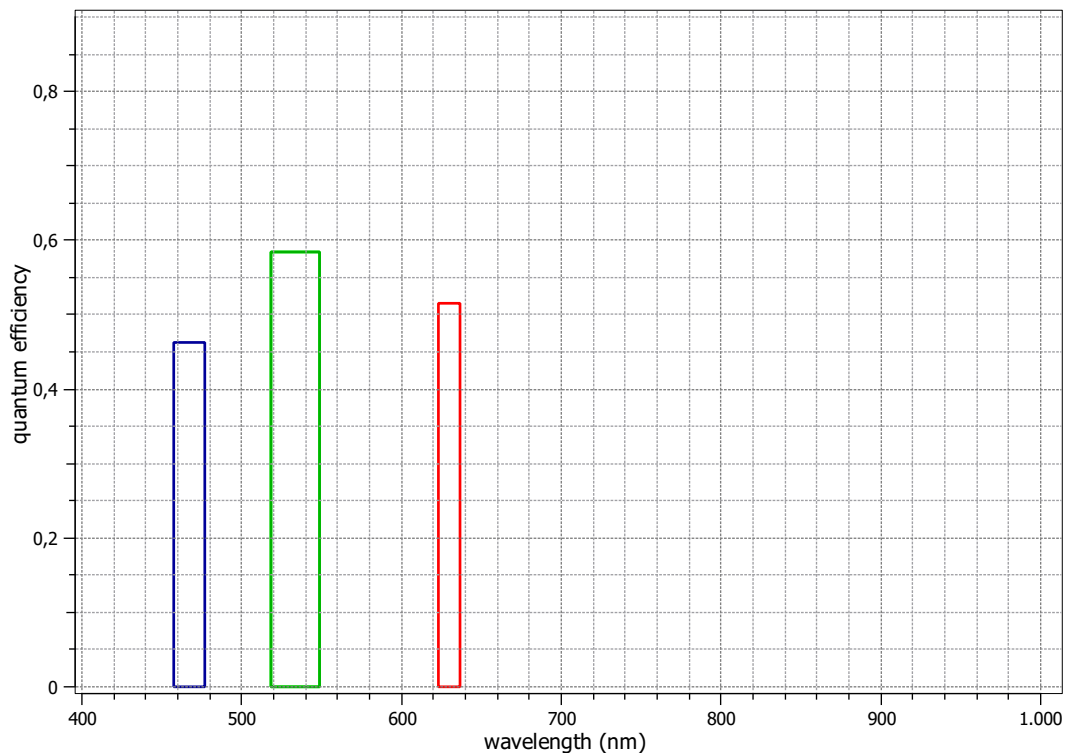


## EMVA 1288 Summary Sheet

This datasheet describes the specification according to the standard 1288 release 3.1 for "Characterization and Presentation of Specification Data for Image Sensors and Cameras" issued on December 30, 2016 by the European Machine Vision Association (EMVA), published at [www.standard1288.org](http://www.standard1288.org) and the *zenodo EMVA 1288 community* with proprietary extensions from AEON. The measurements were performed with the AEON ACC3 Release 7, 21.08.2018, SN 0018(AEON).

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

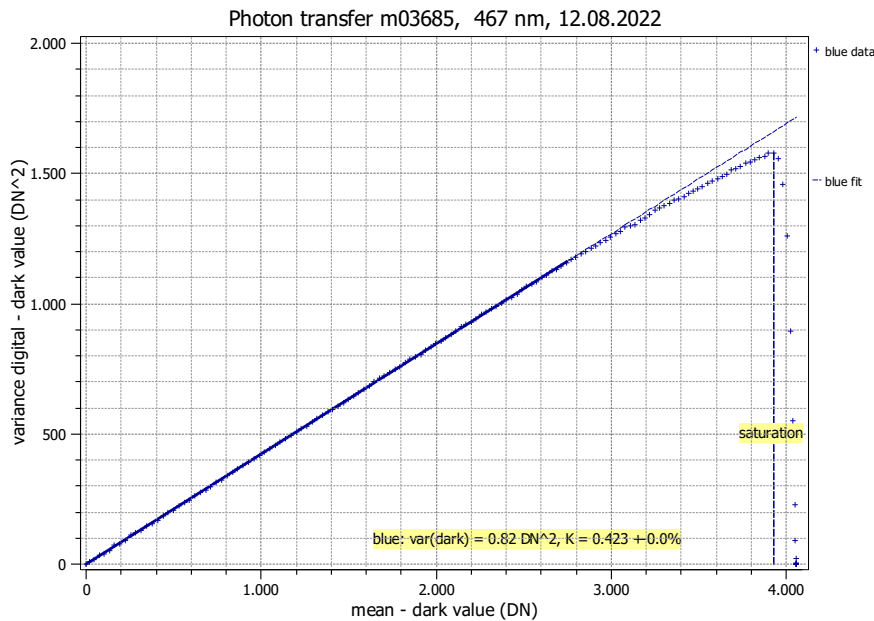
Vendor	Baumer	Type of data presented	Single
Model	VCXU.2-31C	<b>Operation point 1</b>	
Serial number	700008639409	Wavelength centroid	467.2 nm
Sensor diagonal	8.83 mm	Wavelength FWHM	19.5 nm
Lens category	C-Mount	Gain, black-level	1.0 / 38.0
Resolution	2048 × 1536, 12 bit	<b>Operation point 2</b>	
Pixel size (h×v)	3.45 μm × 3.45 μm	Wavelength centroid	533.3 nm
Sensor	Sony IMX252	Wavelength FWHM	30.3 nm
Sensor type	CMOS	Gain, black-level	1.0 / 38.0
Shutter type	Global shutter	<b>Operation point 3</b>	
Overlap cap.	Overlapped	Wavelength centroid	629.9 nm
Max. frame rate	0.0 Hz	Wavelength FWHM	12.9 nm
Interface type	U3V	Gain, black-level	1.0 / 38.0
		<b>Optional data measured</b>	
		None	



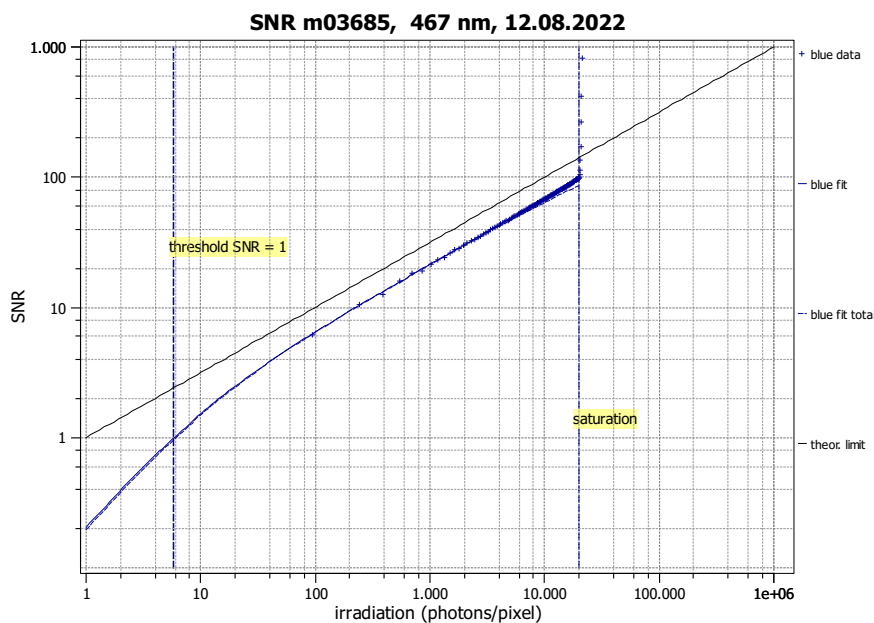
## Summary Sheet for Operation Point 1 at a Wavelength of 467 nm

Type of data	Single	Gain, black-level	1.0 / 38.0
Exposure control	By irradiance	Environmental temperature	24.4 °C
Exposure time	796.00 $\mu$ s	Camera body temperature	32.5 °C
Frame rate	10.0 Hz	Internal temperature(s)	—
Data transfer mode	BayerRG12	Wavelength, centr., FWHM	467 nm, 19.5 nm

### Photon Transfer



### Signal-to-Noise Ratio



#### Quantum efficiency

$\eta$  46.2%

#### Overall system gain

$K$  0.423 DN/e<sup>-</sup>

$1/K$  2.365 e<sup>-</sup>/DN

#### Temporal dark noise

$\sigma_d$  2.03 e<sup>-</sup>

$\sigma_{y,\text{dark}}$  0.91 DN

#### Signal-to-noise ratio

SNR<sub>max</sub> 96

39.7 dB

6.6 bit

$1/\text{SNR}_{\text{max}}$  1.04 %

#### Absolute sensitivity threshold

$\mu_{p,\text{min}}$  5.84 p

$\mu_{p,\text{min,area}}$  0.491 p/ $\mu\text{m}^2$

$\mu_{e,\text{min}}$  2.70 e<sup>-</sup>

$\mu_{e,\text{min,area}}$  0.227 e<sup>-</sup>/ $\mu\text{m}^2$

#### Saturation capacity

$\mu_{p,\text{sat}}$  20006 p

$\mu_{p,\text{sat,area}}$  1681 p/ $\mu\text{m}^2$

$\mu_{e,\text{sat}}$  9240 e<sup>-</sup>

$\mu_{e,\text{sat,area}}$  776 e<sup>-</sup>/ $\mu\text{m}^2$

#### Dynamic range

DR 3424

70.7 dB

11.7 bit

#### Spatial nonuniformities

DSNU<sub>1288</sub> 0.66 e<sup>-</sup>

0.28 DN

PRNU<sub>1288</sub> 0.52 %

#### Linearity error

LE<sub>min</sub> -0.59%

LE<sub>max</sub> 1.36%

#### Dark current

$\mu_{c,\text{mean}}$  -1.20 ± 0.26 e<sup>-</sup>/s

-0.51 DN/s

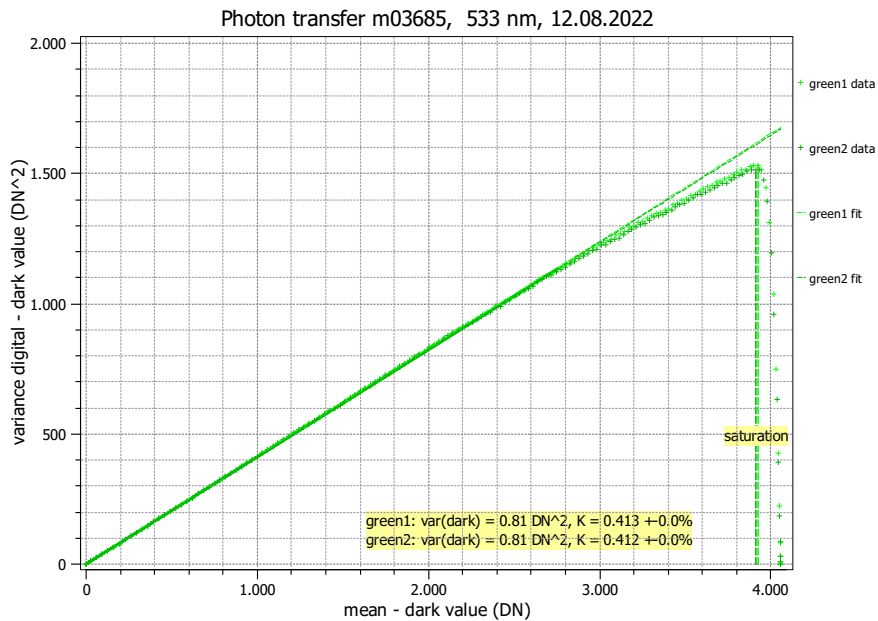
$\mu_{c,\text{var}}$  0.10 ± 0.25 e<sup>-</sup>/s

$T_d$  — °C

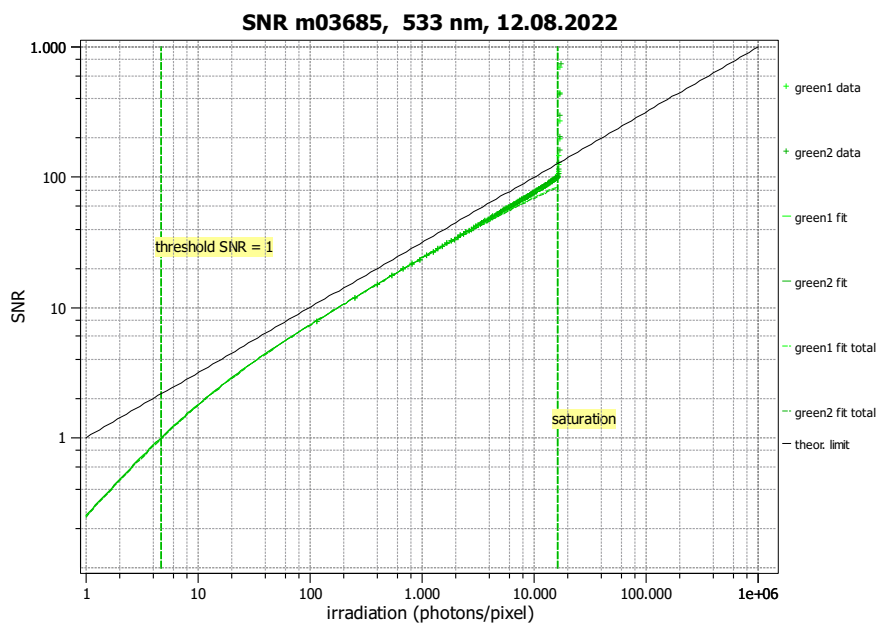
## Summary Sheet for Operation Point 2 at a Wavelength of 533 nm

Type of data	Single	Gain, black-level	1.0 / 38.0
Exposure control	By irradiance	Environmental temperature	25.2°C
Exposure time	796.00 $\mu$ s	Camera body temperature	33.8°C
Frame rate	10.0 Hz	Internal temperature(s)	—
Data transfer mode	BayerRG12	Wavelength, centr., FWHM	533 nm, 30.3 nm

### Photon Transfer



### Signal-to-Noise Ratio



#### Quantum efficiency

$\eta$  58.5%

#### Overall system gain

$K$  0.413 DN/e<sup>-</sup>

$1/K$  2.420 e<sup>-</sup>/DN

#### Temporal dark noise

$\sigma_d$  2.06 e<sup>-</sup>

$\sigma_{y,\text{dark}}$  0.90 DN

#### Signal-to-noise ratio

SNR<sub>max</sub> 97

39.8 dB

6.6 bit

$1/\text{SNR}_{\text{max}}$  1.03%

#### Absolute sensitivity threshold

$\mu_{p,\text{min}}$  4.67 p

$\mu_{p,\text{min,area}}$  0.392 p/ $\mu\text{m}^2$

$\mu_{e,\text{min}}$  2.73 e<sup>-</sup>

$\mu_{e,\text{min,area}}$  0.229 e<sup>-</sup>/ $\mu\text{m}^2$

#### Saturation capacity

$\mu_{p,\text{sat}}$  16189 p

$\mu_{p,\text{sat,area}}$  1360 p/ $\mu\text{m}^2$

$\mu_{e,\text{sat}}$  9464 e<sup>-</sup>

$\mu_{e,\text{sat,area}}$  795 e<sup>-</sup>/ $\mu\text{m}^2$

#### Dynamic range

DR 3468

70.8 dB

11.8 bit

#### Spatial nonuniformities

DSNU<sub>1288</sub> 0.55 e<sup>-</sup>

0.23 DN

PRNU<sub>1288</sub> 0.58%

#### Linearity error

LE<sub>min</sub> -0.61%

LE<sub>max</sub> 1.42%

#### Dark current

$\mu_{c,\text{mean}}$  -1.22  $\pm$  0.25 e<sup>-</sup>/s

-0.50 DN/s

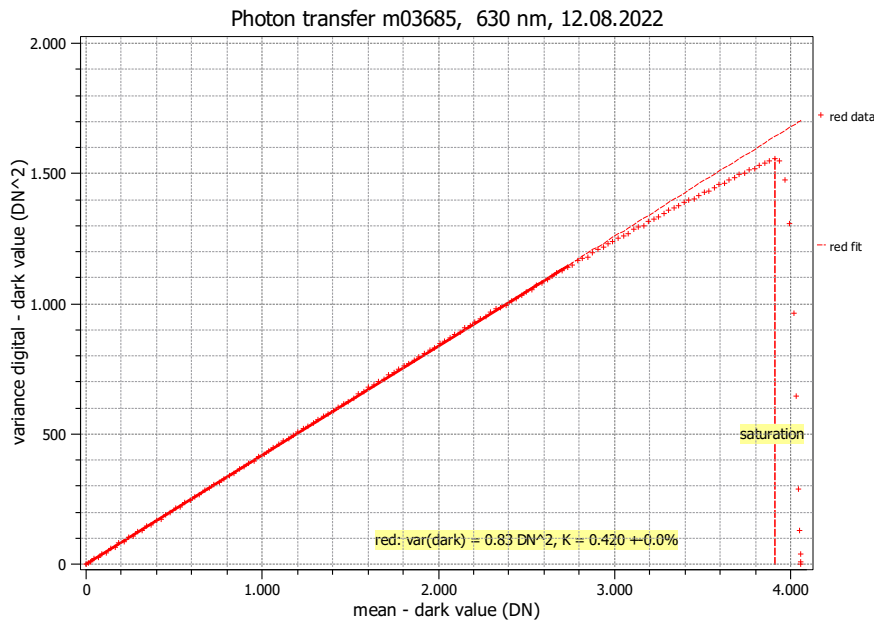
$\mu_{c,\text{var}}$  -0.10  $\pm$  0.22 e<sup>-</sup>/s

$T_d$  — °C

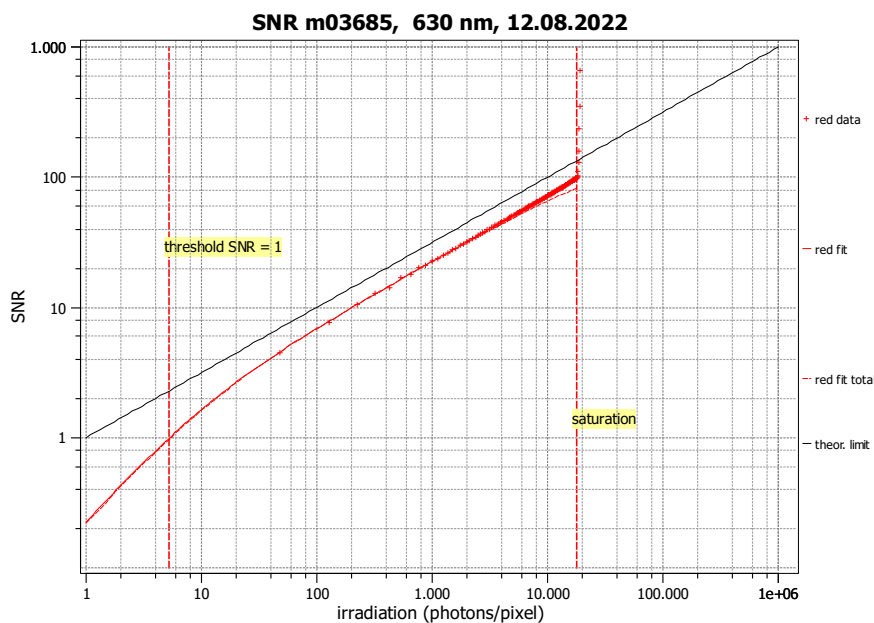
## Summary Sheet for Operation Point 3 at a Wavelength of 630 nm

Type of data	Single	Gain, black-level	1.0 / 38.0
Exposure control	By irradiance	Environmental temperature	25.7°C
Exposure time	796.00 $\mu$ s	Camera body temperature	34.1°C
Frame rate	10.0 Hz	Internal temperature(s)	—
Data transfer mode	BayerRG12	Wavelength, centr., FWHM	630 nm, 12.9 nm

### Photon Transfer



### Signal-to-Noise Ratio



#### Quantum efficiency

$\eta$  51.6%

#### Overall system gain

$K$  0.420 DN/e<sup>-</sup>

$1/K$  2.383 e<sup>-</sup>/DN

#### Temporal dark noise

$\sigma_d$  2.06 e<sup>-</sup>

$\sigma_{y,\text{dark}}$  0.91 DN

#### Signal-to-noise ratio

SNR<sub>max</sub> 97

39.7 dB

6.6 bit

$1/\text{SNR}_{\text{max}}$  1.04%

#### Absolute sensitivity threshold

$\mu_{p,\text{min}}$  5.29 p

$\mu_{p,\text{min,area}}$  0.444 p/ $\mu\text{m}^2$

$\mu_{e,\text{min}}$  2.73 e<sup>-</sup>

$\mu_{e,\text{min,area}}$  0.229 e<sup>-</sup>/ $\mu\text{m}^2$

#### Saturation capacity

$\mu_{p,\text{sat}}$  18063 p

$\mu_{p,\text{sat,area}}$  1518 p/ $\mu\text{m}^2$

$\mu_{e,\text{sat}}$  9323 e<sup>-</sup>

$\mu_{e,\text{sat,area}}$  783 e<sup>-</sup>/ $\mu\text{m}^2$

#### Dynamic range

DR 3417

70.7 dB

11.7 bit

#### Spatial nonuniformities

DSNU<sub>1288</sub> 0.56 e<sup>-</sup>

0.23 DN

PRNU<sub>1288</sub> 0.62%

#### Linearity error

LE<sub>min</sub> -0.37%

LE<sub>max</sub> 0.97%

#### Dark current

$\mu_{c,\text{mean}}$   $-1.26 \pm 0.25$  e<sup>-</sup>/s

-0.52 DN/s

$\mu_{c,\text{var}}$   $-0.13 \pm 0.25$  e<sup>-</sup>/s

$T_d$  — °C