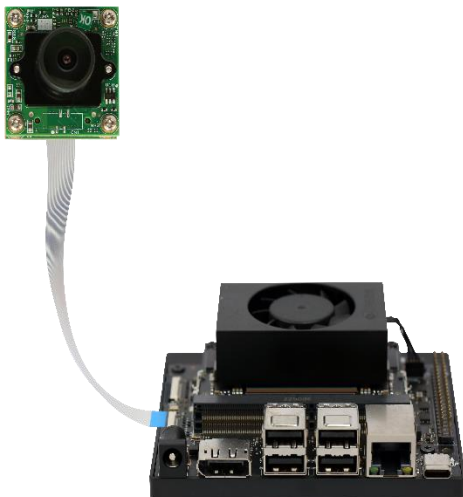


e-CAM25_CUONX

Application Note:

Trigger and Strobe Mode



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Introduction to e-CAM25_CUONX

e-con Systems is a leading Embedded Product Design Services Company which specializes in advanced camera solutions. e-CAM25_CUONX is a new Mobile Industry Processor Interface (MIPI) camera which uses the AR0234 camera module. It is a 4-Lane module connected to the Jetson Orin Nano™ development kit supported for Jetson Orin Nano and Orin NX platforms launched by e-con Systems. The prebuilt driver for this camera along with the camera board is provided by e-con Systems.

The NVIDIA® Orin Nano™ development kit is a small, powerful computer for embedded applications and Artificial Intelligence (AI) Internet of Things (IoT). It is pre-flashed with a Linux environment, includes support for many common APIs, and is supported by NVIDIA® complete development toolchain. Jetson Orin NX™/Orin Nano™ platforms support single camera for 4-lane configuration.

e-CAM25_CUONX is 2.3 MP custom lens camera module based on 1/2.6" AR0234CS CMOS image sensor from onsemi™. It is a color camera which supports UYVY image 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 Video for Linux version 2 (V4L2) application.

e-CAM25_CUONX has a 2.3 MP color camera with S-mount (also known as M12 board lens) lens holder. The S-mount is one of the most used small form factor lens mounts for board cameras. e-CAM25_CUONX camera is interfaced to J21 connector of the Jetson Orin NX™/Orin Nano™ development kit using the ACC-RB-WTB-ADP board.

e-con Systems provides the sample applications that demonstrate the features of this camera. However, this camera can also be utilized by any V4L2 application.

This document describes external trigger setup to interface e-CAM25_CUONX board on Jetson Orin NX™/Orin Nano™ development kit.

Description

This Application Note concentrates on the working of trigger mode in e-CAM25_CUONX. Many imaging applications commonly requires the image sensor to capture an image after the triggering action. This triggering action can be the passing of an object on a conveyor belt, the flash of a strobe light, or the click of a button.

e-CAM25_CUONX offers the ability to synchronize the start of the image sensor's exposure with this triggering action. This synchronization is controlled on the image sensor using one trigger signal. Additionally, the camera offers the flexibility to program the exposure time.

e-CAM25_CUONX is a two-board solution as follows:

- e-CAM217_CUMI0234_MOD (Camera module)
- ACC-RB-WTB-ADP (Adaptor Board)

The front and rear views of e-CAM25_CUONX camera module and Adaptor board are shown in following figures.



Figure 1: Front View of e-CAM25 Camera Board

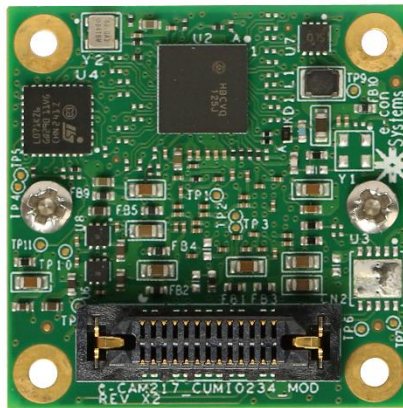


Figure 2: Rear View of e-CAM25 Camera Board



Figure 3: Front view of e-CAM25 ADP Board

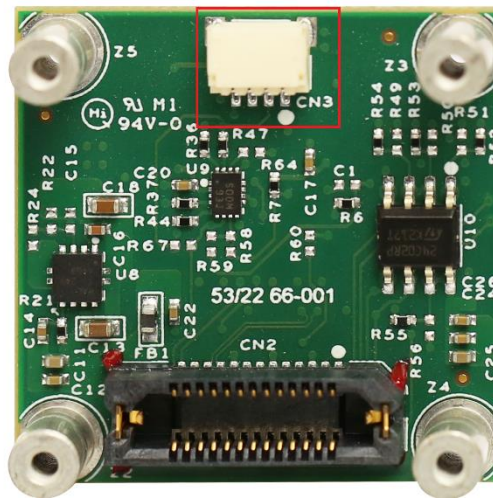


Figure 4: Rear view of e-CAM25 ADP Board

Note: CN3 connector in the e-CAM25 ADP Board is used for trigger input and strobe output signal.

Trigger Mode

In trigger mode, e-CAM25_CUONX camera can synchronize the exposure (or integration) of the camera pixels to an external trigger pulse that can be given through the GPIO connector of the camera. Since this is a global shutter camera, all the pixels start and stop integrating at the same time, avoiding rolling skew during the capture of fast-moving scenes.

In trigger mode of e-CAM25_CUONX, the preview will not be available, and the camera will be kept in standby waiting for a trigger pulse to start the integration of pixels and provide a global shutter image.

You can configure the camera settings such as white balance, exposure, still image resolution, still image storage location and so on, in manual mode and then enter the trigger mode. The auto function lock option can be used to lock the auto functions such as exposure, white balance and so on, in auto mode. In trigger mode, the camera settings will be retained, but preview will not be available. The camera will be waiting for an external event on the GPIO connector, and the camera will start exposing on the trigger signal.

All the images captured will be stored in the default location, that is, the desktop or can be stored in any user specified path, in the format selected in the Still Capture Settings.

Pin Description

This section describes about the pin description of e-CAM25_CUONX.

In trigger mode, the EXT_TRIGGER pin of the CN3 connector of ACC-RB-WTB-ADB board is used for input trigger pulse. The below table lists the pin configuration of CN3 External Header.

CN3 Pin No	Signal Name	Pin Type	Description
1	VCC_3P3	POWER	3.3V power supply
2	TRIGGER	INPUT	3.3V trigger input to the camera
3	STROBE	OUTPUT	3.3V strobe output from the camera
4	GND	POWER	Ground signal for digital and analog

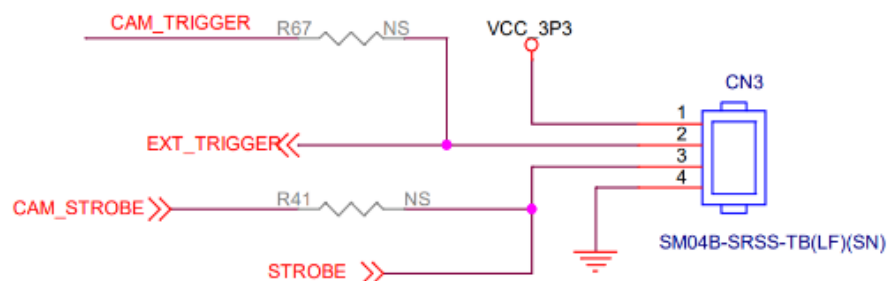
Note on **TRIGGER** Pin: If trigger mode is enabled, the trigger pulses must be provided to this pin to get the streaming. For more information on sensor trigger please refer to the e-CAM25_CUONX_Linux_App_User_Manual_<REV>.pdf.

Note:

- If the trigger pulse width is lesser than the required trigger pulse width, either the exposure may not start, or the captured image will be dark.
- If the required frame rate is 30fps, then the frequency of the trigger pulse should be 30Hz.
- Duty cycle should be less than 10%. If the duty cycle is more than 10%, it will affect exposure time and readout time of the camera.

CN3 Header Circuit

This section describes the CN3 connector of e-CAM25_CUONX.



Revision History

Rev	Date	Description	Author
1.0	25-Apr-2023	Initial Draft	Camera Dev Team
1.1	24-May-2024	Added a note on external trigger configuration	Camera Dev Team
1.2	29-May-2025	Updated CN3 connector schematics	Camera Dev Team