e-CAM130_CURB

Getting Started Manual

Version 1.2 e-con Systems

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e-con Systems

Your Product Development Partner

Disclaimer

The specifications of the e-CAM130_CURB camera Module and instructions on how to use this camera module with Raspberry Pi 4 are provided as reference only and e-con Systems reserves the right to edit/modify this document without any prior intimation of whatsoever.

Contents

Introduction to e-CAM130_CURB

e-CAM130_CURB is a 13 MP fixed focus, color, MIPI 2-Lane camera module designed and developed by e-con Systems, a leading Embedded Product Design Services Company which specializes in the advanced camera solutions. It is a two-board solution which includes e-CAM137A_CUMI1335_MOD and ACC_NANO_ADP board. This camera module can be directly interfaced to the Raspberry Pi 4 using FPC cable .

e-CAM130_CURB can stream uncompressed VGA at 114 fps, HD at 77 fps, FHD at 64 fps, 4K at 17 fps in UYVY format. It can also stream the uncompressed 13 MP at 11 fps.

This document describes how to interface and use the e-CAM130_CURB with Raspberry Pi 4.

Prerequisites

The prerequisites are as follows:

- Micro SD card with minimum 8GB capacity
- Raspberry Pi 4

Parts Supplied

The following table lists the parts supplied with the kit.

Table 1: Parts Supplied

Parts Supplied	Images	Quantity
Camera Module Board with lens		1

Adapter Board		1
FPC Cable		1

Description

The e-CAM130_CURB board consists of 13 MP fixed focus camera module board and ACC_NANO_ADP adapter board. The camera adapter board is based on AR1335 image sensor from ON Semiconductor® and an on-board Image Signal Processor (ISP). The ACC_NANO_ADP adapter board connects camera module board and Raspberry Pi 4 via FFC cable. AR1335 is a 1/3.2” optical form factor, CMOS image sensor with an electronic rolling shutter.

The top views of ACC_NANO_ADP and e-CAM137A_CUMI1335_MOD boards are shown in below figures.

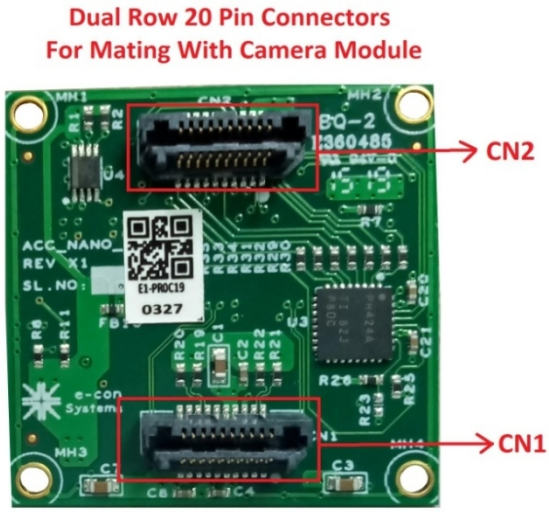

Figure 1: Top View of ACC_NANO_ADP

Figure 2: Top View of e-CAM137A_CUMI1335_MOD Board

e-CAM130_CURB Board Handling Procedure

This section describes the handling procedure of e-CAM130_CURB board.

The procedure to assemble the board setup are as follows:

1. Interface the e-CAM137A_CUMI1335_MOD module board, ACC_NANO_ADP adapter board and Raspberry Pi 4 using the supplied FPC cable.

   The supplied FPC cable is shown in below figure.

Figure 3: FFC Cable

The insertion and locking position of FFC cable on the ACC_NANO_ADP and Raspberry Pi 4 boards are shown in below figures.

Figure 4: FFC cable insertion to ACC_NANO_ADP adapter board (Lock open)

Figure 5: FFC Cable Connector Locked Position

2. Insert the MIPI CSI connectors (CN1 ,CN2) of the e-CAM137A_CUMI1335_MOD module board to MIPI CSI connectors (CN1 ,CN2) of ACC_NANO_ADP adapter board as shown in below figure.

Figure 7: MODULE board and Adapter Board Connection

The connector location of Raspberry Pi 4 is shown below

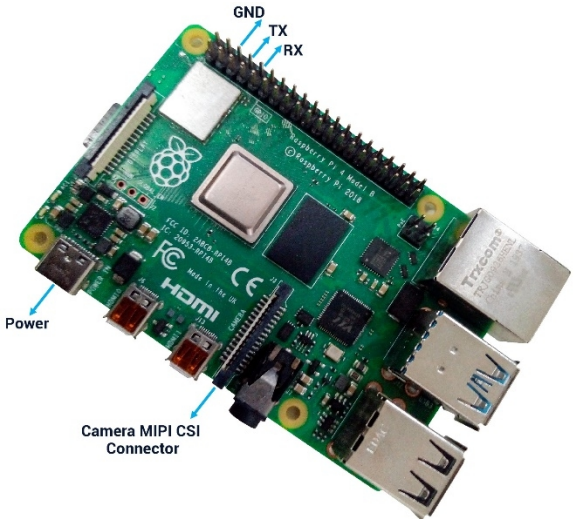

Figure 8: Mipi camera connector in Raspberry Pi 4

3. Once the camera is connected please remove the protective cover from the camera lens (if present).
4. Make sure you connected FPC cable properly as shown in the image below. Blue side should be same as shown in the figure

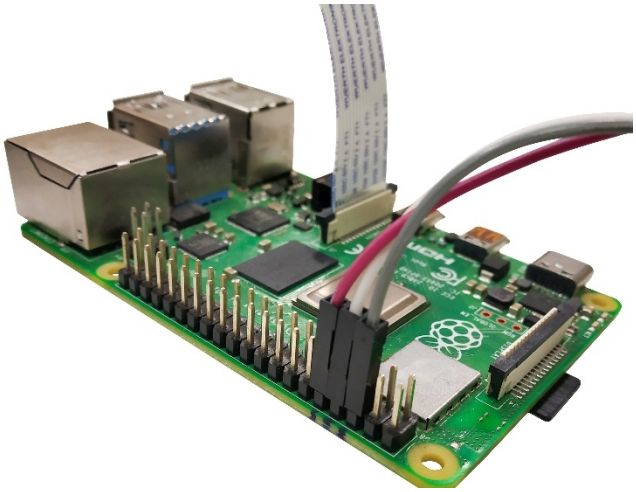

Figure 9: Camera connection with development kit

Software Quick Setup

This section provides the steps to quickly prepare a bootable SD card to boot the Raspberry Pi 4 with e-CAM130_CURB. After successful flashing, the SD card will be bootable. The data in the SD card which is used for flashing needs to be backed up as a preliminary step.

The commands and output messages in this manual are represented by different colors as shown in below table.

Table 3: Notation of Colors

Color	Notation
Blue	Commands running in Development PC
Red	Output message in Development PC
Green	Commands running in Development Board
Orange	Output message in Development Board

The steps to prepare a bootable SD card are as follows:

1. Connect the SD card of minimum 8GB size to be flashed to the Host PC.
2. Clone files from e-con gitlab repository where camera patches were already applied.

```
git clone https://gitlab.com/linkup1/raspberrypi.git
```

3. Run the following command to flash the SD card image in the release package.

```
cd raspberrypi/
git checkout e-CAM130_CURB
cd prebuild_binaries
```

4. untar the tar file

```
tar -xvf E-CON_RPI4_sd_card.tar.xz
```

5. Flash the sd card with the image file

```
sudo dd if=E-CON_RPI4_sd_card.img of=/dev/sdx status=progress
```

Note: **/dev/sdX** must be replaced with the appropriate device node such as **/dev/sdb** or **/dev/sdc** of the SD card. This can be obtained by “dmesg” command on your host Linux PC after the SD card reader is inserted. Accidentally mentioning the wrong device node might result in data loss in the corresponding device. So, **this must be done with caution.**

6. Remove and connect the SD card to the Raspberry Pi 4 board, after the completion of flashing, that is, after obtaining the dd command.
7. Connect the power supply of 5V 3A to Raspberry Pi 4 development board.
8. Connect micro HDMI<->HDMI cable between display and the Raspberry Pi development kit at HDMI0 connector.
9. Run the following command to setup the serial port in the host PC using any serial port software. For example, to setup picocom.

```
sudo picocom /dev/ttyUSB0 -b 115200
```

10. Power ON the board. First time boot with Raspian OS will take longer time to do background setup. Do not cancel the process until login prompt appears.
11. After booting, enter the login credentials in the Raspberry Pi development kit as shown in below table.

Table 4: Default Login Credentials

Fields	Inputs
Username	pi
Password	raspberry

12. Run the following command to check the presence of camera video nodes.

```
ls /dev/video0
```

presence of video0 indicates driver probed successfully.

13. Run the following command to start camera streaming

```
gst-launch-1.0 v4l2src device=/dev/video0  ! video/x-
raw ,width=1920, height=1080 ! videoconvert ! fpsdisplaysink video-
sink=autovideosink text-overlay=false sync=false -v
```

or run camera_test_script.sh in /home/pi/ directory to start stream and take still picture automatically

Note:

Above gstreamer pipeline execution should be executed from terminal in raspberry pi GUI, but not from UART terminal (picocom or minicom) of Host PC.

Reference Documents

This section describes the software and hardware documents of e-CAM130_CURB.

Software Documents

The software documents and its description are shown in below table.

Table 5: Description of Software Documents

S. NO	What I need	Documents to Refer
1	Build and install the sample application.	e-CAM130_CURB_Developer_Guide_1.0.pdf
2	• Use prebuilt binaries to support e-CAM130_CURB. • Build custom kernel with support for using e-CAM130_CURB.	e-CAM130_CURB_Developer_Guide_1.0.pdf
3	Use GStreamer to control the e-CAM130_CURB camera on the Raspberry pi 4.	e-CAM130_CURB_Gstreamer_Usage_Guide_1.0.pdf

Hardware Documents

The hardware documents and its description are shown in below table.

Table 6: Description of Hardware Documents

S.NO	Documents Name	Description
1	e-CAM130_CURB_Datasheet_1.0.pdf	Describes the features, connector pin-out details and mechanical dimensions of e-CAM130_CURB.
2	e-CAM130_CURB_Lens_Datasheet_1.0.pdf	Describes the optical specification of lenses used in e-CAM130_CURB.

Troubleshooting

In this section, you can view the commonly occurring issue and their troubleshooting step.

What can I do if frame rate is fluctuating in gst-capture application?

This issue occurs when the camera is in auto exposure mode as the camera changes exposure based on lighting conditions. If a fixed fps is required, change the camera to manual exposure mode.

Why video tearing observed while moving camera very fast ?

HDMI signal strength and modes should be adjusted in config.txt properly according to your HDMI display interfaced. Its known issue already with Raspberry pi which were discussed in the Pi forums. For confirmation please try running video tearing test videos in your board.

FAQ

1. **Do e-con Systems have any plan to support longer length cable?**

   e-con Systems provide a very flexible and robust 30 cm coaxial cable along with this kit. For customization, please write to camerasolutions@e-consystems.com with your requirement.

2. **Can I boot the Raspberry Pi 4 board directly from the SD card shipped with the product?**

   No, the SD card shipped with the product has the release package in .zip format. Since it is not a bootable SD card, it cannot be used to boot the Raspberry Pi 4 board. For customization, please write to camerasolutions@e-consystems.com with your requirement.

3. **Why camera not detected**

   Please cross check whether the FPC cable connected properly. Please connect blue color sides of the cable exactly like shown in the images in the document

What’s Next?

After understanding the specifications of camera daughter board and instructions on how to use this daughter board with Raspberry Pi board, you can refer to the following documents to understand more about e-CAM130_CURB.

- *e-CAM130_CURB Developer Guide*

Glossary

CMOS: Complementary Metal Oxide Semiconductor.

CSI: Camera Serial Interface.

FHD: Full HD (Industry name for 1920 x 1080P resolution).

HD: High Definition (Industry name for 1280 x 720 resolution).

ISP: Image Signal Processor.

MIPI: Mobile Industry Processor Interface.

UHD: Ultra HD (Industry name for 3840 x 2160 resolution).

USB: Universal Serial Bus.

VGA: Video Graphics Array (Industry name for 640 x 480 resolution).

4K: Indutrial name for 4096x2160

Support

Contact Us

If you need any support on e-CAM130_CURB 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

Revision History

Rev	Date	Description	Author
1.0	07-NOV-2020	Initial draft	Camera Team
1.1	11-DEC-2020	Removed SD card shipping notes and added video tearing issue in troubleshooting column	Camera Team
1.2	15-DEC-2020	Added tar command to untar sd card image	Camera Team