

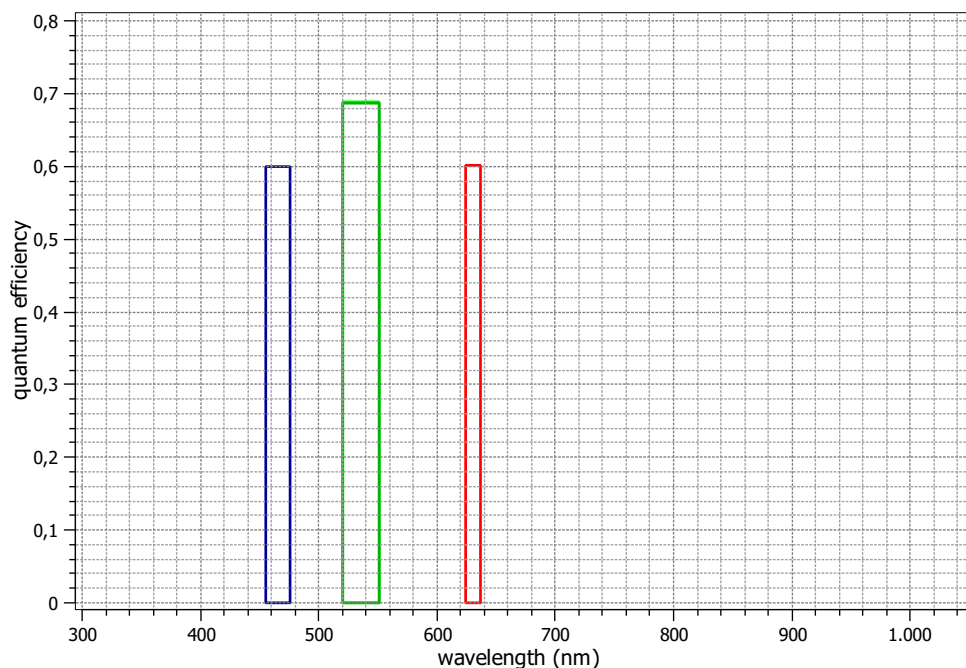
## EMVA 1288 Summary Sheet

This datasheet describes the specification according to the standard 1288 for "Characterization and Presentation of Specification Data for Image Sensors and Cameras of the European Machine Vision Association (EMVA)" (see [www.standard1288.org](http://www.standard1288.org) or the *Zenodo EMVA 1288 community*) release 3.0 with proprietary extensions from AEON. The measurements were performed with the AEON ACC3 RGB Release 3, 15.08.2015, SN 0001(Baumer), recalibrated 26.08.2019. The performance parameters and estimated accuracy of the measurements are described in the technical report for the instrument, its calibration in the corresponding specification and calibration report.

Measurements performed by Technical and Application Support Center, Baumer Optronik GmbH.

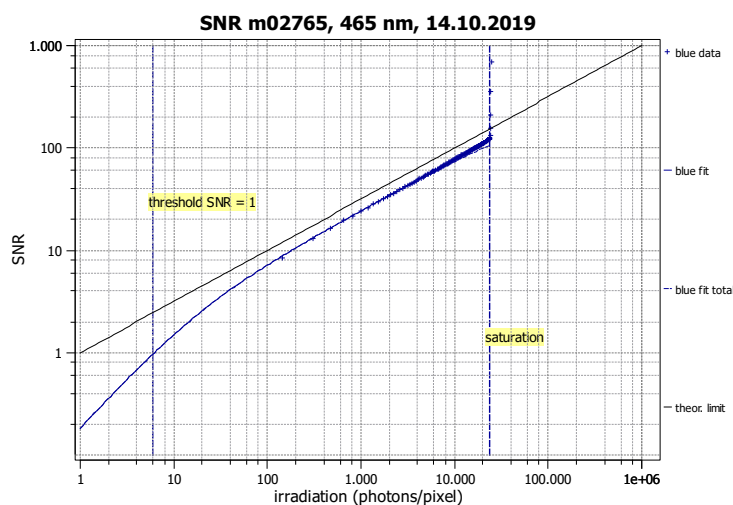
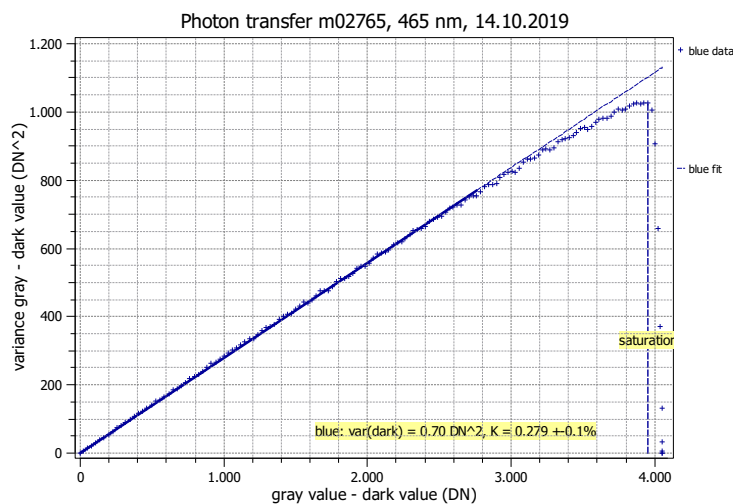
|                      |                     |
|----------------------|---------------------|
| Vendor               | Baumer              |
| Model                | VCXG-22C.R          |
| Serial number        | 700004404017        |
| Sensor diagonal      | 6.39 mm             |
| Lens category        | C-Mount             |
| Resolution           | 1920 × 1080, 12 bit |
| Pixel size           | 2.90 μm × 2.90 μm   |
| Sensor               | Sony IMX290         |
| Sensor type          | CMOS                |
| Shutter type         | Rolling shutter     |
| Overlap capabilities | Overlapped          |
| Maximum frame rate   | 0.0 Hz              |
| Interface type       | GEV                 |

|                               |            |
|-------------------------------|------------|
| Type of data presented        | Single     |
| <b>Operation point 1</b>      |            |
| Wavelength centroid           | 465.1 nm   |
| Wavelength FWHM               | 20.5 nm    |
| Gain / BlackLevel             | 1.0 / 40.0 |
| <b>Operation point 2</b>      |            |
| Wavelength centroid           | 535.7 nm   |
| Wavelength FWHM               | 31.9 nm    |
| Gain / BlackLevel             | 1.0 / 40.0 |
| <b>Operation point 3</b>      |            |
| Wavelength centroid           | 630.3 nm   |
| Wavelength FWHM               | 13.2 nm    |
| Gain / BlackLevel             | 1.0 / 40.0 |
| <b>Optional data measured</b> |            |
| None                          |            |



## EMVA 1288 Summary Sheet for Operating Point 1

|                    |               |                           |                 |
|--------------------|---------------|---------------------------|-----------------|
| Type of data       | Single        | Gain / BlackLevel         | 1.0 / 40.0      |
| Exposure control   | By irradiance | Environmental temperature | 23.8°C          |
| Exposure time      | 1.58 ms       | Camera body temperature   | 30.2°C          |
| Frame rate         | 9.6 Hz        | Internal temperature(s)   | —               |
| Data transfer mode | BayerRG12     | Wavelength, centr., FWHM  | 465 nm, 20.5 nm |



### Quantum efficiency

$\eta$  60.0%

### Overall system gain

$K$  0.279 DN/e<sup>-</sup>  
 $1/K$  3.585 e<sup>-</sup>/DN

### Temporal dark noise & DSNU

$\sigma_{y,\text{dark}}$  0.84 DN  
 DSNU<sub>1288</sub> 0.07 DN  
 $\sigma_d$  2.83 e<sup>-</sup>  
 DSNU<sub>1288</sub> 0.26 e<sup>-</sup>

### Signal-to-noise ratio & PRNU

SNR<sub>max</sub> 119  
 41.5 dB  
 6.9 bit  
 $1/\text{SNR}_{\text{max}}$  0.84 %  
 PRNU<sub>1288</sub> 0.43 %

### Nonlinearity

LE 0.16%  
 LE<sub>min</sub> -0.21%  
 LE<sub>max</sub> 0.11%

### Sensitivity & saturation

$\mu_{p,\text{min}}$  5.92 p  
 0.703 p/ $\mu\text{m}^2$   
 $\mu_{p,\text{sat}}$  23717 p  
 2820 p/ $\mu\text{m}^2$   
 $\mu_{e,\text{min}}$  3.55 e<sup>-</sup>  
 0.422 e<sup>-</sup>/ $\mu\text{m}^2$   
 $\mu_{e,\text{sat}}$  14239 e<sup>-</sup>  
 1693 e<sup>-</sup>/ $\mu\text{m}^2$

### Dynamic range

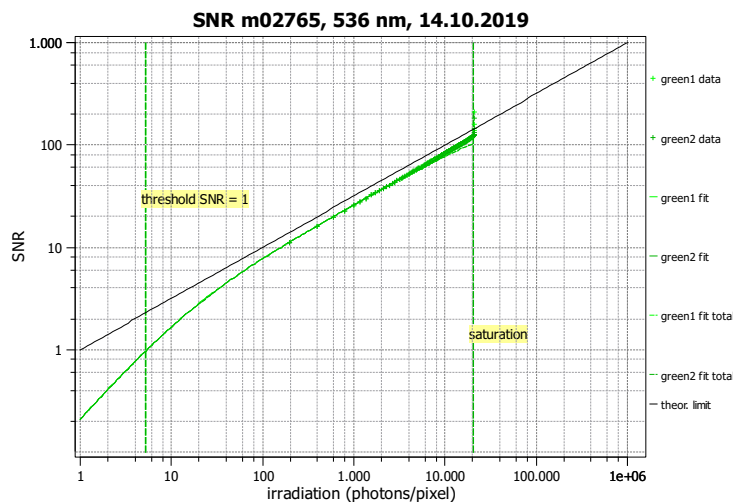
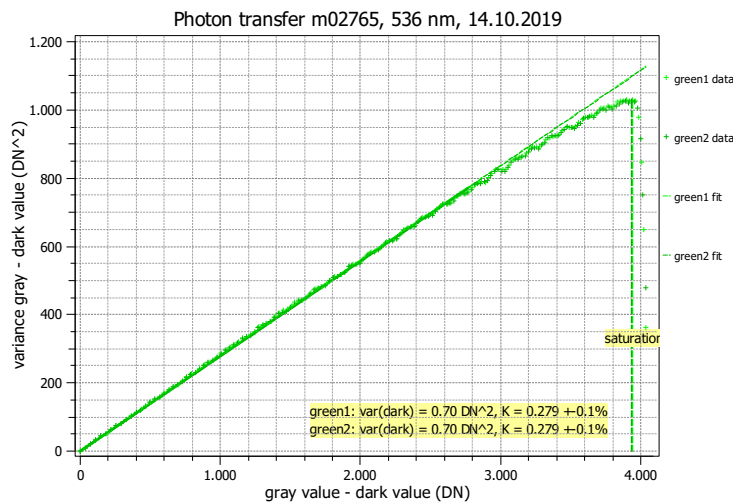
DR 4009  
 72.1 dB  
 12.0 bit

### Dark current

$\mu_{c,\text{mean}}$  0.0 DN/s  
 $\mu_{c,\text{mean}}$  0.0 e<sup>-</sup>/s  
 $\mu_{c,\text{var}}$  0.4 e<sup>-</sup>/s

## EMVA 1288 Summary Sheet for Operating Point 2

|                    |               |                           |                 |
|--------------------|---------------|---------------------------|-----------------|
| Type of data       | Single        | Gain / BlackLevel         | 1.0 / 40.0      |
| Exposure control   | By irradiance | Environmental temperature | 23.8°C          |
| Exposure time      | 1.58 ms       | Camera body temperature   | 30.2°C          |
| Frame rate         | 9.6 Hz        | Internal temperature(s)   | —               |
| Data transfer mode | BayerRG12     | Wavelength, centr., FWHM  | 536 nm, 31.9 nm |



### Quantum efficiency

$\eta$  68.8%

### Overall system gain

$K$  0.279 DN/e<sup>-</sup>

1/ $K$  3.582 e<sup>-</sup>/DN

### Temporal dark noise & DSNU

$\sigma_{y,\text{dark}}$  0.84 DN

DSNU<sub>1288</sub> 0.07 DN

$\sigma_d$  2.81 e<sup>-</sup>

DSNU<sub>1288</sub> 0.26 e<sup>-</sup>

### Signal-to-noise ratio & PRNU

SNR<sub>max</sub> 119

41.5 dB

6.9 bit

1/SNR<sub>max</sub> 0.84 %

PRNU<sub>1288</sub> 0.47 %

### Nonlinearity

LE 0.11%

LE<sub>min</sub> -0.15%

LE<sub>max</sub> 0.07%

### Sensitivity & saturation

$\mu_{p,\text{min}}$  5.14 p

0.611 p/ $\mu\text{m}^2$

$\mu_{p,\text{sat}}$  20558 p

2444 p/ $\mu\text{m}^2$

$\mu_{e,\text{min}}$  3.54 e<sup>-</sup>

0.421 e<sup>-</sup>/ $\mu\text{m}^2$

$\mu_{e,\text{sat}}$  14151 e<sup>-</sup>

1683 e<sup>-</sup>/ $\mu\text{m}^2$

### Dynamic range

DR 4001

72.0 dB

12.0 bit

### Dark current

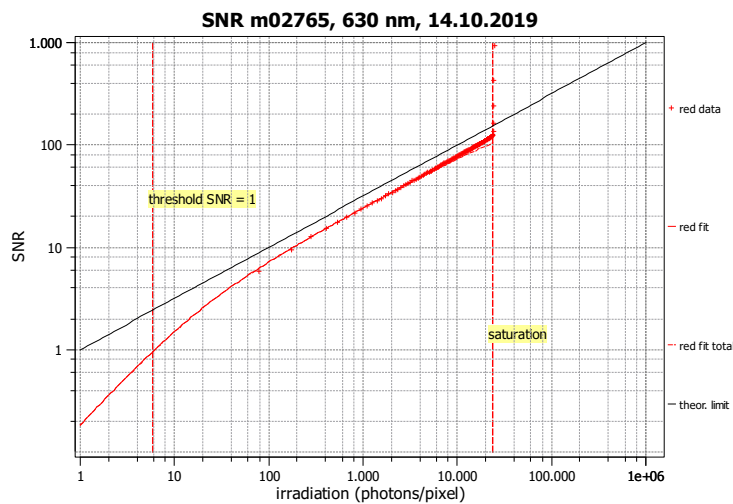
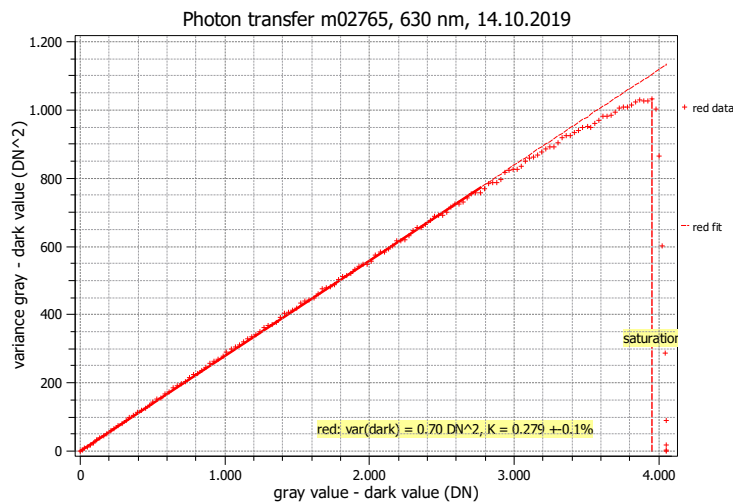
$\mu_{c,\text{mean}}$  0.0 DN/s

$\mu_{c,\text{mean}}$  0.1 e<sup>-</sup>/s

$\mu_{c,\text{var}}$  0.4 e<sup>-</sup>/s

## EMVA 1288 Summary Sheet for Operating Point 3

|                    |               |                           |                 |
|--------------------|---------------|---------------------------|-----------------|
| Type of data       | Single        | Gain / BlackLevel         | 1.0 / 40.0      |
| Exposure control   | By irradiance | Environmental temperature | 23.8°C          |
| Exposure time      | 1.58 ms       | Camera body temperature   | 30.2°C          |
| Frame rate         | 9.6 Hz        | Internal temperature(s)   | —               |
| Data transfer mode | BayerRG12     | Wavelength, centr., FWHM  | 630 nm, 13.2 nm |



### Quantum efficiency

$\eta$  60.1%

### Overall system gain

$K$  0.279 DN/e<sup>-</sup>

1/ $K$  3.579 e<sup>-</sup>/DN

### Temporal dark noise & DSNU

$\sigma_{y,\text{dark}}$  0.84 DN

DSNU<sub>1288</sub> 0.07 DN

$\sigma_d$  2.81 e<sup>-</sup>

DSNU<sub>1288</sub> 0.26 e<sup>-</sup>

### Signal-to-noise ratio & PRNU

SNR<sub>max</sub> 119

41.5 dB

6.9 bit

1/SNR<sub>max</sub> 0.84 %

PRNU<sub>1288</sub> 0.47 %

### Nonlinearity

LE 0.24%

LE<sub>min</sub> -0.33%

LE<sub>max</sub> 0.15%

### Sensitivity & saturation

$\mu_{p,\text{min}}$  5.89 p

0.700 p/μm<sup>2</sup>

$\mu_{p,\text{sat}}$  23755 p

2825 p/μm<sup>2</sup>

$\mu_{e,\text{min}}$  3.54 e<sup>-</sup>

0.421 e<sup>-</sup>/μm<sup>2</sup>

$\mu_{e,\text{sat}}$  14272 e<sup>-</sup>

1697 e<sup>-</sup>/μm<sup>2</sup>

### Dynamic range

DR 4035

72.1 dB

12.0 bit

### Dark current

$\mu_{c,\text{mean}}$  0.0 DN/s

$\mu_{c,\text{mean}}$  0.1 e<sup>-</sup>/s

$\mu_{c,\text{var}}$  0.4 e<sup>-</sup>/s