C-Cam Technologies

# BCCMV4000 CMOS CAMERA

- **2048 x 2048 pixels**
- **Global Pipelined Shutter**
- **17 full-frames / sec.**
- **Monochrome or Color**
- **8, 10 -bit digital output**
- **USB 2.0 or Camera Link Base interface**
- **Opto-isolated trigger input/output**
- **Area-scan, line-scan and sub-sampled operation**
- **Multi-slope exposure for extended dynamic range**


The BCcmv4000 camera is a very compact, high-resolution CMOS camera. The camera is equipped with the CMOSIS CMV4000 image sensor with 5.5 µm square pixels producing up to 17 full frames per second.

Higher frame-rates can be achieved by defining up to 8 row-based Windows-Of-Interest within the 2048 x 2048 pixel area, and/or specify sub-sampling.

The camera has an excellent signal-to-noise ratio in combination with superior contrast performance.

The sensor has a pipelined global shutter. The digital camera can operate 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. Frame-rates up to 35 fps can be achieved, or much higher using the programmable Window-of-Interest and sub-sampling modes.

The Correlated Double Sampling (CDS) technique is used to reduce Fixed Pattern Noise (FPN) and increase dynamic range.

The image sensor has a Multi-Slope Exposure mode that prevents over-exposure of brighter parts of an image while preserving contrast in the darker areas. In this way the dynamic range is extended from the normal 60dB up to 90dB. The camera can be switched between normal and Multi-Slope mode.

The in-camera memory is used as image FIFO and can also be used with custom camera logic for other purposes, such as reference image, camera calibration data, etc.

C-Cam Technologies currently supply two standard interfaces: USB 2.0 and Camera Link (Base). All cameras have an isolated trigger input and output. The Camera Link interface will also allow for remote triggering via the interface cable.

The BC family of cameras come with a complete Software Development Kit (SDK) including drivers, DLL files and sample code in high-level languages. Software engineers can easily adapt this code to integrate into their own applications. Application libraries are available for Windows and Linux.

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### *Sensor Specifications*

| | |
|---|---|
| **Imager type** | CMOS sensor CMV-4000 manufactured by CMOSIS with Global Pipelined shutter |
| **Sensor types** | Monochrome or Bayer colour |
| **Total light-sensitive pixels** | 4.2 megapix (2048H x 2048V) |
| **Window Of Interest (WOI)** | Full row rectangle or line image format specified by the user. |
| **Multiple WOI** | Up to 8 windows-of-interest |
| **Active image area** | 11.26mm (H) x 5.98mm (V) |
| **Pixel pitch** | 5.5 x 5.5 µm |
| **Optical Format** | 2/3 inch |
| **Fill factor** | 42% (without microlenses) |
| **QE * FF** | >50% (with microlenses) |
| **Sensitivity** | 4.64 V / lux.s (0.22 A / W) |
| **Spectral Response Range** | approx. 400-1000nm (t.b.d.) |
| **Temporal noise** | 13$e^-$ (RMS) |
| **Well capacity** | 13500 $e^-$ |
| **Dark current signal** | 125$e^-$/s @25°C |
| **Parasitic Light Sensitivity** | 1/50,000 |
| **Standard dynamic range** | 60dB linear |
| **High dynamic range** | 90dB in multi-slope mode |
| **Multi-slope Exposure** | Up to 3 slopes, fully programmable |
| **Grey level** | resolution 8 or 10 bits |
| **MTF** | t.b.d. |
| **Fixed Pattern Noise (FPN)** | <1 LSB (<0.1% of full-swing) |
| **PRNU** | <1% of signal |
| **Pixel rate** | 16 channel x 480 Mbps |
| **Frame speed full resolution** | 148 fps (10-bit mode)<br>70 fps (12-bit mode) |
| **Shutter** | On-chip electronic shutter<br>Global pipelined |
| **Shutter synchronisation** | Remote via software or cable<br>Local via I/O interface |
| **Minimum exposure time** | 2.7µs |

### *In-camera Resources*

| | |
|---|---|
| **Memory** | 32MB DDR2 |
| **FPGA Logic** | 15k Lut |

### *Interface Specifications*

| | |
|---|---|
| **Interface types** | |
| max. 11 fps | USB 2.0 |
| max. 17 fps | Base Camera Link |
| **Interface connector** | |
| USB 2.0 | Mini-USB with screwlocks |
| CameraLink | Mini Camera Link SDR26p |
| **Cable lengths** | |
| USB 2.0 | 5m [2] |
| Camera Link | max 10m [4] |
| **Remote Trigger** | via Camera Link interface |
| **Local Trigger** | Isolated, 1 input, 1 output |
| **Local Trigger Connector** | Binder 712 series 5-pole [1] |

### *Mechanical Specifications*

| | |
|---|---|
| **Dimensions** | 50 x 50 x 53 mm (not incl lens) |
| **Weight** | < 200 grams (not incl lens) |
| **Housing** | Aluminium, black anodised |
| **Lens adapter** | C-mount (standard) |
| **Tripod mount** | 1/4 inch mount (1 off) |
| **Machine mount** | M6 x 1 (4 x 2 off) |

### Environmental Requirements

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|---|---|
| **Operating temperature** | 0°C to +50°C |
| **Storage temperature** | -30°C to +80°C (non-condensing) |

### Power Requirements

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|---|---|
| **USB** | via interface cable |
| **Camera Link** | 8 - 12 Volts via separate [3] Binder 712 series 2-pole |
| **Power consumption** | <2 Watt |

[1] Trigger-cable 5m included in package
[2] USB-cable 5m included in package. Other lengths on request.
[3] Power-adapter with changeable input plugs for Europe , UK , USA and Australia.
[4] Camera-link-cable not included.

## Ordering Codes

| | |
|---|---|
| **BCcmv4000-CL-x** | **Base Camera-link** |
| **BCcmv4000-U-x** | **USB2.0** |

X = M for Monochrome and B for Bayer Color

The BCcmv4000 camera is also available with customized housing or without housing for OEM.
Bundle's including frame-grabber and camera-link cable available on request.
Please contact C-Cam for more info



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