

## Datasheet

### Main Features

- **Sensor:**
  - 512 14x14  $\mu\text{m}$  Pixel
  - 1024 14 x 14  $\mu\text{m}$  Pixel
  - 2048 14 x 14  $\mu\text{m}$  Pixel
  - or 4096 10 x 10  $\mu\text{m}$  Pixel
- **Interface:** GigE Vision ® and GenICam
- **Line rate (in 8 bits)**
  - Up to 175 KI/s in 8 bits
- **Bit Depth:** 12 or 8 bits
- **100% Aperture, Built-in Anti-blooming, No Lag**
- **Automatic tap balance and Flat Field correction**
- **Packet\_Resend 512 Mbit Memory**
- **GPIO**
- **Contrast Expansion**
- **Look Up Table**
- **Standby Low Power Mode**
- **Very Compact Design: 93 x 56 x 48.8 mm (w, h, l)**
- **Fully Configurable with e2v's CommCam software**



### Product Description

The AViVA® EM1 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 performances, 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 EM1 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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for the latest version of the datasheet

## 1. Standard Conformity

The AViiVA cameras have been tested using the following equipment:

- A shielded power supply cable
- A shielded and twisted pairs Ethernet cat6 cable

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 89/336/CEE (EN50081-2, EN 61000-6-2).

### 1.2 FCC

The 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
<b>Sensor Characteristics at Maximum Pixel Rate</b>					
Resolution	512	1024	2048	4096	Pixels
pixel size (square)	14	14	14	10	µm
Max line rate (in 8 bits)	175	102	54	28	kHz
<b>Radiometric Performance at Maximum Pixel Rate and Minimum Camera Gain</b>					
Bit depth	8,12				Bits
Responsivity (14 µm pixels size)	164				LSB/(nJ/cm <sup>2</sup> )
Responsivity (10 µm pixels size)	82				LSB/(nJ/cm <sup>2</sup> )
Response nonlinearity	<1				%
PRNU	±1				%
Dynamic range	68				dB
<b>Functionality (Programmable via Control Interface)</b>					
Gain	Up to 32 dB				
Offset	-4096 to +4096 LSB				
Trigger Mode	Timed TriggerWidth and TriggerControlled				
<b>Mechanical and Electrical Interface</b>					
Size (w x h x l)	93 x 56 x 48.8 with lateral heatsinks 60 x 56 x 48.8 without lateral heatsinks				mm
Weight	310g (without mount but includes lateral heatsinks)				g
Lens mount	F, T2, M42x1, C compliant with AViVA SM2 series				
Sensor alignment (see <a href="#">Section 4.</a> )	±100				µm
Sensor flatness	±35				µm
Power supply	Single 12 DC to 24 DC				V
Power dissipation	< 11				W
Low power mode	< 4				W
<b>General features</b>					
Operating temperature	0 to 60 (front face)				°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			Average Gain (+12 dB)			Max Gain (+24 dB)		
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max
Dark Noise RMS	LSB		1.5	2		6			27	
Dynamic range	dB		68			56			44	
FPN rms	LSB		0.3	1		1			4	
FPN peak-to-peak	LSB		1.2	5		7			30	
PRNU rms (at half saturation)	%		0.07	0.5		0.1			0.2	
PRNU peak-to-peak (at half saturation)	%		0.4	3		1.2			1.8	
SNR			48			42			35	

Test conditions:

- Maximum data rate (4 × 30 MHz)
- Light source 3200K with BG38 filter 2 mm thickness
- LSB are given for 12-bit depth configuration
- Stabilized front face temperature 50°C

### 3.2 Image Sensor

**Figure 3-1.** Sensor Architecture

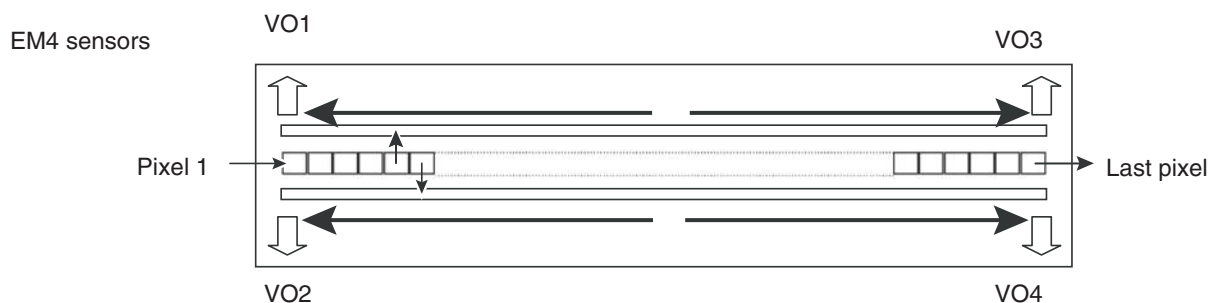
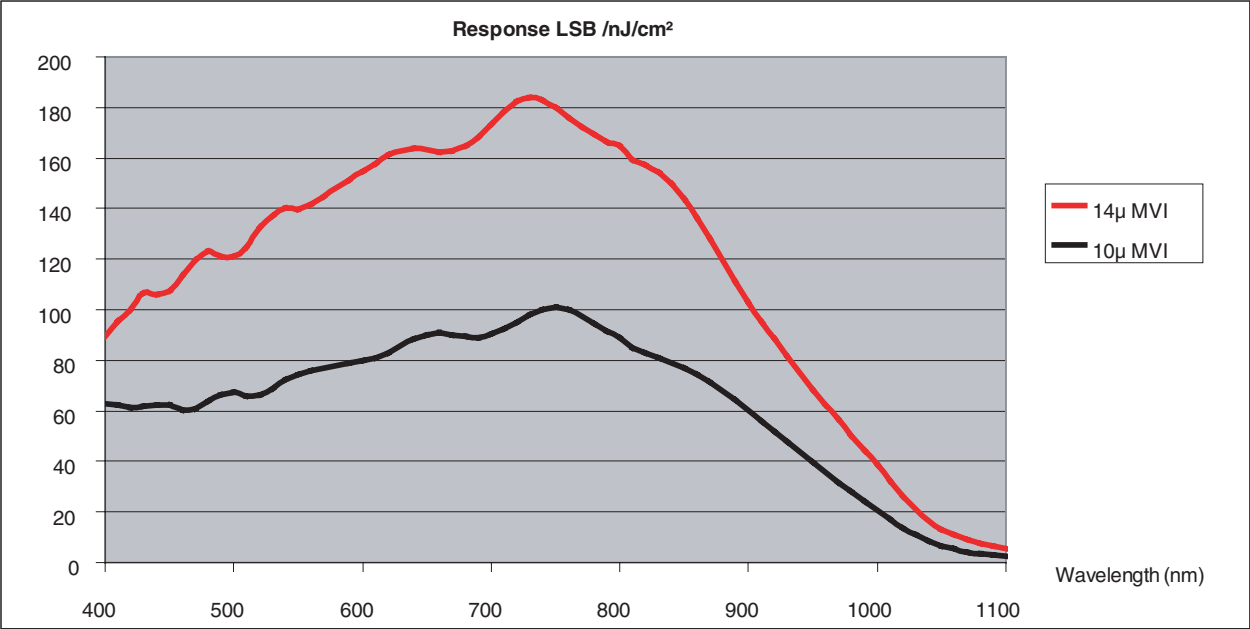


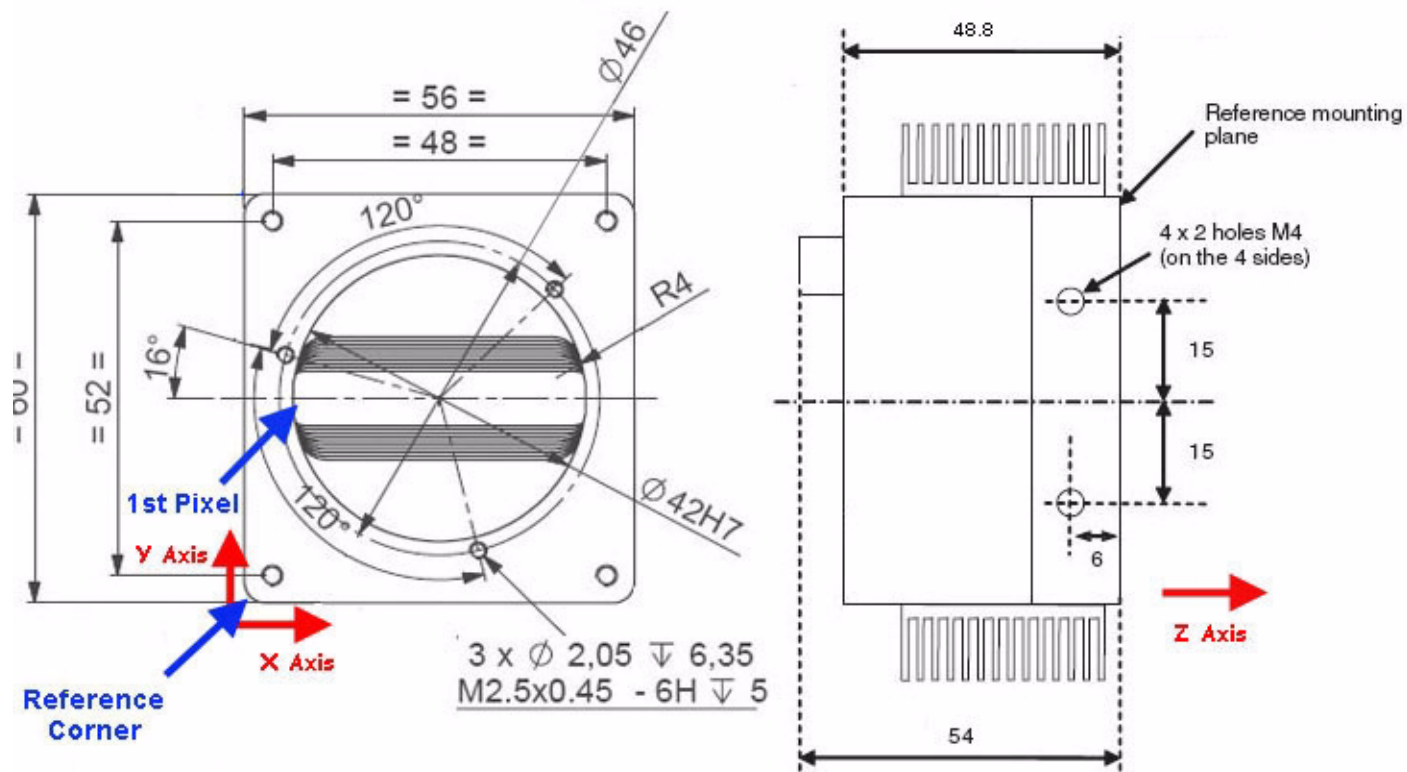
Figure 3-2. Response



## 4. Camera Hardware Interface

### 4.1 Mechanical Drawings

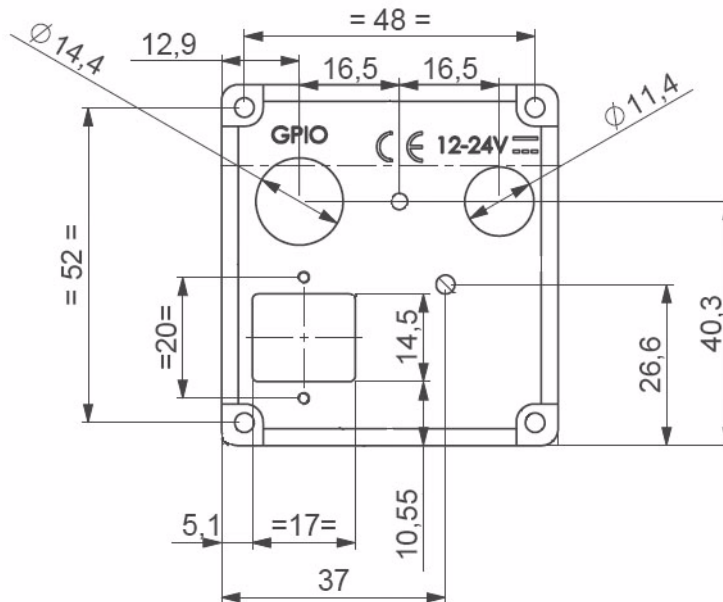
Figure 4-1. Mechanical Drawings



Note: All dimensions are in millimeters

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Figure 4-2. Rear Face



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#### 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

# AViVA® EM1 MVI

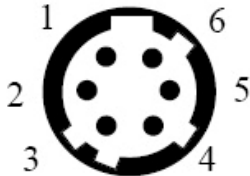
Figure 4-3. Connectors and LED



## 4.1.2 Power Connector

- Camera connector type: Hirose HR10A-7R-6PB (male)
- Cable connector type: Hirose HR10A-7P-6S (female)

Table 4-3. Power Connector

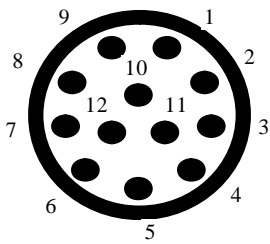
 <p>Camera side description</p>	Signal	Pin	Signal	Pin
	PWR	1	GND	4
	PWR	2	GND	5
	PWR	3	GND	6
<p>Power supply from 12 to 24v Power 15W max with an inrush current of 2,2A during power up</p>				



4.1.3 GPIO Connector

- Camera connector type: Hirose HR10A-10R-12SB (female)
- Cable connector type: Hirose HR10A-10P-12P (male)

Table 4-4. GPIO Connector

 <p>Camera side description</p>	Signal	Pin	Signal	Pin
	LineIn0n	1	LineOut0p	7
	LineIn0p	2	LineIn1n	8
	LineIn2n	3	LineIn1p	9
	LineIn2p	4	NC	10
	GND	5	LineOut1n	11
	LineOut0n	6	LineOut1p	12

5. Camera Models

Table 5-1. Ordering Code

Part Number	Description
<b>Camera</b>	
EV71YEM1GE4010-BA0	4096 pixels, 10 µm size
EV71YEM1GE2014-BA0	2048 pixels, 14 µm size
EV71YEM1GE1014-BA0	1024 pixels, 14x µm size
EV71YEM1GE 0514-BA0	512 pixels, 14 µm size
<b>Accessories</b>	
AT71KFPVIVA-ABA	F mount (NIKON)
AT71KFPVIVA-AKA	T2 mount (M42 x 0.75)
AT71KFPVIVA-ADA	M42x1 mount
AT71KFPVIVA-ACA	C mount



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