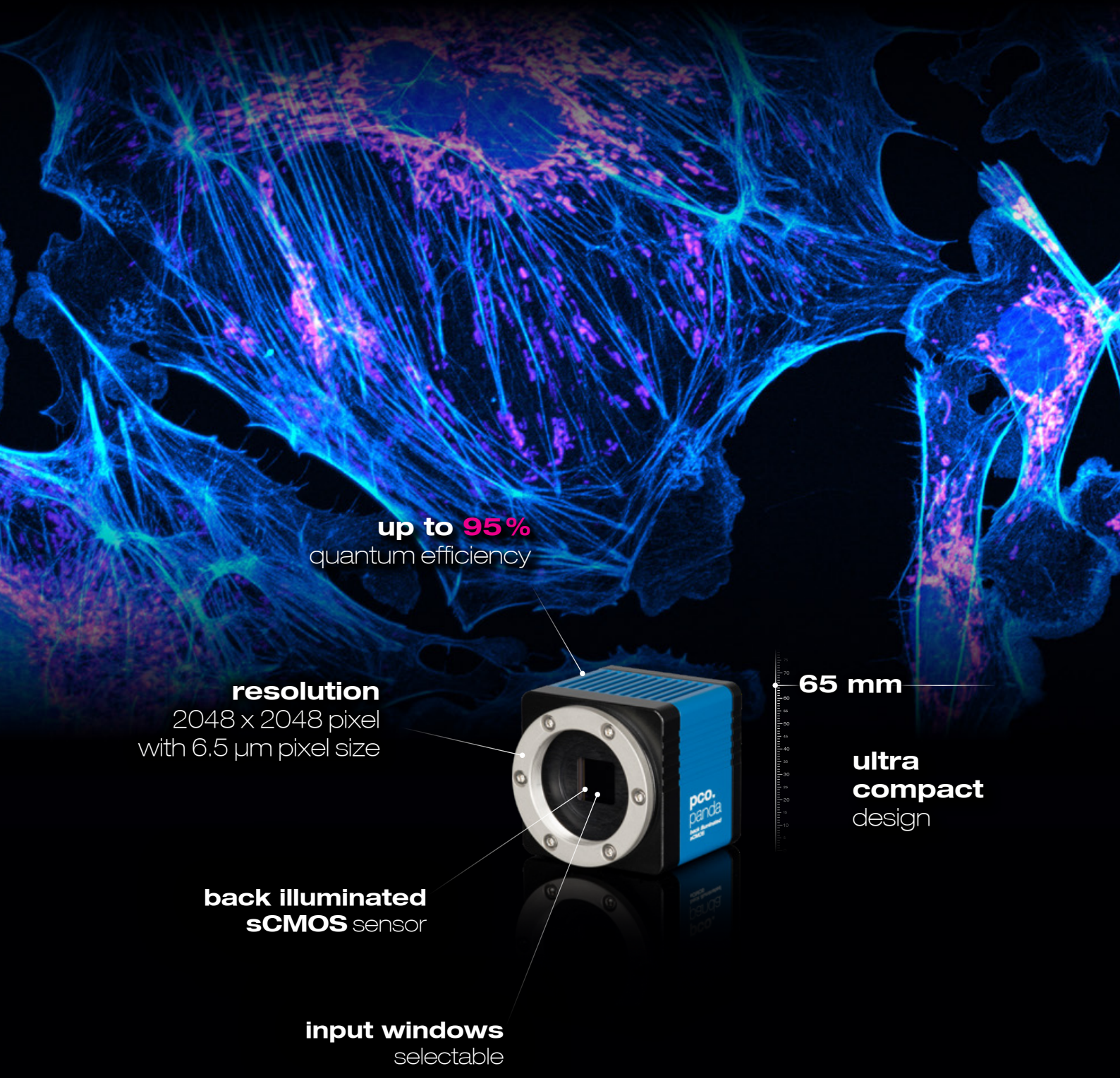
pco.panda family

ultra compact **sCMOS** cameras

bi back illuminated



up to 95%
quantum efficiency

resolution
2048 x 2048 pixel
with 6.5 µm pixel size

back illuminated
sCMOS sensor

input windows
selectable

65 mm

ultra
compact
design

1288
EMVA Standard Compliant

pco.

technical specifications

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» sCMOS image sensor

models	pco.panda 4.2	pco.panda 4.2 bi bi 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-	48 000 e-
readout noise (typ.)[1]	2.1 med e- / 2.3 rms e-	1.8 med e- / 1.9 rms e-
dynamic range (typ.)	21 400 : 1 up to 87 dB	26 667 : 1 up to 88.5 dB
quantum efficiency	up to 80 % (monochrome)	up to 95 %
spectral range	370 nm ... 1100 nm	370 nm ... 1100 nm 190 nm ... 1100 nm **UV version**
dark current (typ.)	15 e-/pixel/s @ 21 °C ambient temperature	42 e-/pixel/s @ 21 °C ambient temperature
DSNU	0.5 rms e-	0.9 rms e-
PRNU	0.6 %	1.2 %

» camera system

models	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-/DN	0.8 e-/DN
pixel scan rate	44.0 MHz	46.0 MHz
pixel data rate	176.0 Mpixel/s	184.0 Mpixel/s
binning horizontal	x1, x2, x4	
binning vertical	x1, x2, x4	
region of interest (ROI)	horizontal: steps of 32 pixels vertical: steps of 8 pixel	
non-linearity	< 0.6 %	
cooling method	passive cooled	
trigger input signals	frame trigger, aquire (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	pco.panda 4.2	pco.panda 4.2 bi bi back illuminated
power delivery	power over USB 3.1 Gen 1	
power consumption	typ. 4.5 W (max. 6.0 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	

[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.

[2] 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 sophistically merged into one 16 bit value.

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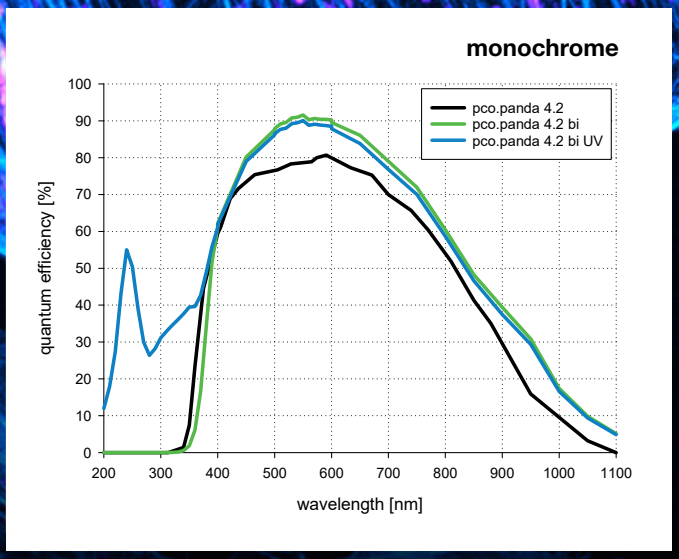
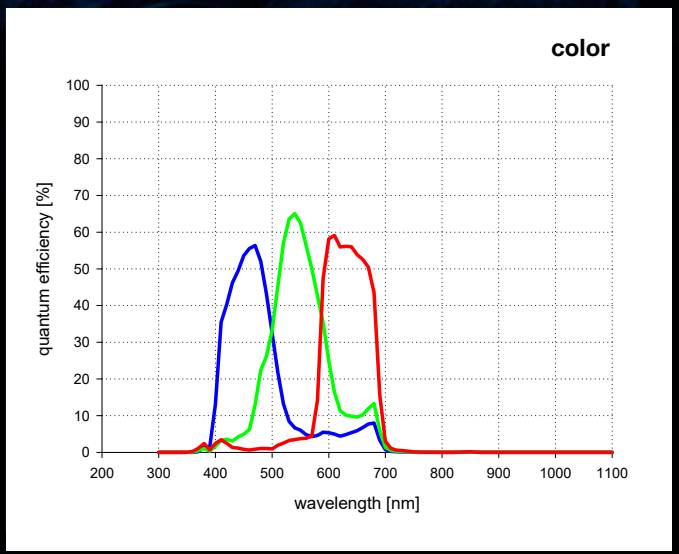
» frame rate table

models »	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





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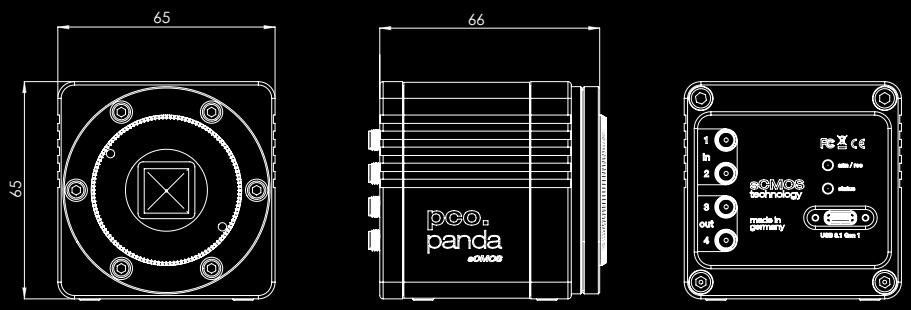
» dimensions



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

» camera view

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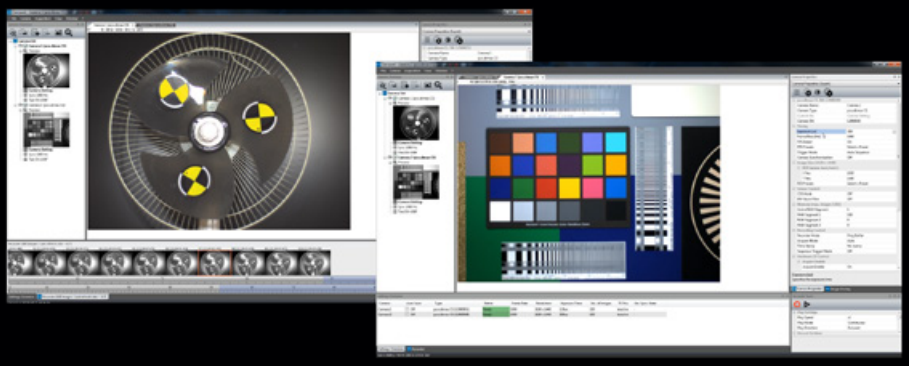
» applications

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



With pco.camware you control all camera settings, the image acquisition and the storage of your image data. The pco.sdk is the complementary software development kit. It includes dynamic link libraries for user customization and integration on Windows-PC platforms. Drivers for popular third party software packages are also available for you.

All this items like pco.camware, pco.sdk and third party drivers, are free-to-download at www.pco.de.

» third party integrations

LabVIEW · MathWorks · µ-Manager · Nikon

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for application stories
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