AViiVA® EM2 EM4 CL
Line Scan Camera

Datasheet

Main Features

- **Sensor: 2048 14 x 14 µm or 4096 10 x 10 µm Pixels**
- **Interface: Camera Link® Base for EM2, Base/Medium for EM4**
- **Data rate:**
  - **EM2: 80 Mpixel/s**
  - **EM4: 160 Mpixel/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 AViiVA 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 AViiVA 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	Pixels
pixel size (square)	14	10	µm
Max line rate EM4 (four taps) Max line rate EM2 (two taps)	70 37	37 19	kHz
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 AViiVA SM2 series		
Sensor alignment (see Section 4.)	±100		µm
Sensor flatness	±35		µm
Power supply	Single 12 DC to 24 DC		V
Power dissipation Low power mode	< 11 < 4		W 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

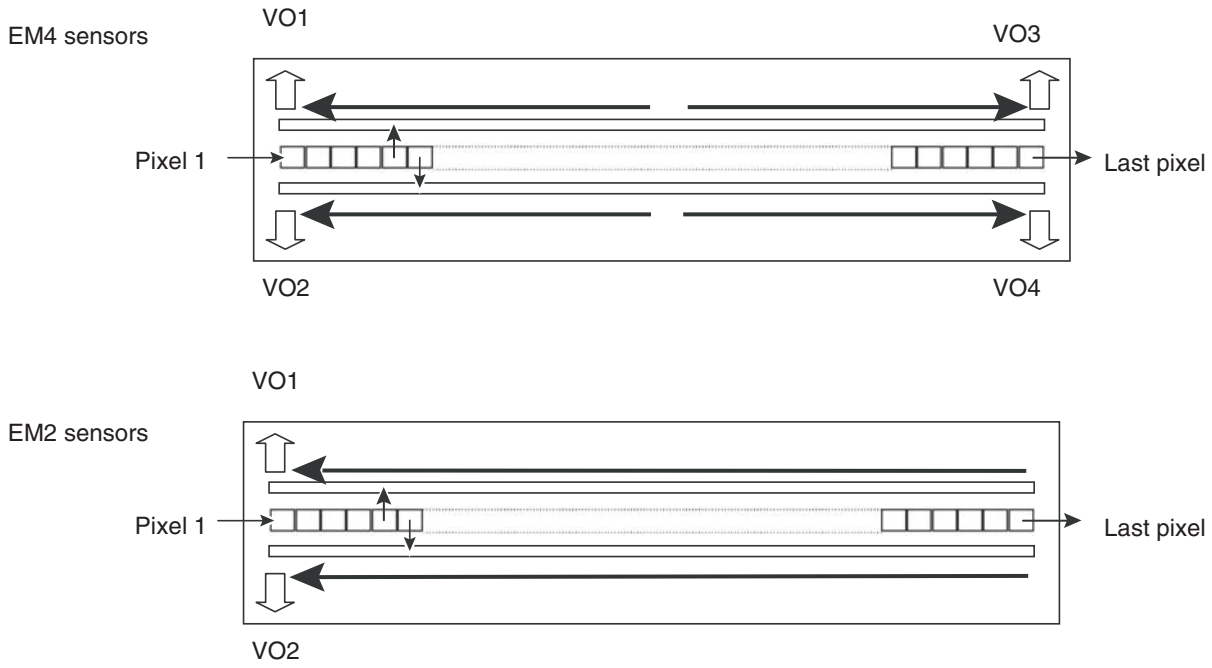
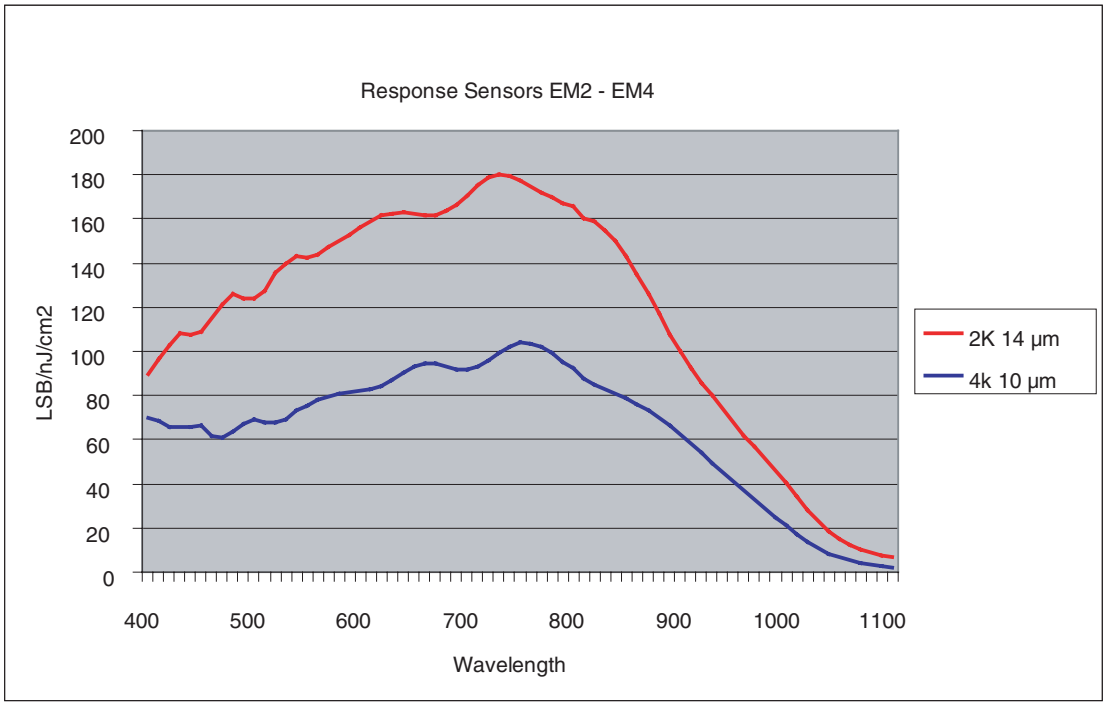


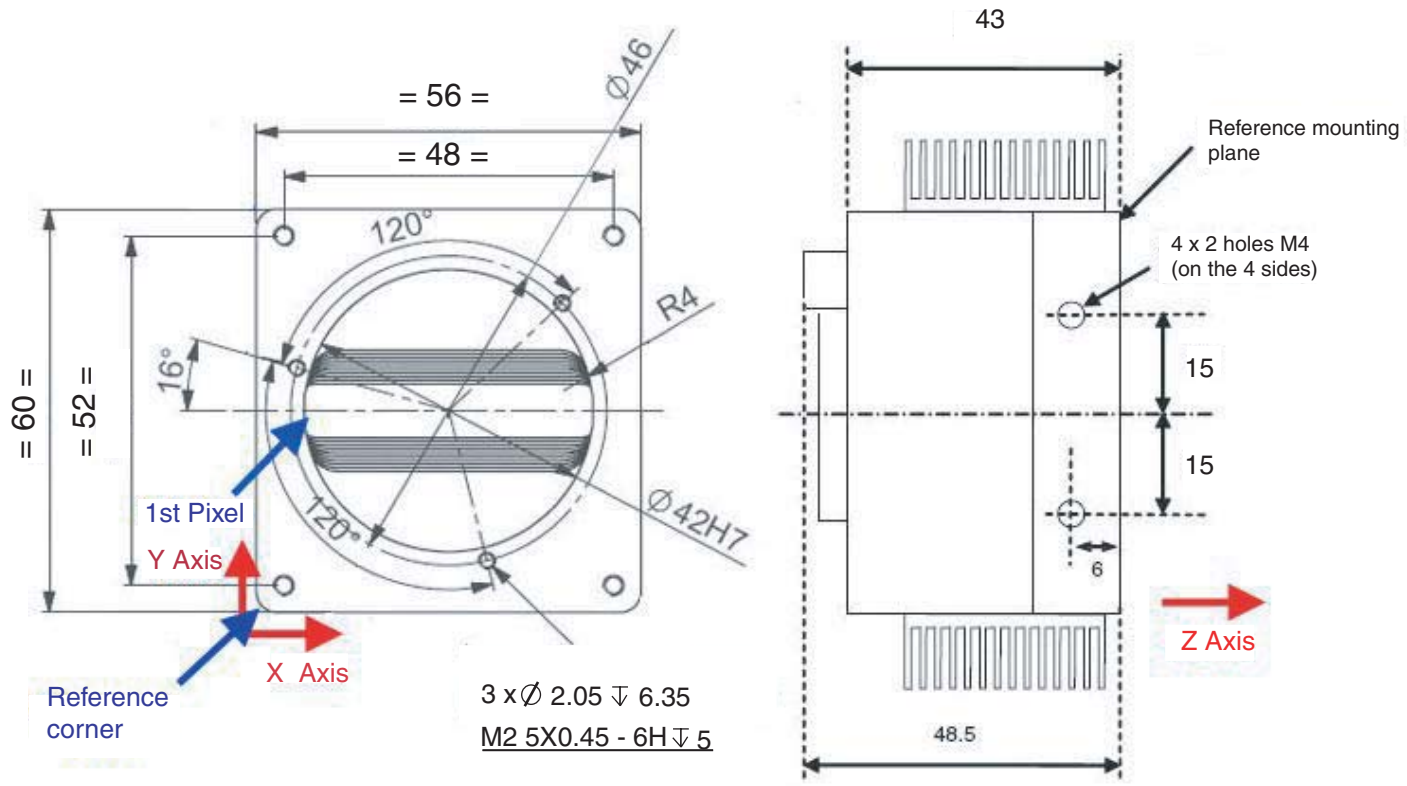
Figure 3-2. Relative Response



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

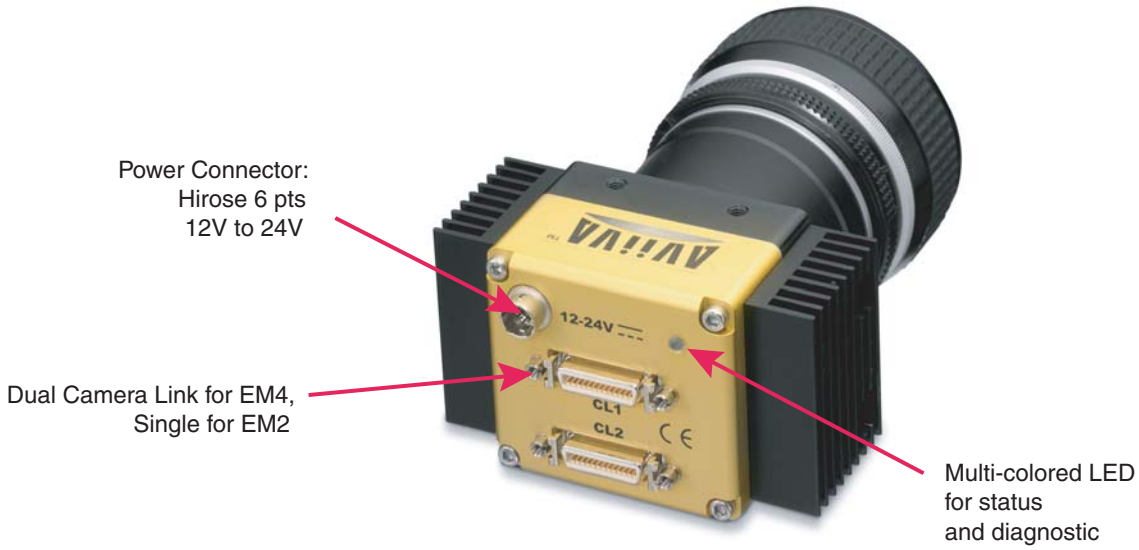
Sensor Alignment	
Z	-10.3 ±150 µm
Y	30 ±100 µm
Planarity	±35 µm
Rotation (X,Y plan)	±0,2°
Tilt (versus lens mounting plane)	±35 µm

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

4.2 Input/Output Connectors and LED

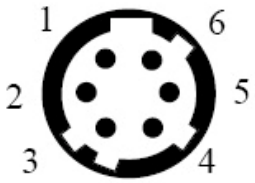
Figure 4-2. Rear View



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	Sensor Type (Resolution, Pixels size)	Description
Camera		
EV71YEM4CL4010-BA0	4096 pixels, 10 µm size	AViiVA EM4 CL 4010
EV71YEM4CL2014-BA0	2048 pixels, 14 µm size	AViiVA EM4 CL 2014
EV71YEM2CL4010-BA0	4096 pixels, 10µm size	AViiVA EM2 CL 4010
EV71YEM2CL2014-BA0	2048 pixels, 14 µm size	AViiVA EM2 CL 2014
Accessories		
AT71KFPAVIVA-ABA		F mount (NIKON)
AT71KFPAVIVA-AKA		T2 mount (M42 x 0.75)
AT71KFPAVIVA-ADA		M42 x 1 mount
AT71KFPAVIVA-ACA		C mount

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