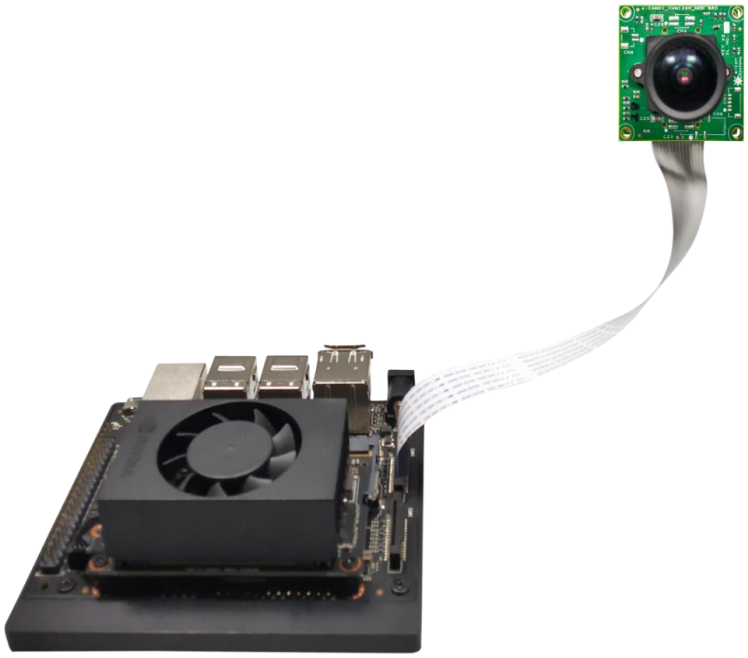
e-con Systems India Pvt Ltd

Web: www.e-consystems.com

Email: camerasolutions@e-consystems.com

e-CAM22_CUNX



Datasheet

Revision 1.1
24 August, 2023

Contents

1 Introduction

The e-CAM22_CUNX camera is a 2 MP MIPI color camera from e-con Systems, a company with over two decades of experience in designing, developing, and manufacturing OEM cameras. This camera can be directly interfaced with NVIDIA® Jetson Xavier NX™ development kit using J1 or J9 connectors on the Xavier™ NX development kit using a FPC connector.

e-CAM22_CUNX board connects 2 MP camera module based on Sony STARVIS® IMX462 CMOS image sensor with NVIDIA® Jetson Xavier™ NX development kit. This 2 MP color camera has 1/2.8" optical form-factor with electronic rolling shutter and utilizes Jetson™ platforms in-built ISP. This camera module is provided with S-mount lens holder (also known as M12 board lens), which is the most used small form-factor lens mounts for board cameras and offers customized optics.

This document describes about the features of e-CAM22_CUNX board and the pin-outs of the connectors including the mechanical diagram.

2 Disclaimer

The specifications and features of e-CAM22_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.

3 Description

e-CAM22_CUNX connects 2 MP camera modules using individual 2-Lane MIPI CSI camera connections supported by NVIDIA® Jetson Xavier™ NX development kit. The Jetson Xavier™ NX development kit is a small size, low power, AI system-based evaluation kit developed by NVIDIA®.

e-CAM22_CUNX is a multi-board solution, which has two boards as follows:

- Camera module board (e-CAM221_CUMI462_MOD)
- Adaptor board (ACC_NANO_ADP)

The front and rear views of e-CAM221_CUMI462_MOD board and ACC_NANO_ADP adaptor board are shown in the following figures.

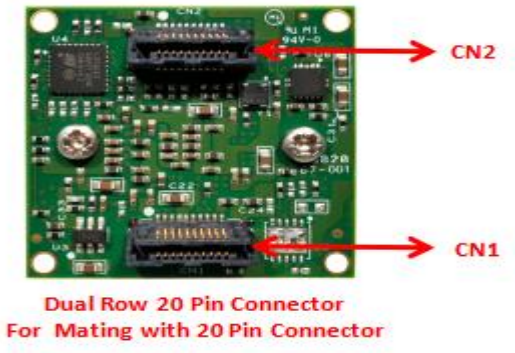


Figure 1: Rear View of e-CAM221_CUMI462_MOD Board

Figure 2: Front View of e-CAM221_CUMI462_MOD Board

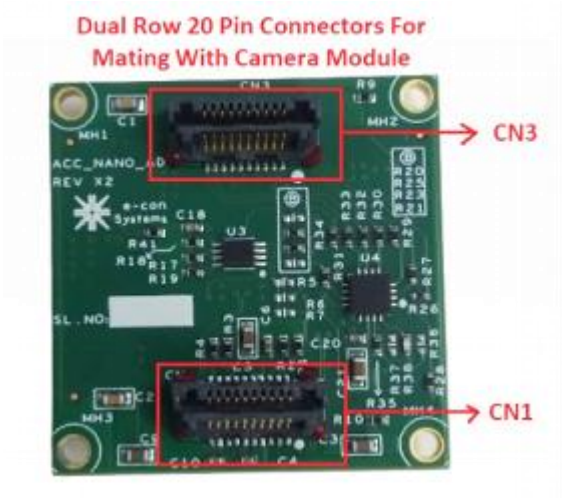


Figure 3: Front View of ACC_NANO_ADP Adaptor Board

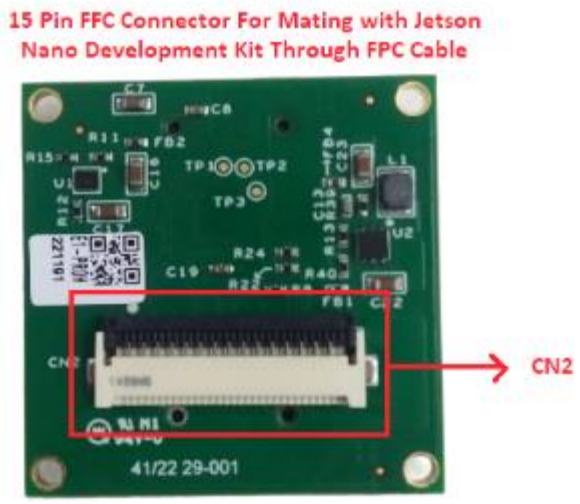


Figure 4: Rear View of ACC_NANO_ADP Adaptor Board

e-CAM22_CUNX camera module has two 20-pin Samtec connectors (CN1 and CN2) for mating with e-CAM22_CUNX adaptor board. This adaptor board acts as a bridge between the camera module and the Jetson® Xavier™ NX development kit. The adaptor board provides the voltages required for camera module. e-CAM22_CUNX adaptor board consists of 15-pin FFC connector (CN3), through which e-CAM22_CUNX is connected to Jetson® Xavier™ NX development kit over FPC cable of maximum 15 cm length.

For detailed interfacing of the e-CAM22_CUNX camera board, please refer to the *e-CAM22_CUNX_Getting_Started_Manual_Rev_<ver>.pdf*.

The below table lists the supported frame rates with Jetson NX™ Xavier development kit.

Platform	Resolution	Frame Rate (fps) in 12-bit Output
With Xavier NX	HD (1280 x 720)	60
	FHD (1920 x 1080)	60
	FHD (1280 x 720)	30
	FHD (1920 x 1080)	30

Table 1: Supported Resolution and Frame Rates

2.1 Features

The features of e-CAM22_CUNX are as follows:

- Multi-board solution.
- Compatible with Xavier™ platforms.
- Standard M12 lens holder for use with customized optics or lenses for various applications.
- Light weight, versatile, and portable design.
- Control for individual cameras and numbers of cameras to be streamed is selectable.
- Imaging applications:
  - 2 MP CMOS image sensor with RGB 12-bit output format.

  - Still capture supported resolution - HD and FHD.
  - Preview supported resolution - HD and FHD.
  - Field of View (FOV) angle is not the same for all preview resolutions.
- Operating power - 1.94W (cameras streaming condition).
- Operating temperature -30ºC to +85ºC.
- Restriction of Hazardous Substances (RoHS) compliant.

3 Key Specifications

The below table lists the key specifications of e-CAM22_CUNX.

Description	Specification
Video Format	YUV 420
Image Resolution	1920 x 1080 (2 MP)
Supported OS	Linux

Table 2: Key Specifications of e-CAM22_CUNX

3.1 CMOS Image Sensor Specification

The below table lists the specification of CMOS image sensor used in e-CAM22_CUNX board.

Sensor Specification	
Type/Optical Size	1/2.8" Optical format CMOS image sensor
Resolution	2 MP
Sensor Type	RAW 12-bit
Pixel Size	2.9 µm x 2.9 µm
Total Number of Pixels	1945H x 1109V
Sensor Effective Area	1945H x 1097V
G Sensitivity	2.376V at 12-bit HCG mode
	0.921V at 12-bit LCG mode

Table 3: CMOS Image Sensor Specification

For more information about IMX462 CMOS image sensor or for *Datasheet*, please contact Sony®.

4 Pin Description

e-CAM22_CUNX adaptor board has three connectors CN1, CN2 and CN3. The CN1 and CN2 are dual row 20-pin Samtec connectors, used for direct mating with the camera module, whereas CN3 is a single row 15-pin connector, used for connecting with Jetson Xavier™ NX development kit through the FPC cable. The dual row connector is 1 to 2 mating type connectors. You must note the given pin numbers and direction with respect to the adaptor board.

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

4.1 Pin-out Details of Adaptor Board Dual Row Connectors (CN1, CN3)

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

CN1 Pin No	Signal Name	Pin Type	Description
1	MIPI_DN0	INPUT	MIPI Data Lane 0 Differential Pair -
2	RSVD	--	Reserved
3	MIPI_DP0	INPUT	MIPI Data Lane 0 Differential Pair +
4	RSVD	--	Reserved
5	GND	POWER	Ground signal for digital and analog
6	GND	POWER	Ground signal for digital and analog
7	VCC_3P3	POWER	3.3V Power supply for camera board
8	VCC_3P3	POWER	3.3V Power supply for camera board
9	VCC_3P3	POWER	3.3V Power supply for camera board
10	VCC_3P3	POWER	3.3V Power supply for camera board
11	GND	POWER	Ground signal for digital and analog
12	GND	POWER	Ground signal for digital and analog
13	MIPI_CLKN	INPUT	MIPI Clock Lane Differential Pair -
14	RSVD	--	Reserved
15	MIPI_CLKP	INPUT	MIPI Clock Lane Differential Pair +
16	RSVD	--	Reserved
17	VCC_1P8	POWER	1.8V Power supply for camera board
18	GND	POWER	Ground signal for digital and analog
19	VCC_1P8	POWER	1.8V Power supply for camera board
20	VCC_1P8	POWER	1.8V Power supply for camera board

Table 4: Adaptor Board CN1 Connector Pin Description Details

The below table lists the pin-out details of CN3 connector.

CN2 Pin No	Signal Name	Pin Type	Description
1	MIPI_DN1	INPUT	MIPI Data Lane 1 Differential Pair -
2	VCC_2P8	POWER	2.8V Power supply for camera board
3	MIPI_DP1	INPUT	MIPI Data Lane 1 Differential Pair +
4	VCC_2P8	POWER	2.8V Power supply for camera board
5	GND	POWER	Ground signal for digital and analog
6	GND	POWER	Ground signal for digital and analog
7	RSVD	--	Reserved
8	CAM_I2C_SCL	OUTPUT	1.8V IO Camera I^2C SCL signal (Internally pulled-up to 1.8V using 4.7KΩ)

9	RSVD	--	Reserved
10	CAM_I2C_SDA	I/O	1.8V IO Camera I²C SDA signal (Internally pulled-up to 1.8V using 4.7KΩ)
11	RSVD	--	Reserved
12	nCAM_RST	OUTPUT	1.8V IO camera reset signal (Active low signal)
13	RSVD	--	Reserved
14	CAM_PWDN	OUTPUT	1.8V IO camera power down signal (Active high signal)
15	GND	POWER	Ground signal for digital and analog
16	RSVD	--	Reserved
17	CAM_TRIGGER	OUTPUT	1.8V IO Trigger signal for camera
18	RSVD	--	Reserved
19	RSVD	---	Reserved
20	GPIO	I/O	1.8V IO GPIO signal for camera

Table 5: Adaptor Board CN3 Connector Pin Description Details

4.2 Pin-out Details of Adaptor Board FFC Connector (CN2)

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

CN3 Pin No	Signal Name	Pin Type	Description
1	GND	POWER	Ground signal for digital and analog
2	MIPI_DN0	OUTPUT	MIPI Data Lane 0 Differential Pair -
3	MIPI_DP0	OUTPUT	MIPI Data Lane 0 Differential Pair +
4	GND	POWER	Ground signal for digital and analog
5	MIPI_DN1	OUTPUT	MIPI Data Lane 1 Differential Pair -
6	MIPI_DP1	OUTPUT	MIPI Data Lane 1 Differential Pair +
7	GND	POWER	Ground signal for digital and analog
8	MIPI_CLKN	OUTPUT	MIPI Clock Lane Differential Pair -
9	MIPI_CLKP	OUTPUT	MIPI Clock Lane Differential Pair +
10	GND	POWER	Ground signal for digital and analog
11	RSVD	--	Reserved
12	RSVD	--	Reserved
13	I2C_SCL	INPUT	3.3V IO I2C SCL signal (Internally pulled-up to 3.3V using 4.7KΩ)
14	I2C_SDA	I/O	3.3V IO I2C SCL signal (Internally pulled-up to 3.3V using 4.7KΩ)
15	VCC_3P3	POWER	3.3V Power supply for camera board

Table 6: Adaptor Board CN3 Connector Pin Description Details

4.3 Connector Part Numbers

The below table lists the connectors used in e-CAM22_CUNX and its compatible mating connectors.

Connector	Description	Manufacturer	Part Number
e-CAM22_CUNX adaptor board dual row connectors (CN1 and CN2) for mating with e-CAM22_CUNX camera module	Board - Board, 20-Pin, 0.635 mm pitch, Vertical SMD connector	Samtec	LSS-110-01-H-DV-A
e-CAM22_CUNX FFC connector (CN3) for connecting with Jetson Xavier NX™ development kit through FPC cable	FFC Board - Cable, 15-pin, 1 mm pitch, Right angle, rotary lock, SMD connector	Omron Electronics	XF3M(1)-1515-1B
FPC cable used for connecting e-CAM22_CUNX with Jetson Xavier™ NX development kit	FPC cable, 15 position, 1 mm pitch, 15 cm length, with conductive top on one side and bottom on another side	Wurth Electronics	686715152001

Table 7: Connector Part Numbers

5 Electrical Specification

The electrical specification of e-CAM22_CUNX are as follows:

- Functional Temperature Range
- Recommended Operating Condition

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.

5.1 Functional Temperature Range

The below table lists the functional temperature range of e-CAM22_CUNX.

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

Table 8: Operating Temperature Range

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

5.2 Recommended Operating Condition

The below table lists the recommended operating condition of e-CAM22_CUNX.

Development Kit	Typical Operating Voltage	Typical Power Consumption
With Xavier NX	3.3 V	0.495 W

Table 9: Recommended Operating Condition

6 Mechanical Specifications

The e-CAM22_CUNX adaptor board and camera board size are 30 mm x 30 mm. The board drawing and its dimensions are described in the following section.

6.1 e-CAM22_CUNX Adaptor Board Dimension

The front portion of e-CAM22_CUNX adaptor board with mechanical dimensions is shown below.

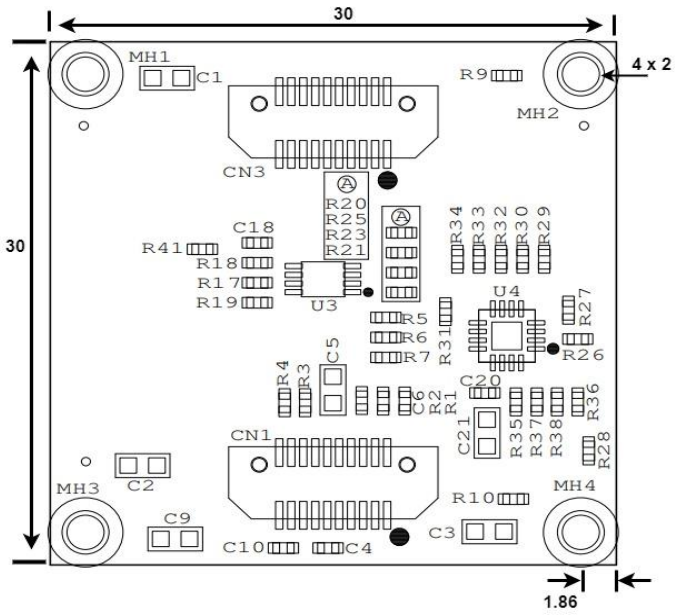


Figure 5: Front Portion of e-CAM22_CUNX Adaptor Board Mechanical Dimensions

The rear portion of e-CAM22_CUNX adaptor board with mechanical dimensions is shown below.

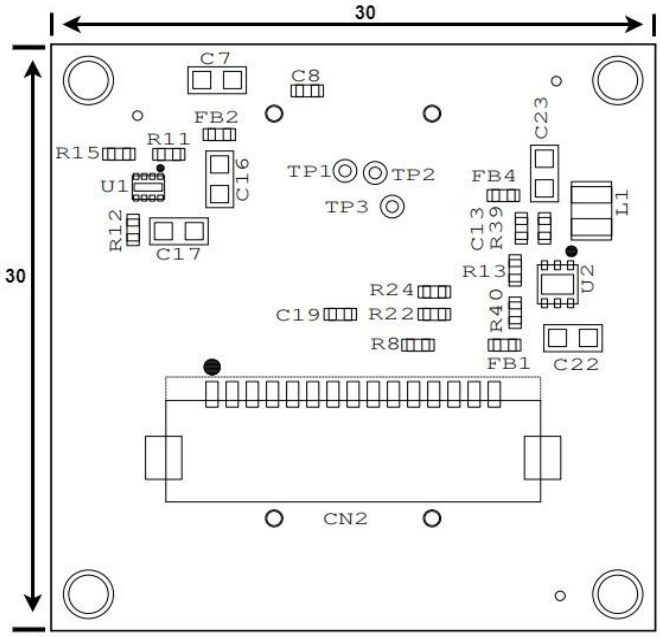


Figure 6: Rear Portion of e-CAM22_CUNX Adaptor Board Mechanical Dimensions

Note: All dimensions are in mm.

For e-CAM22_CUNX module board mechanical dimension information, please refer to the *e-CAM221_CUMI462_MOD_Datasheet_Rev_<ver>.pdf*.

6.2 Lens Holder Dimensions

The lens holder with mechanical dimensions is shown below.

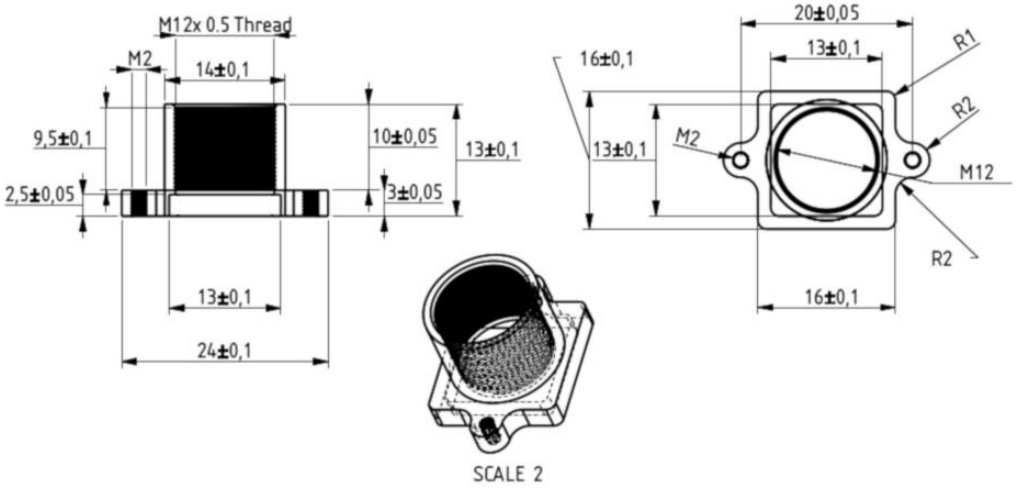


Figure 7: Lens Holder Mechanical Dimensions

Revision History

Rev	Date	Description	Author
1.0	27-Jan-2021	Initial draft	Application Engineering Team
1.1	24-Aug-2023	Software release package is updated	Product Marketing Team

Support

Contact Us

If you need any support on e-CAM22_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