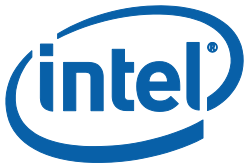

Intel® USB 3.0 eXtensible Host Controller Driver

Bring Up Guide

December 2012

Revision 1.03 (for PV Release)

Intel Confidential

Document Number: 474002

Contents

Figures

Revision History

Document Number	Revision Number	Description	Revision Date
N/A	0.7	Initial release.	February 2011
474002	0.75	Second release. Updated driver installation section for installer release.	April 2011
474002	0.8	Updated for Alpha release. Main changes include: • section 3.1: removed Readme problem info and added new screen capture • section 3.2: added all new steps and info about silent installation • section 3.4: added all new steps and info about uninstalling the Driver via Control Panel • sections 3.5 and 3.6: updated wording, included reference to issue #3880918 in SW release notes	May 2011
474002	0.85	Updated for Alpha2 release. Main changes include: • Added note about driver not supporting Windows* XP and Vista • sections 3.5 and 3.6: updated reference to issue #4108919 in SW release notes • section 4.3: added the six monitor pop-up event messages and description • Added note to sections 3.1 and 3.2 about 'Newer Versions' Question pop-up message • Added note to section 3.2 to clarify usage of "-report <path>" option	July 2011
474002	0.9	Updated for Beta release. Main changes include: • Removed previous sections 3.5 and 3.6 about Uninstalling driver by Installer and Silent Driver Removal as both methods are not supported. • Added ResultCode table to section 3.2	Sept 2011
474002	0.95	Updated for PC release. Main changes include: • Updated Note in section 1.1 about Windows* XP and Vista support and BIOS settings • Updated Intel(R) 7 Series/C216 Chipset Family naming • Removed Notes for 'Newer Versions' Question pop-up message as no longer applicable for PC release	Dec 2011
474002	1.0	Updated for PV release.	Dec 2011
474002	1.01	Added Warning note about not running installer from USB storage device. Updated Figures 3 and 4.	Jan 2012
474002	1.02	Added NOTE on the supported method to uninstall the	May 2012

		Intel® USB 3.0 eXtensible Host Controller Driver	
474002	1.03	Added Windows* Server 2008 R2 64-bit Operating System support for **Intel® C216 series chipset family**	December 2012

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1 Introduction

1.1 Purpose and Scope of Document

This document provides installation instructions and general usage of the Intel® USB 3.0 eXtensible Host Controller Driver. It is intended to help OEM and ODM customers setup their platform as they prepare for validation and debug of USB 3.0 devices.

The Intel® USB 3.0 eXtensible Host Controller Driver for the Intel® 7 Series/C216 Chipset Family (code named Panther Point) based platforms support the following operating system:

Intel® 7 Series Chipset Family:

- Windows* 7 Operating System (both 32-bit and 64-bit versions).

Intel® C216 series chipset family:

- Windows* 7 Operating System (both 32-bit and 64-bit versions).
- Windows* Server 2008 R2 64-bit Operating System.

Note: The Intel® USB 3.0 eXtensible Host Controller Driver is not supported on Windows* XP and Windows* Vista. For these operating systems, ensure your BIOS settings have the xHCI Mode set to "Auto" or "Smart Auto". This will reconfigure the USB 3.0 ports to function as USB 2.0 ports using the native Windows* EHCI driver. For more information, see the Intel® 7 Series/C216 Chipset Family (Panther Point) Platform Controller Hub BIOS Specification document.

1.2 Acronyms and Terminology

Term	Description
ACPI	Advanced Configuration and Power Interface
BIOS	Basic Input/Output System
BKC	Best Known Configuration
CRB	Customer Reference Board
IBP	Intel Business Portal (https://businessportal.intel.com)
IHV	Independent Hardware Vendor
PCH	Platform Controller Hub

Term	Description
PPT	Panther Point (Intel® 7 Series/C216 Chipset Family)
OS	Operating System
SS	Super Speed
USB	Universal Serial Bus
xHC	eXtensible Host Controller
xHCI	eXtensible Host Controller Interface

1.3 Reference Documents

Document	Document No./Location
USB 3.0 Specification	http://www.usb.org/developers/docs/
Extensible Host Controller Interface (xHCI) Specification for USB 3.0	http://www.intel.com/technology/usb/xhcispec.htm

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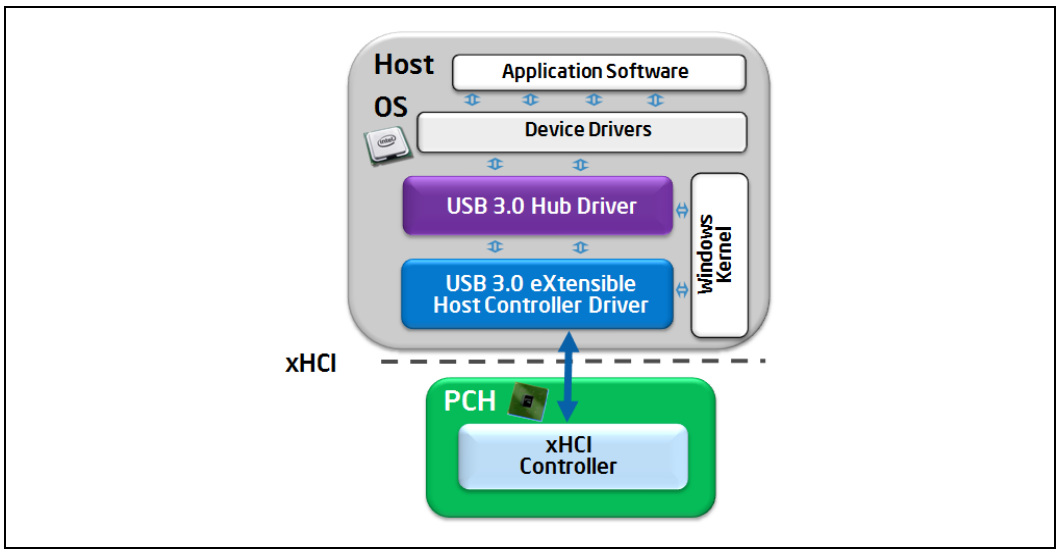
2 Platform Details

2.1 Driver Architecture Overview

As shown in Figure 1, the Intel® USB 3.0 eXtensible Host Controller Driver Stack consists of two main blocks,

- Intel® USB 3.0 eXtensible Host Controller Driver
- Intel® USB 3.0 Hub Driver

Figure 1. Intel® USB 3.0 eXtensible Host Controller Driver Stack



The Intel® USB 3.0 eXtensible Host Controller Driver implements the xHCI specification. Its main functions include:

- Direct control of the USB 3.0 Host Controller hardware by reading and writing memory mapped I/O registers
- Command, Event and Transfer Ring management
- Provide abstraction of HW Interface to other SW layers
- Handles power management of xHCI controller

The Intel® USB 3.0 Hub Driver implements the USB 3.0 specification. Its main functions include:

- Management and control of downstream ports, both USB 3.0 and USB 2.0 high/full/low-speed, on the root hub and external hubs
    - Servicing connection status change
    - Managing port power
- Association of USB 3.0 and USB 2.0 parts of external USB 3.0 hub
- USB bus enumeration (exposing USB devices to the OS)
- Exposing USB Driver Interface (USBDI) to class drivers
- I/O requests and USB Request Block (URB) processing
- Interfaces with 3rd party device drivers

Note that there are different kinds of device drivers. Most of them (for example, Microsoft inbox class drivers) are running in kernel space. There are also some drivers operating in user space, usually provided by Independent Hardware Vendors (IHV).

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3 Driver Installation

Note: A supported Operating System must be installed prior to the installation of the Intel® USB 3.0 eXtensible Host Controller Driver.

There are two different methods to install the Intel® USB 3.0 eXtensible Host Controller Driver:

1. Driver Installation via Installer
2. Silent Driver Installation via Installer

There is only one method to uninstall the Intel® USB 3.0 eXtensible Host Controller Driver: Uninstalling the Driver via Control Panel

Note: Uninstallation of the Intel® USB 3.0 eXtensible Host Controller driver through the Device Manager is not a supported method and it's not validated. Do not uninstall the Intel® USB 3.0 eXtensible Host Controller driver through the Device Manager.

Please see the following subsections for more details.

3.1 Driver Installation via Installer

Follow the steps listed below for driver installation via installer:

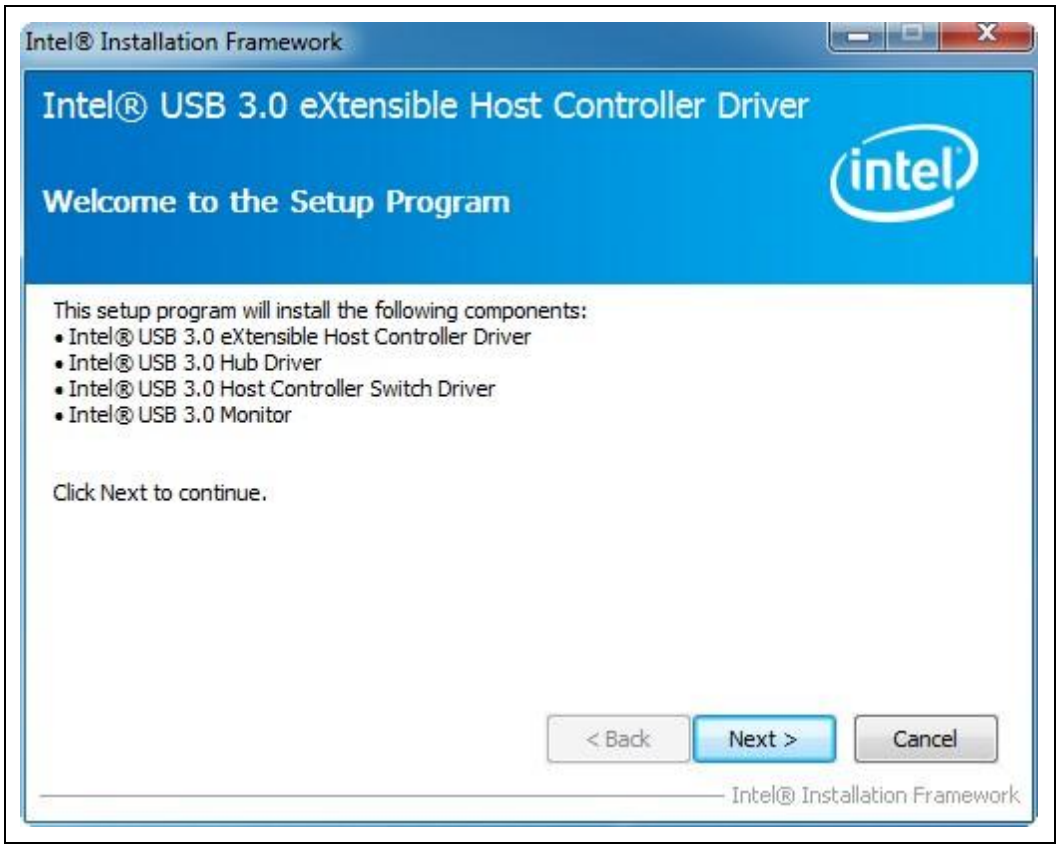
1. Copy and unzip the Intel® USB 3.0 eXtensible Host Controller Driver onto the Intel® 7 Series/C216 Chipset Family (Panther Point) based platform under test.

Note: **WARNING** – Do not run this driver's installer (Setup.exe) from a USB storage device (ie. external USB hard drive or USB thumb drive). For proper installation, please copy driver files to a local hard drive folder and run from there.

2. Locate the "\Driver_Installer\Setup.exe" file.

3. Right click on the executable and select 'Run as administrator' option from the menu to start the installer and then click on 'Yes' button in User Account Control pop-up window.You should see welcome screen with component details as shown in Figure 2. Click 'Next >' button to continue the installation.

Figure 2. Welcome Screen



4. Next, you should see license agreement screen as shown in Figure 3. Please review the license agreement and if you accept the license terms then click on 'Yes' button to continue the installation.

Figure 3. License Agreement

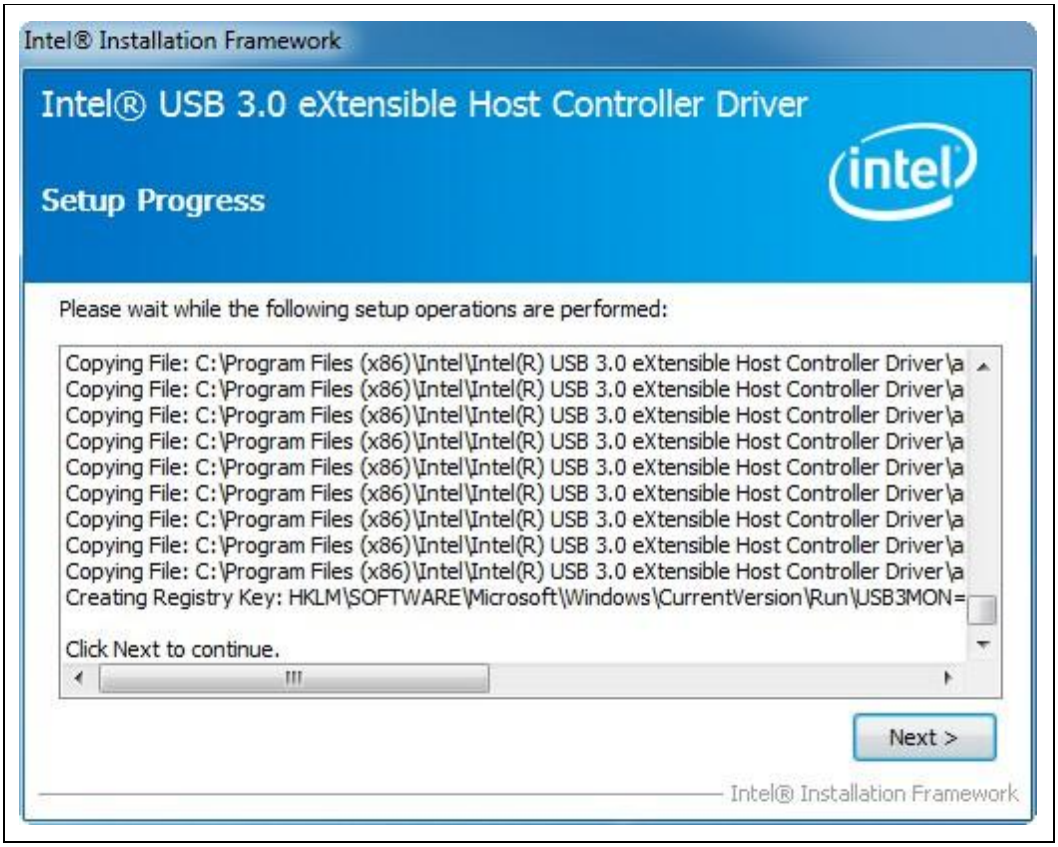
5. Next, you should see Readme File Information screen with details on system requirements and installer information as shown in Figure 4. Click on 'Next >' button to continue the installation.

Note: **WARNING** – Do not run this driver's installer (Setup.exe) from a USB storage device (ie. external USB hard drive or USB thumb drive). For proper installation, please copy driver files to a local hard drive folder and run from there.

Figure 4. Readme File Information

6. Then, installer will perform various installation operations and show progress in Setup Progress screen. When installation is complete, you should see screen as shown in Figure 5. Click on 'Next >' button to continue.

Figure 5. Setup Progress



7. After successful installation, you should see setup completion screen as shown in Figure 6. Click on 'Finish' button to restart the system.

Figure 6. Setup Completion

8. After the system has booted, you can refer to section 3.3 to check the driver version.

3.2 Silent Driver Installation via Installer

Follow the steps listed below for silent driver installation via installer:

1. Copy and unzip the Intel® USB 3.0 eXtensible Host Controller Driver onto the Intel® 7 Series/C216 Chipset Family (Panther Point) based platform under test.

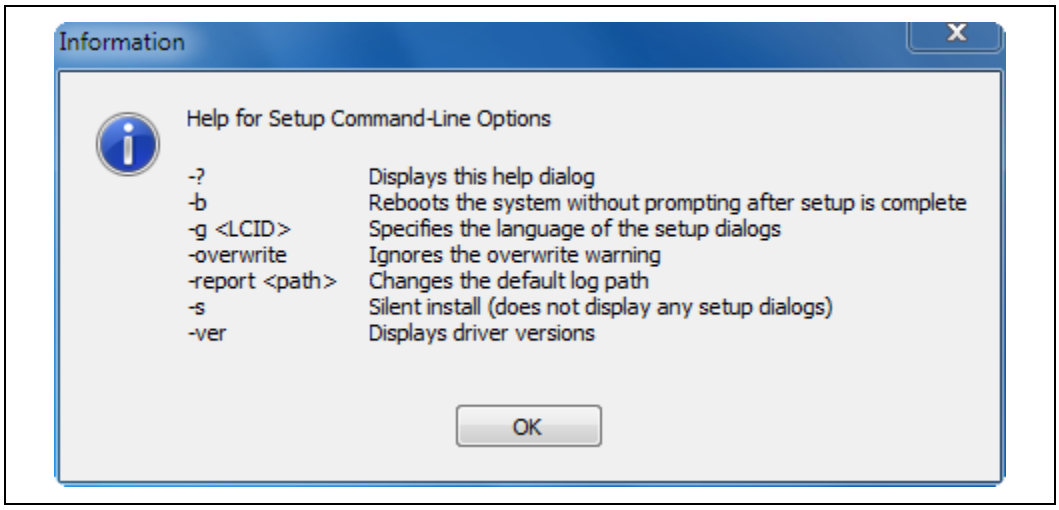
Note: **WARNING** – Do not run this driver's installer (Setup.exe) from a USB storage device (ie. external USB hard drive or USB thumb drive). For proper installation, please copy driver files to a local hard drive folder and run from there.

2. Open a Command Prompt (cmd.exe) with administrator rights (ie. Run as administrator). Click on 'Yes' button in User Account Control pop-up window.

3. Change the directory to where you unzipped the driver in Step 1 and then change to the "Driver_Installer" directory.

4. To see all available options for the Installer, run command "Setup.exe -?". You should see a window pop-up similar to Figure 7. For the "-g <LCID>" option which specifies the language of the setup dialogs, the LCID list is shown in below table. Click OK to continue.

Figure 7. Installer Help Information



Note: The "-report <path>" option allows users to change where the installation log file is saved. Otherwise, Intel driver installation log files are stored in the general location of 'C:\Intel\Logs'.

LCID	Language
0401	Arabic
0804	Chinese (Simplified)
0404	Chinese (Traditional)
0405	Czech
0406	Danish
0413	Dutch
0409	English (USA)
040B	Finnish
040C	French
0407	German
0408	Greek
040D	Hebrew
040E	Hungarian
0410	Italian

LCID	Language
0411	Japanese
0412	Korean
0414	Norwegian
0415	Polish
0416	Portuguese (Brazil)
0816	Portuguese (Standard)
0419	Russian
0C0A	Spanish
041B	Slovak
0424	Slovenian
041D	Swedish
041E	Thai
041F	Turkish

5. Run command "Setup.exe –b –s" to start the silent installation. This process should take about 1 min to complete. When silent installation is complete, the system will automatically reboot.

6. After the system has booted, you can refer to section 3.3 to check the driver version.

Other silent installation examples are:

> Setup.exe -s -overwrite -report C:\Temp

> Setup.exe -s –g 0404

For the installation, a full listing of return values can be found in the following table. The 'ResultCode' value can be found at the end of the installation log file.

ResultCode	Description
0x0	Success
0xA001	Bad command line
0xA002	User is not an administrator
0xA003	The OS is not supported for this product
0xA005	No devices were found that matched package INF files
0xA007	User refused a driver downgrade
0xA009	User canceled the installation
0xA00A	Another install is already active
0xA00B	Error while extracting files
0xA00C	Nothing to do
0xA00D	A system restart is needed before setup can continue
0xA00E	Setup has completed successfully but a system restart is required
0xA00F	Setup has completed successfully and a system restart has been initiated
0xA010	A bad file path was provided
0xA011	Fatal error occurred while installing a driver
Win32 error code	General install failure

3.3 Checking the Driver Version

To check the Intel® USB 3.0 eXtensible Host Controller Driver version:

1. Open Device Manager.
2. Click the "Universal Serial Bus controllers" arrow to open the list of USB devices.
3. You can check either the "Intel(R) USB 3.0 eXtensible Host Controller" device or the "Intel(R) USB 3.0 Root Hub" device. Double click on the device you want.
4. Select the "Driver" tab and the Driver Version will be listed (see Figure 8 and Figure 9).

Figure 8. Intel(R) USB 3.0 eXtensible Host Controller Driver Version

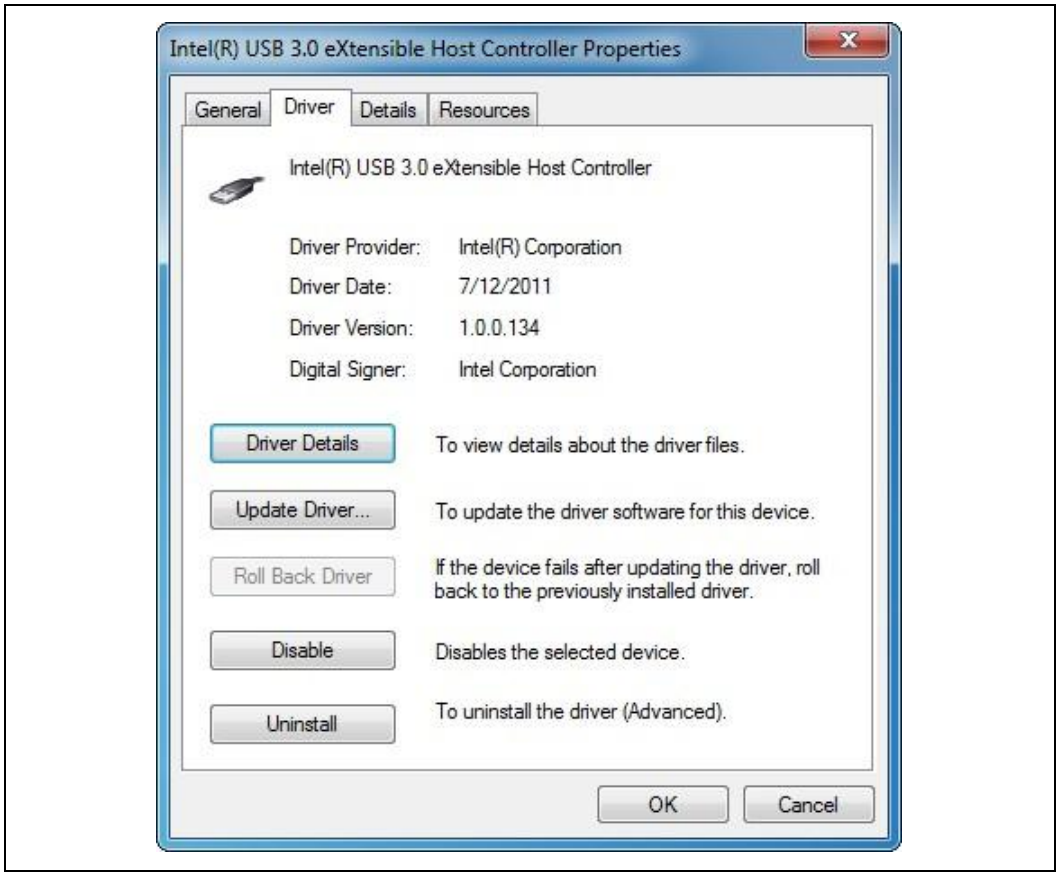


Figure 9. Intel(R) USB 3.0 Root Hub Driver Version

3.4 Uninstalling the Driver via Control Panel

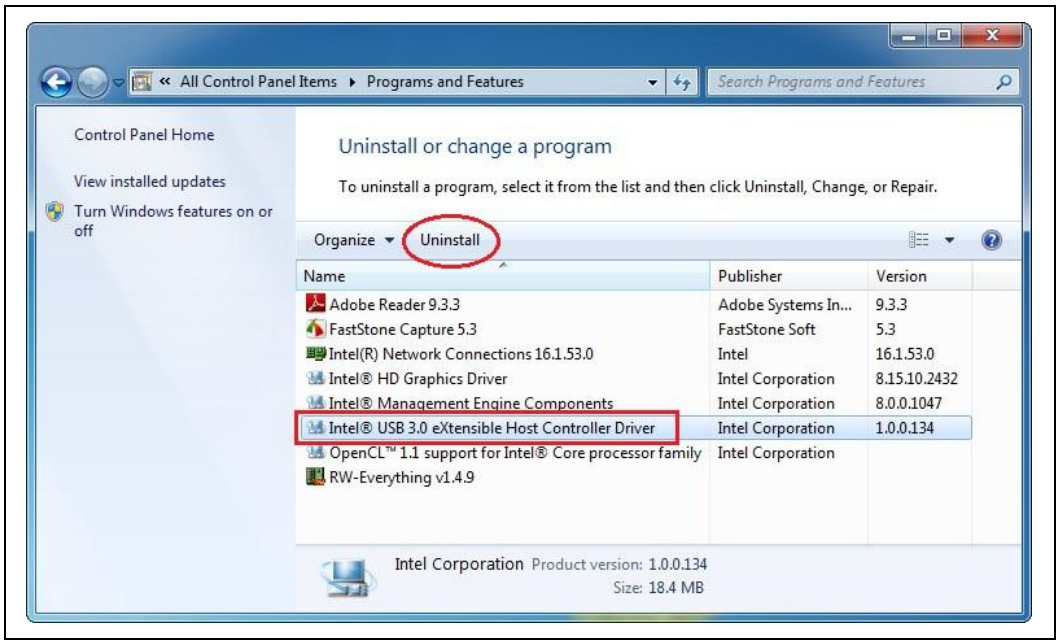
Follow the steps listed below to uninstall the driver via the Control Panel:

1. Open the Control Panel window (Start -> Control Panel).
2. If the Control Panel window is shown in 'Category' view, then select "Uninstall a program" as shown in Figure 10. Otherwise if the Control Panel window is shown in 'icon' view, then select "Programs and Features".

Figure 10. Control Panel – Uninstall a program

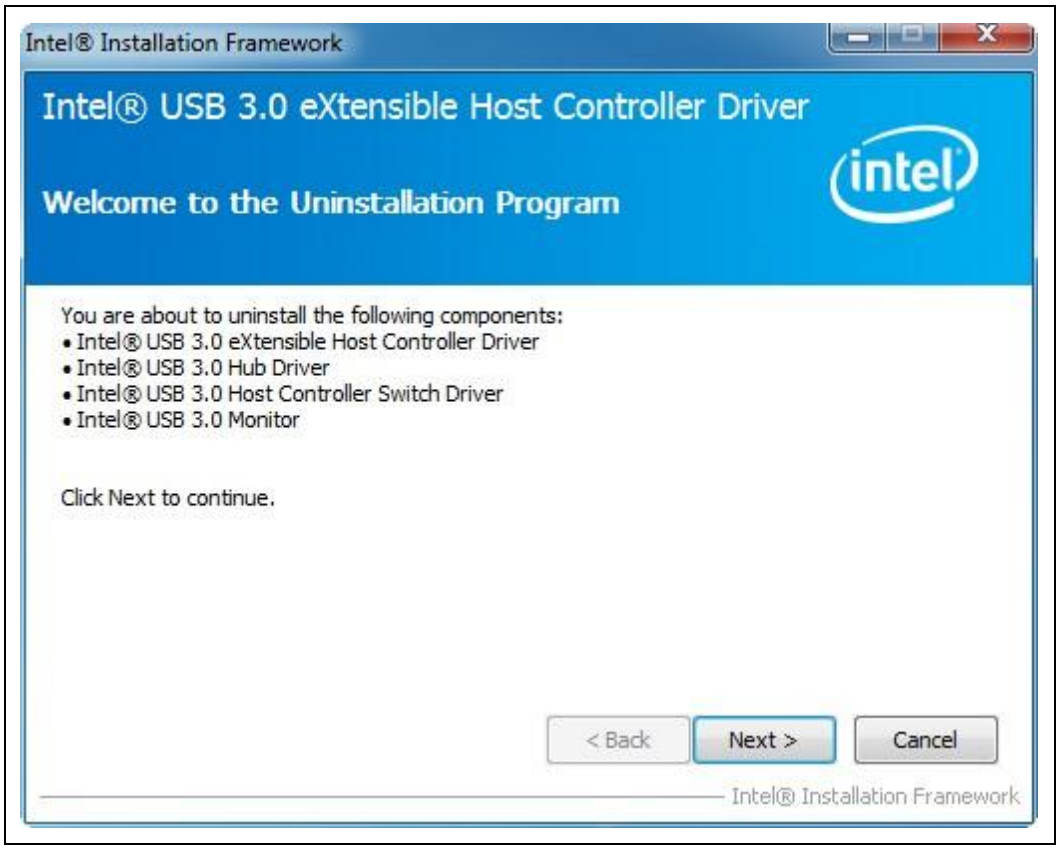
3. On the next window, select the "Intel® USB 3.0 eXtensible Host Controller Driver" (see Figure 11) from the list of programs. Then click the "Uninstall" button.

Figure 11. Control Panel – Programs List



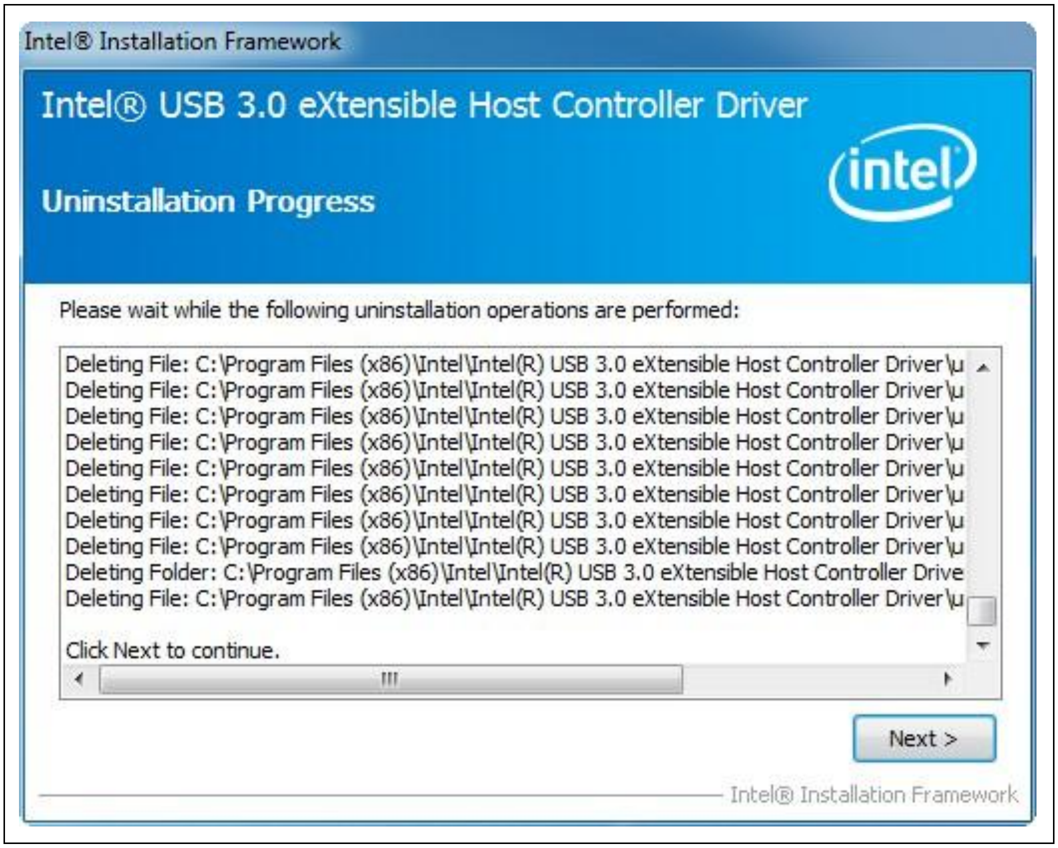
4. You should see the "Welcome to the Uninstallation Program" pop-up window with component details as shown in Figure 12. Click 'Next >' button to continue.

Figure 12. Welcome to the Uninstallation Program



5. Next, installer will perform various operations and show progress in Uninstallation Progress screen. When the uninstall is completed, you should see screen as shown in Figure 13. Click on 'Next >' button to continue.

Figure 13. Uninstallation Progress



6. After successful uninstall, you should see setup completion screen as shown in Figure 14. Click on 'Finish' button to restart the system.

Figure 14. Uninstall Setup Completion

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4 Using the USB 3.0 Driver

4.1 Resetting the USB 3.0 Driver

During USB 3.0 testing, there may be situations when the Intel® USB 3.0 eXtensible Host Controller Driver stops functioning due to driver hang, crash or USB device mal-function. There are two methods to reset this driver,

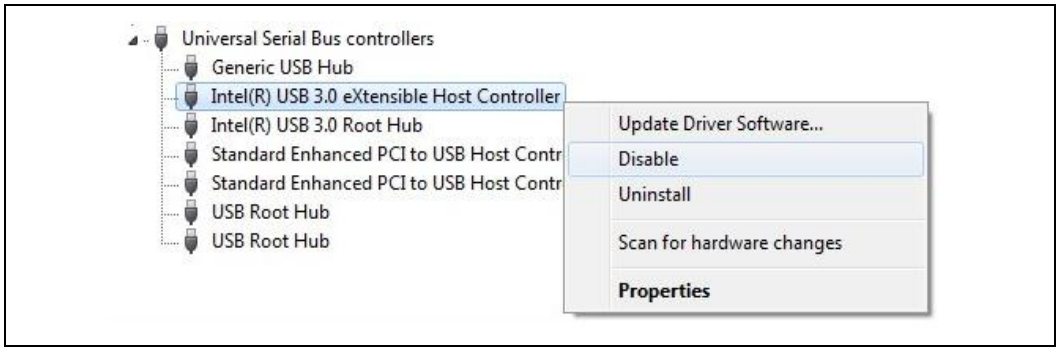
- Reset the platform (S5)
- Reset the Intel® USB 3.0 eXtensible Host Controller Driver

For situations when the Intel® USB 3.0 eXtensible Host Controller Driver has a severe hang/crash or causes the system to be unstable, it is best to reset the platform (S5) and when the reset is finished check the USB 3.0 drivers in the Device Manager. If the drivers have a problem (disabled or yellow bang), you may need to enable or re-install them. If the drivers are working, continue with the USB 3.0 testing.

Since resetting the platform will take longer, the preferred method is to reset the Intel® USB 3.0 eXtensible Host Controller Driver which is accomplished by disabling and then enabling the driver. Here are the steps to do so:

5. Open Device Manager.
6. Click the "Universal Serial Bus controllers" arrow to open the list of USB devices.
7. Right click "Intel(R) USB 3.0 eXtensible Host Controller" device and select "Disable" (see Figure 15).

Figure 15. Device Manager: Disabling Intel® USB 3.0 xHC

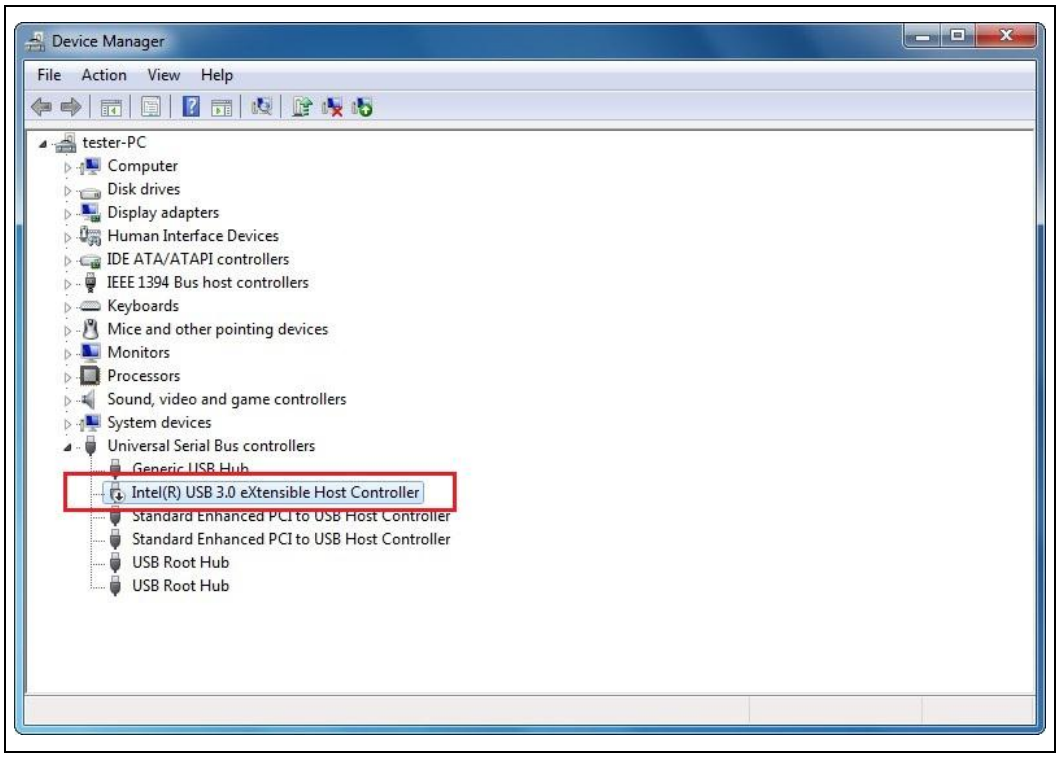


8. A confirmation window will pop-up, click Yes (Figure 16).

Figure 16. Device Manager: Confirm disable Intel® USB 3.0 xHC

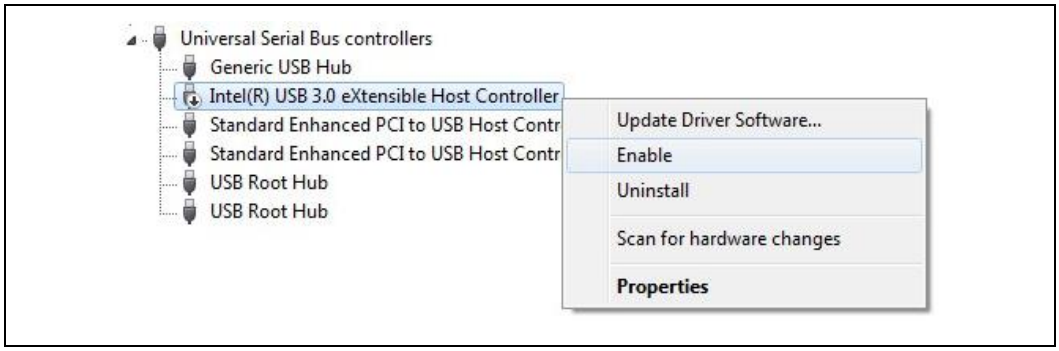
9. You will now see a disabled icon next to the "Intel(R) USB 3.0 eXtensible Host Controller" device (Figure 17).

Figure 17. Device Manager: Disabled icon for Intel® USB 3.0 xHC device



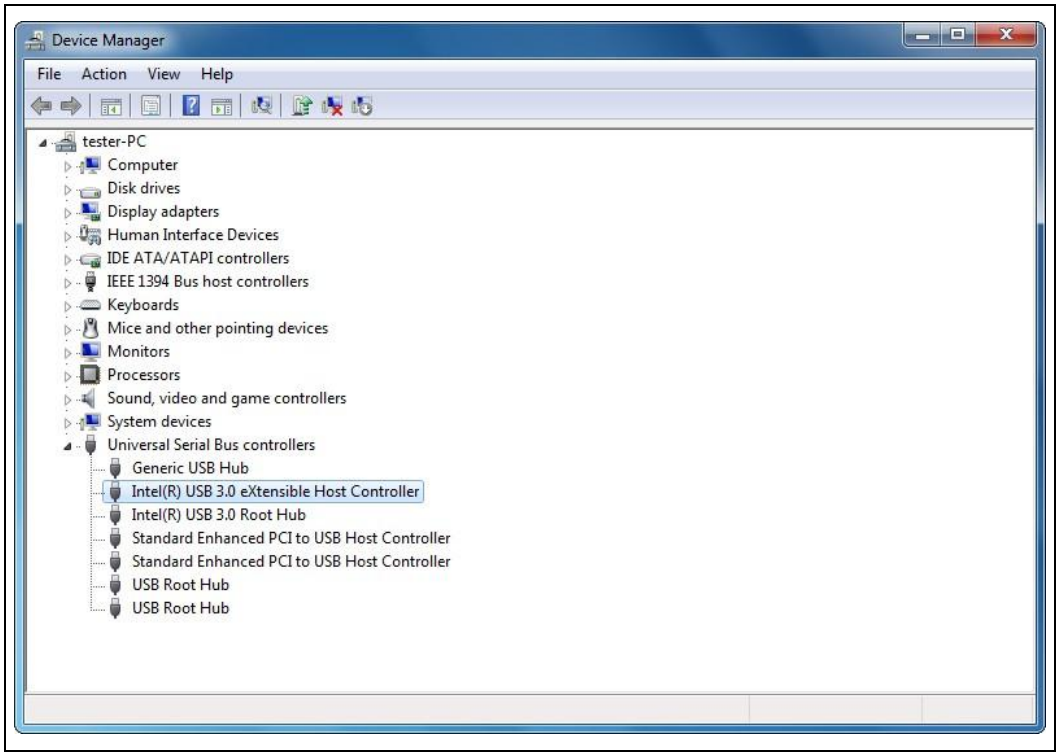
10. Now right click "Intel(R) USB 3.0 eXtensible Host Controller" device and select "Enable" (see Figure 18)

Figure 18. Device Manager: Enabling Intel® USB 3.0 xHC



11. The "Intel(R) USB 3.0 eXtensible Host Controller" device should now be enabled (see Figure 19).

Figure 19. Device Manager: USB 3.0 Driver enabled

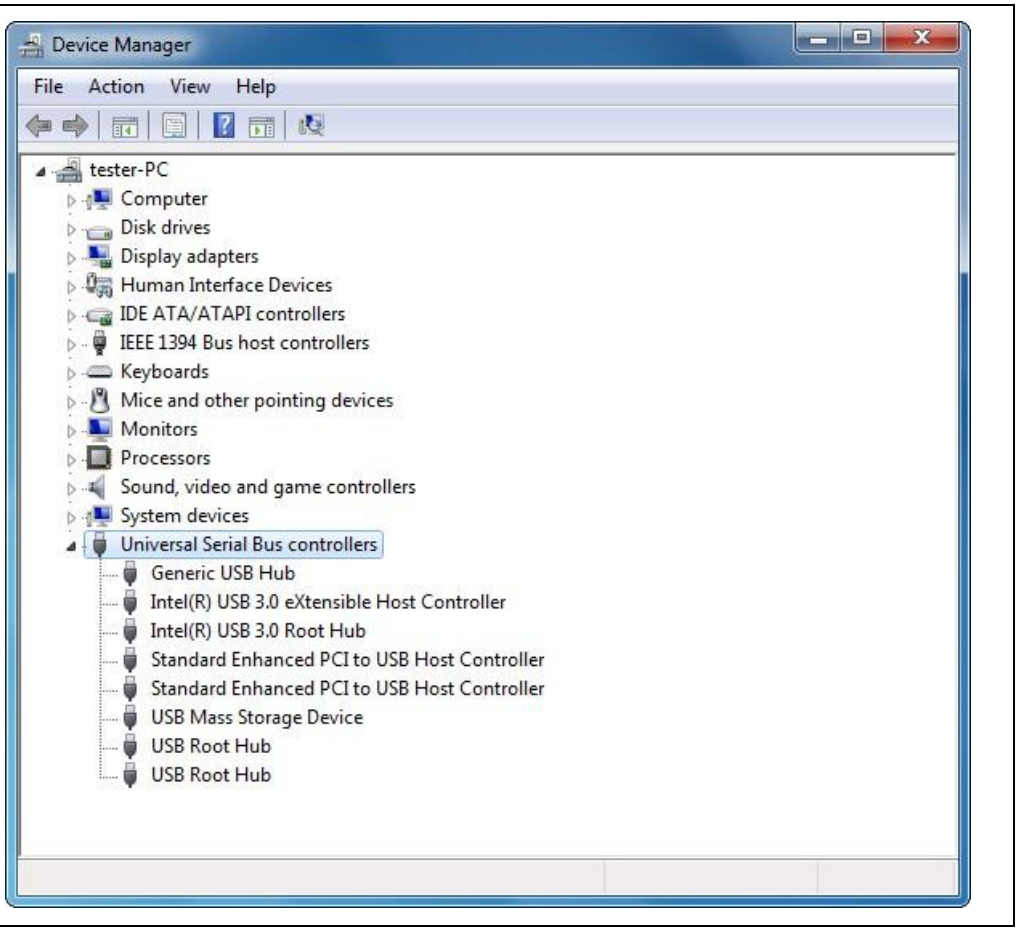


12. Users may now resume their USB 3.0 testing.

4.2 How to Check Connected USB devices

Since your platform may have other USB 2.0 and USB 3.0 controllers, it is often useful to check which controller a USB device is actually connected to. When you first open the Device Manager, the default view is "Devices by type" as shown in Figure 20.

Figure 20. Device Manager: Devices by type view



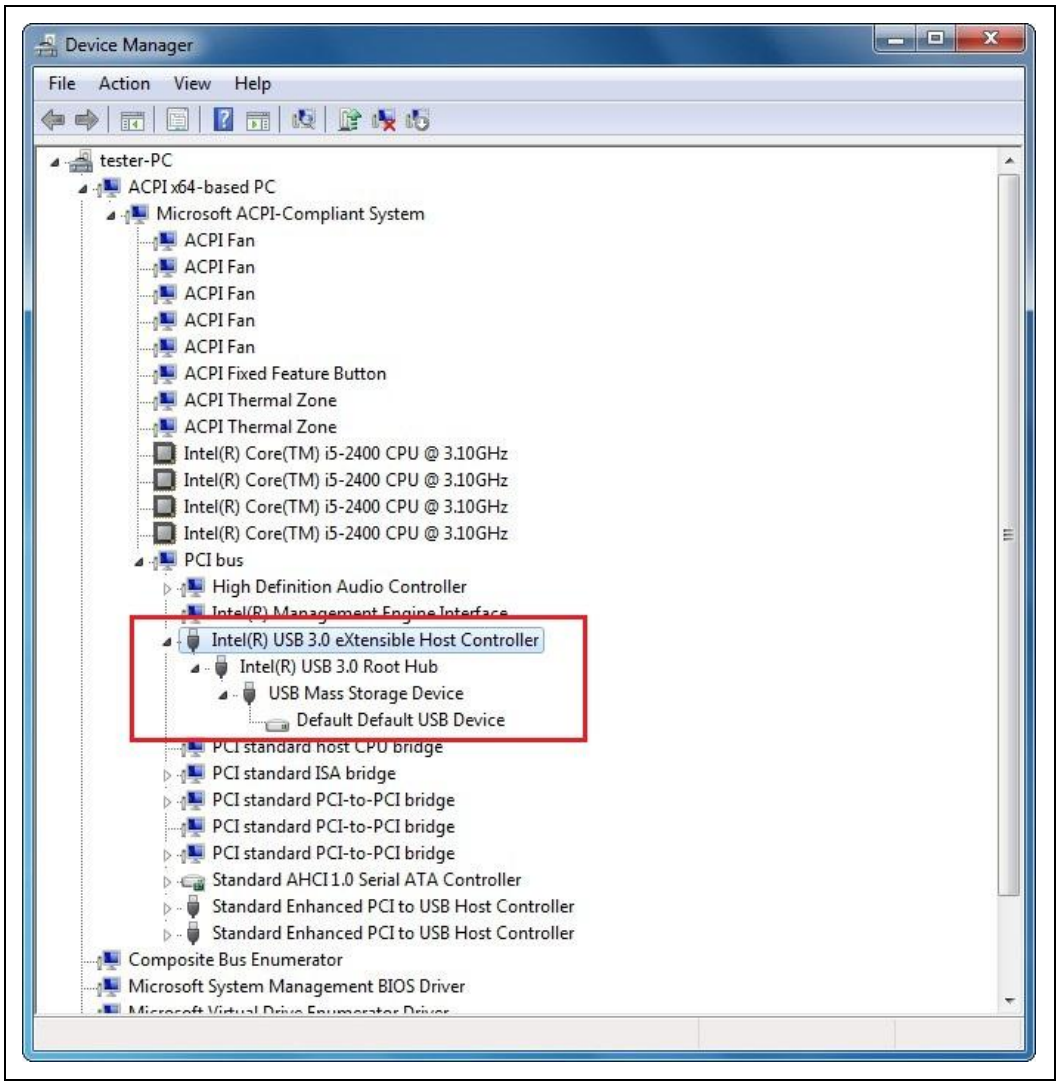
If you connected a USB 3.0 thumb drive (USB Mass Storage Device) to one of the Intel USB 3.0 ports, you'll see it listed under the "Universal Serial Bus controllers" category.

To check which USB controller this device is connected to, click "View" and select "Devices by connection" as shown in Figure 21.

Figure 21. Device Manager: Devices by connection view

The Device Manager view will change to the connection view (Figure 22) which easily allows you to see which USB 3.0 controller is being used.

Figure 22. Device Manager: USB Device connection view



4.3 Intel® USB 3.0 Monitor Application

The Intel® USB 3.0 eXtensible Host Controller Driver release kit includes the Intel® USB 3.0 Monitor application. It will be installed by the Intel® USB 3.0 eXtensible Host Controller Driver Installer (see section 3.1 for more information about the Installer).

The main functions of this application are:

- Monitors plug and play status of all USB 3.0 Ports
- Generates pop-up message for event notification

The 6 pop-up messages are listed in the following table

Pop-up Message	Description
Bandwidth allocation failure	The eXtensible Host Controller cannot assign sufficient bandwidth on the bus for the attached device. Click on pop-up message for possible workaround to adjust bandwidth settings.
Device can run faster	Super Speed capable device is attached to a USB 2.0 only port on the system. User should move the Super Speed device to a Super Speed capable port.
Enumeration failure	Enumeration failure occurred with USB device.
Hub too deep	As per the USB 3.0 specification, the maximum hub depth is 5. This pop-up notification will be displayed when users exceed the maximum hub depth.
Insufficient power	There is insufficient power for all USB device(s) and hub(s) connected to the USB port. Move some devices to another USB port.
Overcurrent	The USB device is drawing excessive current from the USB port. Check USB device to ensure it is operating normally and try on another USB port.

4.4 Intel® USB 3.0 Host Controller Switch Driver

The Intel® USB 3.0 eXtensible Host Controller Driver release kit includes the Intel® USB 3.0 Host Controller Switch Driver. This driver uses BIOS ACPI method to control dynamic switching from EHCI to xHCI during OS boot. It will be installed by the Intel® USB 3.0 eXtensible Host Controller Driver Installer (see section 3.1 for more information about the Installer).

For more information about the Switch Driver, see the Intel® 7 Series/C216 Chipset Family (Panther Point) Platform Controller Hub BIOS Specification document.

4.5 Next Steps – USB 3.0 Validation and Debug

Please see the document "Intel® USB 3.0 eXtensible Host Controller Driver - Customer Validation and Debug Guide" for information on driver validation and debug methods. This document is available on IBP (Doc #477627), please contact your Intel FAE for access.

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