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## e-CAM24\_CUNX



## Datasheet

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## Contents

1	Revision History.....	3
2	Introduction.....	4
3	Disclaimer.....	4
4	Description.....	4
4.1	Features.....	5
5	Key Specifications.....	5
5.1	CMOS Image Sensor Specifications.....	5
6	Pin Description.....	6
6.1	Pin-out Details of Adaptor Board Dual Row Connector (CN1).....	6
6.2	Pin-out Details of Adaptor Board FPC Connector (CN2).....	7
6.3	Connector Part Numbers.....	8
7	Electrical Specification.....	8
7.1	Recommended Operating Condition.....	8
7.2	Power Consumption Details.....	9
8	Mechanical Specification.....	9
9	Lens Holder Dimensions.....	11
	Support.....	12



## 1 Revision History

Rev	Date	Major Changes	Author
1.0	07-Dec-2020	Initial draft	Camera Team
2.0	30-Dec-2020	NANO support Added	Camera Team



## 2 Introduction

The e-CAM24\_CUNX board is a camera board which is designed and developed by e-con Systems, a leading Embedded Product Design Services Company which specializes in the advanced camera solutions. This camera board targets the NVIDIA® Xavier™ NX / Jetson NANO™ development kits. e-CAM24\_CUNX can be directly interfaced with Xavier™ NX development kits using J1 and J9 connectors and to Jetson NANO using J13 and J49 connectors.

e-CAM24\_CUNX is a 2 MP custom lens camera module based on 1/2.6" AR0234CS CMOS image sensor from ON Semiconductor®. It is a color camera which supports UYVY image format and provided with S-mount (also known as M12 board lens) lens holder. The S-mount is small form-factor lens mounts for board cameras. e-con Systems provides the sample applications that demonstrates the features of this camera. However, this camera can also be utilized by any V4L2 application.

This document describes about the features of e-CAM24\_CUNX board and the pin-outs of the connectors including the mechanical diagram.

## 3 Disclaimer

The specifications and features of e-CAM24\_CUNX camera board are provided here as reference only and e-con Systems reserves the right to edit/modify this document without any prior intimation of whatsoever.

## 4 Description

NVIDIA® Xavier™ NX / Jetson NANO™ is a small size, low power, AI system-based evaluation boards developed by NVIDIA®. Xavier™ NX / Jetson NANO™ which supports two individual 2-lane MIPI CSI-2 camera connections. e-CAM24\_CUNX uses these 2-lane MIPI CSI for connecting 2 MP camera modules.

e-CAM24\_CUNX is a multi-board solution, which has two boards as follows:

- Camera module (e-CAM217\_CUMI0234\_MOD)
- Adaptor board (ACC-XVRNX-MIPICAMERA-ADP)

The camera module is a small, low-power, high performance 2 MP camera with a built-in ISP. It is based on AR0234CS CMOS image sensor from ON Semiconductor®. The AR0234CS is a 1/2.6" optical form-factor, CMOS image sensor with a global shutter.

The following table lists the supported frame rates of e-CAM24\_CUNX camera module.

Resolution	Frame Rate (fps)
1280 x 720	120
1920 x 1080	65
1920 x 1200	60

**Table 1: Supported Resolution and Frame Rates**



The e-CAM24\_CUNX camera module has dual row 26-pin Samtec connector (CN2) for mating with ACC-XVRNX-MIPICAMERA-ADP adaptor board. This adaptor board acts as a bridge between the camera module and the Xavier™ NX development kit. The adaptor board supplies the voltages required for camera module. e-CAM24\_CUNX adaptor board consists of 15-pin FFC connector (CN3), through which e-CAM24\_CUNX is connected to Xavier™ NX development kit using the 15 cm FPC cable.

## 4.1 Features

The features of e-CAM24\_CUNX are as follows:

- Multi-board solution
- 2 MP camera sensor with uncompressed UYVY format
- Compatible with NVIDIA® Xavier™ NX / Jetson NANO™ development kit
- Standard M12 lens holder for use with customized optics or lenses for various applications
- Light weight, versatile, and portable design
- Imaging applications
  - 2 MP CMOS image sensor with 1/2.6" optical form-factor
  - Still capture supported resolution: HD (1280 x 720), FHD (1920 x 1080), 1920 x 1200
  - Video streaming supported resolution: HD (1280 x 720), FHD (1920 x 1080), 1920 x 1200
- Linux camera driver (V4L2) for 2 MP MIPI CSI-2 camera module is supported
- Maximum power consumed: 0.92 W
- Operating temperature range: -30°C to 70°C
- RoHS compliant

## 5 Key Specifications

The following table lists the key specifications of e-CAM24\_CUNX.

Description	Specification
Size (L x W)	30 mm × 30 mm
Video format	UYVY
Maximum image resolution	1920 x 1200
Supported OS	Linux

**Table 2: Key Specifications of e-CAM24\_CUNX**



## 5.1 CMOS Image Sensor Specifications

The following table lists the specifications of the CMOS image sensor used in this e-CAM24\_CUNX camera board.

Sensor Specification	
Type/Optical size	1/2.6" Optical format CMOS image sensor
Resolution	2 MP
Image Format	UYVY
Pixel size	3.0 $\mu\text{m}$
Sensor active area	1920 (H) x 1200 (V)
Responsivity	56 Ke/lux*s
SNR	38 dB
Dynamic range	71.4 dB

**Table 3: CMOS Image Sensor Specification**

For more information about the AR0234CS sensor or for Datasheet, please contact ON Semiconductor®.

## 6 Pin Description

e-CAM24\_CUNX adaptor board has two connectors CN1 and CN2. CN1 is dual row 26-pin Samtec connector, used for direct mating with the camera module, whereas CN2 is a single row 15-pin connector, used for connecting with Xavier™ NX development kit through the FPC cable. The dual row connector is 1 to 1 mating type connectors.

**Note:** You must note the given pin numbers and direction with respect to the adaptor board.

The connectors on ACC-XVRNX-MIPICAMERA-ADP are shown in the following figure.



**Figure 1: Connectors in ACC-XVRNX-MIPICAMERA-ADP**

The pin descriptions of connectors are explained in the following sections.



## 6.1 Pin-out Details of Adaptor Board Dual Row Connector (CN1)

The following table lists the pin-out details of CN1 connector.

CN1 Pin No	Signal Name	Pin Type	Description
1	MIPI_CLK_N	OUTPUT	MIPI Clock Lane Differential Pair -
2	MIPI_DATA0_N	OUTPUT	MIPI Data Lane 0 Differential Pair -
3	MIPI_CLK_P	OUTPUT	MIPI Clock Lane Differential Pair +
4	MIPI_DATA0_P	OUTPUT	MIPI Data Lane 0 Differential Pair +
5	GND	POWER	Ground signal for digital and analog
6	GND	POWER	Ground signal for digital and analog
7	RSVD	-	-
8	I2C_SCL	INPUT	I2C Clock signal
9	RSVD	-	-
10	I2C_SDA	I/O	I2C Data signal
11	GND	POWER	Ground signal for digital and analog
12	CAM_RESET	INPUT	RESET the ISP
13	-	-	-
14	n_uC_BOOT0	INPUT	MCU Boot Pin
15	RSVD	-	-
16	GND	POWER	Ground signal for digital and analog
17	GND	POWER	Ground signal for digital and analog
18	CAM_SHUTTER	OUTPUT	Camera Shutter Output
19	MIPI_DATA1_N	OUTPUT	MIPI Data Lane 1 Differential Pair -
20	-	-	-
21	MIPI_DATA1_P	OUTPUT	MIPI Data Lane 1 Differential Pair +
22	DIR_SEL	INPUT	Direction Select Pin for the Strobe Output
23	GND	POWER	Ground signal for digital and analog
24	RSVD	-	-
25	CAM_STROBE	OUTPUT	Strobe Output
26	VCC_3P3	POWER	3.3V Power supply for camera boards

**Table 4: Adaptor Board CN1 Connector Pin Description Details**

## 6.2 Pin-out Details of Adaptor Board FPC Connector (CN2)

The following table lists the pin-out details of CN2 connector.

CN2 Pin No	Signal Name	Pin Type	Description
1	GND	POWER	Ground signal for digital and analog
2	MIPI_DATA0_N	OUTPUT	MIPI Data Lane 0 Differential Pair -
3	MIPI_DATA0_P	OUTPUT	MIPI Data Lane 0 Differential Pair +



4	GND	POWER	Ground signal for digital and analog
5	MIPI_DATA1_N	OUTPUT	MIPI Data Lane 1 Differential Pair -
6	MIPI_DATA1_P	OUTPUT	MIPI Data Lane 1 Differential Pair +
7	GND	POWER	Ground signal for digital and analog
8	MIPI_CLK_N	OUTPUT	MIPI Clock Lane Differential Pair -
9	MIPI_CLK_P	OUTPUT	MIPI Clock Lane Differential Pair +
10	GND	POWER	Ground signal for digital and analog
11	INTERRUPT	INPUT	ISP interrupts carrier board
12	RSVD	--	Reserved
13	I2C_3P3_SCL	INPUT	3.3V IO I2C SCL signal
14	I2C_3P3_SDA	I/O	3.3V IO I2C SCL signal
15	VCC_3P3	POWER	3.3V Power supply for camera board

**Table 5: Adaptor Board CN2 Connector Pin Description Details**

### 6.3 Connector Part Numbers

The following table lists the connectors and cables used in e-CAM24\_CUNX and its compatible mating connectors.

Connector	Description	Manufacturer	Part Number
e-CAM24_CUNX adaptor board dual row connector (CN1) for mating with e-CAM24_CUNX camera module	CONN Board to Board Receptacle Outer Shroud Contacts P-0.80mm 26Pos Dual Row Vertical SMT	Samtec	ERF8-013-05.0-L-DV-L-K-TR
e-CAM24_CUNX FFC connector (CN2) for connecting with NVIDIA® Xavier™ NX / Jetson NANO™ development kit through FPC cable	CONN FPC Top Contacts P-1mm 15Pos Right Angle SMT	TE Connectivity	1-84953-5
FPC cable used for connecting e-CAM24_CUNX with NVIDIA® Xavier™ NX / Jetson NANO™ development kit	15 Position FFC, FPC Cable 1mm pitch, 152mm length	Würth Electronics	686615152001

**Table 6: e-CAM24\_CUNX Connector Details**

## 7 Electrical Specification

The following sections list the electrical specification, recommended operating conditions and power consumption details of e-CAM24\_CUNX.

The values described in this section are measured in e-con Systems lab and this can be used as reference only. The current measurements are typical values and are subject to



change for different camera boards under different conditions. However, these values can be taken as a reference for power estimation and power supply design.

## 7.1 Recommended Operating Condition

The following table lists the recommended operating condition of e-CAM24\_CUNX.

Parameter	Typical Operating Voltage	Typical Power Consumption (W)
Input voltage	3.3V	0.92

**Table 7: Recommended Operating Condition**

e-CAM24\_CUNX does not requires any power sequence, since it required only 3.3V power supply for operation.

## 7.2 Power Consumption Details

The following table lists the power consumption details of e-CAM24\_CUNX for various resolution and frame rates.

S.No	Resolution	Frame Rate (fps)	Supply Voltage (V)	Typical Current (mA)	Power Consumption (W)
1	1280 x 720	120	3.3	280	0.92
2	1920 x 1080	65	3.3	208	0.69
3	1920 x 1200	60	3.3	200	0.66

**Table 8: Power Consumption Details**

## 8 Mechanical Specification

The adaptor board and camera board of e-CAM24\_CUNX are 30 mm x 30 mm in dimension. The front and rear views of the e-CAM24\_CUNX adaptor board and module board with its dimensions are shown in the following figures.



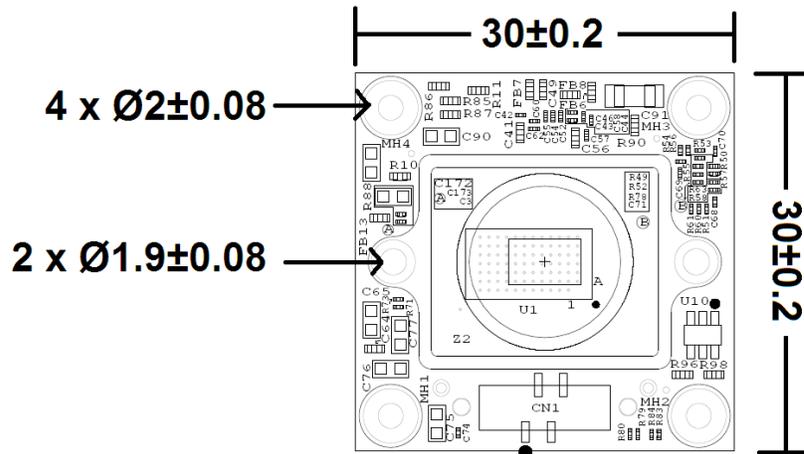


Figure 2: Front View of e-CAM24\_CUNX Module Board Mechanical Dimensions

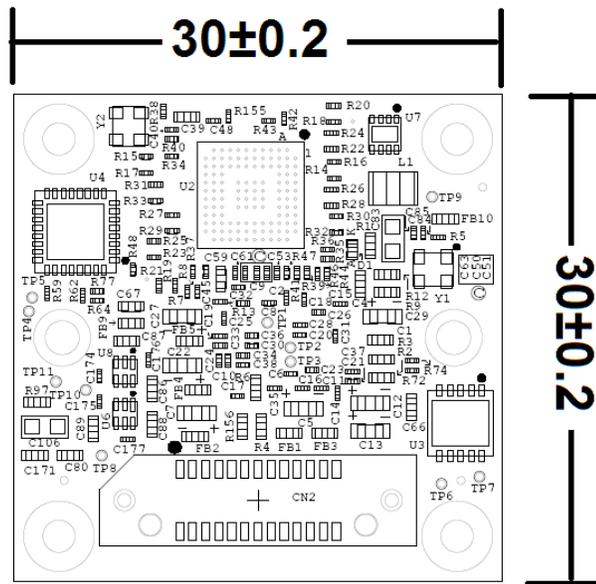


Figure 3: Rear View of e-CAM24\_CUNX Module Board Mechanical Dimensions



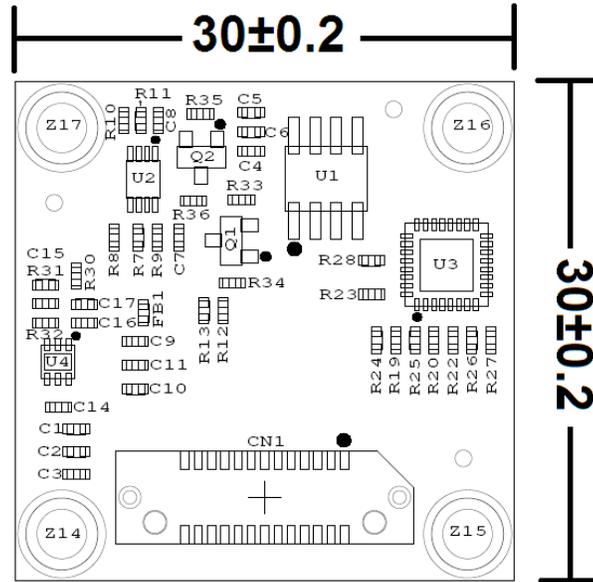


Figure 4: Front View of e-CAM24\_CUNX Adaptor Board Mechanical Dimensions

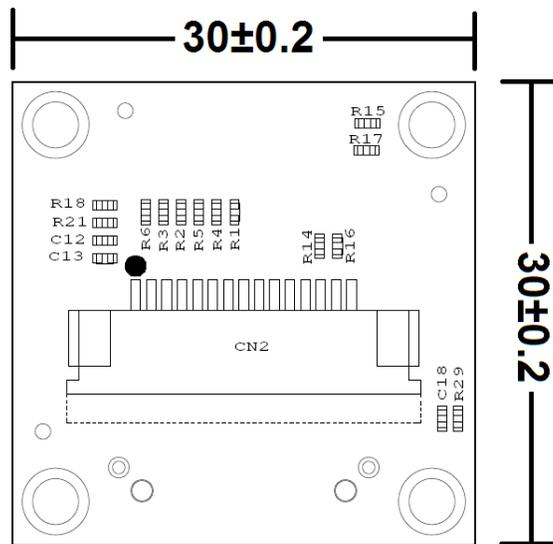


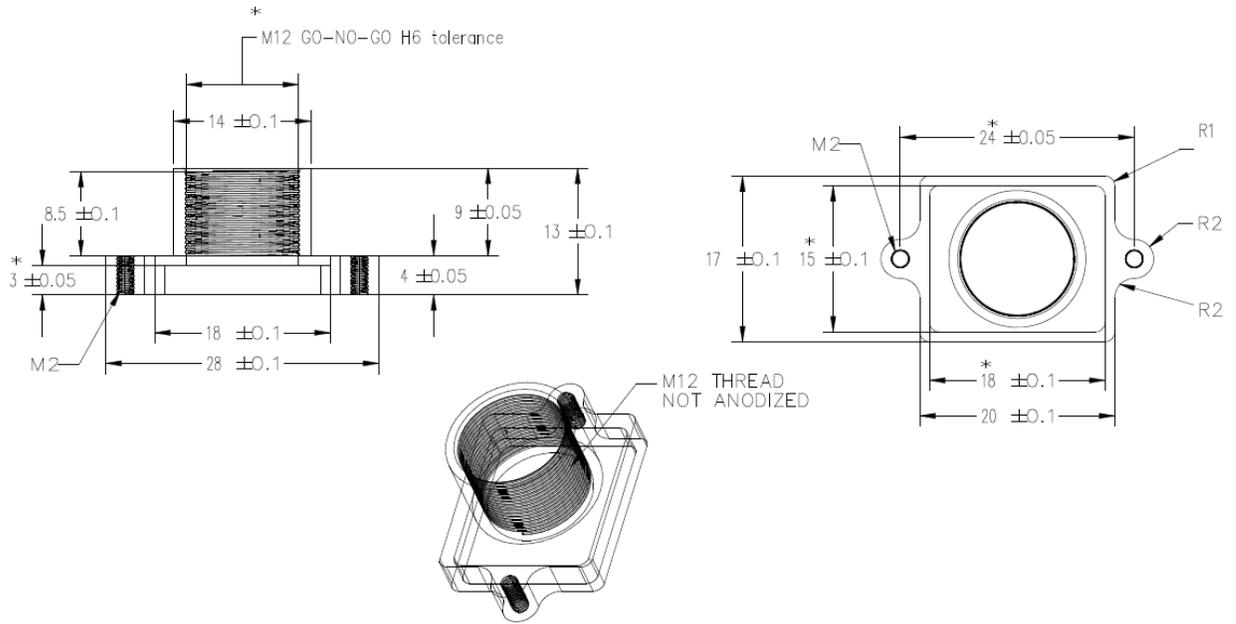
Figure 5: Rear View of e-CAM24\_CUNX Adaptor Board Mechanical Dimensions

Note: All dimensions are in mm.

## 9 Lens Holder Dimensions

The following figure shows the dimension details of S-Mount lens holder.





**Figure 6: S-Mount Holder Outline Dimension**

**Note:** All dimensions are in mm.



## Support

### Contact Us

If you need any support on e-CAM24\_CUNX product, please contact us using the Live Chat option available on our website - <https://www.e-consystems.com/>

### Creating a Ticket

If you need to create a ticket for any type of issue, please visit the ticketing page on our website - <https://www.e-consystems.com/create-ticket.asp>

### RMA

To know about our Return Material Authorization (RMA) policy, please visit the RMA Policy page on our website - <https://www.e-consystems.com/RMA-Policy.asp>

### General Product Warranty Terms

To know about our General Product Warranty Terms, please visit the General Warranty Terms page on our website - <https://www.e-consystems.com/warranty.asp>

