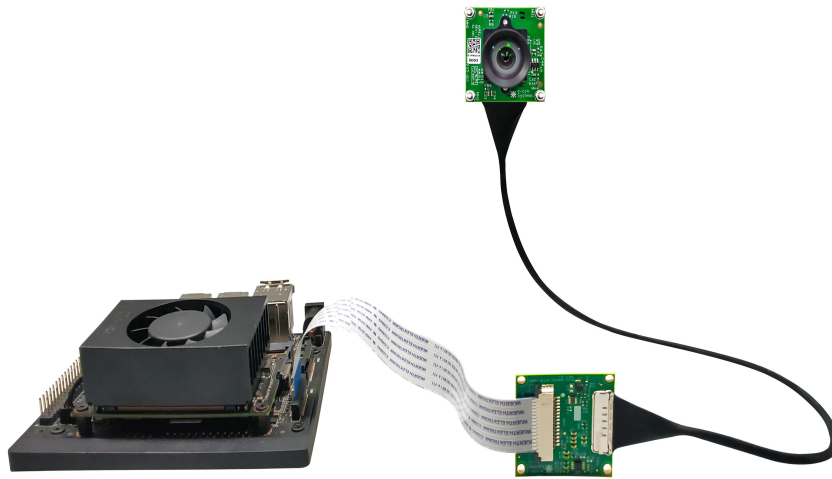




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e-CAM23_CUNX



Datasheet

Revision 1.0
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1 Revision History

Rev	Date	Description	Author
1.0	22-Jan-2021	Initial draft	Application Engineering Team



2 Introduction

The e-CAM23_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 kit. e-CAM23_CUNX can be directly interfaced with Xavier™ NX development kit using J1 and J9 connectors and to Jetson NANO using J13 and J49 connectors.

e-CAM23_CUNX is a 2 MP custom lens camera module based on OmniVision's OV2311 monochrome Image sensor with 3µm x 3µm pixel OmniPixel® 3-GS technology. This 2 MP monochrome camera has 1/2.9" optical form-factor with global shutter and utilizes Jetson™ platform in-built ISP. This camera module is 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 the features of e-CAM23_CUNX board and the pinouts of the connectors including the mechanical diagram.

3 Disclaimer

The specifications and features of e-CAM23_CUNX camera board are provided here as reference only and e-con Systems reserves the right to edit or modify this document without any prior intimation of whatsoever.

4 Description

NVIDIA® Jetson Nano/Xavier™ NX are a small size, low power, AI system-based evaluation boards developed by NVIDIA®. Xavier™ NX/Jetson Nano supports two individual 2-lane MIPI CSI-2 camera connections. e-CAM23_CUNX uses these 2-lane MIPI CSI for connecting 2 MP camera modules.

e-CAM23_CUNX is a multi-board camera solution for Jetson™ platform, which is compatible with Xavier™NX development kit, which has two boards as follows:

- Connector base board (ACC-NANO-WTB-ADP)
- Camera Module board (e-CAM222_CUMI2311_MOD)

The below figures show the adaptor board and module board.



Figure 1: Connector Base Board





Figure 2: Module Board

The camera module is a small, low-power, high performance 2 MP monochrome camera has 1/2.9" optical form-factor with global shutter and utilizes Jetson™ platform in-built ISP. The module board is based on OmniVision's OmniPixel® 3-GS technology CMOS image sensor. These MIPI camera module can be streamed in maximum of 2MP resolution at 60 fps, HD resolution at 90 fps, VGA resolution at 180 fps and QVGA at 280 fps.

The following table lists the supported frame rates of e-CAM23_CUNX camera module. This camera supports below frame rates with Jetson™ NX Xavier development kit.

Platform	Resolution	Frame Rate (fps) in 10-bit Output	Frame Rate (fps) in 8-bit Output
With Xavier NX	QVGA (320 x 240)	280	280
	VGA (640 x 480)	180	180
	HD (1280 x 720)	90	90
	2MP (1600 x 1300)	40	60

Table 1: Maximum Frame Rates in Asynchronous Mode

4.1 Features

The features of e-CAM23_CUNX are as follows:

- Multi-board solution.
- Compactable with Xavier™ platform.
- Standard M12 lens holder for use with customized optics or lenses for various applications.
- Light weight, versatile, and portable design.
- Asynchronous and synchronous states.
- Control for individual cameras and numbers of cameras to be streamed is selectable.
- Imaging applications:
 - ▢ 2 MP CMOS image sensor with Y8/Y16 8-bit/10-bit output format.
 - ▢ Still capture supported resolution - QVGA, VGA, HD and 2MP.
 - ▢ Preview supported resolution - QVGA, VGA, HD and 2MP.
 - ▢ Field of View (FOV) angle is not the same for all preview resolutions.
- Operating power - 0.21W (two cameras streaming condition).
- Operating temperature -30°C to +85°C.



☞ Restriction of Hazardous Substances (RoHS) compliant.

5 Key Specifications

The below table lists the key specifications of e-CAM23_CUNX.

Description	Specification
Base Board Size (L x W)	30 mm x 30 mm
Video Format	YUV 420
Image Resolution	1600 x 1300 (2 MP)
Supported OS	Linux

Table 2: Key Specifications of e-CAM23_CUNX

5.1 CMOS Image Sensor Specification

The below table lists the specification of CMOS image sensor used in e-CAM23_CUNX board.

Sensor Specification	
Type/Optical Size	1/2.9" Optical format CMOS image sensor
Resolution	2 MP
Sensor Type	RAW 8-bit/10-bit
Pixel Size	3 μ m x 3 μ m
Total Number of Pixels	1615H x 1315V
Sensor Effective Area	1600H x 1300V

Table 3: CMOS Image Sensor Specification

For more information about OV2311 CMOS image sensor or for *Datasheet*, please contact Omnivision®.

6 Pin Description

e-CAM23_CUNX adaptor board has two connectors CN1 and CN2. CN1 is 30 pin IPEX connector, used for connecting with the camera module using IPEX cable, whereas CN2 is a single row 15 pin connector, used for connecting with Xavier™ NX development kit through the FPC cable.

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

6.1 Pin-out Details of Camera Connector (CN1)

The below table lists the pin-out details of CAM connector.

Pin No	Signal Name	Pin Type	Description
1	VCC_3P3	POWER	3.3V Power supply for camera board
2	VCC_3P3	POWER	3.3V Power supply for camera board
3	VCC_1P8	POWER	1.8V Power supply for camera board
4	GND	POWER	Ground signal for digital and analog
5	GND	POWER	Ground signal for digital and analog
6	PWDN	OUTPUT	Camera Power down signal
7	I2C_SCL	OUTPUT	I2C Clock signal



8	I2C_SDA	I/O	I2C Data Signal
9	GND	POWER	Ground signal for digital and analog
10	MIPI_D2_N	INPUT	MIPI Data Lane 2 Differential Pair -
11	MIPI_D2_P	INPUT	MIPI Data Lane 2 Differential Pair +
12	TRIGGER	OUTPUT	Camera trigger signal
13	RSVD	-	Reserved
14	GND	POWER	Ground signal for digital and analog
15	MIPI_D1_N	INPUT	MIPI Data Lane 1 Differential Pair -
16	MIPI_D1_P	INPUT	MIPI Data Lane 1 Differential Pair +
17	GND	POWER	Ground signal for digital and analog
18	GND	POWER	Ground signal for digital and analog
19	MIPI_D0_N	INPUT	MIPI Data Lane 0 Differential Pair -
20	MIPI_D0_P	INPUT	MIPI Data Lane 0 Differential Pair +
21	RESET	OUTPUT	Camera reset signal (Active low)
22	GND	POWER	Ground signal for digital and analog
23	RSVD	-	Reserved
24	MIPI_CLK_N	INPUT	MIPI Clock Lane Differential Pair -
25	MIPI_CLK_P	INPUT	MIPI Clock Lane Differential Pair +
26	GND	POWER	Ground signal for digital and analog
27	MIPI_D3_N	INPUT	MIPI Data Lane 3 Differential Pair -
28	MIPI_D3_P	INPUT	MIPI Data Lane 3 Differential Pair +
29	FLASH	INPUT	Camera Flash signal
30	RSVD	-	Reserved

Table 4: Pin-out Details of CAM Connector

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

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

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	CAM_MCLK	INPUT	Camera trigger signal
13	I2C_3P3_SCL	INPUT	3.3V IO I2C SCL signal
14	I2C_3P3_SDA	I/O	3.3V IO I2C SDA 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 below table lists connectors used in e-CAM23_CUNX and its compatible mating connectors.

Connector	Description	Manufacturer	Part Number
e-CAM23_CUNX FFC connector (CN2) for connecting with NVIDIA® Xavier™ NX through FPC cable	CONN FPC Top Contacts P-1mm 15Pos Right Angle SMT	TE Connectivity	1-84953-5
FPC cable used for connecting e-CAM23_CUNX with NVIDIA® Xavier™ NX development kit	15 Position FFC, FPC Cable 1mm pitch, 152mm length	Wurth Electronics	686615152001
e-CAM23_CUNX headers (CN1) for mating module board with adaptor board	30-pin receptacle connector with 0.4 mm pitch fully shielded	I-PEX	20682-030E-02
Micro-coaxial cable assembly to connect base board and adaptor board	30 cm length micro-coaxial cable with pin 1 to 1 compatible	I-PEX	81214-530B-300-1

Table 6: Connector Part Numbers

7 Electrical Specification

The electrical specification of e-CAM23_CUNX are as follows:

- [Functional Temperature Range](#)
- [Recommended Operating Condition](#)
- [Power Consumption Details in Asynchronous Mode](#)

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 Functional Temperature Range

The functional temperature range of e-CAM23_CUNX is listed in the following table.

Temperature Range	Parameter Description
-30°C to 85°C	Electrically functional operating range

Table 6: Operating Temperature Range

Note: The default lens (optional) supplied with this camera has operating temperature range of -20°C to +60°C. You can choose wider operating temperature lens as per your requirements.

7.2 Recommended Operating Condition

The below table lists the recommended operating condition of e-CAM23_CUNX.

Development Kit	Typical Operating Voltage	Typical Power Consumption
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With Xavier NX™	3.3 V	0.21 W
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Table 7: Recommended Operating Condition

8 Mechanical Specifications

e-CAM23_CUNX base board size is 30 mm x 30 mm. The board drawing and its dimensions are described in the following section.

8.1 e-CAM23_CUNX Dimension

The front portion of e-CAM23_CUNX base board with mechanical dimensions is shown below.

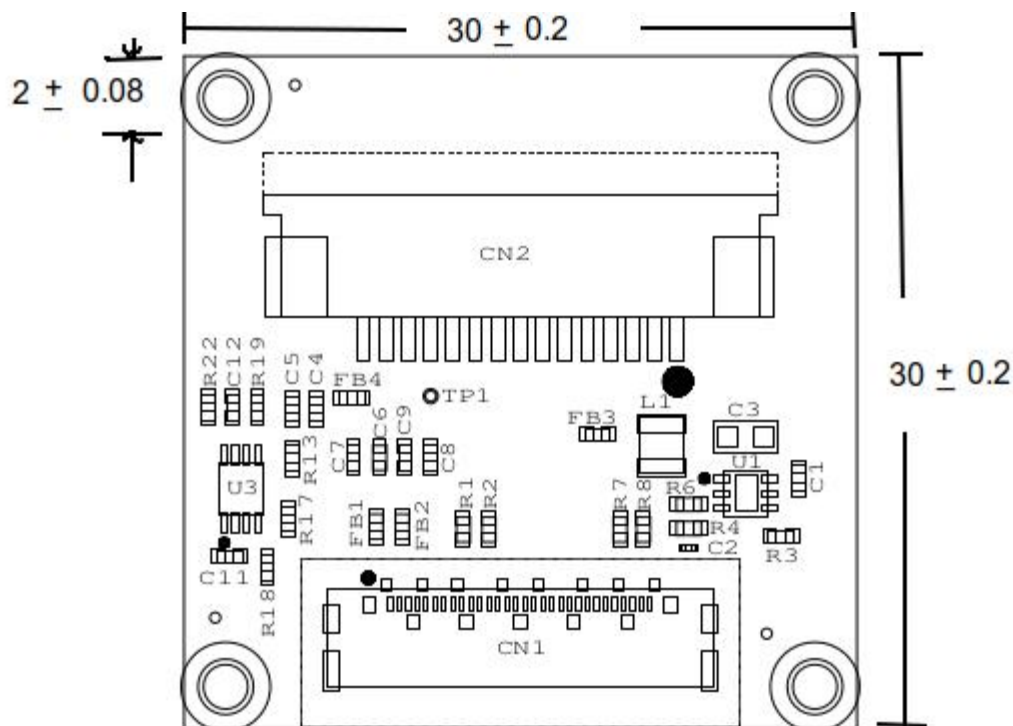


Figure 4: Front Portion of e-CAM23_CUNX Base Board Mechanical Dimensions



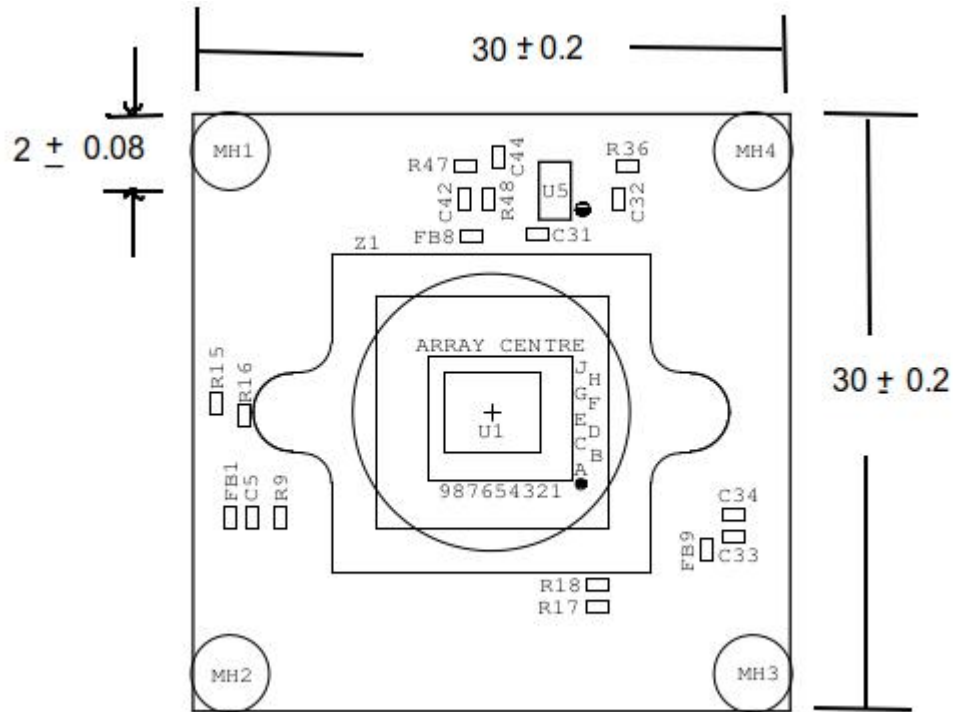


Figure 5: Front Portion of e-CAM222_CUMI_MOD Board Mechanical Dimensions

Note: All dimensions are in mm.

For e-CAM23_CUNX detailed module board mechanical dimension information, please refer to the *e-CAM222_CUMI2311_MOD_Datasheet.pdf*.



Support

Contact Us

If you need any support on e-CAM23_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>

