

Datasheet *Preliminary*

Main Features

- Sensor: 3 or 4 x 4096 pixels 10 x 10 μm
- Multi-line with 3 Versions (each of them in Full or Low speed):
 - RGB
 - RGB + Monochrome
 - RGB + Near Infra Red
- Rows Spacing of Two Pixels (Centre-to-centre)
- Boosted Blue Response
- Line Rate Up to 18 KHz
- Camera Link® Interface (Dual Base, Medium)
- Mechanics: 70 x 76 x 54 mm³
- Automated White Balance and Flat Field Correction
- Bidirectional Scanning
- Tunable Spatial Correction
- Internal 4x4 Color Matrix Correction



Product Description

The ELiXA Color camera is the ideal candidate for the most demanding applications requiring multi wavelength detection (including NIR). Using e2v's unique technology, the CCD sensor features unmatched performance: line rate up to 18 KHz, row spacing of two pixels center-to-center, enhanced blue response, three lines (RGB) and four lines (RGB and fourth line either monochrome or NIR). The camera package is designed to increase efficiency and save cost at vision system level:

- Easy calibration (automatic tap balance and flat field correction, white balance, color correction)
- versatile implementation (trigger modes, output modes, bidirectional scanning, spatial correction)

and with an all-in-one approach, a single ELiXA camera can replace a two camera system of a conventional color camera and a monochrome or NIR camera. The Fourth monochrome line will give you more accuracy to define colors in CIE color system and the NIR version will help you to see even what the eyes can't see.

Typical Applications

- Web Inspection: Printing, Currency
- High-end Inspection: Food, Pharmaceutical, Medical, Packaging
- Surface Inspection: Ceramic tiles, Wood, Printed Circuit Board
- Scanning: High-end Document Process, Film scanning, Postal sorting
- Metrology: Color matching

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for the latest version of the datasheet

1. Standard Conformity

The ELiIXA cameras have been tested using the following equipment:

- A shielded power supply cable
- A camera Link data transfer cable ref. 14B26-SZLB-500-OLC (3M)

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

1.1 CE Conformity

The ELiIXA cameras comply with the requirements of the EMC (European) directive 89/336/CEE (EN 50081-2, EN 61000-6-2).

1.2 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.

1.3 RoHS Conformity

ELiIXA cameras comply with the requirements of the RoHS directive.

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.

2. Key Specifications

Table 2-1. Typical Performances

Sensor Characteristics	Value	Unit
Sensor Characteristics at Maximum Pixel Rate		
Resolution	3 or 4 x 4096	Pixels
pixel size (square)	10 x 10	µm
Spacing between rows	20 (center-to-center)	µm
Line length	40.96	mm
Max line rate	18 (full speed version) or 13 (low speed version)	kHz
Radiometric Performance at Maximum Pixel Rate		
Bit depth	8, 10 or 12	Bits
Responsivity	136	LSB/(nJ/cm ²)
Response nonlinearity	±1	%
PRNU (not corrected)	< 10	%
Dynamic range	62	dB
Functionality (Programmable via Control Interface)		
Gain	Up to 25.4 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)	70 x 76 x 54	mm
Weight	470 (without mount)	g
Lens Mount	F, T2, M42 x 1 compliant with AViVA® SM2 series	
Sensor alignment	±100	µm
Sensor flatness	±35	µm
Power supply	Single 12 to 24	V
Power dissipation	<15	W
Current consumption	Max 2A at the startup	A
General Features		
Operating temperature	0 to 65 (front face)	°C
Storage temperature	−40 to 70	°C
Regulatory	CE, FCC and RoHS compliant	

3. Camera Performances

3.1 Camera Characterization

Table 3-1. Camera Characterization

	Min Gain			Min Gain +10 dB			Min Gain +20 dB			Unit
	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
Dark noise RMS		2.5	3.5		5			25		LSB
Dynamic Range	1170	1640		585	820		135	165		
FPN rms		1	2		2			7		LSB
FPN peak-to-peak		5			11			50		LSB
PRNU rms		0.2			0.3			0.8		%
PRNU peak-to-peak		3			4.5			7		%

Note: These figures in LSB are for a 12-bit format.

3.2 Image Sensor

Figure 3-1. Image Sensor

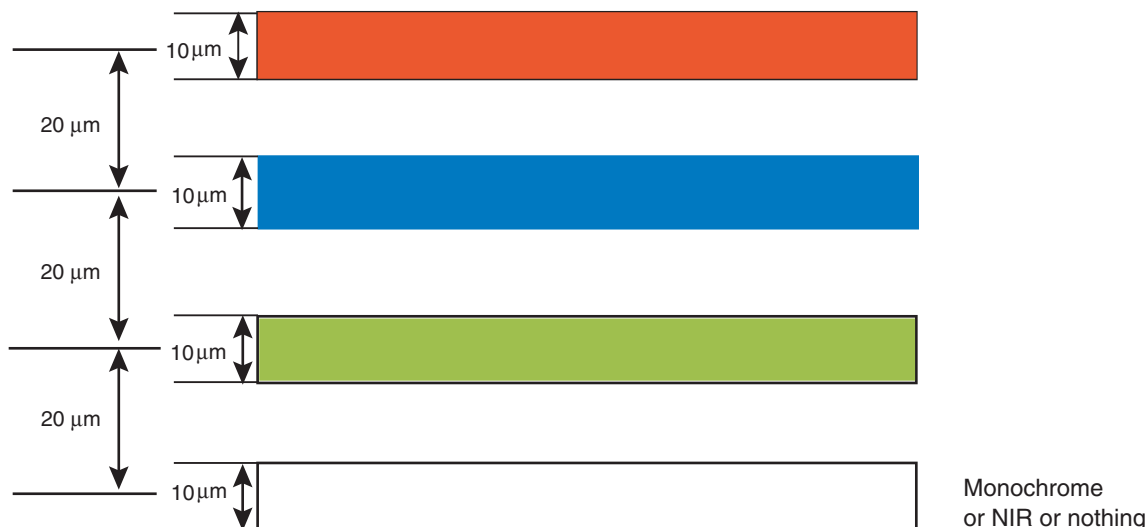


Figure 3-2. Raw Response

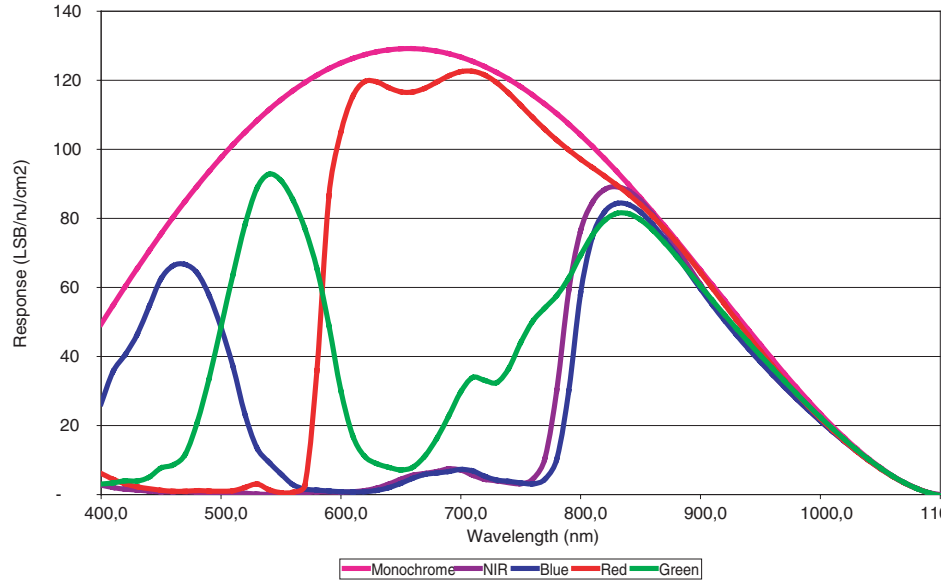


Figure 3-3. Response With BG38 filter (for RGB and RGB+B&W versions)

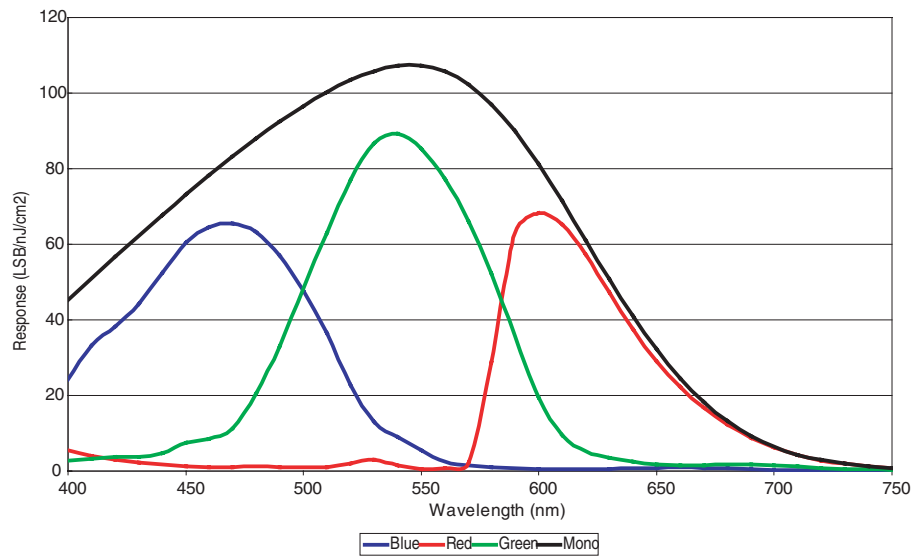
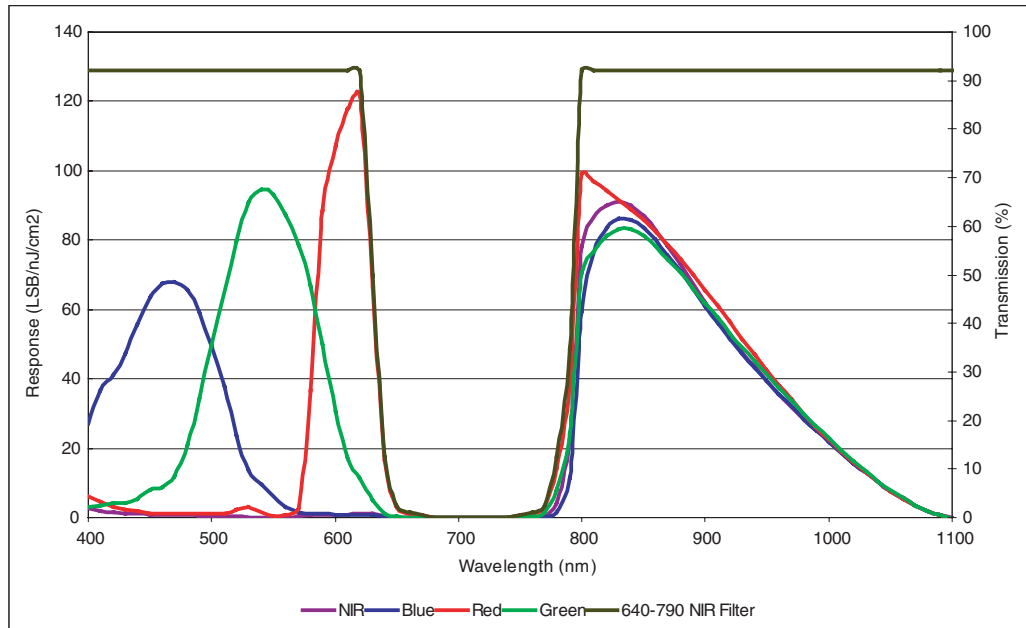


Figure 3-4. Response N-BK7 Band-cut Filter for RGB + Nir version



The sensor has been designed to give in the Near Infra Red (800-1000 nm) and equal answer of each Red, Green and Blue colors than the Nir line itself.

In order to remove simply the Near Infra Red component from each Red, Green and Blue colors, we can define the following color correction matrix:

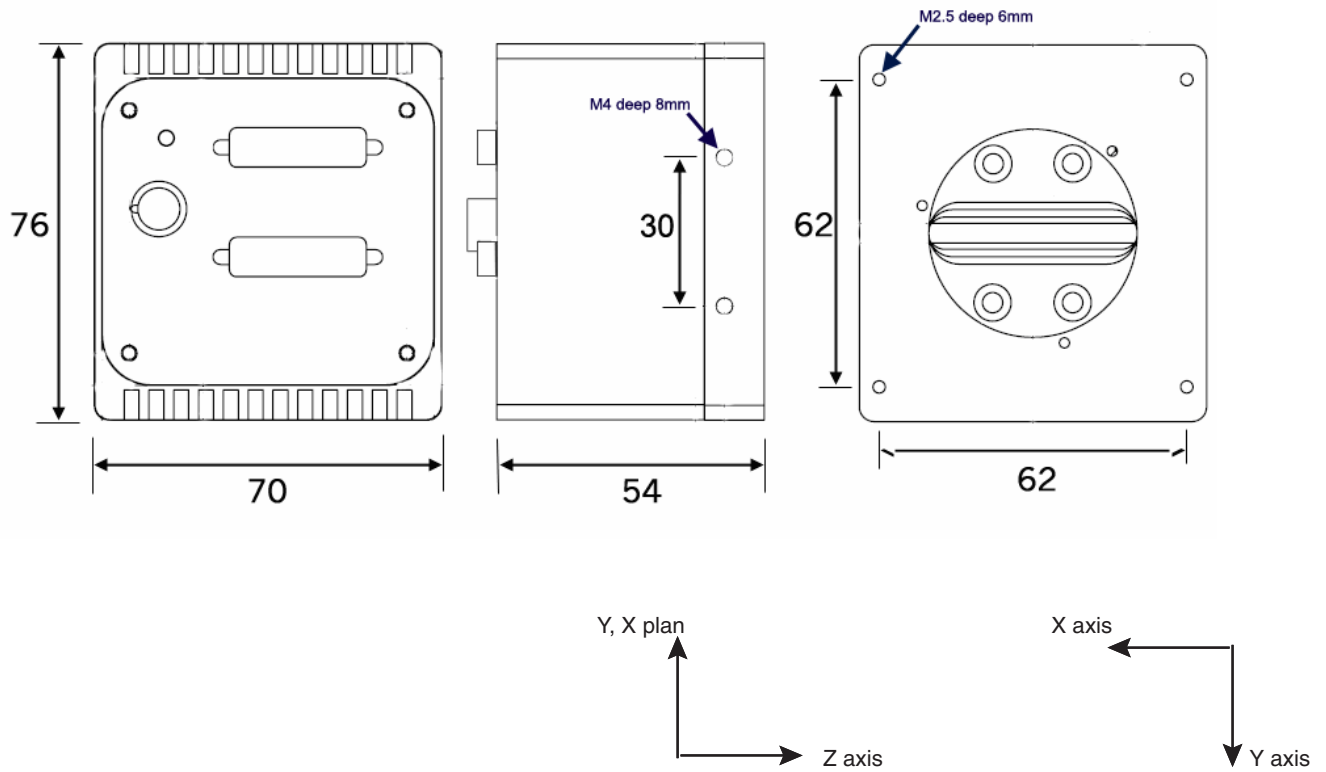
$$(R' \ B' \ G' \ Nir') = \begin{bmatrix} 1 & 0 & 0 & -1 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 1 & -1 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} R \\ B \\ G \\ Nir \end{bmatrix}$$

Depending on your light source, some other combination of filter can be provided. For more information, please, contact the Hotline Camera: hotline-cam@e2v.com

4. Camera Hardware Interface

4.1 Mechanical Drawings

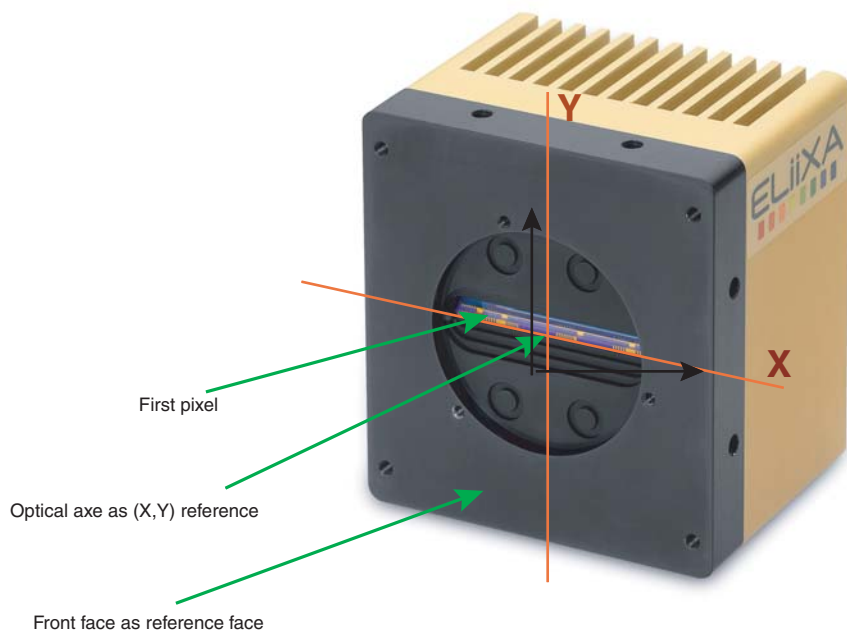
Figure 4-1. Mechanical Drawings



4.1.1 Sensor Alignment

- Z = 10.9 mm ±150 μm
- X = 14.52 mm ±100 μm
- Y = 38 mm ±100 μm
- Planarity ±35 μm
- Rotation (X,Y plan) ±0.2°
- Tilt (versus lens mounting plane) ±35 μm

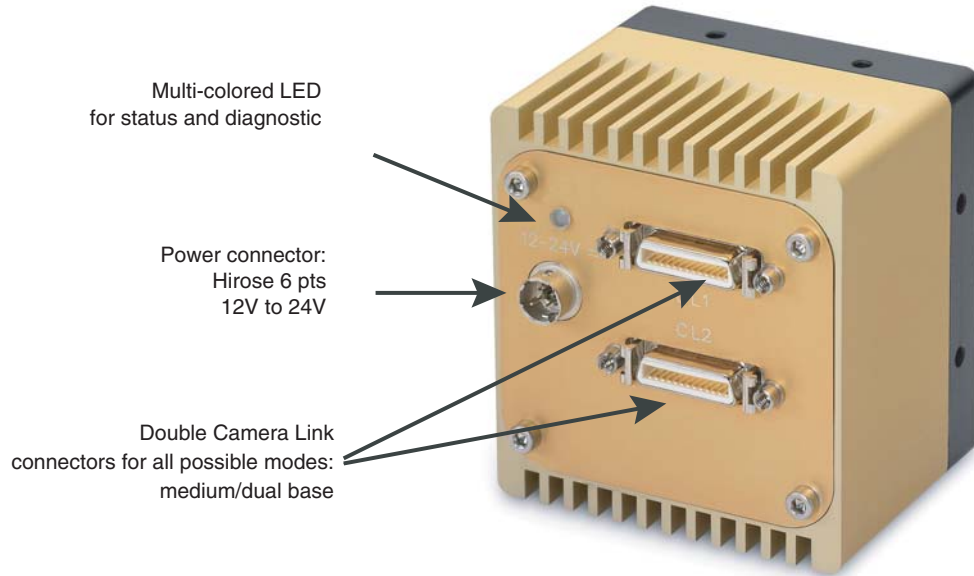
Figure 4-2. Raw Response



Note: All dimensions are in millimeters

4.2 Input/Output Connectors and LED

Figure 4-3. Rear View



4.2.1 Status LED Behavior

After less than two seconds of power establishment, the LED first lights up in RED. Then after a maximum of eight seconds, the LED must turn into one of the following color described in [Table 4-1](#).

Table 4-1. LED Status


Color and State	Meaning
<i>Green</i> and continuous	Ok
<i>Green</i> and blinking slowly	Waiting for Ext Trig (Trig1 and/or Trig2)
<i>Red</i> and continuous	Camera out of order: Internal firmware error

4.2.2 Power Connector

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

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

Table 4-2. Power Connector

 <p>Camera side description</p>	Signal	Pin	Signal	Pin
	PWR	1	GND	4
	PWR	2	GND	5
	PWR	3	GND	6
Power supply from 12V to 24V Power 15W max with an inrush current of 2A during power up				

4.2.3 Camera Link Output Configuration

Table 4-3. Camera Link Output Configuration

Modes	Connector CL1	Connector CL2	Notes
Dual Base 3 + 1			
RGB 8 bits + Nir/Mono 8 bits	RGB: 3x80 or 3x60MHz	Nir or Mono 1x80 or 1x60 MHz	(1)
RGB 8 bits + Nir/Mono 10 bits	RGB: 3x80 or 3x60MHz	Nir or Mono 1x80 or 1x60 MHz	(1)
RGB 8 bits + Nir/Mono 12 bits	RGB: 3x80 or 3x60MHz	Nir or Mono 1x80 or 1x60 MHz	(1)
Dual Base 3 + 3			
RGB 8 bits + RGNir/RGMono 8 bits	RGB: 3x80 or 3x60MHz	RGNir/RGMono 3x80 or 3x60 MHz	(1)
RGB 8 bits + RBNir/RBMono 8 bits	RGB: 3x80 or 3x60MHz	RBNir/RBMono 3x80 or 3x60 MHz	(1)
RGB 8 bits + GBNir/GBMono 8 bits	RGB: 3x80 or 3x60MHz	GBNir/GBMono 3x80 or 3x60 MHz	(1)
Medium			
RBGNir/RBGMono 8 bits	RGB: 3x80 or 3x60MHz	Nir or Mono 1x80 or 1x60 MHz	(2)
RBGNir/RBGMono 10 bits	CameraLink Standard Medium mode in 4x80 or 4x60 MHz		(2)
RBGNir/RBGMono 12 bits	CameraLink Standard Medium mode in 4x80 or 4x60 MHz		(2)

- Notes: 1. On RGB Models only one mode: RGB 8bits 3x80 or 3x60MHz. The Connector CL2 is not used.
 2. On RGB models, the medium 8 bits is equivalent to a base 8 bits because there is no fourth channel

Table 4-4. Connector CL1 Assignment

Port/Bit	Dual Base 3x8 + 1x8bits	Dual Base 3x8 + 1x 10 bits	Dual Base 3x8 + 1x12 bits	Dual Base 3x8 + 3 x 8 bits	Medium 10 bits	Medium 12 bits
Port A0	R0	R0	R0	R0	R0	R0
Port A1	R1	R1	R1	R1	R1	R1
Port A2	R2	R2	R2	R2	R2	R2
Port A3	R3	R3	R3	R3	R3	R3
Port A4	R4	R4	R4	R4	R4	R4
Port A5	R5	R5	R5	R5	R5	R5
Port A6	R6	R6	R6	R6	R6	R6
Port A7	R7	R7	R7	R7	R7	R7
Port B0	G0	G0	G0	G0	R8	R8
Port B1	G1	G1	G1	G1	R9	R9
Port B2	G2	G2	G2	G2	nc	R10
Port B3	G3	G3	G3	G3	nc	R11
Port B4	G4	G4	G4	G4	B8	B8
Port B5	G5	G5	G5	G5	B9	B9
Port B6	G6	G6	G6	G6	nc	B10
Port B7	G7	G7	G7	G7	nc	B11
Port C0	B0	B0	B0	B0	B0	B0
Port C1	B1	B1	B1	B1	B1	B1
Port C2	B2	B2	B2	B2	B2	B2
Port C3	B3	B3	B3	B3	B3	B3
Port C4	B4	B4	B4	B4	B4	B4
Port C5	B5	B5	B5	B5	B5	B5
Port C6	B6	B6	B6	B6	B6	B6
Port C7	B7	B7	B7	B7	B7	B7

Table 4-5. Connector CL2 Assignment

Port/Bit	Dual Base 3x8 + 1x8bits	Dual Base 3x8 + 1x10bits	Dual Base 3x8 + 1x12bits	Dual Base 3x8 + 3x8bits	Medium 10 bits	Medium 12 bits
Port D0	M0	M0	M0	R0	M0	M0
Port D1	M1	M1	M1	R1	M1	M1
Port D2	M2	M2	M2	R2	M2	M2
Port D3	M3	M3	M3	R3	M3	M3
Port D4	M4	M4	M4	R4	M4	M4
Port D5	M5	M5	M5	R5	M5	M5
Port D6	M6	M6	M6	R6	M6	M6
Port D7	M7	M7	M7	R7	M7	M7
Port E0	nc	M8	M8	G0	G0	G0
Port E1	nc	M9	M9	G1	G1	G1
Port E2	nc	nc	M10	G2	G2	G2
Port E3	nc	nc	M11	G3	G3	G3
Port E4	nc	nc	nc	G4	G4	G4
Port E5	nc	nc	nc	G5	G5	G5
Port E6	nc	nc	nc	G6	G6	G6
Port E7	nc	nc	nc	G7	G7	G7
Port F0	nc	nc	nc	M0	G8	G8
Port F1	nc	nc	nc	M1	G9	G9
Port F2	nc	nc	nc	M2	nc	G10
Port F3	nc	nc	nc	M3	nc	G11
Port F4	nc	nc	nc	M4	M8	M8
Port F5	nc	nc	nc	M5	M9	M9
Port F6	nc	nc	nc	M6	nc	M10
Port F7	nc	nc	nc	M7	nc	M11

- Notes: 1. Rx, Gx, Bx = Bit x, for color Red, Green or Blue.
2. Mx = Bit x for Monochrome or Nir

5. Camera Models

Table 5-1. Ordering Code

Part Number	Additional Filter	Description/Sensor
Camera		
EV71YUC8CL4010-BA0	BG38, 2 mm IR cut-off	RGB
EV71YUC8CL4010-BA1	BG38, 2 mm IR cut-off	RGB + B&W
EV71YUC8CL4010-BA2	N-BK7 Band-cut Filter	RGB + NIR
EV71YUC4CL4010-BA0	BG38, 2 mm IR cut-off	RGB
EV71YUC4CL4010-BA1	BG38, 2 mm IR cut-off	RGB + B&W
EV71YUC4CL4010-BA2	N-BK7 Band-cut Filter	RGB + NIR
Accessories		
AT71KFPVIVA-ABA		F-Mount
AT71KFPVIVA-AKA		M42x0,75
AT71KFPVIVA-ADA		M42x1 Mount



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