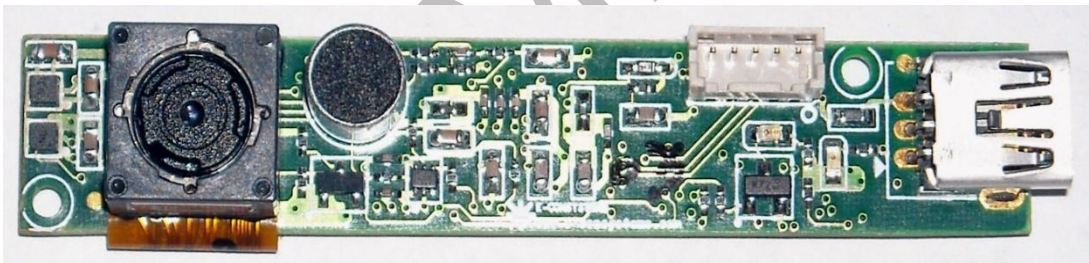


## **CARDUSB3 USB Camera Module**



## **Linux Application User Manual Document**

**Revision 1.0**

Tuesday, August 23, 2011

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## e-CAM\_33 USB

### 1 Revision History

Rev	Date	Description	Author
1	23 – Aug– 2011	Initial Draft	Balaji P

PRELIMINARY

## 2 Introduction

CARDUSB3 is a 60 x 11 mm small form factor device with high performance 3 Mega Pixel pluggable camera module with fixed lens holder especially targeted for PC. Camera module is based on OV3640 CMOS Image sensor from Omnivision Inc.

CARDUSB3 has a built in microphone and an integrated ADC which can provide user with high quality audio sampling functions. 16 bit Pulse code modulation is supported with sample rate of 48 KHz. USB Camera Board is fully compliant with USB Video Class (UVC) 1.0 Standard, the USB Audio Class 1.0 Standard. So video streaming is through UVC and audio streaming is through UAC.

This is a User manual document for the linux application provided by e-con to customer for the e-CAM33\_USB webcam product.

## 3 Scope

This is a CARDUSB3 Linux Application User Manual document for Linux users of CARDUSB3 product. This document is intended for the users working on the command line UVC XU Control application for CARDUSB3 web cam

## 4 Identifying the Deliverables

The release package `e_cam33_usb_webcam_app_package.tar.gz` is a compressed (i.e tar.gz) file which will provide the UVC XU control application binary and user manual document when uncompressed.

Use the command '**tar**' for uncompressing this release package  
`tar -xvzf e_cam33_usb_webcam_app_package.tar.gz`

After uncompressing this package a directory is created in the name  
**e\_cam33\_usb\_webcam\_app\_package**

The hierarchy of the `e_cam33_usb_webcam_app_package` directory is as follows

```
e_cam33_usb_webcam_app_package
|
|-- e_cam33_uvc_xu_app
|
-- CARDUSB3_Linux_Application_User_Manual_Rev1.0.pdf
```

## 5 CARDUSB3 WebCam UVC XU Control

The vendor specific operations for the CARDUSB3 Webcam manufactured by the e-con Systems can be done using the UVC XU control in Linux.

The vendor specific operations for the CARDUSB3 Webcam are

1. Read Sensor ID
2. Single Trigger Auto Focus Control
3. Read the Auto Focus Status

The user can do the vendor specific operations by running the 'CARDUSB3 Webcam UVC XU control Application'.

## 6 Procedure for doing UVC XU Control in CARDUSB3

1. Connect the CARDUSB3 USB Webcam to the Linux Development System

2. Run video streaming application like 'cheese', 'guvcview'.

**sudo guvcview -d <device\_name>**

For example, sudo guvcview -d /dev/video0

3. Run the CARDUSB3 USB WebCam UVC XU control Application 'e\_cam33\_uvc\_xu\_app' in superuser privilege mode

**\$cd <path\_to\_the\_directory\_where\_the\_application\_is\_present>**

**\$sudo ./e\_cam33\_uvc\_xu\_app**

4. The application displays the list of the uvc web cameras connected to the Linux Development System. And the application selects the first uvc web camera which is an e-con Systems Product for the UVC XU control.

### IMPORTANT NOTE:

1. If no e-con Systems UVC Web Camera is connected to the Linux Development System, then the application will exit instead of giving the options for uvc xu control

2. If more than one e-con Systems UVC Web Camera is connected to the Linux Development System, the application always selects the first connected e-con Systems usb web camera.

3. The video streaming applications 'cheese' and 'guvcview' can be installed as follows

sudo apt-get install cheese

sudo apt-get install guvcview

4. If the devices selected by the UVC XU control application and the video streaming application are not same, then all the UVC XU controls will be failed.

### 6.1 UVC XU Control for Reading Sensor ID

The user can get the Sensor ID of the CARDUSB3 USB Web Camera by selecting the option 'READ SENSOR ID' given by the application 'e\_cam33\_uvc\_xu\_app'.

The Sensor ID is '0x364C'

## 6.2 UVC XU Control for Single Trigger Auto Focus

By default the Camera in the CARDUSB3 USB Webcam is in '**SINGLE TRIGGER AUTO FOCUS MODE**'. We can trigger the single shot auto focus by selecting the option '**Apply Single Trigger Focus**' given by the application 'e\_cam33\_uvc\_xu\_app'.

## 6.3 UVC XU Control for Reading Focus Status

The user can get the Focus Status of the Sensor in CARDUSB3 USB Webcam by selecting the option '**READ AF STATUS**' given by the application 'e\_cam33\_uvc\_xu\_app'

The focus states are:

1. MANUAL FOCUS
2. AUTO FOCUS CONTINUOUS FOCUSING
3. AUTO FOCUS CONTINUOUS FOCUSED
4. AUTO FOCUS FROZEN
5. SINGLE TRIGGER AUTO FOCUSING
6. SINGLE TRIGGER AUTO FOCUSED
7. SINGLE TRIGGER AUTO FOCUS FROZEN

## 6.4 Testing MIC in CARDUSB3 Webcam

The Audio Interface (i.e MIC) in the CARDUSB3 USB Webcam can be tested in Linux by using the applications gvcview and Audacity.

### 6.4.1 Pre-requisites

1. Check the driver availability for the USB Sound Devices. Generally the USB Sound Devices Drivers are available as module drivers in ubuntu

```
lsmod | grep snd_usb_audio
```

```
lsmod | grep snd_usbmidi_lib
```

2. If the USB Sound Device Drivers are not available (i.e not inserted) in the running kernel, then insert the driver modules

```
sudo modprobe snd-usb-audio
```

```
sudo modprobe snd-usbmidi-lib
```

3. Confirm that the driver modules are inserted properly

```
lsmod | grep snd_usb_audio
```

```
lsmod | grep snd_usbmidi_lib
```

4. Connect the CARDUSB3 USB Webcam to the Linux Development System

5. Adjust the MIC Gain on CARDUSB3 USB Webcam using the command 'alsamixer'

1. Run the command 'alsamixer'

```
alsamixer
```

2. Press 'F6' to select the Sound Card. The list of available soundcards will be displayed. In this select the Sound Card 'e-con Systems 3MP AF Camera'

3. Press 'F4' to enter the window for adjusting the MIC Gain

4. Adjust the Gain Value to the required one by using the Up, Down Arrow Keys.

5. Press 'ESC' to quit the alsamixer.

## 6.4.2 Testing MIC using Guvview

1. Run the application 'gucvview' for recording video and audio

```
sudo gucvview -d /dev/video1
```

**Note:** In the above command, the /dev/video1 is the device node name assigned by the driver for the connected usb webcam. Please use proper device name here.

2. Go to the 'Audio Tab' in the GUVViewer Controls.

3. Select the Input Device with respect to the connected USB Webcam

For example, select 'e-con System's 3MP Camera: USB Audio (hw:1,0)' for the CARDUSB3 Webcam

4. For the CARDUSB3 USB Camera, the default sample rate is 44100 Hz and the bitrate is 160 Kbps. Choose the required sample rate and bit rate. Recommended Sample Rate is 48000 Hz, Bitrate is 160 Kbps.

5. Go to the 'Video & Files' Tab in the GUVViewer Controls

6. Select the Location and the File name for the Video File to be recorded

7. Select the 'Cap.Video' in 'Video & Files' Tab in the GUVViewer Controls

8. After some time stop the video recording by selecting the 'Stop Video' Button in Video & Files Tab in the GUVViewer Controls

9. Play the recorded video file using any player like VLC player, Movie Player.

## 6.4.3 Testing MIC using Audacity

1. Install and Run the application 'audacity' for recording audio

1. To install 'audacity' in your pc run the command

```
$ sudo apt-get install audacity
```

2. To run the application

```
$ audacity
```

2. Go to the 'Edit Tab' in the Audacity Menu bar

3. Select the 'Preferences' option

4. Select the 'Devices' option in the scroll bar

5. Select Input Device in the Recording Menu with respect to the connected USB Web Cam and select OK.

For example, select 'e-con System's 3MP Camera: USB Audio (hw:1,0)' for the CARDUSB3 Web Cam

6. Select the Project (i.e. sample) rate in the Selection toolbar. For the CARDUSB3 USB Camera, the default sample rate is 44100 Hz.

7. Press the 'Record' Button in the Control Toolbar for recording audio.

8. After some time, Stop the audio recording by pressing the 'Stop' Button in the Control Toolbar.

9. Select the 'Export' option in the 'File' Menu for save the recorded audio file.

10. Select the audio file format like \*.mp3, \*.wav, \*.aiff, etc.

11. Select the Location and the File name for the Audio File.

12. Play the recorded audio file using any player like VLC Player, Movie Player.

## 7 Known Issues and Limitations

1. The UVC XU Control for CARDUSB3 USB Webcam will not work if the Video Streaming with the CARDUSB3 USB Webcam is not going on.

2. If more than one CARDUSB3 Webcam are connected to the Linux Development System, the UVC XU Application and Library always selects the first CARDUSB3 Webcam for the UVC XU Control.

3. This UVC XU Control Application, Library and Audio Interface is tested in linux kernel versions 2.6.35, 2.6.38 and 2.6.39.

4. This UVC XU Control Application, Library and Audio Interface is tested in Ubuntu 10.10 Linux Distribution only.



5. Sometimes the uvc xu control application fails for the following controls for the case: 'The UVC XU control application is run first then the video streaming using the connected CARDUSB3 USB webcam is started later'

- ◆ Read Sensor ID
- ◆ Single Trigger AutoFocus
- ◆ Get AutoFocus Status

**WorkAround for this issue:**

1. Stop all the applications (like e\_cam33\_uvc\_xu\_app, guvcview) which are using the video devices.

2. Uninstall the driver module 'uvcvideo'

```
sudo modprobe -r uvcvideo
```

3. Install the driver module 'uvcvideo'

```
sudo modprobe uvcvideo
```

4. Run the UVC XU control application

```
sudo ./e_cam33_uvc_xu_app
```

5. Run the video streaming application using the connected CARDUSB3 usb webcam

For example, guvcview -d /dev/video0

6. In 'guvcview' application, when a audio (along with video) is recorded with audio sample rate as 44100 Khz, the audio quality in the recorded video is very poor.

7. Using 'audacity' application, we can record audio only.

## 8 Conclusion

The UVC XU Control Application and audio interface testing are explained in this document.