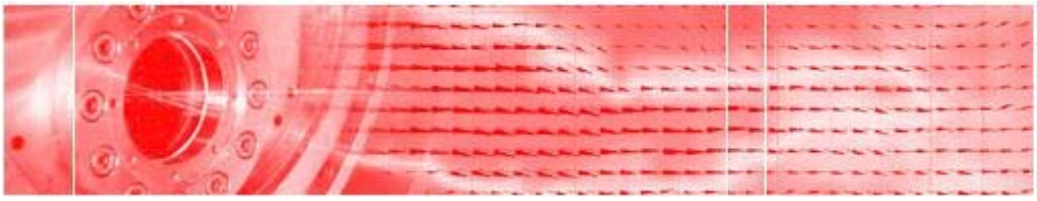
pco.2000
cooled digital 14bit CCD camera system

- excellent resolution (2048x2048pixel)
- 14bit dynamic range
- fast image recording - 160MB/s
- image memory in camera (camRAM up to 4GB)
- excellent low noise of 12e⁻ rms @ 10MHz
- thermoelectrical cooling of -50°C vs. ambient
- standard interfaces (IEEE1394, camera link, ethernet)
- UV sensitive & color CCD image sensor available

pco.
imaging

This PCO brochure is presented to you by:
Intelligent Laser Applications GmbH, Karl-Heinz-Beckurts-Strasse 13, D-52428 Juelich
Phone +49.(0)2461.690-430, Fax +49.(0)2461.690-439, info@ila.de, www.ila.de
ILA is a registered PCO system integrator and third party software provider



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This high performance 14bit CCD camera system comprises advanced CCD and electronics technology. With the new approach to integrate the image memory (camRAM) into the camera itself, it enables unmatched fast image recording with 160MB/s. The system features thermo-electrical cooling (down to –50°C vs. ambient), an excellent high resolution (2048 x 2048pixel) and low noise (down to 12e^- rms). It consists of a compact camera with an external intelligent power supply. The image data are transferred via customer selectable standard data interfaces to a computer (IEEE 1394 (“firewire”), camera link, ethernet). The available exposure times range from 5µs to 49days (500ns opt.).

technical data

	unit	setpoint	pco.2000
resolution (hor x ver)[1]	pixel	@normal/ @extended mode	2048x2048 2112x2072
pixel size (hor x ver)	μm^2		7.4 x 7.4
sensor format/	mm^2/ mm		15.6 x 15.3/ 21.9
peak quantum efficiency	%	@ 500nm typical	55
full well capacity, transfer capacity of CCD	e^-	normal / with ver-binning / with hor-binning	40 000 / 60 000 / 100 000
linearity range of CCD output @40MHz	e^-	KAI-4020 KAI-4010	20 000 40 000
image sensor			KAI-4020 (opt. KAI-4010)
maximum dynamic range	dB	KAI-4020 KAI-4010	70 73
dynamic range A/D[2]	bit		14
readout noise KAI-4020 KAI-4010	e^- rms e^- rms	@10 / 20 / 40MHz @10 / 20 / 40MHz	12 / 16 / 20 14 / 22 / 30
imaging frequency, frame rate	fps	@full frame	14.7
pixel scan rate	MHz		2 x 10 / 2 x20 2 x 40
A/D conversion factor KAI-4020 KAI-4010	e^-/count e^-/count	normal / low	2.2 2.2 / 4.4
spectral range	nm	normal / UV sensitive	320..1000 200..1000
exposure time	s		5µs..49days (500ns..49days opt.)

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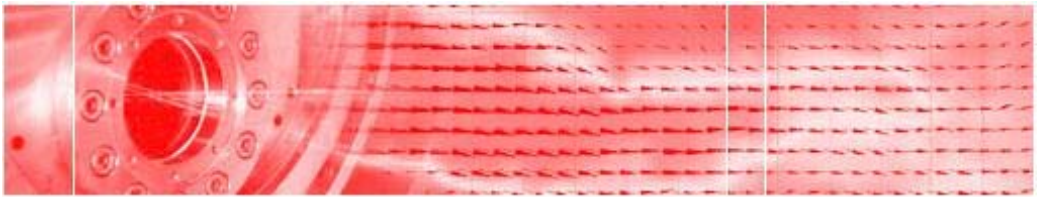

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technical data

anti-blooming factor		typical	>300
smear	%		0.01
binning horizontal	pixel		1, 2
binning vertical	pixel		1, 2, 4, 8
dark current	e^-/pixel·s	@20 °C typical @-20 °C typical	0.5 / 0.01
region of interest	pixel		1, 2, 3, 4..n
non linearity	%	full temperature range	<2
uniformity darkness DSNU[3]	e^- rms	@ 90% center zone	<20
uniformity brightness PRNU[4]	%	typical	2
trigger, auxiliary signals		internal/ external	software / TTL level
power consumption	W	typical/ maximum	24 / 40
power supply	VAC		90..260
mechanical dimensions camera (w x h x l)	mm^3		84 x 66 x 175
mechanical dimensions power supply (w x h x l)	mm^3		135 x 51 x 195
weight	kg		1.8
operating temperature range	°C		+5..+40
operating humidity range	%		10..90
storage temperature range	°C		-20..+70
optical input			c-mount, Nikon f-mount
optical input window			fused silica
data interface			IEEE1394, camera link, ethernet
CE certified			yes
cooled CCD	°C	versus ambient temperature	Δ-50
cooling method			2 stage Peltier cooler with forced air cooling
interframing time PIV modus	ns	full image	180

[1] horizontal versus vertical
[2] Analog-to-Digital-converter
[3] dark signal non-uniformity
[4] photo reponse non-uniformity

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software: Camware software for camera control, image acquisition and archiving of images in various file formats, WindowsXP and later, 32bit-dynamic link library (DLL) is available for user customisation and integration on PC platforms (software development kit - SDK), software is operational in either single mode or with built-in recorder functions, drivers for popular third party software packages are available (see website)

options: CCD image sensor in color & UV sensitive version
custom-made versions
camRAM available in: 512MB, 1GB, 2GB & 4GB

frame rate table [frames per second]

pixelclock	10MHz	20MHz	40MHz
used A/D converters	1 / 2	1 / 2	1 / 2
full frame	2.2 / 4.3	4.3 / 8.1	8.2 / 14.7
2x2 binning	4.3 / 8.3	8.3 / 15.3	15.5 / 26.7
2x8 binning	15.5 / 27.8	27.8 / 46.3	46.8 / 69.7
ROI 1280x1024pixel	4.3 / 8.3	8.3 / 15.5	15.4 / 26.4
ROI 640x480pixel	8.7 / 16.0	16.1 / 28.2	28.8 / 45.9
ROI 320x240pixel	15.9 / 27.7	28.2 / 45.5	46.8 / 67.7

areas of application

laser induced fluorescence ■ high resolution microscopy ■ luminescence microscopy ■ electron microscopy ■ fluorescence spectroscopy (up to NIR) ■ bioluminescence ■ chemoluminescence ■ low light level imaging ■ imaging of bio markers (e.g. green fluorescent protein, GFP) ■ time resolved spectroscopy ■ spray analysis ■ hydrodynamics ■ electrophoresis ■ absorption & luminescence spectroscopy ■ imaging of potential sensitive dyes (Neuroscience) ■ night vision ■ security ■ astronomy ■ combustion process analysis ■ gel imaging ■ fuel injection

contact

PCO AG
Donaupark 11
93309 Kelheim, Germany

fon +49 (0)9441 2005 50
fax +49 (0)9441 2005 20
info@pco.de
www.pco.de

The Cooke Corporation
1091 Centre Road, Suite 100
Auburn Hills, Michigan 48326-2670
USA
fon +1 248 276 8820
fax +1 248 276 8825
info@cookecorp.com
www.cookecorp.com

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