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e-CAM24_CUNX

Datasheet

Revision 2.3
10 Mar 2022

Contents

1 Revision History

Rev	Date	Major Changes	Author
1.0	07-Dec-2020	Initial draft	Camera Team
1.1	22-Dec-2020	Updated the Product Images	Camera Team
2.0	30-Dec-2020	NANO Support added	Camera Team
2.1	25-Mar-2021	CN1 and CN2 connectors pinout details, lens holder, resolutions and mechanical specifications updated	Camera Team
2.2	30-Mar-2021	Lens Holder diagram updated	Camera Team
2.3	10-Mar-2022	CN8 details added and Updated product Image	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® Jetson Nano™/Xavier™ NX development kits. e-CAM24_CUNX can be directly interfaced with Jetson Nano™ A02 development kit through J13 connector, Jetson Nano™ B01 development kit through J13/J49 connector and Xavier NX™ development kit through the J1 and J9 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

Xavier™ NX is a small size, low power, AI system-based evaluation boards developed by NVIDIA® Jetson Xavier™ NX 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)
320 x 240	120
640 x 480	120
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 Jetson Nano™/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 Jetson Nano™/Xavier™ NX development kit using the 15 cm FPC cable. The Adapter board has GPIO connector (CN8) to support external trigger and strobe options.

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 Jetson Nano™/Xavier™ NX 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: QVGA (320 x 240), VGA (640 x 480), HD (1280 x 720), FHD (1920 x 1080), 1920 x 1200
  - Video streaming supported resolution: QVGA (320 x 240), VGA (640 x 480), 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
- External Trigger and Strobe is supported

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 µm
Sensor active area	1920 (H) x 1200 (V)
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 three connectors CN1, CN2 and CN8. 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 Jetson Nano™/Xavier™ NX development kit through the FPC cable. The dual row connector is 1 to 1 mating type connectors. CN8 is a 4-pin board to cable connector, used to give external trigger input and get strobe signal output from the camera

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.

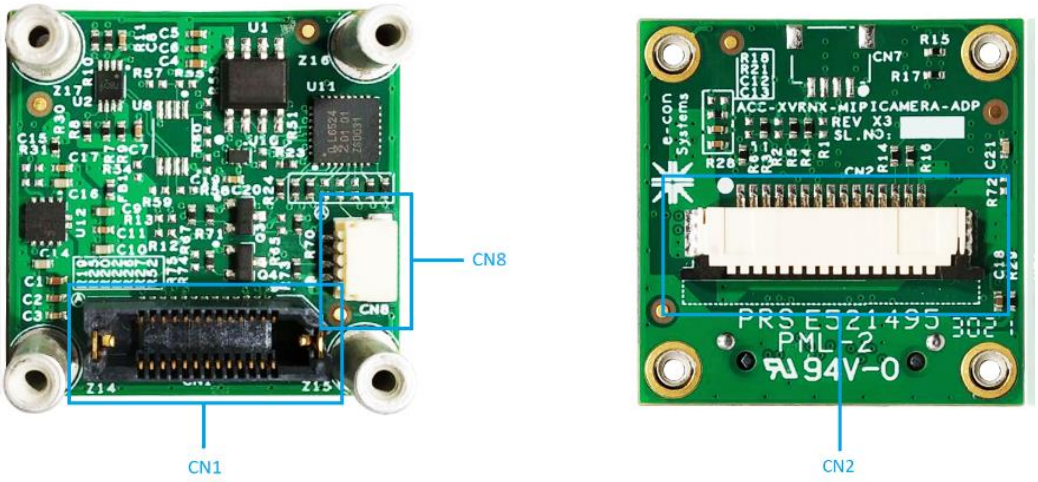

Figure 1: Connectors in ACC-XVRNX-MIPICAMERA-ADP

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	ISP_MIPI_CLK_N	OUTPUT	MIPI Clock Lane Differential Pair -
2	ISP_MIPI_DATA0_N	OUTPUT	MIPI Data Lane 0 Differential Pair -
3	ISP_MIPI_CLK_P	OUTPUT	MIPI Clock Lane Differential Pair +
4	ISP_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	-	RSVD
8	CLK_TX2_ISP_I2C_SCL	INPUT	I2C Clock signal
9	RSVD	-	RSVD
10	TX2_ISP_I2C_SDA	I/O	I2C Data signal
11	GND	POWER	Ground signal for digital and analog
12	CAM_RESET	INPUT	RESET the MCU
13	RSVD	-	RSVD
14	n_uC_BOOT0	INPUT	MCU Boot Pin
15	RSVD	-	RSVD
16	GND	POWER	Ground signal for digital and analog
17	GND	POWER	Ground signal for digital and analog
18	RSVD	-	RSVD
19	ISP_MIPI_DATA1_N	OUTPUT	MIPI Data Lane 1 Differential Pair -
20	NC	-	NC
21	ISP_MIPI_DATA1_P	OUTPUT	MIPI Data Lane 1 Differential Pair +
22	RSVD	-	RSVD
23	GND	POWER	Ground signal for digital and analog
24	RSVD	-	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	ISP_MIPI_DATA0_N	OUTPUT	MIPI Data Lane 0 Differential Pair -
3	ISP_MIPI_DATA0_P	OUTPUT	MIPI Data Lane 0 Differential Pair +
4	GND	POWER	Ground signal for digital and analog
5	ISP_MIPI_DATA1_N	OUTPUT	MIPI Data Lane 1 Differential Pair -
6	ISP_MIPI_DATA1 _P	OUTPUT	MIPI Data Lane 1 Differential Pair +
7	GND	POWER	Ground signal for digital and analog
8	ISP_MIPI_CLK_N	OUTPUT	MIPI Clock Lane Differential Pair -
9	ISP_MIPI_CLK_P	OUTPUT	MIPI Clock Lane Differential Pair +
10	GND	POWER	Ground signal for digital and analog
11	RSVD	-	RSVD
12	NC	-	NC
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 Pin-out Details of Adaptor Board Trigger Connector (CN8)

The following table lists the pin-out details of CN8 connector.

CN2 Pin No	Signal Name	Pin Type	Description
1	VCC_3P3	POWER	3.3V Power Supply
2	STROBE	OUTPUT	3..3V Strobe Output from the Camera
3	TRIGGER	INPUT	3.3V Trigger Input to the Camera
4	GND	POWER	Ground signal for digital and analog

Table 6: Adaptor Board CN8 Connector Pin Description Details

6.4 Connector Part Numbers

The following table lists the connectors and cables used in e-CAM24_CUNX and its compatible mating connector and cable.

Connector	Description	Manufacturer	Part Number
e-CAM24_CUNX MOD board dual row connector (CN2) for mating with e-CAM24_CUNX adaptor board (CN1)	CONN Board to Board Header Center Strip Contacts P-0.80mm 26Pos Dual Row Vertical SMT	Samtec	ERM8-013-03.0-L-DV-L-K-TR

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 Jetson Nano™/Xavier™ NX 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 Jetson Nano™/Xavier™ NX development kit	15 Position FFC, FPC Cable 1mm pitch, 152mm length	Wurth Electronics	686615152001
e-CAM24_CUNX adapter GPIO connector (CN8) for connecting with external trigger and strobe	CONN Header Male P-1mm Shrouded 4Pos Right Angle SMT	JST Sales America Inc	SM04B-SRSS-TB(LF)(SN)
GPIO cable used for connecting e-CAM24_CUNX with external trigger and strobe signals	Cable Assembly Rectangular Socket to Socket 4 Position Length-152.40mm	JST Sales America Inc.	A04SR 04SR30K152A

Table 7: 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 8: 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 nominal 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	320 x 240	120	3.3	267	0.89
2	640 x 480	120	3.3	270	0.90
3	1280 x 720	120	3.3	280	0.92
4	1920 x 1080	65	3.3	208	0.69
5	1920 x 1200	60	3.3	200	0.66

Table 9: 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.

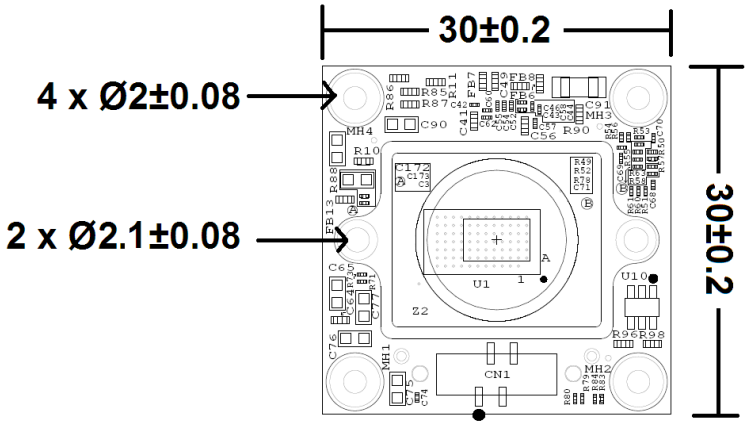

Figure 2: Front View of e-CAM24_CUNX Module Board Mechanical Dimensions

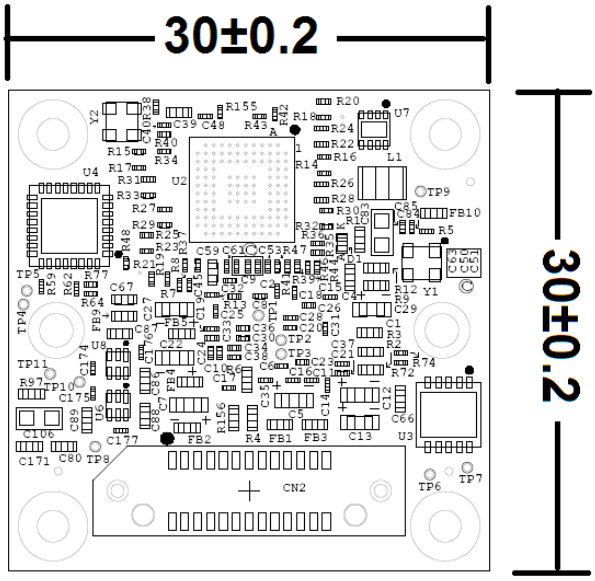

Figure 3: Rear View of e-CAM24_CUNX Module Board Mechanical Dimensions

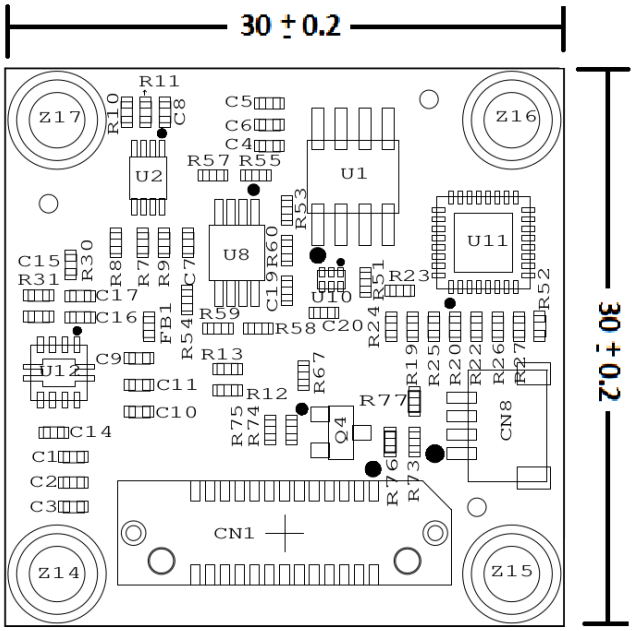

Figure 4: Front View of e-CAM24_CUNX Adaptor Board Mechanical Dimensions

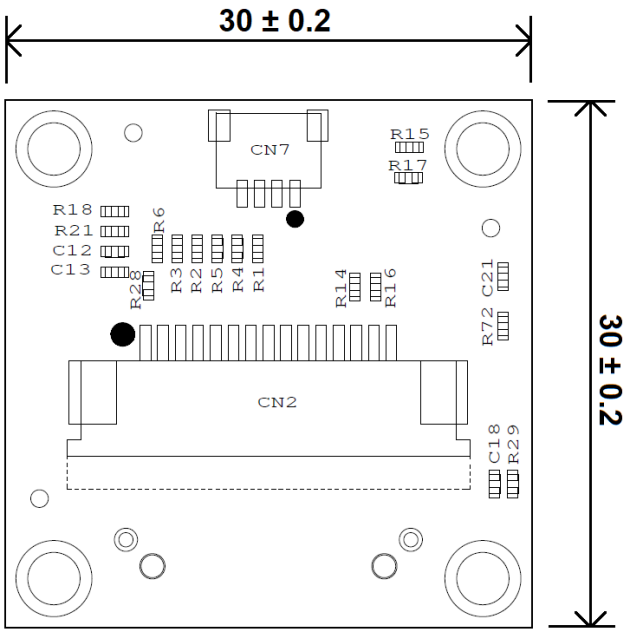

Figure 5: Rear View of e-CAM24_CUNX Adaptor Board Mechanical Dimensions

Note: All dimensions are in mm.

9 Lens Holder Dimensions

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

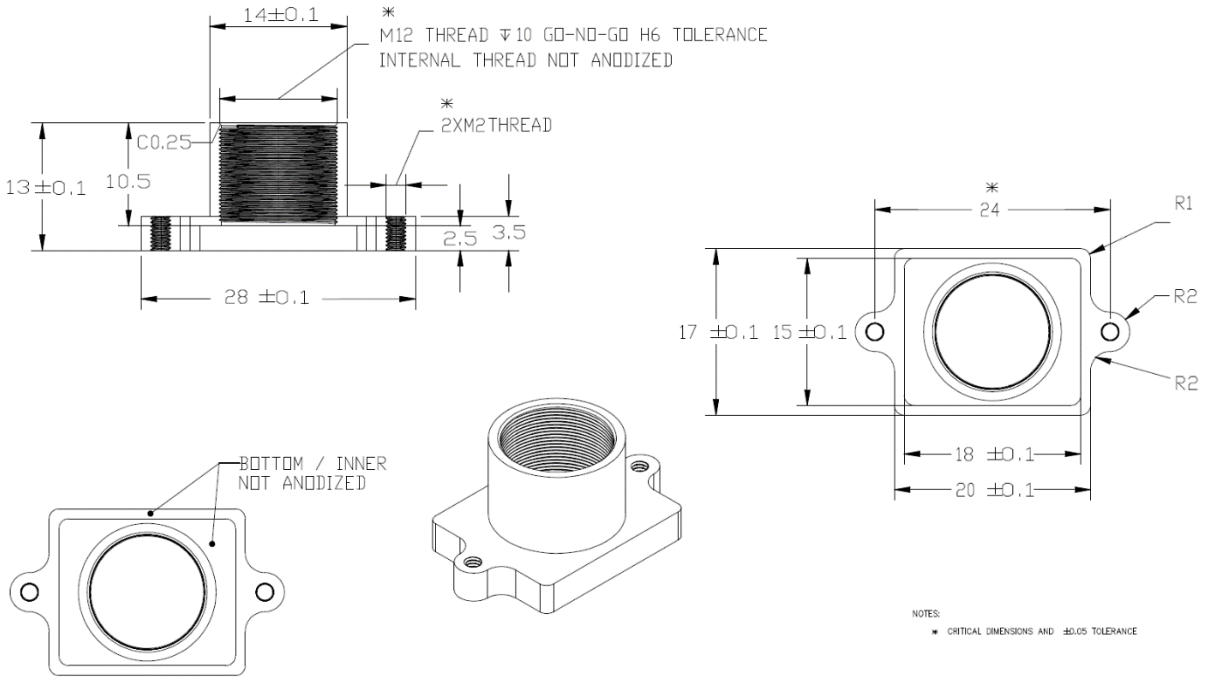

Figure 6: S-Mount Holder Outline Dimension

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

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