

EMVA 1288 Report Summary Cover Page

Package includes all associated EMVA Report Summaries valid for the following Phantom camera models

S641

Refer to the report corresponding with your camera configuration:

- Monochrome models: PDF pages 2-3
- Color models: PDF pages 4-7

Each report summary was generated by Vision Research in accordance with the EMVA 1288 3.1 standard.

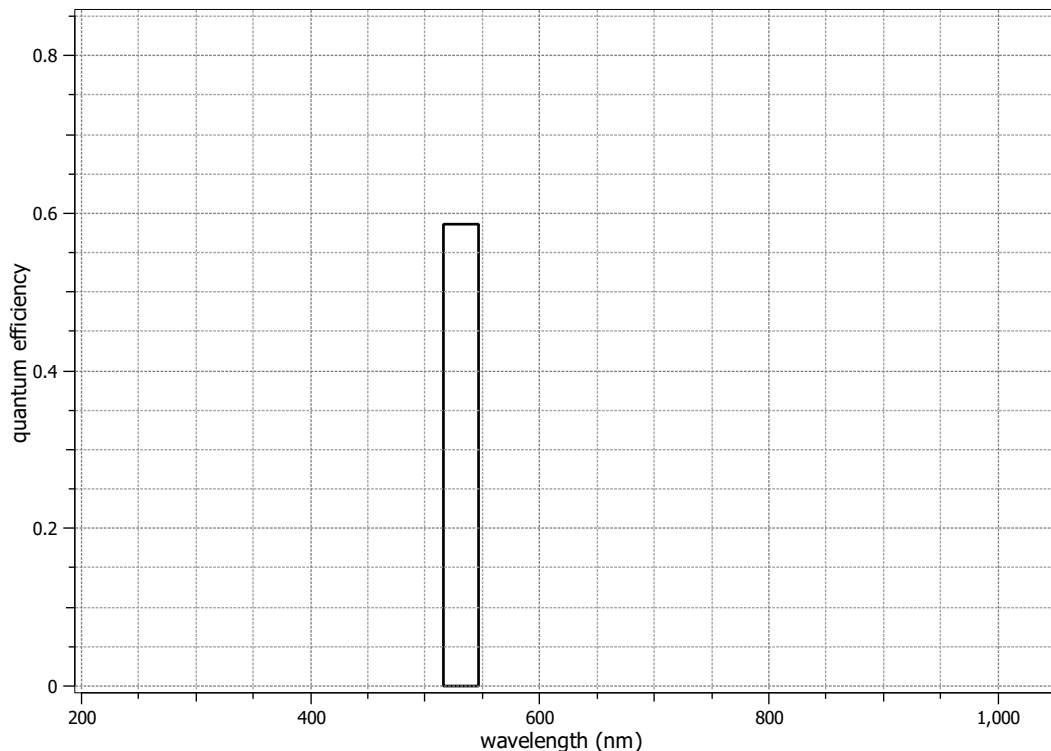
For more information on EMVA 1288 image measurements visit:
www.phantomhighspeed.com/emva

EMVA 1288 Data Sheet m0293

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 ACC2b RGB-IR, Release 9, 30.07.2018, SN 0032(AMETEK).

Measurements were performed by Vision Research. Measurements are on raw sensor data.

Vendor	Vision Research	Type of data presented	Single
Model	Phantom S641	Operation point 1	
Serial number	495	Wavelength centroid	531.5 nm
Sensor diagonal	30.19 mm	Wavelength FWHM	31.2 nm
Lens category	F-Mount	Gain, black-level	1 / 0
Resolution	2560 × 1600, 12 bit	Optional data measured	
Pixel size (h×v)	10.00 μm × 10.00 μm	None	
Sensor	Vision Research Proprietary		
Sensor type	CMOS		
Shutter type	Global		
Overlap cap.	Overlapping		
Max. frame rate	727.0 Hz		
Interface type	CoaXPress 2.0		

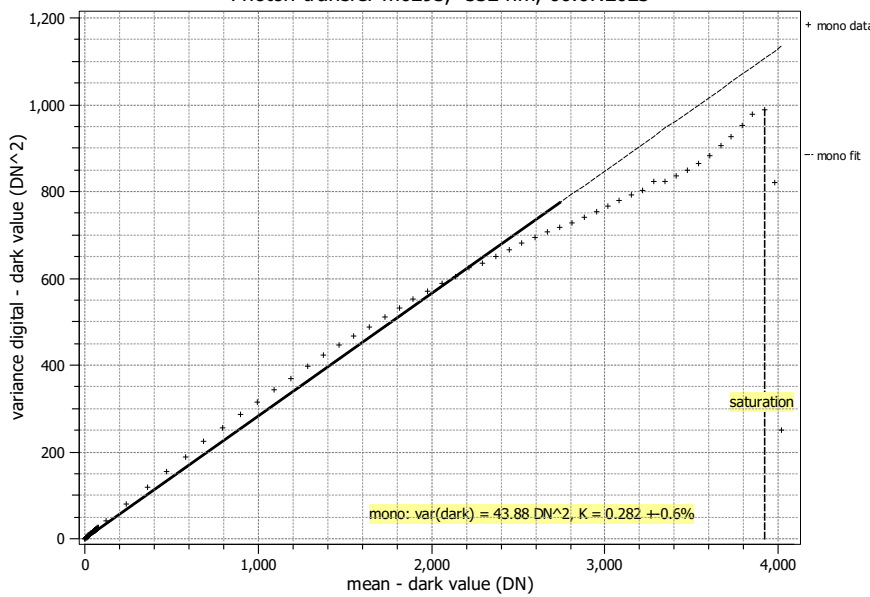


Summary Sheet for Operation Point 1 at a Wavelength of 532 nm

Type of data	Single	Gain, black-level	1 / 0
Exposure control	By irradiance	Environmental temperature	24.1°C
Exposure time	90.00 μ s	Camera body temperature	31.9°C
Frame rate	100.0 Hz	Internal temperature(s)	—
Data transfer mode	Mono 12	Wavelength, centr., FWHM	532 nm, 31.2 nm

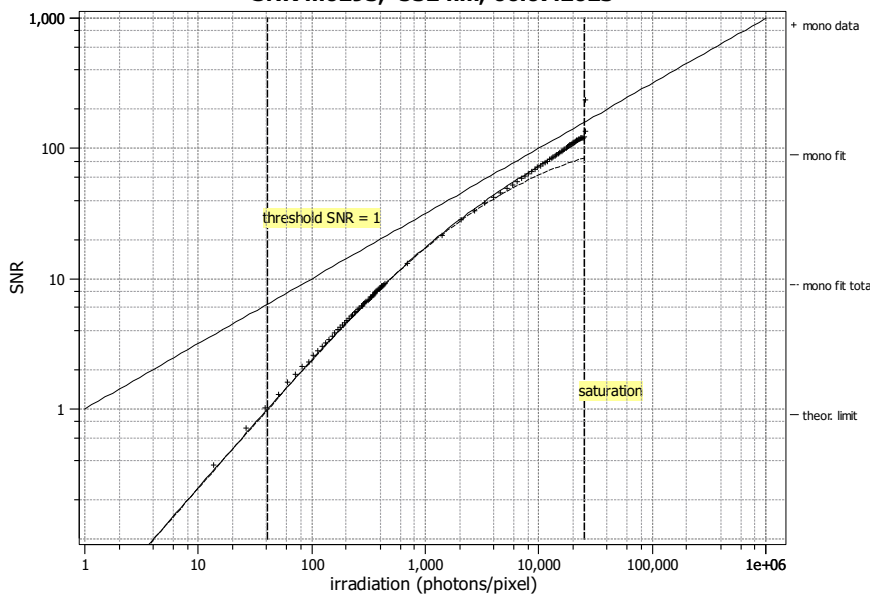
Photon Transfer

Photon transfer m0293, 532 nm, 06.07.2023



Signal-to-Noise Ratio

SNR m0293, 532 nm, 06.07.2023



Quantum efficiency

η 58.6%

Overall system gain

K 0.282 DN/e⁻

1/ K 3.540 e⁻/DN

Temporal dark noise

σ_d 23.43 e⁻

$\sigma_{y,\text{dark}}$ 6.62 DN

Signal-to-noise ratio

SNR_{max} 121

41.7 dB

6.9 bit

1/SNR_{max} 0.82 %

Absolute sensitivity threshold

$\mu_{p,\text{min}}$ 40.9 p

$\mu_{p,\text{min,area}}$ 0.41 p/ μ m²

$\mu_{e,\text{min}}$ 24.0 e⁻

$\mu_{e,\text{min,area}}$ 0.24 e⁻/ μ m²

Saturation capacity

$\mu_{p,\text{sat}}$ 25120 p

$\mu_{p,\text{sat,area}}$ 251 p/ μ m²

$\mu_{e,\text{sat}}$ 14714 e⁻

$\mu_{e,\text{sat,area}}$ 147 e⁻/ μ m²

Dynamic range

DR 614

55.8 dB

9.3 bit

Spatial nonuniformities

DSNU₁₂₈₈ 3.47 e⁻

0.98 DN

PRNU₁₂₈₈ 0.84 %

Linearity error

LE_{min} -4.57%

LE_{max} 2.67%

Dark current

$\mu_{c,\text{mean}}$ -4016 \pm 794 e⁻/s

-1134.4 DN/s

$\mu_{c,\text{var}}$ -450 \pm 934 e⁻/s

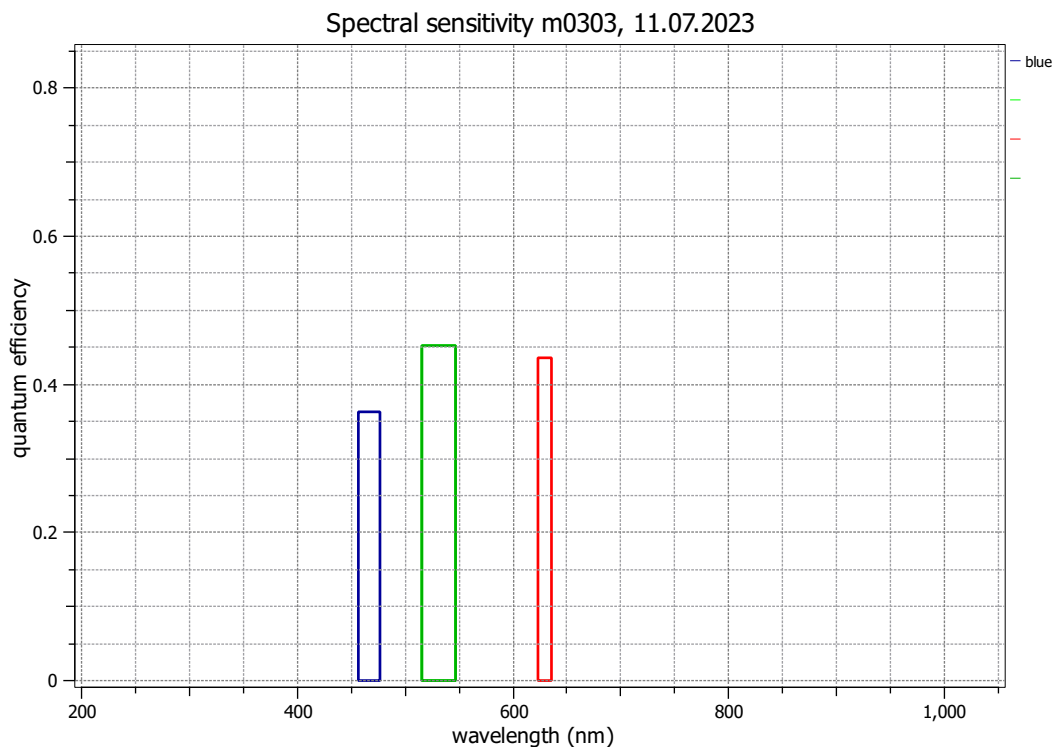
T_d — °C

EMVA 1288 Data Sheet m0304

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 ACC2b RGB-IR, Release 9, 30.07.2018, SN 0032(AMETEK).

Measurements were performed by Vision Research. Measurements are on raw sensor data.

Vendor	Vision Research	Type of data presented	Single
Model	Phantom S641	Operation point 1	
Serial number	519	Wavelength centroid	466.2 nm
Sensor diagonal	30.19 mm	Wavelength FWHM	20.3 nm
Lens category	F-Mount	Gain, black-level	1 / 0
Resolution	2560 × 1600, 12 bit	Operation point 2	
Pixel size (h×v)	10.00 μm × 10.00 μm	Wavelength centroid	531.5 nm
Sensor	Vision Research Proprietary	Wavelength FWHM	31.2 nm
Sensor type	CMOS	Gain, black-level	1 / 0
Shutter type	Global	Operation point 3	
Overlap cap.	Overlapping	Wavelength centroid	629.4 nm
Max. frame rate	727.0 Hz	Wavelength FWHM	13.3 nm
Interface type	CoaXPress 2.0	Gain, black-level	1 / 0
		Optional data measured	
		None	

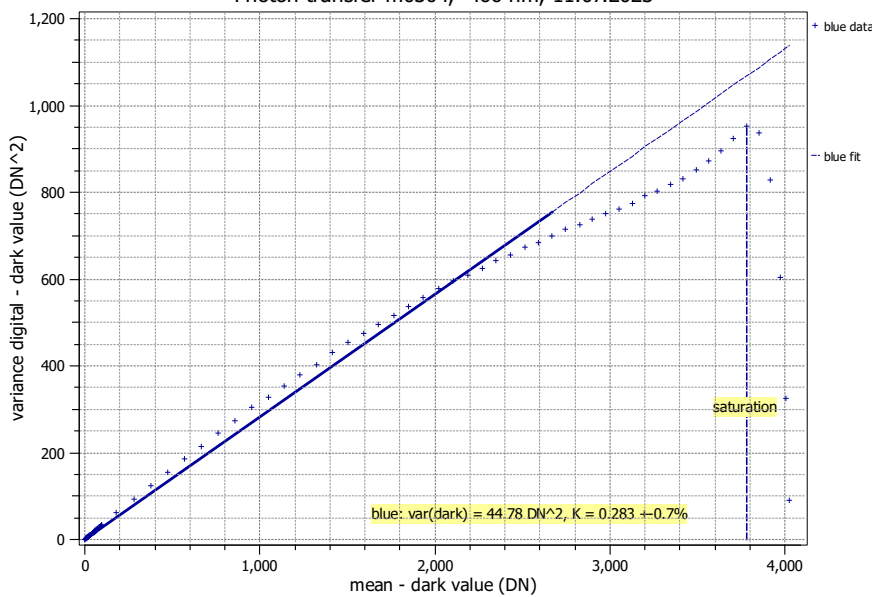


Summary Sheet for Operation Point 1 at a Wavelength of 466 nm

Type of data	Single	Gain, black-level	1 / 0
Exposure control	By irradiance	Environmental temperature	23.5°C
Exposure time	200.00 μ s	Camera body temperature	31.0°C
Frame rate	100.0 Hz	Internal temperature(s)	—
Data transfer mode	Bayer GB12	Wavelength, centr., FWHM	466 nm, 20.3 nm

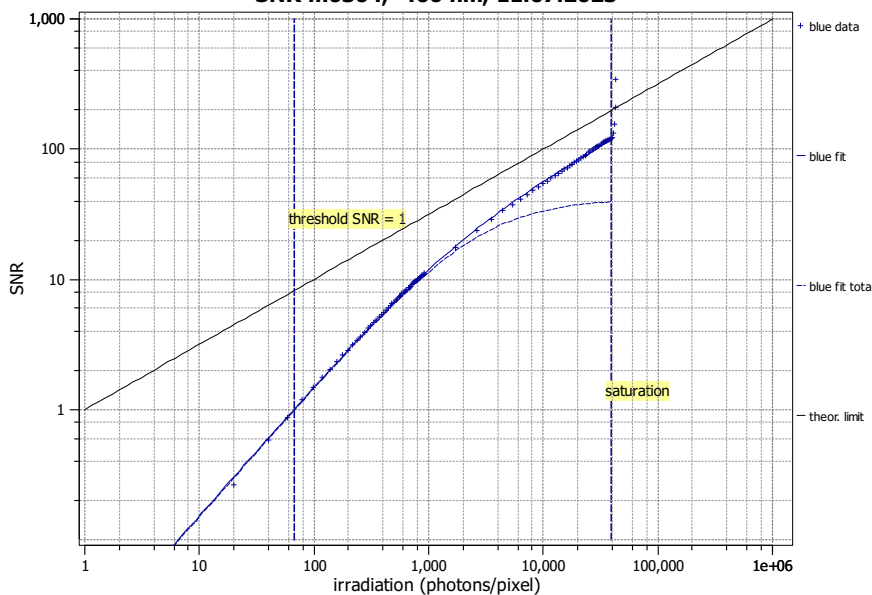
Photon Transfer

Photon transfer m0304, 466 nm, 11.07.2023



Signal-to-Noise Ratio

SNR m0304, 466 nm, 11.07.2023



Quantum efficiency

η 36.2%

Overall system gain

K 0.283 DN/ e^-

$1/K$ 3.539 e^- /DN

Temporal dark noise

σ_d 23.66 e^-

$\sigma_{y,\text{dark}}$ 6.69 DN

Signal-to-noise ratio

SNR_{max} 119

41.5 dB

6.9 bit

$1/SNR_{\text{max}}$ 0.84 %

Absolute sensitivity threshold

$\mu_{p,\text{min}}$ 66.8 p

$\mu_{p,\text{min,area}}$ 0.67 p/ μm^2

$\mu_{e,\text{min}}$ 24.2 e^-

$\mu_{e,\text{min,area}}$ 0.24 e^- / μm^2

Saturation capacity

$\mu_{p,\text{sat}}$ 39106 p

$\mu_{p,\text{sat,area}}$ 391 p/ μm^2

$\mu_{e,\text{sat}}$ 14169 e^-

$\mu_{e,\text{sat,area}}$ 142 e^- / μm^2

Dynamic range

DR 586

55.4 dB

9.2 bit

Spatial nonuniformities

$DSNU_{1288}$ 4.89 e^-

1.38 DN

$PRNU_{1288}$ 2.39 %

Linearity error

LE_{min} -4.36%

LE_{max} 2.62%

Dark current

$\mu_{c,\text{mean}}$ -5406 \pm 1079 e^- /s

-1527.7 DN/s

$\mu_{c,\text{var}}$ -4545 \pm 2677 e^- /s

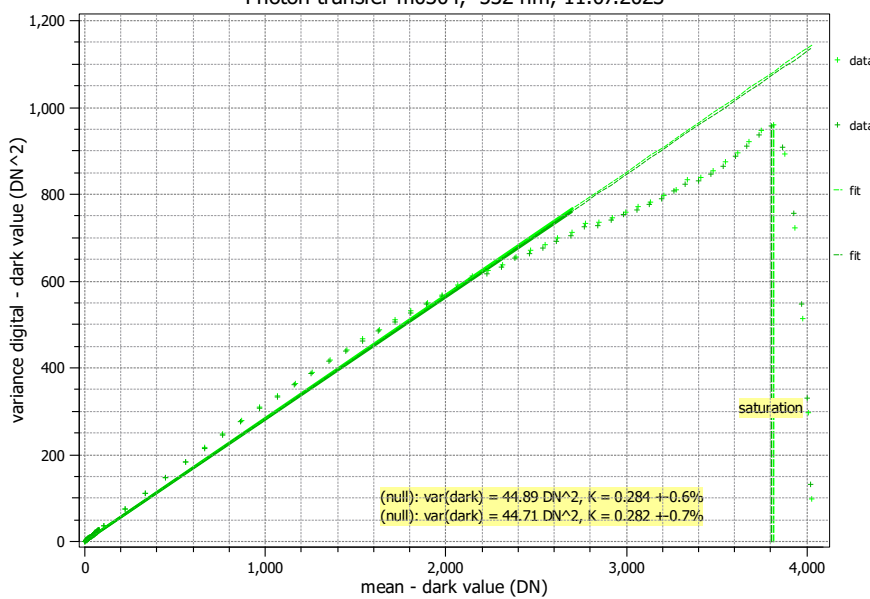
T_d — °C

Summary Sheet for Operation Point 2 at a Wavelength of 532 nm

Type of data	Single	Gain, black-level	1 / 0
Exposure control	By irradiance	Environmental temperature	23.5°C
Exposure time	200.00 μ s	Camera body temperature	30.8°C
Frame rate	100.0 Hz	Internal temperature(s)	—
Data transfer mode	Bayer GB12	Wavelength, centr., FWHM	532 nm, 31.2 nm

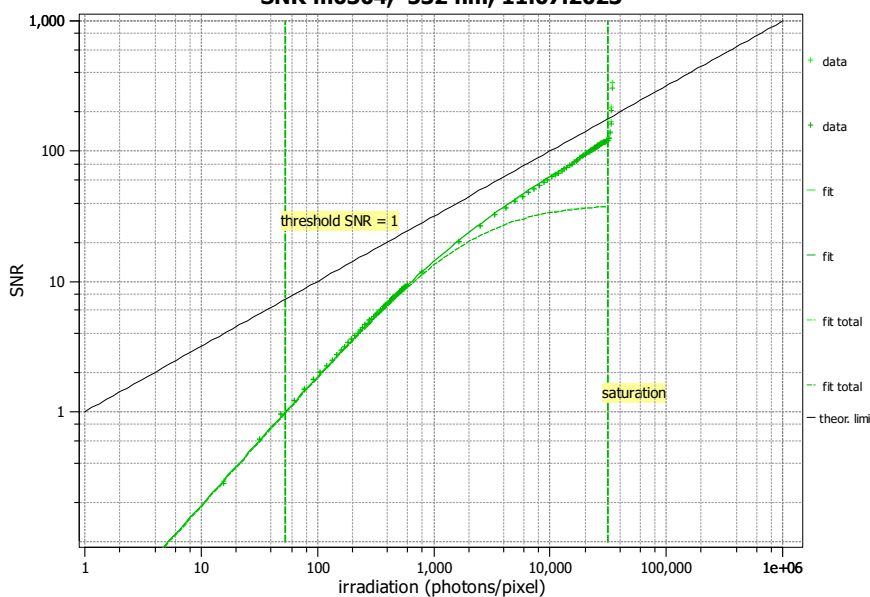
Photon Transfer

Photon transfer m0304, 532 nm, 11.07.2023



Signal-to-Noise Ratio

SNR m0304, 532 nm, 11.07.2023



Quantum efficiency

η 45.1%

Overall system gain

K 0.284 DN/e⁻

1/ K 3.524 e⁻/DN

Temporal dark noise

σ_d 23.59 e⁻

$\sigma_{y,\text{dark}}$ 6.70 DN

Signal-to-noise ratio

SNR_{max} 119

41.5 dB

6.9 bit

1/SNR_{max} 0.84 %

Absolute sensitivity threshold

$\mu_{p,\text{min}}$ 53.4 p

$\mu_{p,\text{min},\text{area}}$ 0.53 p/ μ m²

$\mu_{e,\text{min}}$ 24.1 e⁻

$\mu_{e,\text{min},\text{area}}$ 0.24 e⁻/ μ m²

Saturation capacity

$\mu_{p,\text{sat}}$ 31496 p

$\mu_{p,\text{sat},\text{area}}$ 315 p/ μ m²

$\mu_{e,\text{sat}}$ 14219 e⁻

$\mu_{e,\text{sat},\text{area}}$ 142 e⁻/ μ m²

Dynamic range

DR 590

55.4 dB

9.2 bit

Spatial nonuniformities

DSNU₁₂₈₈ 5.23 e⁻

1.48 DN

PRNU₁₂₈₈ 2.51 %

Linearity error

LE_{min} -4.08%

LE_{max} 2.55%

Dark current

$\mu_{c,\text{mean}}$ -5398 \pm 1073 e⁻/s

-1531.7 DN/s

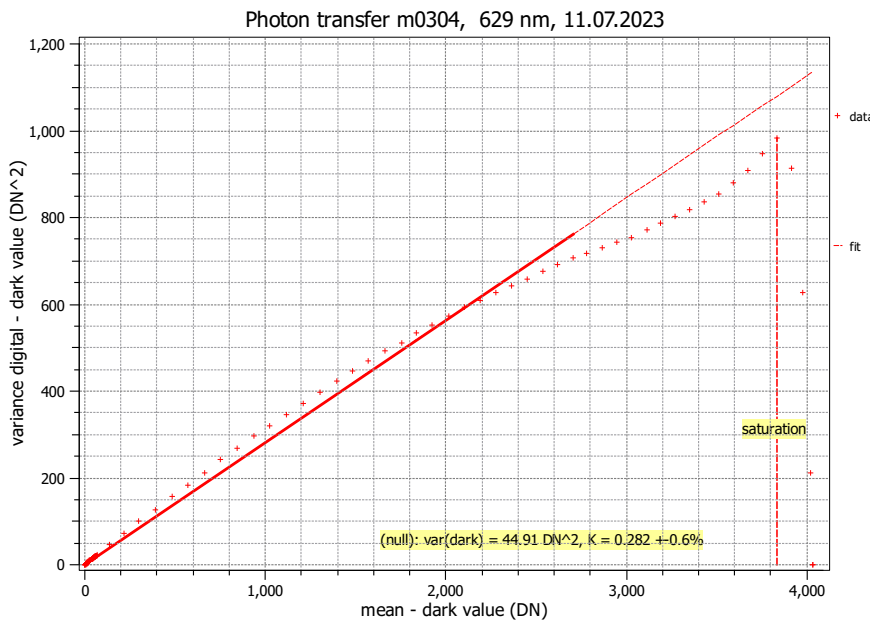
$\mu_{c,\text{var}}$ -4524 \pm 2664 e⁻/s

T_d — °C

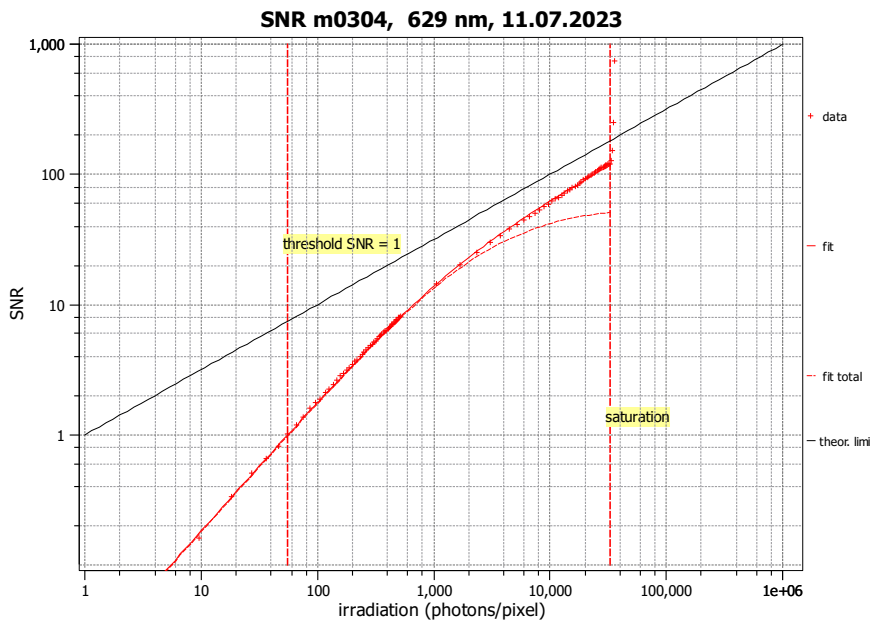
Summary Sheet for Operation Point 3 at a Wavelength of 629 nm

Type of data	Single	Gain, black-level	1 / 0
Exposure control	By irradiance	Environmental temperature	23.5°C
Exposure time	200.00 μ s	Camera body temperature	30.8°C
Frame rate	100.0 Hz	Internal temperature(s)	—
Data transfer mode	Bayer GB12	Wavelength, centr., FWHM	629 nm, 13.3 nm

Photon Transfer



Signal-to-Noise Ratio



Quantum efficiency	
η	43.6%
Overall system gain	
K	0.282 DN/e ⁻
$1/K$	3.551 e ⁻ /DN
Temporal dark noise	
σ_d	23.77 e ⁻
$\sigma_{y,\text{dark}}$	6.70 DN
Signal-to-noise ratio	
SNR _{max}	120
	41.6 dB
	6.9 bit
$1/\text{SNR}_{\text{max}}$	0.83 %
Absolute sensitivity threshold	
$\mu_{p,\text{min}}$	55.7 p
$\mu_{p,\text{min,area}}$	0.56 p/ μm^2
$\mu_{e,\text{min}}$	24.3 e ⁻
$\mu_{e,\text{min,area}}$	0.24 e ⁻ / μm^2
Saturation capacity	
$\mu_{p,\text{sat}}$	33138 p
$\mu_{p,\text{sat,area}}$	331 p/ μm^2
$\mu_{e,\text{sat}}$	14446 e ⁻
$\mu_{e,\text{sat,area}}$	144 e ⁻ / μm^2
Dynamic range	
DR	594
	55.5 dB
	9.2 bit
Spatial nonuniformities	
DSNU ₁₂₈₈	4.65 e ⁻
	1.31 DN
PRNU ₁₂₈₈	1.76 %
Linearity error	
LE _{min}	-4.23%
LE _{max}	2.62%
Dark current	
$\mu_{c,\text{mean}}$	-5415 \pm 1083 e ⁻ /s
	-1527.3 DN/s
$\mu_{c,\text{var}}$	-4570 \pm 2694 e ⁻ /s
T_d	— °C