pco.dimax
digital high speed 12 bit CMOS camera system

- 1279 fps @ full resolution 2016 x 2016 pixel
- 12 bit dynamic range
- 4502 fps @ 1008 x 1000 pixel
- color & monochrome image sensor versions available
- exposure time range 2 µs – 40 ms
- image memory in camera (camRAM up to 36 GB)
- double shutter operation
- GigE & USB 2.0 data interfaces
- multiple trigger interface optimized for automotive applications
- smart battery control (1 h full operation or 6 h data backup)

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This high speed 12 bit CMOS camera system comprises advanced CMOS and electronics technology. With its sensitive 12 bit dynamic it enables remarkable fast image rates of 1279 frames per second (fps) at full resolution of 2016 x 2016 pixel. The system features also a variety of trigger options to cover all offboard applications that have been required by the automotive industry. The image data are transferred via GigE Vision or USB 2.0 interfaces. For preview purposes a DVI or HDSDI interface can be optionally integrated. The pco.dimax has a smart battery control, which allows a full operation for 1 h and a data backup for 6 h. The available exposure times range from 2 µs to 40 ms. This digital CMOS camera system is perfectly suited for high speed camera applications such as material testing, offboard crash or impact tests or super slow motion movie clips.

technical data

	unit	setpoint	pco.dimax
resolution (hor × ver) [1]	pixel		2016 × 2016
pixel size (hor × ver)	µm²		11.0 × 11.0
sensor format / diagonal	mm² / mm		22.18 × 22.18 / 31.36
quantum efficiency	%	@ 600 nm	50
full well capacity	e^-		39 000
image sensor			proprietary
dynamic range	dB	camera system	65.8
dynamic range A/D [2]	bit		12
readout noise	e^- rms	@ 62.5 MHz	< 20
imaging frequency, frame rate	fps	@ full frame @ 1008 x 1000	1279 4502
pixel scan rate	MHz		62.5
pixel data rate	GByte/s		9
A/D conversion factor	e^- / count	normal	9.5
spectral range	nm		290 .. 1100
exposure time	s		2 µs .. 40 ms
anti–blooming factor		typical	no blooming
smear	%		no smear
parasitic light sensitivity		@ 465 nm	1 : 4600
dark current	e^- / pixel·s		530
region of interest [7]	pixel	steps of	48 x 4
non linearity	%	differential / integral 10–80 % signal range	< 1 / < 0.2

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technical data

	unit	setpoint	pco.dimax
uniformity darkness DSNU[4]	e^- rms	@ 90 % center zone	< 20
uniformity brightness PRNU[5]	%	@ 80 % signal	< 0.6
trigger, auxiliary signals		internal external	software TTL high / low level, open contact, differential (RS485), galvanically isolated
MTF	%	@ Nyquist	> 65
power consumption	W	maximum	80
power supply	VAC		90 .. 260 (12 VDC optional)
mechanical dimensions camera (w × h × l)	mm^3		170 × 185 × 290
mechanical dimensions power supply (w × h × l)	mm^3		73 x 41 x 170
weight	kg		7
operating temperature range	°C		+5 .. +40
operating humidity range	%		10 .. 90
storage temperature range	°C		–20 .. +70
optical input			Nikon f–mount
data interface			GigE Vision & USB2.0, camera link (optional)
preview interface (optional)			DVI or HDSDI
CE certified			yes

[1] horizontal versus vertical
[2] Analog–to–Digital–converter
[3] full width half maximum
[4] dark signal non–uniformity
[5] photo response non–uniformity
[6] to be done, not yet measured
[7] ROI – always center aligned

ISO speed rating[1, 4]		
color (raw)	S_{sat} $S_{noise,40}$ $S_{noise,10}$	160 500 3200
color (NLM noise filtered)	S_{sat} $S_{noise,40}$ $S_{noise,10}$	160 1250 6400
monochrome (raw)	S_{sat} $S_{noise,40}$ $S_{noise,10}$	1250 2500 16000
monochrome (RAW & NLM noise filtered)	S_{sat} $S_{noise,40}$ $S_{noise,10}$	1250 > 10 000 > 50 000

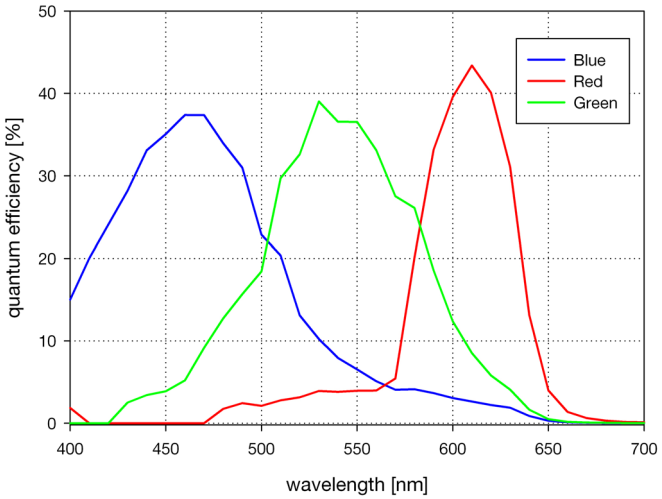
Color Metamerism		
CIELab ΔE^2	average	< 2.4
SMI[3]	ISO 17321	83

[1] ISO 12232: Photography – Electronic still–picture cameras – Determination of ISO speed
[2] using a Macbeth Colorchecker – 24 patches color
[3] Sensitivity metamersim index (SMI) is defined in the ISO Standard 17321 and describes the ability of a camera to reproduce accurate colors using a Macbeth Colorchecker – 18 patches color
[4] measured with daylight 6000 K

trigger modes	single exposure trigger (rising edge / trailing edge / exposure time), sequence trigger (adjustable number of subsequent images / adjustable amount of memory), acquire enable trigger, for all available trigger options and combinations see camera manual
camera synchron.	Master–Slave via daisy–chain maximum coaxial cable (50 Ω) length = 100m
time code	Internal clock with date, time of day, resolution = 10 µs, exposure time start stored to every image
time code synchron.	IRIG B input
IRIG B code	000 .. 003 width coded, no carrier 120 .. 123 sine wave, amplitude modulated
software	Camware software for camera control, image acquisition and archiving of images in various file formats, WindowsXP and later, 32 bit–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	CMOS image sensor in color version custom made versions

quantum efficiency curves

Quantum efficiency
curves of color version



frame rate [frames per second] / recording duration table

The given resolutions are selected for the frame rate calculations in the tables only, they are not mandatory. For ROIs see „technical data“ table on page 2.

resolution horizontal [pixel]	resolution vertical [pixel]	frame rate [fps]	images camRAM 36 GB [quantity]	recording time [s]
2016	2016	1 279	6 324	4.9
1920	1080	2 470	12 395	5.0
1296	720	5 087	27 546	5.4
1008	1000	4 502	25 499	5.7
720	480	11 576	74 374	6.4
480	240	27 667	223 124	8.1
240	120	63 841	892 496	14.0
240	32	126 263	3 346 862	26.5
240	16	153 563	6 693 725	43.6
2016	16	73 443	796 872	10.9

camera views

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