

See3CAM\_CU135

# Type-C Getting Started Manual



Version 1.10

e-con Systems

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### **Disclaimer**

The specifications of See3CAM\_CU135 camera board and instructions on how to connect this board with PC are provided as reference only and e-con Systems reserves the right to edit/modify this document without any prior intimation of whatsoever.

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# Introduction to See3CAM\_CU135

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See3CAM\_CU135 is a 13.0 MP, color, UVC-compliant, USB 3.0 SuperSpeed camera with Type-C connector from e-con Systems, a leading Embedded Product Design Company which specializes in the advanced camera solutions. It is a USB 3.0 SuperSpeed camera product with reversible plug and play Type-C connector interface.

See3CAM\_CU135 is a 13.0 MP color camera with the S-mount (also known as M12 board lens) lens holder. The S-mount is one of the most commonly used small form-factor lens mounts for board cameras. See3CAM\_CU135 is a two-board solution containing the camera sensor module board with 1/3.2" AR1335 CMOS image sensor from ON Semiconductor® and the USB 3.0 interface board. With USB 3.0 interface to the host PC, this See3CAM\_CU135 can stream uncompressed VGA at 120 and 60 fps, HD at 60 and 30 fps (720p60, 720p30), 960P at 60 and 30 fps, FHD at 60 and 30 fps (1080p60, 1080p30), 1440P at 45 and 22.5 fps, 2880P (2880 x 2160) at 20 and 10 fps, 4K at 15 and 7.5 fps (UHD and QFHD) UYVY formats. This can also stream the uncompressed 13 MP at 9 and 4.5 fps when connected to the USB 3.1 GEN1 host PC.

See3CAM\_CU135 also streams compressed MJPEG VGA at 120 fps, HD at 60 fps (720p60), 960P at 60 fps, FHD at 60 fps (1080p60), 1440P at 60 fps, 2880P (2880 x 2160) at 30 fps, 4K (UHD and QFHD) at 30 fps. It can also stream the compressed MJPEG 13 MP at 20 fps. See3CAM\_CU135 is a UVC-compliant USB 3.0 SuperSpeed camera that is also backward compatible with USB 2.0 host ports and it does not require any special camera drivers to be installed in the host PC. When connected to USB 2.0 host ports, the See3CAM\_CU135 supports all the resolutions and at lower frame rates.

See3CAM\_CU135 is a UVC compliant camera and it does not require any drivers to be installed on the PC. The native UVC drivers of Windows and Linux Operating Systems (OS) will be compatible with this camera. e-con Systems also provides the sample application that demonstrates some of the features of this camera. However, this camera can utilize any DirectShow application such as Skype and so on.

This document describes about how to connect the See3CAM\_CU135 board with USB 3.0 host PC.

## Hardware Requirements

The hardware requirements for See3CAM\_CU135 is Desktop or Laptop PC with USB 3.0 or USB 2.0 port.

## Software Requirements

The software requirements for See3CAM\_CU135 are OSes with e-CAMView for Windows or QtCAM for Linux or any standard camera application installed. The OSes are:

- Windows 8.1 or 10.
- Ubuntu 14.04 (32-bit and 64-bit), 16.04 (32-bit and 64-bit) or 18.04 (64-bit).

## Parts Supplied

The parts supplied in See3CAM\_CU135 kit are as follows:

- See3CAM\_CU135 Camera
- USB 3.0 Type-A to Type-C Cable

You can find the above parts in the kit as shown in below table.

**Table 1: Parts Supplied in See3CAM\_CU135 Kit**

Parts Supplied	Images
See3CAM_CU135 Camera	 <p>Without Casing (See3CAM_CU135_CHL_TC)</p>
	 <p>With Casing (See3CAM_CU135_CHL_TC_BX)</p>

USB 3.0 Type-A to Type-C cable



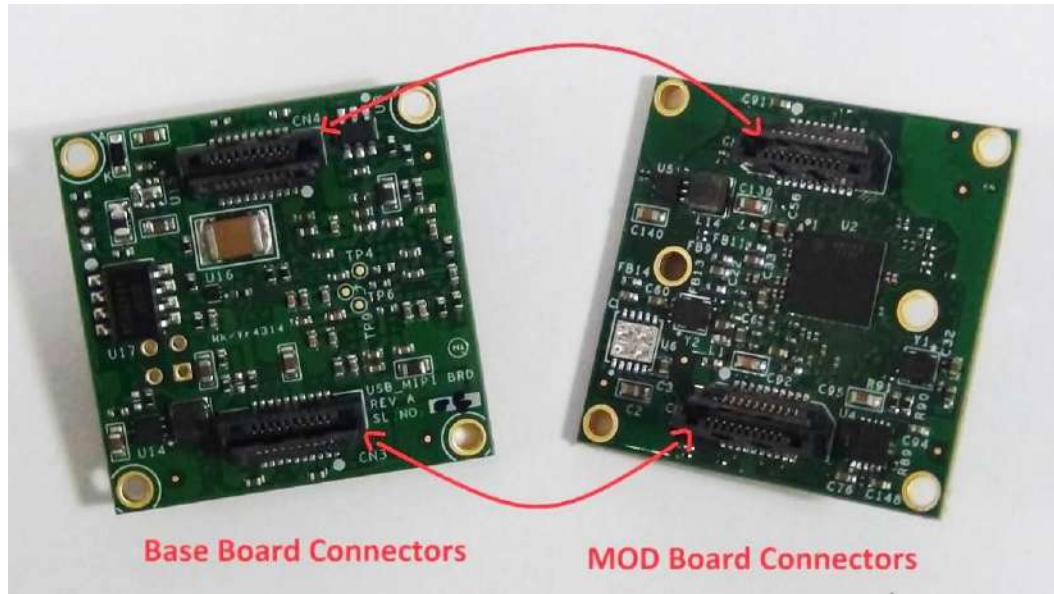
## Description

See3CAM\_CU135 is a two-board solution of size 30 mm x 30 mm. The module board has the AR1335 image sensor from ON Semiconductor® and the Image Signal Processor (ISP), and the base board has the USB interface controller and the USB 3.1/Type-C connector. This See3CAM\_CU135 is a Ready-to-Manufacture camera board with all the necessary firmware built in and is compatible with the USB Video Class (UVC) version 1.0 standard. You can integrate this camera into the products, and this helps to cut short the Time-to-Market. This camera board is UVC-compatible and will work with the standard drivers available with Windows and Linux. There is no need for any additional driver installation.

The top and back to back views of See3CAM\_CU135 without casing (See3CAM\_CU135\_CHL\_TC) are shown in below figures.



**Figure 1: Top View of See3CAM\_CU135 without Casing**



**Figure 2: See3CAM\_CU135 Back to Back Connection without Casing**

The top view of See3CAM\_CU135 with casing (See3CAM\_CU135\_CHL\_TC\_BX) is shown in below figure.



**Figure 3: Top View of See3CAM\_CU135 with Casing**

# Setting Up See3CAM\_CU135

This section describes how to connect the See3CAM\_CU135 to the PC. The See3CAM\_CU135 camera is a USB 3.0 SuperSpeed client device. The See3CAM\_CU135 camera is supplied along with a USB 3.0 Type-A to Type-C cable to connect with the USB Type-A host port.

The following sections describe the parts supplied in the kit.

- [See3CAM\\_CU135 to PC Host Interconnecting Cable](#)
- [Connecting the Board with Host](#)

## See3CAM\_CU135 to PC Host Interconnecting Cable

The USB 3.0 Type-A to Type-C cable is used to connect See3CAM\_CU135 camera board to the PC and will be provided by e-con Systems as shown in below figure.



Figure 4: USB 3.0 Type-A to Type-C Cable

## Connecting the Board with Host

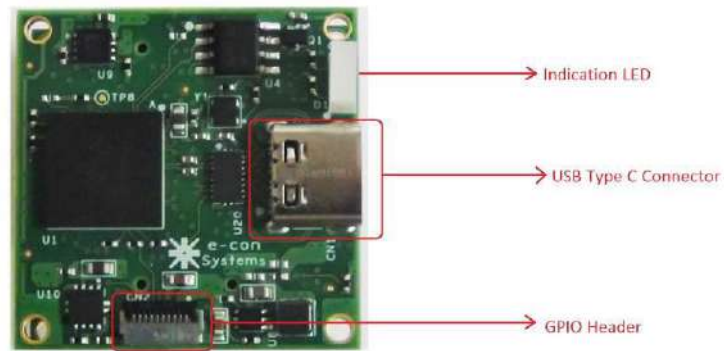
Please follow the below steps to connect See3CAM\_CU135 board with PC or Laptop.

- Step 1. [Identification of USB Type-C Connector](#)
- Step 2. [Insertion of USB 3.0 Type-A to Type-C Cable in Connector](#)
- Step 3. [Connecting the Board to Host](#)

### Step 1: Identification of USB Type-C Connector

The location of USB Type-C connector on See3CAM\_CU135 without casing (See3CAM\_CU135\_CHL\_TC) and with casing (See3CAM\_CU135\_CHL\_TC\_BX) are shown in below figures.





**Figure 5: Location of USB Type-C Connector on See3CAM\_CU135 without Casing**



**Figure 6: Location of USB Type-C Connector on See3CAM\_CU135 with Casing**

## **Step 2: Insertion of USB 3.0 Type-A to Type-C Cable in Connector**

The USB 3.0 Type-A to Type-C cable provided by e-con Systems must be inserted with USB 3.1/Type C connector of See3CAM\_CU135 without casing (See3CAM\_CU135\_CHL\_TC) and with casing (See3CAM\_CU135\_CHL\_TC\_BX) as shown in below figures.

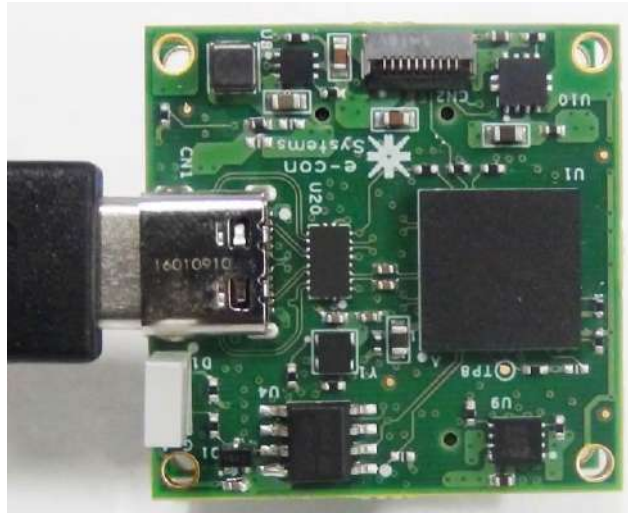


Figure 7: USB 3.0 Type-A to Type-C Cable inserted in USB 3.1/Type C Connector of See3CAM\_CU135 without Casing



Figure 8: USB 3.0 Type-A to Type-C Cable inserted in USB 3.1/Type C Connector of See3CAM\_CU135 with Casing

### Step 3: Connecting the Board to Host

Identify a USB 3.0 port. The port which has the below logo is the USB 3.0 Port.



Figure 9: SuperSpeed USB 3.0 Logo

The USB 3.0 Type-A to Type-C cable must be inserted to SuperSpeed USB 3.0 port of PC or Laptop as shown in below figure.

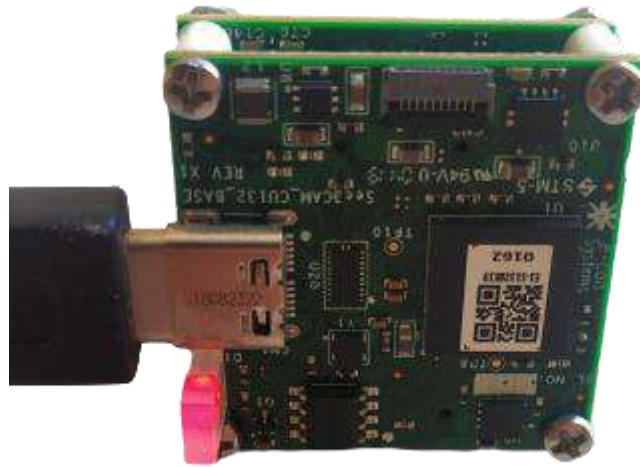


**Figure 10: USB 3.0 Type-A to Type-C Cable-Host Side**



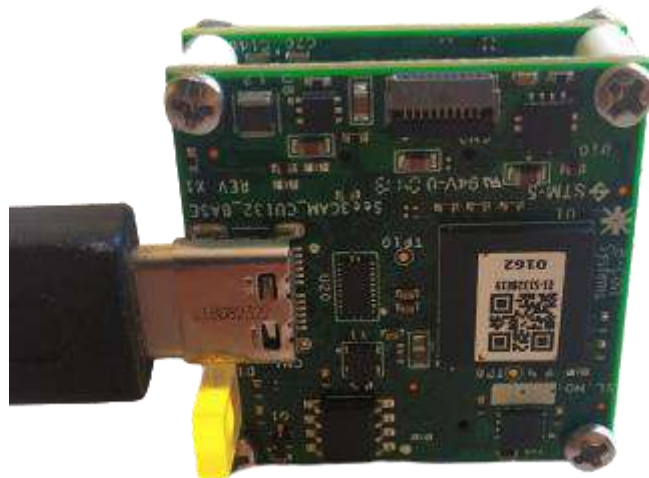
**Figure 11: Connecting USB 3.0 Type-A to Type-C Cable to SuperSpeed Port**

After the insertion of USB 3.0 cable with USB 3.1/Type-C connector on the board and USB Host, the LED (D1) will glow in Red color. This indicates that the board is powered ON as shown in below figure.



**Figure 12: Status LED indicating Board Powered ON**

After selecting the See3CAM\_CU135 device in e-CAMView application, the D1 LED glows in Yellow color. This indicates that the camera is in streaming condition as shown in below figure.

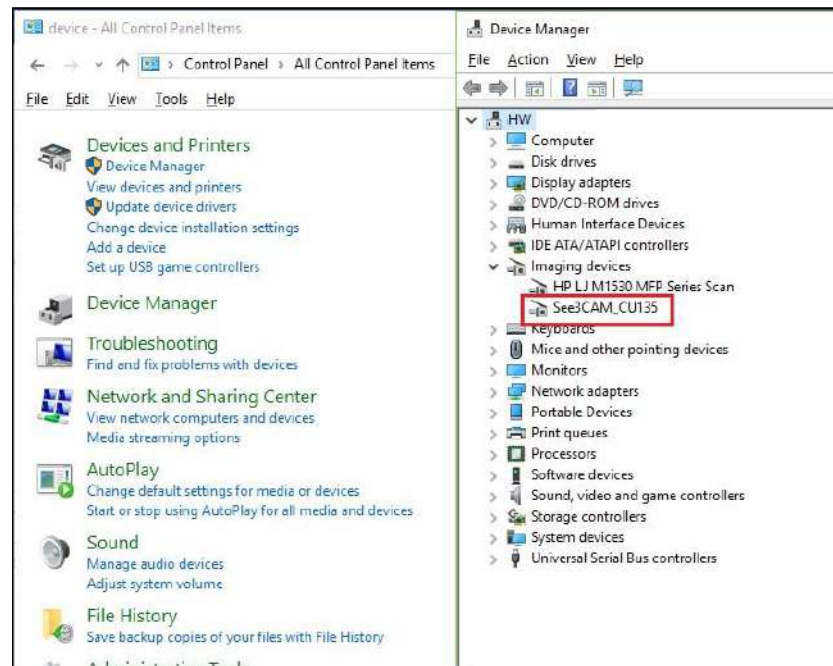


**Figure 13: Status LED indicating Camera streaming**

### **Ensuring the Device is connected to Host in Windows from Device Manager**

After the insertion of board to Host, you can confirm that See3CAM\_CU135 is properly connected to Host from Imaging Devices.

Go to **Control Panel → Device Manager → See3CAM\_CU135**.



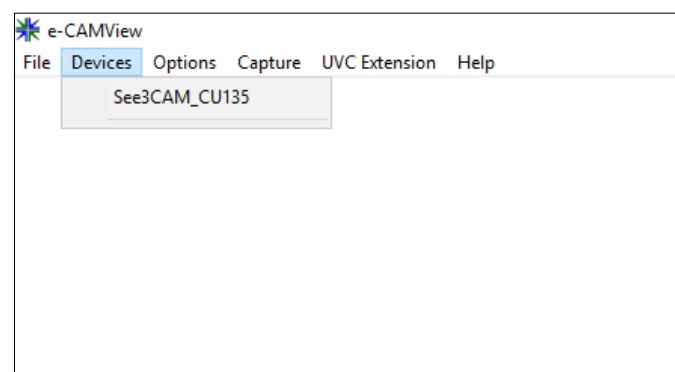
**Figure 14: Imaging Devices showing See3CAM\_CU135 connected to Host**

If you notice **See3CAM\_CU135** listed under **Imaging devices**, then the board is properly connected to the Host.

### Ensuring the Device is connected to Host in Windows from e-CAMView Application

After the insertion of board to Host, you need to confirm that See3CAM\_CU135 is properly connected to Host from e-CAMView application.

Open e-CAMView application and select the **Devices** menu to make sure that the device is listed under **Devices** menu as shown in below figure.



**Figure 15: e-CAMView displaying See3CAM\_CU135 connected to Host**

If you notice **See3CAM\_CU135** listed under **Devices** menu, then the board is properly connected to Host.

## Ensuring the Device is connected to Host in Linux from Terminal

The steps to confirm that the See3CAM\_CU135 is properly connected to Host are as follows:

1. Connect the device to the PC which supports the Ubuntu versions.
2. Open the Terminal.
3. Run the following command to display the details of the device.

```
$ dmesg
```

You can view the details of the device as shown in below figure.

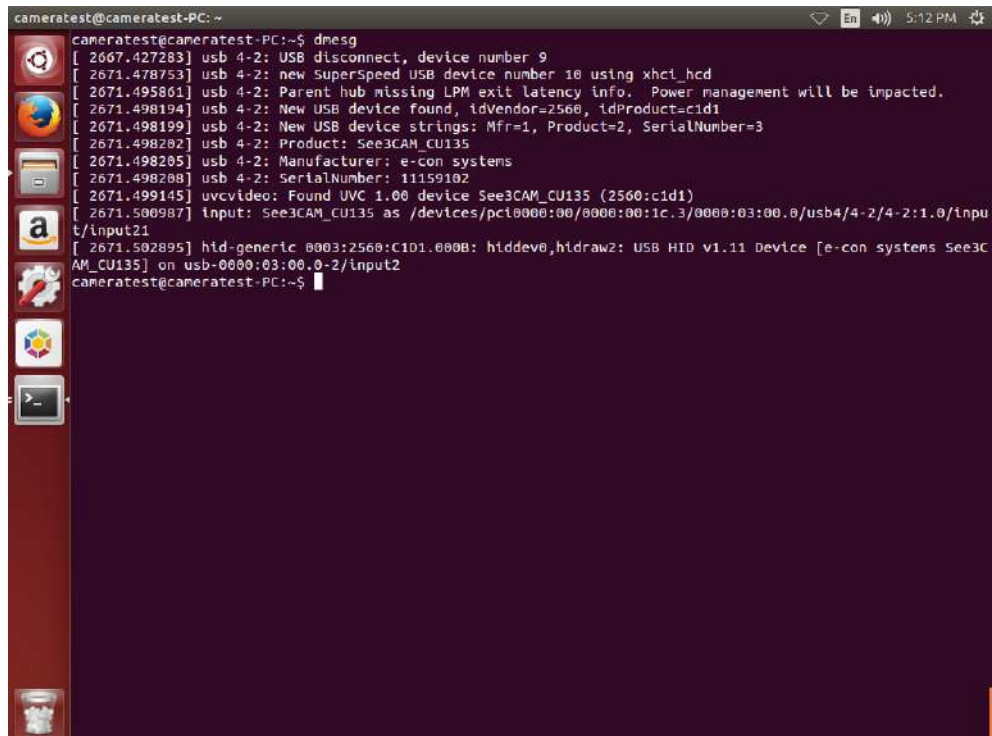
A screenshot of a Linux terminal window titled 'cameratest@cameratest-PC: ~'. The terminal shows the output of the 'dmesg' command. The output includes several lines of system messages: '[ 2667.427283] usb 4-2: USB disconnect, device number 9', '[ 2671.478753] usb 4-2: new SuperSpeed USB device number 10 using xhci\_hcd', '[ 2671.495861] usb 4-2: Parent hub missing LPM exit latency info. Power management will be impacted.', '[ 2671.498194] usb 4-2: New USB device found, idVendor=2560, idProduct=c1d1', '[ 2671.498199] usb 4-2: New USB device strings: Mfr=1, Product=2, SerialNumber=3', '[ 2671.498202] usb 4-2: Product: See3CAM\_CU135', '[ 2671.498205] usb 4-2: Manufacturer: e-con systems', '[ 2671.498208] usb 4-2: SerialNumber: 11159102', '[ 2671.499145] uvcvideo: Found UVC 1.00 device See3CAM\_CU135 (2560:c1d1)', '[ 2671.500987] input: See3CAM\_CU135 as /devices/pci0000:00/0000:00:1c.3/0000:03:00.0/usb4/4-2/4-2:1.0/input21', and '[ 2671.502895] hid-generic 0003:2560:C1D1.0000: hiddev0,hidraw2: USB HID v1.11 Device [e-con systems See3CAM\_CU135] on usb-0000:03:00.0-2/input2'. The terminal prompt returns to '\$'.

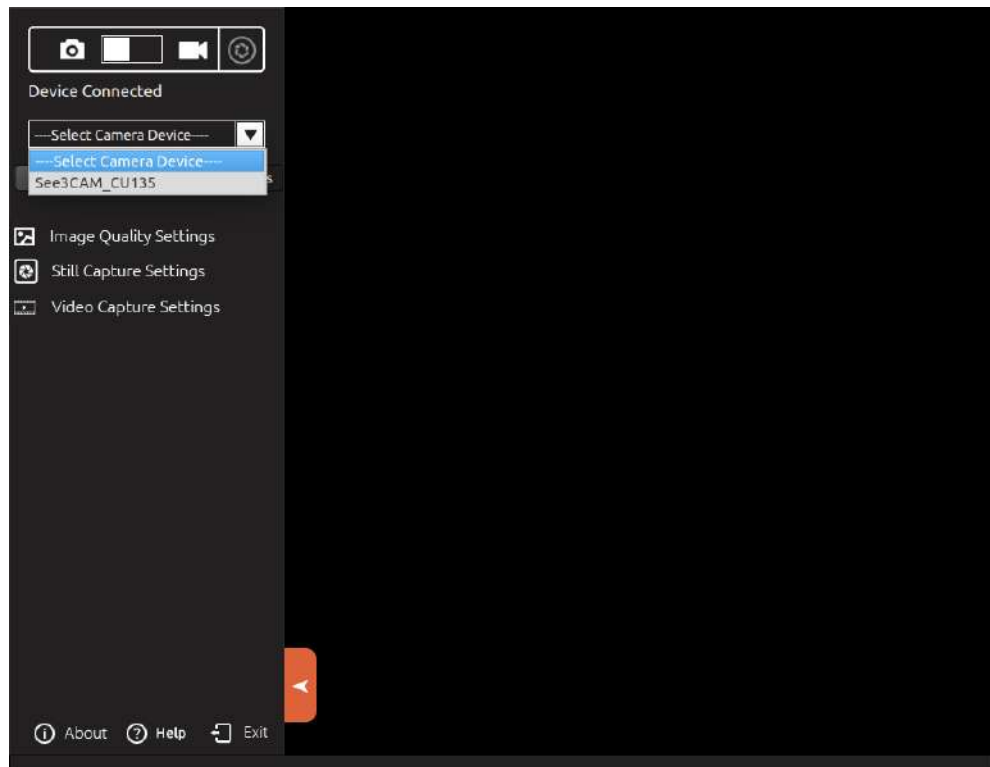
Figure 16: Imaging Devices showing See3CAM\_CU135 connected to Host

If you notice that the See3CAM\_CU135 is displayed in the product name, then the board is properly connected to Host.

## Ensuring the Device is connected to Host in Linux from QtCAM Application

The steps to confirm that the See3CAM\_CU135 is properly connected to Host are as follows:

1. Open QtCAM application.
2. Go to **Device Connected** drop-down list box, and in the drop-down list box, you can view See3CAM\_CU135 as shown in below figure.



**Figure 17: Imaging Devices showing See3CAM\_CU135 connected to Host**

If you notice See3CAM\_CU135 listed under **Device Connected** drop-down list box, then the board is properly connected to the Host.



# Troubleshooting

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In this section, you can view the list of commonly occurring issues and their troubleshooting steps.

**See3CAM\_CU135 device without casing connected, power indication LED is OFF or switching between Red and OFF state.**

It seems like there is no proper power input to the device. You need to check the cable or USB connector integrity. In case if USB Hub is used, use external power.

**See3CAM\_CU135 device without casing connected, power indication LED is Red.**

The device is powered up and ready to stream image data. You can use e-CAMView or QtCAM or any standard streaming application to start streaming.

**In the e-CAMView sample application, the device is selected but the preview window is White.**

You need to install latest version of e-CAMView from the [Developer Resources](#) website.

**In the e-CAMView sample application, the See3CAM\_CU135 device without casing is selected but the preview window is Black and indication LED blinks between Red and Yellow continuously.**

It seems like no image is received from the camera. Contact e-con Systems online support [support@e-consystems.com](mailto:support@e-consystems.com).

**See3CAM\_CU135 device without casing connected, power indication LED is Red, and the device is not listed in the application or device manager.**

It seems like device firmware is corrupted. Try re-flashing firmware image using firmware updater application from [Developer Resources](#) website. If this does not help, contact e-con Systems online support [support@e-consystems.com](mailto:support@e-consystems.com).

**See3CAM\_CU135 device without casing connected, streaming with Yellow LED showing frequent or intermittent blinks. Sometimes frame corruption seen in streaming window.**

It seems like there is bandwidth limitation in USB host. This may occur when multiple cameras are connected to single USB host or in USB hosts of less powerful embedded boards. Visit the blog <https://www.e-consystems.com/blog/camera/?p=1720> for more information on USB practical bandwidths.



**1. I have already bought See3CAM\_CU130 camera. What is the difference between See3CAM\_CU130 and See3CAM\_CU135?**

Both the cameras support up to 13 MP image resolution though they feature different image sensors (AR1335 in See3CAM\_CU135 vs AR1820 in See3CAM\_CU130). The blog - [https://www.e-consystems.com/blog/camera/see3cam\\_cu135-vs-see3cam\\_cu130/](https://www.e-consystems.com/blog/camera/see3cam_cu135-vs-see3cam_cu130/) explains on how they compare against each other and will guide you on which camera to choose.

**2. What is the minimum distance the lens could focus?**

The minimum working distance (distance between the camera and the object) for the camera is 10 cm.

**3. Can I get access to ISP registers?**

No. The option is not available by default but will be provided on case to case basis with firmware customization.

**4. Can I get access to image sensor registers?**

No. The sensor registers are directly controlled by the ISP.

**5. The frame rate is not consistent in UYVY format. Can I fix it?**

Yes, the camera is designed to allow exposure till 66.66 ms in auto exposure mode and hence the frame rates can drop till 15 fps. You can either set the maximum exposure limit using exposure compensation (in UVC Extension menu) or choose manual exposure to get desired frame rates.

**6. The frame rate is not consistent in MJPEG format. Can I fix it?**

Yes, but the frame rate may still get reduced due to the scene details or the frame size which in turn affects the rendering capability from PC to PC. Performance improvement can be seen based on graphic card or display adapter capability. To increase the frame rates, you can decrease Q-Factor or increase De-noise value in UVC Extension menu since both decreases the frame size and hence improves frame rates.

**7. How the occurrence of frame corruption while streaming can be avoided?**

This frame corruption is due to the bandwidth limitation in USB host. This may occur when multiple cameras are connected to single USB host or in USB hosts of less powerful embedded boards. Visit our blog <https://www.e-consystems.com/blog/frame-corruption-while-streaming/>

[consystems.com/blog/camera/?p=1720](https://consystems.com/blog/camera/?p=1720) for more information on USB practical bandwidths.

**8. I need reliable operation when I connect multiple cameras to same host or when I connect to an embedded board. Do I have options?**

Yes. All resolutions available in UYVY do support multiple frame rates. You can switch it to a lower frame rate to improve stability. For MJPEG, reducing the Q-Factor will improve stability in case of any issues. If it is still required to reduce the frame rates, contact [sales@e-consystems.com](mailto:sales@e-consystems.com).

**9. How to use the external trigger option in See3CAM\_CU135?**

Please refer to *See3CAM\_CU135\_Trigger\_Mode\_Application\_Note.pdf* to know about how to use external trigger option in See3CAM\_CU135.

**10. What sort of support does e-con Systems provide along with the camera?**

e-con Systems will provide the basic support on the evaluation for all the customers who have purchased the camera. The hardware/software/firmware customization of the kit will be provided by e-con Systems based on your requirements. e-con Systems will also manufacture your custom cameras and will be supplied.

**11. Is there any software available with the kit?**

Yes, e-con Systems provide e-CAMView for Windows and QtCAM for Linux sample application demonstrating the capabilities of this camera.

**12. What are the supported OSes?**

The supported OSes are Windows 8.1 and 10, and Linux Ubuntu 14.04 (32-bit and 64-bit), 16.04 (32-bit and 64-bit) and 18.04 (64-bit).

**13. The camera is not suitable for my requirements. Can I return the kit?**

No, the kit is non-returnable and non-refundable. However, the kit is under warranty and e-con Systems will replace for any failed kit under warranty terms.

**14. The kit is getting very hot. Is it suitable for usage?**

Yes, but the camera module needs an external heat sink to dissipate the heat for prolonged usage.

## What's Next?

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After ensuring that the device is connected to host properly, you need to refer the *e-CAMView Streaming Application Installation Manual See3CAM\_CU135* to install e-CAMView, a sample DirectShow application that demonstrates the features of See3CAM\_CU135.

# Glossary

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**4K:** UHD or Industry name for 3840 x 2160 resolution.

**CMOS:** Complementary Metal Oxide Semiconductor.

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

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

**ISP:** Image Signal Processor.

**MJPEG:** Motion Joint Photographic Experts Group (A type of frame compression).

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

**USB:** Universal Serial Bus.

**USB 2.0:** Universal Serial Bus High Speed.

**USB 3.0:** Universal Serial Bus Super Speed.

**USB Type-C Connector:** USB Type C (Industry name for USB 3.1) reversible connector.

**UVC:** USB Video Class.

**UYVY:** YUV422 16-bit image format with UYVY ordering.

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

# Support

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## **Contact Us**

If you need any support on See3CAM\_CU135 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	16-May-2017	Initial Draft	Camera Team
1.1	19-May-2017	Reviewed and added Change	Camera Team
1.2	14-September-2017	Updated Resolutions and frame rates	Camera Team
1.3	14-November-2019	Updated Supported OS	Camera Team
1.4	30-December-2019	Updated Supported OS	Camera Team
1.5	11-February-2020	Updated alignment	Camera Team
1.6	12-May-2020	Updated changes	Camera Team
1.7	22-June-2020	Updated images	Camera Team
1.8	26-June-2020	Updated alignment	Camera Team
1.9	24-February-2021	Added changes	Camera Team
1.10	29-April-2021	Updated Changes	Camera Team