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e-CAM50_CUiMX8_H01R2

Datasheet

Revision 1.1
27 July, 2023

Contents

1 Revision History

Rev	Date	Description	Author
1.0	17-Dec-2020	Initial draft	Application EngineeringTeam
1.1	27-July-2023	Adapter Board changed	Product Marketing Team

2 Introduction

The e-CAM50_CUiMX8_H01R2 board is a camera board from e-con Systems, a company with over two decades of experience in designing, developing, and manufacturing OEM cameras. This camera board can be directly interfaced with a Toradex® development kit using a FPC connector.

e-CAM50_CUiMX8_H01R2 is 5 MP custom lens camera based on 1/2.5" AR0521 CMOS image sensor from onsemi™. It is a color camera which supports UYVY image format and is provided with a S-mount (also known as M12 board lens) lens holder. The S-mount is a small form-factor lens mounts for board cameras. This camera can be utilized by any V4L2 application.

This document describes about the features of e-CAM50_CUiMX8_H01R2 board and the pin-outs of the connectors including the mechanical diagram.

The following table lists the supported platforms for the e-CAM50_CUiMX8_H01R2.

Camera	Platforms
e-CAM50_CUiMX8_H01R2	Apalis iMX8QM SoM with Ixora carrier board
	Verdin iMX8MM and iMX8MP SoM with verdin carrier board

Table 1: Supported Platforms

3 Disclaimer

The specifications and features of the e-CAM50_CUiMX8_H01R2 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

e-CAM50_CUiMX8_H01R2 uses 4-Lane MIPI CSI-2 interface for connecting 5 MP camera modules. This camera solution consists of two boards:

- Camera module board (e-CAM55_CUMI0521_MOD)
- Camera adaptor board (ACC-iMX8-MI-WTB-ADP-H01R1)

The following figures show the front and rear views of the module board and the adaptor board.

Figure 1: Front View of Camera Module Board

Figure 2: Rear View of Camera Adapter Board

The camera module is a small, low-power, high performance 5 MP camera module with a built-in ISP. This module is based on AR0521 CMOS image sensor from onsemi™. The AR0521 is a 1/2.5" optical form-factor, CMOS image sensor with an electronic rolling shutter.

The following table lists the supported frame rates of e-CAM55_CUiMX8_H01R2 camera module.

Resolution	Frame Rate (fps)
640 x 480	58
1280 x 720	70
1280 x 960	58
1920 x 1080	65
2560 x 1440	38
2592 x 1944	28

Table 2: Supported Resolution and Frame Rates

The e-CAM55_CUMI0521_MOD camera module has two 20-pin Samtec connectors (CN1 and CN2) for mating with the ACC-iMX8-MI-WTB-ADP-H01R1 adaptor board. The camera adaptor board is connected with the Toradex® development kit though the FPC cable. This adaptor board acts as a bridge between the camera module and the Toradex® development kit. The adaptor board supplies the voltages required by camera module.

4.1 Features

The features of e-CAM50_CUiMX8_H01R2 are as follows:

- Multi-board solution
- 5 MP camera sensor with uncompressed UYVY format
- Compatible with Toradex® development kit
- Standard M12 lens holder for use with customized optics or lenses for various applications
- Light weight, versatile, and portable design
- Imaging applications
  - 5 MP CMOS image sensor with 1/2.5" optical form-factor
  - Still capture supported resolution: 640 x 480, 1280 x 720, 1280 x 960, 1920 x 1080, 2560 x 1440, 2592 x 1944
  - Video streaming supported resolution: 640 x 480, 1280 x 720, 1280 x 960, 1920 x 1080, 2560 x 1440, 2592 x 1944
  - Field of View (FOV) angle is not the same for all preview resolutions
- Linux camera driver (V4L2) for 5 MP MIPI CSI-2 camera module is supported
- Maximum power consumed: 1.62 W
- Operating temperature range: -30°C to 70°C
- RoHS compliant

5 Key Specifications

The following table lists the specifications of e-CAM50_CUiMX8_H01R2.

Description	Specification
Size (L x W x H)	30 mm × 30 mm
Video format	UYVY
Maximum resolution image	2592 x 1944 (5 MP)
Supported OS	Linux

Table 3: Key Specifications of e-CAM50_CUiMX8_H01R2

5.1 CMOS Image Sensor Specifications

The following table lists the specifications of the CMOS image sensor used in the e-CAM50_CUiMX8_H01R2 camera board.

Sensor Specifications	
Type /Optical Size	1/2.5” Optical format CMOS Image Sensor
Resolution	5 MP
Image Format	UYVY
Pixel Size	2.2um X 2.2um
Sensor Active area	2592 (H) X 1944 (V)
Responsivity	18.8 ke-/lux-sec
SNR	40 dB

Dynamic range	74.3 dB

Table 4: CMOS Image Sensor Specification

For more information about the AR0521 sensor or for Datasheet, please contact onsemi™.

6 Pin Description

e-CAM50_CUiMX8_H01R2 has three connectors CN1, CN2 of e-CAM55_CUMI0521_MOD, and CN1 of ACC-iMX8-MI-WTB-ADP-H01R1. The CN1 and CN2 are dual row 20-pin Samtec connectors, used for direct mating with the camera adaptor board, whereas CN1 of camera adapter board is a single row 24-pin connector, used for connecting with the Toradex® development kit. The dual row connector is 1 to 2 mating type connectors.

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

- Pin-out Details of Camera Adapter board Connector (CN2, CN3)
- Pin-out Details of Adaptor Board FFC Connector (CN1)

6.1 Pin-out Details of Camera Adapter board Connector (CN2, CN3)

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

CN2 Pin No	Signal Name	Pin Type	Description
1	MIPI_DN0	INPUT	MIPI Data Lane 0 Differential Pair -
2	MIPI_DN2	INPUT	MIPI Data Lane 2 Differential Pair-
3	MIPI_DP0	INPUT	MIPI Data Lane 0 Differential Pair+
4	MIPI_DP2	INPUT	MIPI Data Lane 2 Differential Pair+
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	MIPI_DN3	INPUT	MIPI Data Lane 3 Differential Pair-
15	MIPI_CLKP	INPUT	MIPI Clock Lane Differential Pair+
16	MIPI_DP3	INPUT	MIPI Data Lane 3 Differential Pair+
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 5: Camera Adapter Board CN2 Connector Pin Description Details

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

CN3 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	INPUT	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_RESET	I/O	1.8V IO Camera Reset signal (Active low signal
13	RSVD	--	Reserved
14	CAM_PWDN	I/O	1.8V IO Camera Power Down signal (Active High signal)
15	GND	POWER	Ground signal for digital and analog
16	GND	POWER	Ground signal for digital and analog
17	CAM_TRIGGER	OUTPUT	1.8V IO Trigger signal for camera
18	RSVD	--	Reserved
19	CAM_STROBE	INPUT	1.8V IO GPIO signal for camera
20	RSVD	--	Reserved

Table 6: Camera Adapter Board CN3 Connector Pin Description Details

6.2 Pin-out Details of Adaptor Board FFC Connector (CN1)

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

CN1 Pin No	Signal Name	Pin Type	Description
1	GND	POWER	Ground signal for digital and analog
2	MIPI_DN0	INPUT	MIPI Data Lane 0 Differential Pair -
3	MIPI_DP0	INPUT	MIPI Data Lane 0 Differential Pair +
4	GND	POWER	Ground signal for digital and analog
5	MIPI_DN1	INPUT	MIPI Data Lane 1 Differential Pair -
6	MIPI_DP1	INPUT	MIPI Data Lane 1 Differential Pair +
7	GND	POWER	Ground signal for digital and analog
8	MIPI_CLKN	INPUT	MIPI Clock Lane Differential Pair -
9	MIPI_CLKP	INPUT	MIPI Clock Lane Differential Pair +
10	GND	POWER	Ground signal for digital and analog
11	GPIO0_RST_3P3	OUTPUT	3.3V IO camera reset signal (Active low signal)
12	RSVD	--	Reserved
13	CAM_I2C_SCL	INPUT	3.3V IO Camera I2C SCL signal (Internally pulled-up to 1.8V using 4.7KΩ)
14	CAM_I2C_SDA	I/O	3.3V IO Camera I2C SDA signal (Internally pulled-up to 1.8V using

			4.7KΩ)
15	VCC_3P3	POWER	3.3V Power supply for camera board
16	MIPI_DN2	INPUT	MIPI Data Lane 2 Differential Pair -
17	MIPI_DP2	INPUT	MIPI Data Lane 2 Differential Pair +
18	GND	POWER	Ground signal for digital and analog
19	MIPI_DN3	INPUT	MIPI Data Lane 3 Differential Pair -
20	MIPI_DP3	INPUT	MIPI Data Lane 3 Differential Pair +
21	VCC_5V	POWER	5V Power supply for camera board
22	PWDN	OUTPUT	3.3V IO camera power down signal (Active high signal)
23	CAM_STROBE	INPUT	1.8V IO Strobe signal from camera
24	CAM_TRIGGER	OUTPUT	1.8V IO Trigger signal for camera

Table 7: Adaptor Board CN1 Connector Pin Description Details

6.3 Connector Part Numbers

The following table lists the connectors and cables used in e-CAM50_CUiMX8_H01R2 and its compatible mating connectors.

Connector	Description	Manufacturer	Part Number
e-CAM50_CUiMX8_H01R2 camera adaptor board dual row connectors (CN2 and CN3) are used for mating with e-CAM50_CUiMX8_H01R2 camera module	Board - Board, 20- Pin, 0.635 mm pitch, Vertical SMD connector	Samtec	LSS-110- 01-H-DV-A
e-CAM50_CUiMX8_H01R2 FFC connector (CN1) is used for connecting with Toradex® development kit through FPC cable	FFC board - Cable, 24-pin, 0.5 mm pitch, SMD connector	Molex	5051102491
FPC cable is used for connecting e-CAM50_CUiMX8_H01R2 with Toradex® development kit	FPC cable, 24 position, 0.5 mm pitch, 10 cm length, with same side connection	Molex	150180259

Table 8: Connectors and its Part Number Details

7 Electrical Specification

The electrical specifications of e-CAM50_CUiMX8_H01R2 are as follows:

- Recommended Operating Condition
- Power Consumption

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 the e-CAM50_CUiMX8_H01R2.

Parameter	Typical Operating Voltage	Typical Power Consumption (mW)
Input Voltage	3.3V	1.62

Table 9: Recommended Operating Condition of e-CAM50_CUiMX8_H01R2

e-CAM50_CUiMX8_H01R2 does not require any power sequence since it required only 3.3V power supply for operation.

For more information, please refer to the *e-CAM55_CUMI0521_MOD_datasheet.*

7.2 Power Consumption

The following table lists the power consumption details of the e-CAM50_CUiMX8_H01R2.

Parameter Description	Temperature Range
Operating temperature range[1]	−30°C to 70°C

Table 10: Power Consumption Details

8 Mechanical Specifications

The camera adaptor board and camera module of the e-CAM50_CUiMX8_H01R2 is 30 mm x 30 mm in dimension.

8.1 Camera Adaptor Board Dimensions

The following figures show the front and rear views of the e-CAM50_CUiMX8_H01R2 camera adaptor board mechanical dimensions.

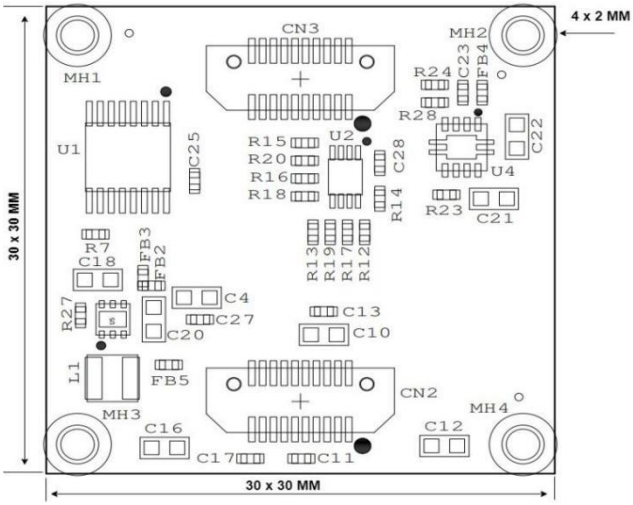

Figure 3: Front View of e-CAM50_CUiMX8_H01R2 Camera Adaptor Board Mechanical Dimensions

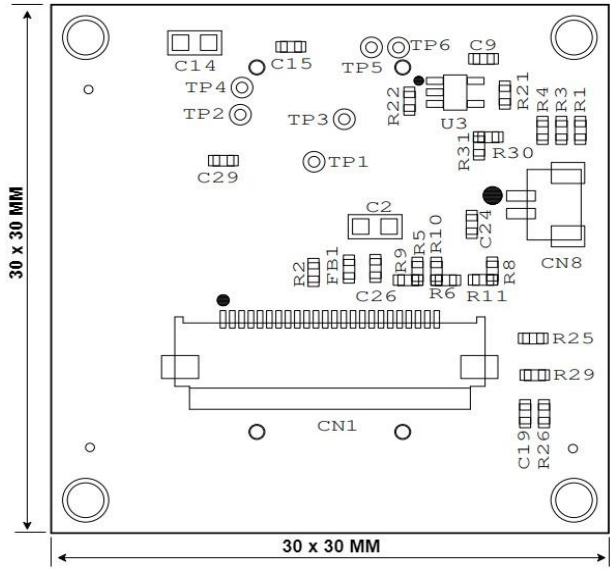

Figure 4: Rear View of e-CAM50_CUiMX8_H01R2 Camera Adaptor Board Mechanical Dimensions

Note: All dimensions are in millimeter (mm).

For e-CAM50_CUiMX8_H01R2 module board mechanical dimension information, please refer to the *e-CAM55_CUMI0521_MOD datasheet.*

8.2 Lens Holder Dimension

The following figure shows the lens holder with mechanical dimensions.

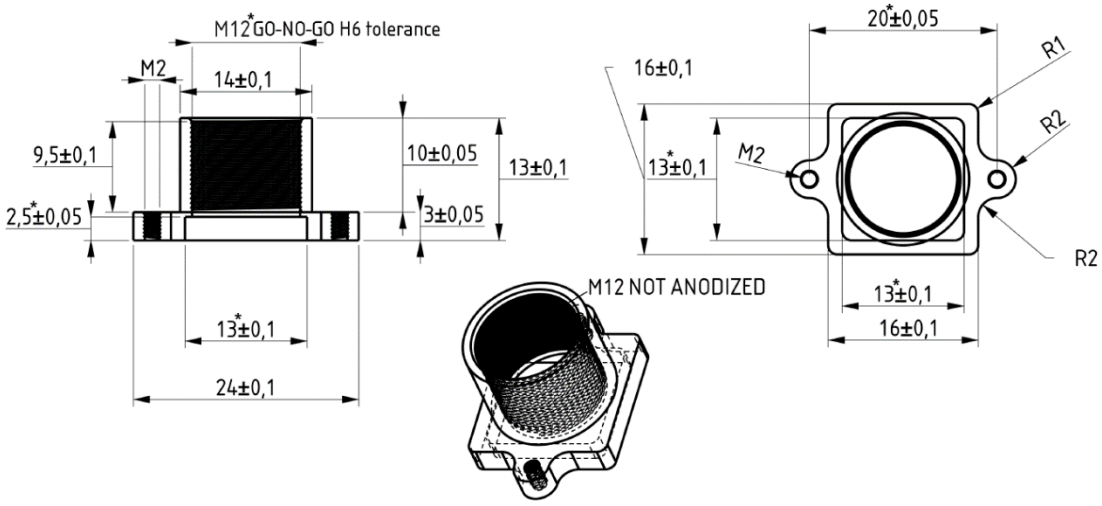

Figure 5: Lens Holder Mechanical Dimensions

Note: All dimensions are in millimeter (mm).

Support

Contact Us

If you need any support on e-CAM50_CUiMX8_H01R2 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