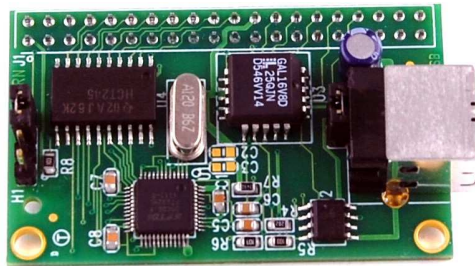


*HUSB*TM

High speed data transfer to a PC via USB



Technical Manual



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Temperature readings for controllers are based on the results of limited sample tests; they are provided for design reference use only.

Chapter 1: Introduction

1.1 Functional Description

The HUSB™ is a low cost expansion board for TERN controller to add a high speed SLAVE USB port. Some user applications need to transfer data in and out to a PC at a high speed. Traditional RS232 serial transfer data rate can only manage a peak bandwidth of approximately 10K bytes per second (at 115,200 baud). USB interface can provide much higher data transfer rate.

The HUSB™ integrates a high-performance USB stack chip (FT232H, FTDI) to provide an easy to program USB 1.1/2.0 slave interface. The onboard hardware fully handles USB stack processing, and provides for high-speed bi-directional 8-bit parallel communication. The HUSB™ exposes a slave USB interface, and connects to a PC via USB-B connector. The HUSB™ is an upgrade to the CUSB™ with the same mechanical dimension. For connection to the TERN controller, the HUSB™ relies on the J1 expansion header compatible with most TERN controllers. No USB specific firmware programming is required on the controller side. The USB interface is seen as a transparent parallel FIFO buffer tasked with transferring data back and forth with the remote host. The only control signals needed is “ready to transmit” and “data received” signals, readily available to your C/C++ application running on the TERN controller.

Royalty-free software drivers are provided for most Windows environments (7, XP, 2000, NT, 98). These field proven USB software drivers eliminates the requirement for Windows USB driver development.

Two types of USB software drivers are available: VCP and D2xx. The VCP (Virtual Com Port) driver supports up to 300 K bytes per second transfer rate, and allowing the device to be accessed transparently on the PC side through traditional COM port software. The D2xx (USB direct driver and DLL) drivers can support up to 8M bytes per second. Additional utilities available from third-party sources allow the USB interface to be programmed with unique service and product ID numbers, allowing the unit to be transparently integrated into OEM applications.



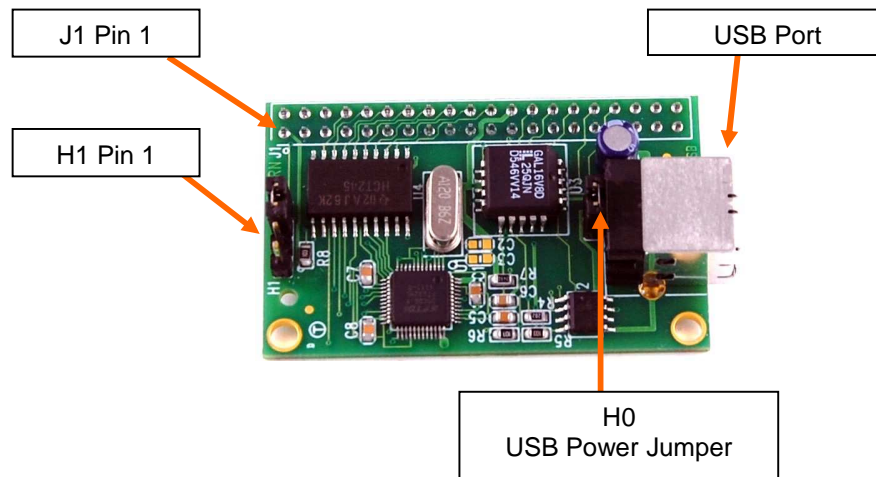
Figure 1.1 HUSB + FlashCore-B

Features:

- * Expansion board to add a SLAVE USB port
- * 8-bit parallel high speed bus
- * Ready to use, royalty free USB drivers
- * Eliminate Windows driver development
- * 2.1x1.3", USB bus powered
- * USB 1.1 and USB2.0 compatible
- * Tx/Rx buffer FIFO for parallel high speed data
- * Data transfer rate to 150 KB/sec with VCP driver
- * Data transfer rate to 8 MB/sec with D2xx driver

1.2 Physical Description

Below shows the physical description of the UB.



Chapter 2: Hardware

2.1 High-Speed USB 1.1/2.0 Slave FT232H

FTDI's FT232H chip provides a USB 1.1/2.0 slave USB-B port. The FT232H handles USB stack processing and no USB specific firmware programming is required. The FT232H is configured to interface with the HUSB CPU using the FT245 style asynchronous FIFO interface. When configured in this mode, the pins on the FT232H connect directly to the databus of the CPU and is selected using an I/O mapped chip select. The FT232H uses two types of USB software drivers: VCP or D2xx. When the FT232H is configured to use the VCP driver, the USB connection creates a virtual COM port on the PC. This allows the HUSB to communicate to a terminal program as if it were connected via RS232. The sample program `\tern\186\samples\ub\ub_usb_vcp.c` shows how to use the USB port as a virtual COM port. By default, the FT232H is configured to use the D2xx driver. The data transfer rate can go as high as 8 MB/sec with the D2xx driver. The D2xx driver provides a dynamic linked library that the user can use in developing a Windows application interface (see FTDI.com for information on using the D2xx driver). See the appendix at the end of this manual for installing and configuring the FTDI drivers.

2.2 Hardware Drivers

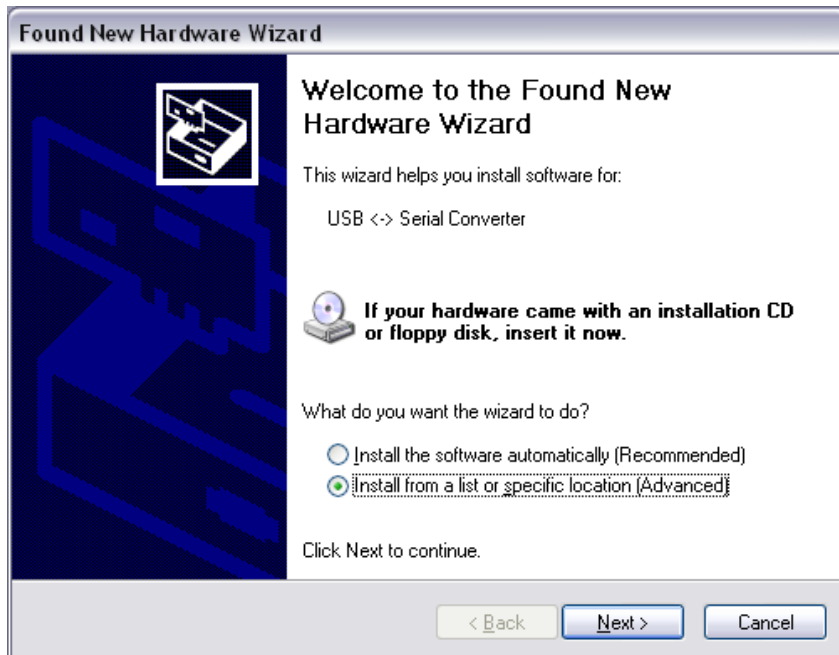
2.2.1 Installing FTDI's D2XX Driver

The FT232H on the HUSB is configured by TERN to interface the D2XX Windows driver. The D2XX driver can be used with application software to directly access the FT232H through a DLL. The D2XX driver can be found on the TERN CD *TERN_Docs\TERNUSB\cusb-direct* or at FTDI's website <http://www.ftdichip.com>. This section describes the process of installing the D2XX driver to work with the HUSB.

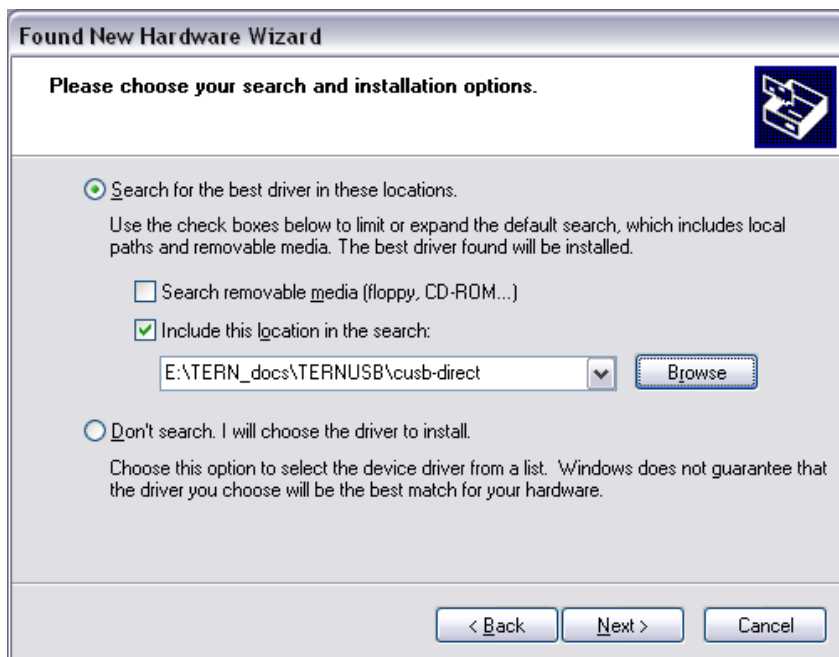
The following instructions were performed on a Windows XP machine. Other version of Windows may vary.

1. Connect the USB to your computer using USB cable. No other power connection is required. Once it's plugged in, Windows should detect the new hardware and prompt with the Found New Hardware Wizard.





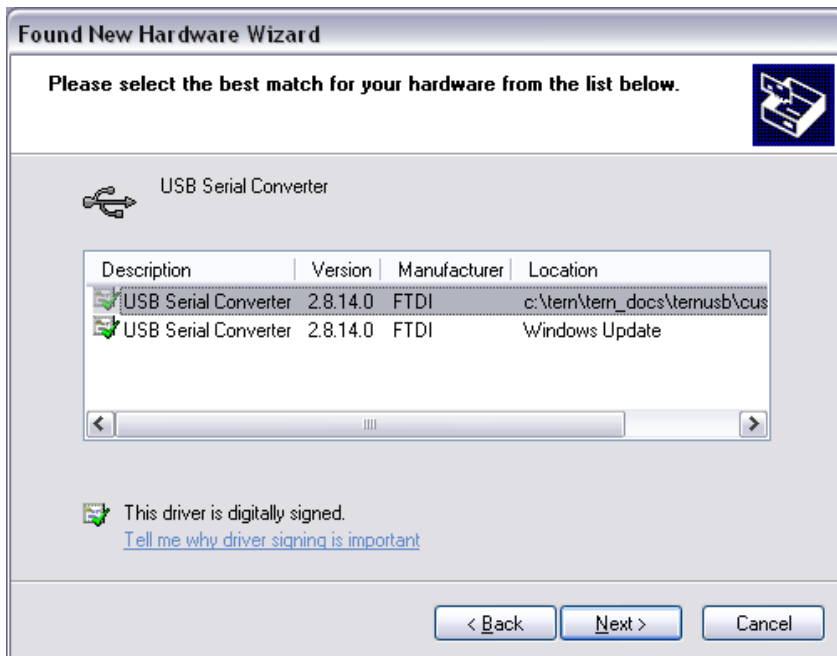
2. Set the search location to the *TERN_docs\TERNUSB\cusb-direct* folder on the TERN Development Kit CD. Click “Next”.



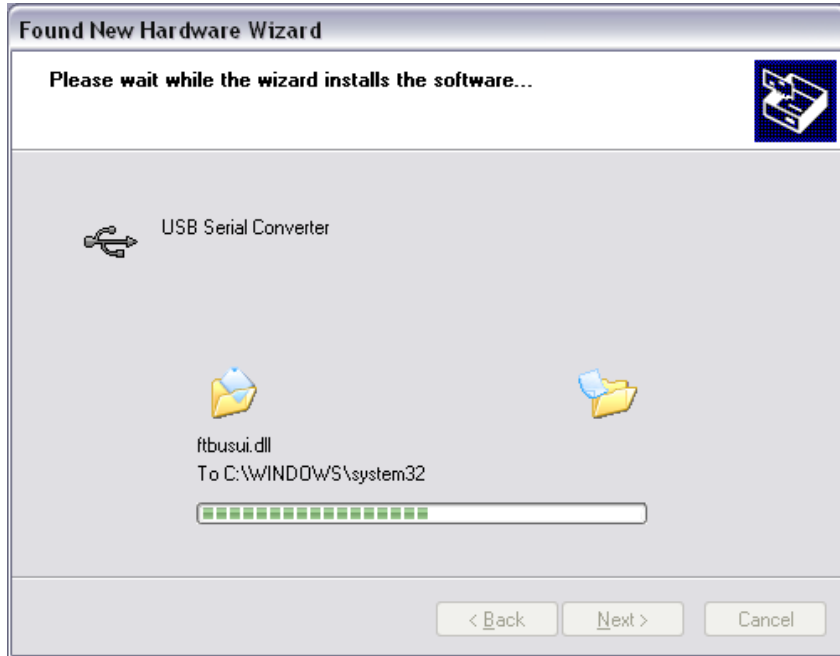
Windows should begin searching for the correct driver.



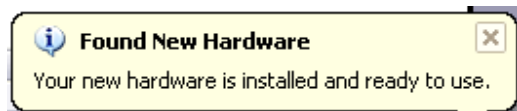
3. Select the **USB Serial Converter** driver. This example shows the same driver in two locations. This will vary on different computers, but at least one driver should be located.



4. Click “Next” and Windows will install the USB Serial Converter driver.



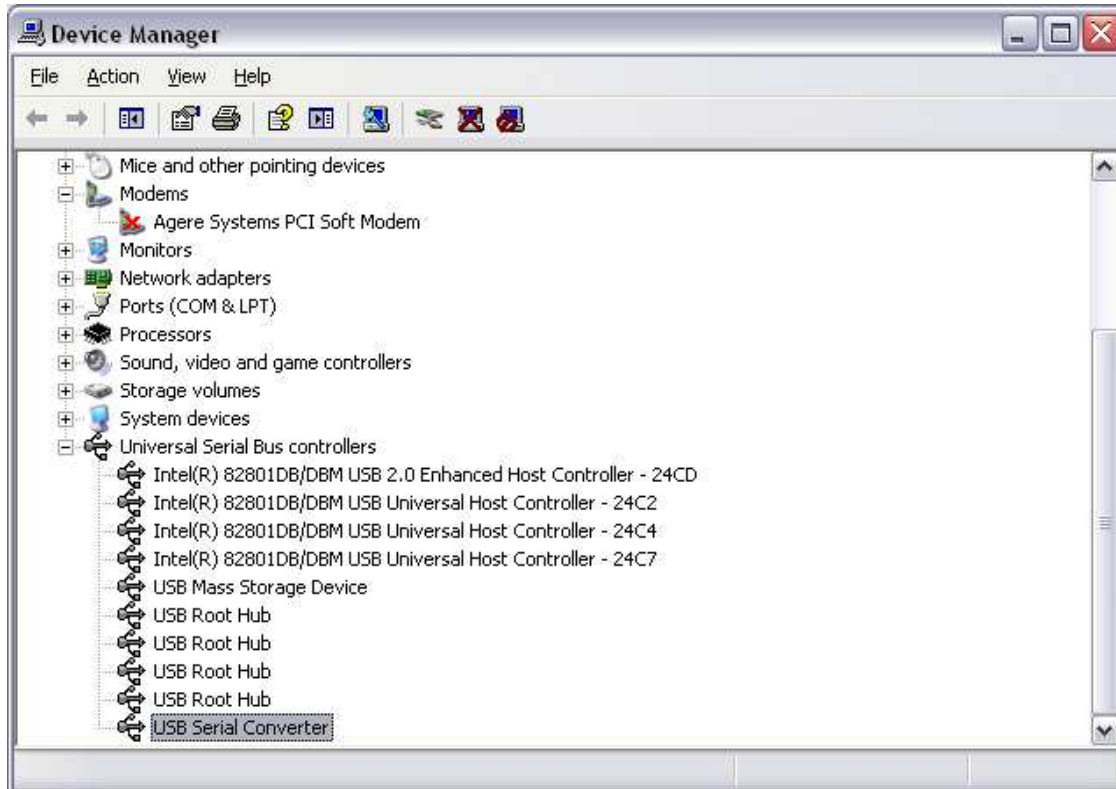
5. When the installation is complete, Windows will prompt that the new hardware is installed and ready to use. The D2XX driver is now accessible to application programs.



6. To verify the driver is installed, open System Properties by right-clicking the My Computer desktop icon and selecting Properties. Click the Device Manager button on the Hardware tab.



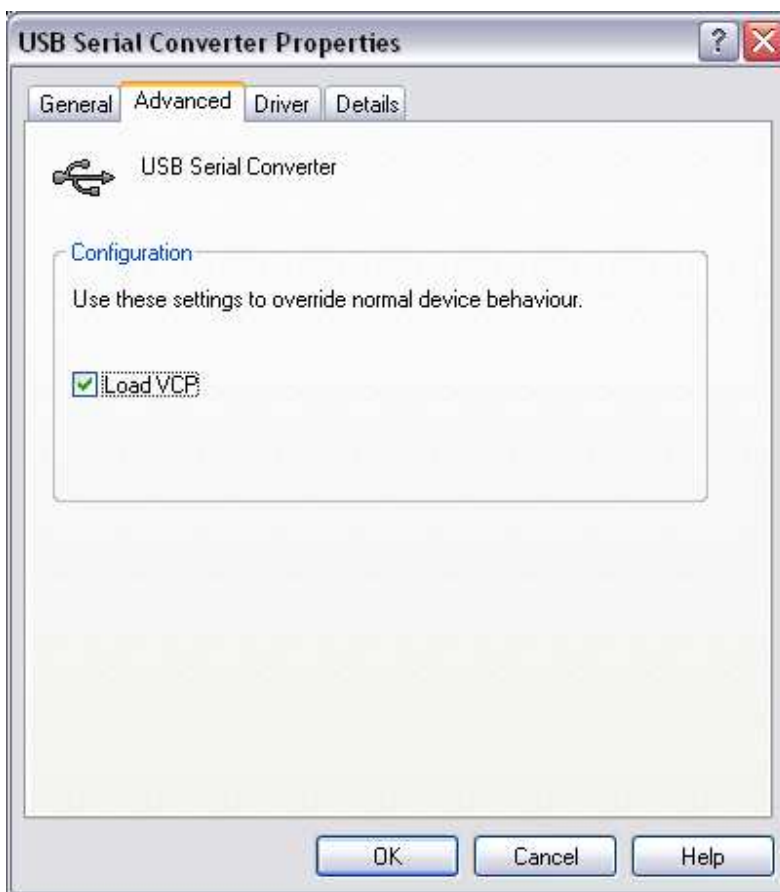
The Device Manager should show a “USB Serial Converter” node under the Universal Serial Bus controllers branch. This represents the active USB connection to the HUSB.



2.2.2 Installing FTDI's VCP Driver

The VCP version of the driver creates a Virtual COM Port allowing legacy serial port applications to operate over USB e.g. HyperTerminal. In order to use the VCP driver, the D2XX driver must be configured to load the VCP driver when connected. This section describes the steps to setup the VCP driver.

1. After installing the D2XX driver described in the last section, open the Properties tab of the “USB Serial Converter” node from the Device Manager. The previous section describes finding the “USB Serial Converter” node in the Device Manager tree.
2. Select the Advanced tab in the Properties page and check the “Load VCP” box. Click OK and exit Device Manager. This will force D2XX to use the VCP driver instead.



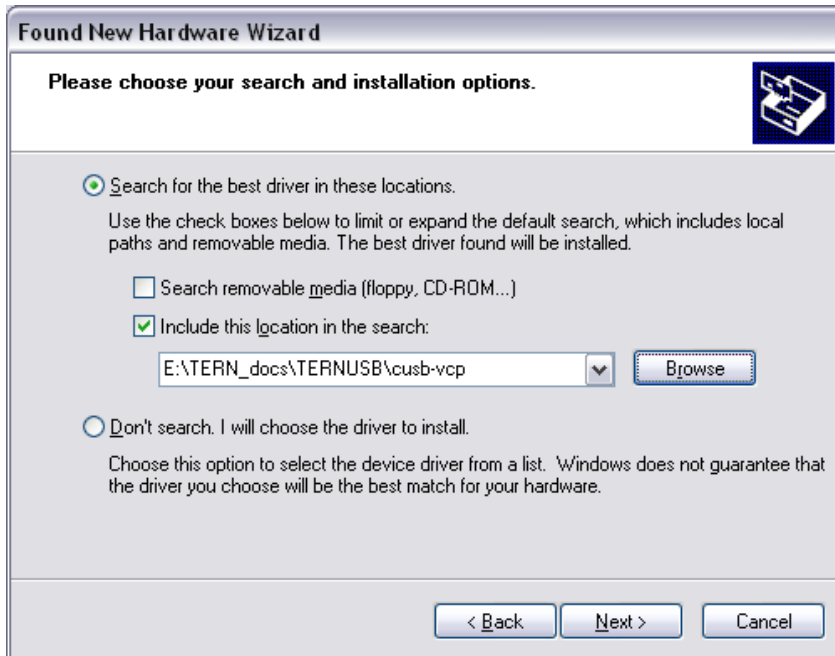
3. Disconnect the USB connection to the HUSB and then reconnect it. When reconnected, the D2XX driver will attempt to load the VCP driver and treat the HUSB as a new device. Windows should prompt with “Found New Hardware”.



4. When the Found New Hardware Wizard appears, select to install from a specific location.



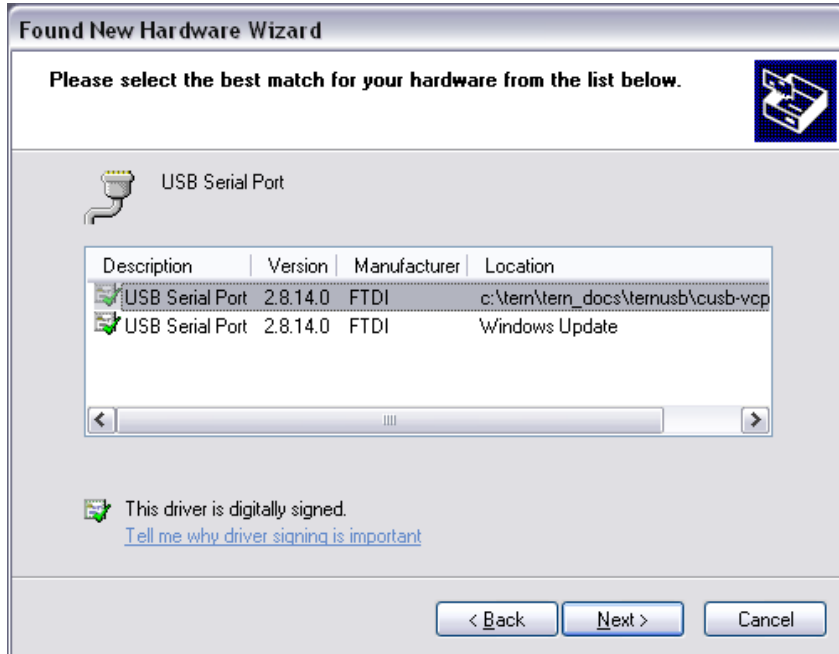
5. Set the search location to the *TERN_docs\TERNUSB\cusb-vcp* folder on the TERN Development Kit CD. Click “Next”.



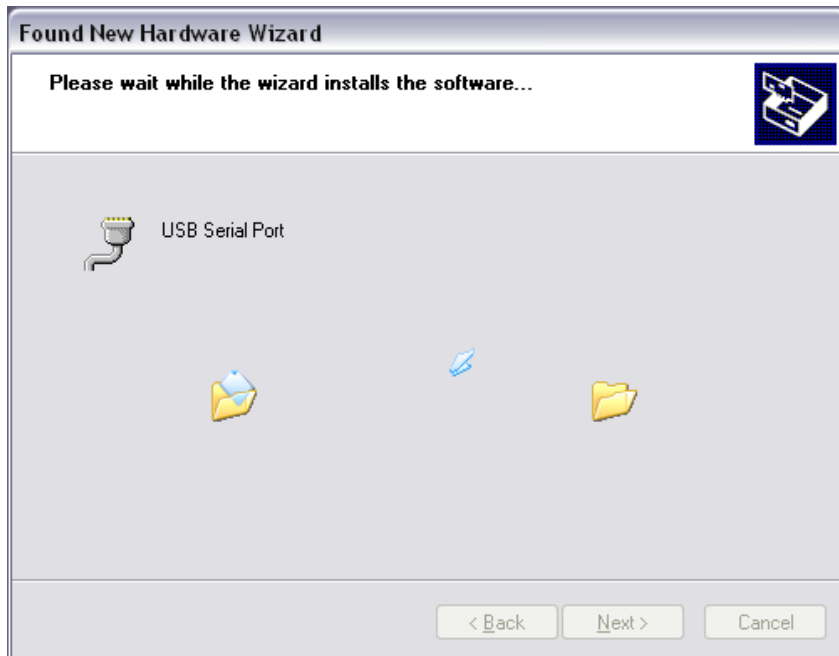
Windows should begin searching for the correct driver.



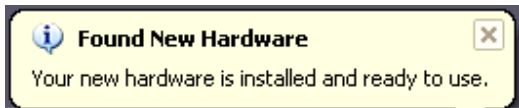
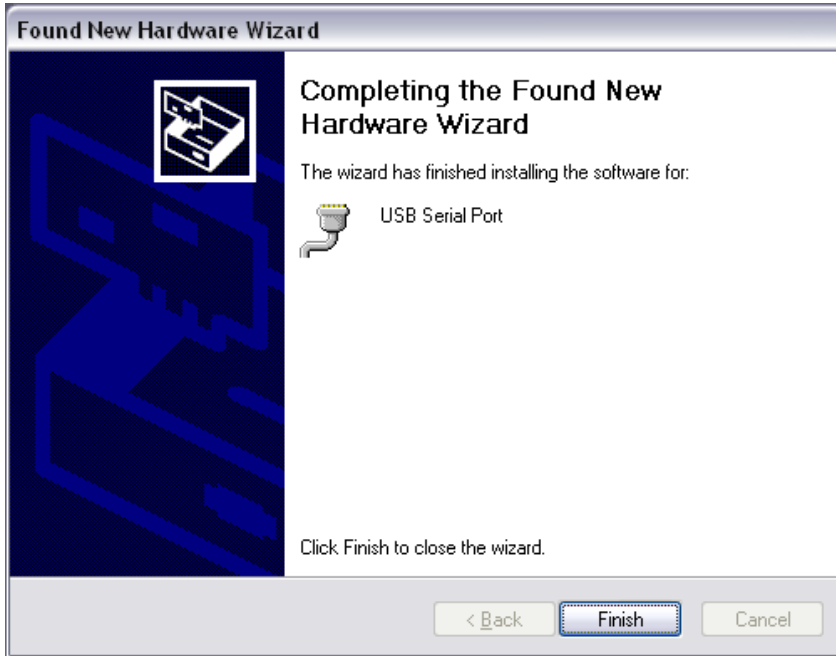
6. Select the **USB Serial Converter** driver. This example shows the same driver in two locations. This will vary on different computers, but at least one driver should be located.



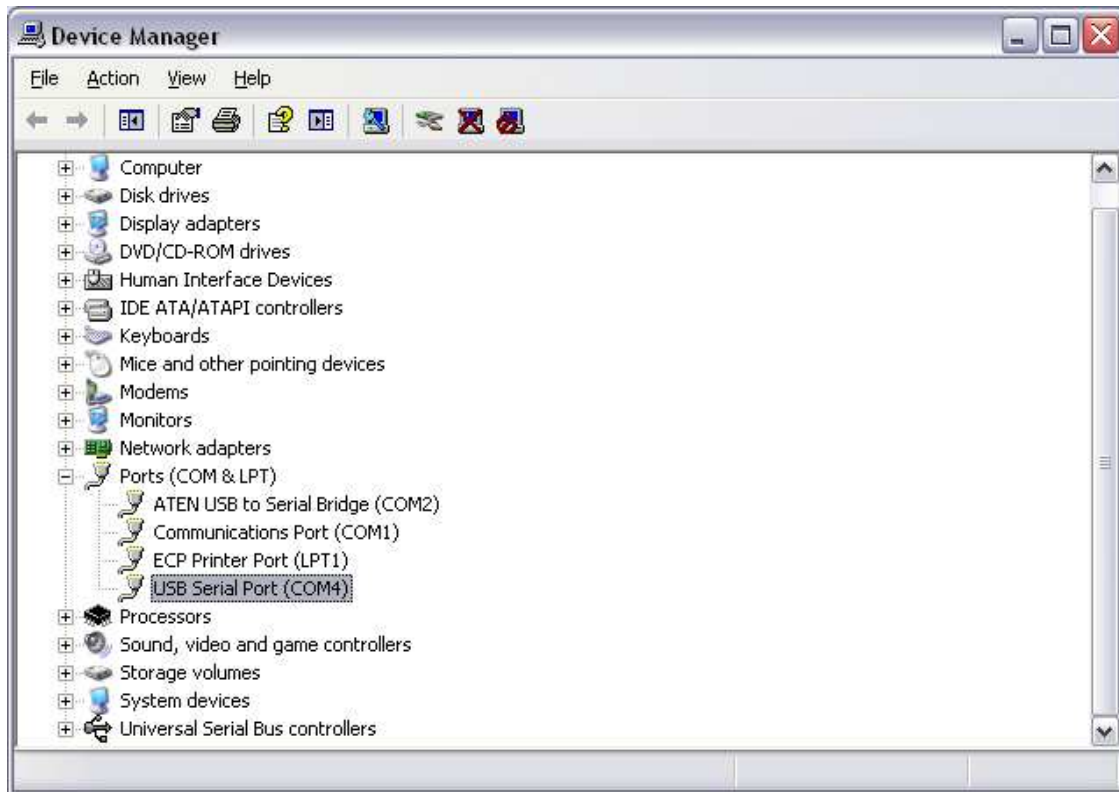
7. Click "Next" and Windows will install the USB Serial Converter driver.

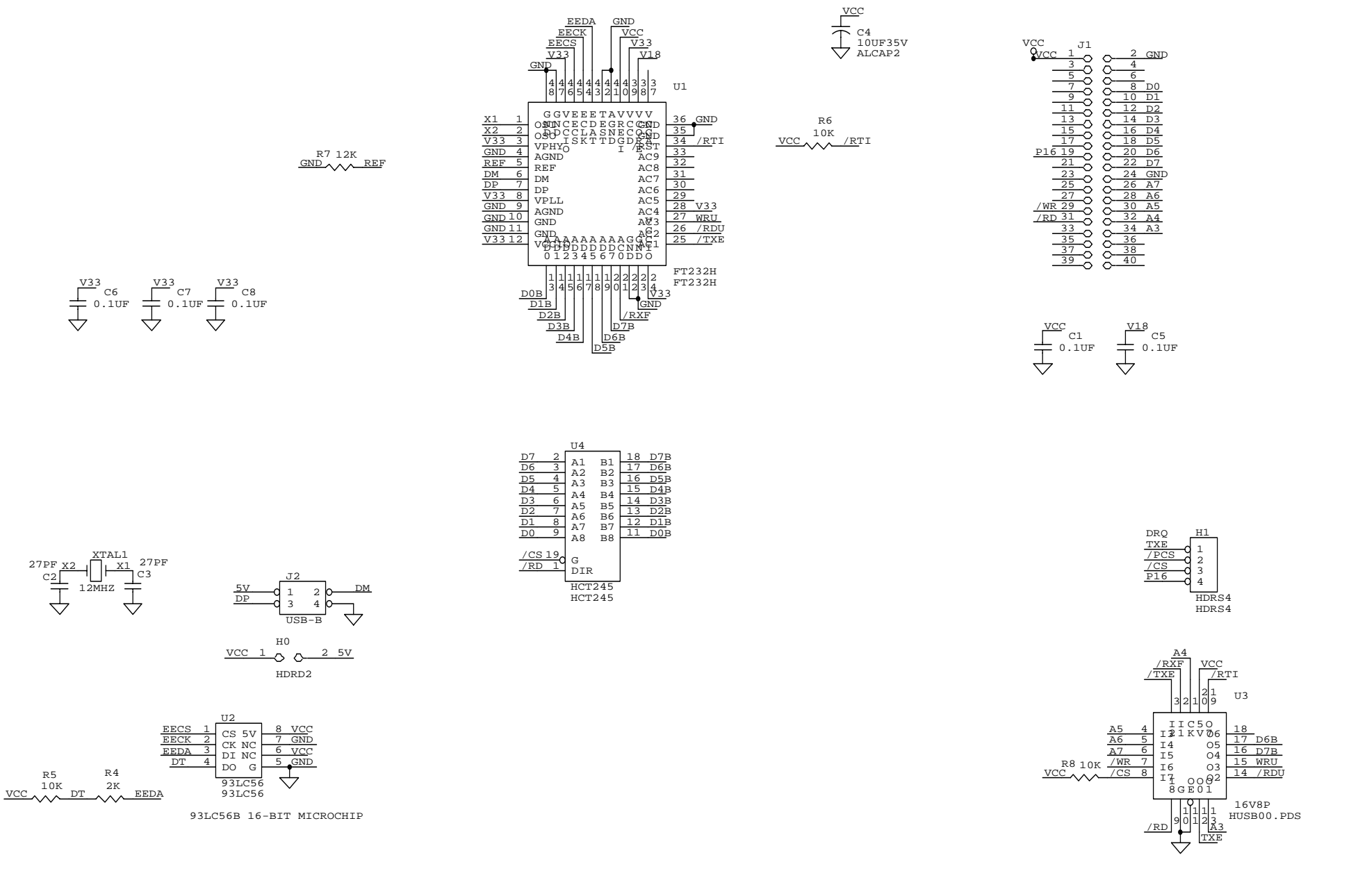


8. Windows will prompt when the New Hardware installation is complete.



9. Open the Device Manager as described previously to verify the VCP driver is installed correctly. The HUSB should show up on the Device Manager as a USB Serial Port. The HUSB can now communicate with the PC like a serial COM Port.





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Title		
HIGH SPEED USB EXPANSION		
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