



CCi₄ CMOS Camera



- **Ibis4 CMOS sensor**
- **1280 x 1024 pixels (H x V)**
- **Monochrome and Colour versions available**
- **10 bit digital output**
- **Limited Exposure Technology results in Extended Dynamic Range**
- **PCI-LVDS interface**
- **IEEE-1394 (Fire Wire) interface**

The CCi₄ camera is one of a series of highly integrated CMOS sensor based cameras. The camera is equipped with the Ibis4 CMOS image sensor from FillFactory™ 1280 x 1024 pixels (7 µm square), better known as an SXGA resolution. The sensor has a remarkably good signal-to-noise ratio combined with an excellent contrast performance. The dark current of the sensor is superior to classical image sensors allowing longer exposure times.

The image sensor utilises Limited Exposure Technology (Patent Pending). This technique prevents over-exposure of brighter parts of an image while preserving excellent contrast in the darker areas of the image. In this fashion the dynamic range is extended from 66 dB to more than 100 dB. The CCi₄ camera can switch between normal and LET mode.

C-Cam Technologies supply the standard PCI-LVDS card as interface. Any compatible digital frame grabber equipped with bi-directional LVDS interface technology can be used, but in some cases an external power supply is required. The camera supports cables up to 10 metres long. Also available is the IEEE-1394 interface also known as Fire Wire™.

The software in the CCi₄ camera provides flexibility and can be altered to the customer's specific requirements, e.g. special trigger timing for use with lasers or flash. Additional memory can be used for storing the image and/or performing DSP-like operations.

The CCi₄ camera provides a complete solution for system designers who require a rapid solution with little or no involvement at chip level.

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Sensor Specifications

Imager type	CMOS integrating active pixel sensor (APS) IBIS4 from FillFactory with on-chip non-uniformity correction (CDS)
Sensor types	Monochrome or RGB colour
Total pixels	1,324,580 (1286H x 1030V)
Total light-sensitive pixels	1,310,720 (1280H x 1024V)
Sub-sampled view mode	81,920 (320H x 256V)
Window Of Interest (WOI)	Any rectangle or line image format specified by the user
Active image area	8.96mm (H) x 7.17mm (V)
Pixel pitch	7 x 7 µm
Fill factor	60 % (no microlenses)
Spectral response	More than 30 %
Temporal noise	20 electrons, 500 µV RMS
Well capacity	More than 70,000 electrons (55,000 linear range)
Dark current signal	787 electrons/second @ 21°C
Avg. auto-saturation time	51 seconds @ 21°C
Dark current	255 pA/cm ² @ 21°C
Blooming suppression	1 x 10 ⁵
Smear	None
Standard dynamic range	66 dB (40,000 / 20)
High dynamic range	100 dB in Limited Exposure Technology (LET) mode
Grey level resolution	8 bits or 256 grey levels and 10 bits or 1024 grey levels
MTF	0,4 - 0,5 @ 450 nm 0,25-0,35@650 nm
PRNU	10 %p/p with 1/2 saturation in neighbourhood

Image Specifications

Pixel rate	10 MHz (typical)
Frame speed full resolution	Approx. 7.5 frames/second
Frame speed CCIR format	Approx. 30 frames/second
Frame speed WOI	Depending up on the frame size and exposure time
Maximal Exposure time	2 seconds with negligible dark current effect @ 21°C 10 seconds with 20 % dark current effect @ 21°C longer, until sensor saturation (without dark current correction)

Minimal exposure time	135 µsec
Shutter	On-chip electronic shutter, rolling curtain type
Shutter synchronisation	Via software or I/O interface

Interface Specifications

Interface type	Digital LVDS (Texas Instruments) bi-directional (LVDM)
Remote control	Via digital LVDS interface
Interface connector	SCSI 50 pin connector
Cable lengths	1, 3, 5 or 10 meters from camera to PC interface

Mechanical Specifications

Dimensions	118 x 60 x 50 mm (not incl. lens)
Weight	360 grams (not incl. lens)
Housing	Aluminium black anodised
Filter adapter	C-mount with 22.5 mm filters (optional)
Lens adapter	C-mount standard black anodised
Microscope adapter	1.25 inch Push-Fit adapter, black anodised (optional)
Tripod mount	1/4 inch mount (1 off)
Machine mount	M6 x 1 (2 off)

Environmental Requirements

Operating temperature	0°C to +50°C
Storage temperature	-30°C to +80°C in non-condensing conditions

Power Requirements

Power supply voltage	from PC through SCSI cable when used with standard PCI interface from IEEE-1394 connector 8 – 12 Volts DC if used with other digital frame grabbers
Power consumption	1.6 Watt

Ordering Information

B&W LVDS 10 MHz	CCI4-30-M-10
RGB LVDS 10 MHz	CCI4-30-C-10
B&W IEEE-1394 10 MHz	CCI4-1394-30-M-10
RGB IEEE-1394 10 MHz	CCI4-1394-30-M-10

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