

EMVA 1288 Data Sheet m1307

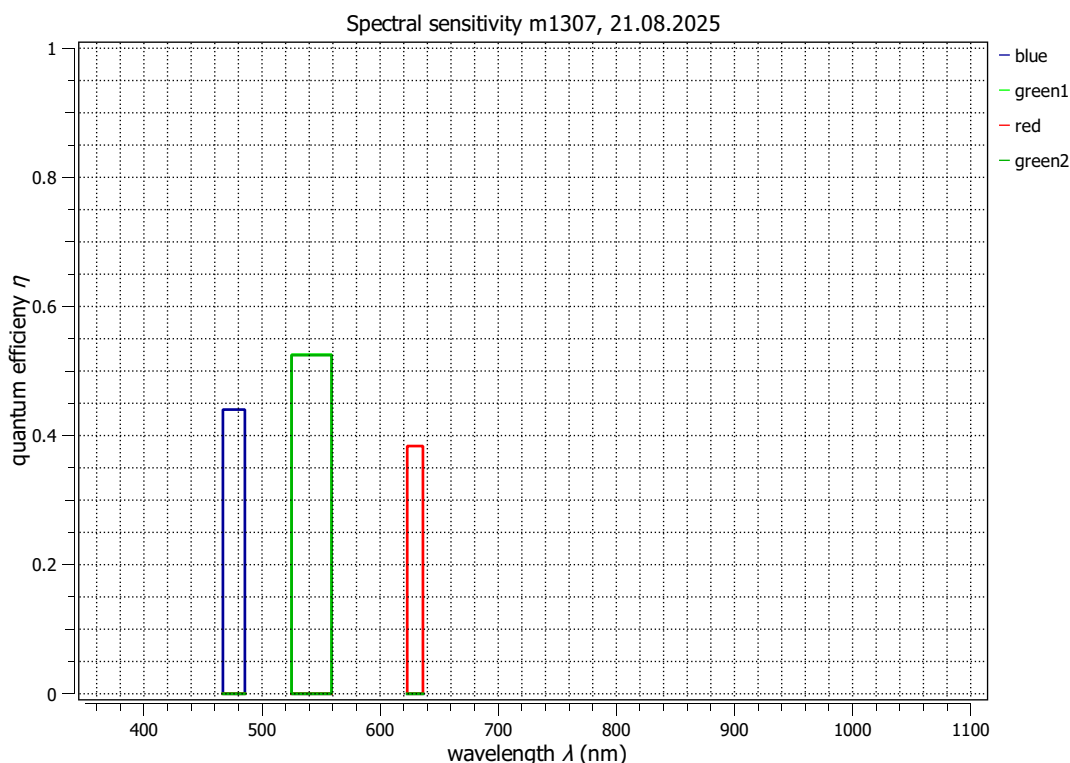
This data sheet describes the specification according to the standard 1288 Release 4.0 Linear issued on 21 June 2021 for "Characterization and Presentation of Specification Data for Image Sensors and Cameras" by the European Machine Vision Association (EMVA), published at <https://www.emva.org/standards-technology/emva-1288/> with proprietary extensions from AEON. The measurements were performed with the AEON ACC2b 14x1 color, Release 9, 13.11.2020, SN 0066(Balluff), software version 3.2.

Measurements performed by Product Development Vision, Balluff GmbH

| | |
|------------------------|---------------------|
| Type of data presented | Single |
| Vendor | Balluff GmbH |
| Model | BVS CA-GV1-0204AC |
| Serial number | GV000104 |
| Sensor diagonal | 17.48 mm |
| Lens category | C-Mount |
| Resolution | 4512 × 4512, 12 bit |
| Offset/size channels | 0 × 0/ 2256 × 2256 |
| Pixel size (h×v) | 2.74 μm × 2.74 μm |
| Sensor | IMX541 |
| Sensor type | CMOS |
| Shutter type | Global |
| Overlap cap. | Overlapping |
| Max. frame rate | 0.0 Hz |
| Interface type | GigEVision |

| Nr. | Centroid/FWHM | Gain, blacklevel | t_{exp} (ms) |
|-----|---------------|------------------|----------------|
| 1 | 476.2/18.6 nm | 0.0dB, 0.1 | 2.00 |
| 2 | 542.0/33.9 nm | 0.0dB, 0.1 | 3.00 |
| 3 | 629.6/13.3 nm | 0.0dB, 0.1 | 2.00 |

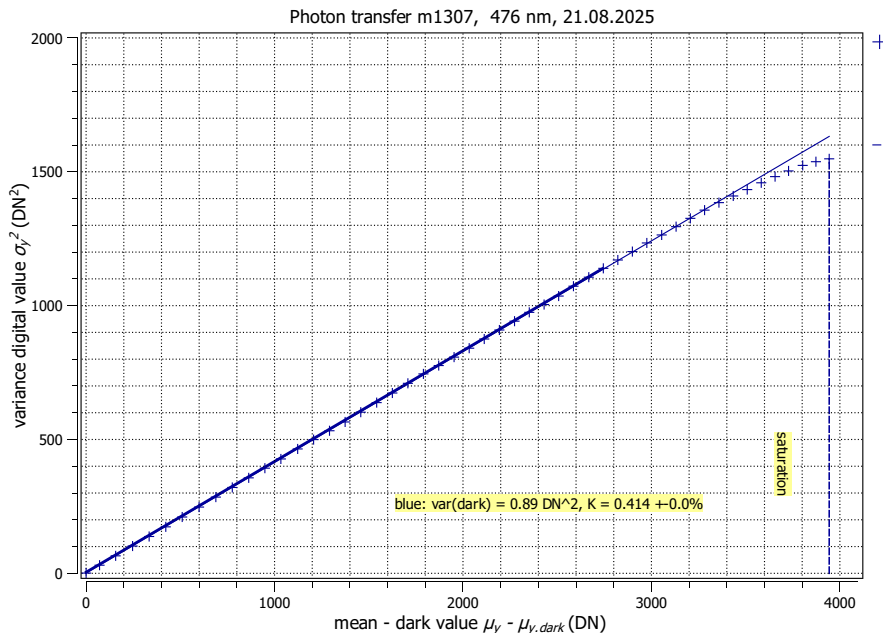
Optional data measured: None



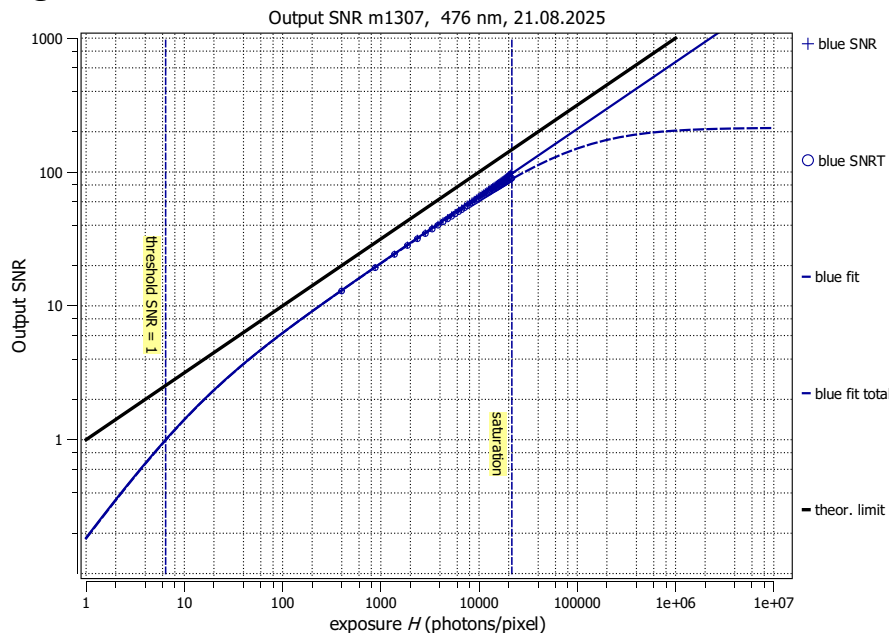
Summary Sheet for Operation Point 1 at a Wavelength of 476 nm

| | | | |
|--------------------|---------------|---------------------------|-----------------|
| Type of data | Single | Gain, black-level | 0.0dB, 0.1 |
| Exposure control | By irradiance | Environmental temperature | 23.4°C |
| Exposure time | 2.000 ms | Camera body temperature | 32.8°C |
| Frame rate | 18.3 Hz | Internal temperature(s) | 46.1°C, 35.0°C |
| Data transfer mode | BayerRG12p | Wavelength, centr., FWHM | 476 nm, 18.6 nm |

Photon Transfer



Signal-to-Noise Ratio

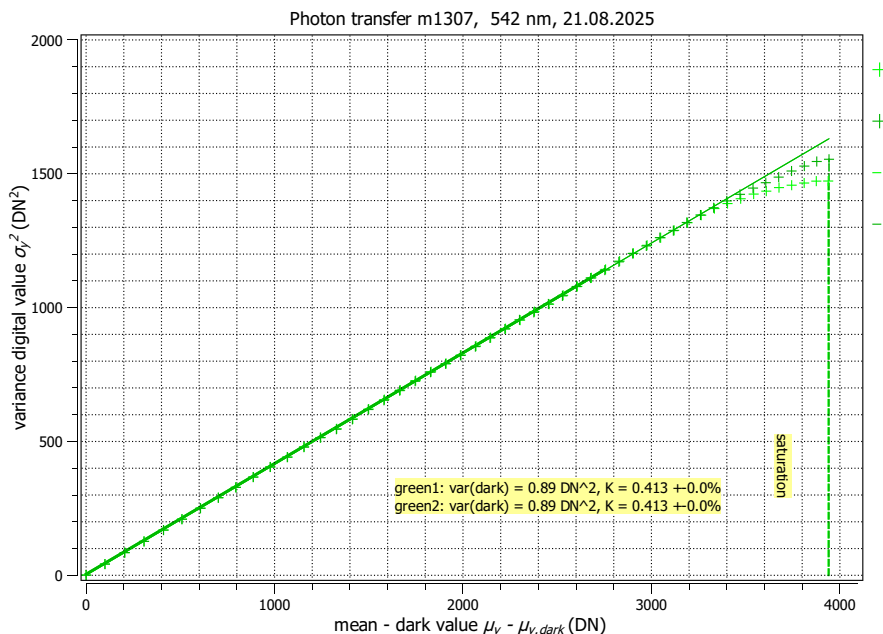


| | |
|---------------------------------------|---------------------------------------|
| Quantum efficiency | |
| η | 44.0% |
| Overall system gain | |
| K | 0.4137 DN/e ⁻ |
| $1/K$ | 2.417 e ⁻ /DN |
| Temporal dark noise | |
| σ_d | 2.18 e ⁻ |
| $\sigma_{y, \text{dark}}$ | 0.946 DN |
| Signal-to-noise ratio | |
| SNR_{max} | 97.4 |
| | 39.8 dB |
| $1/\text{SNR}_{\text{max}}$ | 1.026 % |
| Absolute sensitivity threshold | |
| $\mu_{e, \text{min}}$ | 2.84 e ⁻ |
| $\mu_{e, \text{min, area}}$ | 0.378 e ⁻ /μm ² |
| Saturation capacity | |
| $\mu_{e, \text{sat}}$ | 9495 e ⁻ |
| $\mu_{e, \text{sat, area}}$ | 1265 e ⁻ /μm ² |
| Dynamic range | |
| DR | 3343 |
| | 70.48 dB |
| Spatial nonuniformities | |
| DSNU ₁₂₈₈ | 0.360 e ⁻ |
| DSNU _{1288, col} | 0.033 e ⁻ |
| DSNU _{1288, row} | 0.028 e ⁻ |
| DSNU _{1288, pix} | 0.358 e ⁻ |
| PRNU ₁₂₈₈ | 0.467 % |
| PRNU _{1288, col} | 0.038 % |
| PRNU _{1288, row} | 0.012 % |
| PRNU _{1288, pix} | 0.465 % |
| Linearity error | |
| LE | 0.30% |
| Dark current | |
| $\mu_{c, \text{mean}}$ | 4.98E-01 e ⁻ /s |
| $\mu_{c, \text{var}}$ | 4.81E-01 e ⁻ /s |

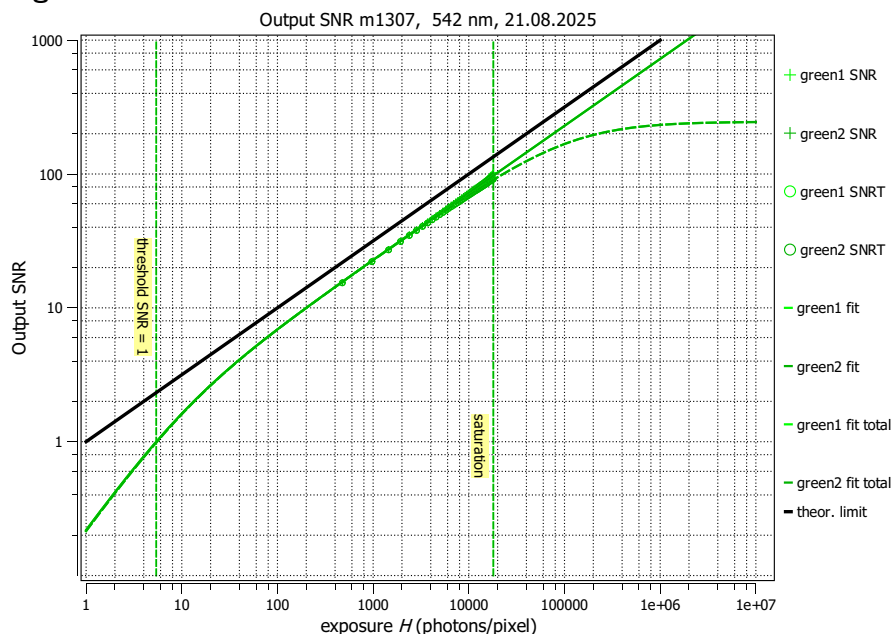
Summary Sheet for Operation Point 2 at a Wavelength of 542 nm

| | | | |
|--------------------|---------------|---------------------------|-----------------|
| Type of data | Single | Gain, black-level | 0.0dB, 0.1 |
| Exposure control | By irradiance | Environmental temperature | 23.4°C |
| Exposure time | 3.000 ms | Camera body temperature | 33.4°C |
| Frame rate | 18.3 Hz | Internal temperature(s) | 47.0°C, 35.2°C |
| Data transfer mode | BayerRG12p | Wavelength, centr., FWHM | 542 nm, 33.9 nm |

Photon Transfer



Signal-to-Noise Ratio



Quantum efficiency

η 52.5%

Overall system gain

K 0.4135 DN/e⁻

$1/K$ 2.418 e⁻/DN

Temporal dark noise

σ_d 2.18 e⁻

$\sigma_{y, \text{dark}}$ 0.946 DN

Signal-to-noise ratio

SNR_{max} 97.4

39.8 dB

$1/\text{SNR}_{\text{max}}$ 1.027 %

Absolute sensitivity threshold

$\mu_{e, \text{min}}$ 2.84 e⁻

$\mu_{e, \text{min, area}}$ 0.379 e⁻/μm²

Saturation capacity

$\mu_{e, \text{sat}}$ 9482 e⁻

$\mu_{e, \text{sat, area}}$ 1263 e⁻/μm²

Dynamic range

DR 3337

70.47 dB

Spatial nonuniformities

DSNU₁₂₈₈ 0.465 e⁻

DSNU_{1288, col} 0.031 e⁻

DSNU_{1288, row} 0.028 e⁻

DSNU_{1288, pix} 0.463 e⁻

PRNU₁₂₈₈ 0.406 %

PRNU_{1288, col} 0.058 %

PRNU_{1288, row} 0.013 %

PRNU_{1288, pix} 0.402 %

Linearity error

LE 0.33%

Dark current

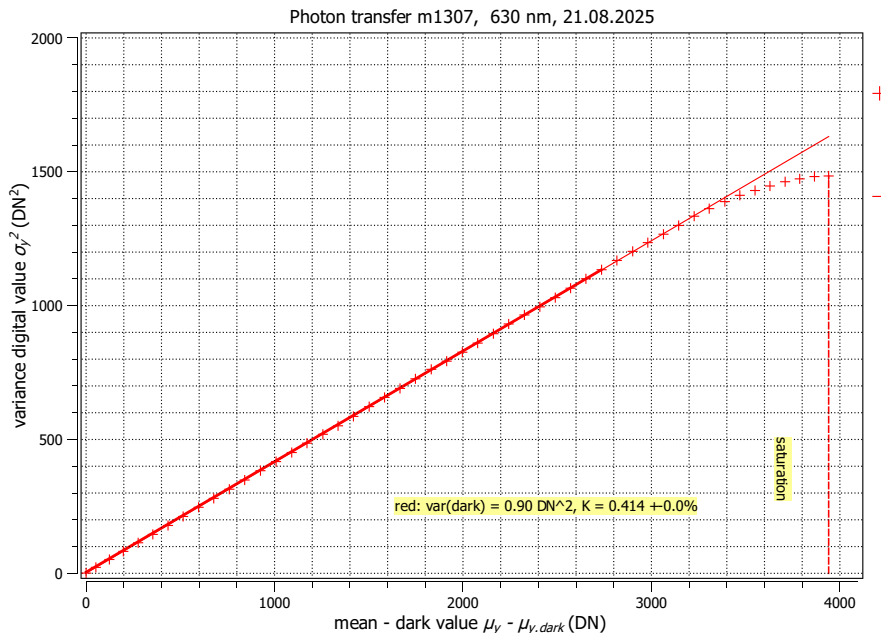
$\mu_{c, \text{mean}}$ 4.84E-01 e⁻/s

$\mu_{c, \text{var}}$ 5.05E-01 e⁻/s

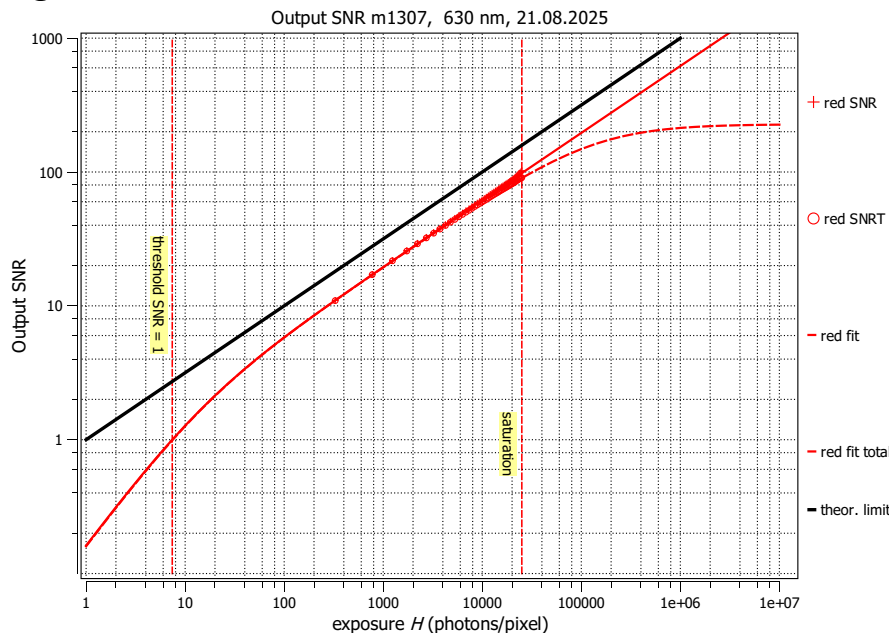
Summary Sheet for Operation Point 3 at a Wavelength of 630 nm

| | | | |
|--------------------|---------------|---------------------------|-----------------|
| Type of data | Single | Gain, black-level | 0.0dB, 0.1 |
| Exposure control | By irradiance | Environmental temperature | 23.5°C |
| Exposure time | 2.000 ms | Camera body temperature | 33.8°C |
| Frame rate | 18.3 Hz | Internal temperature(s) | 47.3°C, 36.0°C |
| Data transfer mode | BayerRG12p | Wavelength, centr., FWHM | 630 nm, 13.3 nm |

Photon Transfer



Signal-to-Noise Ratio



Quantum efficiency

η 38.4%

Overall system gain

K 0.4139 DN/e⁻

$1/K$ 2.416 e⁻/DN

Temporal dark noise

σ_d 2.18 e⁻

$\sigma_{y, \text{dark}}$ 0.948 DN

Signal-to-noise ratio

SNR_{max} 98.1

39.8 dB

$1/\text{SNR}_{\text{max}}$ 1.019%

Absolute sensitivity threshold

$\mu_{e, \text{min}}$ 2.84 e⁻

$\mu_{e, \text{min. area}}$ 0.379 e⁻/μm²

Saturation capacity

$\mu_{e, \text{sat}}$ 9627 e⁻

$\mu_{e, \text{sat. area}}$ 1282 e⁻/μm²

Dynamic range

DR 3386

70.59 dB

Spatial nonuniformities

DSNU₁₂₈₈ 0.374 e⁻

DSNU_{1288.col} 0.038 e⁻

DSNU_{1288.row} 0.028 e⁻

DSNU_{1288.pix} 0.371 e⁻

PRNU₁₂₈₈ 0.440 %

PRNU_{1288.col} 0.067 %

PRNU_{1288.row} 0.013 %

PRNU_{1288.pix} 0.434 %

Linearity error

LE 0.25%

Dark current

$\mu_{c, \text{mean}}$ 4.34E-01 e⁻/s

$\mu_{c, \text{var}}$ 4.31E-01 e⁻/s