EZ-USB® FX3™ HD 720p Camera Kit

Quick Start Guide

Version 2.0

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1. Introduction

The Cypress EZ-USB FX3 HD 720p Camera Kit is a combination of hardware, software, and documentation that demonstrates FX3 design for high-definition (HD) cameras. You can use this kit as an example to build your own USB 3.0 camera.

The FX3 HD 720p Camera Kit consists of three boards: EZ-USB FX3 Development Board (DVK), Aptina MT9M114 Image Sensor Headboard, and Aptina Interconnect Board. This kit allows you to:

- Stream uncompressed High-definition 720p (1280x720) resolution video at 30 frames per second (fps) over USB 3.0
- Stream uncompressed Standard-definition VGA (640x480) resolution video at 15 frames per second (fps) over USB 2.0

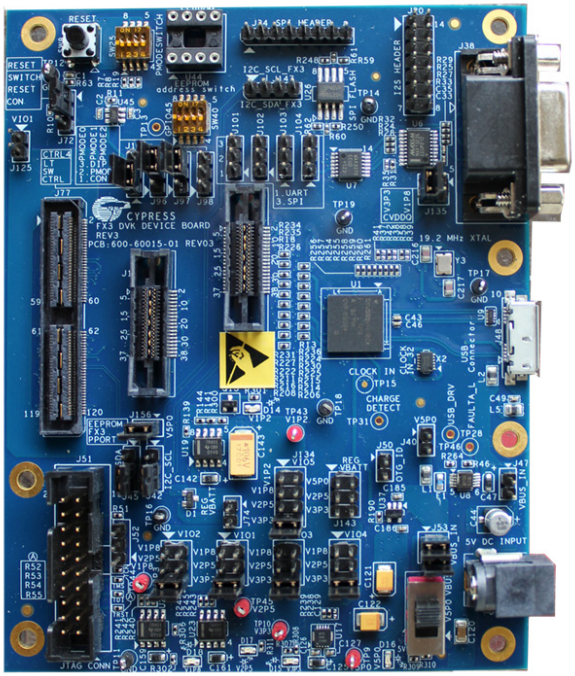
1.1 Kit Contents

In order to use the EZ-USB FX3 HD 720p Camera Kit, please procure the following boards and firmware example code:

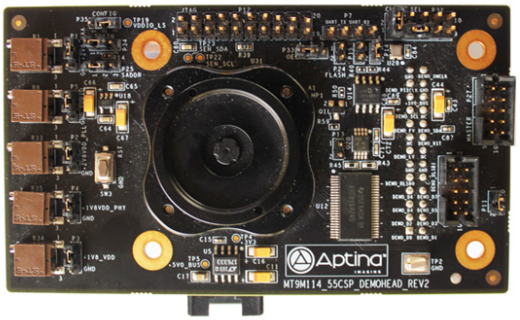
- EZ-USB FX3 Development Board (CYUSB3KIT-001)
  - Buy from Cypress Website (http://www.cypress.com/?rID=58321)
- Aptina MT9M114 Image Sensor Headboard (MT9M114EBLSTCZH ES)
  - Sign NDA with Aptina (send request to fx3@cypress.com for expedited process)
  - Buy from Aptina Distributors (http://www.aptina.com/how_to_buy/distributors.jsp)
- Aptina Interconnect Board
  - Please contact fx3@cypress.com
- FX3 Image Sensor USB Video Class (UVC) Firmware Example Code
  - The binary image is available for download from Camera Kit Web Page (http://www.cypress.com/?rID=72599)
  - The source code is available upon request

Figure 1-1. EZ-USB FX3 HD 720p Camera Kit Boards

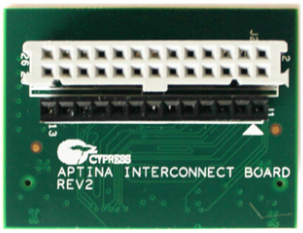
FX3 Development Kit (DVK)



Aptina Image Sensor Headboard



Aptina Interconnect Board



1.2 Software

The following software is required to run the demonstration:

- Latest EZ-USB FX3 Software Development Kit (SDK)
  - Download from http://www.cypress.com/?rID=57990
- Debut Video Capture Software v1.69
  - Download from http://www.nchsoftware.com/capture/index.html

1.3 Minimum System Requirement

- Windows 7, Vista, XP
- PC with USB 2.0 host or USB 3.0 host
  (In the absence of a USB 3.0 host, an USB 3.0 ExpressCard adapter may be used)

1.4 Additional Learning Resources

Visit www.cypress.com for additional learning resources in the form of data sheets, technical reference manual and application notes.

1.5 Document History

Revision	PDF Creation Date	Origin of Change	Description of Change
1.0	12/28/2012	STVC	Initial version of kit guide
2.0	05/21/2013	STVC	Changed document title to EZ-USB FX3 HD 720p Camera Kit - Quick Start Guide, Rev. 2.0 Updated Section 1.1 Kit Contents, Aptina interconnection board is now procured by contacting fx3@cypress.com.

1.6 Documentation Conventions

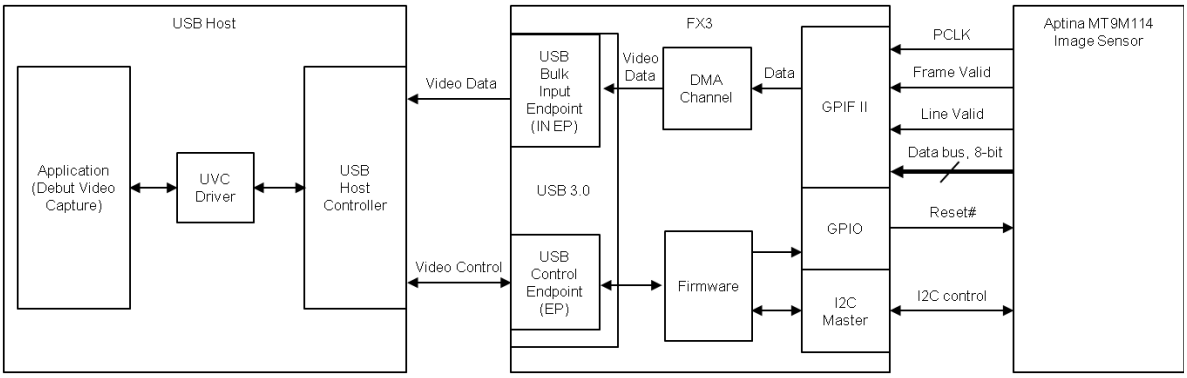
Table 1-1. Document Conventions for Guides

Convention	Usage
`Courier New`	Displays file locations, user entered text, and source code: `C:\ ...cd\icc\`
Italics	Displays file names and reference documentation: Read about the *sourcefile.hex* file in the *PSoC Designer User Guide*.
File > Open	Represents menu paths: File > Open > New Project
Bold	Displays commands, menu paths, and icon names in procedures: Click the **File** icon and then click **Open**.

2. Getting Started

2.1 EZ-USB FX3 HD 720p Camera Kit

Figure 2-1. System Block Diagram



2.1.1 Overview

In this application, FX3 interfaces to a parallel image sensor over the General Programmable Interface (GPIF II). The FX3 firmware supports the USB Video Class (UVC) and communicates with a USB 3.0 or USB 2.0 host. An application such as Debut Video Capture is used for viewing video on the PC. This application communicates directly with the UVC driver on the PC.

The control commands to the image sensor are communicated by FX3 over the I2C interface.

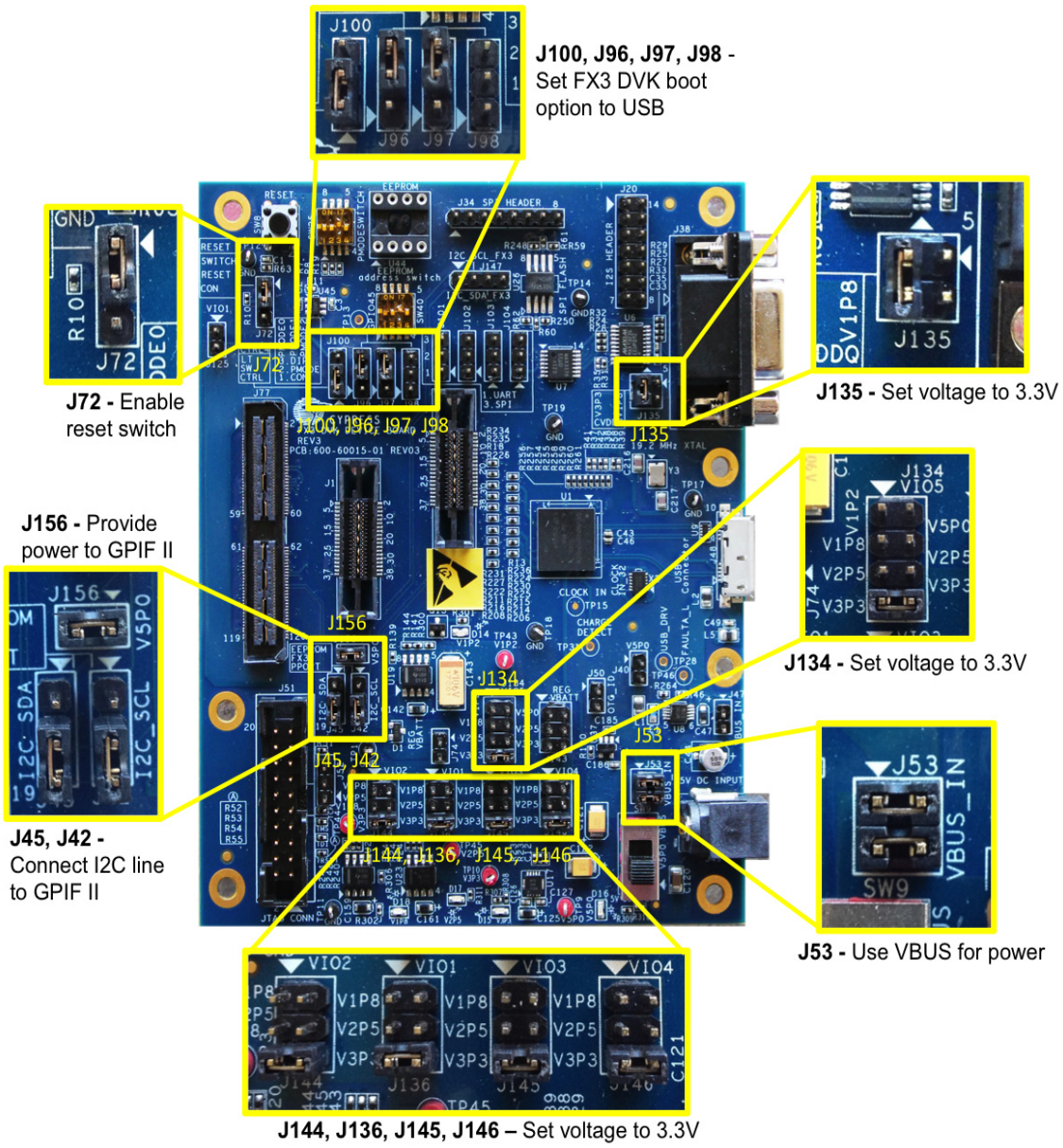
The details of the GPIFII descriptor and the firmware implementation can be found in the application note "AN75779 - Interfacing an Image Sensor to EZ-USB® FX3™ in a USB video class (UVC) Framework"

2.2 Configure Jumper Settings on FX3 DVK

The jumper settings on the FX3 development board must be set properly to run the camera demo. Please follow the instructions below:

1. Unplug all jumpers from the FX3 DVK
2. Place the jumpers as illustrated in Figure 2-2

Figure 2-2. FX3 DVK Jumper Configuration for HD 720p Camera Kit

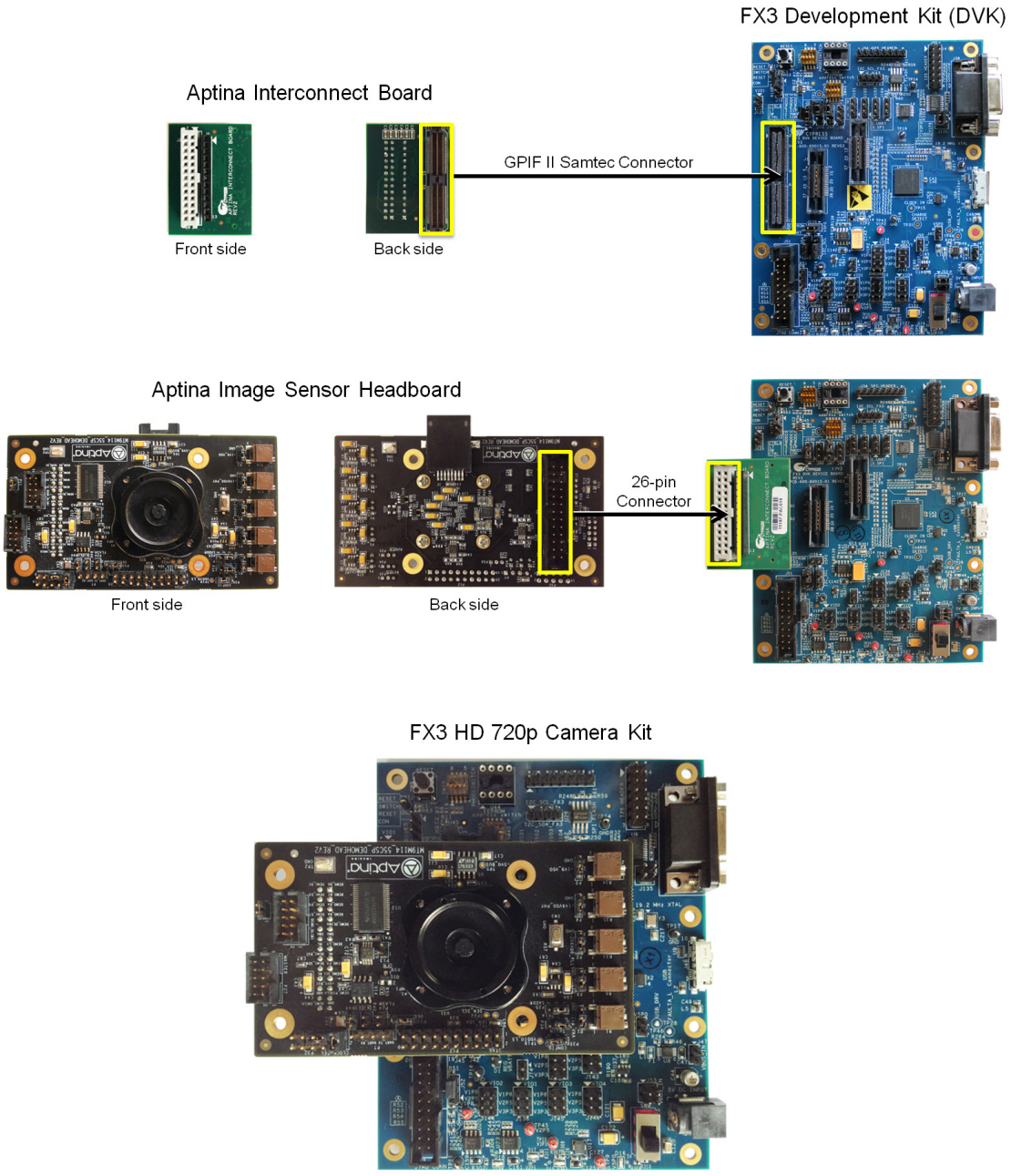


2.3 Camera Kit Assembly

1. Connect the interconnect board to the FX3 DVK via the GPIF II Samtec connector
2. Connect the Aptina image sensor headboard to the interconnect board via the 26-pin connector. The male connector is located on the back of the Aptina image sensor headboard and the female connector is on the front of the interconnect board

Note: See demo video for kit assembly on http://www.cypress.com/?rID=72422.

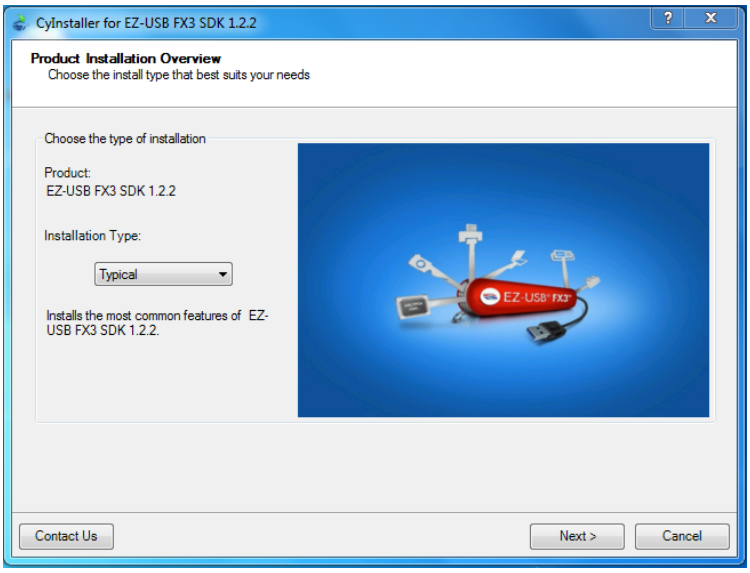
Figure 2-3. EZ-USB FX3 HD 720p Camera Kit Assembly



2.4 Install FX3 Software Development Kit (SDK)

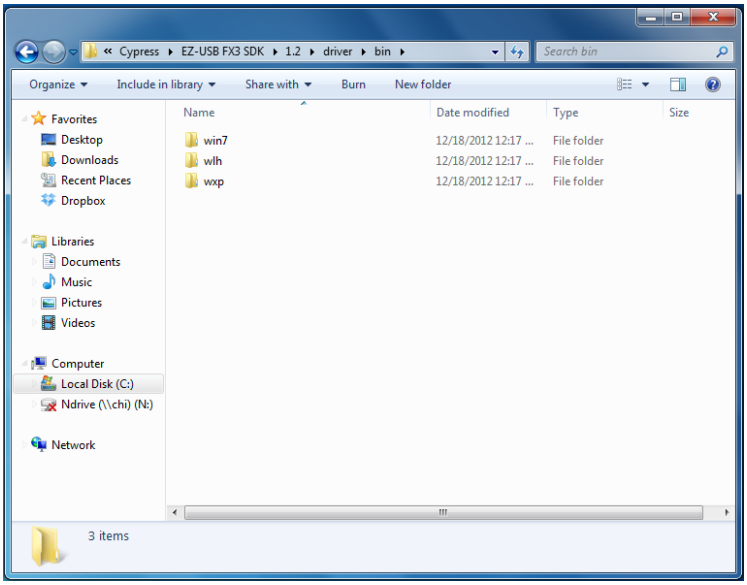
1. Download the latest FX3 SDK from http://www.cypress.com/?rID=57990
2. Using the "*Typical*" Installation Type, complete the install wizard

Figure 2-4. FX3 SDK Installation



Note: The 32-bit and 64-bit drivers are located at `C:\Program Files (x86)\Cypress\EZ-USB FX3 SDK\1.2\driver\bin`.

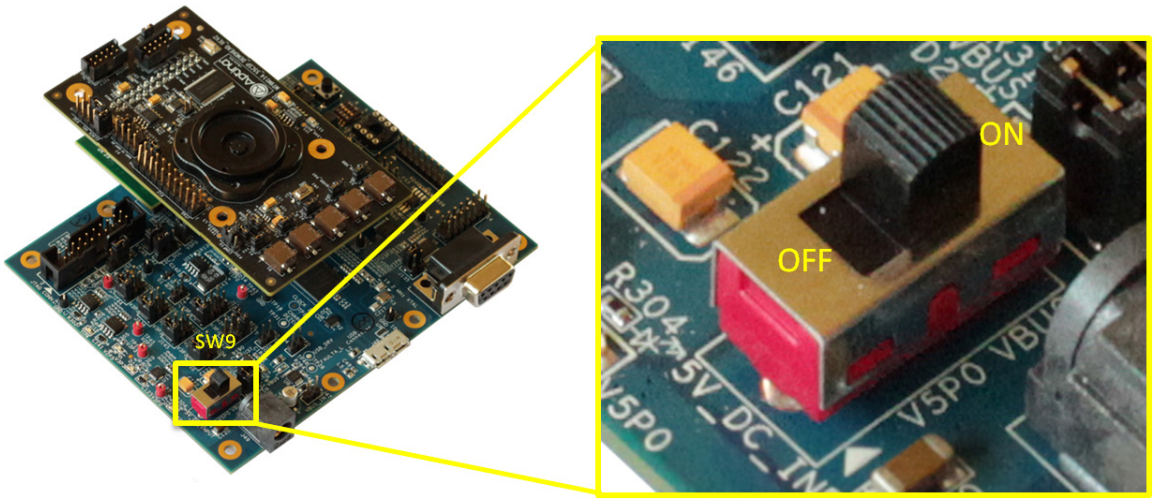
Figure 2-5. Default Location of the 32-bit and 64-bit Drivers



2.5 Connect Camera Kit to PC

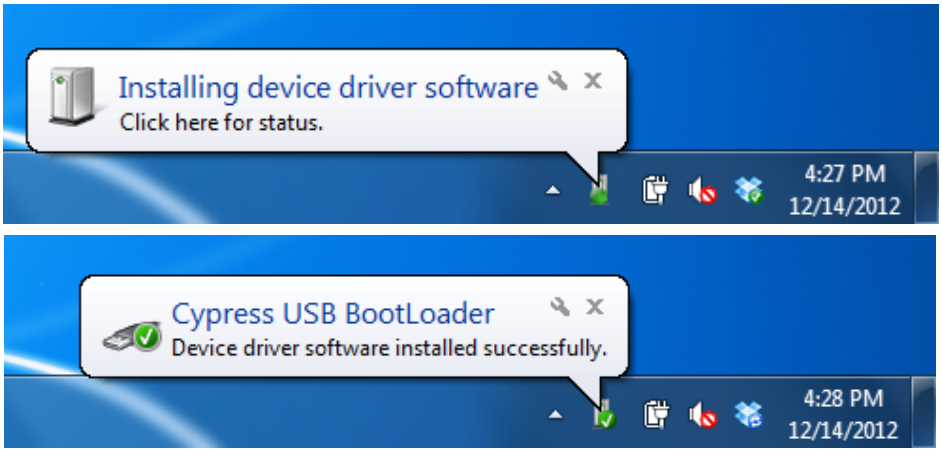
1. Connect the Camera Kit to a USB 3.0 port on the PC via a USB 3.0 cable
2. Toggle the switch (*SW9*) on the FX3 DVK to turn it on (LEDs will light up)

Figure 2-6. Toggle the Switch (SW9) to Turn on the FX3 DVK



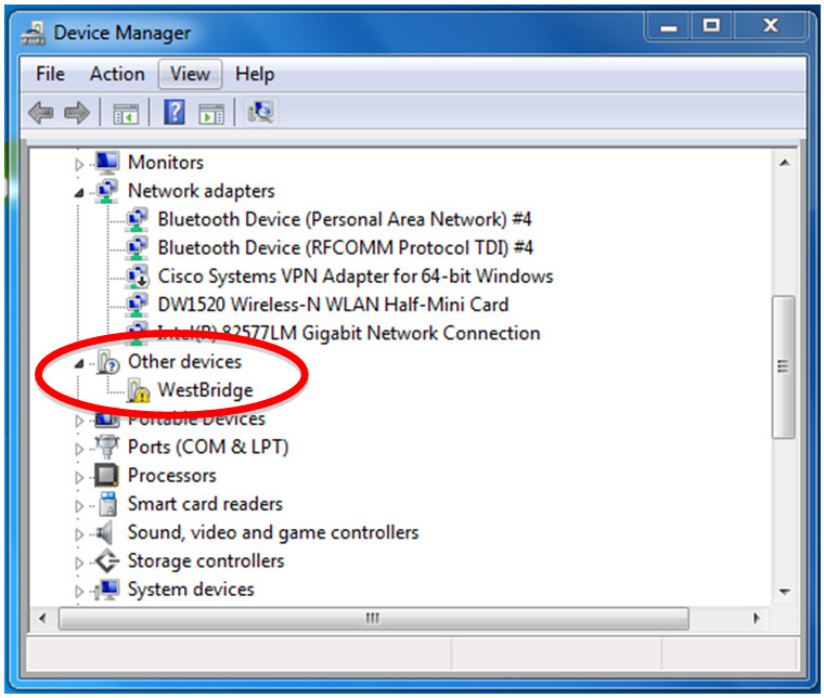
3. New hardware will be detected and device driver software should be installed automatically.

Figure 2-7. Automatic Detection and Installation of FX3 Device Driver Software



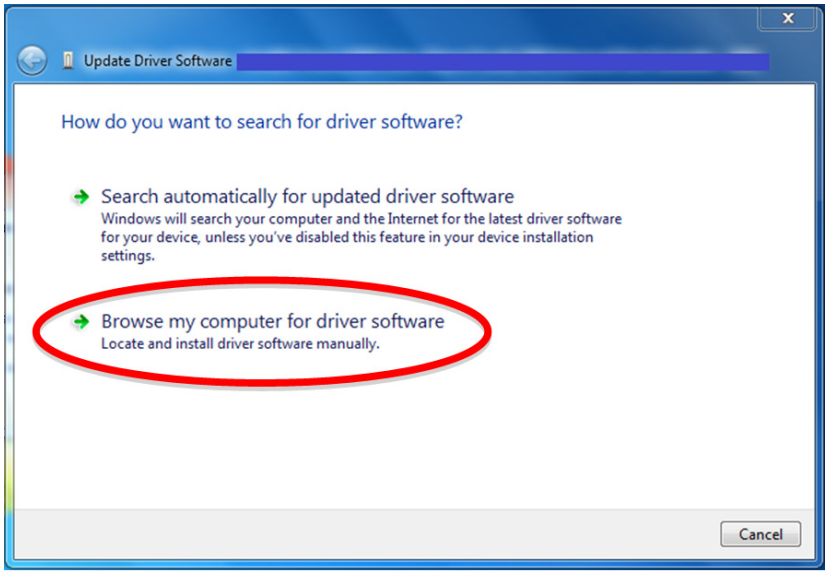
4. If the system is unable to locate the driver, please install the driver manually:
   a. Launch **Device Manager**, under **Other devices**, right click on "*WestBridge*" and select **Update Driver Software...**

Figure 2-8. Manual Installation of FX3 Driver Software - Step 1



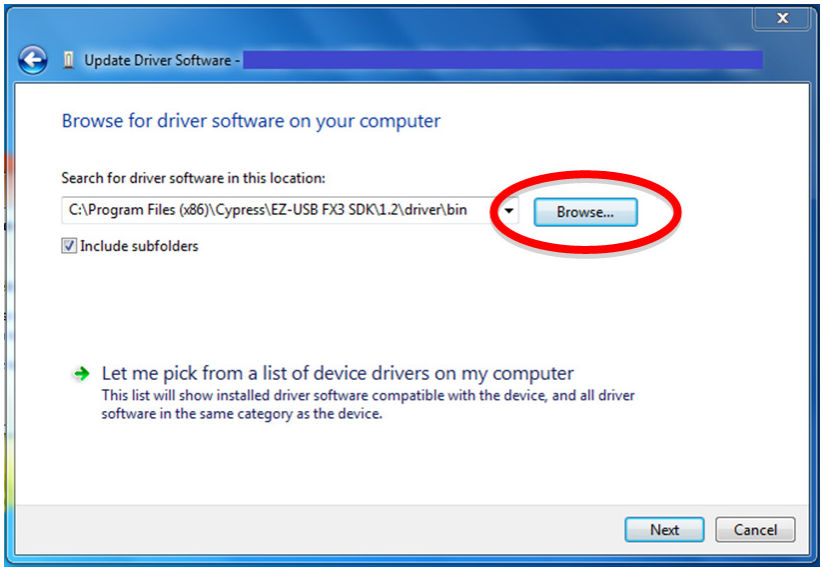
   b. Choose **Browse my computer for driver software**

Figure 2-9. Manual Installation of FX3 Driver Software - Step 2



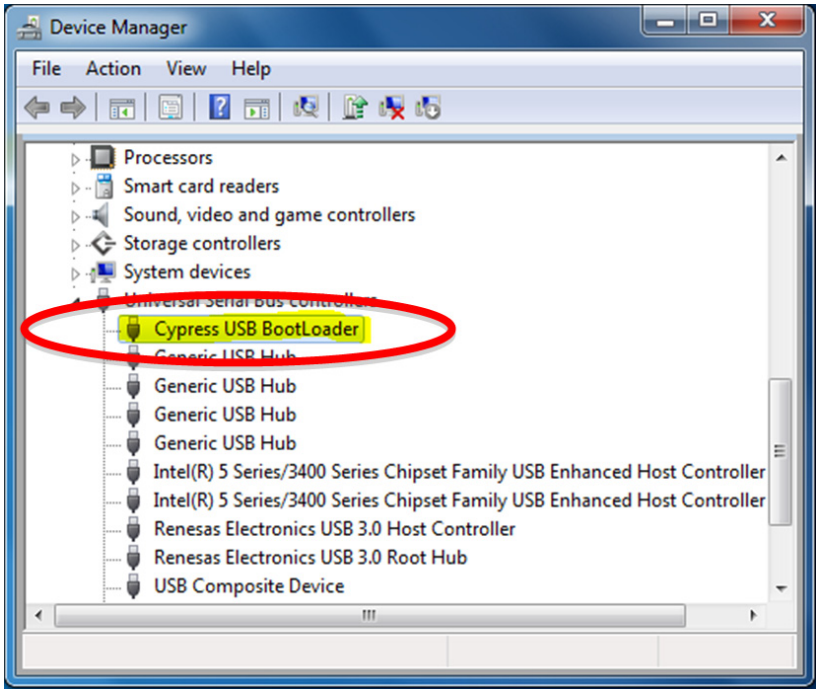
c. Click **Browse**, locate the driver at "`C:\Program Files (x86)\Cypress\EZ-USB FX3 SDK\1.2\driver\bin`", then click **Next**

Figure 2-10. Manual Installation of FX3 Driver Software - Step 3



d. Complete the installation process. Camera Kit will show up as "*Cypress USB BootLoader*" in **Device Manager**. The FX3 driver software is now installed

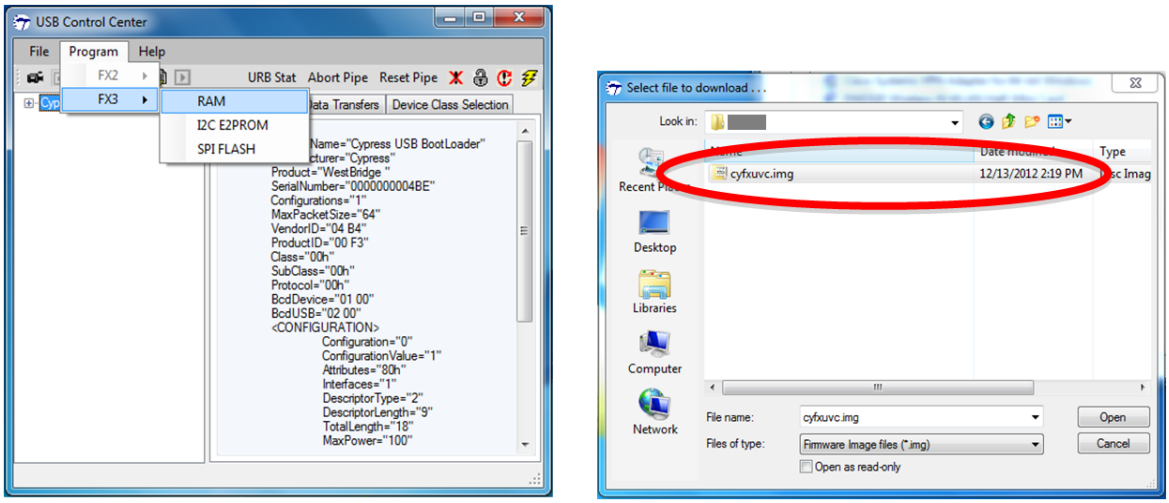
Figure 2-11. Manual Installation of FX3 Driver Software - Step 4



2.6 Program the Camera Kit

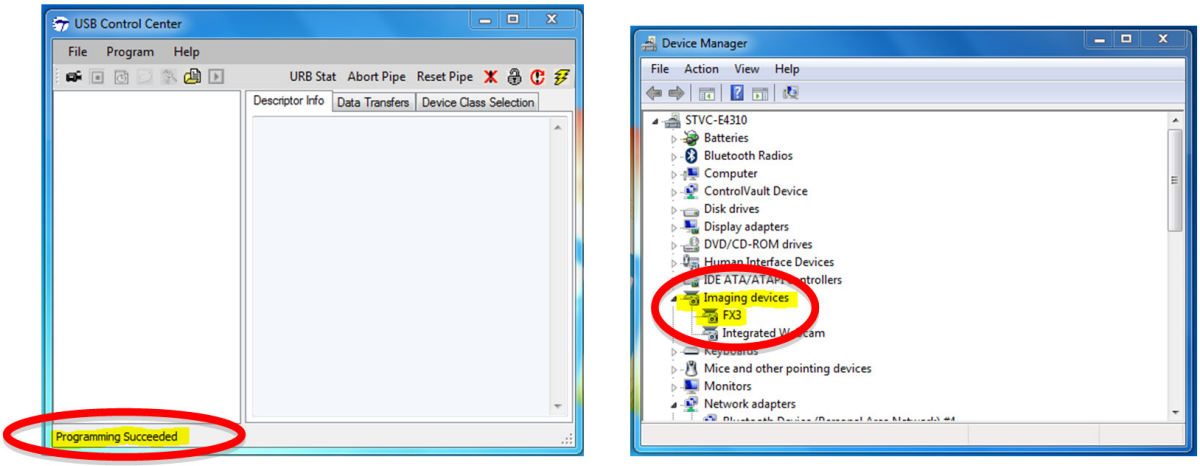
1. Download the image sensor firmware example code (*cyfxuvc.img*) from Camera Kit Web Page (http://www.cypress.com/?rID=72599), save it in a folder of your choice
2. Launch **USB Control Center** from **Start Menu** > All Programs > Cypress > Cypress USBSuite > Control Center
3. In **USB Control Center**, go to Program > FX3 > RAM, choose the FX3 image sensor firmware example code (*cyfxuvc.img*) from where it was saved to program the Camera Kit

Figure 2-12. Program Camera Kit with Image Sensor Firmware Example Code



4. Once the programming is completed, the message "*Programming Succeeded*" will appear at the bottom-left corner of the **USB Control Center** window. In **Device Manager**, the Camera Kit will appear as an **Imaging Device** called "*FX3*".

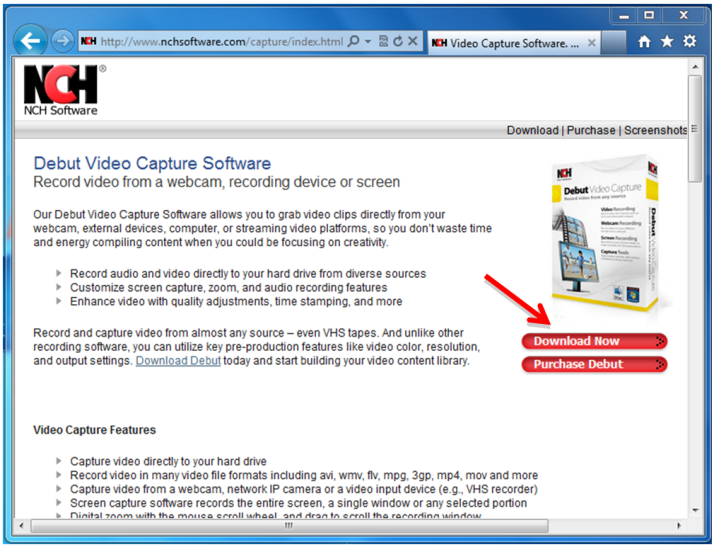
Figure 2-13. Successful Programming of Camera Kit with Image Sensor Firmware Example Code



2.7 Run Video Capturing Software to View Live HD 720p Video from Camera Kit

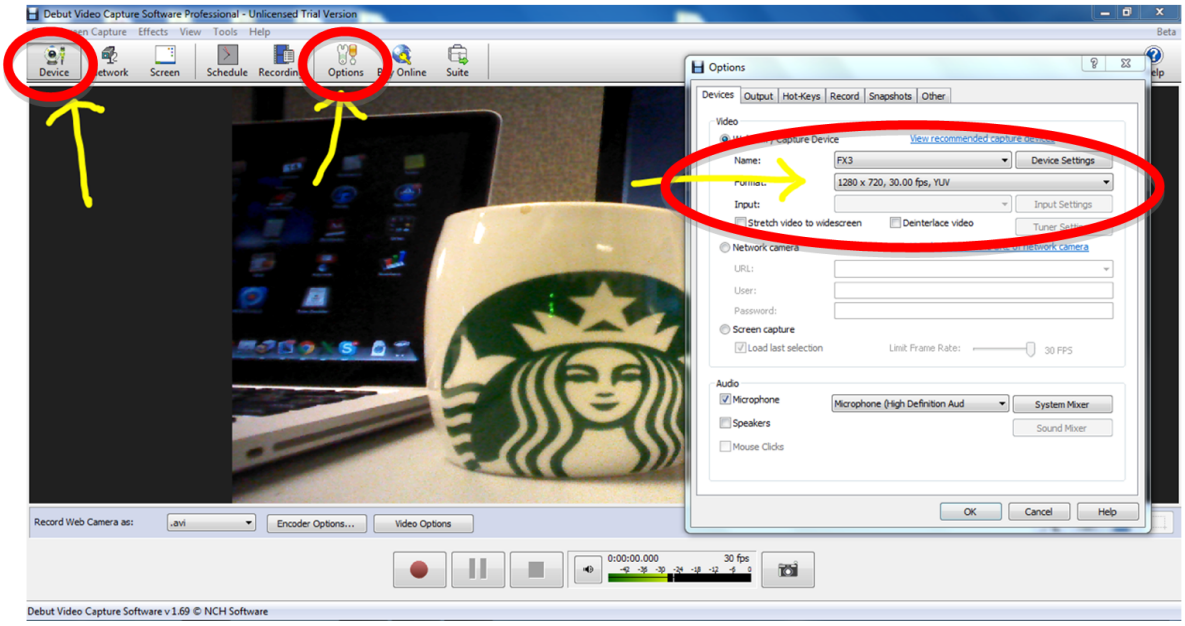
1. Download and install the unlicensed trial version of **Debut Video Capture** software from http://www.nchsoftware.com/capture/index.html
   Note: During installation, *deselect* all related Programs and Extras, as they are not required for this camera demonstration

Figure 2-14. Debut Video Capture Official Web Page



2. Launch **Debut Video Capture** software from desktop
3. Click on **Device** to view live video streaming
4. Click on **Options**, select "*FX3*" as the Capture Device

Figure 2-15. Debut Video Capture Software and Option Settings



2.8 Connecting the Camera Kit to USB 2.0 Port

EZ-USB FX3 HD 720p Camera Kit is compatible with USB 2.0. When connected to a USB 2.0 host PC, the Camera Kit operates at a reduced resolution (VGA 640x480) and frame rate (15 frames per second).