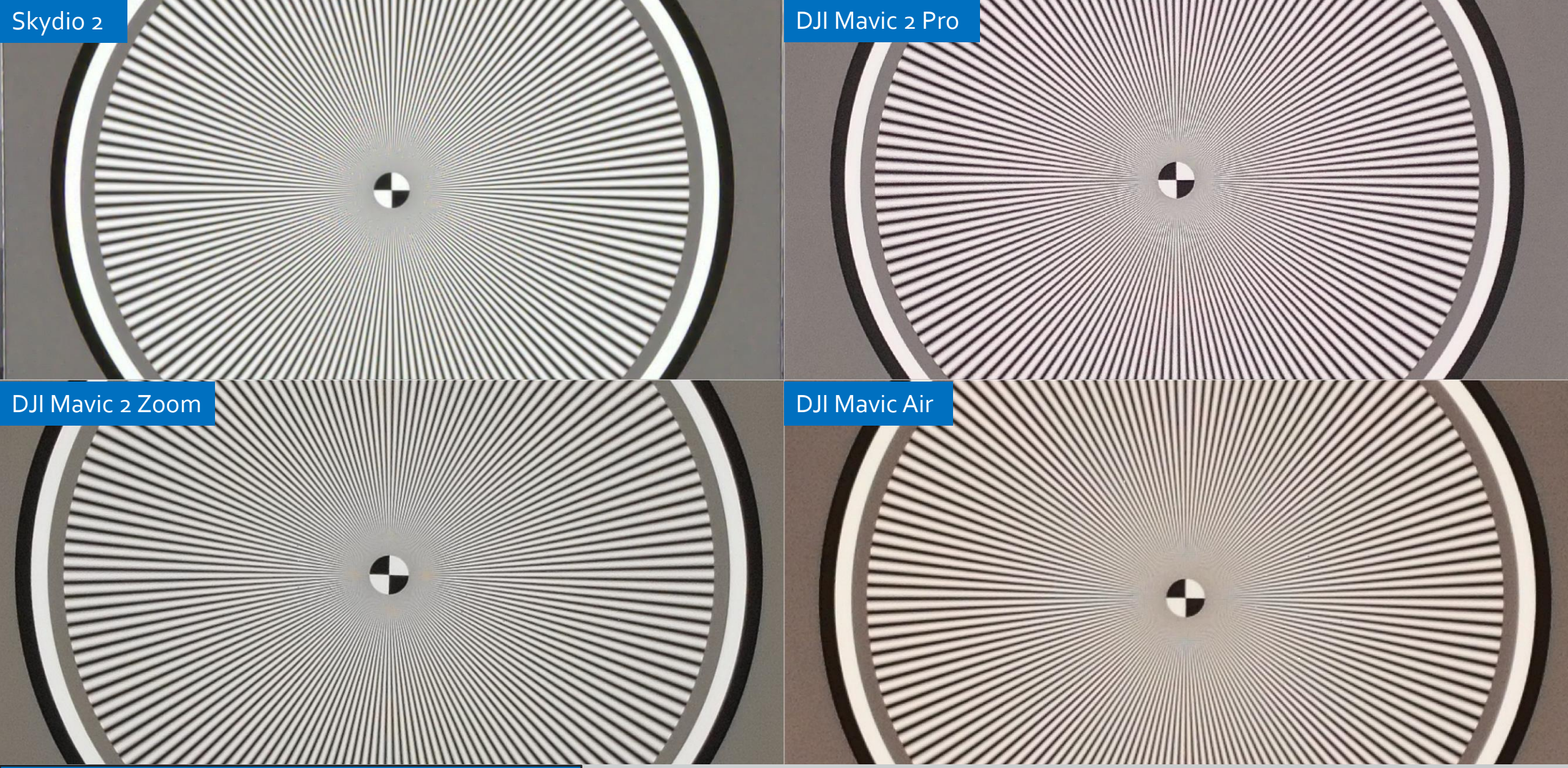


Resolution: Indoor

- All drones have good resolution

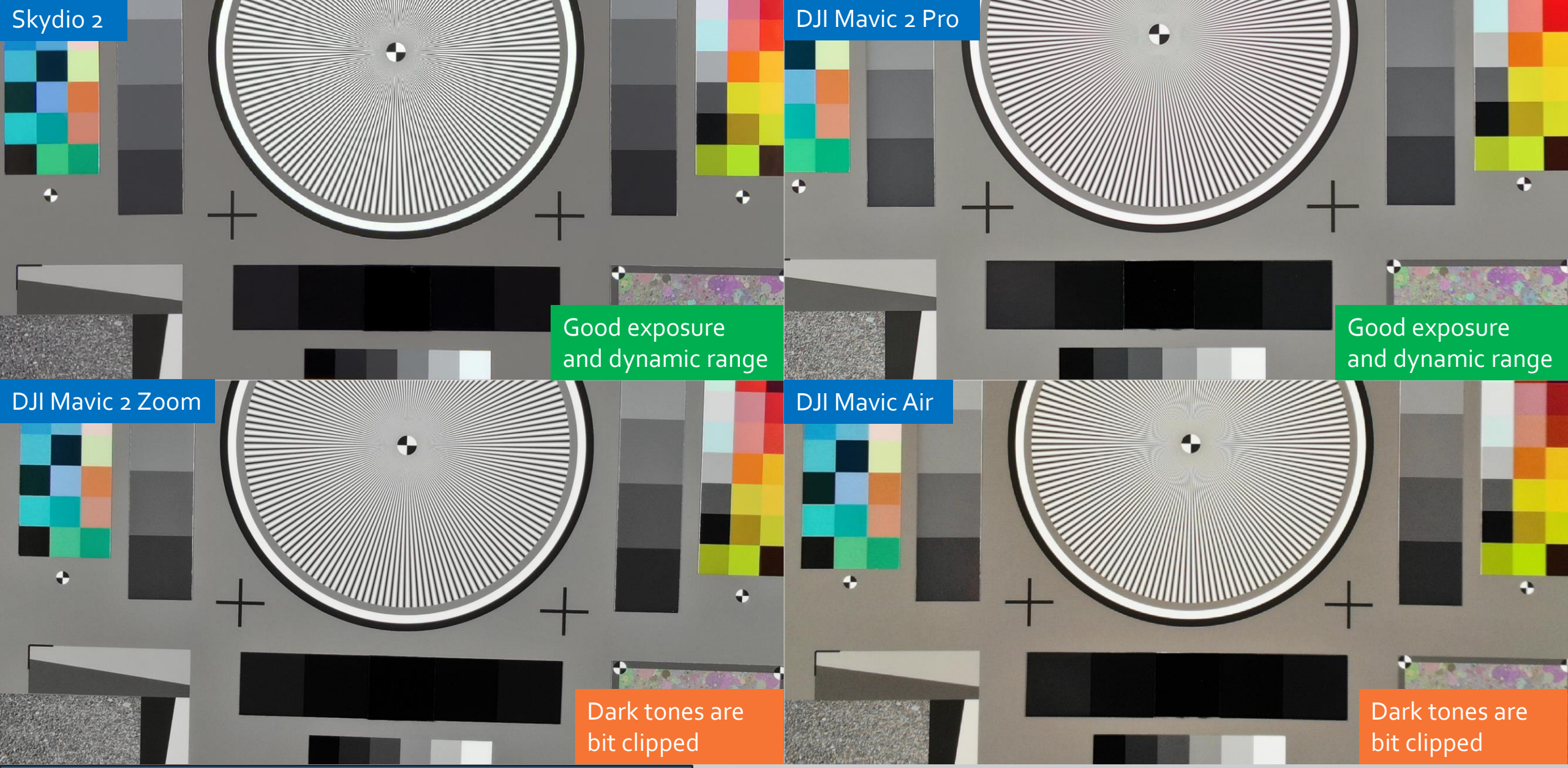
NomiCam



Resolution: Low light

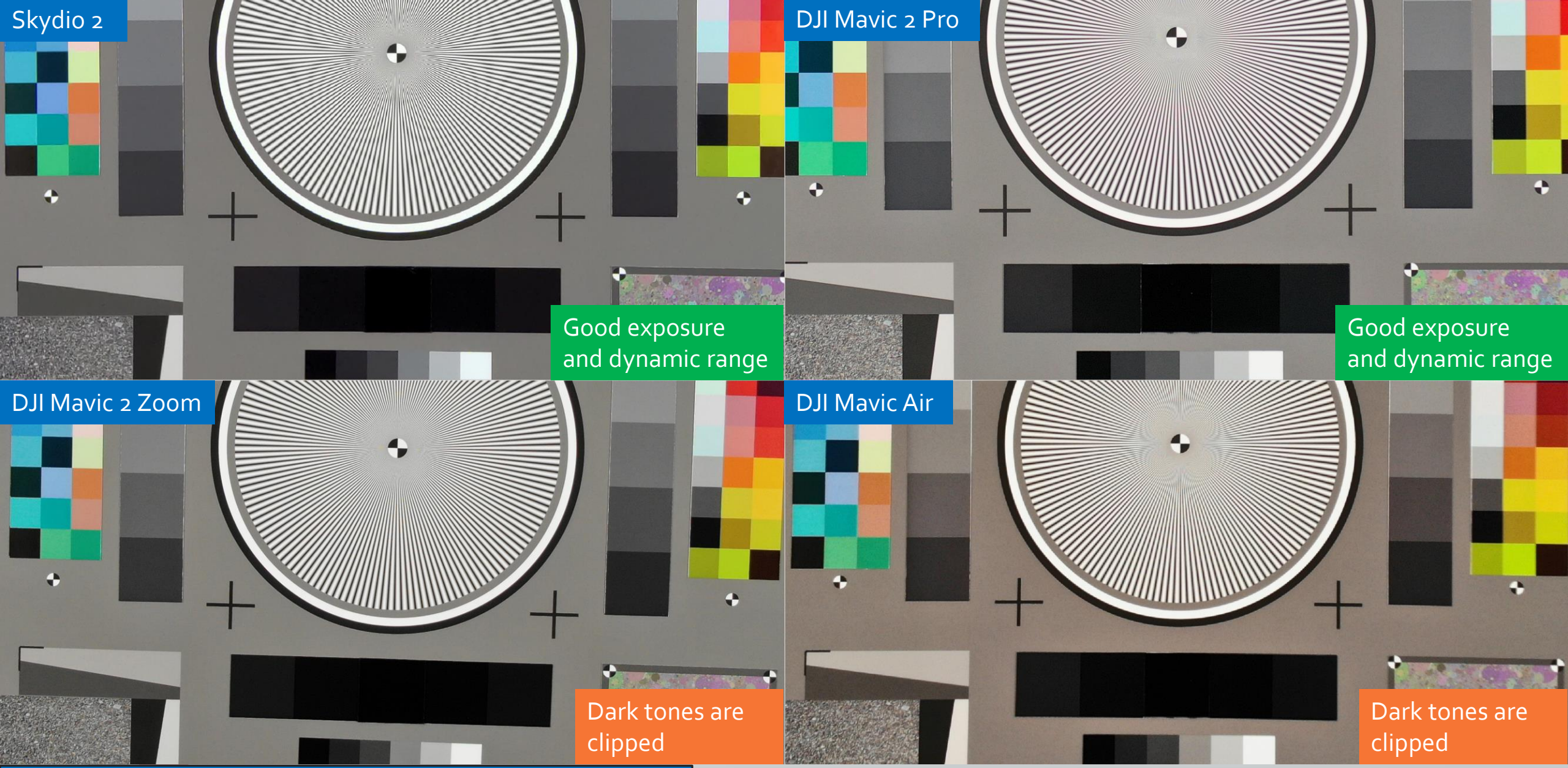
- All drones have good resolution

NomiCam



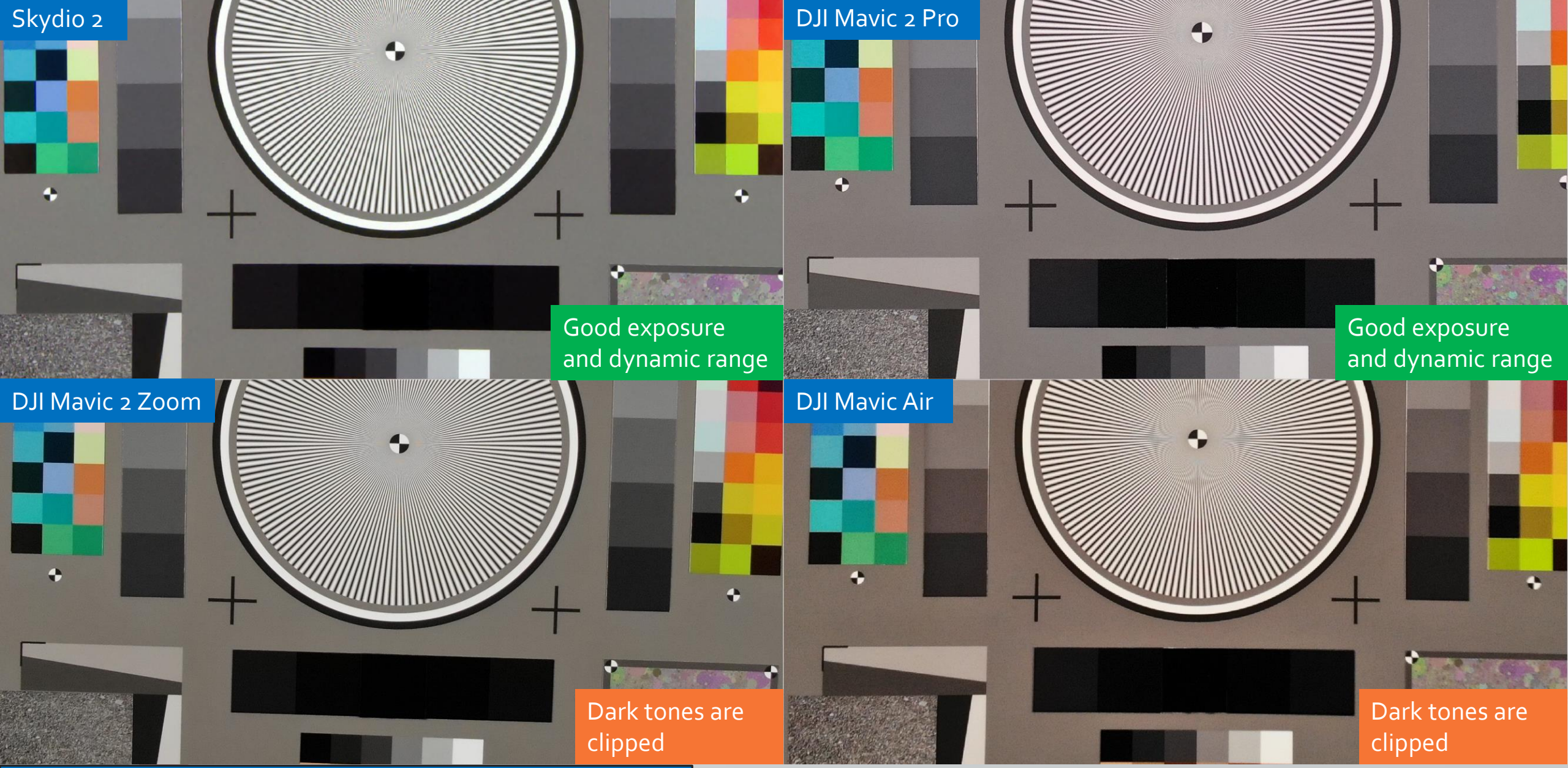
DR & Exposure: Daylight

NomiCam



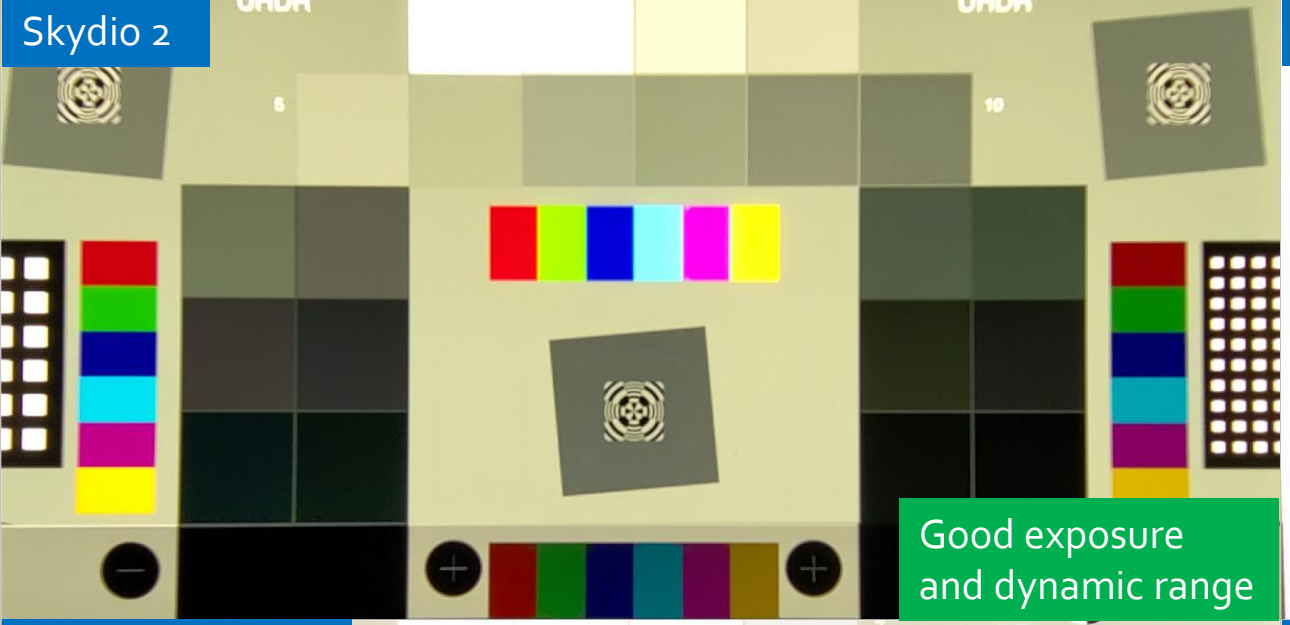
DR & Exposure: Indoor

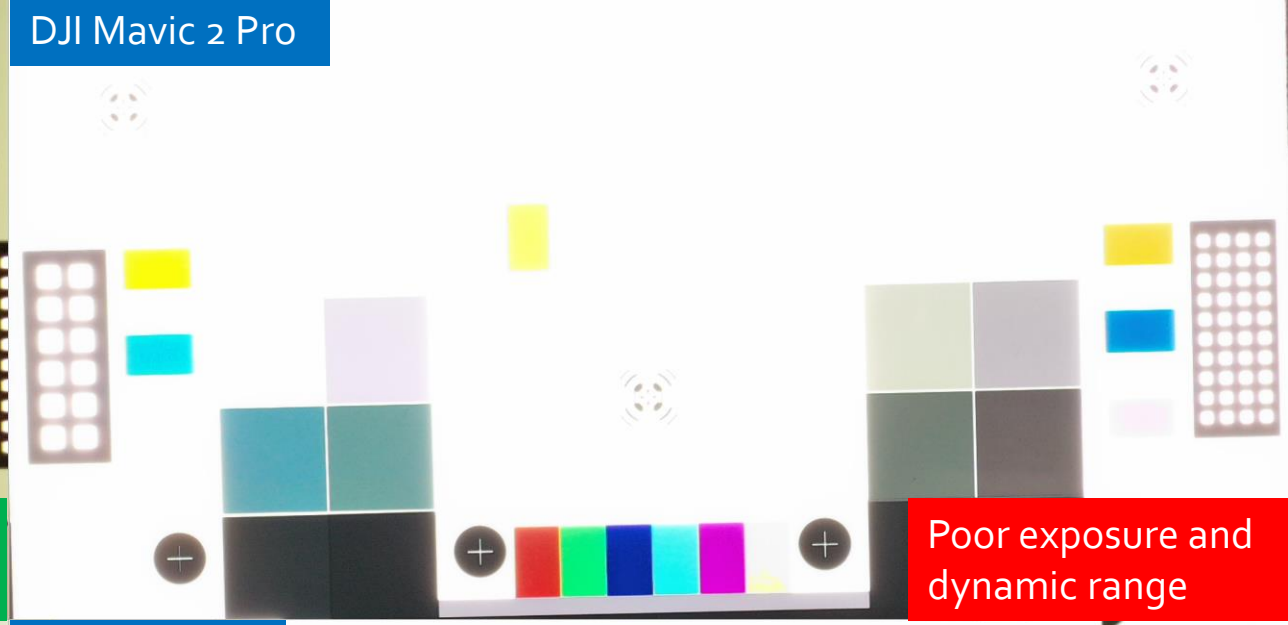
NomiCam

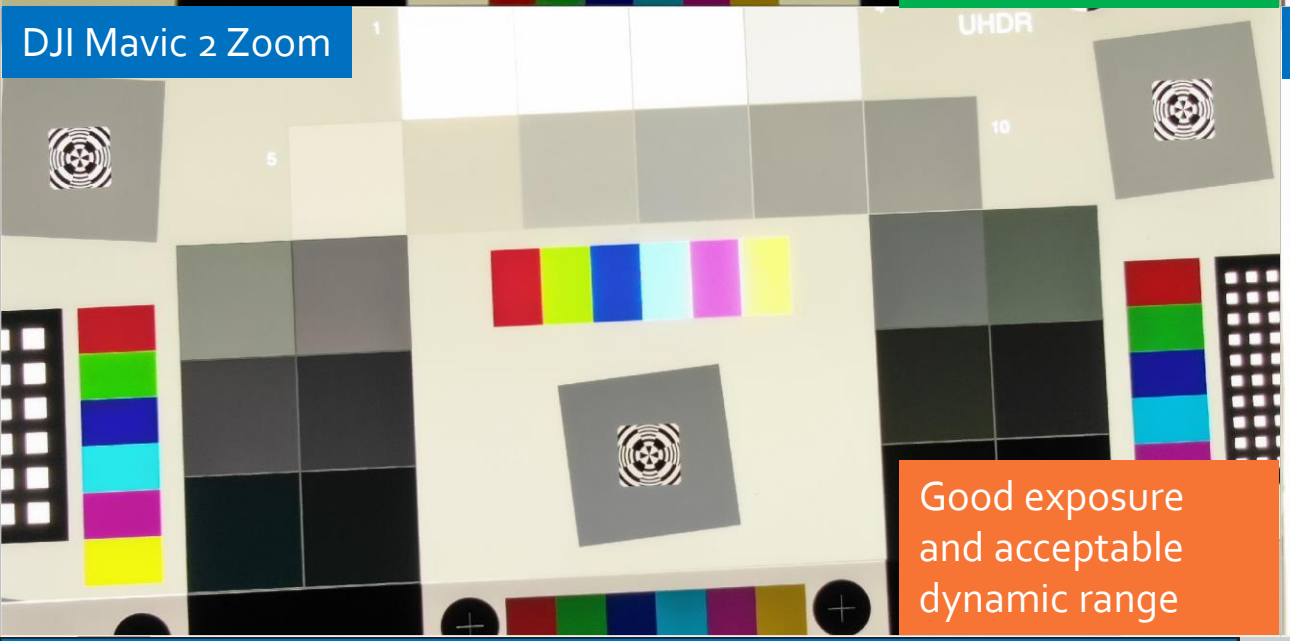


DR & Exposure: Low light

NomiCam

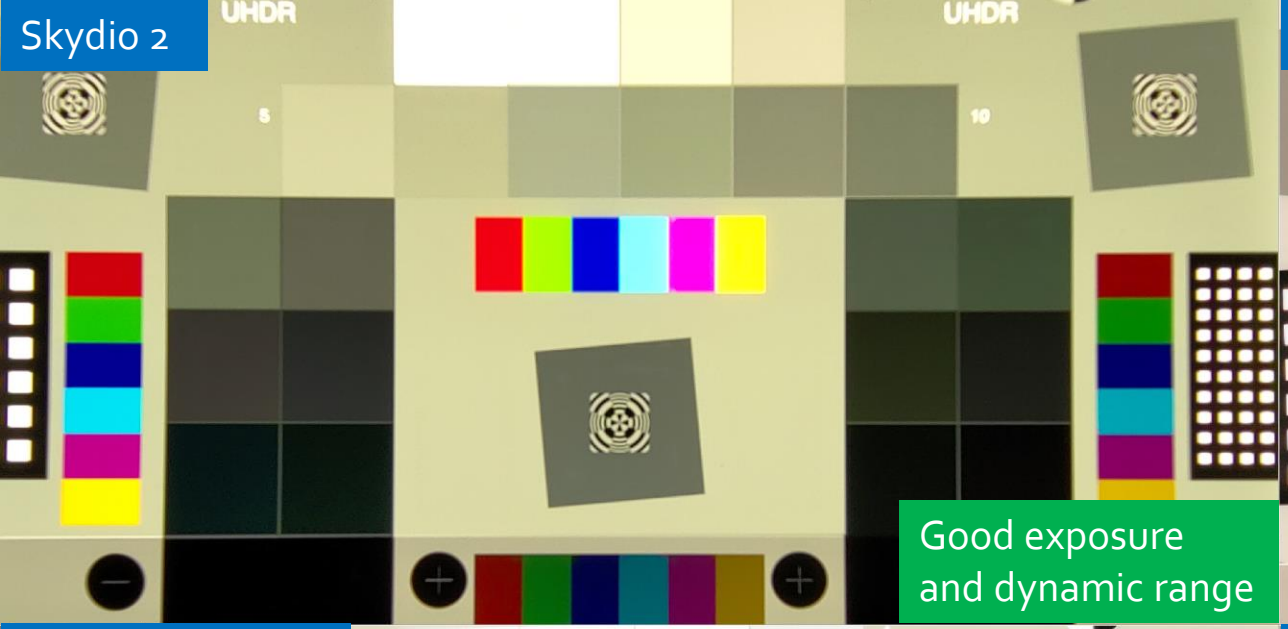


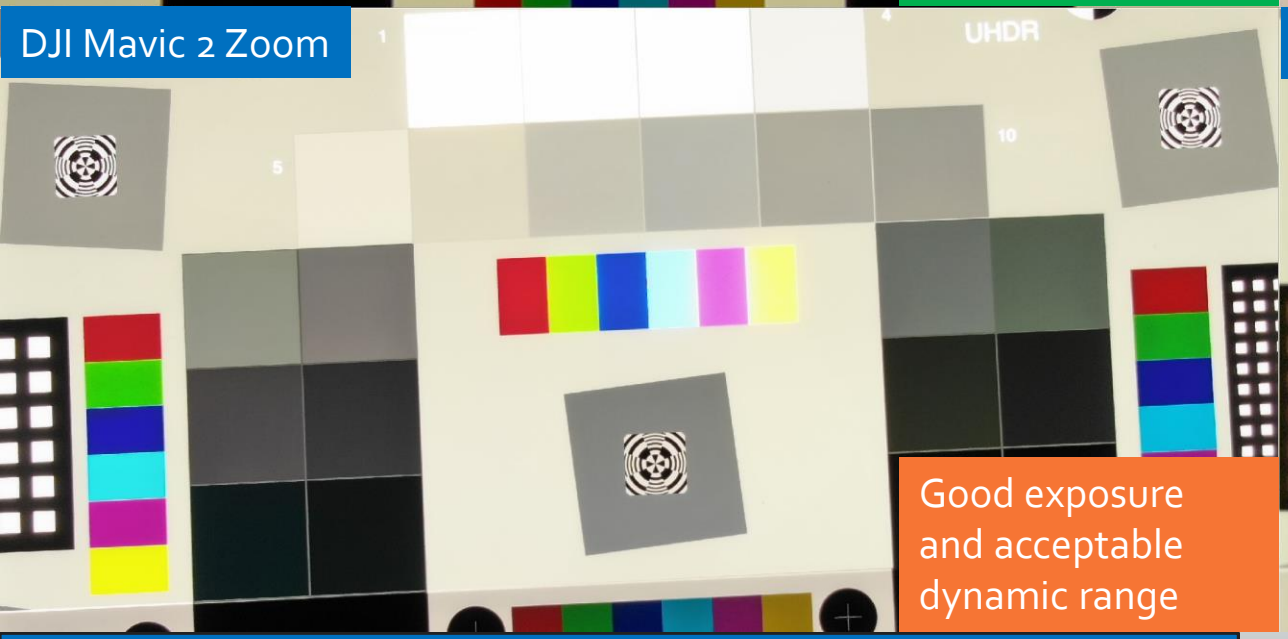


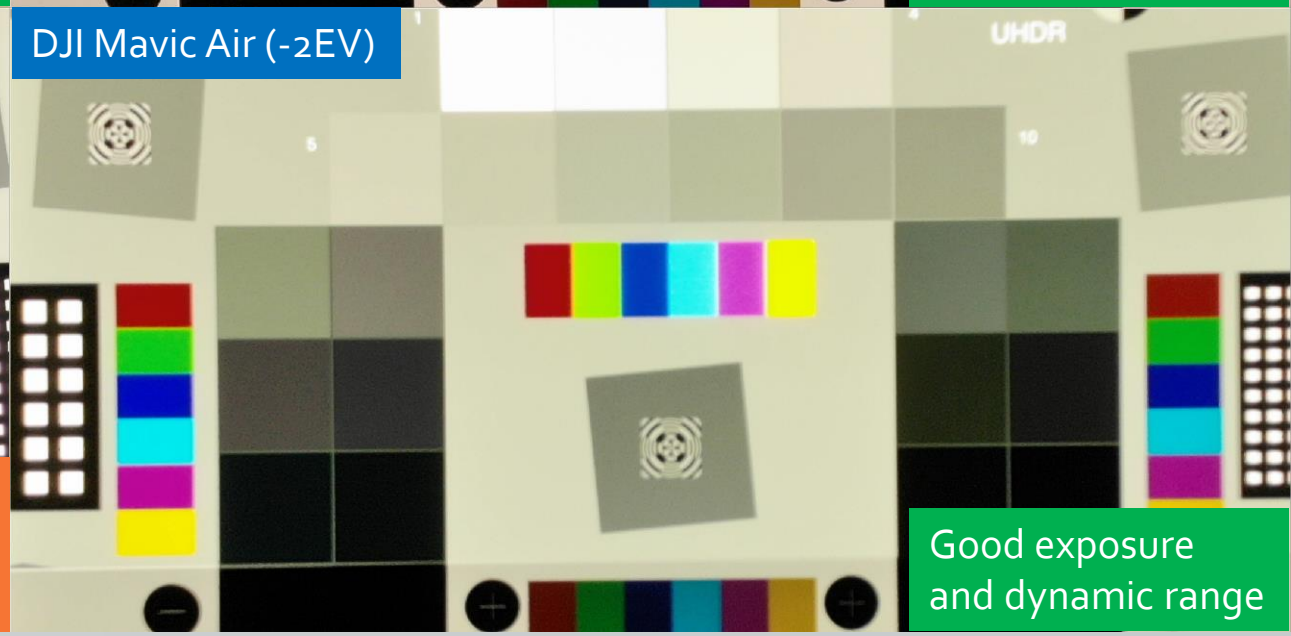


HDR content, Normal mode

NomiCam







HDR content, Normal mode

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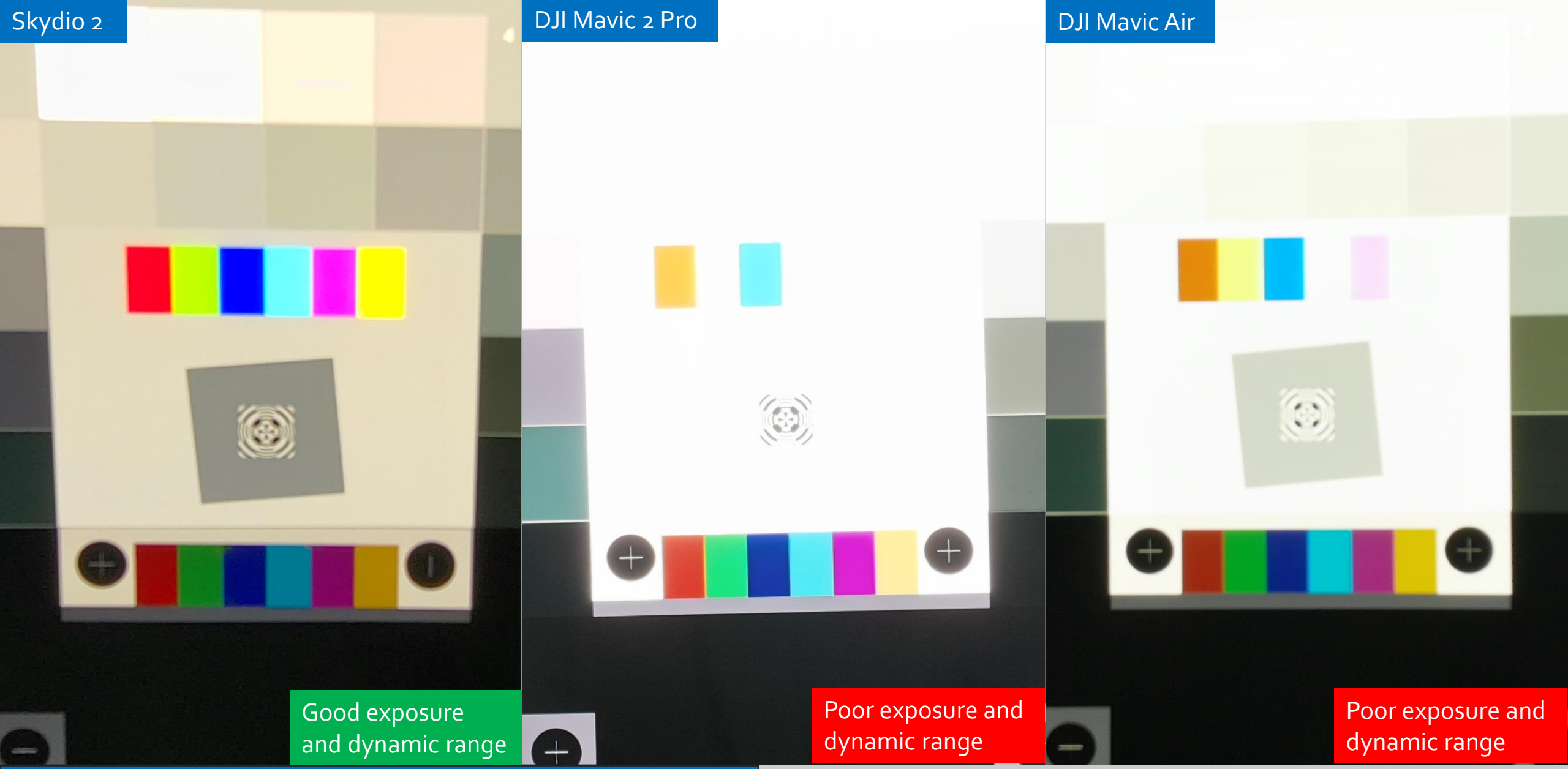
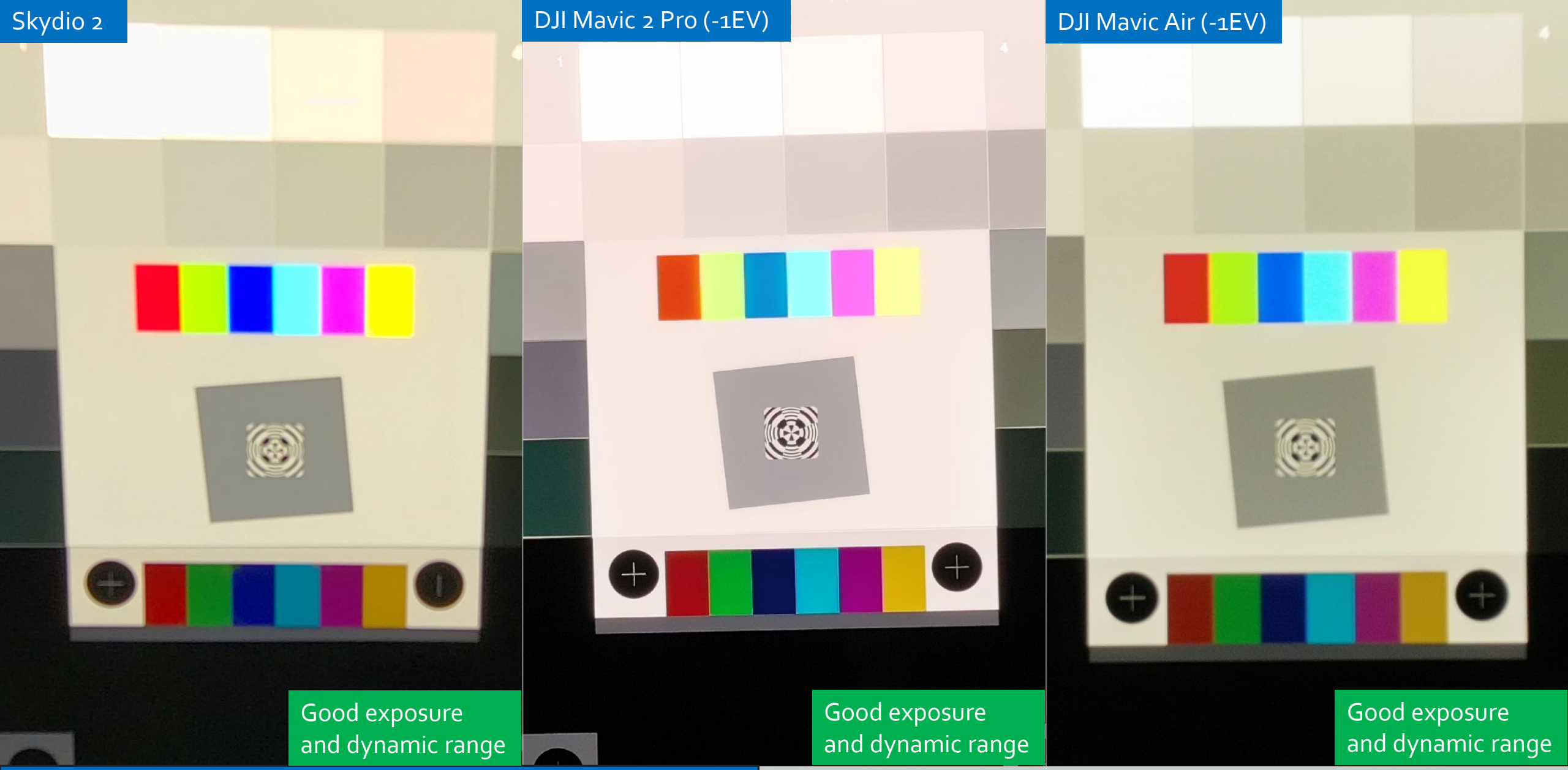


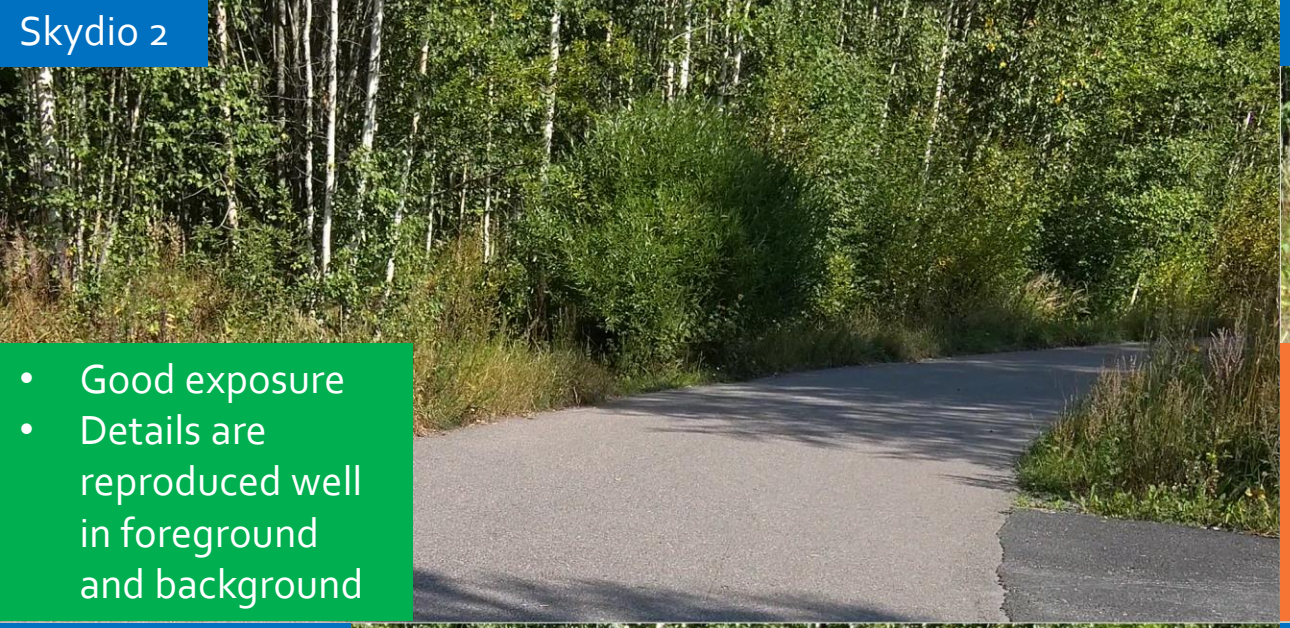
HDR content, HDR mode

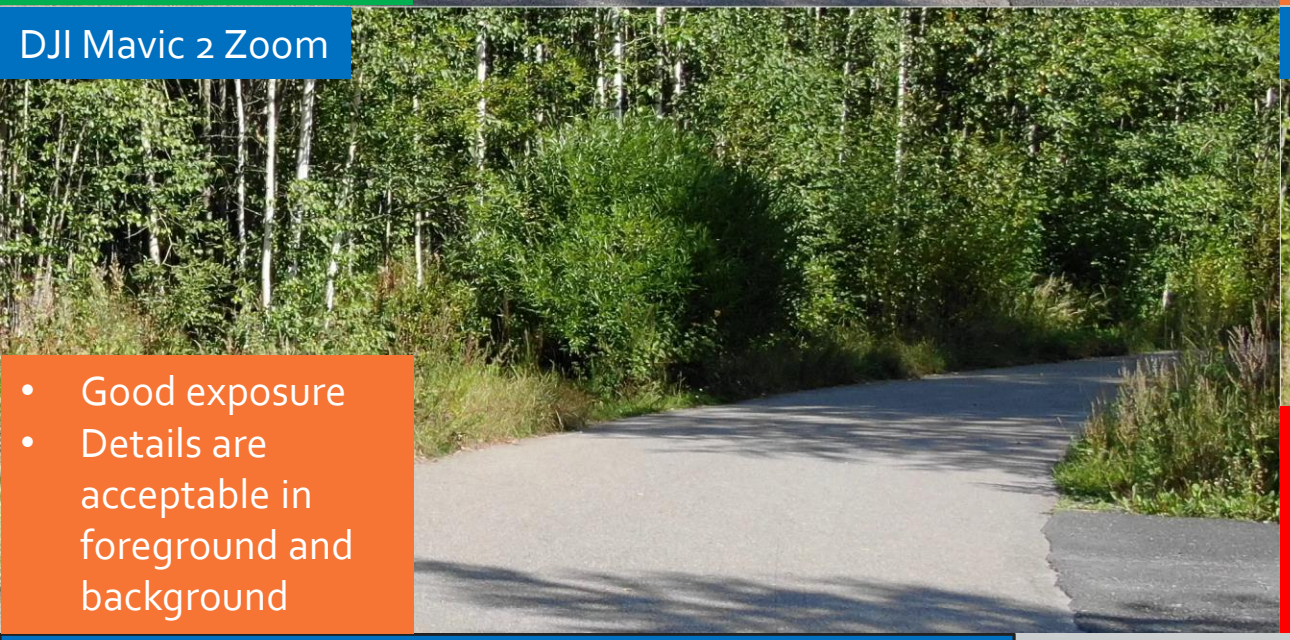
NomiCam

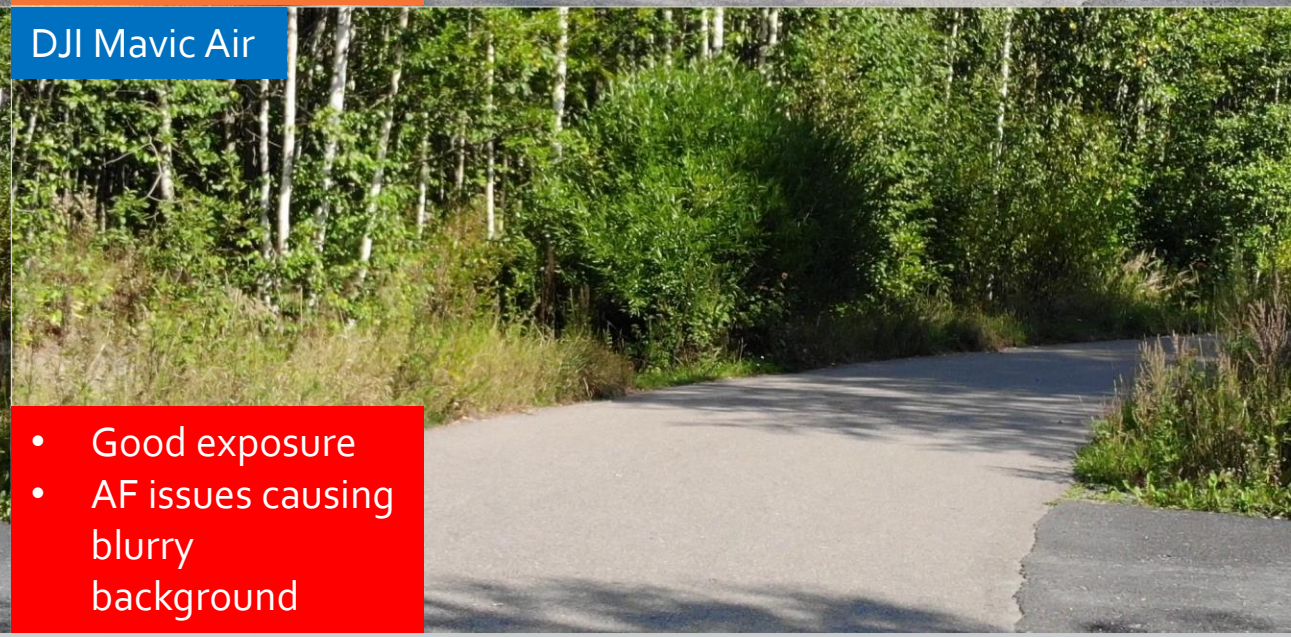


HDR content, HDR mode

NomiCam







Field testing: Sun light

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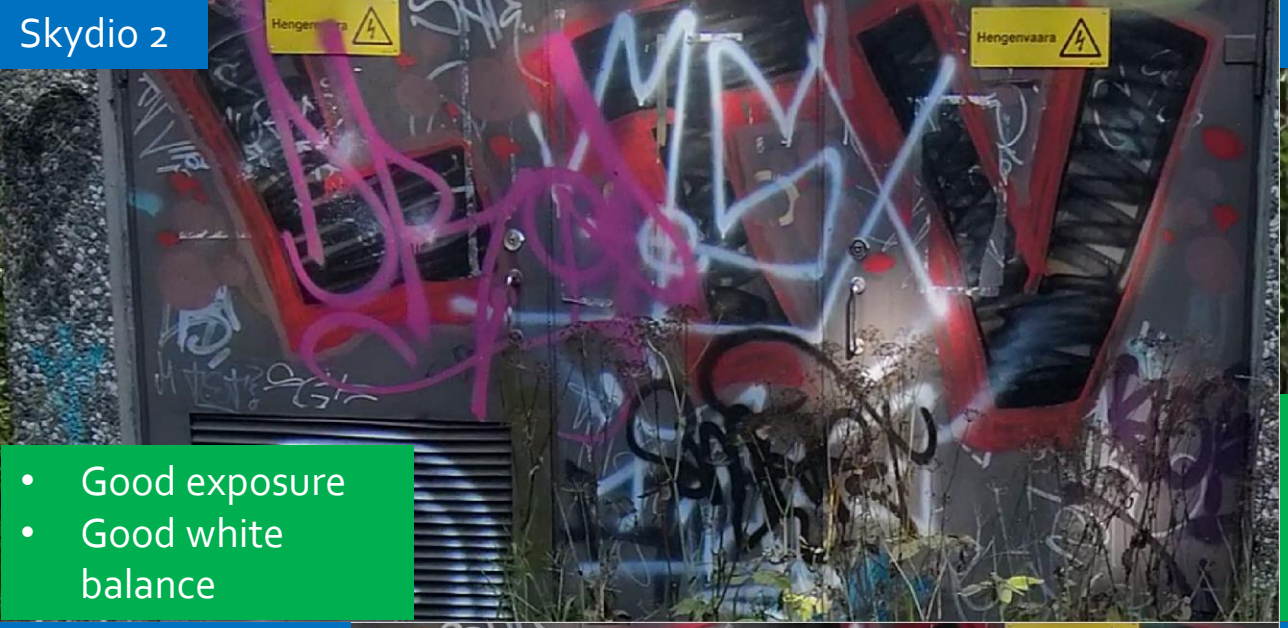
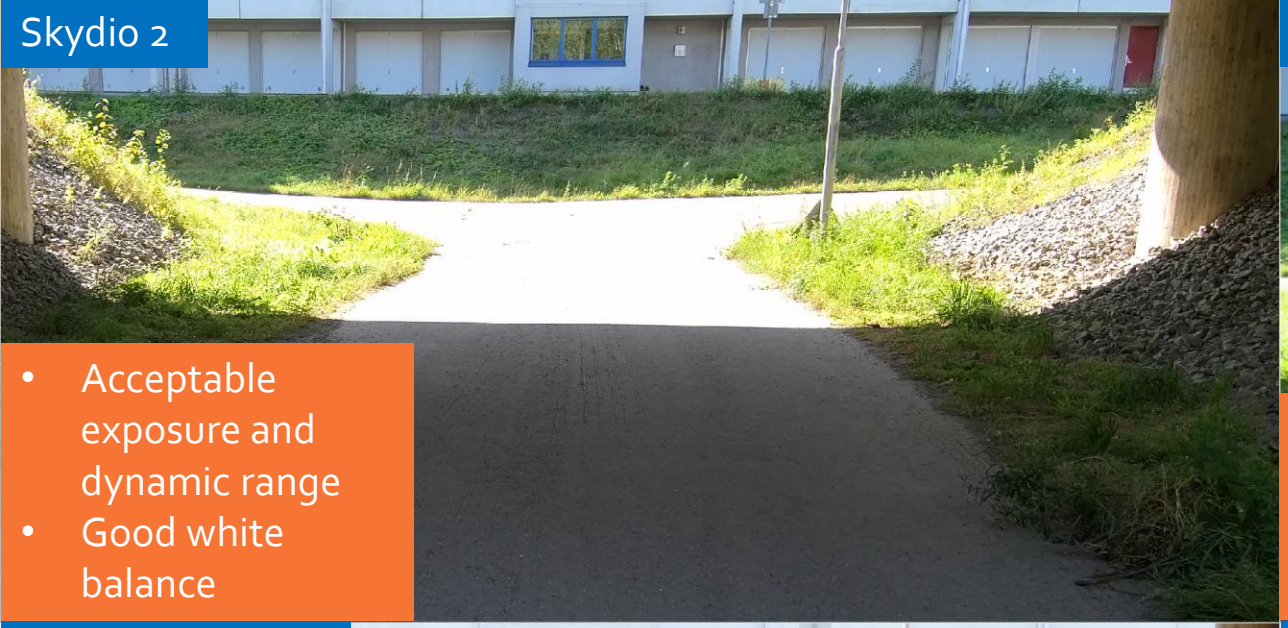
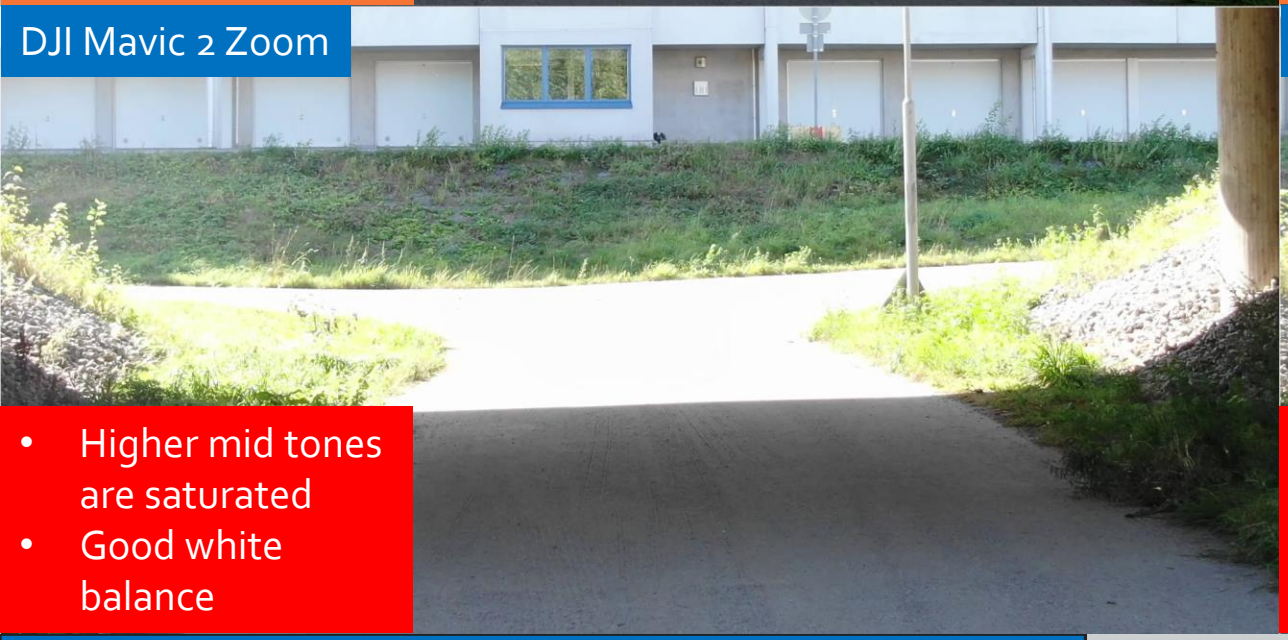


Field testing: Shadow

NomiCam





Field testing: HDR scene

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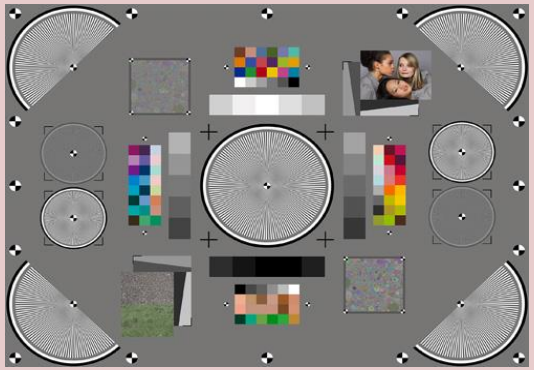
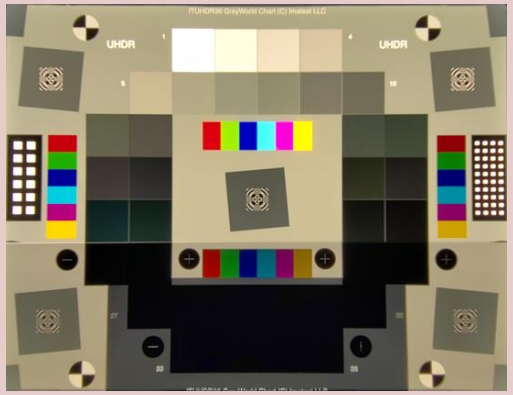
Conclusion

- Skydio 2 and DJI Mavic2Pro are the best ones of the 4 tested drones, all IQ KPI:s are in good level. DJI Mavic2Pro has bit high noise in lab measurement but noise is not an issue in real field use. Also when using –EV in lab exposure in HDR test chart is good.
- DJI Mavic Air has good resolution and exposure, acceptable noise levels but colors and dynamic range are poor. In HDR content exposure is poor. When using –EV shift exposure is good. Device had AF issues in field testing.
- DJI Mavic2 Zoom has good exposure and resolution, acceptable colors and noise levels but dynamic range is poor.

Test Setup

NomiCam

Test	Lightning conditions	KPI:s	Test target
TE42	• 1000 Lux D65 • 250 Lux D65 • 63 Lux D65	• Dynamic range • Exposure • Resolution • Noise	
lightSTUDIO	• 1000 Lux D65 • 1000 Lux D50 • 500 Lux F11 • 500 Lux F12 • 100 Lux Halogen	• Colors • White balance	
IDTR-36 UHDR (150dB)	• 30000 Lux LED	• Dynamic range • Exposure	

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