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e-CAM217_CUMI0234_MOD

Camera Module Datasheet

Revision 1.0
15th April 2021

Contents

1 Revision History

Rev	Date	Description	Author
1.0	15-APR-2021	Initial Draft	Camera Team

2 Introduction

e-CAM217_CUMI0234_MOD is a superior low−light and IR performance, 2 MP low light camera module. It is based on AR0234CS CMOS color image sensor from ON Semiconductor®. e-CAM217_CUMI0234_MOD is designed to connect with any application processor that has MIPI interface.

This document serves as the datasheet for e-CAM217_CUMI0234_MOD with electrical and mechanical features.

3 Disclaimer

The specifications and features of e-CAM217_CUMI0234_MOD 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

The camera module 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. e-CAM217_CUMI0234_MOD can stream HD (1280 x 720) at 120 fps, FHD (1920 x 1080) at 65 fps, 1920 x 1200 at 60 fps.

The front view of e-CAM217_CUMI0234_MOD is shown in the following figure.

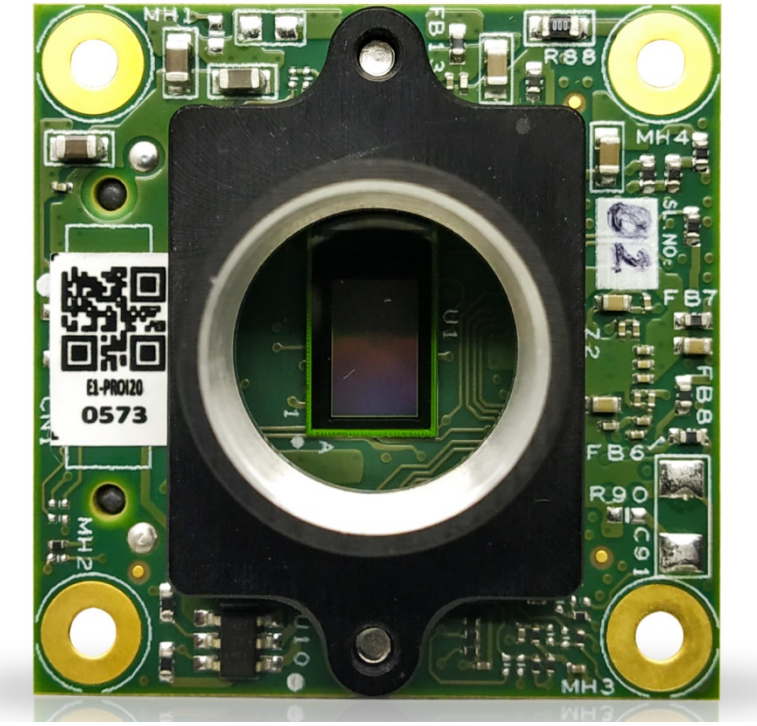

Figure 1: e-CAM217_CUMI0234_MOD Camera Module

4.1 Camera Module Features

The features of camera module are as follows:

- 1/2.6" optical form-factor, 2 MP camera module
- Manual focus/fixed focus lens
- External ISP
- On-board micro-controller to communicate to sensor through I2C Interface
- UYVY image format
- MIPI CSI-2 video output
- Capable of high frame rate video
  - HD (1280 x 720) at 120 fps
  - FHD (1920 x 1080) at 65 fps
  - 1920 x 1200 at 60 fps
- Small form factor pluggable camera module with S-mount lens holder
- 30 mm x 30 mm size
- Restriction of Hazardous Substances (RoHS) compliant
- Two 20-pin SMT connectors
- Power consumption: 0.92 W
- Operating temperature: -30°C to 70°C

4.2 CMOS Image Sensor Features

The features of CMOS image sensor are as follows:

- AR0521 - 5 MP RAW 10-bit CMOS image sensor from ON Semiconductor®
- 1/2.6" optical form-factor
- 3.0 µm pixel size
- Responsivity: 56 Ke/lux*s
- Dynamic Range: 71.4 dB
- SNR_{MAX}: 38 dB
- Active Pixels: 1920 (H) x 1200 (V)

4.3 Maximum Frame Rate Supported

The maximum frame rate supported in e-CAM217_CUMI0234_MOD is listed in following table.

Mode or Resolution	1280 x 720 HD	1920x1080 FHD	1920 x 1200
UYVY	120	65	60

Table 1: Maximum Frame Rate Supported

5 Pin Description

e-CAM217_CUMI0234_MOD has dual row 26-pin connector. The CN2 pin numbers, signal names, pin types and their description from sensor perspective are listed in following table.

CN2 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	ISP_MIPI_DATA2_N	OUTPUT	MIPI Data Lane 2 Differential Pair -
8	CLK_TX2_ISP_I2C_SCL	INPUT	I2C Clock signal
9	MIPI_DATA2_P	OUTPUT	MIPI Data Lane 2 Differential Pair +
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 ISP
13	ISP_MIPI_DATA3_N	OUTPUT	MIPI Data Lane 3 Differential Pair -
14	n_uC_BOOT0	INPUT	MCU Boot Pin
15	ISP_MIPI_DATA3_P	OUTPUT	MIPI Data Lane 3 Differential Pair +
16	GND	POWER	Ground signal for digital and analog
17	GND	POWER	Ground signal for digital and analog
18	CAM_SHUTTER	OUTPUT	Camera Shutter Output
19	ISP_MIPI_DATA1_N	OUTPUT	MIPI Data Lane 1 Differential Pair -
20	-	-	-
21	ISP_MIPI_DATA1_P	OUTPUT	MIPI Data Lane 1 Differential Pair +
22	DIR_SEL	INPUT	Direction Select Pin for the Strobe Output
23	GND	POWER	Ground signal for digital and analog
24	TRIGGER	-	-
25	CAM_STROBE	OUTPUT	Strobe Output
26	VCC_3P3	POWER	3.3V Power supply for camera boards

Table 2: CN2 Pin Descriptions

5.1 Mating Connector Details

The details of mating connectors are listed in following table.

Connector	Description	Manufacturer	Part Number
On-board Connector	CONN Board to Board Receptacle 0.80mm pitch 26Pos Dual Row Vertical SMT	Samtec	ERF8-013-05.0-L-DV-L-K-TR

Table 3: Mating Connector Details

6 Electrical Specification

The electrical specification of e-CAM217_CUMI0234_MOD are as follows:

- Recommended Operating Condition
- Functional Temperature Range
- DC Characteristics
- Power-Up Sequence

6.1 Recommended Operating Condition

The recommended operating voltage and current consumption of e-CAM217_CUMI0234_MOD in active mode is listed in following table.

S.No	Typical Operating Voltage	Current Consumption
1	1.2 V	456mA
2	1.8V	30mA
3	2.8V	68mA
4	3.3V	263mA

Table 4: Recommended Operating Condition in Active Mode

6.2 Functional Temperature Range

The functional temperature range of e-CAM217_CUMI0234_MOD is listed in following table.

Temperature Range	Parameter Description
-30°C to 70°C	Electrically functional operating range

Table 6: Functional Temperature Range

Note: As the temperature increases, the noise level also increases.

6.3 DC Characteristics

The typical condition: VAA = 2.8 V; VAA_PIX = 2.8 V; VDD_IO = 1.8 V; VDD (DIGITAL CORE) = 1.2 V; VDD_PHY = 1.2 V; Output load = 68.5 pF; TJ = 60°C TA = 25°C.

The DC characteristics of e-CAM217_CUMI0234_MOD general purpose IO signals is listed in the following table.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Digital Input Signals						
V_{IL}	Input voltage LOW	V_{DD}_IO = 1.8 V	-		0.54	V
V_{IH}	Input voltage HIGH	V_{DD}_IO = 1.8 V	1.26		-	V
Digital Output Signals						
V_{OL}	Output voltage LOW	-	-		0.4	V
V_{OH}	Output voltage HIGH	-	1.5		-	V

Table 7: DC Characteristics of General Purpose IO Signals

The DC characteristics of e-CAM217_CUMI0234_MOD Reset signal is listed in the following table.

Symbol	Parameter	Conditions	Min	Typical	Max	Unit
Digital Input Signals						
V_{IL}	Input voltage LOW	V_{DD}_IO = 1.8 V	-		0.54	V
V_{IH}	Input voltage	V_{DD}_IO = 1.8 V	1.26		-	V

	HIGH					
Digital Output Signals						
V_{OL}	Output voltage LOW	-	-		0.11	V
V_{OH}	Output voltage HIGH	-	1.68		-	V

Table 8: DC Characteristics of nRST Signal

The DC characteristics of e-CAM217_CUMI0234_MOD Power down signal is listed in the following table.

Symbol	Parameter	Conditions	Min	Typical	Max	Unit
Digital Input signals						
V_{IL}	Input voltage LOW	V_{DD}_IO = 1.8 V	-		0.54	V
V_{IH}	Input voltage HIGH	V_{DD}_IO = 1.8 V	1.26		-	V

Table 9: DC Characteristics of PWDN Signal

Note: e-con Systems recommends the working voltage levels to be typically $1.8V_{DC}$ and not to reach the maximum limit.

6.4 Power-Up Sequence

The e-CAM217_CUMI0234_MOD camera module uses 1.2V for camera's digital core power which is generated from external 5V supply. The I^2C activity must not be performed during power-up sequence. The power-up sequence recommended by e-con Systems in the customer design is shown in the following figure.

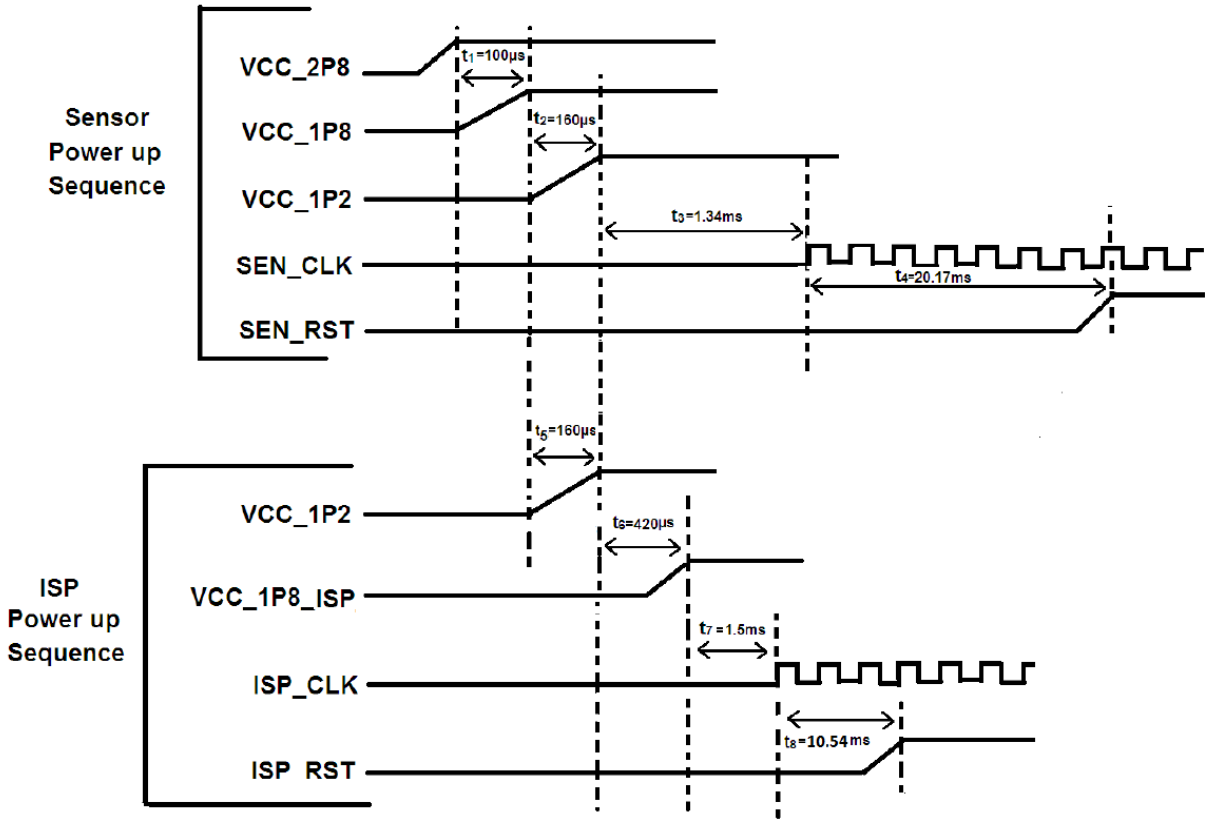

Figure 2: Power-Up Sequence of e-CAM217_CUMI0234_MOD

The power-up sequence timing parameters are listed in the following table.

Symbol	Parameter	Minimum	Unit
t1	2.8V to 1.8V delay	100	µs
t2	1.8V to 1.2V (IO voltage) delay	160	µs
t3	IO voltage to clock control delay	1.34	ms
t4	IO voltage to reset control delay	20.17	ms

Table 10: Power-Up Sequence Timing Parameters

Note: e-con Systems recommends implementing the power-up sequence as mentioned in this document.

7 Mechanical Specifications

The module size is 30 mm x 30 mm and the stack-up height of the board with its mating connector is 6 mm. The height of the S-mount lens holder is 13 mm. The datasheets of the connectors, the S-mount lens holder, and the modules mechanical drawing in DXF File format are available on request.

The e-CAM217_CUMI0234_MOD board drawing and dimensions are described in the following section.

7.1 e-CAM217_CUMI0234_MOD Mechanical Drawing

The top and bottom views of e-CAM217_CUMI0234_MOD mechanical drawing with optical orientation is shown in the following figures.

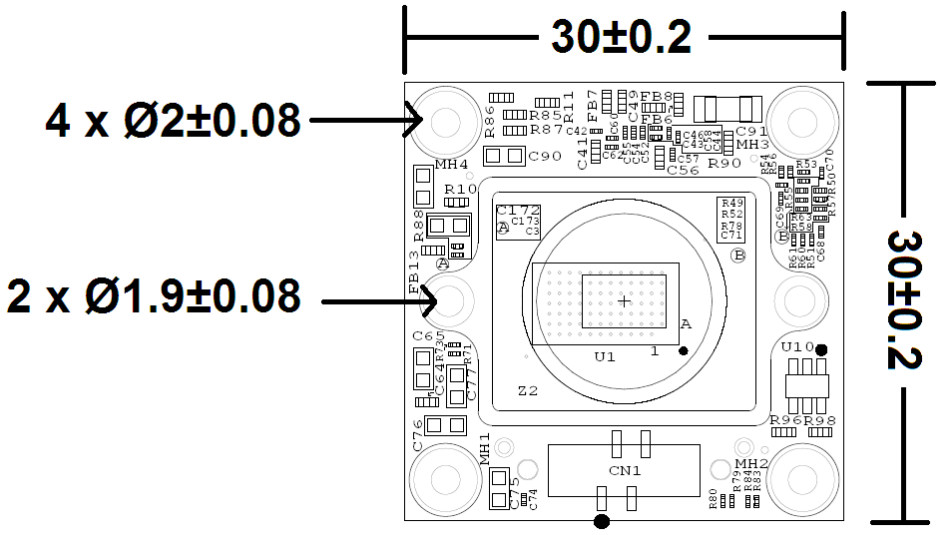

Figure 3: Top View of e-CAM217_CUMI0234_MOD Mechanical Drawing

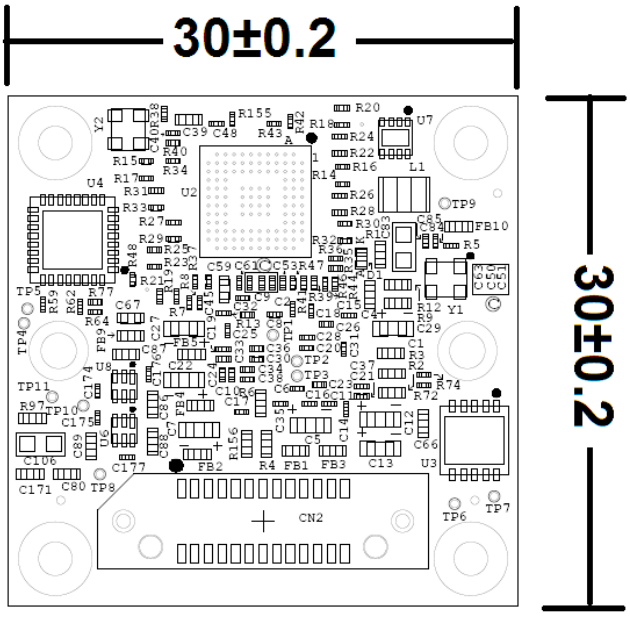

Figure 4: Bottom View of e-CAM217_CUMI0234_MOD Mechanical Drawing (Mirrored)

Note: All dimensions are in mm.

7.2 S-Mount Lens Holder Drawing

The mechanical diagram of the S-mount lens holder is shown in the following figure.

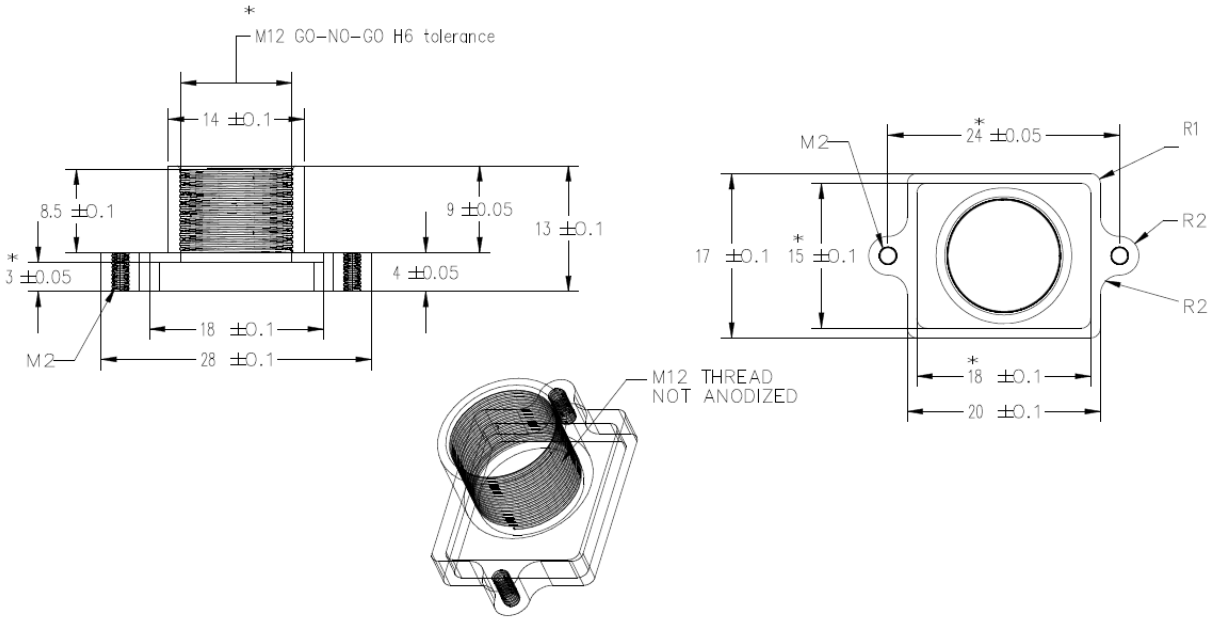

Figure.5: S-Mount Lens Holder Mechanical Diagram

Note: All dimensions are in mm.

7.3 Mechanical Part Details

The mechanical accessories for e-CAM217_CUMI0234_MOD camera board is listed in following table.

Part	Quantity	Specification
Lens holder	1	Standard S-mount metal lens holder (M12P0.5)
Lens holder screw	2	Screw M2 machine screw stainless steel head diameter 4mm max, thread diameter 2mm max, length 5mm

Table 11: Mechanical Part Details

Support

Contact Us

If you need any support on e-CAM217_CUMI0234_MOD 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