



# **CV-M4<sup>+</sup>/M4<sup>+</sup>CL**

## **Digital Double Speed Monochrome Megapixel Progressive Scan Camera**



- **Digital 2/3" monochrome progressive scan CCD camera**
- **1392 (h) x 1040 (v) 6.45  $\mu$ m square pixels**
- **Extended IR sensitivity**
- **8 bit video output as LVDS (EIA 644) using 10 bit internal processing**
- **Camera Link version with 10 bit video output**
- **Full 1380 (h) x 1030 (v) frame readout in 1/24 second**
- **Higher frame rates with partial scanning or binning**
- **Partial scan to 1/8 and vertical and horizontal binning**
- **Edge pre-select and pulse width external trigger modes**
- **Binning, frame-delay and smearless readout modes**
- **Multiple exposure with up to 6 exposures within a single frame**
- **Shutter speeds from 1/24 to 1/10,000 second in 10 steps**
- **Trigger and timing signals as LVDS or via Camera Link**
- **Setup by switches or serial control (short ASCII commands)**
- **Windows 98/NT/2000 setup software**

**The leading manufacturer of high performance camera solutions**

# Specifications for CV-M4<sup>+</sup>/CV-M4<sup>+</sup>CL

Specifications	CV-M4 <sup>+</sup> /CV-M4 <sup>+</sup> CL
Scanning system	Progressive 1060 lines 24 frames/sec.
Pixel clock with H binning	40.49 MHz 20.25 MHz
Line frequency with H binning	25.43 kHz (1592 pixel clock/line) 23.11 kHz (1752 pixel clock/line)
Frame rate for full frame with V binning	24 frames/sec. (1060 lines/frame) 44 frames/sec. (565 lines/frame)
CCD sensor	2/3" progressive scan monochrome IT CCD
Sensing area	8.9 (h) x 6.6 (v) mm
Cell size	6.45 (h) x 6.45 (v) μm
Effective pixels	1392 (h) x 1040 (v)
<b>Pixels in video output</b>	
Full	1380 (h) x 1030 (v) 24 frames/sec.
V binning	1380 (h) x 515 (v) 44 frames/sec.
H binning	690 (h) x 1030 (v) 24 frames/sec.
H+V binning	690 (h) x 515 (v) 44 frames/sec.
1/2 partial	1380 (h) x 512 (v) 44 frames/sec.
1/4 partial	1380 (h) x 256 (v) 70 frames/sec.
1/8 partial	1380 (h) x 128 (v) 102 frames/sec.
Spectral sensitivity	380 – 1000 nm
Sensitivity on sensor	0.1 Lux (Max. gain, 50% video)
S/N ratio	>57 dB
Video A/D conversion	10 bit
Video output digital	8 bit LVDS (EIA 644) 10 bit in Camera Link
Video out (analogue for test)	0.7 Vpp, 75 Ω
Gamma	1.0
Gain	Manual - Automatic
Gain range	-3 to +12 dB
Synchronization	Int. X-tal. Ext. random trigger
Sync. output	Composite 4 Vpp from 75 Ω
Trigger input TTL	4 V ± 2 V
EEN output	4 Vpp from 75 Ω
Pixel clock output	LVDS or Camera Link
LEN/FEN output	LVDS or Camera Link
Trigger input LVDS	LVDS or Camera Link
Multiple exposure	LVDS or Camera Link
Trigger modes	Continuous, Edge pre-select, Pulse width control
Trigger in (Edge pre-select)	> 2H
Shutter speed (fixed)	1/24 through 1/10,000 second
Pulse width control	2 H to 3 frames. (80 μsec. to 72 msec.)
Frame-delay readout	Fixed shutter speeds. Delay ≤ 3 frames
Smearless readout	Edge pre-select, PWC and frame-delay
Multiple exposure Interval	≤ 6 fixed exposures in frame-delay readout. Fixed shutter time + 1H (80 μsec.)
Camera setup by switches on rear	Shutter, Trigger, Scanning, Smearless, RS 232C control
Functions controlled by RS 232C	Shutter, Trigger, Scanning, Readout, Trigger input, Select/polarity, LEN/FEN/EEN polarity, Video level, Set-up level and Gain
Operating temperature	-5°C to +45°C
Humidity	20 - 80% non-condensing
Storage temp./humidity	-25°C to 60°C/ 20% - 90%
Power	12V DC ± 10%. 3.3 W
Lens mount	C-mount
Dimensions	40 x 50 x 90 mm (HxWxD)
Weight	250g

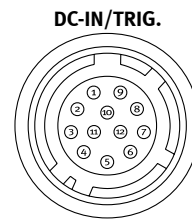
### Multiple Exposure

### Internal Switch

Internal SW	OFF	ON
TRIGGER sel	1	2
TRIGGER pol	3	4
LEN/FEN/een pol	5	6
MULTIPLE EXP.	7	8
BINNING	9	10

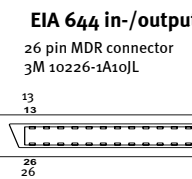
LVDS < > Hi/lopt  
 ↑ < > ↓  
 OFF < > On  
 < > < > B = 1/8  
 OFF < >

## Connection Description



- HIROSE HR10A-10R12P
- Pin 1 Ground
  - 2 +12V DC
  - 3 Ground
  - 4 Video output (test)
  - 5 Ground
  - 6 RXD RS 232C
  - 7 TXD RS 232C
  - 8 Ground
  - 9 Sync. output/EEN output\*
  - 10 Trigger input (TTL)\*
  - 11 +12V DC/Multiple exposure\*
  - 12 Ground

\* Signals can be changed by internal switches and jumpers or via RS 232C.

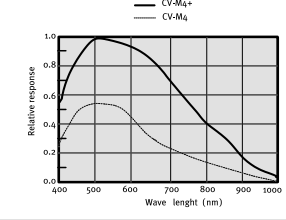


- ### Digital I/O
- | Pin   | Signal                     |
|-------|----------------------------|
| 1 14  | +/- D0 Video output (LSB)  |
| 2 15  | +/- D1 Video output        |
| 3 16  | +/- D2 Video output        |
| 4 17  | +/- D3 Video output        |
| 5 18  | +/- D4 Video output        |
| 6 19  | +/- D5 Video output        |
| 7 20  | +/- D6 Video output        |
| 8 21  | +/- D7 Video output (MSB)  |
| 9 22  | +/- TRIG Trigger input     |
| 10 23 | +/- Mult Multiple exposure |
| 11 24 | +/- LEN Line enable        |
| 12 25 | +/- FEN Frame enable       |
| 13 26 | +/- PCLK Pixel clock       |

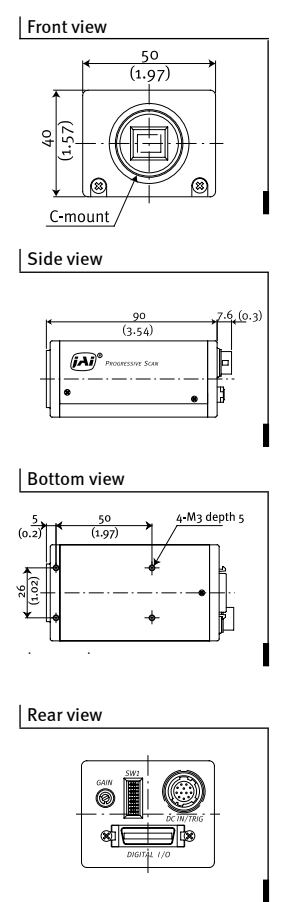
EIA 644 in and output circuits  
NS. D590C031/D590C032

For Camera Link pin configuration, see user manual.

## Spectral Sensitivity



## Dimensions



## Switch Setting

Function	OFF	ON
SHUTTER	1	1/24
	2	1/50
	3	1/100
	4	1/200
EXT. TRIGGER	5	Off
	6	Edge pre sel.
SCANNING	7	Full
	8	1/2 part.
SMEAR-LESS	9	1/4 part.
	10	1/8 part.
CONTROL	Local	Smear-less
		RS232C

seconds

Frame delay

## Ordering Information

CV-M4<sup>+</sup> 2/3" Digital Double Speed Megapixel Progressive Scan Camera. LVDS  
 CV-M4<sup>+</sup>CL 2/3" Digital Double Speed Megapixel Progressive Scan Camera. Camera Link

**JAI A-S, Denmark**  
 Phone +45 4457 8888  
 Fax +45 4491 8880  
 www.jai.com

**JAI Corporation, Japan**  
 Phone +81 45 933 5400  
 Fax +81 45 931 6142  
 www.jai-corp.co.jp

**JAI UK Ltd., England**  
 Phone +44 208 573 7737  
 Fax +44 208 573 7734  
 www.jai.com

**JAI America Inc., USA**  
 Phone (Toll-Free) +1 877 472-5909  
 www.jai.com



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