

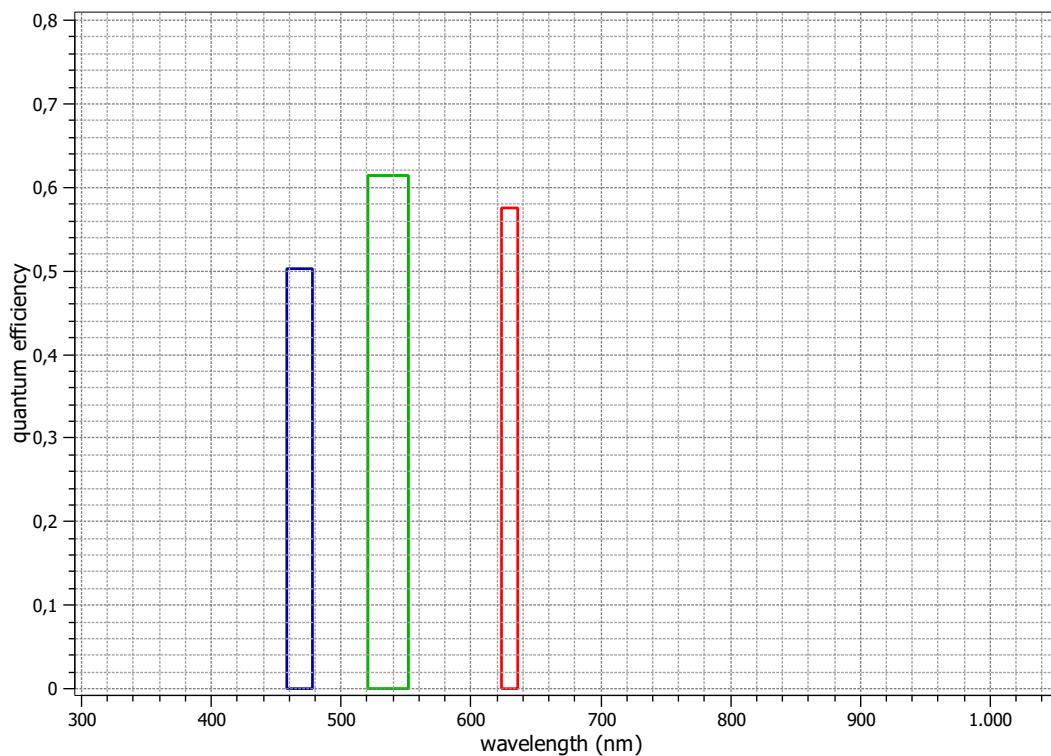
EMVA 1288 Data Sheet m0708

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 or the *Zenodo EMVA 1288 community*) release 3.0 with proprietary extensions from AEON. The measurements were performed with the AEON ACC3 Release 6, 26.11.2016, SN 0005(MatrixVision) . 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 T.Renner, Matrix Vision GmbH

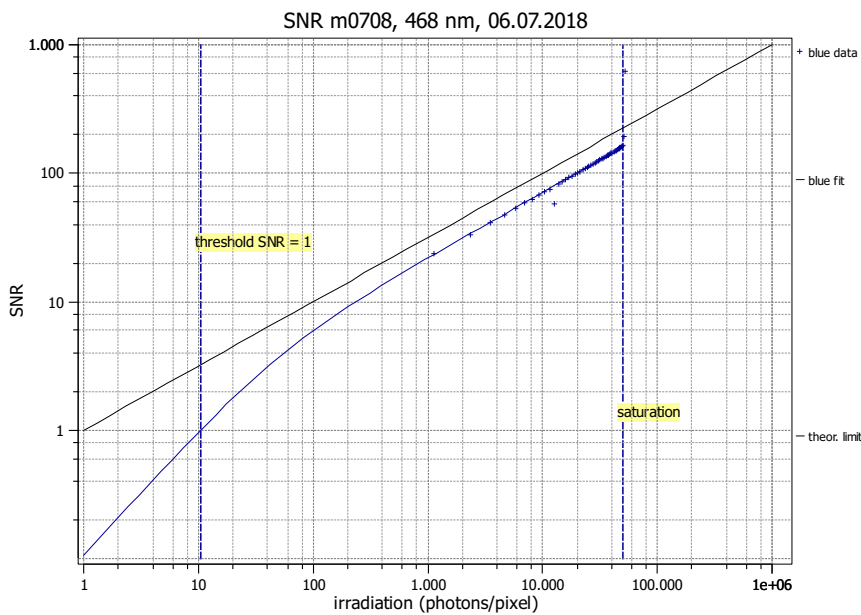
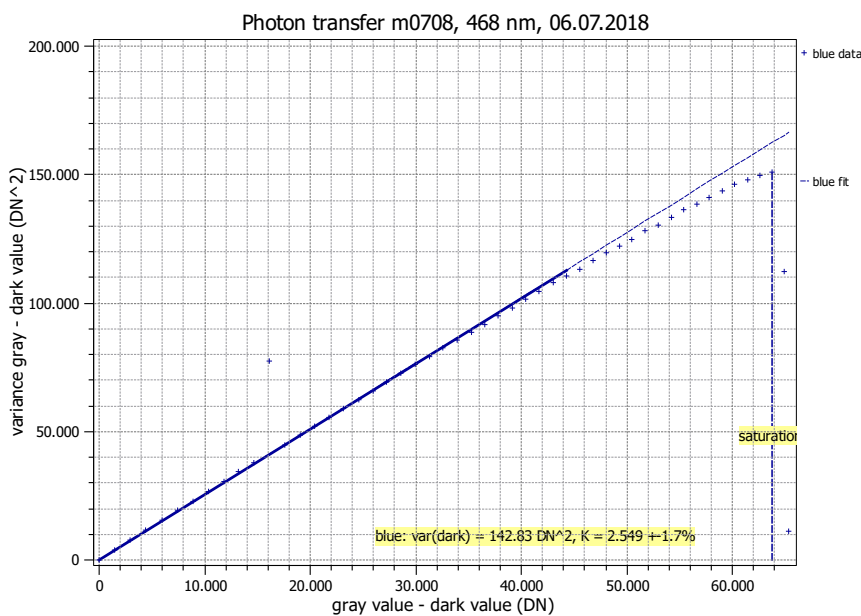
Vendor	MATRIX VISION
Model	mvBlueCOUGAR-XD107C
Serial number	GX205616
Sensor diagonal	17.55 mm
Lens category	C-Mount
Resolution	3216 × 2208, 16 bit
Pixel size	4.50 μm × 4.50 μm
Sensor	IMX420
Sensor type	CMOS
Shutter type	Global
Overlap capabilities	Overlapping
Maximum frame rate	16.8 Hz
Interface type	GigE Vision

Type of data presented	Single
Operation point 1, (page 5)	
Wavelength centroid	468.0 nm
Wavelength FWHM	20.0 nm
Gain, black-level	12/0dB, 0.3
Operation point 2, (page 11)	
Wavelength centroid	536.0 nm
Wavelength FWHM	31.0 nm
Gain, black-level	12/0dB, 0.3
Operation point 3, (page 17)	
Wavelength centroid	630.0 nm
Wavelength FWHM	13.0 nm
Gain, black-level	12/0dB, 0.3
Optional data measured	
None	



EMVA 1288 Summary Sheet for Operating Point 1

Type of data	Single	Gain, black-level	12/0dB, 0.3
Exposure control	By irradiance	Environmental temperature	27.1°C
Exposure time	19.00 ms	Camera body temperature	57.7°C
Frame rate	13.0 Hz	Internal temperature(s)	—
Data transfer mode	BayerRG16	Wavelength, centr., FWHM	468 nm, 20.0 nm



Quantum efficiency

η 50.2%

Overall system gain

K 2.549 DN/e⁻

$1/K$ 0.392 e⁻/DN

Temporal dark noise & DSNU

$\sigma_{y,\text{dark}}$ 11.95 DN

DSNU₁₂₈₈ — DN

σ_d 4.69 e⁻

DSNU₁₂₈₈ — e⁻

Signal-to-noise ratio & PRNU

SNR_{max} 159

44.0 dB

7.3 bit

$1/\text{SNR}_{\text{max}}$ 0.63 %

PRNU₁₂₈₈ — %

Nonlinearity

LE 0.24%

LE_{min} -0.28%

LE_{max} 0.19%

Sensitivity & saturation

$\mu_{p,\text{min}}$ 10.39 p

0.513 p/ μm^2

$\mu_{p,\text{sat}}$ 50174 p

2478 p/ μm^2

$\mu_{e,\text{min}}$ 5.22 e⁻

0.258 e⁻/ μm^2

$\mu_{e,\text{sat}}$ 25179 e⁻

1243 e⁻/ μm^2

Dynamic range

DR 4828

73.7 dB

12.2 bit

Dark current

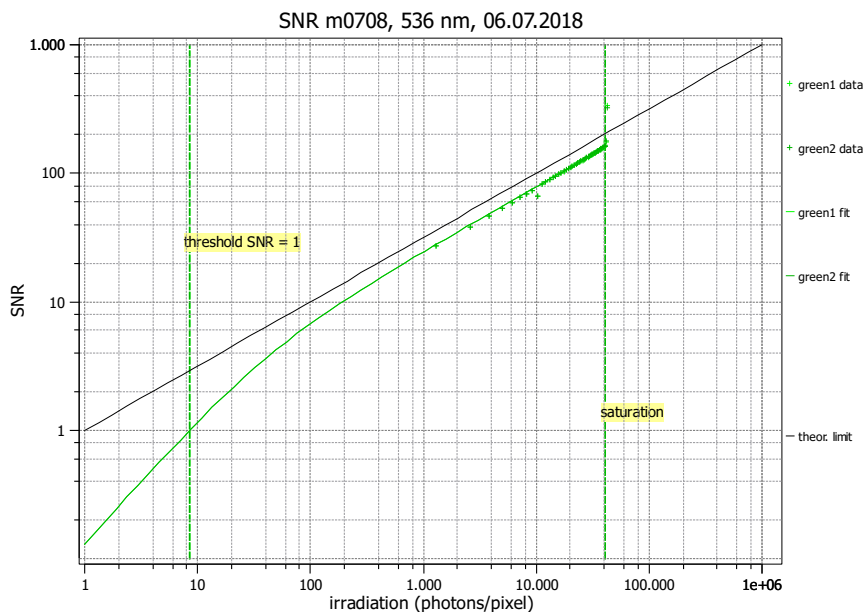
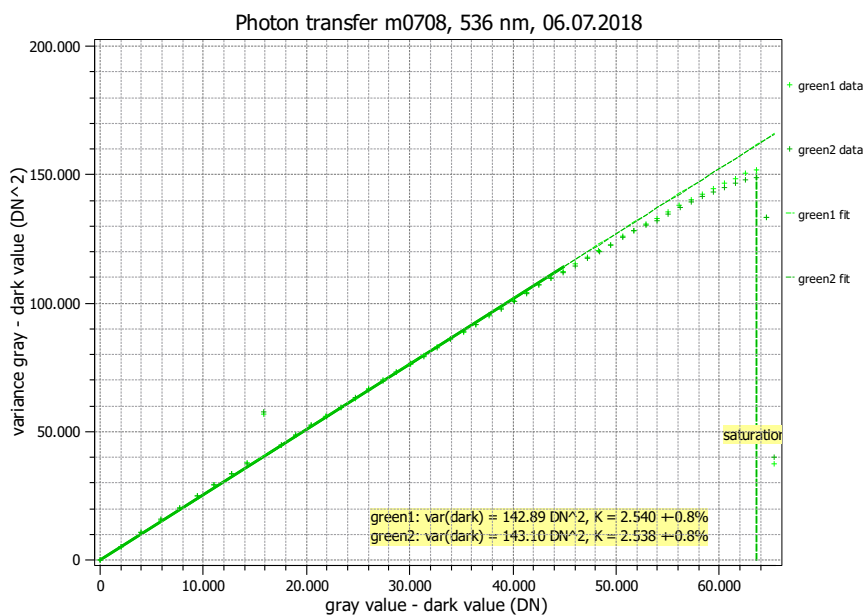
$\mu_{c,\text{mean}}$ — DN/s

$\mu_{c,\text{mean}}$ — e⁻/s

$\mu_{c,\text{var}}$ — e⁻/s

EMVA 1288 Summary Sheet for Operating Point 2

Type of data	Single	Gain, black-level	12/0dB, 0.3
Exposure control	By irradiance	Environmental temperature	27.1°C
Exposure time	19.00 ms	Camera body temperature	57.7°C
Frame rate	13.0 Hz	Internal temperature(s)	—
Data transfer mode	BayerRG16	Wavelength, centr., FWHM	536 nm, 31.0 nm



Quantum efficiency

η 61.4%

Overall system gain

K 2.540 DN/e⁻
 $1/K$ 0.394 e⁻/DN

Temporal dark noise & DSNU

$\sigma_{y,dark}$ 11.95 DN
 DSNU₁₂₈₈ — DN
 σ_d 4.70 e⁻
 DSNU₁₂₈₈ — e⁻

Signal-to-noise ratio & PRNU

SNR_{max} 159
 44.0 dB
 7.3 bit
 $1/SNR_{max}$ 0.63 %
 PRNU₁₂₈₈ — %

Nonlinearity

LE 0.25%
 LE_{min} -0.30%
 LE_{max} 0.21%

Sensitivity & saturation

$\mu_{p,min}$ 8.52 p
 0.421 p/ μm^2
 $\mu_{p,sat}$ 41111 p
 2030 p/ μm^2
 $\mu_{e,min}$ 5.23 e⁻
 0.258 e⁻/ μm^2
 $\mu_{e,sat}$ 25246 e⁻
 1247 e⁻/ μm^2

Dynamic range

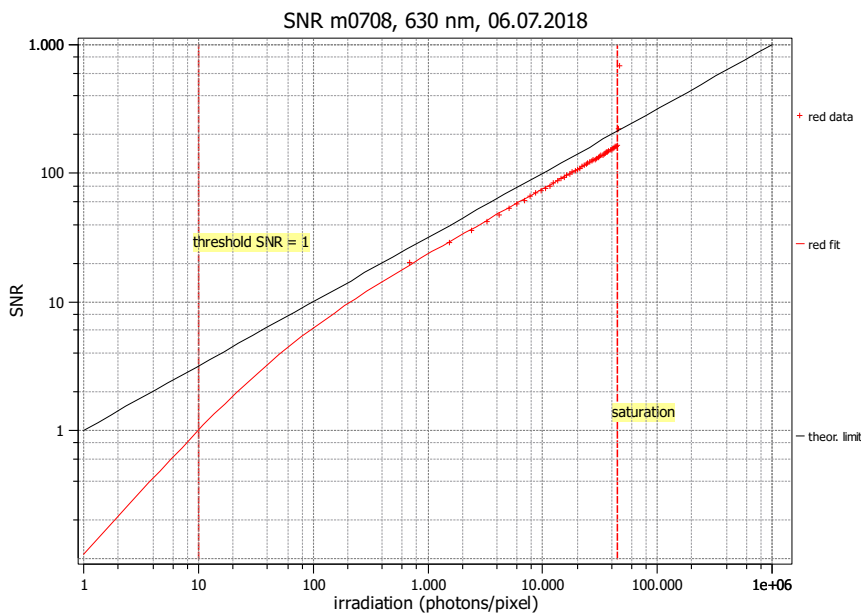
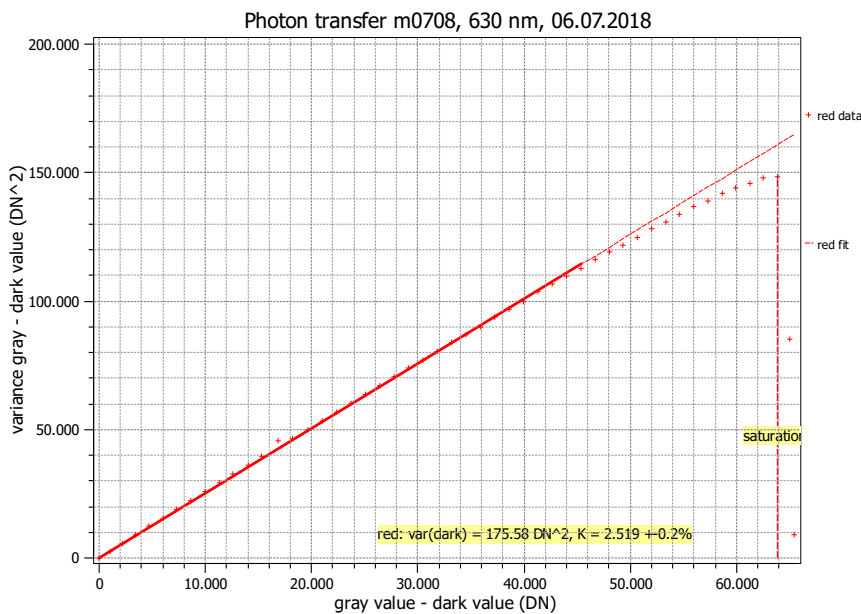
DR 4825
 73.7 dB
 12.2 bit

Dark current

$\mu_{c,mean}$ — DN/s
 $\mu_{c,mean}$ — e⁻/s
 $\mu_{c,var}$ — e⁻/s

EMVA 1288 Summary Sheet for Operating Point 3

Type of data	Single	Gain, black-level	12/0dB, 0.3
Exposure control	By irradiance	Environmental temperature	27.1°C
Exposure time	19.00 ms	Camera body temperature	57.7°C
Frame rate	13.0 Hz	Internal temperature(s)	—
Data transfer mode	BayerRG16	Wavelength, centr., FWHM	630 nm, 13.0 nm



Quantum efficiency

η 57.5%

Overall system gain

K 2.519 DN/e⁻

$1/K$ 0.397 e⁻/DN

Temporal dark noise & DSNU

$\sigma_{y,\text{dark}}$ 13.25 DN

DSNU₁₂₈₈ — DN

σ_d 5.26 e⁻

DSNU₁₂₈₈ — e⁻

Signal-to-noise ratio & PRNU

SNR_{max} 160

44.1 dB

7.3 bit

$1/\text{SNR}_{\text{max}}$ 0.62 %

PRNU₁₂₈₈ — %

Nonlinearity

LE 0.37%

LE_{min} -0.48%

LE_{max} 0.25%

Sensitivity & saturation

$\mu_{p,\text{min}}$ 10.05 p

0.496 p/ μm^2

$\mu_{p,\text{sat}}$ 44593 p

2202 p/ μm^2

$\mu_{e,\text{min}}$ 5.78 e⁻

0.286 e⁻/ μm^2

$\mu_{e,\text{sat}}$ 25657 e⁻

1267 e⁻/ μm^2

Dynamic range

DR 4436

72.9 dB

12.1 bit

Dark current

$\mu_{c,\text{mean}}$ — DN/s

$\mu_{c,\text{mean}}$ — e⁻/s

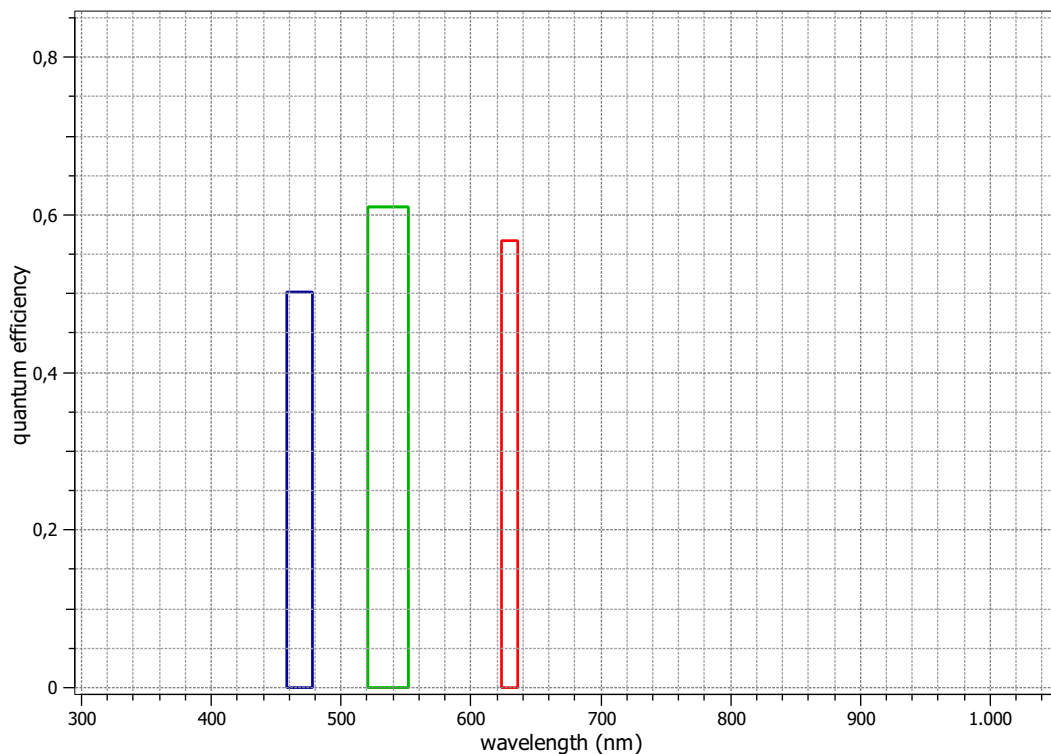
$\mu_{c,\text{var}}$ — e⁻/s

EMVA 1288 Data Sheet m0661

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 and the *Zenodo EMVA 1288 community*) with proprietary extensions from AEON. The measurements were performed with the AEON ACC3 Release 6, 26.11.2016, SN 0005(MatrixVision) .

Measurements performed by T.Renner, Matrix Vision GmbH

Vendor	MATRIX VI-SION	Type of data presented	Single
Model	mvBlueCOUGAR-XD107C	Operation point 1 (page 5)	
Serial number	GX205616	Wavelength centroid	468.0 nm
Sensor diagonal	17.55 mm	Wavelength FWHM	20.0 nm
Lens category	C-Mount	Gain, black-level	0dB, 0.1
Resolution	3216 × 2208, 12 bit	Operation point 2 (page 20)	
Pixel size (h×v)	4.50 μm × 4.50 μm	Wavelength centroid	536.0 nm
Sensor	IMX420	Wavelength FWHM	31.0 nm
Sensor type	CMOS	Gain, black-level	0dB, 0.1
Shutter type	Global	Operation point 3 (page 35)	
Overlap cap.	Overlapping	Wavelength centroid	630.0 nm
Max. frame rate	16.8 Hz	Wavelength FWHM	13.0 nm
Interface type	GigE Vision	Gain, black-level	0dB, 0.1
		Optional data measured	
		None	

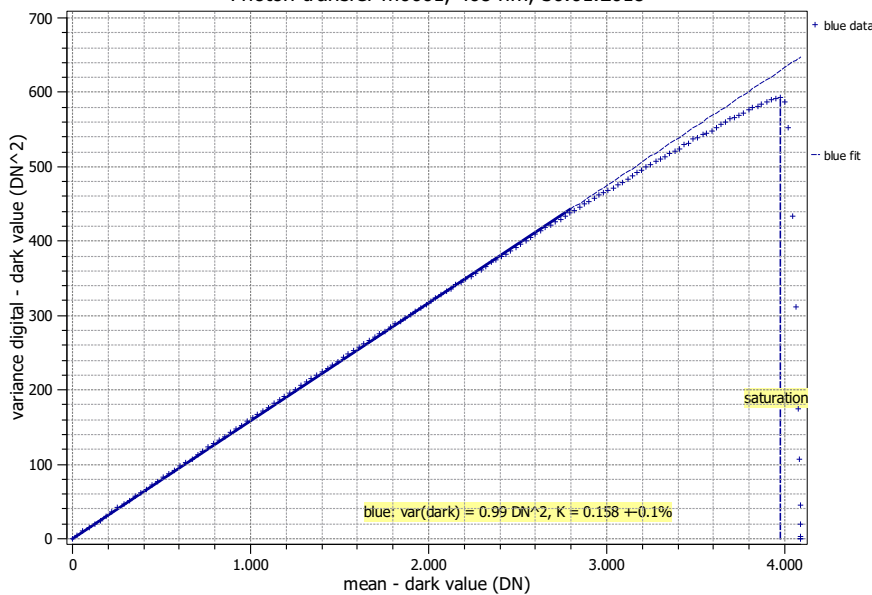


Summary Sheet for Operation Point 1 at a Wavelength of 468 nm

Type of data	Single	Gain, black-level	0dB, 0.1
Exposure control	By irradiance	Environmental temperature	24.8°C
Exposure time	18.00 ms	Camera body temperature	54.9°C
Frame rate	16.8 Hz	Internal temperature(s)	—
Data transfer mode	BayerRG12	Wavelength, centr., FWHM	468 nm, 20.0 nm

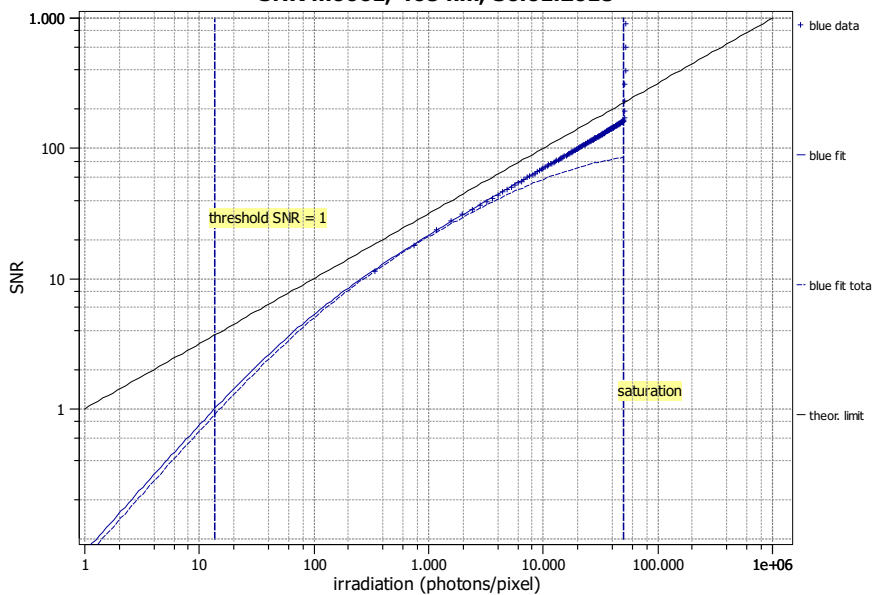
Photon Transfer

Photon transfer m0661, 468 nm, 30.01.2018



Signal-to-Noise Ratio

SNR m0661, 468 nm, 30.01.2018



Quantum efficiency

η 50.3%

Overall system gain

K 0.158 DN/e⁻

$1/K$ 6.318 e⁻/DN

Temporal dark noise

σ_d 6.03 e⁻

$\sigma_{y,\text{dark}}$ 1.00 DN

Signal-to-noise ratio

SNR_{max} 159

44.0 dB

7.3 bit

$1/\text{SNR}_{\text{max}}$ 0.63 %

Absolute sensitivity threshold

$\mu_{p,\text{min}}$ 13.57 p

$\mu_{p,\text{min,area}}$ 0.670 p/ μm^2

$\mu_{e,\text{min}}$ 6.82 e⁻

$\mu_{e,\text{min,area}}$ 0.337 e⁻/ μm^2

Saturation capacity

$\mu_{p,\text{sat}}$ 50200 p

$\mu_{p,\text{sat,area}}$ 2479 p/ μm^2

$\mu_{e,\text{sat}}$ 25233 e⁻

$\mu_{e,\text{sat,area}}$ 1246 e⁻/ μm^2

Dynamic range

DR 3700

71.4 dB

11.9 bit

Spatial nonuniformities

DSNU₁₂₈₈ 3.29 e⁻

0.52 DN

PRNU₁₂₈₈ 0.99 %

Linearity error

LE_{min} -0.34%

LE_{max} 0.21%

Dark current

$\mu_{c,\text{mean}}$ -50 ± 8 e⁻/s

-8.0 DN/s

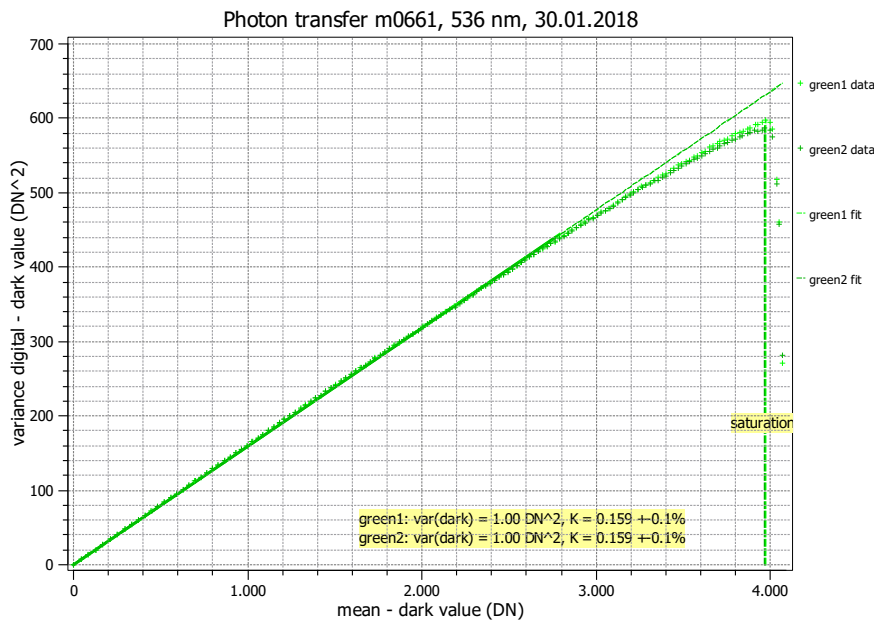
$\mu_{c,\text{var}}$ -44 ± 12 e⁻/s

T_d — °C

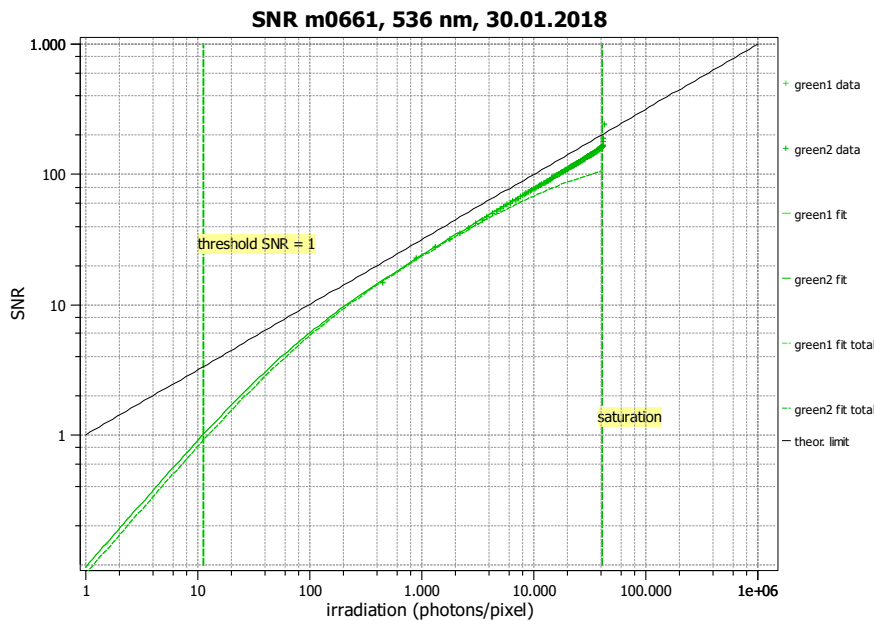
Summary Sheet for Operation Point 2 at a Wavelength of 536 nm

Type of data	Single	Gain, black-level	0dB, 0.1
Exposure control	By irradiance	Environmental temperature	25.0°C
Exposure time	18.00 ms	Camera body temperature	55.4°C
Frame rate	16.8 Hz	Internal temperature(s)	—
Data transfer mode	BayerRG12	Wavelength, centr., FWHM	536 nm, 31.0 nm

Photon Transfer



Signal-to-Noise Ratio



Quantum efficiency

η 61.0%

Overall system gain

K 0.159 DN/e⁻

$1/K$ 6.288 e⁻/DN

Temporal dark noise

σ_d 6.02 e⁻

$\sigma_{y,\text{dark}}$ 1.00 DN

Signal-to-noise ratio

SNR_{max} 158

44.0 dB

7.3 bit

$1/\text{SNR}_{\text{max}}$ 0.63 %

Absolute sensitivity threshold

$\mu_{p,\text{min}}$ 11.16 p

$\mu_{p,\text{min,area}}$ 0.551 p/μm²

$\mu_{e,\text{min}}$ 6.81 e⁻

$\mu_{e,\text{min,area}}$ 0.336 e⁻/μm²

Saturation capacity

$\mu_{p,\text{sat}}$ 41171 p

$\mu_{p,\text{sat,area}}$ 2033 p/μm²

$\mu_{e,\text{sat}}$ 25115 e⁻

$\mu_{e,\text{sat,area}}$ 1240 e⁻/μm²

Dynamic range

DR 3690

71.3 dB

11.8 bit

Spatial nonuniformities

DSNU₁₂₈₈ 3.33 e⁻

0.53 DN

PRNU₁₂₈₈ 0.70 %

Linearity error

LE_{min} -0.38%

LE_{max} 0.33%

Dark current

$\mu_{c,\text{mean}}$ -50 ± 8 e⁻/s

-8.0 DN/s

$\mu_{c,\text{var}}$ -44 ± 12 e⁻/s

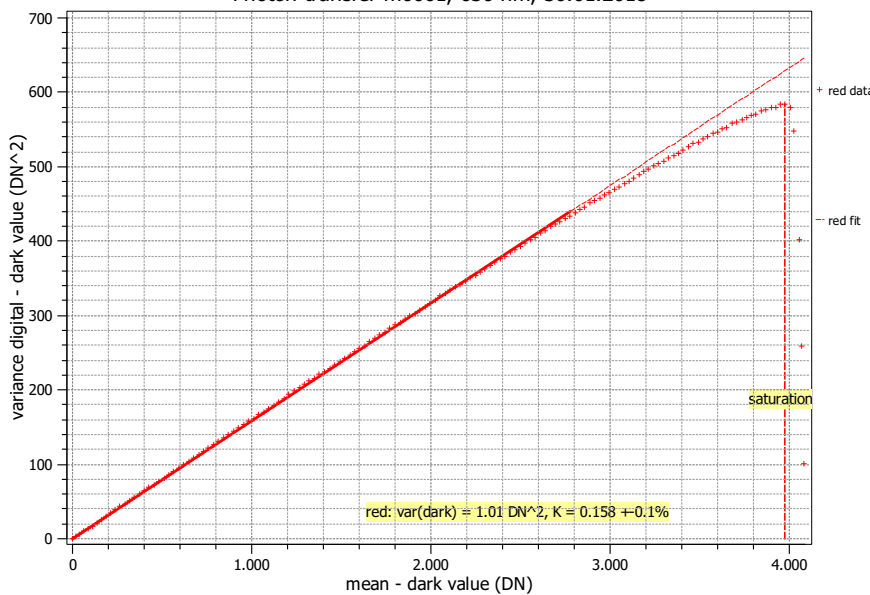
T_d — °C

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

Type of data	Single	Gain, black-level	0dB, 0.1
Exposure control	By irradiance	Environmental temperature	25.2°C
Exposure time	18.00 ms	Camera body temperature	56.0°C
Frame rate	16.8 Hz	Internal temperature(s)	—
Data transfer mode	BayerRG12	Wavelength, centr., FWHM	630 nm, 13.0 nm

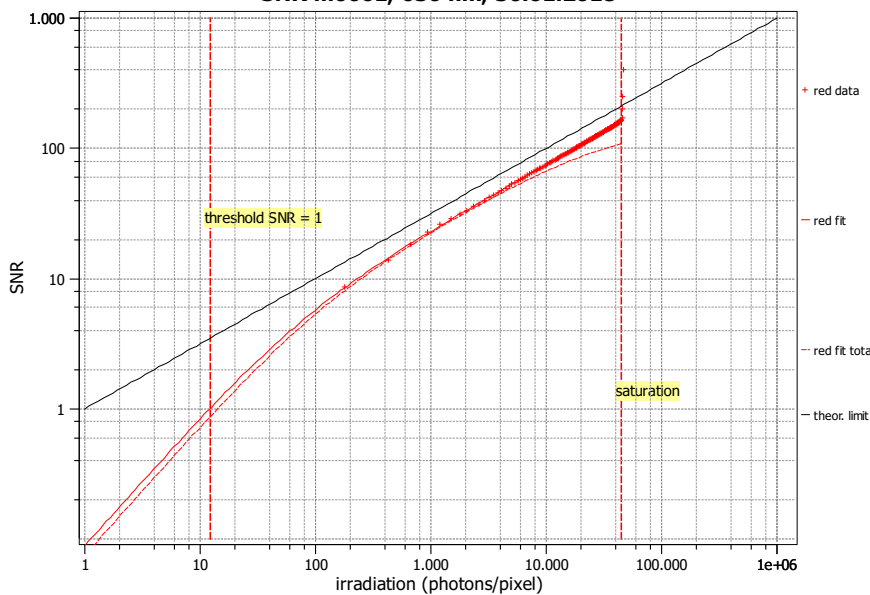
Photon Transfer

Photon transfer m0661, 630 nm, 30.01.2018



Signal-to-Noise Ratio

SNR m0661, 630 nm, 30.01.2018



Quantum efficiency

η 56.7%

Overall system gain

K 0.158 DN/e⁻

$1/K$ 6.323 e⁻/DN

Temporal dark noise

σ_d 6.08 e⁻

$\sigma_{y.dark}$ 1.00 DN

Signal-to-noise ratio

SNR_{max} 159

44.1 dB

7.3 bit

$1/SNR_{max}$ 0.63 %

Absolute sensitivity threshold

$\mu_{p.min}$ 12.11 p

$\mu_{p.min.area}$ 0.598 p/ μm^2

$\mu_{e.min}$ 6.87 e⁻

$\mu_{e.min.area}$ 0.339 e⁻/ μm^2

Saturation capacity

$\mu_{p.sat}$ 44835 p

$\mu_{p.sat.area}$ 2214 p/ μm^2

$\mu_{e.sat}$ 25438 e⁻

$\mu_{e.sat.area}$ 1256 e⁻/ μm^2

Dynamic range

DR 3704

71.4 dB

11.9 bit

Spatial nonuniformities

DSNU₁₂₈₈ 3.26 e⁻

0.52 DN

PRNU₁₂₈₈ 0.71 %

Linearity error

LE_{min} -1.09%

LE_{max} 0.48%

Dark current

$\mu_{c.mean}$ -49 ± 8 e⁻/s

-7.8 DN/s

$\mu_{c.var}$ -38 ± 12 e⁻/s

T_d — °C