

Datasheet

Main Features

- **Sensor:**
 - 512 14 x 14 μm Pixel
 - 1024 14 x 14 μm Pixel
 - 2048 14 x 14 μm Pixel
or 4096 10 x 10 μm Pixel
- **Interface:** Camera Link® Base for EM2, Base/Medium for EM4
- **Data rate/Line rate:**
 - EM2: 80 Mpixel/s Up to 126 Kl/s
 - EM4: 160 Mpixel/s Up to 210 Kl/s
- **Bit Depth:** 12,10 or 8 bits
- **100% Aperture, Built-in Anti-blooming, No Lag**
- **Automatic Tap Balance and Flat Field correction**
- **Contrast Expansion**
- **Look Up Table**
- **Standby Low Power Mode**
- **Very Compact Design:** 93 x 56 x 43 mm (w, h, d)
- **Fully Configurable with e2v's CommCam software**



Product Description

The AViVA EM2/EM4 is designed to set new standards for line scan cameras in term of speed and image quality. With resolutions of up to 4096 pixels, and the design of new CCD image sensors, it delivers state-of-the-art performance specifications, without compromises.

Its rich built-in features, such as automatic FCC, LUT or automatic tap balance, are positioning it as the perfect choice for high demanding Machine Vision applications.

The EM2/EM4 benefits from e2v's long experience in imaging, and the proven qualities of the AViVA family: performance, reliability, and high precision mechanical design.

Typical Applications

- **Web Inspection:** Metallurgy, Wood, Paper, textile etc.
- **Process Control:** Pick and Place, Positioning
- **Print Inspection**
- **Sorting:** Food, Postal, Parcel, Checks etc.
- **Surface Inspection:** Wafers, PCB etc.
- **Document Archiving, Data Archiving**
- **OCR and Barcode Reading**

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1. Standard Conformity

AViiVA cameras have been tested using the following equipment:

- A 3 meter 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 AViiVA cameras comply with the requirements of the EMC (European) directive 2004/108/CE (EN 50081-2, EN 61000-6-2).

1.2 FCC

AViiVA 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.

1.3 RoHS Conformity

AViiVA cameras comply with the requirements of the RoHS directive 2002/95/EC.

2. Key Specifications

Table 2-1. Typical Performance

Characteristics	Value				Unit
Sensor Characteristics at Maximum Pixel Rate					
Resolution	2048	4096	1024	512	Pixels
pixel size (square)	14	10	14	14	µm
Max line rate EM4 (four taps)	70	37	126	210	kHz
Max line rate EM2 (two taps)	37	19	70	126	
Radiometric Performance at Maximum Pixel Rate and Minimum Camera Gain					
Bit depth	8, 10, 12				Bits
Responsivity (14 µm pixels size)	164				LSB/(nJ/cm²)
Responsivity (10 µm pixels size)	82				LSB/(nJ/cm²)
Response nonlinearity	<1				%
PRNU	±1				%
Dynamic range	68				dB
Functionality (Programmable via Control Interface)					
Gain	Up to 32 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)	93 x 56 x 43 with lateral heatsinks 60 x 56 x 43 without lateral heatsinks				mm
Weight	310g (without mount but includes lateral heatsinks)				g
Lens mount	F, T2, M42x1 compliant with AViVA SM2 series				
Sensor alignment (see Section 4.)	±100				µm
Sensor flatness	±35				µm
Power supply	Single 12 DC to 24 DC				V
Power dissipation	< 11				W
Low power mode	< 4				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				

3. Camera Performance

3.1 Camera Characterization

Table 3-1. Camera Characterization

	Unit	Min Gain (-24 dB)			Average Gain (-12 dB)			Max Gain (0 dB)		
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max
Dark Noise RMS	LSB		1.5			6.4			27	
Dynamic range	dB		68			56			44	
FPN rms	LSB		0.3	1		1			4	
FPN peak-to-peak	LSB		2	5		7			30	
PRNU High Frequency rms (at half saturation)	%		0.2	0.5		0.2			0.2	
PRNU High Frequency peak-to-peak (at half saturation)	%		1	3		1.5			1.8	

Test conditions:

- Maximum data rate (4 × 40 MHz)
- Light source 3200K with BG38 filter 2 mm thickness
- LSB are given for 12-bit depth configuration
- Stabilized front face temperature 50°C
- 100 μs line period and 100 μs exposure time

3.2 Image Sensor

Figure 3-1. Sensor Architecture

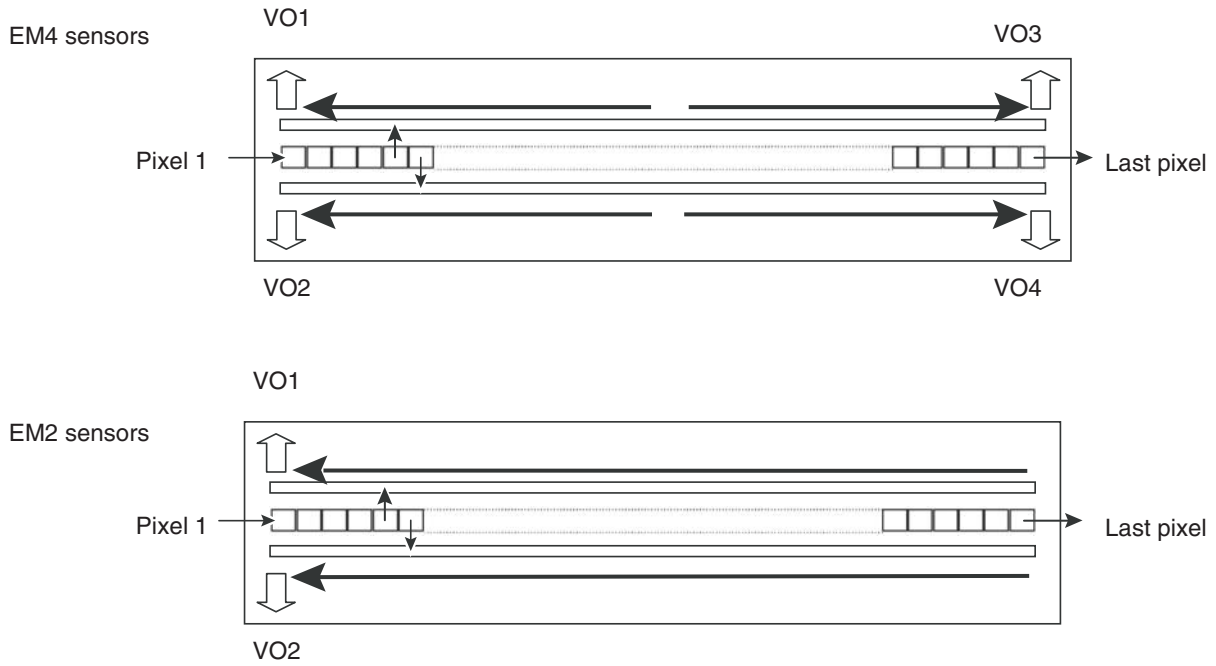
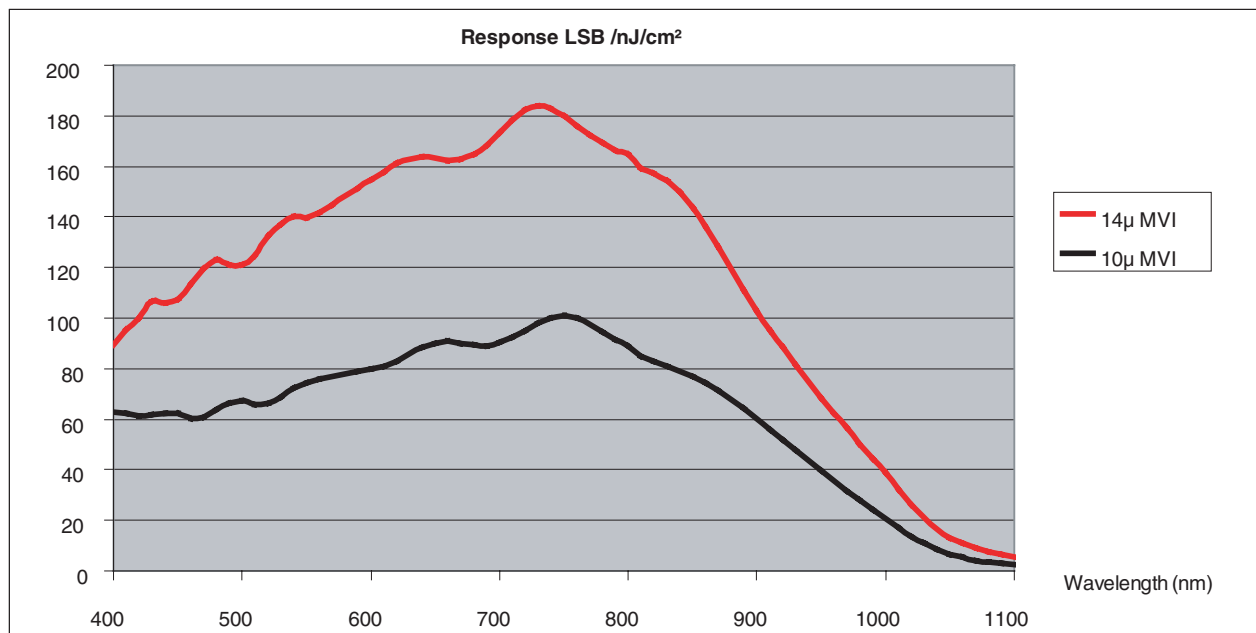


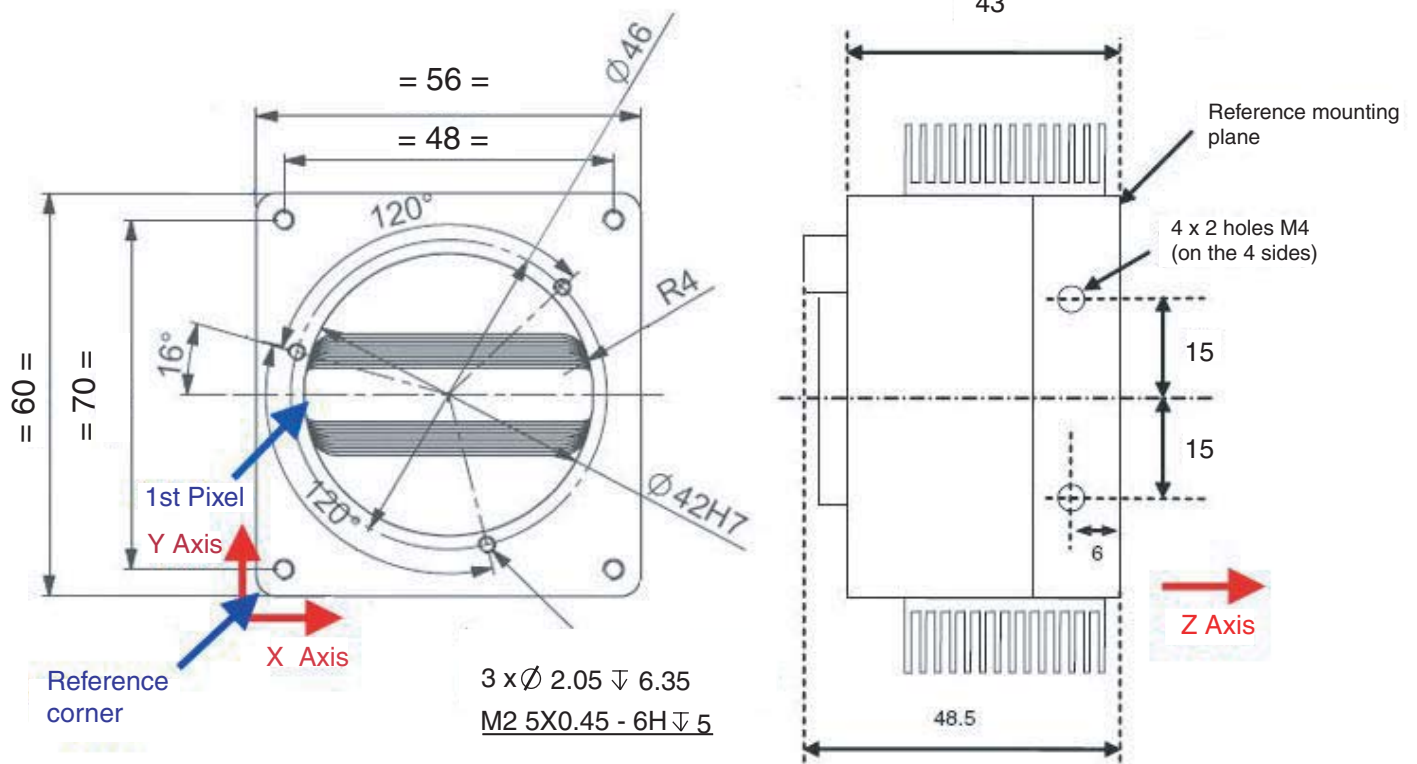
Figure 3-2. Response



4. Camera Hardware Interface

4.1 Mechanical Drawings

Figure 4-1. Mechanical Drawings



Note: All dimensions are in millimeters

4.1.1 Sensor Alignment

Table 4-1. Characteristics

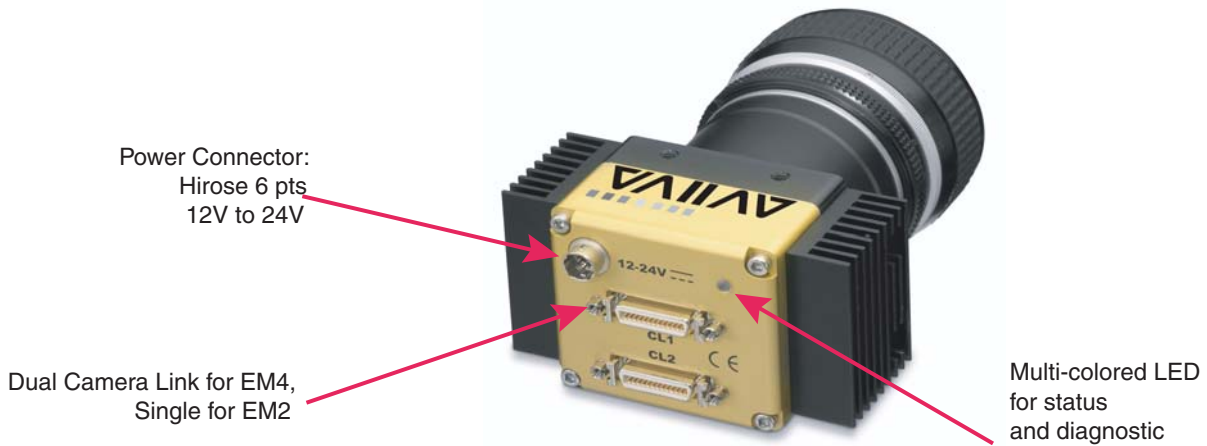
Sensor Alignment	
Z	-10.3 ±150 µm
Y	30 ±100 µm
Planarity	±35 µm
Rotation (X,Y plan)	±0,2°
Tilt (versus lens mounting plane)	±35 µm

Table 4-2. Characteristics

X for First Pixel Location	
4096 x 10 µm sensor	7.52 ±100 µm
2048 x 14 µm sensor	13.66 ±100 µm
1024 x 14 µm sensor	20.83 ±100 µm
512 x 14 µm sensor	24.81 ±100 µm

4.2 Input/Output Connectors and LED

Figure 4-2. Rear View



4.2.1 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 12V to 24V Power 11W max with a typical inrush current of 2.2A during power up				

4.2.2 Camera Link Output Configuration

EM2 cameras follow Camera Link® Base configuration standard, two taps interleaved. Each tap run at 40M pixel per second, 8 bits, 10 bits or 12 bits per pixel.

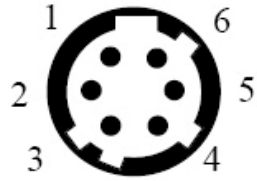
EM4 cameras follow Camera Link® Medium configuration standard, four taps (two taps right interleaved and two taps left interleaved). Each tap run at 40 Mpixel per second, 8 bits, 10 bits or 12 bits per pixel.

EM4 cameras can also be configured in Base configuration. In that case, sensor tap1 and tap2 are multiplexed at 80Mpix/second. Same as sensor tape2 and tap3.

5. Camera Models

Table 5-1. Ordering Code

Part Number	Description
Camera	
EV71YEM4CL4010-BA0	4096 pixels, 10 µm size
EV71YEM4CL2014-BA0	2048 pixels, 14 µm size
EV71YEM2CL4010-BA0	4096 pixels, 10µm size
EV71YEM2CL2014-BA0	2048 pixels, 14 µm size
EV71YEM2CL1014-BA0	1014 pixels, 10 µm size
EV71YEM4CL1014-BA0	1014 pixels, 14 µm size
EV71YEM2CL0514-BA0	512 pixels, 10µm size
EV71YEM4CL0514-BA0	512 pixels, 14 µm size
Accessories	
AT71KFPVIVA-ABA	F mount (NIKON)
AT71KFPVIVA-AKA	T2 mount (M42 x 0.75)
AT71KFPVIVA-ADA	M42 x 1 mount
AT71KFPVIVA-ACA	C mount





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