TELEDYNE e2v
Everywhereyoulook™

# ELIIXA+ 8k/4k CL

## Cmos Multi-Line Monochrome Camera

# Datasheet

## Features


- Cmos Sensor up to 4x 8192 Pixels, 5 x 5µm
- Multi-Line structure and Multi-Definition(*):
  - 8192 pixels, 5x5µm in 1, 2 up to 4 lines summation
  - 4096 pixels, 10x10µm in 1 or 2 lines summation
  - 2048 pixels, 20x20µm
- Interface : CameraLink®
  - BA0/BH0 versions : Base or Medium
  - BA1/BH1 versions : Base, Medium, Full or Deca
- Line Rate : Up to 100000 l/s
- Data Rate : Up to 850 MB/s
- Bit Depth : 8, 10 and 12bits
- Flat Field Correction
- Look up Table
- Low Power Consumption : < 7,5W
- Mounts : F, T2, M42
- Full Exposure Control
- "BHx" Models with HDR Mode (High Dynamic Range)

*(*) depending on Models*

## Description

e2v's next generation of line scan cameras are setting new, high standards for line rate and image quality. Thanks to e2v's recently developed multi-line CMOS technology, the camera provides an unmatched 100,000 lines/s and combines high response with an extremely low noise level; this delivers high signal to noise ratio even when short integration times are required or when illumination is limited. The 5µm pixel size is arranged in four active lines, ensuring optimal spatial resolution in both scanning and sensor directions with standard F-mount lenses. Vertical and horizontal binning functions allow the camera to be operated in a 8,192 pixels, 5µm x 5µm pixel pitch, 4 active CMOS lines mode or 4,096 pixels, 10µm x 10 µm pixel pitch, 2 active CMOS lines mode depending on the user settings. This versatile feature sets new standard for next generation machine vision systems

## Application

- Raw material surface inspection
- General inspection
- PCB inspection
- Parcel and postal sorting
- High resolution document scanning

CAMERA Link™

## Standard Confomity

The ELIIXA+ cameras have been tested using the following equipment:

- A shielded power supply cable
- A Camera Link data transfer cable ref. **MVC-1-1-5-2M from CEI (Component Express, Inc.)**

e2v recommends using the same configuration to ensure the compliance with the following standards.

## CE Conformity

The ELIIXA+ cameras comply with the requirements of the EMC (European) directive 2004/108/EC (EN50081-2, EN 61000-6-2).

## FCC Conformity

The ELIIXA+ cameras further comply with Part 15 of the FCC rules, which states that: Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation

This equipment has been tested and found to comply with the limits for Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

**Warning**: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

## RoHs Conformity

ELIIXA+ cameras comply with the requirements of the RoHS directive 2011/65/EU.

# Key Specifications

| Functionality (Programmable via Control Interface) | | |
|---|---|---|
| Sensor modes :<br>Multi-definition,<br>Multi-sensitivity | 8k Pixels 5µm : Multi-Lines 1, 2 or 4<br>4k Pixels 10µm : Binning 1 or 2 Lines<br>2k Pixels 20µm : Binning 4x4, 1 line | |
| Analog Gain | Up to 12 (x4) | dB |
| Offset | -4096 to +4096 | LSB |
| Trigger Mode | Timed (Free run) and triggered (Ext Trig, Ext ITC) modes | |
| **Mechanical and Electrical Interface** | | |
| Size (w x h x l) | 125 x 60 x 35 | mm |
| Weight | 360 | g |
| Lens Mount | F-Mount, T2 and M42x1 | - |
| Sensor alignment ( see chapter 2.1 ) | ±100 | µm |
| Sensor flatness | 50 | µm |
| Power supply | Single 12 DC to 24 DC | V |
| Power dissipation - CameraLink | < 7,5 | W |
| **General Features** | | |
| Operating temperature | 0 to 55 (front face) or 70 (Internal) | °C |
| Storage temperature | -40 to 70 | °C |
| Regulatory | CE, FCC and RoHS compliant | |

Note : All values in LSB are given in 12 bits format

| Characteristics | Typical Value | | Unit |
|---|---|---|---|
| **Sensor Characteristics at Maximum Pixel Rate** | | | |
| Resolution | 2 or 4 x 8192 | 1 or 2 x 4096 | Pixels |
| pixel size (square) | 5 x 5 | 10 x 10 | µm |
| **Max Line Rate (Bx0/Bx1 versions, 8 or 12bits)** | | | |
| CameraLink Base 2 x 85MHz | 20 | 40 | kHz |
| CameraLink Medium 4 x 85MHz | 40 | 80 | kHz |
| **Max Line Rate (Bx1 version only, 8 bits)** | | | |
| CameraLink Full 8 x 85MHz | 80 | 100 | kHz |
| CameraLink Deca 10 x 85MHz | 100 | 100 | kHz |
| **Radiometric Performance at Maximum Pixel Rate and minimum camera gain** | | | |
| Bit depth | 8, 10 and 12 | | Bits |
| Response (broadband) | 450 | | LSB/(nJ/cm²) |
| Full Well Capacity | 27300<br>(in 2S or 4S mode and MultiGain at 1/2) | | electrons |
| Response non linearity | 0,3 | | % |
| PRNU HF Max | 3 | | % |
| Dynamic range (1S / 2S / 4S mode) | 67,6 / 70,7 / 68,7 | | dB |

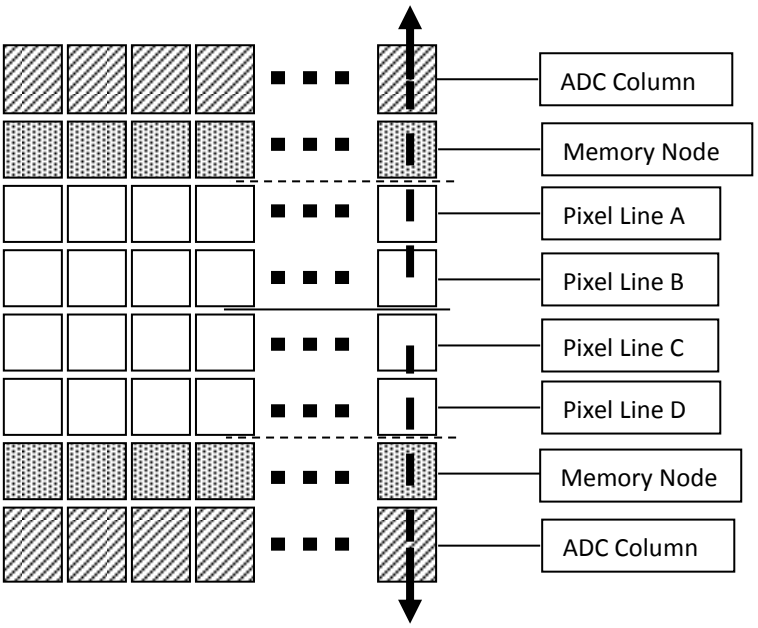
# Camera Description

## Image Sensor

The Eliixa+ 8k sensor is composed of two pairs of sensitive lines. Each pair of lines use the same Analog to Digital Column converter (ADC Column). An appropriate (embedded) Time delay in the exposure between each line allows combining two successive exposures in order to double the sensitivity of a single line.

This Time Delay Exposure is used only in the 4S multi-line modes (4 Lines) and also in the three binning modes, as described below.

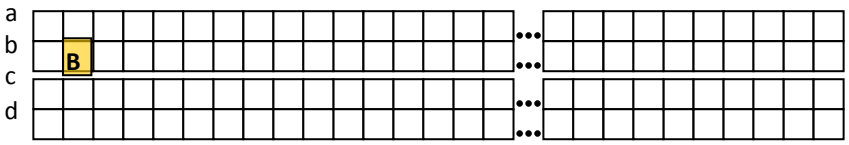
The 8192 Pixels of the whole sensor are divided in 2 blocks of 4096 pixels.



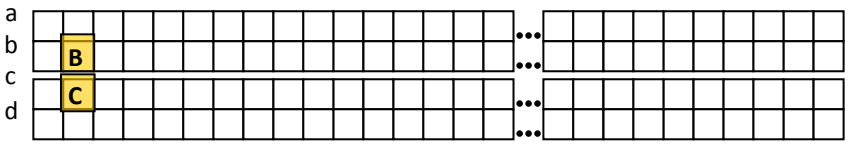

## Sensor modes

**8K Pixels Output**

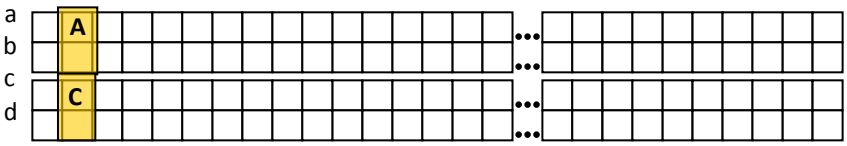
Mode 1S = B




Mode 2S = B+C (FPGA)

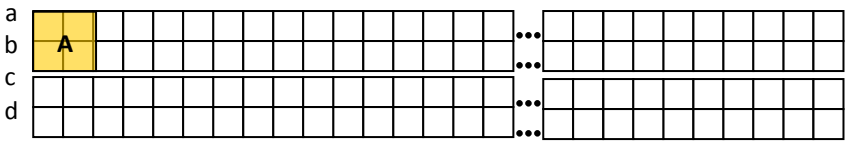



Mode 4S = (A.B)+(C.D)
Note : (A.B) = summation in the sensor (not available for EV71YC2MCL8005-BH0)

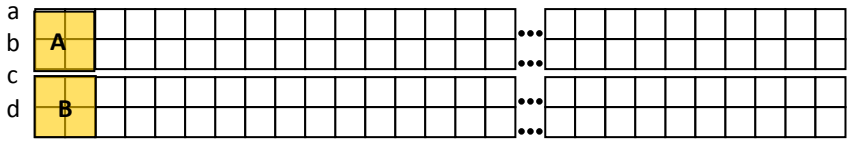



**4k Pixels Output**

Mode 1SB = A

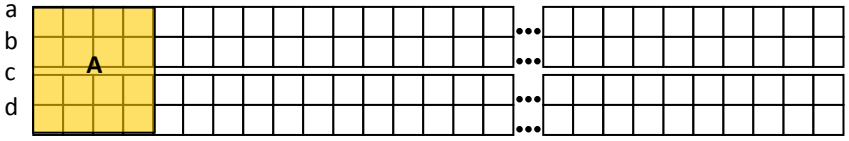



Mode 2SB = (A+B)



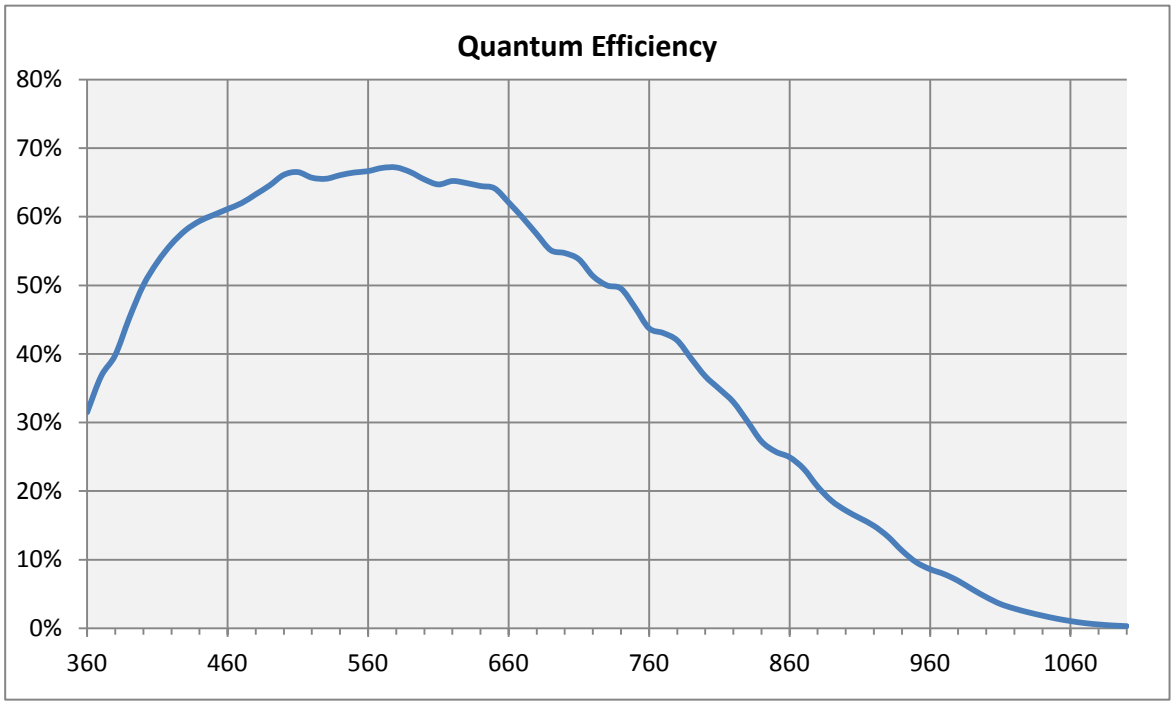

**2k Pixels Output**

Mode 4SB = A



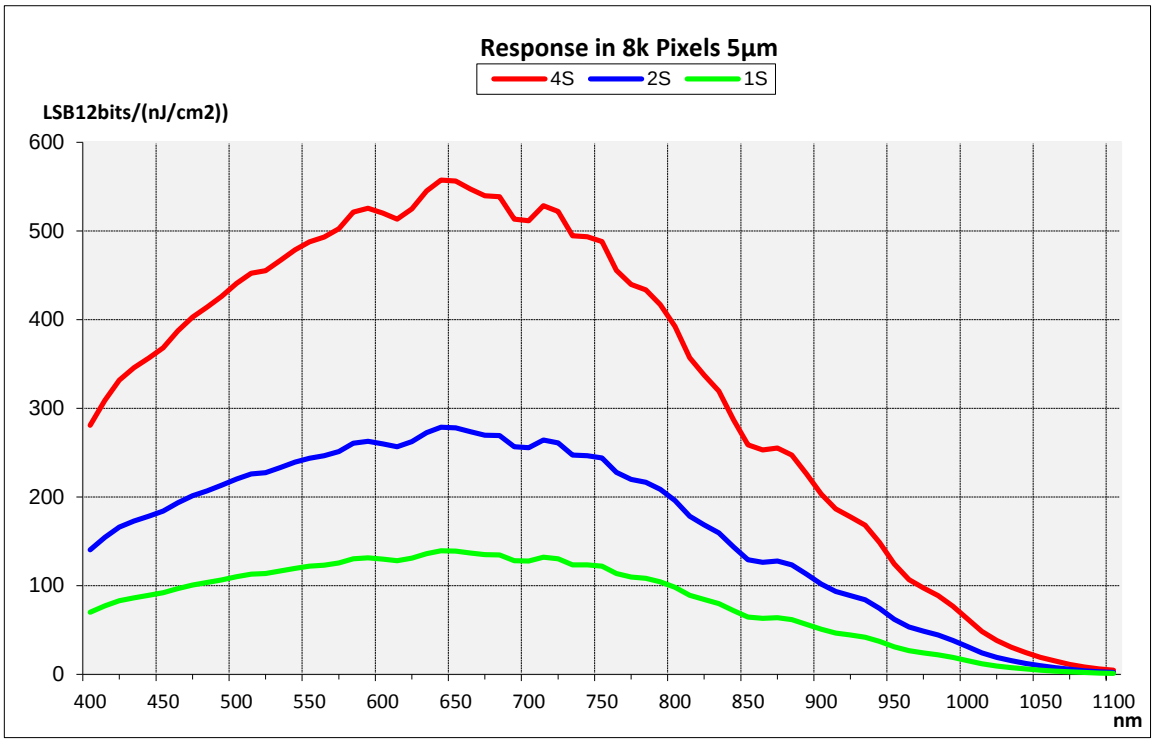
# Response & QE curves

## Quantum Efficiency

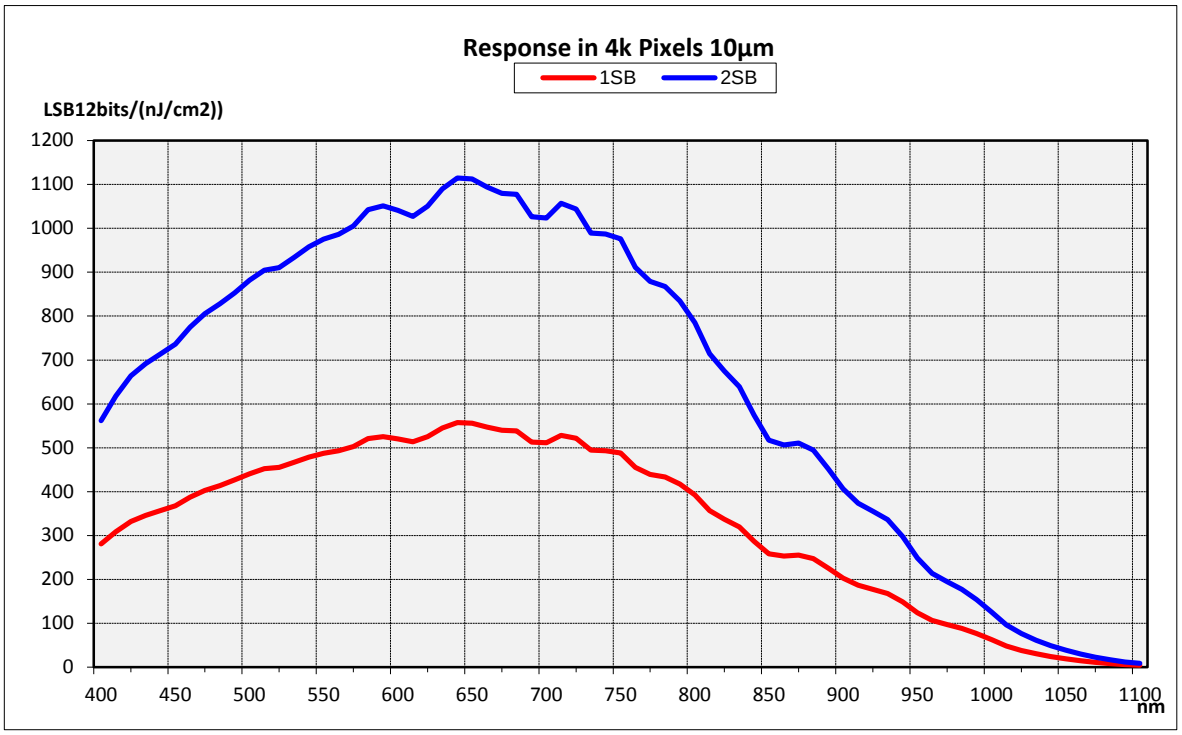



## Spectral Responses

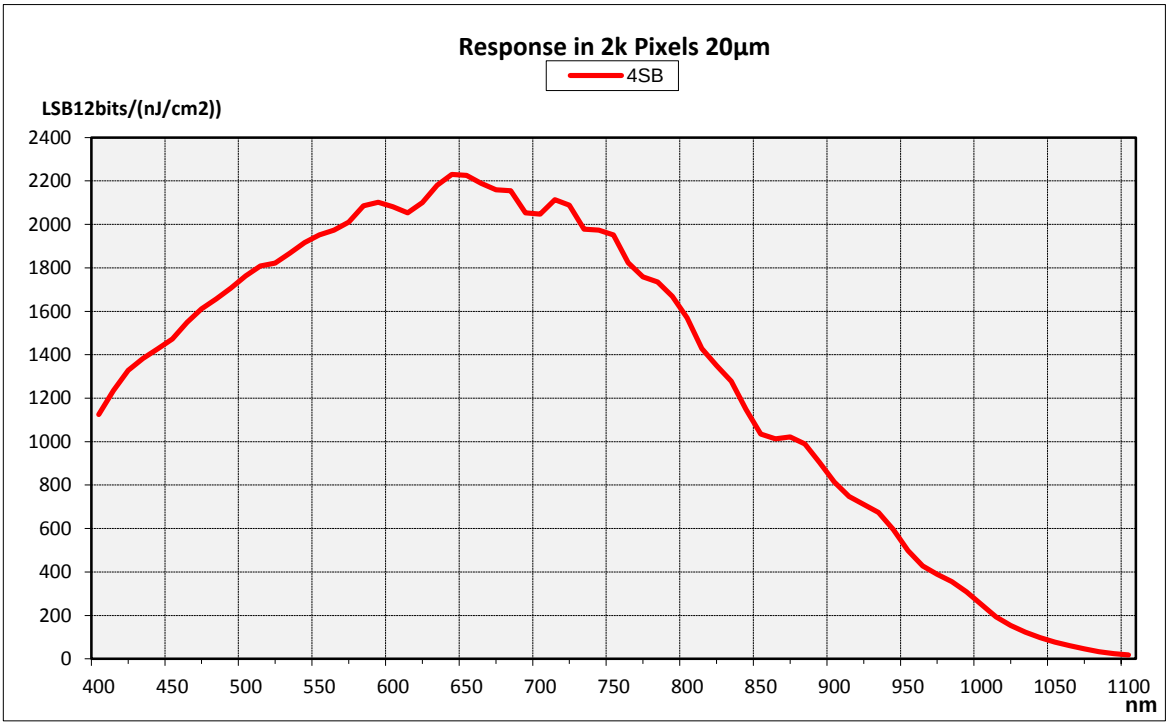
### Single Modes : 1S, 2S, 4S



## Binning Modes : 1SB, 2SB

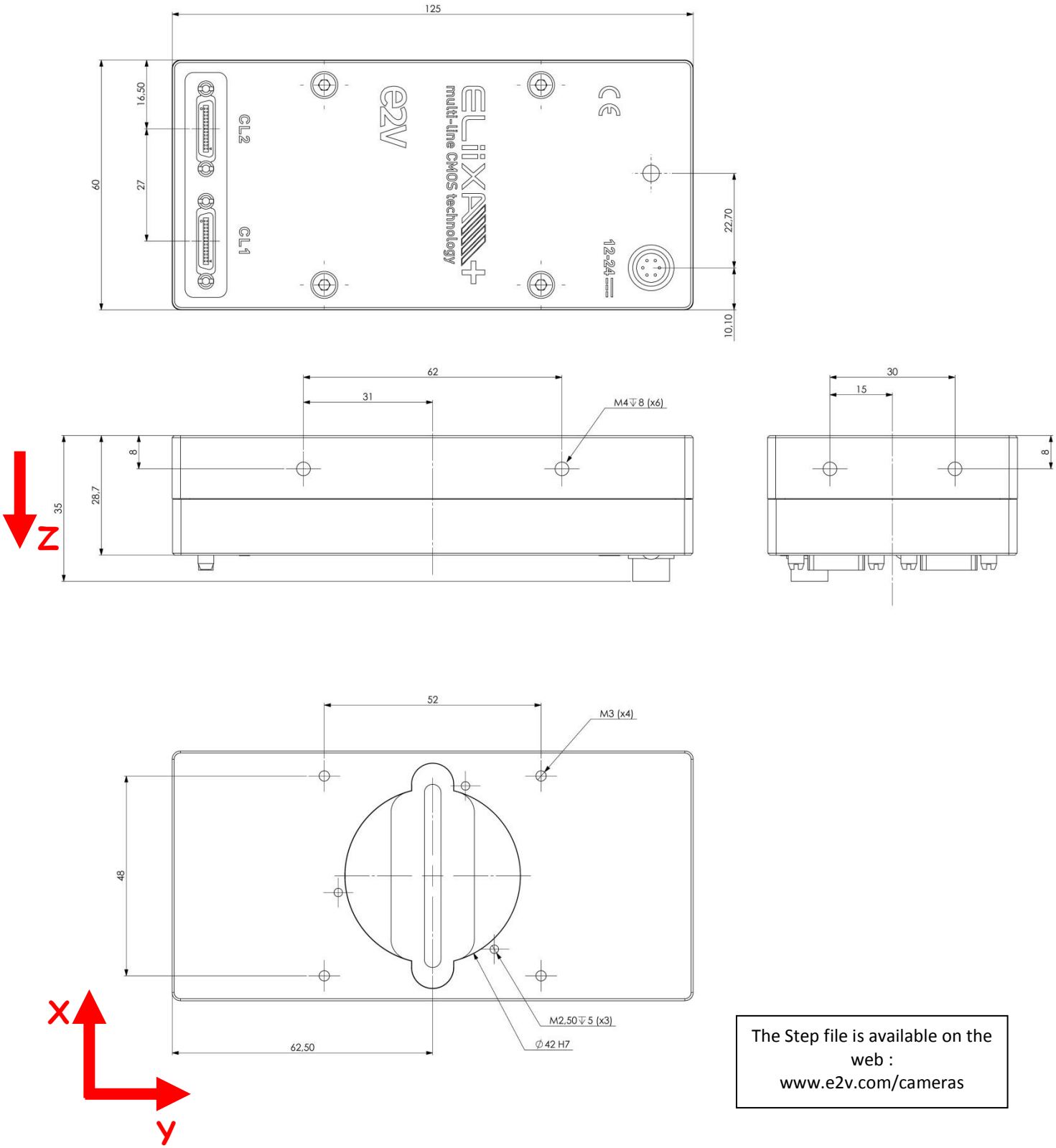



## Binning 4x4 Mode



# Camera Hardware Interface

## Mechanical Drawings




The Step file is available on the web :
www.e2v.com/cameras

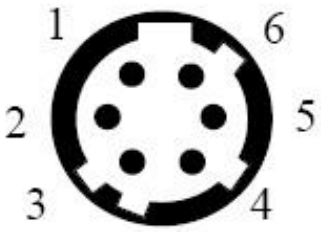
| Sensor alignment | |
|---|---|
| Z = -10.3 mm | ±100µm |
| X = 9.5 mm | ±100 µm |
| Y = 62.5mm | ±100 µm |
| Flatness | 50 µm |
| Rotation (X,Y plan) | ±0,15° |
| Tilt (versus lens mounting plane) | 50µm |

## Input/output Connectors and LED

## Power Connector

Camera connector type: Hirose HR10A-7R-6PB (male)

Cable connector type: Hirose HR10A-7P-6S (female)




| Signal | Pin | Signal | Pin |
|---|---|---|---|
| PWR | 1 | GND | 4 |
| PWR | 2 | GND | 5 |
| PWR | 3 | GND | 6 |

Power supply from 12 to 24v
Power 7,5W max with an typical inrush current peak of **1A** during power up

## Status LED Behaviour

After less than 2 seconds of power establishment, the LED first lights up in ORANGE. Then after a Maximum of 40 seconds, the LED must turn in a following colour :

| Colour and state | Meaning |
|---|---|
| Green and continuous | OK |
| Green and blinking slowly | Waiting for Ext Trig (Trig1 and/or Trig2) |
| Red and continuous | Camera out of order : Internal firmware error |

## CameraLink Output Configuration

| | Adjacent Channels | Pixels per Channel |
|---|---|---|
| **Versions Bx0/Bx1** | | |
| Base : 2 Channels 8/10/12bits | 2 x 85MHz (80/75/70/65/60MHz) | 2 x 4096 |
| Medium : 4 Channels 8/10/12bits | 4 x 85MHz (80/75/70/65/60MHz) | 4 x 2048 |
| **Version Bx1 (only)** | | |
| Full : 8 Channels 8bits | 8 x 85MHz (80/75/70/65/60MHz) | 8 x 1024 |
| Deca : 10 Channels 8bits | 10 x 85MHz (80/75/70/65/60MHz) | 10 x 819 |

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# Models

| Part Number | Sensor | Outputs | Max Line Rate | Details |
|---|---|---|---|---|
| EV71YC4MCL8005-BA0 | 4x Lines, 8k 5x5µm<br>2x Lines, 4k 10x10µm | 4x85MHz or 2x85MHz | 40 KHz<br>80 KHz | - |
| EV71YC4MCL8005-BA1 | 4x Lines, 8k 5x5µm<br>2x Lines, 4k 10x10µm | Up to 10x85MHz | 100 KHz | - |
| EV71YC4MCL8005-BH0 | 4x Lines, 8k 5x5µm<br>2x Lines, 4k 10x10µm | 4x85MHz or 2x85MHz | 40 KHz<br>80 KHz | New Sensor & HDR Function |
| EV71YC4MCL8005-BH1 | 4x Lines, 8k 5x5µm<br>2x Lines, 4k 10x10µm | Up to 10x85MHz | 100 KHz | New Sensor & HDR Function |
| EV71YC2MCL8005-BA0 | 2x Lines, 8k 5x5µm<br>2x Lines, 4k 10x10µm | 4x85MHz or 2x85MHz | 40 KHz<br>80 KHz | New Sensor. 2 Lines only |
| EV71YC2MCL8005-BA1 | 2x Lines, 8k 5x5µm<br>2x Lines, 4k 10x10µm | Up to 10x85MHz | 100 KHz | New Sensor. 2 Lines only |