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e-CAM30_CUNANO



Datasheet

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e-CAM30_CUNANO

1 Revision History

Rev	Date	Major Changes	Author
1.0	30-April-2019	Initial draft	Camera Team



2 Introduction

The e-CAM30_CUNANO 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™ development kit. e-CAM30_CUNANO can be directly interfaced with Jetson Nano™ development kit through J13 connector.

e-CAM30_CUNANO is 3.4MP customer lens camera module based on 1/3" AR0330 CMOS image sensor from ON Semiconductor®. It is a color camera that supports uncompressed UYVY 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-CAM30_CUNANO board and the pin-outs of the connectors including the mechanical diagram.

3 Disclaimer

The specifications and features of e-CAM30_CUNANO 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

Jetson Nano™ is a newly launched small size, low power, AI system-based evaluation board developed by NVIDIA® Jetson Nano™ SOM containing 12 MIPI CSI-2 D-PHY lanes, which can be either used as four 2-Lane MIPI CSI configuration or three 4-Lane MIPI CSI configuration for camera interfaces. Jetson Nano™ development kit is limited to single 2-lane MIPI CSI-2 configuration. e-CAM30_CUNANO uses these 2-Lane MIPI CSI for connecting 3.4MP camera modules.

e-CAM30_CUNANO is a multi-board solution, which has two boards as follows:

- Camera module (e-CAM30A_CUMI0330_MOD)
- Adaptor board (ACC_NANO_ADP)

The camera module is a small, low-power, high performance 3.4MP camera with a built-in ISP, which supports UYVY format. This camera module is based on AR0330CS CMOS image sensor from ON Semiconductor®. The AR0330 is a 1/3" optical form-factor, CMOS image sensor with an electronic rolling shutter.

The following table lists the supported frame rates by e-CAM30_CUNANO camera module.

Resolution	Frame Rate (fps)
VGA (640 x 480)	60
HD (1280 x 720)	60
FHD (1920 x 1080)	60



3MP (2304 x 1296)	45
3.4MP (2304 x 1536)	38

Table 1: Supported Resolution and Frame Rates

The e-CAM30_CUNANO camera module has two 20-pin Samtec connectors (CN1 and CN2) for mating with e-CAM30_CUNANO adaptor board. This adaptor board acts as a bridge between the camera module and the Jetson Nano™ development kit. The adaptor board supplies the voltages required by camera module. e-CAM30_CUNANO adaptor board consists of 15-pin FFC connector (CN3), through which e-CAM30_CUNANO is connected to Jetson Nano™ development kit using the FPC cable of 15cm length.

4.1 Features

The features of e-CAM30_CUNANO are as follows:

- Multi-board solution.
- 3.4 MP camera sensor with UYVY format.
- Standard M12 lens holder for use with customized optics or lenses for various applications.
- Lightweight, versatile, and portable design.
- Imaging applications
 - 3.4 MP CMOS image sensor with 1/3" optical form-factor.
 - Still capture supported resolution: 640x480, HD (720p), FHD (1080p), 3MP and 3.4MP.
 - Video streaming supported resolution: 640x480, HD (720p), FHD (1080p), 3MP and 3.4MP.
 - Field of View (FOV) angle is not the same for all preview resolutions.
- Linux camera driver (V4L2) for 3.4 MP MIPI CSI-2 camera module is supported.
- Maximum power consumed -1.16W (3.3V +/- 5% @ 351mA).
- Operating temperature range: -30°C to 70°C.
- Restriction of Hazardous Substances (RoHS) compliant.

5 Key Specifications

The following table lists the key specifications of e-CAM30_CUNANO.

Description	Specification
Base board size (L x W)	30 mm x 30 mm
Video format	UYVY
Image resolution	2304 x 1536 (3.4 MP)
Supported OS	Linux

Table 2: Key Specifications of e-CAM30_CUNANO

5.1 CMOS Image Sensor Specifications

The following table lists the specifications of the CMOS image sensor used in this e-CAM30_CUNANO camera board.

Sensor Specification	
Type / Optical size	1/3" Optical format CMOS Image sensor
Resolution	3.4MP
Sensor type	10-bit or 12-bit RAW format
Pixel size	2.2 μm x 2.2 μm
Sensor active area	2304H x 1536V
Responsivity	2 V/lux-sec
SNR	39 dB
Dynamic range	69.5 dB

Table 3: CMOS Image Sensor Specification

For more information about the AR0330 sensor or for Datasheet, please contact ON Semiconductor®.

6 Pin Description

e-CAM30_CUNANO 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 Nano™ development kit through the FPC cable. The pin description of connectors is explained in the following sections.

6.1 Pin-out Details of Adaptor Board Dual Row Connector (CN1, CN2)

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

CN2Pin 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 I2C 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	CAM_STROBE	INPUT	1.8V IO Strobe signal from Camera
20	GPIO	I/O	1.8V IO GPIO signal for Camera

Table 5: Adaptor Board CN2 Connector Pin Description Details

6.2 Pin-out Details of Adaptor Board FFC Connector (CN3)

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

CN3Pin 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 4.7K Ω)
14	I2C_SDA	I/O	3.3V IO I2C SCL signal (Internally pulled-up to 3.3V using 4.7K Ω)
15	VCC_3P3	POWER	3.3V Power supply for camera board

Table 6: Adaptor Board CN3 Connector Pin Description Details

6.3 Connector Part Numbers

The following table lists connectors and cable used in e-CAM30_CUNANO and its compatible mating connectors.

Connector	Description	Manufacturer	Part Number
e-CAM30_CUNANO adaptor board dual row connectors (CN1 and CN2) for mating with e-CAM30_CUNANO camera module	Board - Board, 20-Pin, 0.635 mm pitch, Vertical SMD connector	Samtec	LSS-110-01-H-DV-A
e-CAM30_CUNANO FFC connector (CN3) for connecting with Jetson Nano™ development kit through FPC cable	FFC, Board - Cable, 15-pin, 1mm pitch, Right angle, rotary lock, SMD connector	Omron Electronics	XF3M(1)-1515-1B
FPC cable used for connecting e-CAM30_CUNANO with Jetson Nano™ development kit	FPC cable, 15 position, 1mm pitch, 15cm length, with conductive top on one side and bottom on another side	Wurth Electronics	686715152001

Table 7: e-CAM30_CUNANO Connector Details

7 Electrical Specification

The following sections list the electrical specification, recommended operating conditions and power consumption details of e-CAM30_CUNANO.

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-CAM30_CUNANO.

Parameter	Typical Operating Voltage	Typical Power Consumption
Input voltage	3.3V	351mA

Table 8: Recommended Operating Condition

e-CAM30_CUNANO 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-CAM30_CUNANO for various resolution and frame rates.

S.No	Resolution	Frame Rate(fps)	SupplyVoltage (V)	TypicalCurrent(mA)	PowerConsumption (W)
1	VGA(640 x 480)	60	3.3V	231	0.762
2	HD(1280 x 720)	60	3.3V	346	1.142
3	FHD(1920 x 1080)	60	3.3V	351	1.158
4	3MP(2304 x 1296)	45	3.3V	308	1.016
5	3.4MP(2304 x 1536)	38	3.3V	309	1.020

Table 9: Power Consumption Details

8 Mechanical Specification

The adaptor board and camera board of e-CAM30_CUNANO are 30mm x 30mm in dimension. The front view of the e-CAM30_CUNANO adaptor board and its dimensions are shown in the following figure.



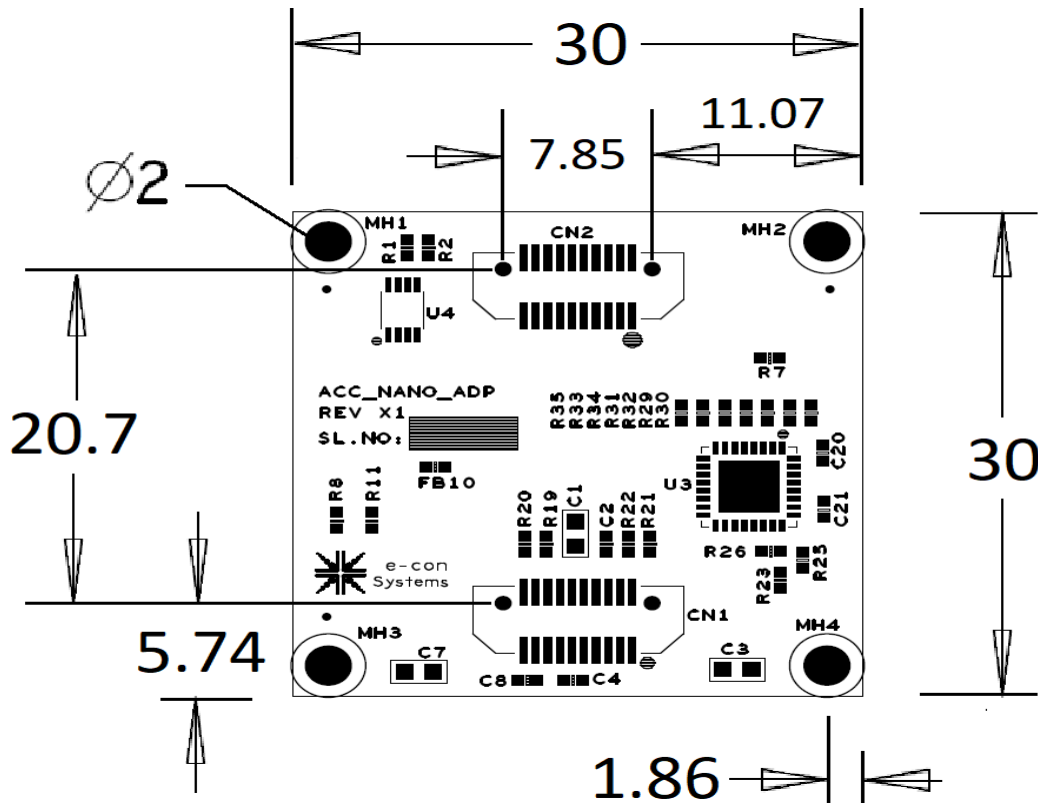


Figure 1: Front View of e-CAM30_CUNANO Adaptor Board Mechanical Dimensions

Note: All dimensions are in mm.

For e-CAM30_CUNANO module board mechanical dimension information, please refer to the *e-CAM30A_CUMI0330_MOD_Datasheet.pdf*.



Support

Contact Us

If you need any support on e-CAM30_CUNANO 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>

