AN75705

Getting Started with FX3

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Associated Project: No
Associated Part Family: EZ-USB® FX3
Software Version: N/A
Related Application Notes: N/A

Abstract

AN75705 guides you in getting started with the Development Kit (DVK). This Application Note also helps in verifying the working condition of DVK, its compatibility with the users host system, and also gives methods for troubleshooting process issues.

Contents

Introduction

Cypress's EZ-USB FX3 peripheral controller lets developers add USB 3.0 functionality to any system.

EZ-USB FX3 has a configurable, parallel, general programmable interface called GPIF II, which is an enhanced version of the GPIF in FX2LP. The GPIF II can connect to an external processor, ASIC, or FPGA and provides a glue less connectivity to interfaces such as asynchronous SRAM, asynchronous and synchronous address data multiplexed interface, and many others.

The FX3 DVK helps developers to develop their firmware before prototyping their own boards. This application note provides the resources for quickly getting started with FX3; how to use the DVK and SDK; how to verify your setup and troubleshoot in the event of errors.

Configuring your Development Kit

The FX3 DVK has the necessary jumper settings that let you reconfigure the development board. (See Table 1) These jumper settings can be used as a reference for verifying your DVK and host environment. Further details of all the jumpers and switches can be looked up in the DVK schematic. The settings that are not given in Table 1 can be left disconnected.

PMODE settings configure booting options for the device. This example uses PMODE setting F11 which is USB boot. Additional details on PMODE Settings can be found in AN73150 – Booting EZ-USB FX3 over high-speed USB.

Table 1. Default Configuration

Purpose	Jumpers	Setting
Set Voltage Levels to 3.3 Volts	J134-J136 J144-J146	V3P3
Set VBATT regulator	J143	V5P0
Use USB VBUS for power	J53	Pins 1-2 Both Pairs
Setup JTAG	J52	Pins 2-3
Connect I2C lines to P-Port	J42, J45	Pins 2-3
Enable Reset Switch	J72	Pins 1-2
Set PMODE Boot option	SW25	Off, Off, Off, Off
Set PMODE Boot option	J96, J97	Pins 2-3
Set PMODE Boot option	J98	Disconnected

Configuring your USB 3.0 Host

The next step is to setup the USB host environment with the FX3 SDK and proper drivers.

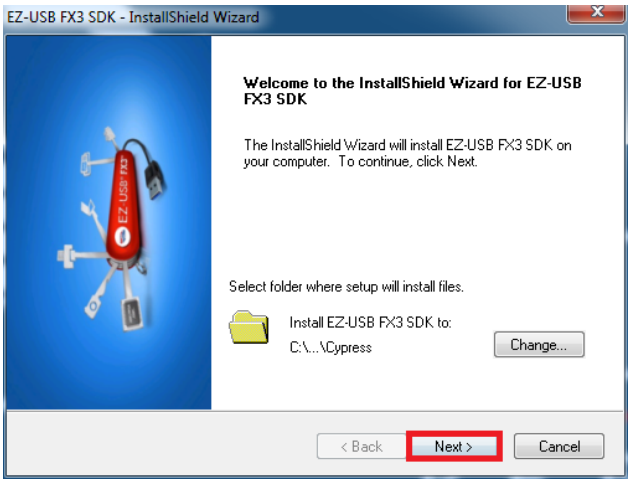
USB 3.0 Host Drivers

First you must check whether you have the latest drivers for your USB 3.0 host controller. Check with your USB 3.0 host controller manufacturer for verification. For best performance we recommend that you use a setup with a built-in chipset rather than an ExpressCard because an ExpressCard based USB 3.0 hosts may show reduced performance.

Installing the SDK

The SDK includes all the necessary software components for developing your application. This includes software tools, development environment, drivers, compiler, example code, API and API documentation. The SDK installer is included on the CD contained in your DVK. You may also download the SDK from the web. (Click here for download). If you have a beta version of the SDK installed you should uninstall it before installing the SDK.

Figure 1. Launch the SDK Installer



Note Leave the default settings for the installer. The rest of the application note references these settings.

Figure 2. Choose Installation Options

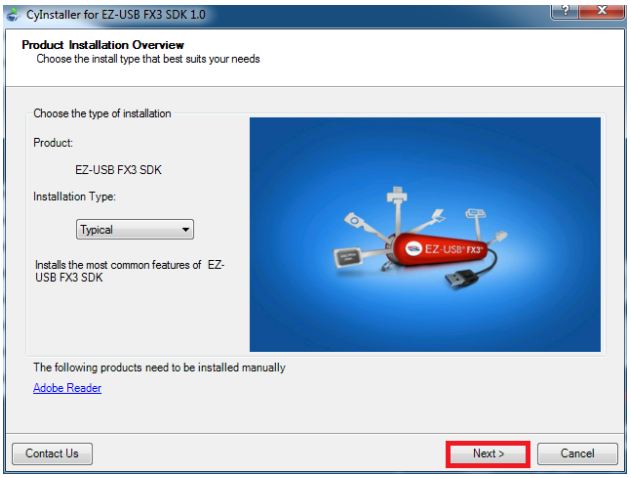
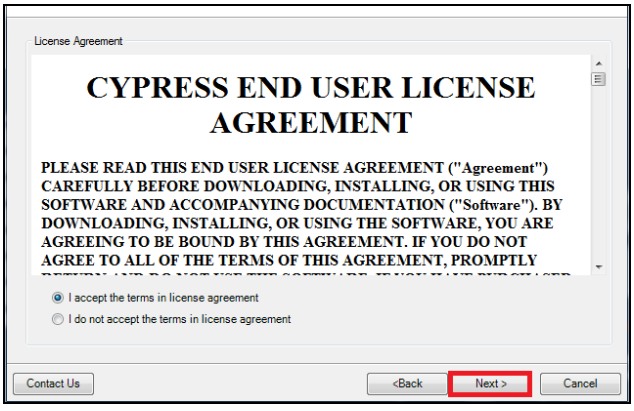


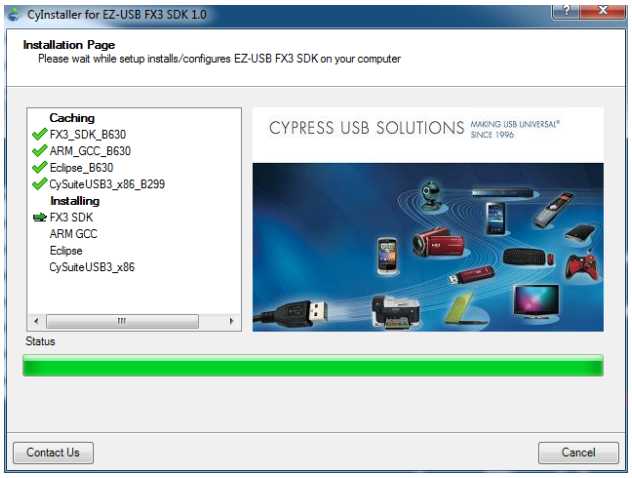
Figure 3. Accept License Agreements



Note The SDK installer contains several software packages that require you to get license for these different software packages. The licenses are for the Cypress tools, CodeSourcery compiler and Eclipse IDE.

The following figure shows the installation of all the individual components of the SDK package.

Figure 4. Installation in Progress



Setting up and using Eclipse IDE

Eclipse is included with the SDK, which is setup as your IDE. Also included in the SDK is example code and API libraries. Here we will setup the environment and compile the example projects. Figures 5-13 details the steps for importing and building the example projects including USBBulkLoopAuto which will be used for our verification later.

Launch Eclipse from Start Menu → Cypress → Eclipse → Eclipse IDE.

Figure 5. Launch Eclipse

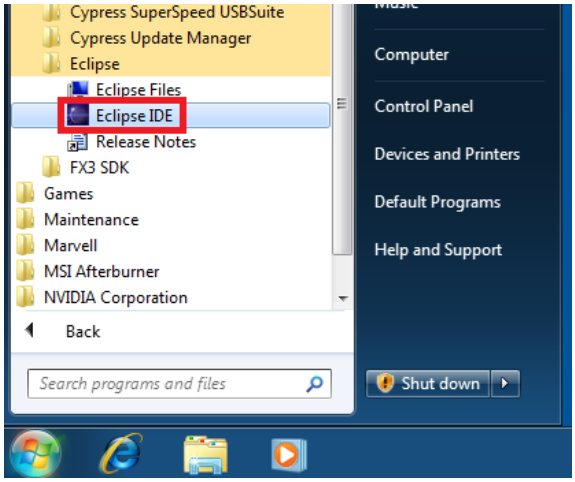
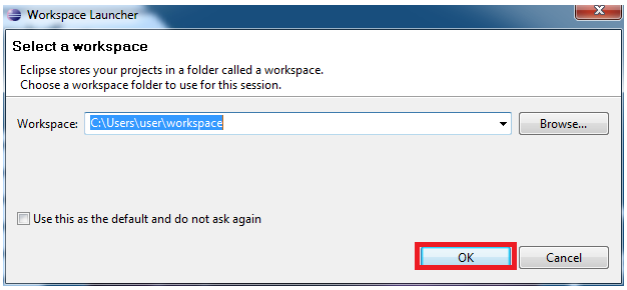


Figure 6. Select Workspace



Import existing projects from the SDK. In the IDE use File → Import.

Figure 7. Import Example Code

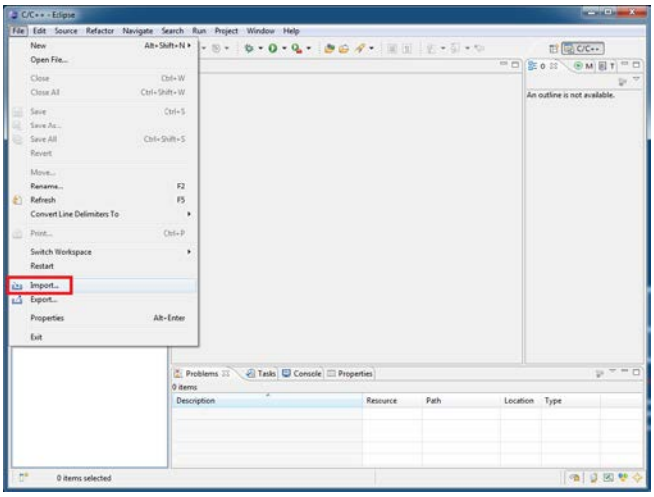


Figure 8. Import Existing Projects into Workspace

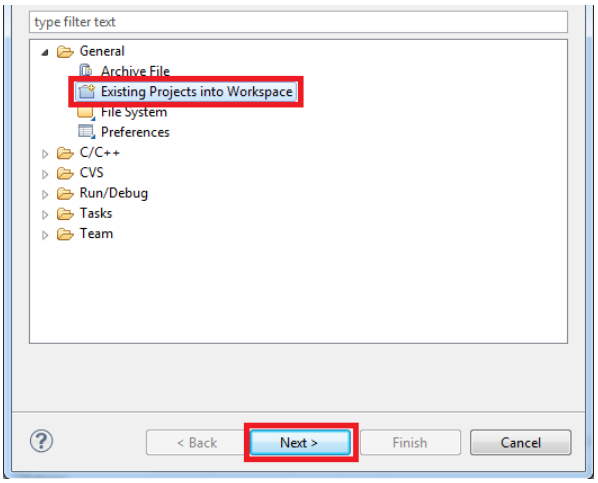
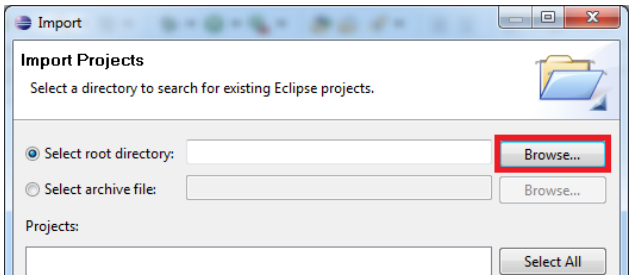


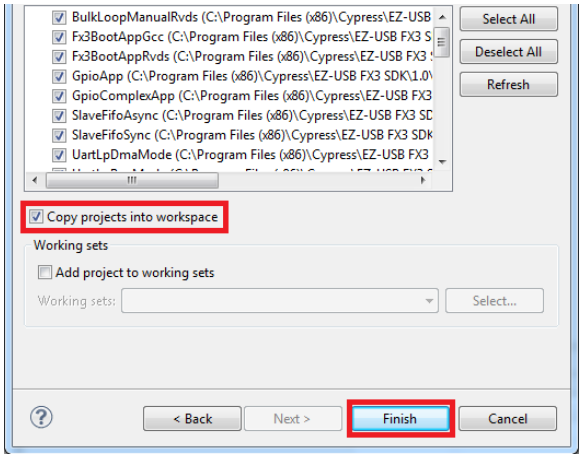
Figure 9. Select Projects



Select the firmware directory of the SDK installation for the root directory. This directory contains all of the eclipse projects for the example firmware. Eclipse will recognize the directory format and import them as projects.

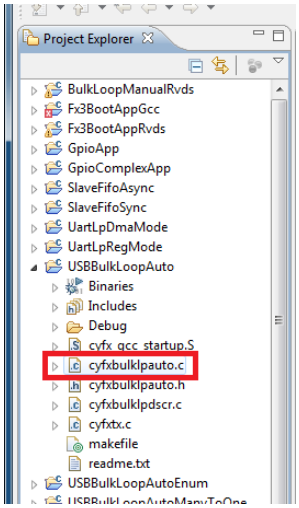
Note Default firmware directory is "`C:\Program Files (x86)\Cypress\EZ-USB FX3 SDK\1.0\firmware`"

Figure 10. Import all projects and copy into workspace



Now all the example code projects have been imported. Each project contains a comment at the top of the main C file that describes what the project does. More details on these projects can be found in the firmware overview section of "Getting Started with FX3 SDK.pdf" which is included in the SDK which details the differences between example projects, gives additional information and provides use cases. For this application note we are only interested in USBBulklLoopAuto.

Figure 11. Open USBBulkLoopAuto



Note It is recommended you turn on the "Save Automatically before Build" setting. This can be found under Window→ Preferences in the tab General → Workspace.

Figure 12. Build Project

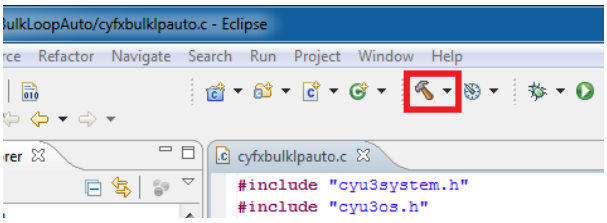
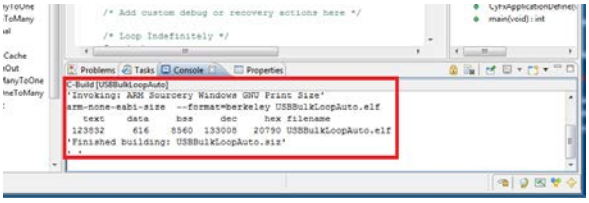


Figure 13. Build completed successfully



Installing Drivers

After building the example firmware you must install the necessary drivers for the FX3 bootloader. The bootloader is a firmware burned into the FX3 ROM that loads when the device is first powered up. Depending on the PMODE settings the bootloader will display different functionality. In this example the bootloader enumerates over USB 2.0 and waits for a firmware image. The bootloader uses Vendor ID 0x04B4 and Product ID 0x00F3.

The cyusb3.sys driver allows us to communicate with the FX3 after it boots. With this driver we will be able to use the Cypress Control Center to program the FX3 with our

example firmware. For these following steps you must have your FX3 DVK plugged into your USB 3.0 port. Also make sure the device is powered on with SW9. When not powered on only the LED3 and D24 will be lit. When powered on D14-D18 will also be lit.

Note If you are using Windows 7 64 bit you must disable Driver Signature Enforcement because the current driver is still in development and has not been signed by Microsoft. To do this, press F8 at startup and choose “Disable Driver Signature Enforcement”. Repeat this step every time the computer is booted.

Go to Start Menu and right click on “Computer” and select Properties.

Figure 14. Open Computer Properties

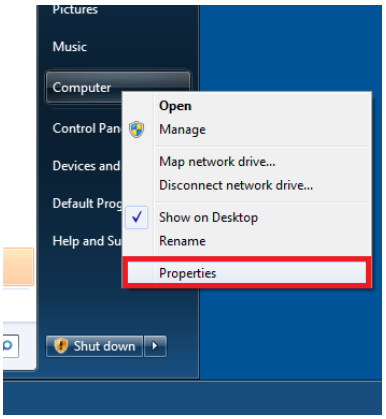
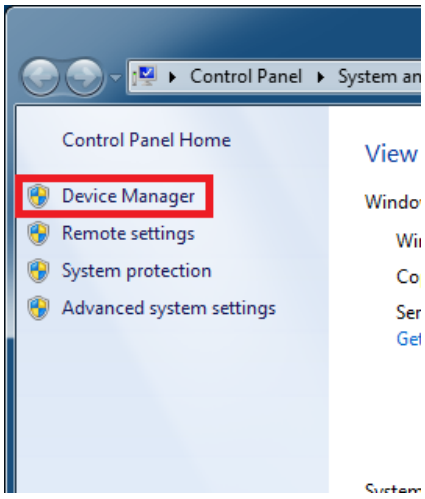


Figure 15. Open device manager



When the FX3 is plugged in without a driver installed, it appears as “WestBridge” under “Other devices”. Right click on the WestBridge and select “Updated Driver Software”.

Figure 16. Update driver software

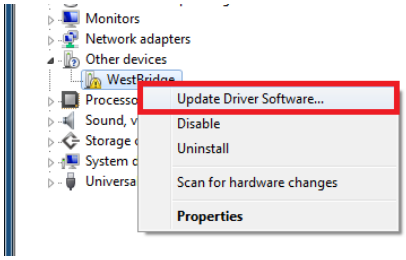


Figure 17. Browse for driver software

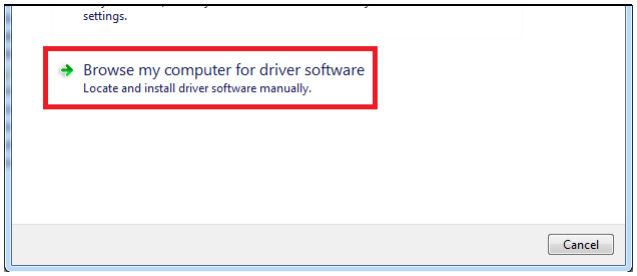
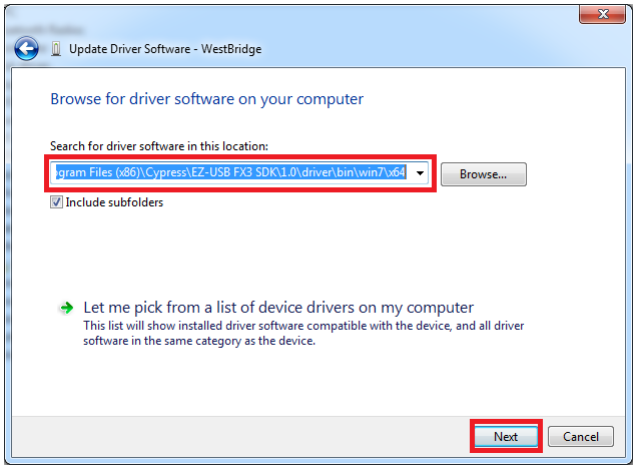


Figure 18. Browse to driver location

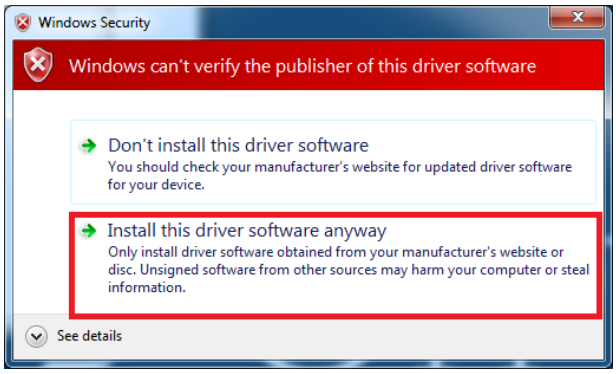


The default location is:

`C:\Program Files (x86)\Cypress\EZ-USB FX3 SDK\1.0\driver\bin\win7\x64`.

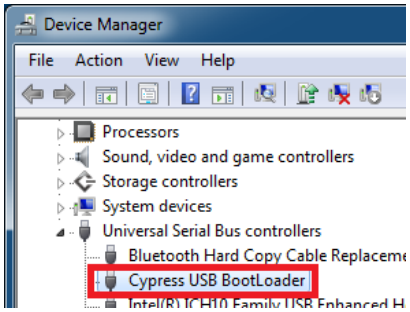
For 32 bit systems or for XP/Vista systems change the last two directories as necessary. Also if you changed the default install location of the SDK change this path accordingly.

Figure 19. Confirm installation of unsigned driver



After successful installation "Cypress USB Bootloader" will appear under the Universal Serial Bus controllers menu.

Figure 20. Device manager after a successful installation



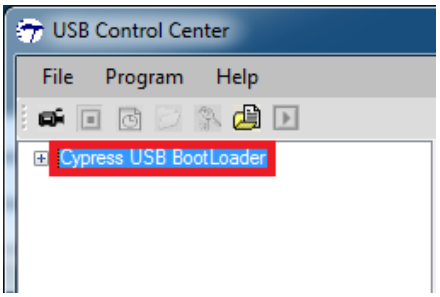
Verifying Your Setup

After setting up your host and host environment you can now run a test of the entire setup. The USBBulkLoopAuto demo sends data from the USB OUT endpoint to the FX3. The data is written to a buffer that is then sent automatically out on the IN endpoint back to the host.

Loading USBBulkLoopAuto Firmware

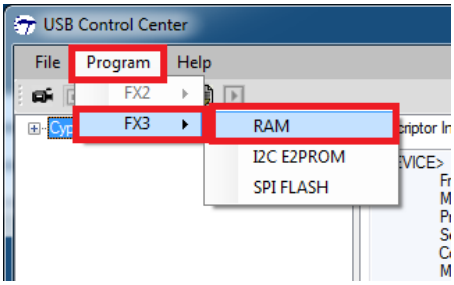
We will use the Cypress Control Center to load the example firmware onto the FX3 DVK. The Cypress Control Center can be found in the start menu under Cypress → Cypress SuperSpeed USBSuite.

Figure 21. Select which device to program



Load the firmware into the FX3 device by selecting Program → FX3 → RAM. Other options allow you to program the I2C EEPROM or SPI FLASH for other booting options. Details on these boot options can be found in "AN68914 – EZ-USB FX3 I2C Boot Option" and "AN70193 – EZ-USB FX3 SPI Boot Option".

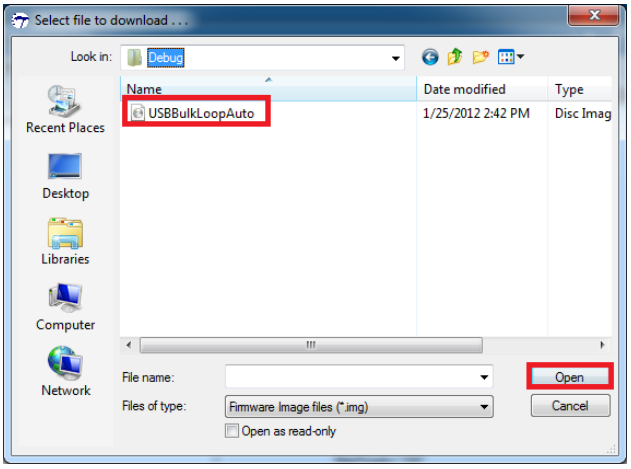
Figure 22. Program the FX3 RAM



Select the firmware you wish to load. Firmware generated with the SDK and Eclipse will end in an IMG file extension.

Note By default the firmware can be found in the Eclipse workspace directory underneath `USBBulkLoopAuto\Debug`

Figure 23. Open the firmware image



Note After programming, the FX3 device will disappear from the Control Center menu. This is because the device has reenumerated with a new Vendor ID 0x04B4 and Product ID 0x00F0. The Control Center only shows devices that bind with cyusb.sys.

Driver Installation for Bulk Loop Firmware

Next install the driver for the Bulk Loop firmware. The previous driver was installed for the bootloader firmware which enumerates when the device is booted. The bulk loop firmware uses the same default cyusb3 driver but since it has a different VID/PID the driver must be installed again with a similar process.

You can modify the INF file to add specific VID/PID pairs. To do so, open the INF file that corresponds to your driver in a text editor. For Windows 7 64 bit open:

```
C:\Program Files (x86)\Cypress\EZ-USB FX3 SDK\1.0\driver\bin\win7\x64\cyusb3.inf
```

In this file follow the comments on lines 32, 38 and 45 to add additional VID/PID pairs. For this demo you would add: `%VID_04B4&PID_00F0.DeviceDesc%=CyUsb3, USB\VID_04B4&PID_00F0` in all three locations.

Finally add a line in the strings section following the template on line 144. For this example add

```
VID_04B4&PID_00F0.DeviceDesc="FX3 Bulk Loop Demo"
```

Note If you do not change the INF file you must force the device manager to use this driver since it will not recognize it as a match. It will have no effect on functionality.

Figure 24. Enter the device manager like previously and update the driver software for the unknown FX3 device

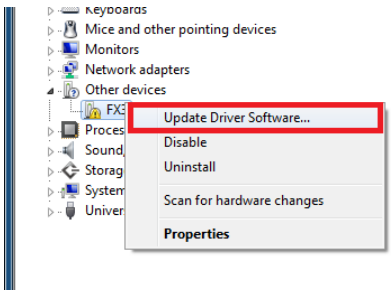


Figure 25. Browse for driver software manually

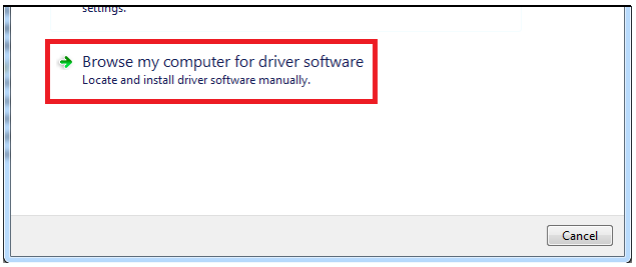


Figure 26. Pick the driver manually since the VID/PID do not match

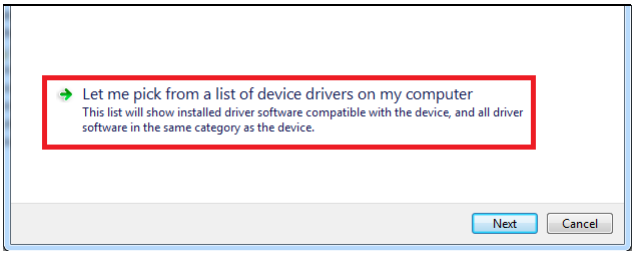


Figure 27. Select "Show all Devices"

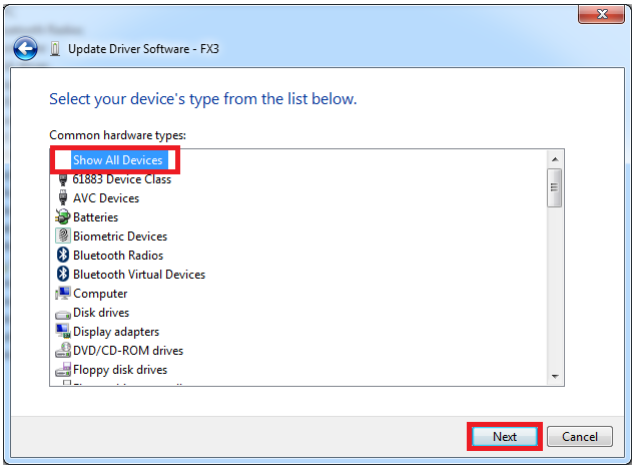
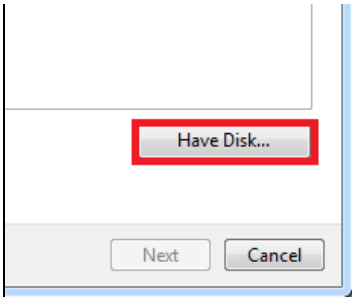


Figure 28. Select "Have Disk"

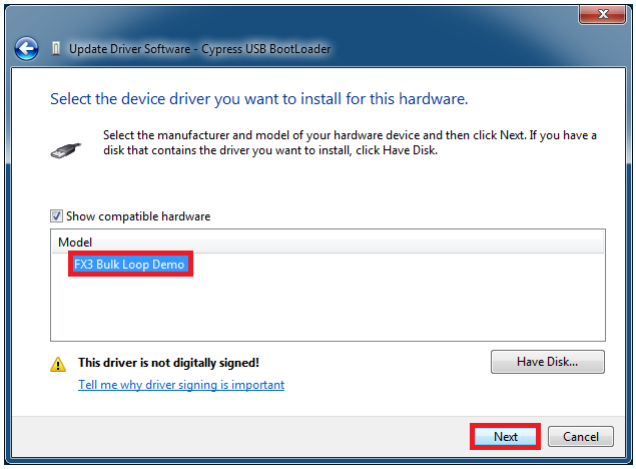


Browse to the cyusb3 driver. For Windows 7 64-bit computers, the default location for the cyusb3.sys driver is:

`C:\Program Files (x86)\Cypress\EZ-USB FX3 SDK\1.0\driver\bin\win7\x64.`

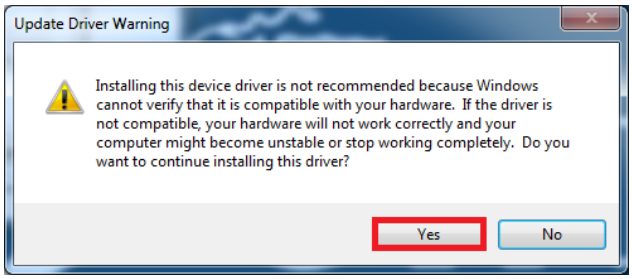
If you have a 32-bit computer, or if you are using XP/Vista modify the path accordingly.

Figure 29. Select USB Bootloader.



Note This selection does not affect the functionality but only affects the name of the device in the device manager.

Figure 30. Confirm the correct driver



Verifying with Bulk Loop tool

With the firmware properly loaded and the driver properly installed, we can now run the bulk loop software tool included in the SDK.

The bulk loop tool lets you to test your firmware image and USB 3.0 connection, by sending data on an OUT endpoint and then waiting to receive it on an IN endpoint. When paired with a bulk loop back firmware that echoes back the data from the OUT endpoint onto the IN endpoint, the bulk loop tool sends and receives the data continuously to the FX3.

Since the bulk loop tool requires a specific firmware, it will only work if a specific VID/PID is detected. In this case it looks for 0x04B4 and 0x00F0. If no such devices are found it will report no device found.

The tool can be found in Start Menu → Cypress → Cypress SuperSpeed USBSuite → Bulk Loop.

Figure 31. Setting Bulk Loop tool

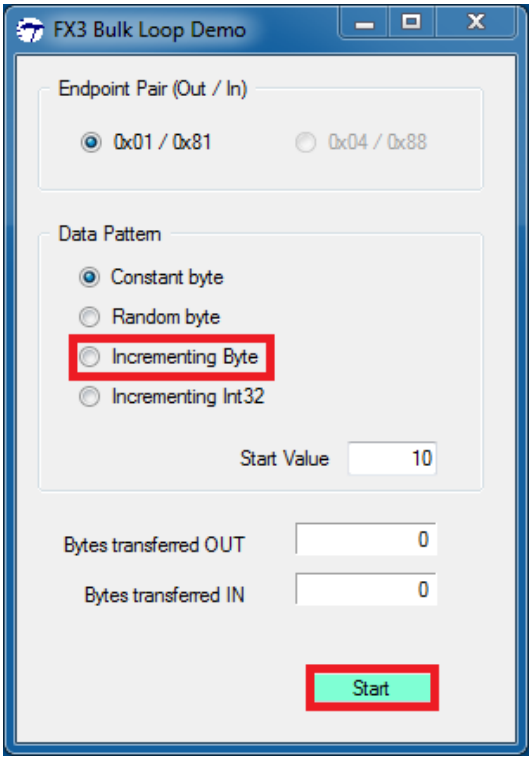
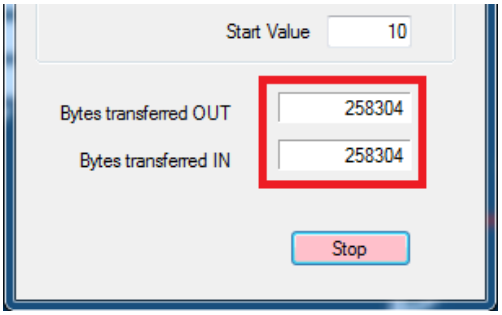


Figure 32. A successful demo



Troubleshooting steps

In the event that any of the above steps do not work as expected refer to Table 2 for troubleshooting steps and solutions.

Table 2. Possible issues and solutions

Problem	Solutions
Bootloader does not enumerate	Check PMODE boot settings are set to F11
	Check with your vendor that your USB 3.0 Host driver
	Make sure DVK is powered. Check VBUS power settings(J53) and power switch (SW9)
Device can't start (code 10)	Check with your vendor that your USB 3.0 Host driver
Cannot install cyusb3 driver	Disable Driver Signature Enforcement with F8 at Windows boot
	Make sure you are using correct cyusb3.sys driver for your OS.
No device in Control Center	Check device manager for FX3 device
	Hit reset switch (SW8)
Bulk Loop "no device" error	Check to see if driver is installed for Bulk Loop
	Reset Device (SW8) and reload firmware
	Check that correct firmware is used with correct VID/PID of 0x04B4 and 0x00F0.

Summary

This application note gives you a foundation to work with FX3 DVK and to understanding about the hardware settings for DVK board, SDK installation, Driver installation, IDE configuration, and use of SDK software tools. This application note also provides methods for verifying a working host/device setup. You also have a series of steps for troubleshooting issues with the host/device setup.

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Document History

Document Title: Getting Started with FX3 - AN75705

Document Number: 001-75705

Revision	ECN	Orig. of Change	Submission Date	Description of Change
**	3427934	ATAM	02/23/2012	New Application Note.

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