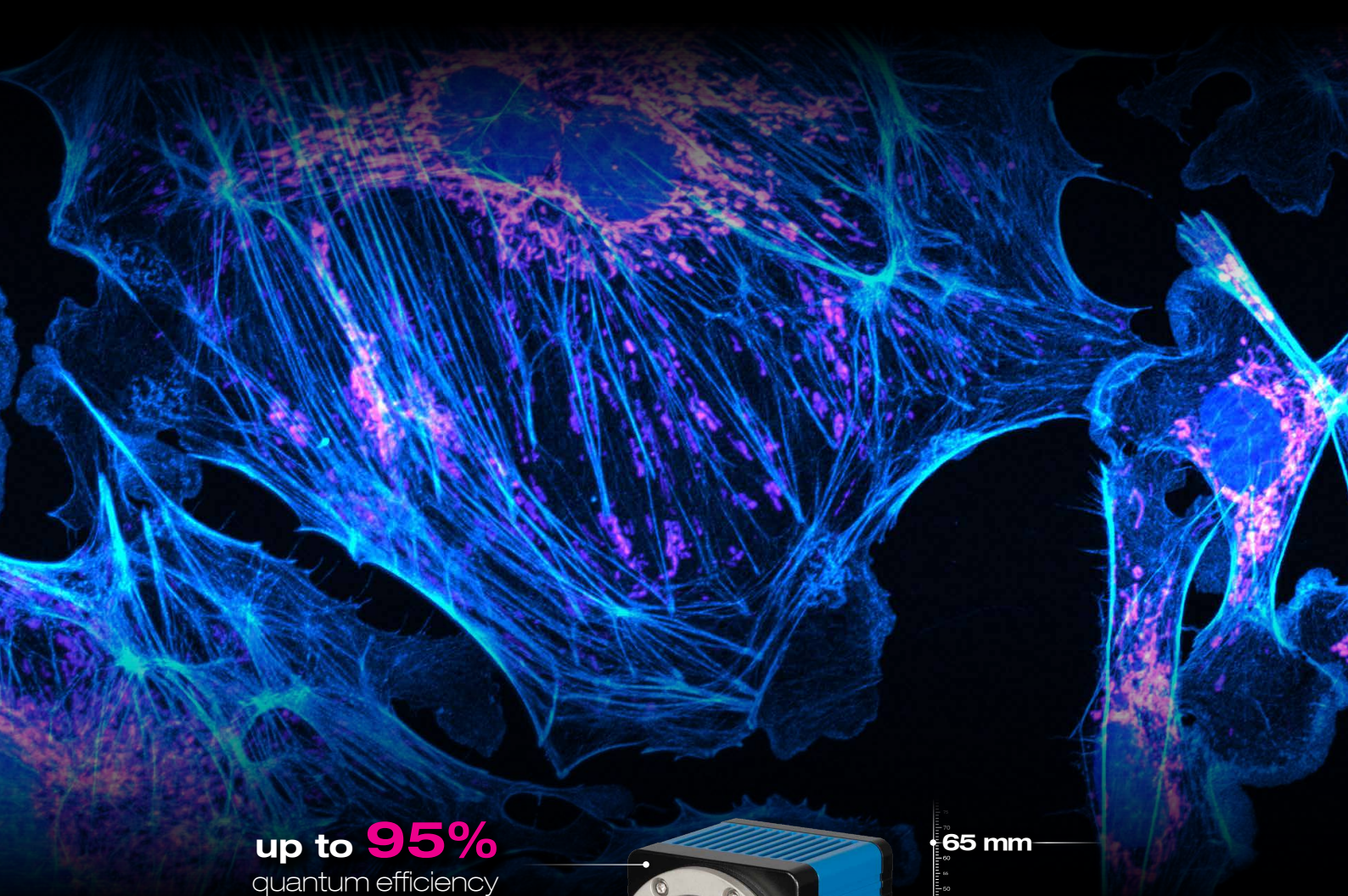


pco.panda family

ultra compact **sCMOS** cameras

datasheet

bi back
illuminated



up to **95%**
quantum efficiency

6.5µm pixel size
for a perfect fit in microscopy
and life science optics



65 mm

**ultra
compact
design**

1288 
EMVA Standard Compliant

pco.

» sCMOS image sensor

	pco.panda 4.2	pco.panda 4.2 bi bi back illuminated
type of sensor	customized scientific CMOS (sCMOS) monochrome or color (bayer pattern)	customized backside illuminated scientific CMOS (bi sCMOS) monochrome
resolution (h x v)	2048 x 2048 active pixels	
pixel size (h x v)	6.5 µm x 6.5 µm	
sensor format / diagonal	13.3 mm x 13.3 mm / 18.8 mm	
shutter mode	rolling shutter (RS)	
MTF	76.9 lp/mm (theoretical)	
fullwell capacity	45 000 e ⁻	54 000 e ⁻
readout noise (typ.) ¹	2.1 _{med} e ⁻ / 2.3 _{rms} e ⁻	1.8 _{med} e ⁻ / 1.7 _{rms} e ⁻
dynamic range (typ.)	21 400 : 1 up to 87 dB	30 000 : 1 up to 90 dB
quantum efficiency	up to 80 % (monochrome)	up to 95 %
dark current (typ.)	15 e ⁻ /pixel/s @ 21 °C	42 e ⁻ /pixel/s @ 21 °C
DSNU	0.5 _{rms} e ⁻ @ 21 °C ambient temp.	0.9 _{rms} e ⁻ @ 21 °C ambient temp.
PRNU	0.6 %	1.1 %

» camera system

	pco.panda 4.2	pco.panda 4.2 bi bi back illuminated
frame rate @ full resolution	> 40 fps	
exposure / shutter time	10 µs .. 5 s	10 µs .. 500 ms
dynamic range A/D ²	16 bit	
A/D conversion factor	0.65 e ⁻ / count	0.7 e ⁻ / count
pixel scan rate	44 MHz	46 MHz
pixel data rate	176 Mpixel/s	184 Mpixel/s
binning horizontal	x1, x2, x4	
binning vertical	x1, x2, x4	
region of interest (ROI)	horizontal: steps of 8 pixels vertical: steps of 1 pixel	horizontal: steps of 8 pixels vertical: steps of 1 pixel
non linearity	< 0.6 %	
cooling method	uncooled	
trigger input signals	frame trigger, acquire (SMA connectors)	
trigger output signals	exposure, busy (SMA connectors)	
data interface	USB 3.1 Gen 1	
time stamp	in image (1 µs resolution)	

» general

	pco.panda 4.2	pco.panda 4.2 bi bi back illuminated
power delivery	power over USB 3.1	
power consumption	max. 6 W	
weight	420 g	
operating temperature	+ 10 °C ... + 40 °C	
operating humidity range	10 % ... 80 % (non-condensing)	
storage temperature range	- 10 °C ... + 60 °C	
optical interface	C-mount (optional: F-mount)	
CE / FCC certified	yes	

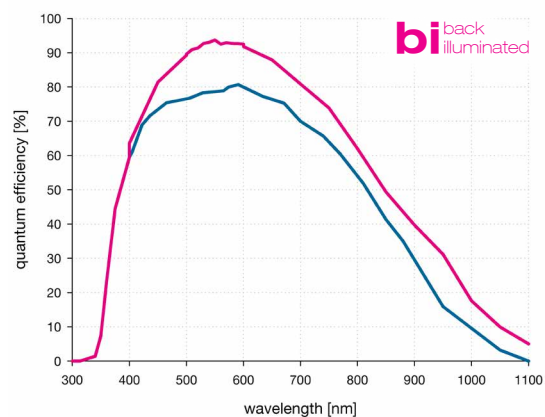
» frame rate table

typical examples	pco.panda 4.2	pco.panda 4.2 bi bi back illuminated
2048 x 2048	41 fps	40 fps
2048 x 1024	80 fps	80 fps
2048 x 512	160 fps	159 fps
2048 x 256	301 fps	300 fps
2048 x 128	521 fps	520 fps
1920 x 1080	76 fps	76 fps
1600 x 1200	68 fps	68 fps
1280 x 1024	80 fps	80 fps
640 x 480	170 fps	170 fps
320 x 240	318 fps	317 fps

» quantum efficiency

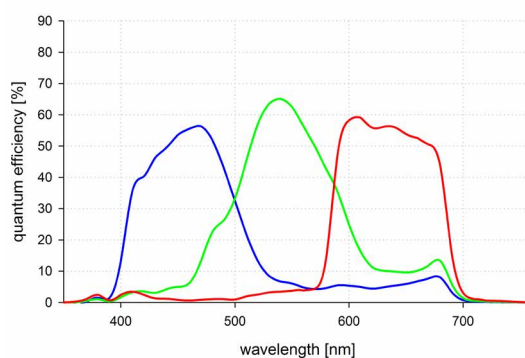
monochrome

pco.panda 4.2
pco.panda 4.2 bi



color

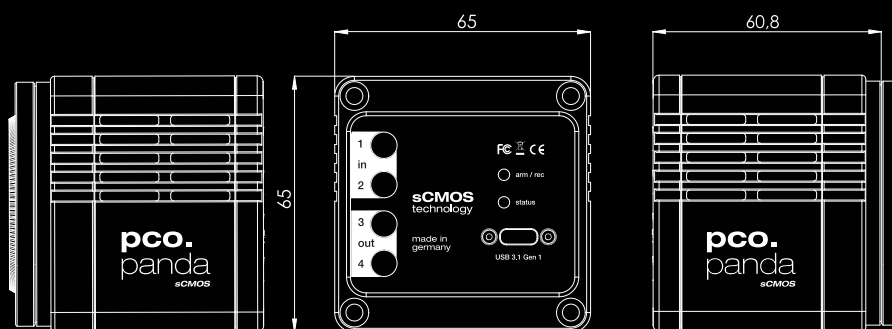
pco.panda 4.2



¹ The readout noise values are given as median (med) and root mean square (rms) values, due to the different noise models, which can be used for evaluation. All values are raw data with filtering.

² The high dynamic signal is simultaneously converted at high and low gain by two 12 bit A/D converters and the two 11 bit values are sophisticatedly merged into one 16 bit value.

» dimensions



F-mount and C-mount lens changeable adapter. All dimensions are given in millimeter.

» camera view



» applications

widefield microscopy | fluorescent microscopy | digital pathology | PALM | STORM | GSDIM | dSTORM | superresolution microscopy | lightsheet microscopy | selective plane imaging microscopy (SPIM) | calcium imaging | FRET | FRAP | 3D structured illumination microscopy | high-speed bright field ratio imaging | high throughput screening | high content screening | biochip reading | TIRF | TIRF microscopy / waveguides | spinning disk confocal microscopy | live cell microscopy | 3D metrology | TV / broadcasting | ophtalmology | electro physiology | lucky astronomy | photovoltaic inspection | industrial quality inspection

» software

Camware is the application software for camera control, image acquisition and archiving of images in various file formats (Microsoft Windows®). A camera SDK (software development kit) including a 32 / 64 bit dynamic link library for user customization and integration on Microsoft Windows and Linux platforms is available for free. Please visit our [website](#) to get the latest camera interface drivers and software.

technical
specifications

pco.panda family

» back illuminated
sensor technology



- 95% peak quantum efficiency (over 80% QE over the visible wavelength range)
- 100% photosensitive area without microlenses
- optimized angular sensitivity
- 6.5 μm pixel size for optimized spatial sampling (in majority of microscopy applications)
- 6.5 μm pixel size, best compromise between photosensitive area and dark current performance

bi back
illuminated

» third party
integrations



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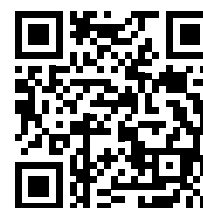
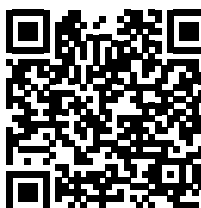
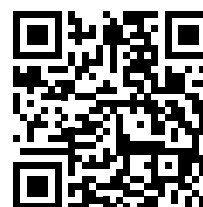
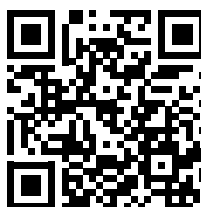
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for application stories
please visit our website

1288
EMVA Standard Compliant



ISO9001 : 2015



pco.

subject to changes without prior notice | lens is sold separately
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