

USB-IF

USB 3.0 Peripheral Development

Kit:

USB-IF xHCI-based PDK

USB 3.0 xHCI-based PDK

March 4, 2011

Revision 1.7

About this Document

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Revision History

Revision 1.0	Release
Revision 1.1	Added information about USB30CV and Drivers
Revision 1.2	Added information about UAC with USB30CV
Revision 1.3	Added information about USB30CV installation, equipment setup with the NEC (Renesas) xHCI
Revision 1.4	Updated information about USB30CV documentation and updated contact information for the USB-IF Technical Support
Revision 1.5	Updated information about USB30CV directory structure
Revision 1.6	Updated information about USB30CV driver names, updated installation settings required for 64-bit operating systems and updated Renesas PDK jumper settings
Revision 1.7	Updated information about PDK Jumper Settings

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1. Summary

This document illustrates USB-IF xHCI-based PDK technical installation and operation. The procedures should be performed by a qualified systems technician. Instructions included in this document:

- System Preparation
- PDK Installation

2. Introduction

This document is provided as a resource from Intel Corporation for the installation of the USB-IF xHCI-based PDK and is recommended when installing the USB-IF xHCI-based PDK Host for the first time or as a training refresher.

3. Scope

Instructions will cover workstation setup, system hardware requirements, and software installation guidelines. All three are required to ensure the PDK product will function properly. The workstation setup environment, system hardware specifications, and software installation have been tested by qualified Intel hardware technicians. Any deviation may result in unpredictable behavior in the USB 3.0 Host product (PDK).

4. Implementation

USB-IF xHCI-based PDK Hardware will provide a PC with a USB 3.0 Host controller that will connect USB devices as defined by the USB 3.0 specification. Following this documentation will provide a baseline system, providing a development test system for USB devices to connect that are in or near the final stages of development. Furthermore this document is not a substitution for any referenced documentation.

5. References

USB 3.0 Specification Revision 1.0

<http://www.usb.org/developers/ssusb/>

SuperSpeed USB Tools

<http://www.usb.org/developers/ssusb/ssusbtools>

USB-IF Company List

http://www.usb.org/developers/tools/comp_dump

Acronyms

ESD	Electro Static Discharge
DUT	Device Under Test
FW	Firmware
HW	Hardware
I/O	Input / Output
MB	Motherboard
NC	No Connection
OS	Operating System
PC	Personal Computer
PCB	Printed Circuit Board
PCI	Peripheral Component Interconnect
PCIe	PCI Express. Refer to the PCIe specification
PCLK	PHY Clock Signal
PDK	Peripheral Development Kit
PHY	Physical Layer
UAC	User Account Control
USB	Universal Serial Bus
USB-IF	Universal Serial Bus Implementers Forum
xHCI	eXtensible Host Controller Interface

6. Workstation Preparation

6.1. Equipment and Materials

1. Peripheral Development Kit
 - a. Renesas xHCI-based PDK PCIe Card
 - b. Fresco Logic xHCI-based PDK PCIe Card
 - c. 1 meter USB 3.0 cable
 - d. Technical Documentation
 - e. Software and Drivers – Available from the [SuperSpeed USB Tools](#) site noted in Section 5
2. Recommended Computer System

Current model Desktop PC with available PCIe slot.

(See section 6.2)
3. Recommended: USB 3.0 Protocol Analyzer

6.2. PDK System Requirements

Recommended system requirements: The following system requirements are tested and ensure the highest system stability for the PDK. Any modifications to this list of hardware may result in system related failures or system crashes.

- ATX or BTX Mid Tower Desktop System Case
- Intel Desktop Board (or equivalent) with available PCIe slot
- Intel Core™2 Duo, 1.80GHz or higher clock speed
- 1024MB of RAM or higher
- 450W Power Supply or higher power rating with AC Power Switch
- DVD/CD-Rom Drive
- 40GB or Higher Hard Disk with 10GB of free space
- Monitor, Keyboard and Mouse
- Windows 7 Operating System

6.3. Hardware Configuration

6.3.1. PDK Dimensions

1. 1.0" [25.4 mm] is recommended for the component side of the PDK for clearance to view device states and access optional reset button.

Renesas Host Controller

- Card Length from the PCIe I/O bracket = 3.94" [100.0 mm]
- Card Width at highest point from the PCB mounting surface = 0.33" [8.3 mm]
- Card Height from the top of the PCIe connector = 3.82" [97.0 mm]

Fresco Logic Host Controller

- Card Length from the PCIe I/O bracket = 4.72" [120.0 mm]

- Card Width at highest point from the PCB mounting surface = 0.49" [12.5 mm]
 - Card Height from the top of the PCIe connector = 4.13" [105.0 mm]
2. Power is provided to the PDK through the PCIe connection.

6.4. Software Installation

Before installing any software, User Account Control (UAC) must be turned off. Locate this setting in the Windows Control Panel\User Accounts section. After turning off UAC, the system must be rebooted.

Install the USB 3.0 CV software available from the [SuperSpeed USB Tools](#) site noted in Section 5 before installing the PDK HW.

Download the file named **usb.if** at the [USB-IF Company List](#) site noted in Section 5. Place the file named **usb.if** inside of the lib folder located at Program Files\USB-IF Test Suite\USB30CV\lib

Read the Readme.rtf file located in the Documents folder located at Program Files\USB-IF Test Suite\USB30CV\Documents. This document contains important information regarding the setup and operation of the USB 3.0 CV

The USB 3.0 CV software is proprietary software provided by the USB-IF or their representative. Find more information regarding proprietary software setup at the USB-IF website.

After the USB 3.0 CV software installation is finished, shut down and disconnect power to the PC then install the PDK hardware as described in Section 6.5.

6.5. Hardware Installation

6.5.1. PDK Assembly

1. The PDK comes fully assembled and tested prior to shipment ready for installation.

6.5.2. PDK System Installation

1. Installing the Renesas or Fresco xHCI-based PDK board.
 - a. Refer to Section 6.4 above.
 - b. Shutdown the PC. Use *caution* anytime hardware is removed or inserted into a computer system.
 - c. **Remove power to the PC system. If the PC does not provide a power switch unplug the power cord before attempting to remove or insert the PDK.** In this situation it's also recommended to use a properly grounded ESD strap if the AC plug is removed.
 - i. If you are installing the Renesas xHCI-based PDK board, then ensure that the jumper on the Renesas PDK (located near the PCIe connector) is connecting pins 2 and 3. Install a 4-pin power plug from the PC's power supply into the PDK board. The Renesas PDK requires this external power source to ensure that bus powered external peripherals are provided with sufficient power.
2. Power on the PC after the PDK is properly installed.
 - i. If you have a 64 bit version of Windows 7, then press F8 before Windows starts to load to open the Advanced Boot Options. If

Windows loads without displaying any option, then restart the computer and continuously tap F8 when the machine boots up, as the initial attempt may have been after Windows started loading. Once in the Advanced Boot Options, select 'Disable Driver Signature Enforcement' and press Enter. Windows 7 will now boot and allow the installation of the PDK drivers.

3. When the OS loads Windows with the PDK for the first time the OS will find a new device connected to the PC.

6.5.3. Initial Compliance Driver Installation

1. The New Hardware Wizard install will prompt the user to install a driver.
2. Select "Browse my computer for driver software", then select "Let me pick from a list of device drivers on my computer".
3. Click on the "Have Disk" button, then Browse to the Program Files\USB-IF Test Suite\USB30CV\Driver\Host folder and select XHCIdrv.inf. Click OK, and then select the xHCI Controller.
4. Navigate to the Device Manager and View Devices by connection to confirm proper installation of the xHCI Controller as shown in Figure 6.5.3.1.

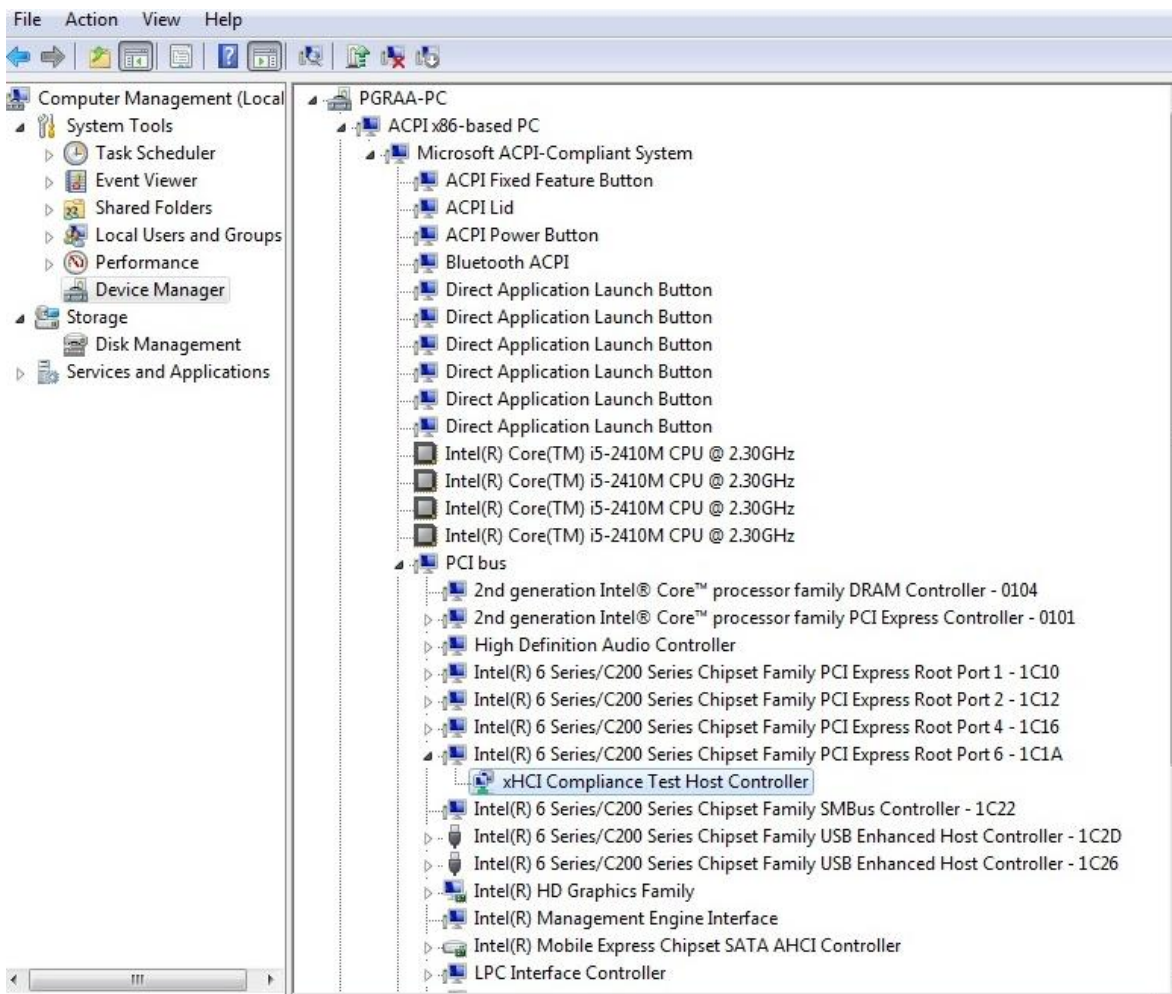


Figure 6.5.3.1: xHCI Compliance Driver

6.6. Additional Driver Installation

There are two drivers available with the PDK: the xHCI Compliance Driver and the xHCI Prototype Driver. Only one of these drivers can be loaded at a time.

- i. The xHCI Compliance Driver (which was installed in Section 6.5.3) is necessary to operate the USB30CV tool.
 - ii. The xHCI Prototype Driver supports host interoperation in Windows 7. This driver is composed of two parts – the USB-IF xHCI USB Host Controller Driver and the USB-IF USB 3.0 Hub Driver. The USB-IF USB 3.0 Hub Driver is used by the xHCI Prototype Driver for the root hub as well as any hubs installed downstream of the root hub.
1. **To install the Prototype Driver for host interoperation in Windows 7:**
 - a. Navigate to the Device Manager, View Devices by connection and select the xHCI Controller.
 - b. Update the xHCI Controller. Select “Browse my computer for driver software”, then select “Let me pick from a list of device drivers on my computer”.
 - c. Click on the “Have Disk” button, then Browse to the Program Files\USB-IF Test Suite\USB30CV\Driver\Host folder and select xHCIPort.inf. Click OK, and then select the USB-IF xHCI USB Host Controller.
 - d. Navigate to the Device Manager and View Devices by connection to confirm proper installation of the USB-IF xHCI USB Host Controller as shown in Figure 6.6.1.

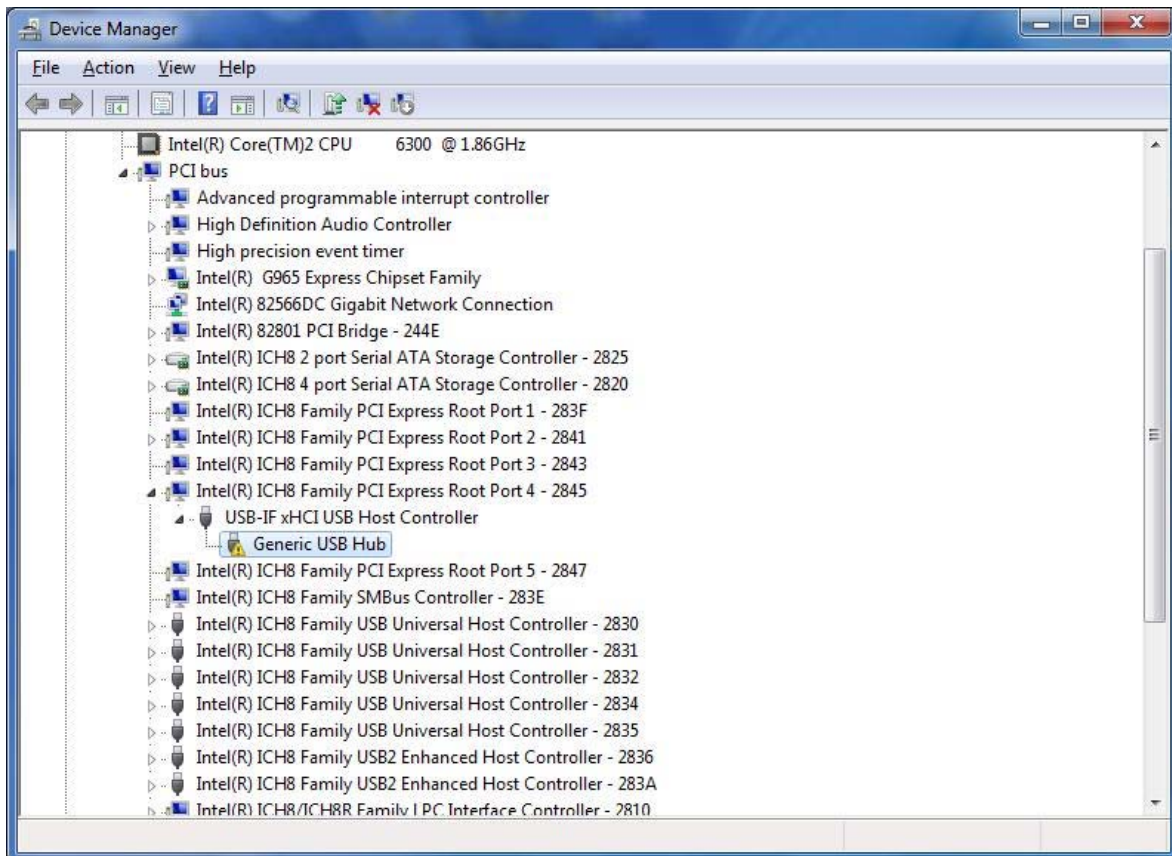


Figure 6.6.1: Standard eXtensible PCI to USB Host Controller Driver

- e. Navigate to the Device Manager, View Devices by connection and select the Generic USB Hub connected to the USB-IF xHCI USB Host Controller.
- f. Update the Generic USB Hub driver. Select “Browse my computer for driver software”, then select “Let me pick from a list of device drivers on my computer”.
- g. Click on the “Have Disk” button, then Browse to the Program Files\USB-IF Test Suite\USB30CV\Driver\Host folder and select usb3Hub.inf. Click OK, and then select the first USB-IF USB 3.0 Hub.
- h. Navigate to the Device Manager and View Devices by connection to confirm proper installation of the USB-IF USB 3.0 Hub as shown in Figure 6.6.2.

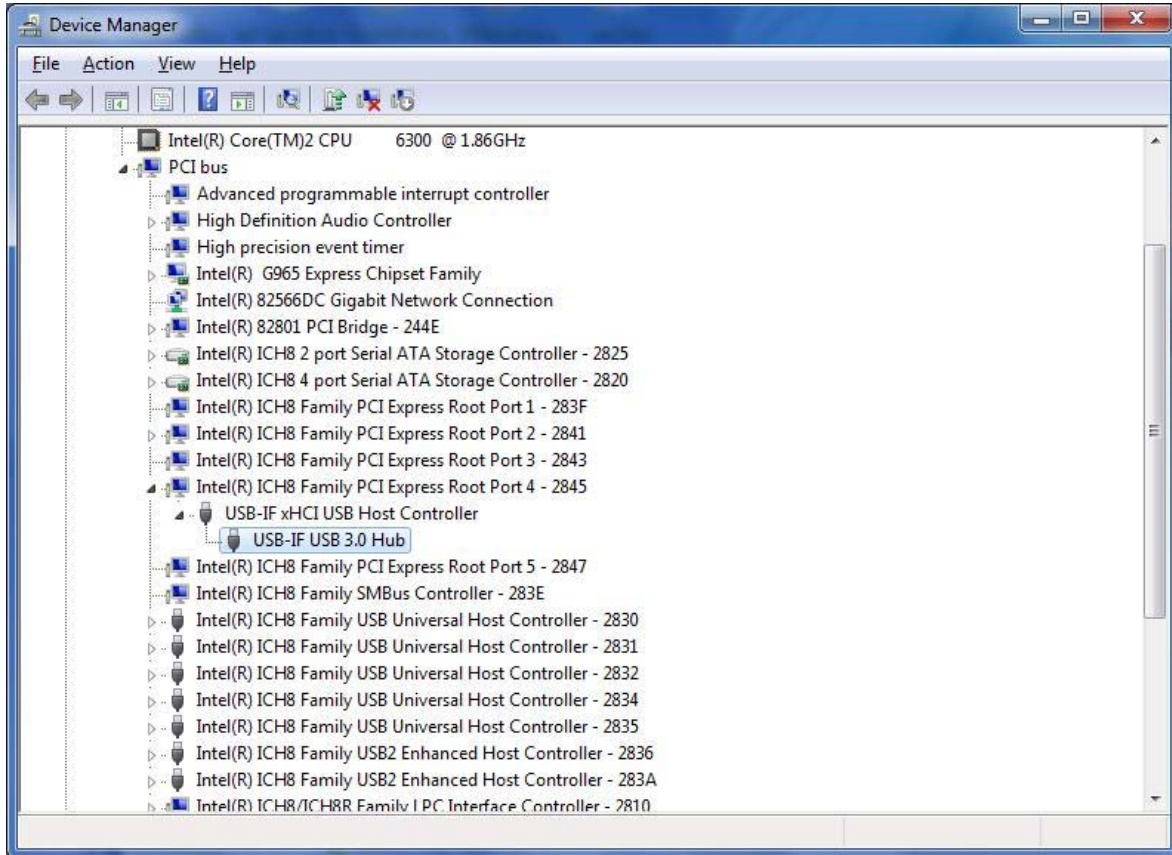


Figure 6.6.2: Standard USB 3.0 Driver

- i. Whenever you connect any USB 3.0 hub or USB 2.0 hub into the xHCI, you must repeat steps e.) through h.) to install the correct driver for the xHCI Prototype Driver to operate the device as a USB hub.
2. **To re-install the Compliance Driver for use with USB30CV:**
 - a. Navigate to the Device Manager, View Devices by connection and select the USB-IF xHCI USB Host Controller.
 - b. Update the USB-IF xHCI USB Host Controller driver. Select “Browse my computer for driver software”, then select “Let me pick from a list of device drivers on my computer”.

- c. Click on the “Have Disk” button, then Browse to the Program Files\USB-IF Test Suite\USB30CV\Driver\Host folder and select XHCIdrv.inf. Click OK, and then select the xHCI Controller.
- d. Navigate to the Device Manager and View Devices by connection to confirm proper installation of the xHCI Controller as shown previously in Figure 6.5.3.1.

7. Graphics and Tables

7.1. USB-IF xHCI-based PDK



Figure 7.1.1: Fresco Logic xHCI Host Controller (LPM PDK)

Note: In order for Fresco Host controller to work properly, a power supply must be connected to the white connector on the add-in card and JP2 reference designator must be jumpered. If no power supply is connect, JB2 must be unjumpered for proper operation. Firmware updates are not possible using a Fresco Host Controller.

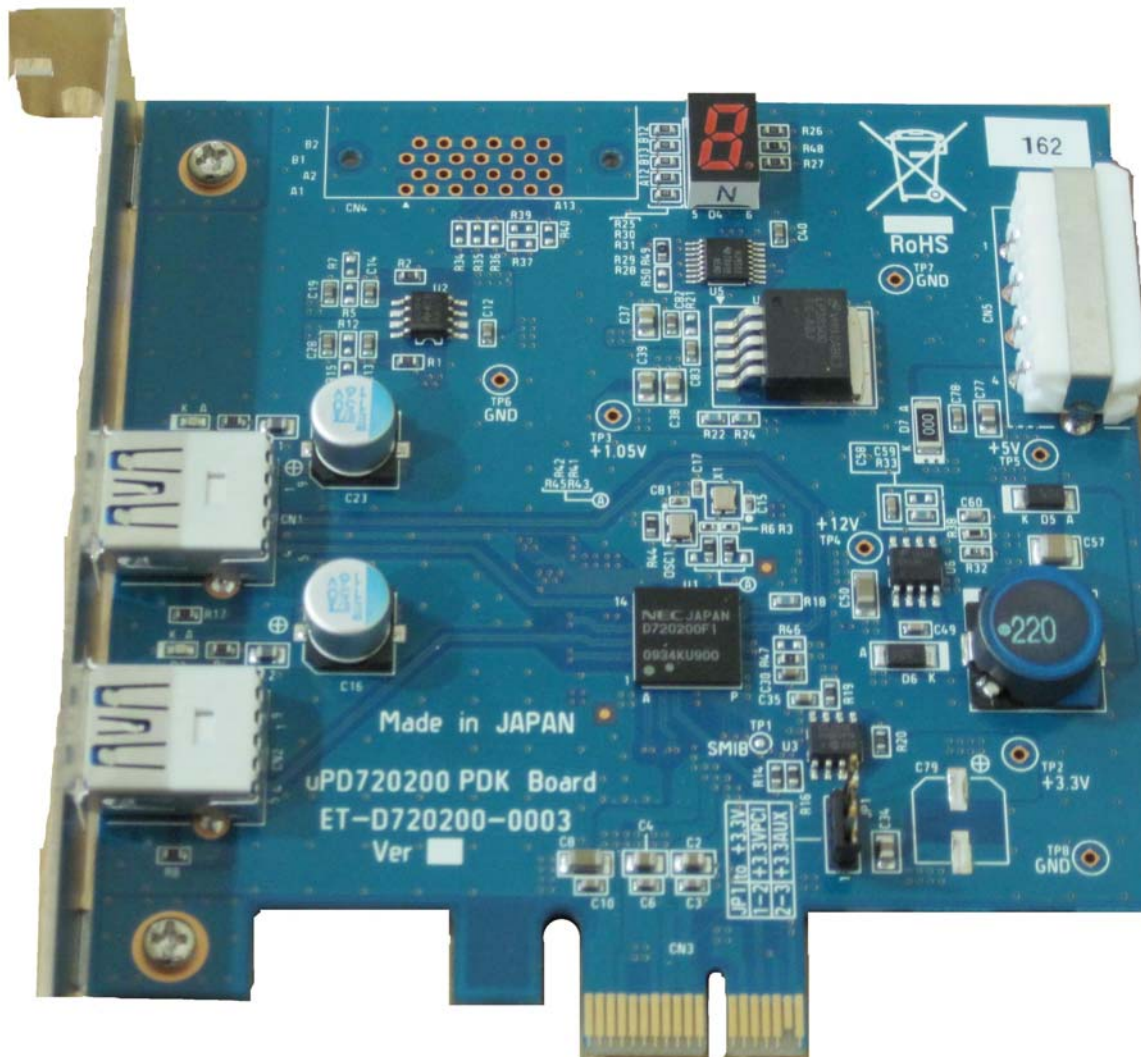


Figure 7.1.2: Renesas xHCI Host Controller

Note: In order for Renesas host controller to have firmware upgrade capability, the PDK board must display a number 130 or greater on the white sticker at the top right as shown in picture above (above picture shows # 162).

The PDK firmware is proprietary and may only be updated with firmware updater packages provided by the USB-IF or their representative.

The xHCI Drivers installed with USB 3.0 CV are only supported for use with Microsoft Windows 7.

For technical support, contact the USB-IF at ssusbcompliance@usb.org

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