See3CAM_24CUG

e-CAMView Streaming Application User Manual

e-con Systems

Your Product Development Partner

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Introduction to See3CAM_24CUG

See3CAM_24CUG is a 2.3 MP, color, global shutter, UVC compliant, USB 3.1 Gen1 SuperSpeed camera from e-con Systems, a leading Embedded Product Design Services Company which specializes in the advanced camera solutions. It is the latest member of the See3CAM family of USB 3.1 Gen1 SuperSpeed camera products launched by e-con Systems.

See3CAM_24CUG is a 2.3 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_24CUG is a single board solution containing the 1/2.6" AR0234 CMOS image sensor from Aptina™ with USB 3.1 Gen1 interface. It is also backward compatible with the USB 2.0 high speed interface, albeit at lower frame rates.

See3CAM_24CUG is an 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.

e-con Systems provides a sample DirectShow application, called e-CAMView, along with the See3CAM_24CUG camera. e-CAMView is a typical DirectShow camera application but customized to demonstrate some of the features of See3CAM_24CUG.

This document describes the special features of sample camera application when it is used with See3CAM_24CUG.

Prerequisites

The steps to initialize the device with the host computer are as follows:

1. Connect the one end of USB 3.1 Gen1 cable to the USB 3.1 Gen1 connector provided at the back of See3CAM_24CUG.
2. Connect the other end of USB 3.1 Gen1 cable to the USB 3.1 Gen1 host controller on the computer.

Once connected, the LED on the device will glow indicating that See3CAM_24CUG is powered up and ready to use.

As See3CAM_24CUG is a generic UVC device, Windows will automatically detect and installs the drivers. This happens for the first time and from the second time onwards, the device will be detected immediately by the host PC and will be ready for use.

To view the preview, the e-CAMView application designed for See3CAM_24CUG must be installed whose version must be1.0.63.395 or above. Refer to the *e-CAMView_Streaming_Application_Installation_Manual_See3CAM_24CUG.pdf* to know more on how to install the e-CAMView application.

Description

See3CAM_24CUG is a USB 3.1 Gen1 color camera capable of streaming the resolution and frame rates as listed in below table.

Table 1: See3CAM_24CUG Resolution and Frame Rates with FOV

Format	Resolution	Frame Rate (fps)		% Crop in FOV	
		USB 3.1 Gen1	USB 2.0	Horizontal	Vertical
UYVY	2.3MP (1920 x 1200)	58	6	0%	0%
	FHD (1920 x 1080)	60	8	0%	10%
	HD (1280 x 720)	120 and 60	15	0%	10%
MJPEG	2.3MP (1920 x 1200)	114 and 60	114 and 60	0%	0%
	FHD (1920 x 1080)	120, 60 and 30	120, 60 and 30	0%	10%
	HD (1280 x 720)	120 and 60	120 and 60	0%	10%

For streaming MJPEG, use MainConcept-MJPEG codec package. Find the installer in the install path **C:/Program Files (x86)/e-consystems/e-CAMView** and install a demo version of the codec by selecting **ignore for demo version** while prompted.

Note:

- The above table is true only in manual exposure.
- When the exposure value is changed above -6 (15.6 ms), there will be a drop in the frame rate because the exposure time is more than the frame time. In auto exposure, maximum frame rate could be achieved with maximum lighting.

The camera controls of See3CAM_24CUG are as follows:

- Brightness
- Contrast
- Saturation
- Sharpness
- Gamma
- White Balance (both manual and automatic)
- Gain
- Exposure (both manual and automatic)
- Powerline Frequency

This document explains the following sections:

- Selecting the supported preview resolutions.
- Selecting the still image resolution.
- Capturing still images.

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- Using supported controls.
- Getting the Unique ID of the camera.

The Field of View (FOV) of See3CAM_24CUG is shown below.

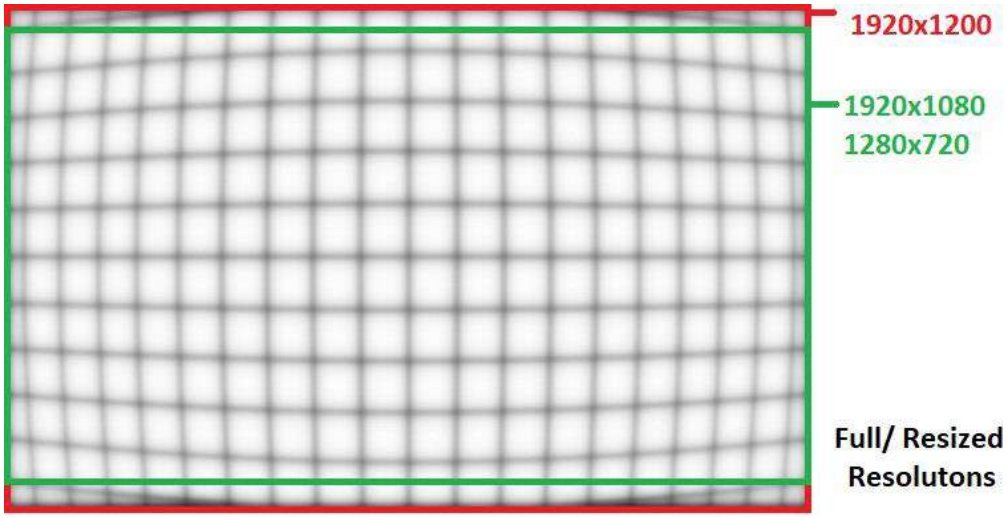

Figure 1: FOV of See3CAM_24CUG

Using e-CAMView

This section describes how to use the e-CAMView application.

To launch the e-CAMView video streaming and capture application, click **Start > Search >** enter **e-CAMView >** click **e-CAMView** or double-click the **e-CAMView** icon in desktop.

The e-CAMView application is provided with a set of features that can be used to attain the full functionality of See3CAM_24CUG. The Menu bar at the top contains few menu items and the Status bar at the bottom shows some information. When the application is running, the current preview resolution and the frame rate are displayed in the Status bar as shown below.

Figure 2: Application Launch Appearance

The following sections describe each of the menu items in detail.

Devices Menu

You can click the **Devices** menu to view the currently connected video devices to host PC and you can select any video devices attached to the computer. A check mark is placed before the device indicating the video device which is currently streaming. By default, the See3CAM_24CUG device will be indicated by the name **See3CAM_24CUG**. The See3CAM_24CUG camera being listed in the **Devices** menu is shown below.

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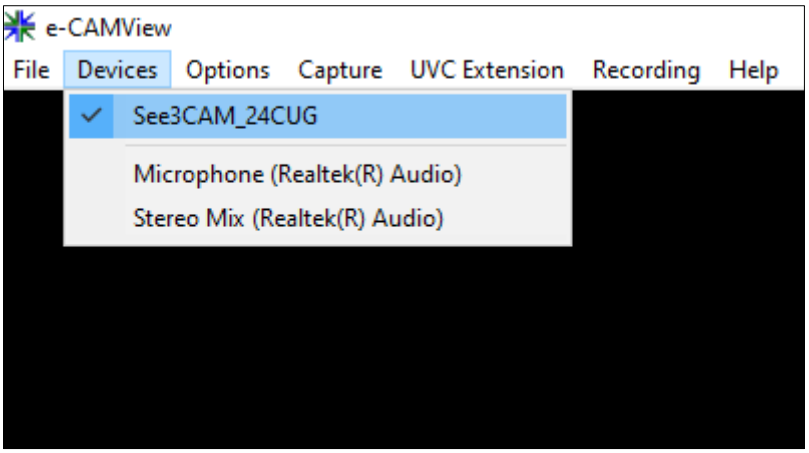

Figure 3: Enumerated Devices List

In case any other video device such as on-board webcam is connected, e-CAMView will list those video capture devices and you can switch between the available video capture devices, by selecting the respective device.

Note: There is no audio capture source available with See3CAM_24CUG camera.

Options Menu

You can click the **Options** menu to select the various preview, image resolutions and the controls that are supported by See3CAM_24CUG. When you click the **Options** menu, you can view the options listed in the **Options** menu as shown below.

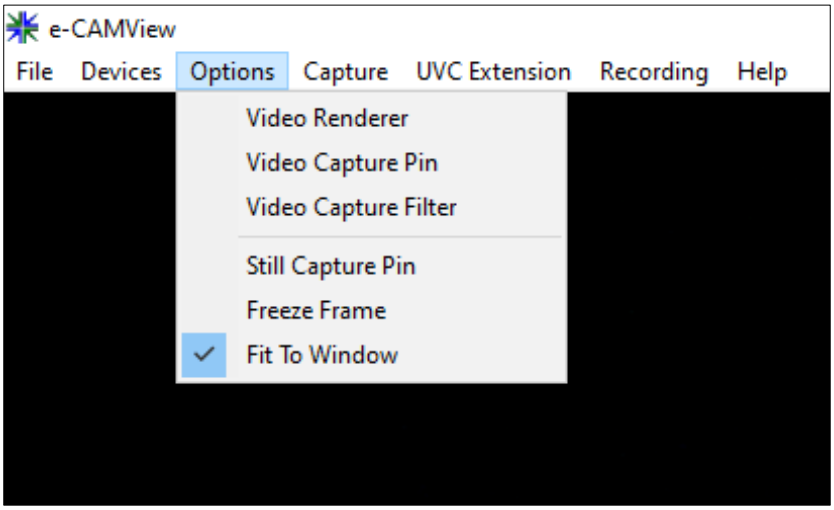

Figure 4: Options Menu

From this **Options** menu, you can select the following options:

- Video Capture Pin - to select various video preview resolutions supported by the device.
- Video Capture Filter - to change brightness, contrast, saturation, sharpness, gamma, white balance, gain, zoom, exposure, pan and tilt values.

- Still Capture Pin - to select various still image resolutions supported by the device.
- Freeze Frame - to pause the live preview.
- Fit To Window - to resize the preview to e-CAMView window.

The details of each of these options are described below.

Video Capture Pin

You can click the **Video Capture Pin** option of the **Options** menu to select the various supported resolutions by See3CAM_24CUG as shown below.

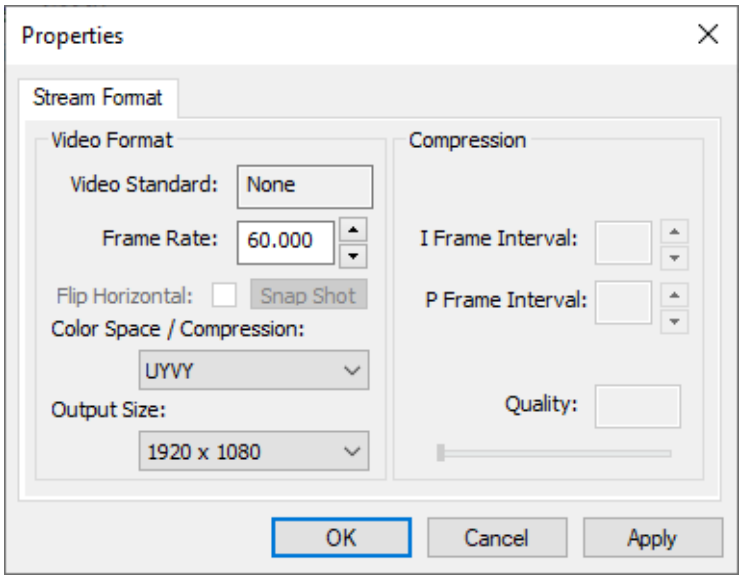

Figure 5: Video Capture Pin

To change the resolution, you can select any one of the resolutions from the **Output Size** drop-down list box. The frame rate supported by the current resolution will appear in the **Frame Rate** text box. Refer to *Table 1* for the resolution and frame rate supported in See3CAM_24CUG.

While changing the preview resolution, the preview will be stopped and resume once again when the resolutions are selected and click **OK**.

Note: When the exposure value is changed above -6 (15.6 ms), there will be a drop in the frame rate because the exposure time is more than the frame time. In auto exposure, maximum frame rate could be achieved with maximum lighting.

Video Capture Filter

You can click the **Video Capture Filter** option of the **Options** menu to configure some of the camera parameters of See3CAM_24CUG camera. When you click the **Video Proc Amp** tab in the **Properties** dialog box, you can view the controls that are available in the **Properties** dialog box as shown below.

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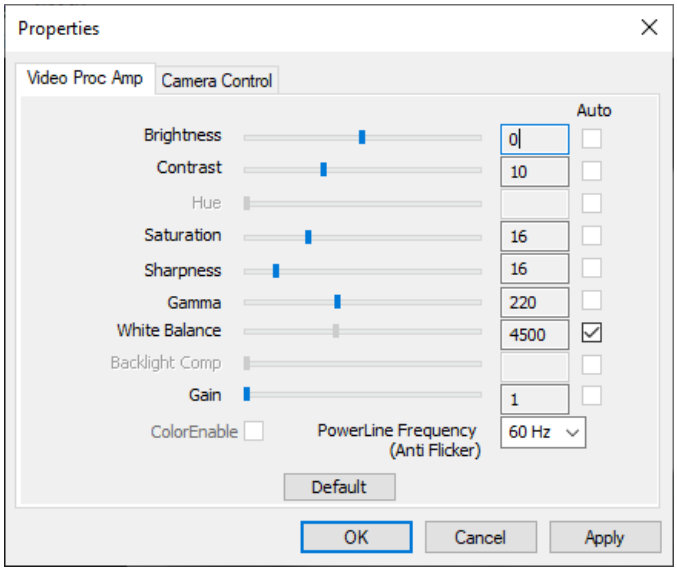

Figure 6: Video Proc Amp

The camera controls of See3CAM_24CUG are as follows:

- Brightness
- Contrast
- Saturation
- Sharpness
- Gamma
- White Balance (both manual and automatic)
- Gain
- Powerline Frequency
- Exposure (both manual and automatic)

The controls are classified into two tabs. The brightness, contrast, saturation, sharpness, gamma, white balance, gain and powerline frequency controls are available in the **Video Proc Amp** tab whereas the zoom, exposure, pan and tilt controls are available in the **Camera Control** tab as shown below.

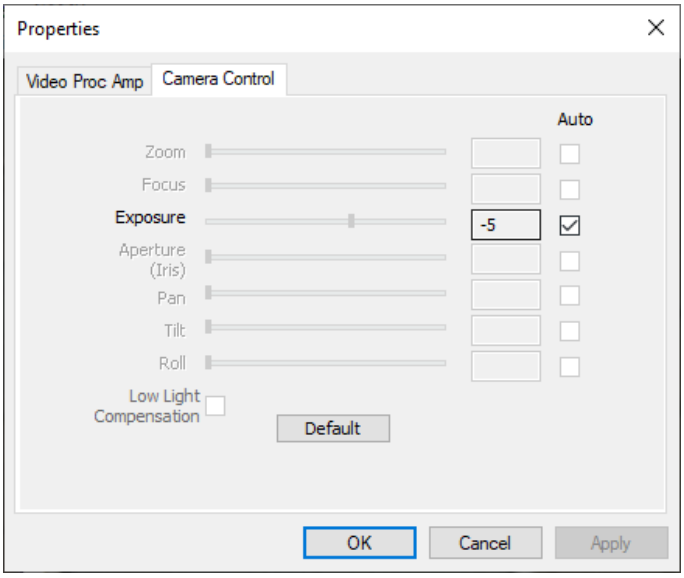

Figure 7: Camera Control

The **Default** button in both the tabs is used to select the default inbuilt values of all the controls for See3CAM_24CUG.

The values of See3CAM_24CUG controls are shown in below table.

Table 2: Values of See3CAM_24CUG Controls

Controls	Minimum Value	Maximum Value	Default Value	Step Size	Manual Control	Auto Control
Brightness	-15	15	0	1	YES	NO
Contrast	0	30	9	1	YES	NO
Saturation	0	60	16	1	YES	NO
Sharpness	0	127	16	1	YES	NO
Gamma	40	500	220	1	YES	NO
White Balance	1000	10000	4500	1	YES	YES
Gain	1	40	1	1	YES	NO
Powerline Frequency	50Hz	60Hz	Auto	-	YES	YES
Exposure	-14(50 µs)	0(1 second)	-5(31.2 ms)	Factor of 2 in each step value	YES	YES

Brightness

You can change the brightness values from a minimum value of -15 to 15 by moving the slider, and the exact changes will be reflected immediately in the preview. This brightness control increases the low light performance of See3CAM_24CUG. The default value is 0.

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Contrast

You can change the contrast values from a minimum value of 0 to 30 by moving the slider, and the exact changes will be reflected immediately in the preview. Increasing the Contrast control increases the luminance ratio of See3CAM_24CUG. The default value is 9.

Saturation

You can change the saturation values from a minimum value of 0 to 60 by moving the slider, and the exact changes will be reflected immediately in the preview. Increasing the Saturation control increases the intensity of the color of See3CAM_24CUG. The default value is 16.

Sharpness

You can change the sharpness values from a minimum value of 0 to 127 by moving the slider, and the exact changes will be reflected immediately in the preview. This Sharpness control increases the clarity of See3CAM_24CUG. The default value is 16.

Gamma

You can change the gamma values from a minimum value of 40 to 500 by moving the slider, and the exact changes will be reflected immediately in the preview. The values can be converted to the gamma exponent by dividing the set value with 100. The default value 220 represents 220/100 = 2.2 (SRGB) gamma exponent.

White Balance

You can change the white balance values from a minimum value of 1000 to 10000 by moving the slider, and the exact changes will be reflected immediately in the preview. This white balance value decides the color temperature of See3CAM_24CUG. The default value is 4500.

Gain

You can change the gain values from a minimum value of 1 to 40 with default value being 1. The changes are updated in the preview immediately.

Note: The gain slider will not have any effect in auto exposure mode.

Powerline Frequency

The powerline frequency values can be selected between 50Hz and 60Hz. The default mode is auto.

Note:

- The auto and disable anti flicker mode can be selected from **UVC Extension** menu.
- The changes made in the **UVC Extension** menu will be reflected in Video Capture Filter option.

- For auto and disable mode, the powerline frequency control of Video Capture Filter option will be in disabled state.

Exposure

To select the exposure control, you can select the Exposure check box as shown in *Figure 7*.

See3CAM_24CUG supports both auto and manual exposure which can be controlled using the **Camera Control** tab of the Video Capture Filter option. The exposure value could be manually changed by moving the slider, and See3CAM_24CUG supports exposure values ranging from 100 µs to 1 second represented from -13 to 0 in the slider. The default value is -5 (15.6 ms). The exposure values are configured inside the CMOS image sensor based on the sensor configuration and clock configuration details. In the DirectShow application layer, the exposure values are encoded as 0 to -13.

To obtain a good low light performance, it is essential to change the exposure according to the change in lighting conditions. To support this feature, See3CAM_24CUG has an auto exposure feature by which the exposure of the camera will be changed according to the lighting conditions which gives the best low light performance.

Note:

- When the exposure value is changed above -6 (15.6 ms), there will be a drop in the frame rate because the exposure time is more than the time period of camera frame.
- The controls are global across all resolutions and all modes, and hence changing the control values will reflect the changes in both the modes and resolutions.

The slider values are computed according to the UVC standards, and hence the exposure time that is applied is shown in below table.

Table 3: See3CAM_24CUG Slider Value-Exposure Time Mapping

Slider Value	Exposure Time
-14	50 µs
-13	100 µs
-12	200 µs
-11	500 µs
-10	1 ms
-9	2 ms
-8	3.9 ms
-7	7.8 ms
-6	15.6 ms
-5	31.2 ms
-4	62.5 ms
-3	125 ms
-2	250 ms

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-1	500 ms
0	1 second

Still Capture Pin

You can click the Still Capture Pin option of the **Options** menu to select the various resolutions supported by See3CAM_24CUG for capturing still images. The e-CAMView application will save the images in Bitmap (.bmp) for UYVY format and JPEG (.jpg) for MJPEG format in the location you have specified.

When you click the Still Capture Pin option, you can view the **Still Pin Properties** dialog box as shown below.

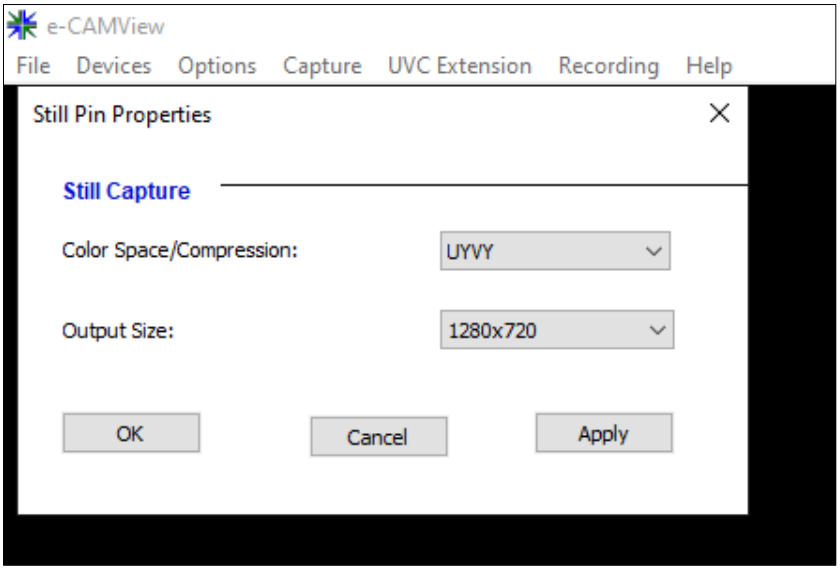

Figure 8: Still Capture Pin

To change the color space or compression format, you can select the format in the **Color Space/Compression** drop-down list box. To change the output size, you can select any one of the resolutions from the **Output Size** drop-down list box.

Note: The resolutions are same as in preview resolutions available through Video Capture Pin option.

Freeze Frame

You can select the Freeze Frame option of the **Options** menu to pause and resume a streaming preview in any resolution. The shortcut key for Freeze Frame option is Space bar.

Fit To Window

When Fit To Window option is enabled, the streaming preview is resized to fit into the streaming window to maintain the aspect ratio. If disabled, then a cropped version of the preview will be displayed in the streaming window.

Capture Menu

The **Capture** menu is used to capture the image using the e-CAMView application. It can also be used to select the still image capture path where the images will be saved. When you click the **Capture** menu, you can view the available options of **Capture** menu as shown below.

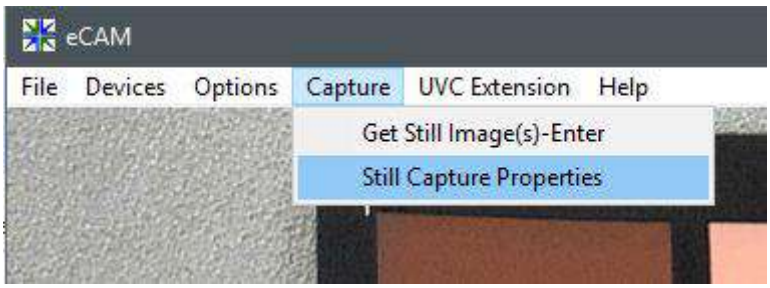

Figure 9: Capture Menu

Get Still Image

To capture an image, you can either click the **Get Still Image(s)-Enter** option or press the **Enter** key of the keyboard. The image will be captured and stored in the location you have specified.

Note: By default, e-CAMView will set the desktop as the image storage path for easy access, but you can change it to any location using the Still Capture Properties option.

Still Capture Properties

When you click the Still Capture Properties option, a **Still Path** dialog box appears as shown below.

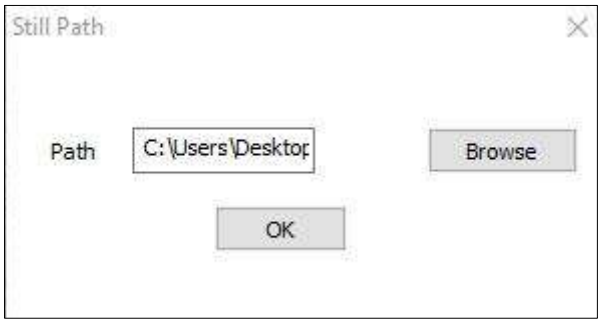

Figure 10: Still Path Dialog Box

UVC Extension Menu

The See3CAM_24CUG camera has some additional controls and features and is listed as UVC Extension controls, hence they are not included in the standard UVC controls. You can click the **UVC Extension** menu to select these extended Extension Unit controls of See3CAM_24CUG as shown below.

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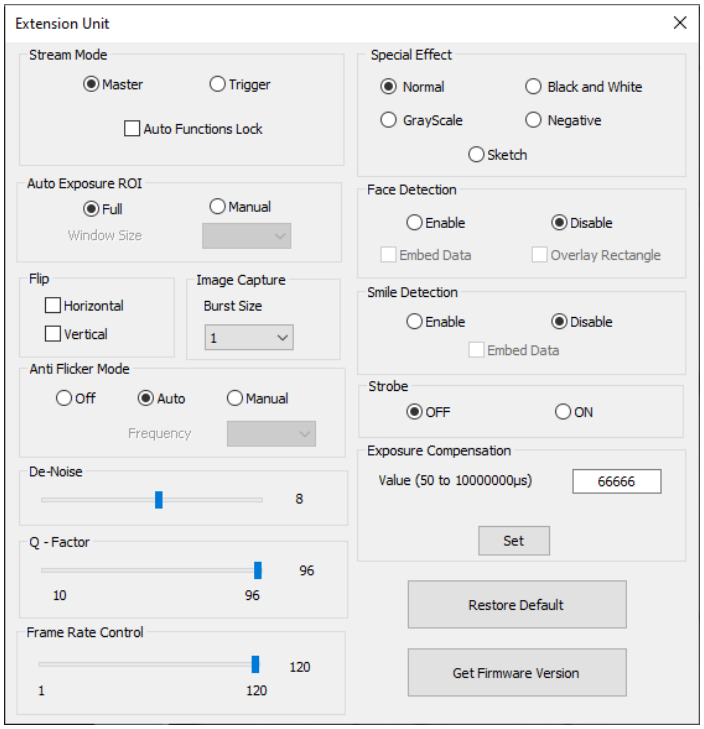

Figure 11: Extension Unit Menu

The controls supported in the **Extension Unit** menu are as follows:

- Stream Mode
- Auto Exposure Region of Interest (ROI)
- Flip
- Image Capture
- Anti- Flicker Mode
- De-Noise
- Quality Factor (Q-Factor)
- Frame Rate Control
- Special Effect
- Face Detection
- Smile Detection
- Strobe
- Exposure Compensation
- Restore Default
- Get Firmware Version

Stream Mode

The stream mode allows you to switch between master and trigger modes. The modes supported in stream mode are explained below.

- **Master**: The master mode can be considered as a free-running mode of the camera. In this mode, the camera is configured for a preview resolution and still

resolution. This is a simple mode of operation for the camera without any external trigger capability.

- **Trigger**: In trigger mode, See3CAM_24CUG camera can synchronize the exposure (or integration) of the pixels of the camera 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 See3CAM_24CUG, 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. An **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 shall be waiting for an external event on the GPIO connector and the camera will start exposing on the trigger signal. The external trigger pulse on the GPIO connector must be of certain duration for the camera to recognize this event. The requirements for this external trigger signal are given in the *See3CAM_24CUG_Trigger_Mode_Application_Note.pdf*.

  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 Pin option.

  Note: *The Auto Function Lock control will be work only in auto exposure and auto white balance mode. The change in manual exposure and manual white balance will reflect in preview even when the auto function lock is enabled.*

Auto Exposure ROI

In this mode, you can select the ROI for auto exposure algorithm. The ROI selection can be made by clicking the preview window.

The modes in auto exposure ROI are as follows:

- **Full ROI**: In this mode, full region-based exposure value will be applied to the frame.
- **Manual ROI**: In this mode, you can select the ROI and at that region, the exposure value will be applied to the entire frame. The images of manual ROI mode are shown in below table.

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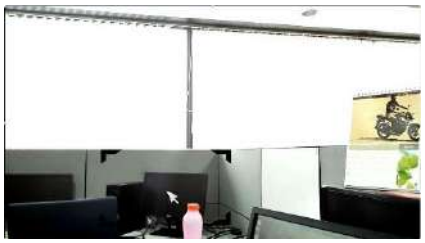
Table 4: Images of Manual ROI Mode

Note:

- The exposure window size can also be selected from the **UVC Extension** menu.
- The mouse pointer and the surrounding rectangle is just for representative purpose and will not be present in the actual image.

The window size defines the size of the ROI. For window size 8, the entire frame will be the ROI. If this region exceeds or deceeds, the frame boundary of the ROI will be clipped automatically.

For frame size 1280 x 720, the exposure region based on the window size is listed in below table.

Table 5: Exposure Region for Various Window Sizes

Window Size	Exposure Region (1280 x 720)
1	1/8 (160 x 90)
2	2/8 (320 x 180)
3	3/8 (480 x 270)
4	4/8 (640 x 360)
5	5/8 (800 x 450)
6	6/8 (960 x 540)
7	7/8 (1120 x 630)
8	1 (1280 x 720)

Flip

The two types of flip are as follows:

- **Horizontal Flip**: This control flips the preview left or right as shown below.

Figure 12: Horizontal Flip

- **Vertical Flip**: This control flips the preview vertically up or down as shown below.

Figure 13: Vertical Flip

Note: When both Horizontal and Vertical flips are enabled, the image is rotated to 180 deg.

Image Capture

You can select the burst size from a minimum value of 1 to 5 in a **Burst Size** drop-down list box, and the exact number of images will be captured and stored in the location you have specified.

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Anti-Flicker Mode

The flicker detection is used to avoid flicker in the video preview due to AC light source. You can select off mode for flicker avoidance, auto mode, or manual mode (50 Hz and 60 Hz).

Note: In some lighting conditions, the auto flicker mode will take longer time to settle. During those conditions, it is advisable to use manual anti flicker mode.

De-Noise

You can select the De-Noise option to blur the effect of noise in the image preview. The values can be varied from 0 to 15 with default value being 8 by moving the slider.

When you select the minimum De-Noise value by moving the slider, you can view the screen similar to the screen shown below.

Figure 14: Minimum De-Noise

When you select the maximum De-Noise value by moving the slider, you can view the screen similar to the screen shown below.

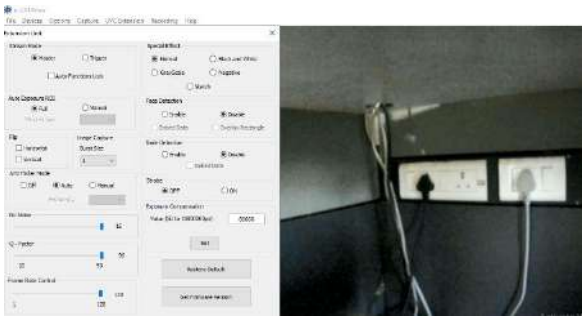

Figure 15: Maximum De-Noise

Q-Factor

The Q-Factor defines the value that is used as a scale factor for the quantization table. The values can be varied from 10 to 96 with default being 96 in USB 3.1 Gen1 and 84 in USB 2.0.

Frame Rate Control

You can change the frame rate using the Frame Rate control. The default frame rate control value will appear in the **Frame Rate** text box of **Video Capture Pin** property dialog box.

Note: The slider value of frame rate control will not have any effect above the default frame rate. The control value will get update to its default value when the resolution is changed.

Special Effect

The special effects enable four other processed image preview options in See3CAM_24CUG. The special effects are as follows:

- **Normal**: In this mode, the normal un-processed UYVY or MJPEG image stream from the camera.
- **Black and White**: In this mode, thresholding is applied to the normal preview and the image stream is composed of black and white pixels as shown below.

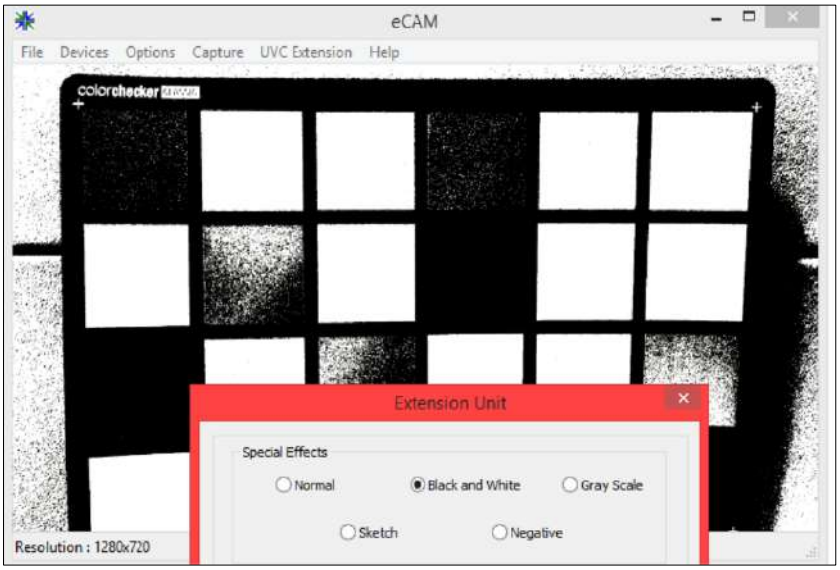

Figure 16: Black and White Effect

- **Grayscale**: In this mode, the normal preview is desaturated, and the image stream is composed of gray shades as shown below.

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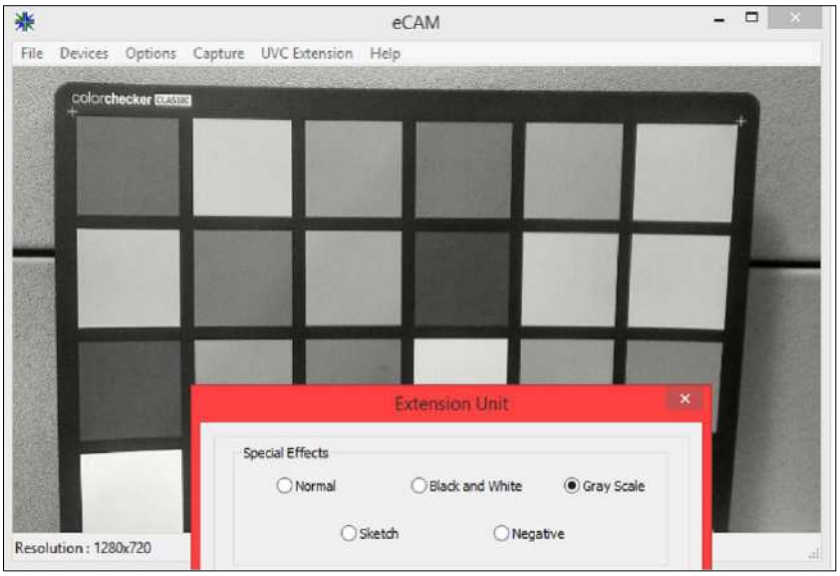

Figure 17: Grayscale Effect

- **Negative**: In this mode, the normal preview is color inversed as shown below.

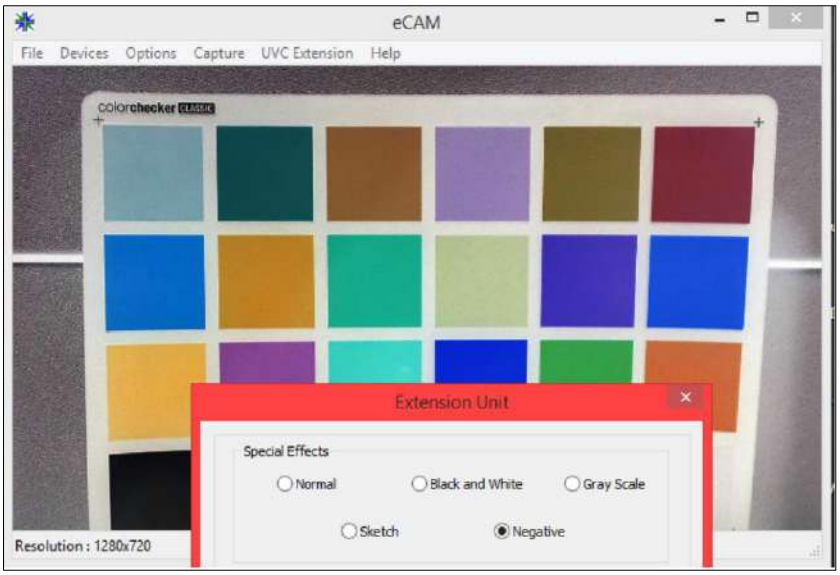

Figure 18: Negative Effect

- **Sketch**: In this mode, an effect of edge dominant image stream useful for edge detection is produced as shown below.

Figure 19: Sketch Effect

Face Detection

You can select the face detection control to enable and disable the face detection. The Overlay Rectangle option allows you to enable or disable the overlay rectangle around the faces during face detection. When you select Overlay Rectangle option, you can view the screen similar to the screen shown below.

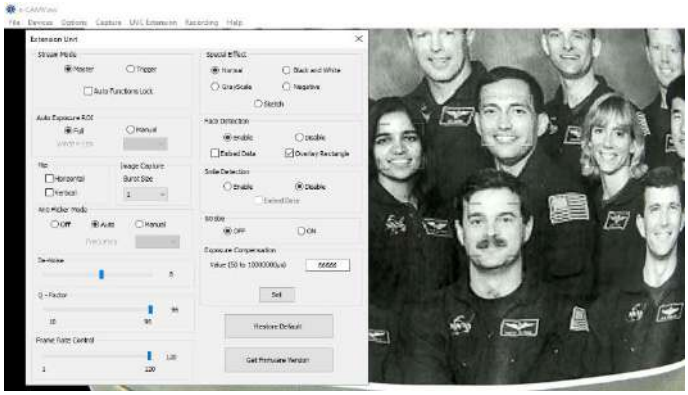

Figure 20: Face Detection

When Embed Data option is selected, the last part of the frame will be replaced with face details. Refer to the *See3CAM_24CUG_Face_and_Smile_Detection_Application_Note.pdf* for more information.

Note: The face detection is only applicable for Normal and Grayscale in Special effects.

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Smile Detection

You can select the smile detection control to enable and disable the smile detection. When you select Enable option, you can view the screen similar to the screen shown below.

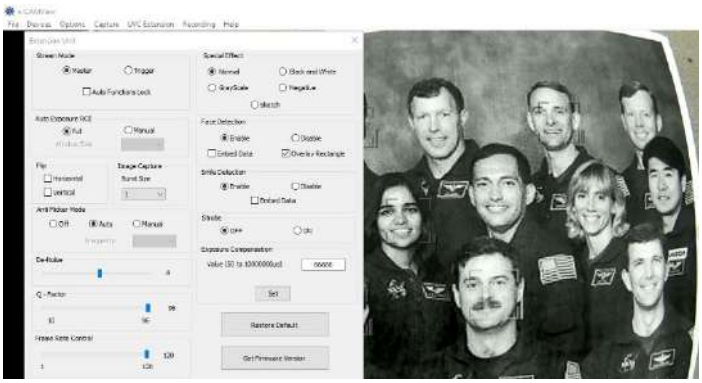

Figure 21: Smile Detection

When the Embed Data option is selected, the last part of the frame will be replaced with smile details. For more information, refer to the *See3CAM_24CUG_Face_and_Smile_Detection_Application_Note.pdf*.

Note:

- When face/smile detection embed data is enabled, there will be a drop-in frame rate.
- When the overlay rectangle control is enabled, the captured images will have overlay rectangle.
- For safe operation, it is advisable to disable the overlay rectangle control during still capture.

Strobe

If LED or Xenon Flash is used, it must be connected to pin 5 of CN2 connector in the USB base board. Refer to the *See3CAM_24CUG_Datasheet.pdf* for the connections and pin description details. The two types of strobe controls are as follows:

- **OFF**: It disables the strobe controls.
- **ON**: When this control is enabled, the LED ON time is set based on the current exposure value (integration time).

Exposure Compensation

You can adjust the automatically calculated exposure using the exposure compensation control.

Note: The exposure compensation value will not have any effect in manual exposure mode. The exposure compensation value will get update to its default value when

the resolution is changed. There will be a change in frame rate when the exposure compensation value is changed.

The resolution and default exposure compensation value of See3CAM_24CUG is shown in below table.

Table 6: Resolution and Default Exposure Compensation Values of See3CAM_24CUG

Format	Resolution	Frame Rate	Default Exposure Compensation (µs)	
			USB 3.1 Gen1	USB 2.0
UYVY	720P(1280 x 720)	60	66666	NA
		15	NA	66666
	1080P(1920 x 1080)	60	66666	NA
		8	NA	125000
	1200P(1920 x 1200)	58	66666	NA
		6	NA	166666
MJPEG	720P(1280 x 720)	120	66666	
		60		
	1080P(1920 x 1080)	120		
		60		
		30		
	1200P(1920 x 1200)	114		
		60		

Restore Default

When you click the **Restore Default** button, all the controls will be updated to their default values.

Get Firmware Version

You can click the **Get Firmware Version** button available in the Extension Unit dialog box, to get the Unique ID that has been assigned to the See3CAM range of cameras. The Serial Number of the camera will be displayed along with the Firmware Version as shown below.

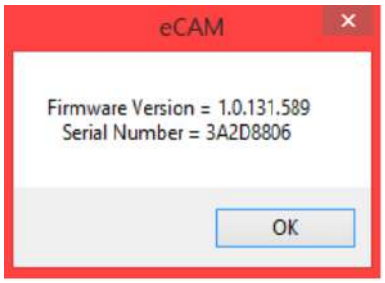

Figure 22: Firmware Version and Camera Serial Number

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Recording Menu

You can record video and audio by clicking the Record option. Make sure that the audio device is selected before recording the audio data. In See3CAM_24CUG, recording is available in 1280 x 720 and 1920 x 1080 formats.

When you click the **Recording** menu, you can view the available options as shown below.

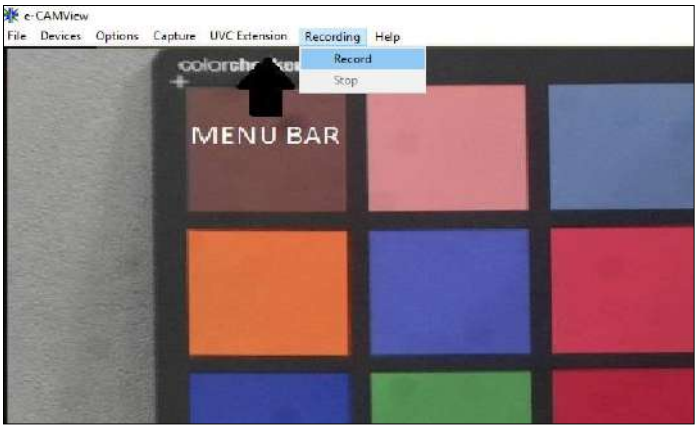

Figure 23: Recording Menu

Note:

- If default frame rate of the resolution is less than 10, then recording is not supported.
- Frame rate in the recorded video varies based on PC performance.
- If Face overlay rectangle and Smile detection enabled with focusing the device at any valid faces while recording, the recorded video will also have overlay rectangles over the faces with smile threshold value.
- While recording frame drop or corruption may occur in some PCs due to the low performance of the PC, please reduce FPS while recording in UYVY format or reduce the Q-factor in MJPEG format.
- In Windows 8.1 (32 bit and 64 bit), if we record more than 20 mins there will be problem in playback. So, it is advisable not to record more than 20 mins. This issue is under work around.

Help Menu

You can click the **Help** menu to obtain the current version information of e-CAMView application installed in the computer. The eCAM Version information is displayed as shown below.

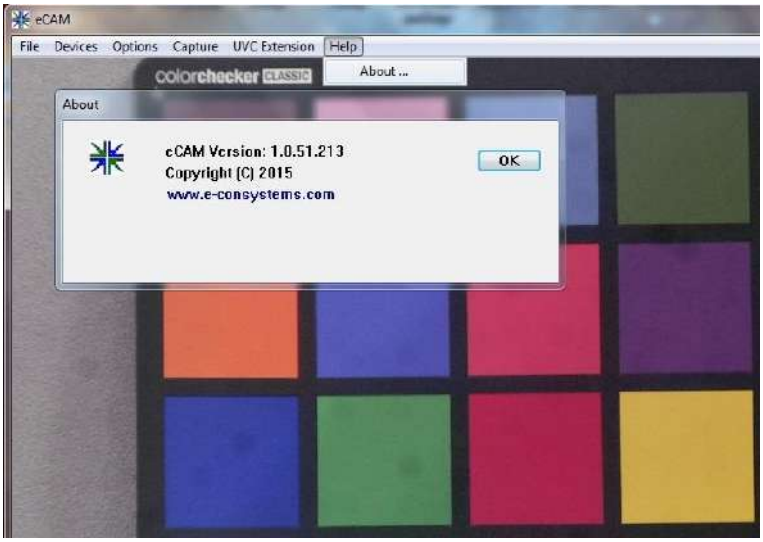

Figure 24: Help Menu

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Troubleshooting

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

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

You need to install the latest version of e-CAMView application from the Developer Resources website.

In e-CAMView sample application, the device 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.

Device connected, 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.

Device 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. You can visit the blog https://www.e-consystems.com/blog/camera/?p=1720 for more information on USB practical bandwidths.

1. **What is See3CAM_24CUG?**

   See3CAM_24CUG is a 2.3 MP, color, global shutter, UVC compliant, USB 3.1 Gen1 camera with the S-mount (also known as M12 board lens) lens holder. It is a single-board solution containing the camera sensor module board with 1/2.6" AR0234 CMOS image sensor from ON Semiconductor® and the USB 3.1 Gen1 interface board.

2. **What is the lens used in this camera?**

   The lens used in the camera is S-mount (M12) with a focal length of 3.0mm and a diagonal FOV of 128 deg.

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

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

4. **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.

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

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

6. **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.

7. **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 the frame rates.

8. **I can view frame corruption while streaming. Can this be avoided?**

   Yes, this is due to bandwidth limitation in USB host. This may occur when multiple cameras are connected to single USB host or in USB hosts of less

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powerful embedded boards. You can visit the blog https://www.e-consystems.com/blog/camera/?p=1720 for more information on USB practical bandwidths.

9. **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 value will improve stability in case of any issues. If it is still required to reduce the frame rates, contact sales@e-consystems.com.

10. **How to use the external trigger option in See3CAM_24CUG?**

    The external trigger option can be used to capture still images in Master mode and it can be utilized for external synchronization in Trigger mode. Please refer the *See3CAM_24CUG_Hardware_Trigger_Application_note.pdf*.

11. **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.

12. **Is there any software available with the camera?**

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

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

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

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

    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.

15. **The camera 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.

16. I would like to use a different lens. What is the NRE charge?

If your application requires fixed focus custom lens, contact sales@e-consystms.com. Non-recurring engineering (NRE) refers to the one-time cost to research, design, develop and test a new product or product enhancement.

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What's Next?

After understanding the usage of e-CAMView application, you can refer to the following documents to understand more about See3CAM_24CUG.

- *See3CAM_24CUG Extension Unit API DocumentSee3CAM_24CUGDatasheet*
- *See3CAM_24CUG Face and Smile Detection Application Note*
- *See3CAM_24CUG Hardware Trigger Application Note*

Glossary

CMOS: Complementary Metal Oxide Semiconductor.

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

ROI: Region of Interest.

USB: Universal Serial Bus.

USB 2.0: Universal Serial Bus High speed.

USB 3.1 Gen1: Universal Serial Bus Super speed.

UVC Compliant: USB Video Class Compliant.

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

Q-Factor: Value that is used as a scale factor for the quantization table.

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Support

Contact Us

If you need any support on See3CAM_24CUG 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	24-Jan-2021	Initial Draft	Camera Team
1.1	27-Feb-2021	Added Changes	Camera Team

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