EMVA 1288 Data Sheet m1252

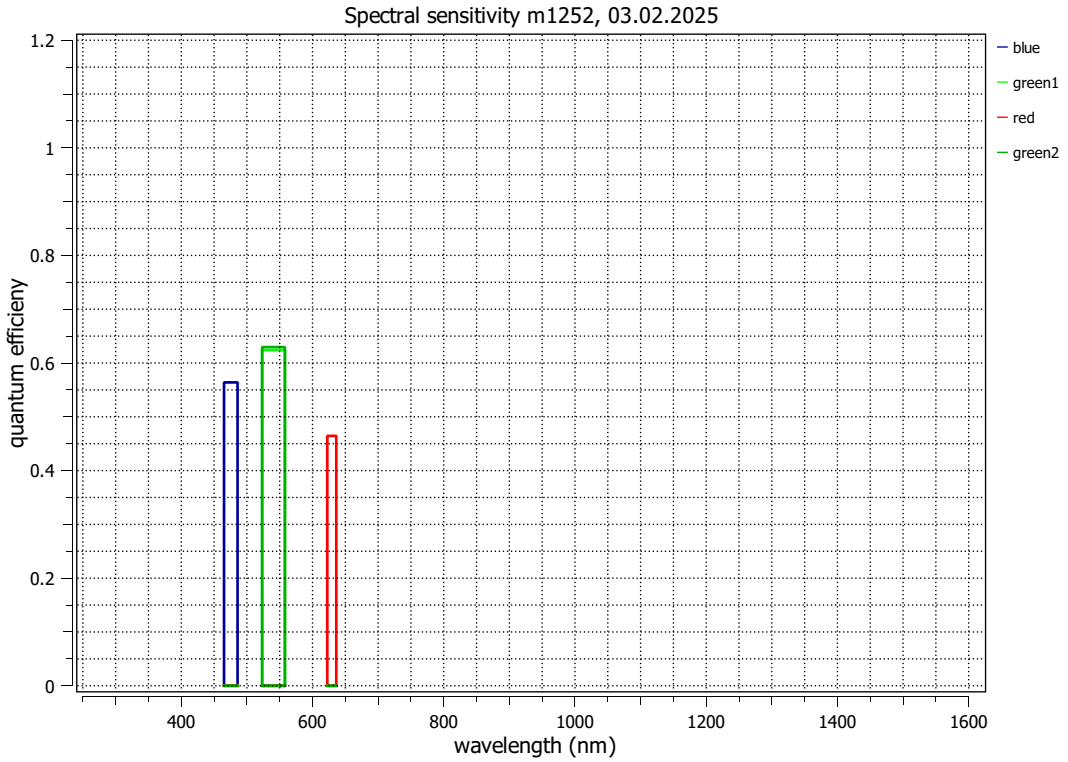
This datasheet describes the specification according to the standard 1288 Release 4.0 Linear issued on 21 June 2021 for "Characterization and Presentation of Specification Data for Image Sensors and Cameras" by the European Machine Vision Association (EMVA), published at `https://www.emva.org/standards-technology/emva-1288/` 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 2.0.

Measurements performed by Product Development Vision, Balluff GmbH

Type of data presented	Single
Vendor	Balluff GmbH
Model	BVS CA-UB1-0051HC
Serial number	UB100103
Sensor diagonal	6.48 mm
Lens category	C-Mount
Resolution	2592 × 1944, 10 bit
Pixel size (h×v)	2.00 μm × 2.00 μm
Sensor	IMX335
Sensor type	CMOS
Shutter type	Rolling
Overlap cap.	Overlapping
Max. frame rate	4.1 Hz
Interface type	mvIMPACT acquire

Nr.	Centroid/FWHM	Gain, blacklevel	t_{exp} (ms)
1	475.5/20.6 nm	0dB, 1	3.00
2	540.6/34.7 nm	0dB, 1	3.00
3	629.4/13.7 nm	0dB, 1	3.00

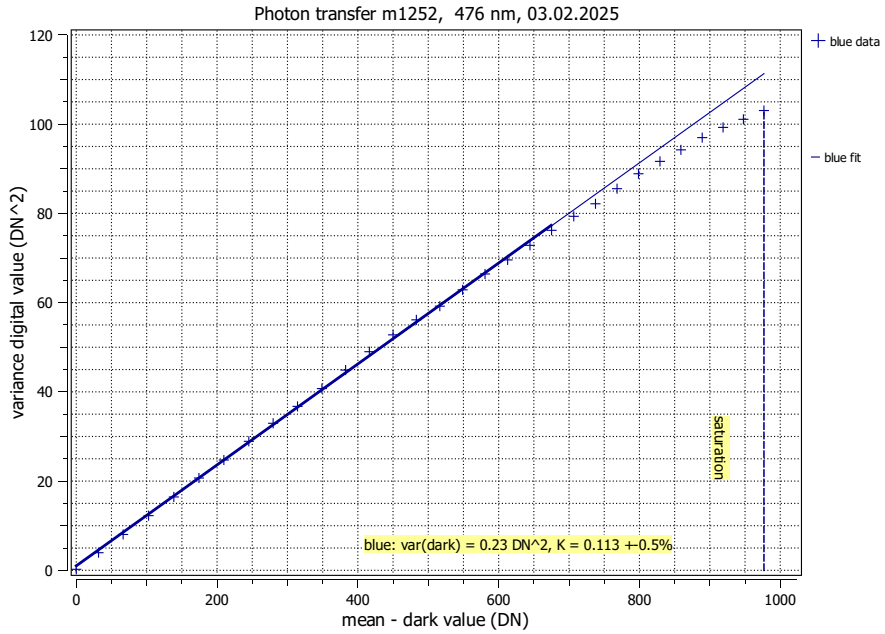
Optional data measured: None



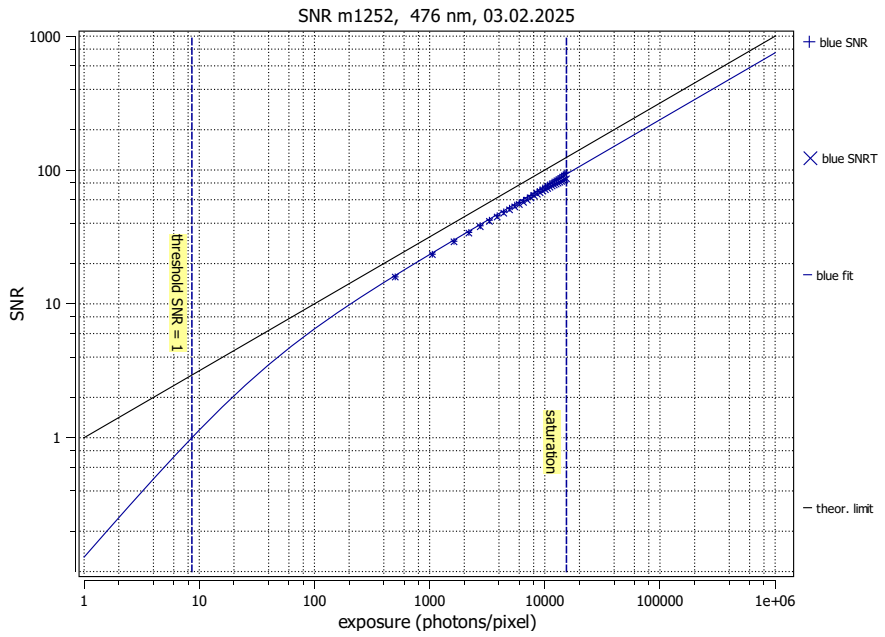
Summary Sheet for Operation Point 1 at a Wavelength of 476 nm

Type of data	Single	Gain, black-level	0dB, 1
Exposure control	By irradiance	Environmental temperature	22.1°C
Exposure time	3.000 ms	Camera body temperature	25.4°C
Frame rate	4.1 Hz	Internal temperature(s)	—
Data transfer mode	BayerGR10	Wavelength, centr., FWHM	476 nm, 20.6 nm

Photon Transfer



Signal-to-Noise Ratio



Quantum efficiency

η	56.4%

Overall system gain

K	0.1130 DN/e$^-$
$1/K$	8.849 e$^-$/DN

Temporal dark noise†

σ_d	3.54 e$^-$
$\sigma_{y.\mathrm{dark}}$	0.490 DN

Signal-to-noise ratio

$\mathrm{SNR}_{\max}$	93.2
	39.4 dB
$1/\mathrm{SNR}_{\max}$	1.072 %

Absolute sensitivity threshold†

$\mu_{e.\mathrm{min}}$	4.86 e$^-$
$\mu_{e.\mathrm{min.area}}$	1.22 e$^-$/μm^2

Saturation capacity

$\mu_{e.\mathrm{sat}}$	8694 e$^-$
$\mu_{e.\mathrm{sat.area}}$	2173 e$^-$/μm^2

Dynamic range†

DR	1787
	65.04 dB

Spatial nonuniformities

DSNU_{1288}	— e$^-$
$\mathrm{DSNU}_{1288.\mathrm{col}}$	— e$^-$
$\mathrm{DSNU}_{1288.\mathrm{row}}$	— e$^-$
$\mathrm{DSNU}_{1288.\mathrm{pix}}$	— e$^-$
PRNU_{1288}	— %
$\mathrm{PRNU}_{1288.\mathrm{col}}$	— %
$\mathrm{PRNU}_{1288.\mathrm{row}}$	— %
$\mathrm{PRNU}_{1288.\mathrm{pix}}$	— %

Linearity error

LE	0.18%

Dark current

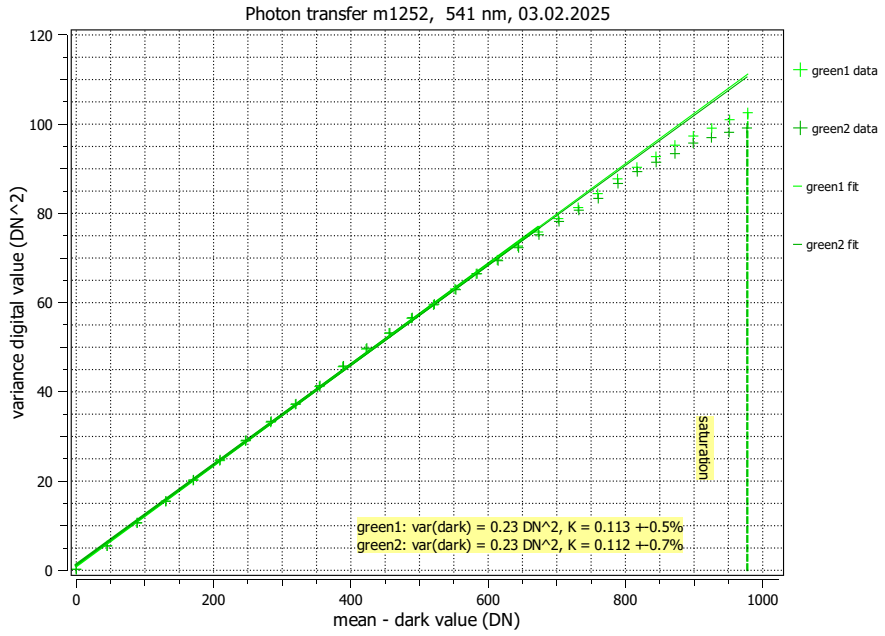
$\mu_{c.\mathrm{mean}}$	0.792 e$^-$/s
$\mu_{c.\mathrm{var}}$	0.923 e$^-$/s

†Dominated by quantization

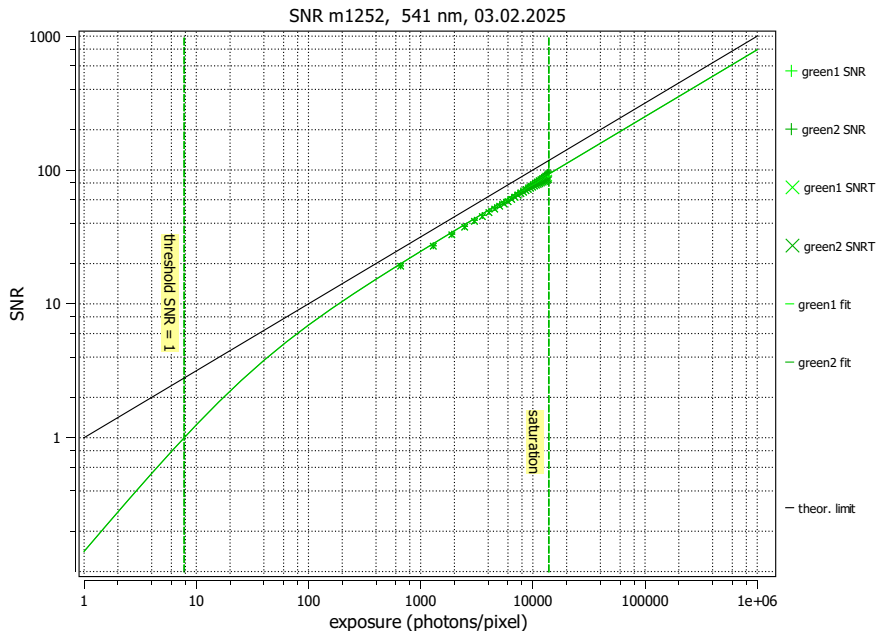
Summary Sheet for Operation Point 2 at a Wavelength of 541 nm

Type of data	Single	Gain, black-level	0dB, 1
Exposure control	By irradiance	Environmental temperature	22.1°C
Exposure time	3.000 ms	Camera body temperature	25.5°C
Frame rate	4.1 Hz	Internal temperature(s)	—
Data transfer mode	BayerGR10	Wavelength, centr., FWHM	541 nm, 34.7 nm

Photon Transfer



Signal-to-Noise Ratio



Quantum efficiency

η	62.4%

Overall system gain

K	0.1127 DN/e$^-$
$1/K$	8.873 e$^-$/DN

Temporal dark noise†

σ_d	3.55 e$^-$
$\sigma_{y.\mathrm{dark}}$	0.490 DN

Signal-to-noise ratio

$\mathrm{SNR}_{\max}$	93.0
	39.4 dB
$1/\mathrm{SNR}_{\max}$	1.075 %

Absolute sensitivity threshold†

$\mu_{e.\mathrm{min}}$	4.88 e$^-$
$\mu_{e.\mathrm{min.area}}$	1.22 e$^-$/μm^2

Saturation capacity

$\mu_{e.\mathrm{sat}}$	8656 e$^-$
$\mu_{e.\mathrm{sat.area}}$	2164 e$^-$/μm^2

Dynamic range†

DR	1775
	64.98 dB

Spatial nonuniformities

DSNU_{1288}	— e$^-$
$\mathrm{DSNU}_{1288.\mathrm{col}}$	— e$^-$
$\mathrm{DSNU}_{1288.\mathrm{row}}$	— e$^-$
$\mathrm{DSNU}_{1288.\mathrm{pix}}$	— e$^-$
PRNU_{1288}	— %
$\mathrm{PRNU}_{1288.\mathrm{col}}$	— %
$\mathrm{PRNU}_{1288.\mathrm{row}}$	— %
$\mathrm{PRNU}_{1288.\mathrm{pix}}$	— %

Linearity error

LE	0.40%

Dark current

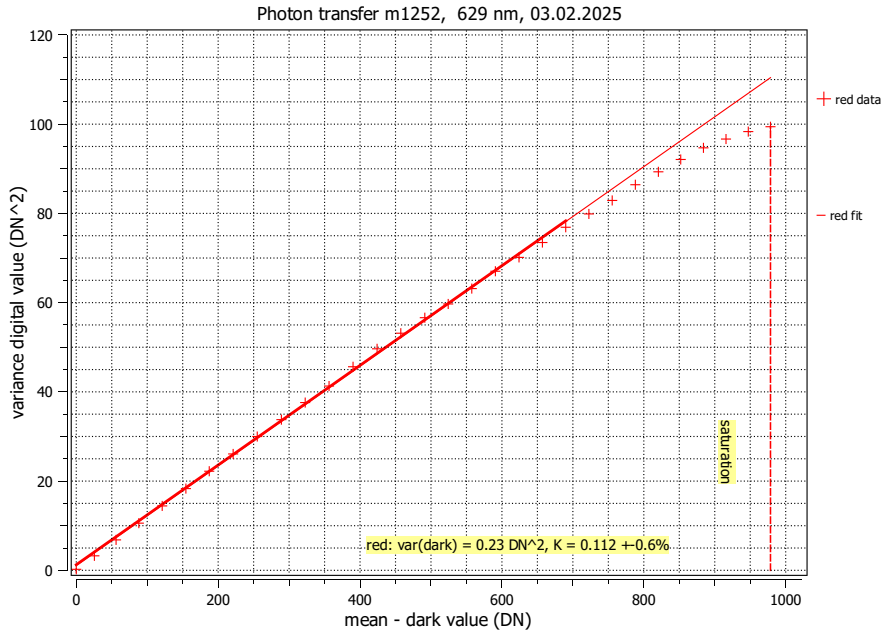
$\mu_{c.\mathrm{mean}}$	0.402 e$^-$/s
$\mu_{c.\mathrm{var}}$	0.875 e$^-$/s

†Dominated by quantization

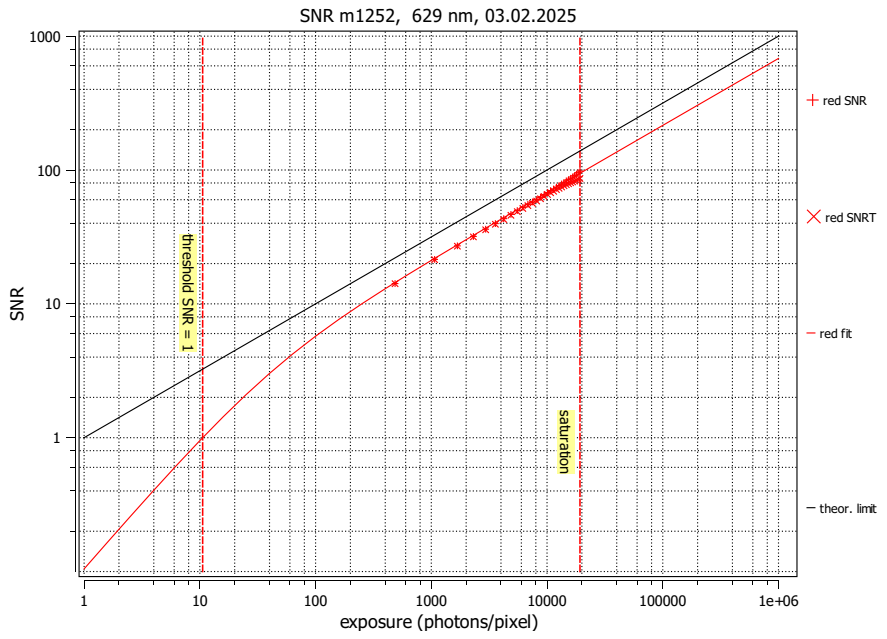
Summary Sheet for Operation Point 3 at a Wavelength of 629 nm

Type of data	Single	Gain, black-level	0dB, 1
Exposure control	By irradiance	Environmental temperature	22.2°C
Exposure time	3.000 ms	Camera body temperature	25.6°C
Frame rate	4.1 Hz	Internal temperature(s)	—
Data transfer mode	BayerGR10	Wavelength, centr., FWHM	629 nm, 13.7 nm

Photon Transfer



Signal-to-Noise Ratio



Quantum efficiency

η	46.5%

Overall system gain

K	0.1117 DN/e$^-$
$1/K$	8.949 e$^-$/DN

Temporal dark noise†

σ_d	3.58 e$^-$
$\sigma_{y.\mathrm{dark}}$	0.490 DN

Signal-to-noise ratio

$\mathrm{SNR}_{\max}$	94.6
	39.5 dB
$1/\mathrm{SNR}_{\max}$	1.057 %

Absolute sensitivity threshold†

$\mu_{e.\mathrm{min}}$	4.91 e$^-$
$\mu_{e.\mathrm{min.area}}$	1.23 e$^-$/μm^2

Saturation capacity

$\mu_{e.\mathrm{sat}}$	8945 e$^-$
$\mu_{e.\mathrm{sat.area}}$	2236 e$^-$/μm^2

Dynamic range†

DR	1821
	65.20 dB

Spatial nonuniformities

DSNU_{1288}	— e$^-$
$\mathrm{DSNU}_{1288.\mathrm{col}}$	— e$^-$
$\mathrm{DSNU}_{1288.\mathrm{row}}$	— e$^-$
$\mathrm{DSNU}_{1288.\mathrm{pix}}$	— e$^-$
PRNU_{1288}	— %
$\mathrm{PRNU}_{1288.\mathrm{col}}$	— %
$\mathrm{PRNU}_{1288.\mathrm{row}}$	— %
$\mathrm{PRNU}_{1288.\mathrm{pix}}$	— %

Linearity error

LE	0.55%

Dark current

$\mu_{c.\mathrm{mean}}$	0.486 e$^-$/s
$\mu_{c.\mathrm{var}}$	0.663 e$^-$/s

†Dominated by quantization