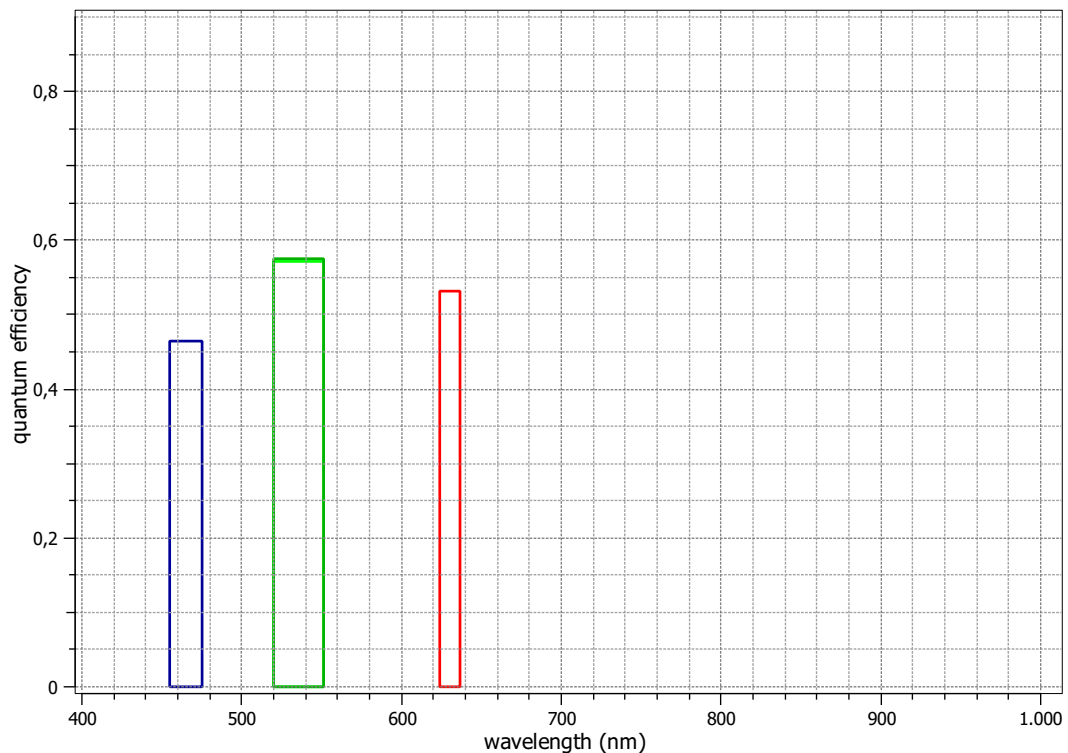


## EMVA 1288 Summary Sheet

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 RGB Release 7, 21.08.2018, SN 0001(Baumer).

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

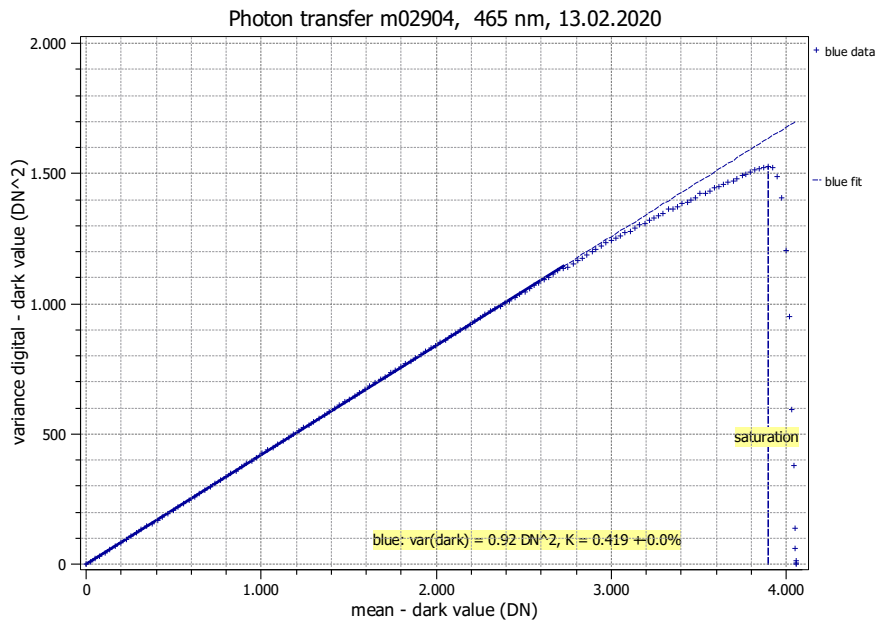
Vendor	Baumer	Type of data presented	Single
Model	VCXU-124C	<b>Operation point 1</b>	
Serial number	700003003171	Wavelength centroid	465.1 nm
Sensor diagonal	17.52 mm	Wavelength FWHM	20.5 nm
Lens category	C-Mount	Gain, black-level	1.0 / 39.0
Resolution	4096 × 3000, 12 bit	<b>Operation point 2</b>	
Pixel size (h×v)	3.45 μm × 3.45 μm	Wavelength centroid	535.7 nm
Sensor	Sony IMX304	Wavelength FWHM	31.9 nm
Sensor type	CMOS	Gain, black-level	1.0 / 39.0
Shutter type	Global shutter	<b>Operation point 3</b>	
Overlap cap.	Overlapped	Wavelength centroid	630.3 nm
Max. frame rate	0.0 Hz	Wavelength FWHM	13.2 nm
Interface type	U3V	Gain, black-level	1.0 / 39.0
		<b>Optional data measured</b>	
		None	



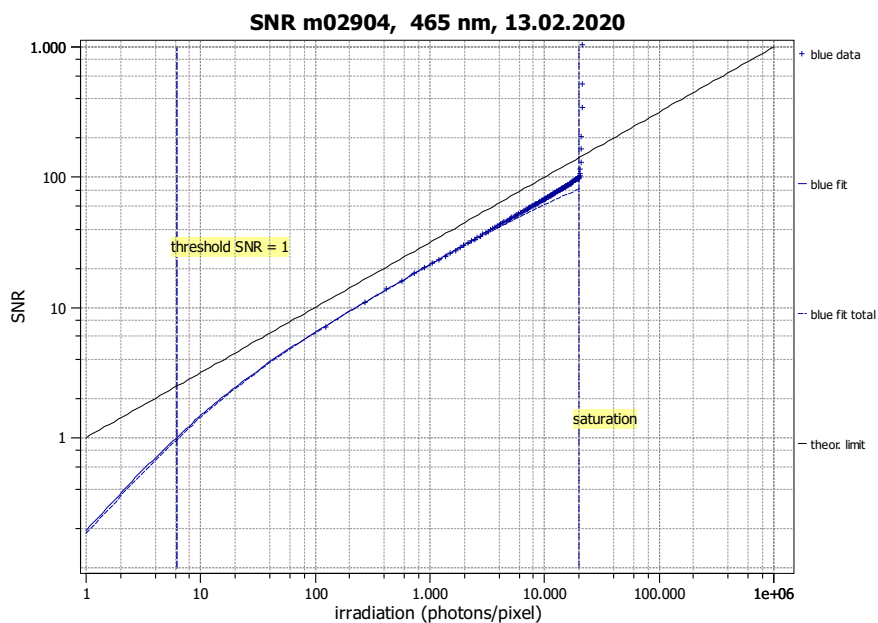
## Summary Sheet for Operation Point 1 at a Wavelength of 465 nm

Type of data	Single	Gain, black-level	1.0 / 39.0
Exposure control	By irradiance	Environmental temperature	23.7°C
Exposure time	796.00 $\mu$ s	Camera body temperature	33.5°C
Frame rate	10.0 Hz	Internal temperature(s)	—
Data transfer mode	BayerRG12	Wavelength, centr., FWHM	465 nm, 20.5 nm

### Photon Transfer



### Signal-to-Noise Ratio



#### Quantum efficiency

$\eta$  46.4%

#### Overall system gain

$K$  0.419 DN/e<sup>-</sup>

$1/K$  2.384 e<sup>-</sup>/DN

#### Temporal dark noise

$\sigma_d$  2.18 e<sup>-</sup>

$\sigma_{y,\text{dark}}$  0.96 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

$\mu_{p,\text{min}}$  6.13 p

$\mu_{p,\text{min,area}}$  0.515 p/ $\mu\text{m}^2$

$\mu_{e,\text{min}}$  2.84 e<sup>-</sup>

$\mu_{e,\text{min,area}}$  0.239 e<sup>-</sup>/ $\mu\text{m}^2$

#### Saturation capacity

$\mu_{p,\text{sat}}$  20008 p

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

$\mu_{e,\text{sat}}$  9278 e<sup>-</sup>

$\mu_{e,\text{sat,area}}$  779 e<sup>-</sup>/ $\mu\text{m}^2$

#### Dynamic range

DR 3262

70.3 dB

11.7 bit

#### Spatial nonuniformities

DSNU<sub>1288</sub> 0.81 e<sup>-</sup>

0.34 DN

PRNU<sub>1288</sub> 0.69 %

#### Linearity error

LE<sub>min</sub> -0.56%

LE<sub>max</sub> 1.42%

#### Dark current

$\mu_{c,\text{mean}}$  -1.1 ± 0.2 e<sup>-</sup>/s

-0.46 DN/s

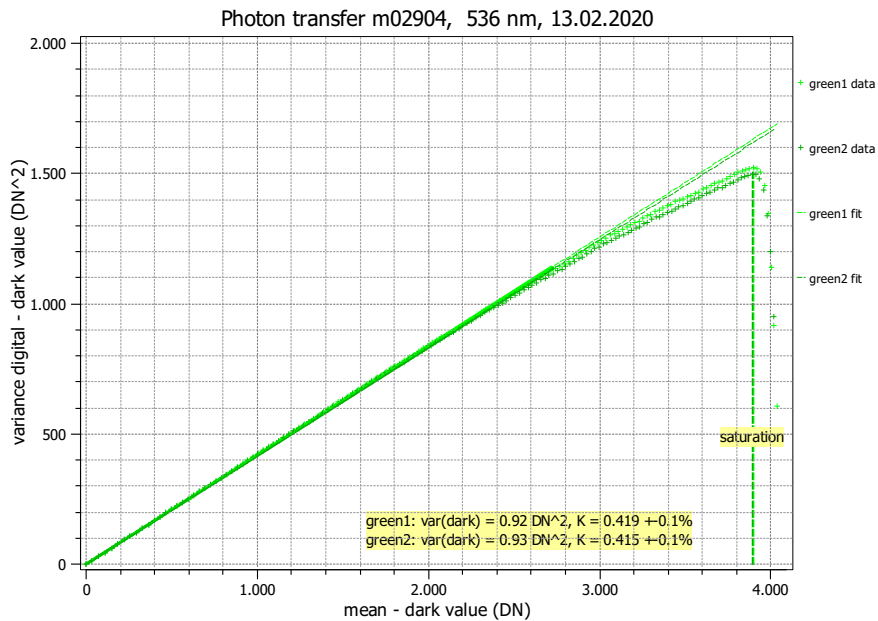
$\mu_{c,\text{var}}$  1.1 ± 0.2 e<sup>-</sup>/s

$T_d$  — °C

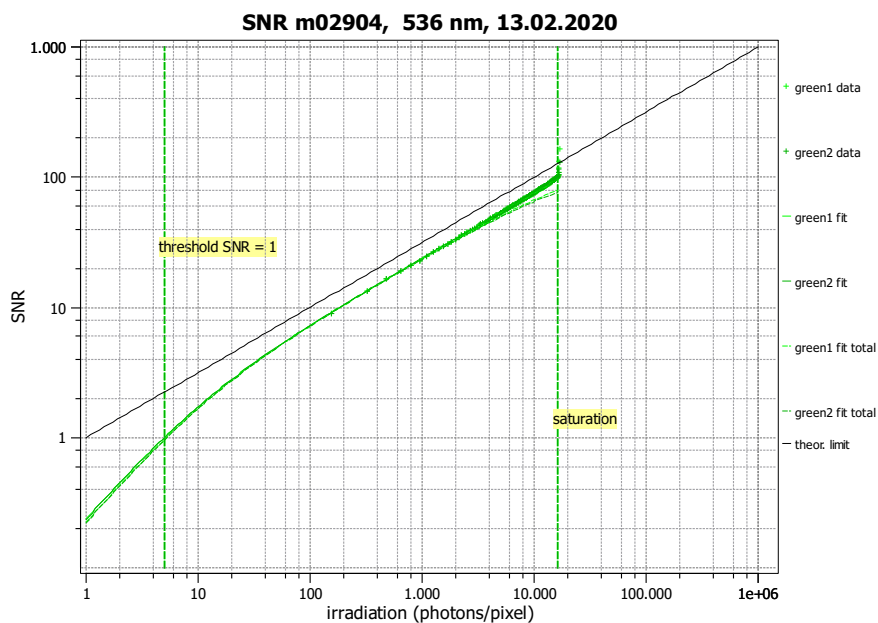
## Summary Sheet for Operation Point 2 at a Wavelength of 536 nm

Type of data	Single	Gain, black-level	1.0 / 39.0
Exposure control	By irradiance	Environmental temperature	24.6 °C
Exposure time	796.00 $\mu$ s	Camera body temperature	34.5 °C
Frame rate	10.0 Hz	Internal temperature(s)	—
Data transfer mode	BayerRG12	Wavelength, centr., FWHM	536 nm, 31.9 nm

### Photon Transfer



### Signal-to-Noise Ratio



#### Quantum efficiency

$\eta$  57.2%

#### Overall system gain

$K$  0.419 DN/e<sup>-</sup>

$1/K$  2.387 e<sup>-</sup>/DN

#### Temporal dark noise

$\sigma_d$  2.19 e<sup>-</sup>

$\sigma_{y,\text{dark}}$  0.96 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

$\mu_{p,\text{min}}$  4.98 p

$\mu_{p,\text{min,area}}$  0.418 p/ $\mu\text{m}^2$

$\mu_{e,\text{min}}$  2.85 e<sup>-</sup>

$\mu_{e,\text{min,area}}$  0.239 e<sup>-</sup>/ $\mu\text{m}^2$

#### Saturation capacity

$\mu_{p,\text{sat}}$  16215 p

$\mu_{p,\text{sat,area}}$  1362 p/ $\mu\text{m}^2$

$\mu_{e,\text{sat}}$  9278 e<sup>-</sup>

$\mu_{e,\text{sat,area}}$  779 e<sup>-</sup>/ $\mu\text{m}^2$

#### Dynamic range

DR 3257

70.3 dB

11.7 bit

#### Spatial nonuniformities

DSNU<sub>1288</sub> 0.83 e<sup>-</sup>

0.35 DN

PRNU<sub>1288</sub> 0.71 %

#### Linearity error

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

LE<sub>max</sub> 1.73%

#### Dark current

$\mu_{c,\text{mean}}$  -1.1 ± 0.2 e<sup>-</sup>/s

-0.45 DN/s

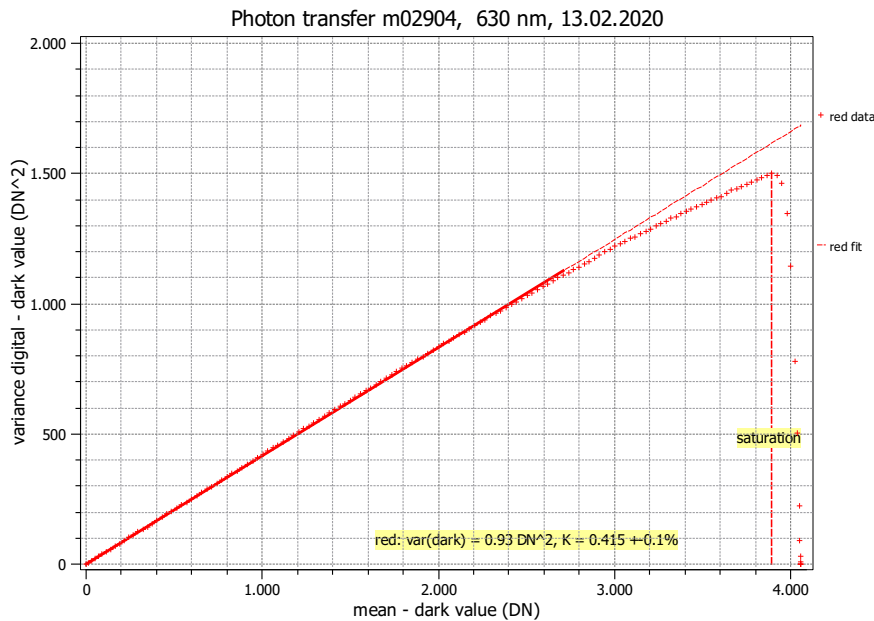
$\mu_{c,\text{var}}$  1.0 ± 0.2 e<sup>-</sup>/s

$T_d$  — °C

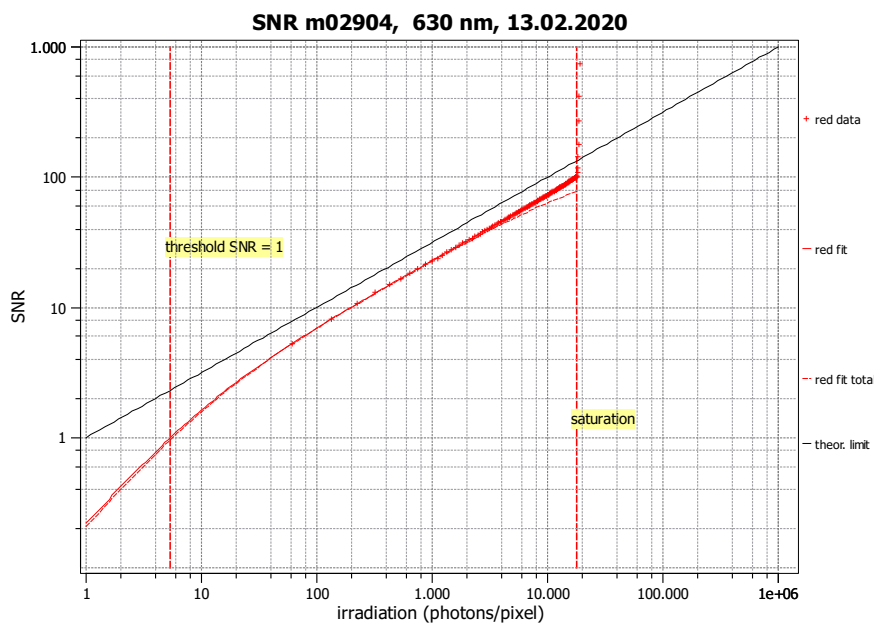
## Summary Sheet for Operation Point 3 at a Wavelength of 630 nm

Type of data	Single	Gain, black-level	1.0 / 39.0
Exposure control	By irradiance	Environmental temperature	25.2 °C
Exposure time	796.00 $\mu$ s	Camera body temperature	34.7 °C
Frame rate	10.0 Hz	Internal temperature(s)	—
Data transfer mode	BayerRG12	Wavelength, centr., FWHM	630 nm, 13.2 nm

### Photon Transfer



### Signal-to-Noise Ratio



#### Quantum efficiency

$\eta$  53.2%

#### Overall system gain

$K$  0.415 DN/e<sup>-</sup>

$1/K$  2.408 e<sup>-</sup>/DN

#### Temporal dark noise

$\sigma_d$  2.21 e<sup>-</sup>

$\sigma_{y,\text{dark}}$  0.96 DN

#### Signal-to-noise ratio

SNR<sub>max</sub> 97

39.7 dB

6.6 bit

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

#### Absolute sensitivity threshold

$\mu_{p,\text{min}}$  5.40 p

$\mu_{p,\text{min,area}}$  0.454 p/ $\mu\text{m}^2$

$\mu_{e,\text{min}}$  2.87 e<sup>-</sup>

$\mu_{e,\text{min,area}}$  0.241 e<sup>-</sup>/ $\mu\text{m}^2$

#### Saturation capacity

$\mu_{p,\text{sat}}$  17722 p

$\mu_{p,\text{sat,area}}$  1489 p/ $\mu\text{m}^2$

$\mu_{e,\text{sat}}$  9426 e<sup>-</sup>

$\mu_{e,\text{sat,area}}$  792 e<sup>-</sup>/ $\mu\text{m}^2$

#### Dynamic range

DR 3280

70.3 dB

11.7 bit

#### Spatial nonuniformities

DSNU<sub>1288</sub> 0.82 e<sup>-</sup>

0.34 DN

PRNU<sub>1288</sub> 0.78 %

#### Linearity error

LE<sub>min</sub> -0.40%

LE<sub>max</sub> 0.36%

#### Dark current

$\mu_{c,\text{mean}}$   $-1.1 \pm 0.2$  e<sup>-</sup>/s

-0.45 DN/s

$\mu_{c,\text{var}}$   $1.2 \pm 0.3$  e<sup>-</sup>/s

$T_d$  — °C