

Scientific CMOS Board-Level Camera C11440-50B

**OEM
Solution**



The core of the C11440-50B camera is the new scientific image sensor FL-280, an advanced CMOS detector that simultaneously achieves high resolution, fast readout speeds and low noise. With its small size, board-level design and simple, low-cost integration using IEEE1394b with bus power, the C11440-50B is the ideal camera for OEM scientific imaging.

Applications

- High speed Ca²⁺ imaging
- Ratio imaging
- FRET
- TIRF microscopy
- Live cells expressing GFP
- Time lapse fluorescence imaging
- Micromorphological observation
- Real-time confocal microscopy
- Fluorescence in situ hybridization (FISH)
- Failure analysis
- Semiconductor inspection
- X-ray scintillator readout

Low noise **3 electrons (rms)**

High resolution **2.8 megapixel**

High speed readout **45 frames/second**

High dynamic range **4500: 1**

Features

● High image quality (no fixed pattern noise)

Comparison of noise performance (no image correction)

● Conventional CMOS camera



▲ Exposure time: 15 ms

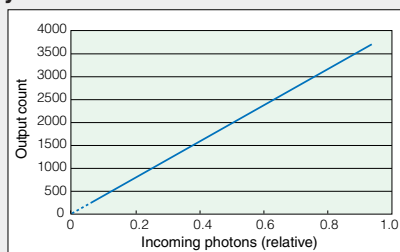
● C11440-50B



▲ Exposure time: 50 ms

● Linearity

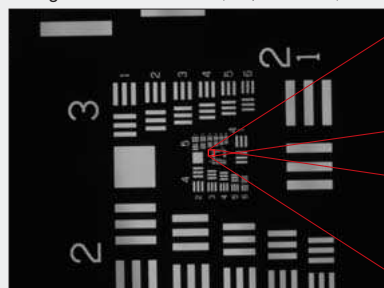
Linearity characteristics



● About twice the resolution of CCD (2/3 inch, 1.3 megapixel)

Comparison of resolution

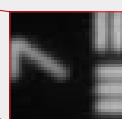
● Bright field observation (Sample: Test Plate)



▲ Entire image



▲ CCD (2/3 inch, 1.3 megapixel)

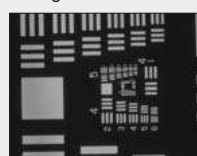


▲ C11440-50B

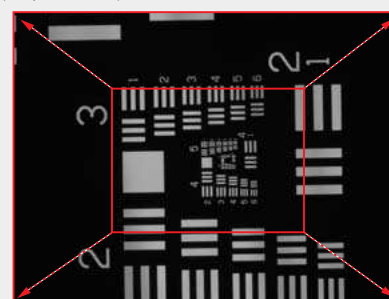
● Wider field of view than CCD (2/3 inch, 1.3 megapixel)

Comparison of field of view

● Bright field observation (Sample: Test Plate)



▲ CCD (2/3 inch, 1.3 megapixel) (without relay lens)



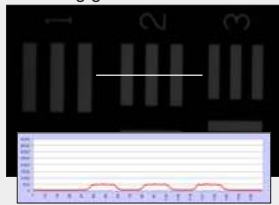
▲ C11440-50B (0.5x relay lens used)

Functions

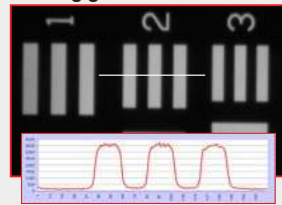
Analog gain

Comparison

● Analog gain 1x



● Analog gain 8x



▲ These graphs show the intensity profile of the white line in each image.

External trigger functions and timing output functions

- Global exposure trigger
- Synchronous readout trigger
- Start trigger
- Trigger delay function
- Programmable timing output
- Global exposure timing output
- Trigger ready output

Specifications

Type number	C11440-50B
Camera type	Board type
Imaging device	Scientific CMOS Image Sensor FL-280
Effective number of pixels	1920 (H) × 1440 (V)
Cell size	3.63 μm (H) × 3.63 μm (V)
Effective area	6.97 mm (H) × 5.23 mm (V)
Readout speed	45.4 frames/s to 1273 frames/s
Binning*	2 × 2
Readout noise (rms) typ.	3 electrons (gain 8x)
Full well capacity typ.	18000 electrons
Analog gain	1× to 8× (256 steps)
Dynamic range typ.**	4500: 1 (gain 1×)
A/D converter	12 bit or 8 bit
Exposure time	20 μs to 1 s (at internal trigger/external trigger)
External trigger mode	Edge trigger, Level trigger Global exposure trigger Synchronous readout trigger Start trigger
Trigger delay function	0 μs to 1 s (10 μs step)
Trigger output	Programmable timing output Global exposure timing output Trigger ready output
Lens mount	C-mount
Interface	IEEE1394b × 2 bus
Connector	9-pin IEEE1394b connector (Industrial type) × 2
Power requirements	IEEE1394b bus power / DC 8 V to 30 V
Power consumption	Lower than 3 W
Ambient storage temperature	-10 °C to +50 °C
Ambient operating temperature	0 °C to +40 °C
Ambient storage /operating humidity	70 % max. (no condensation)

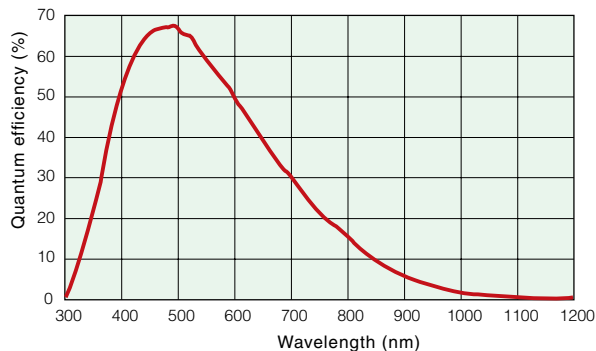
*Digital binning processing in the camera

**Calculated from the ratio of the full well capacity and the readout noise.

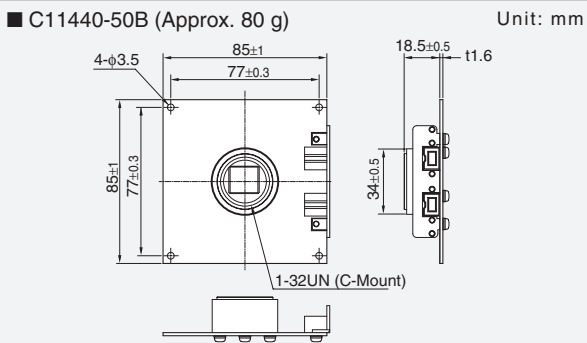
● Readout mode / speed (Unit: frame/s)

Sub-array	1 bus		2 bus	
	8 bit	12 bit	8 bit	12 bit
1920 (H) × 1440 (V)	22.7	15	45.4	30
1920 (H) × 1080 (V)	30	19.8	60	39.6
1920 (H) × 600 (V)	52.3	34.5	104	69
1920 (H) × 240 (V)	118	78.1	236	156
1920 (H) × 80 (V)	270	178	540	356
1920 (H) × 8 (V)	1273	840	1273	840

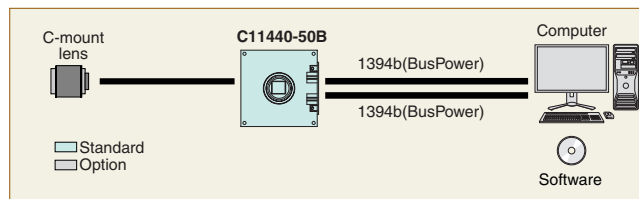
● Spectral response



Dimensional outlines



System configuration



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