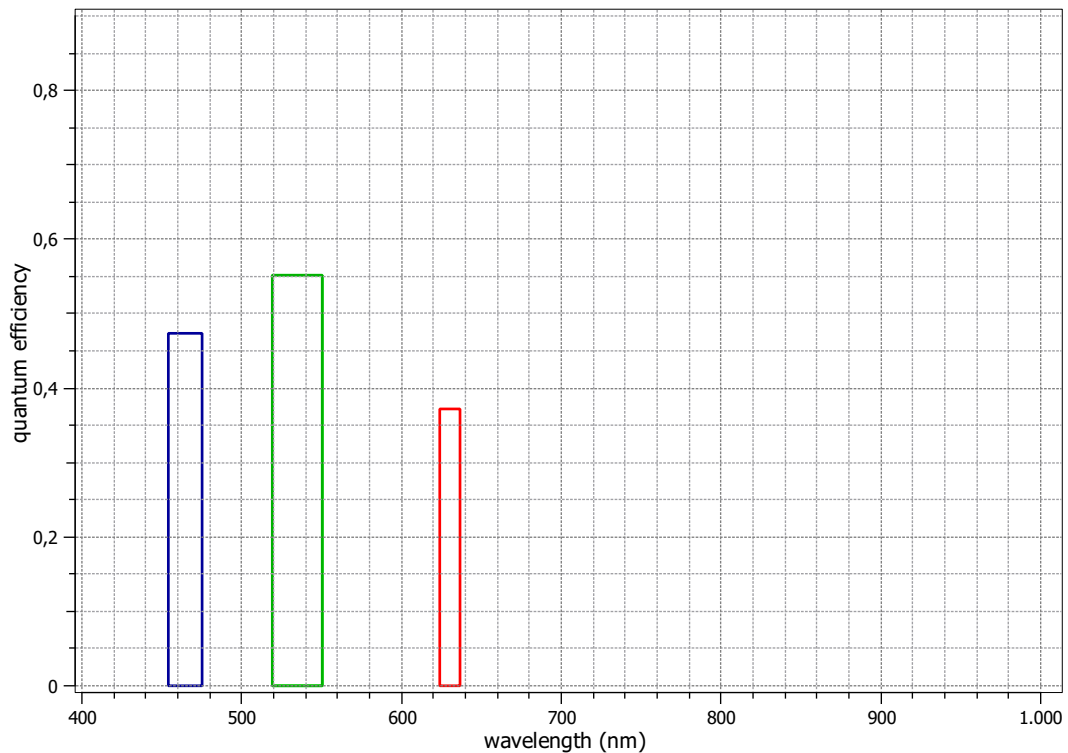


## EMVA 1288 Summary Sheet

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 Optronik GmbH.

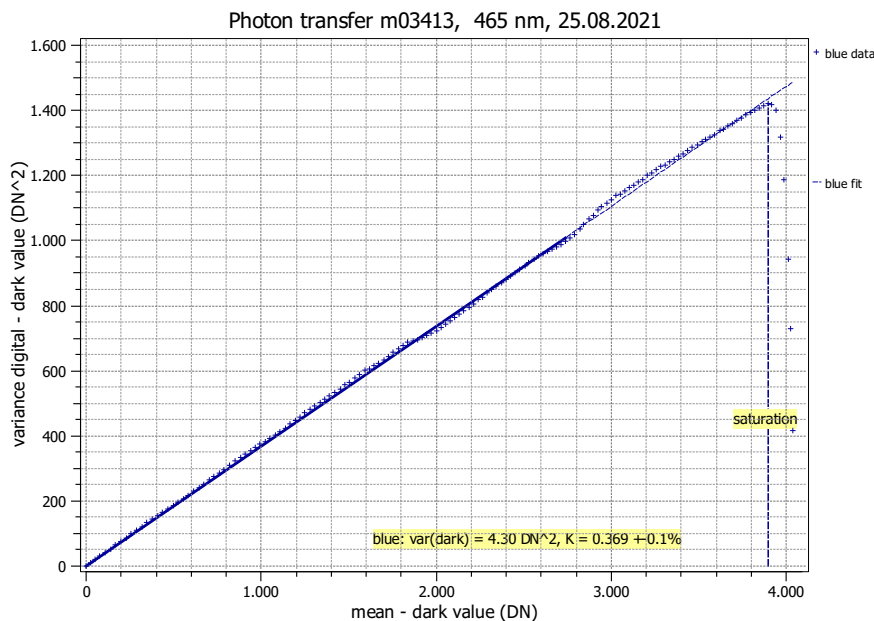
Vendor	Baumer	Type of data presented	Single
Model	VLXT-650C.I.EF	<b>Operation point 1</b>	
Serial number	700007019317	Wavelength centroid	464.6 nm
Sensor diagonal	34.99 mm	Wavelength FWHM	20.6 nm
Lens category	M58 mount	Gain, black-level	1.0 / 41.0
Resolution	8400 × 7000, 12 bit	<b>Operation point 2</b>	
Pixel size (h×v)	3.20 μm × 3.20 μm	Wavelength centroid	534.9 nm
Sensor	GPixel GPIXEL.GMAX3265	Wavelength FWHM	31.8 nm
Sensor type	CMOS	Gain, black-level	1.0 / 41.0
Shutter type	Global shutter	<b>Operation point 3</b>	
Overlap cap.	Overlapped	Wavelength centroid	630.5 nm
Max. frame rate	0.0 Hz	Wavelength FWHM	12.9 nm
Interface type	GEV	Gain, black-level	1.0 / 41.0
		<b>Optional data measured</b>	
		None	



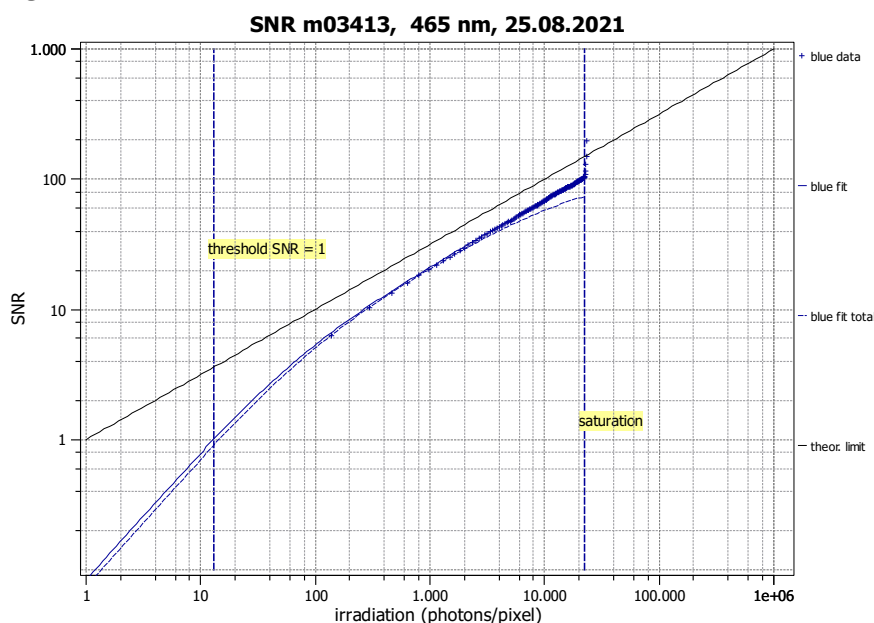
## Summary Sheet for Operation Point 1 at a Wavelength of 465 nm

Type of data	Single	Gain, black-level	1.0 / 41.0
Exposure control	By irradiance	Environmental temperature	28.4 °C
Exposure time	801.00 $\mu$ s	Camera body temperature	42.5 °C
Frame rate	10.0 Hz	Internal temperature(s)	—
Data transfer mode	BayerRG12	Wavelength, centr., FWHM	465 nm, 20.6 nm

### Photon Transfer



### Signal-to-Noise Ratio



### Quantum efficiency

$\eta$  47.4%

### Overall system gain

$K$  0.369 DN/e<sup>-</sup>

$1/K$  2.714 e<sup>-</sup>/DN

### Temporal dark noise

$\sigma_d$  5.57 e<sup>-</sup>

$\sigma_{y,\text{dark}}$  2.07 DN

### Signal-to-noise ratio

SNR<sub>max</sub> 103

40.2 dB

6.7 bit

$1/\text{SNR}_{\text{max}}$  0.97 %

### Absolute sensitivity threshold

$\mu_{p,\text{min}}$  12.97 p

$\mu_{p,\text{min,area}}$  1.266 p/ $\mu\text{m}^2$

$\mu_{e,\text{min}}$  6.15 e<sup>-</sup>

$\mu_{e,\text{min,area}}$  0.601 e<sup>-</sup>/ $\mu\text{m}^2$

### Saturation capacity

$\mu_{p,\text{sat}}$  22274 p

$\mu_{p,\text{sat,area}}$  2175 p/ $\mu\text{m}^2$

$\mu_{e,\text{sat}}$  10563 e<sup>-</sup>

$\mu_{e,\text{sat,area}}$  1032 e<sup>-</sup>/ $\mu\text{m}^2$

### Dynamic range

DR 1718

64.7 dB

10.7 bit

### Spatial nonuniformities

DSNU<sub>1288</sub> 3.01 e<sup>-</sup>

1.11 DN

PRNU<sub>1288</sub> 0.94 %

### Linearity error

LE<sub>min</sub> -0.35%

LE<sub>max</sub> 0.25%

### Dark current

$\mu_{c,\text{mean}}$  37  $\pm$  3 e<sup>-</sup>/s

13.5 DN/s

$\mu_{c,\text{var}}$  48  $\pm$  2 e<sup>-</sup>/s

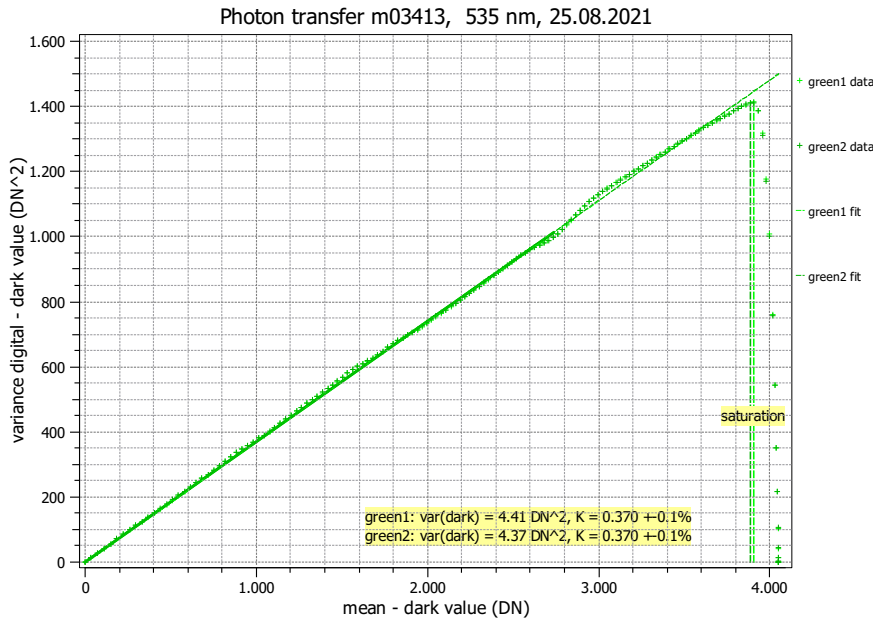
$T_d$  — °C



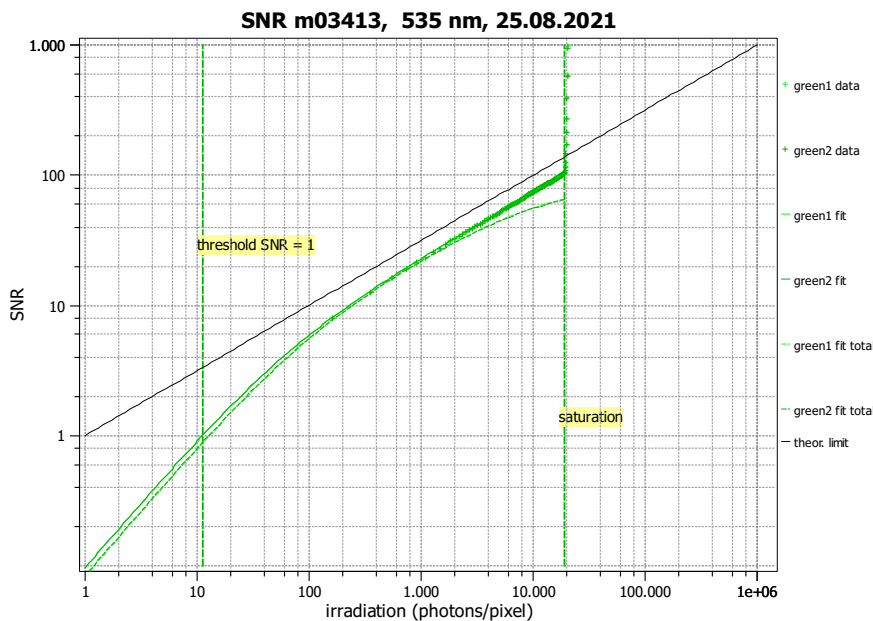
### Summary Sheet for Operation Point 2 at a Wavelength of 535 nm

Type of data	Single	Gain, black-level	1.0 / 41.0
Exposure control	By irradiance	Environmental temperature	31.4 °C
Exposure time	1.58 ms	Camera body temperature	50.0 °C
Frame rate	10.0 Hz	Internal temperature(s)	—
Data transfer mode	BayerRG12	Wavelength, centr., FWHM	535 nm, 31.8 nm

#### Photon Transfer



#### Signal-to-Noise Ratio



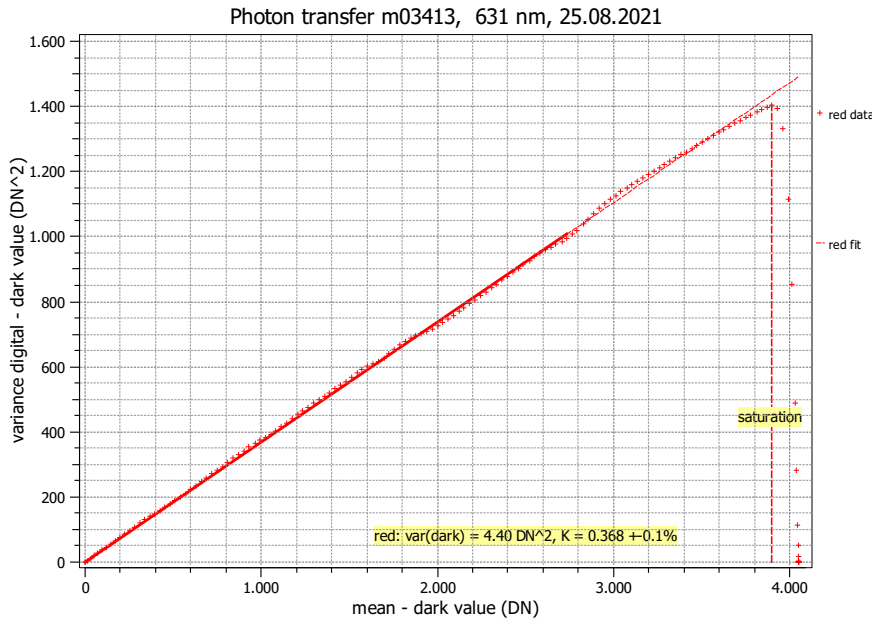
<b>Quantum efficiency</b>	$\eta$	55.2%
<b>Overall system gain</b>	$K$	0.370 DN/e <sup>-</sup>
	$1/K$	2.702 e <sup>-</sup> /DN
<b>Temporal dark noise</b>	$\sigma_d$	5.62 e <sup>-</sup>
	$\sigma_{y, \text{dark}}$	2.10 DN
<b>Signal-to-noise ratio</b>	$\text{SNR}_{\text{max}}$	103
		40.2 dB
		6.7 bit
	$1/\text{SNR}_{\text{max}}$	0.97 %
<b>Absolute sensitivity threshold</b>	$\mu_{p, \text{min}}$	11.22 p
	$\mu_{p, \text{min, area}}$	1.096 p/ $\mu\text{m}^2$
	$\mu_{e, \text{min}}$	6.20 e <sup>-</sup>
	$\mu_{e, \text{min, area}}$	0.605 e <sup>-</sup> / $\mu\text{m}^2$
<b>Saturation capacity</b>	$\mu_{p, \text{sat}}$	19061 p
	$\mu_{p, \text{sat, area}}$	1861 p/ $\mu\text{m}^2$
	$\mu_{e, \text{sat}}$	10523 e <sup>-</sup>
	$\mu_{e, \text{sat, area}}$	1028 e <sup>-</sup> / $\mu\text{m}^2$
<b>Dynamic range</b>	DR	1699
		64.6 dB
		10.7 bit
<b>Spatial nonuniformities</b>	$\text{DSNU}_{1288}$	3.39 e <sup>-</sup>
		1.26 DN
	$\text{PRNU}_{1288}$	1.18 %
<b>Linearity error</b>	$\text{LE}_{\text{min}}$	-0.38%
	$\text{LE}_{\text{max}}$	0.54%
<b>Dark current</b>	$\mu_{c, \text{mean}}$	36 ± 3 e <sup>-</sup> /s
		13.4 DN/s
	$\mu_{c, \text{var}}$	47 ± 2 e <sup>-</sup> /s
	$T_d$	— °C



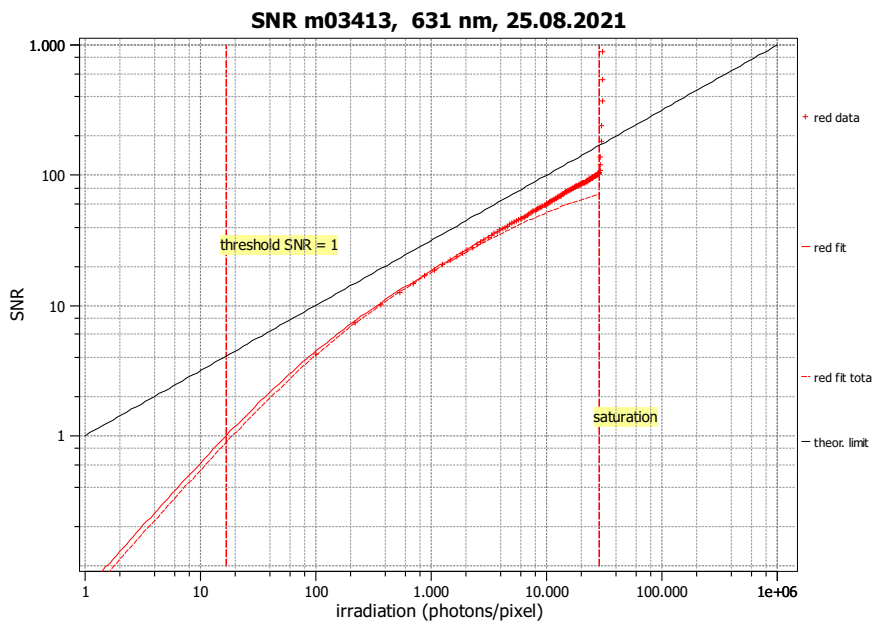
### Summary Sheet for Operation Point 3 at a Wavelength of 631 nm

Type of data	Single	Gain, black-level	1.0 / 41.0
Exposure control	By irradiance	Environmental temperature	33.7°C
Exposure time	1.58 ms	Camera body temperature	53.6°C
Frame rate	10.0 Hz	Internal temperature(s)	—
Data transfer mode	BayerRG12	Wavelength, centr., FWHM	631 nm, 12.9 nm

#### Photon Transfer



#### Signal-to-Noise Ratio



<b>Quantum efficiency</b>	$\eta$	37.1%
<b>Overall system gain</b>	$K$	0.368 DN/e <sup>-</sup>
	$1/K$	2.716 e <sup>-</sup> /DN
<b>Temporal dark noise</b>	$\sigma_d$	5.65 e <sup>-</sup>
	$\sigma_{y,dark}$	2.10 DN
<b>Signal-to-noise ratio</b>	$SNR_{max}$	103
		40.3 dB
		6.7 bit
	$1/SNR_{max}$	0.97 %
<b>Absolute sensitivity threshold</b>	$\mu_{p,min}$	16.76 p
	$\mu_{p,min,area}$	1.637 p/ $\mu m^2$
	$\mu_{e,min}$	6.22 e <sup>-</sup>
	$\mu_{e,min,area}$	0.608 e <sup>-</sup> / $\mu m^2$
<b>Saturation capacity</b>	$\mu_{p,sat}$	28651 p
	$\mu_{p,sat,area}$	2798 p/ $\mu m^2$
	$\mu_{e,sat}$	10636 e <sup>-</sup>
	$\mu_{e,sat,area}$	1039 e <sup>-</sup> / $\mu m^2$
<b>Dynamic range</b>	DR	1709
		64.7 dB
		10.7 bit
<b>Spatial nonuniformities</b>	$DSNU_{1288}$	3.22 e <sup>-</sup>
		1.19 DN
	$PRNU_{1288}$	1.02 %
<b>Linearity error</b>	$LE_{min}$	-0.57%
	$LE_{max}$	0.38%
<b>Dark current</b>	$\mu_{c,mean}$	35 ± 3 e <sup>-</sup> /s
		13.0 DN/s
	$\mu_{c,var}$	47 ± 2 e <sup>-</sup> /s
	$T_d$	— °C