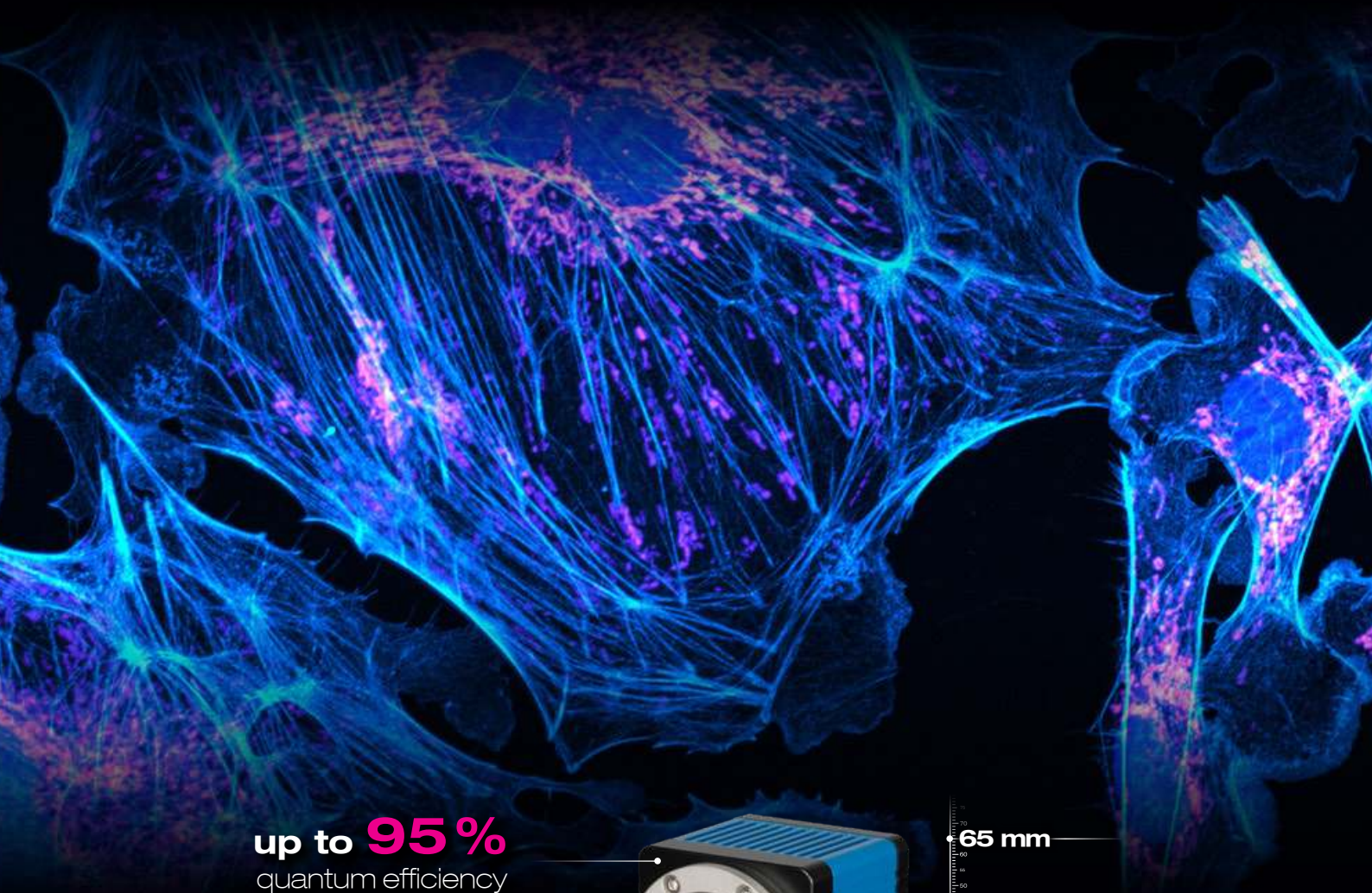


# pco.panda family

ultra compact sCMOS cameras

bi back illuminated



up to **95%**  
quantum efficiency

**6.5  $\mu\text{m}$  pixel size**  
for a perfect fit in microscopy  
and life science applications



65 mm

ultra  
compact  
design

1288   
EMVA Standard Compliant

pco.

» sCMOS image sensor

models »	pc <sub>o</sub> .panda 4.2	pc <sub>o</sub> .panda 4.2 bi <b>bi</b> back illuminated
type of sensor	scientific CMOS (sCMOS) monochrome or color (bayer pattern)	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 <sup>-</sup>	54 000 e <sup>-</sup>
readout noise (typ.) <sup>1</sup>	2.1 <sub>med</sub> e <sup>-</sup> / 2.3 <sub>rms</sub> e <sup>-</sup>	1.8 <sub>med</sub> e <sup>-</sup> / 1.9 <sub>rms</sub> e <sup>-</sup>
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 <sup>-</sup> /pixel/s @ 21 °C ambient temperature	42 e <sup>-</sup> /pixel/s @ 21 °C ambient temperature
DSNU	0.5 <sub>rms</sub> e <sup>-</sup>	0.9 <sub>rms</sub> e <sup>-</sup>
PRNU	0.6 %	1.1 %

» camera system

models »	pc <sub>o</sub> .panda 4.2	pc <sub>o</sub> .panda 4.2 bi <b>bi</b> back illuminated
frame rate @ full resolution	40 fps	
exposure / shutter time	10 µs .. 5 s	10 µs .. 500 ms
dynamic range A/D <sup>2</sup>	16 bit	
A/D conversion factor	0.65 e <sup>-</sup> / count	0.8 e <sup>-</sup> / 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	
non-linearity	< 0.6 %	
cooling method	passive cooled	
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

models »	pc <sub>o</sub> .panda 4.2	pc <sub>o</sub> .panda 4.2 bi <b>bi</b> back illuminated
power delivery	power over USB 3.1	
power consumption	typ. 4.5 W (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	

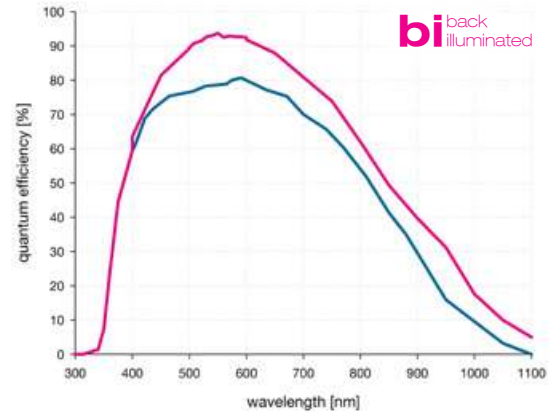
» frame rate table

models »	pco.panda 4.2	pco.panda 4.2 bi <b>bi</b> 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

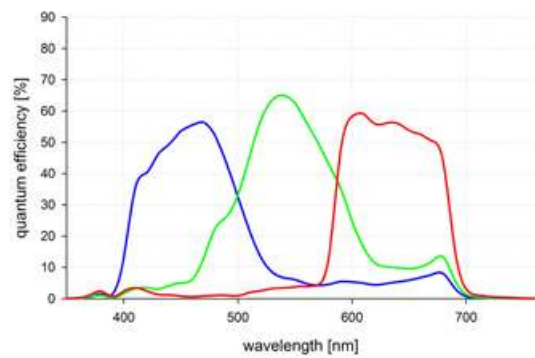
monochrome

pco.panda 4.2  
pco.panda 4.2 bi



color

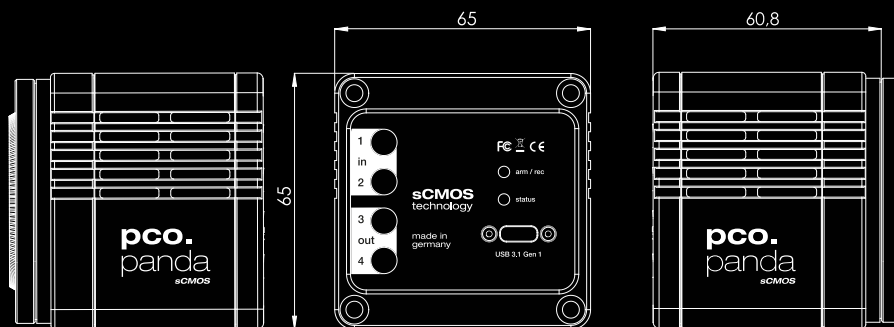
pco.panda 4.2



<sup>1</sup> 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.

<sup>2</sup> The high dynamic signal is simultaneously converted at high and low gain by two 12 bit A/D converters and the two 12 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

brightfield microscopy | fluorescence microscopy | digital pathology | single molecule localization microscopy | lightsheet fluorescence microscopy (LSFM) | calcium imaging | FRET | FRAP | structured illumination microscopy (SIM) | high-speed bright field ratio imaging | high throughput screening | high content screening | biochip reading | TIRF microscopy | spinning disk confocal microscopy | 3D metrology | ophthalmology | 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.

## bi back illuminated

- 95 % peak quantum efficiency and more than 80 % quantum efficiency for the visible wavelength range.  
*Enhanced sensor cover glass providing better quantum efficiency transmission within the visible and NIR wavelength range.*
- No micro lenses eliminates sensitivity to angular limitation and provides a 100% photosensitive area.
- 6.5  $\mu\text{m}$  pixel size is ideal for spatial sampling in microscopy applications.



» third party  
integrations



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