

BCi₄-6600 CMOS Camera



- **6.6 MPixel**
- **2208 x 3000 pixels (H x V)**
- **Compact design**
- **Area with Window Of Interest**
- **8 bit, 10 bit or 12 bit digital output**
- **Monochrome and Colour versions available**
- **Serial LVDS, USB 2.0, IEEE-1394 or Camera Link interface**

The BCi₄-6600 camera is a very compact, high-resolution CMOS camera. The camera is equipped with the Ibis4-6600 image sensor. With 3.5 μm square pixels, the user can define a Window Of Interest within a 2208 x 3000 pixel area that is a multiple of 24 pixels square. The sensor has a remarkably good signal-to-noise ratio in combination with excellent contrast performance. Also the dark current of the sensor is much lower than in classical CMOS image sensors allowing longer exposure times.

The image sensor has a Dual-Slope exposure mode that prevents over-exposure of brighter parts of an image while preserving excellent contrast in the darker areas of the image. Together with the non-destructive readout mode the dynamic range is extended from 60 dB up to 90 dB. The BCi₄-6600 camera can be switched between normal and Dual-Slope mode.

Several sub-sample modes are implemented for a lower resolution output of the selected Window Of Interest.

The camera operates in single shot mode, which makes it ideal for machine vision applications. In this mode, the user has the freedom to decide when the camera has to capture an image, not

the other way around, as is the case with most analogue camera systems. Continuous capture mode is also supported.

The in-camera memory of 16 Mbytes is used as image FIFO in USB2.0 and IEEE-1394 interfaces and can be used with custom camera logic for other purposes, such as reference image, camera calibration data...

C-Cam Technologies supply several standard interfaces: Serial LVDS, SDI, USB 2.0, IEEE-1394 or Camera Link. All interfaces have a local trigger input and output. The Camera Link and Serial LVDS interfaces also allow for remote triggering via the interface cable. The SDI interface makes distances up to 100 m practical. The IEEE-1394 camera is DCAM 1.30 compliant.

The BCi₄-6600 comes with Drivers and DLL files and sample code in Visual C for Windows (98, Me, 2000, XP and NT4.0) and Linux. Software engineers can easily adapt the code to integrate into their own applications. Include-files for Visual Basic are supplied.

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Sensor Specifications

Imager type CMOS integrating active pixel sensor (APS) IBIS4-6600 designed by FillFactory with on-chip non-uniformity correction

Sensor types Monochrome or colour in Bayer pattern

Total pixels 6,697,108 (2222H x 3014V)

Total light-sensitive pixels 6,624,000 (2208H x 3000V)

Window Of Interest (WOI) A rectangle image format specified by the user with an area that is a multiple of 24 by 24 pixels, with several sub-sample modes

Active image area 7.74mm (H) x 10.51mm (V)

Pixel pitch 3.5 x 3.5 µm

Fill factor 50 % (no microlenses)

Spectral response More than 20 %

Spectral sensitivity range 400 – 1000nm

Temporal noise 20 electrons, 500 µV RMS

Well capacity 21,500 electrons

Dark current signal 170 electrons/sec @ 21°C

Avg. auto-saturation time 127 seconds @ 21°C

Blooming suppression tbd

Smear None

Standard dynamic range 59.5 dB (940 : 1) linear, 61 dB (1100 : 1) full range

High dynamic range 90 dB in Dual-Slope mode

Grey level resolution 8 bits = 256 grey levels or 10 bits = 1024 grey levels or 12 bits = 4096 grey levels

Pixel crosstalk 15%

FPN < 0.35 % RMS of saturation level

PRNU < 1.5 % RMS of signal level

Image Specifications

Pixel rate 40 MHz

Frame speed full resolution Approx. 5 frames/second – continuous mode

Shutter On-chip electronic shutter, rolling curtain type

Shutter synchronisation remote via software or via cable, local via I/O interface

Maximum exposure time 1 frame, 170 msec

Minimum exposure time 1 line, 60 µsec

In-camera Resources

Memory 16Mbytes

FPGA Logic 100 k gates

Interface Specifications

Interface type Serial LVDS, SDI, USB 2.0, IEEE-1394, Camera Link

Interface connector

LVDS Binder 712 series 7-pole,

SDI Binder 712 series 8-pole,

USB 2.0 Binder 712 series 4-pole,

IEEE-1394 std. 6-pole

Camera Link MDR26p

Cable length

LVDS 3, 5, 7m

SDI up to 100m

USB 2.0 0.5, 1, 2, 3, 5m

IEEE-1394 max 4.5m

Camera Link 3, 5, 7, 10 m

Remote Trigger via LVDS or Camera Link interface

Local Trigger Isolated, 1 input, 1 output

Local Trigger Connector Binder 712 series 3-pole

Mechanical Specifications

Dimensions LVDS, Camera Link, USB: 50 x 50 x 53 mm, IEEE: 50 x 50 x 62 mm (not incl. lens)

Weight < 200 grams (not incl. lens)

Housing Aluminium black anodised

Lens adapter C-mount standard stainless steel, adjustable

Tripod mount 1/4 inch mount (1 off)

Machine mount M6 x 1 (2 x 2 off)

Environmental Requirements

Operating temperature 0°C to +50°C

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

Power Requirements

LVDS, SDI, IEEE-1394, and USB: Power supply through interface cable

Camera Link: 8 - 12 Volts via separate Binder 712 series 2-pole connector

Power consumption < 2 Watt

Ordering Information

| BCi4-6600 | | Mono-chrome | Color Bayer | 40MHz | Local triggering |
|-------------|------|-------------|-------------|-------|------------------|
| Interface | Code | M | B | 40 | ✓ |
| LVDS | LS | ✓ | ✓ | ✓ | Isolated |
| SDI | SDI | ✓ | ✓ | ✓ | Isolated |
| Camera Link | CL | ✓ | ✓ | ✓ | Isolated |
| IEEE-1394 | 1394 | ✓ | ✓ | ✓ | Isolated |
| USB 2.0 | U | ✓ | ✓ | ✓ | Isolated |

E.g. BCi4-6600-U-M-40 specifies a Monochrome BCi4-6600 with 40 MHz pixel rate and a USB 2.0 interface.

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