

This Getting Started guide gives a detailed description of how to quickly get started with the MSP430F5529 experimental device and the TI MSP430 USB stacks.

Note: The references to the various zip files in this document are located at and can be downloaded off the TI MSP430F5529 product folder web page:

<http://focus.ti.com/docs/prod/folders/print/msp430f5529.html> in the Technical documents/More Literature section.

Contents

1	What is MSP430F5529?	1
2	Sample Kit Contents	2
3	MSP430F5529 Target Board	2
3.1	On-Board Connectors	2
3.2	Jumper Settings	3
4	Using CCE/IAR Platforms for Evaluating the USB API Firmware	3
4.1	Prepare the Integrated Development Environment (IDE)	3
4.2	Attach the USB-FET Tool to the PC	3
4.3	MSP430F5529 Target Board Connections	4
4.4	USB CDC API Firmware and Demo Applications	4
4.5	Using CCE/IAR to Compile/Download/Run the Firmware	5
4.6	MSP430F5529 USB Device First-Time Enumeration	8
4.7	Verifying USB Device Installation and Determining COM Port Assignment	12
5	USBCDC Demo Application using HyperTerminal	14
6	Support	17

1 What is MSP430F5529?

The MSP430F5529 is an F5xx-architecture-based fully-functional MSP430 device equipped with Full Speed USB2.0.

Please note that the included MSP430 samples are XMS430F5529 prototype device and have not met or completed Texas Instrument's internal reliability qualification requirements. These devices are for prototyping purposes only and not intended to be used in production systems. Therefore, the devices are sampled on an "as is" basis and Texas Instruments makes no warranty of fitness for a specific purpose.

The device is subject to errata items, as detailed in the *MSP430F5529 Errata* document that can be downloaded from the following link: <http://focus.ti.com/lit/er/slaz054/slaz054.pdf>

Before proceeding, please review the *X430F5529 Experimental Device Disclaimer* document, located along with this document in the "MSP430F5529 USB Sample Kit – Getting Started & Support Files" zip file.

2 Sample Kit Contents

The MSP430F5529 sample kit contents contain the following:

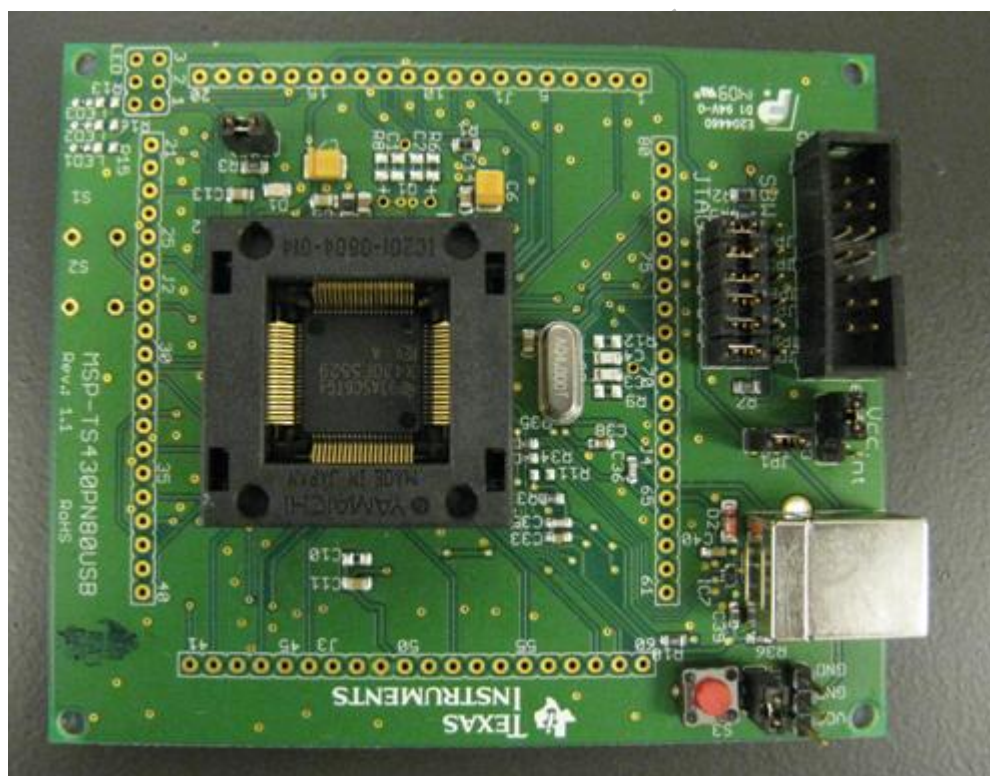
1. X430F5529 device sample
2. Target board with 80-pin socket (MSP-TS430PN80USB), with eight 1x20 pin headers (four male and four female) and an USB Cable (Type A to B).

Please note that this board does not support other 80-pin MSP430 devices -- only the X430F5529

3. Sample Kit CD-ROM – MSP430F5529_CD which has all the sample kit supporting documents and software that are required to start working with the experimental device and the TI MSP430 USB stacks.

3 MSP430F5529 Target Board

This section gives a brief description of the MSP430F5529 target board; on-board connectors and jumper settings. The figure below shows the MSP430F5529 80-pin target board.



3.1 On-Board Connectors

- **JTAG Connector:** The 14-pin JTAG pin header is used to connect the USB-FET tool (MSP-FET430UIF) to the target board in order to download and debug code using CCE/IAR IDEs
- **USB Connector:** The USB type B connector on the target board is used to connect the USB cable (Type A to B) between PC and the target board

3.2 Jumper Settings

The default jumper settings of the target board are as shown in the figure above. This section discusses about the two power scenarios (USB FET powered and USB powered) and the correct jumper settings required in both the cases.

- **USB Bus Powered Scenario (default jumper setting):** Place jumper on pins 3-2 of JP3 to indicate to the USB FET tool that external on-board power is used. Jumper JP4 pin header in order to use the USB bus power.

NOTE: While using the external power (in this case USB bus power) which is the default power setting on the target board, make sure the USB cable is connected between the target board and a spare serial port on PC to download/execute/debug firmware on the MSP430 USB device.

- **USB FET Powered Scenario:** Place jumper on pins 1-2 of JP3 to use the internal USB FET power and make sure pin header JP4 is not jumpered.

Pin Header JP1 is jumpered in both the power scenarios cases. This jumper is removed only when current measurement is to be done.

4 Using CCE/IAR Platforms for Evaluating the USB API Firmware

The MSP430F5529 device that is provided along with the sampling kit does not have any firmware loaded. In order to get the demo application running and evaluate the USB firmware, either CCE or IAR development platforms have to be installed.

This section guides through the installation of IAR and CCE development platforms and necessary patches to support the MSP430F5529, the compilation/downloading of the USB CDC API firmware onto the device and the user-interactive demo application using the HyperTerminal PC application

4.1 Prepare the Integrated Development Environment (IDE)

Programming the MSP430 requires that you have the appropriate tool chain. Both IAR and CCE support the experimental XMS430F5529 silicon. However, necessary patch/support package is required for both CCE and IAR since the released versions of CCE/IAR do not yet support this pre-production MSP430 device.

Please refer the document “*Installing IDEs and Patches for Pre-Production Devices*”, located in the zip files “*MSP430F5529 USB Sample Kit – Development Tools (IAR)*” and “*MSP430F5529 USB Sample Kit – Development Tools (CCE)*”.

4.2 Attach the USB-FET Tool to the PC

- Connect the USB-FET tool to a spare USB port on the PC using the USB cable.
- If the USB-FET tool (MSP-FET430UIF) is attached to the PC for the first time, the device must be installed onto the system - Windows prompts the user to install the software for the detected USB Device by displaying the “Found New Hardware” wizard. Direct the installation

procedure to point to the driver files located in the respective directories:

CCE: C:\Program Files\Texas Instruments\MSP430_USB_DRIVERS_vx.x\usb_fet_xp
IAR: C:\ProgramFiles\IAR Systems\Embedded Workbench x.x\430\drivers\TIUSBFET\WinXP

Appendix F of the FET User's Guide gives detailed instructions how to install the USB drivers under Win2k and XP.

4.3 MSP430F5529 Target Board Connections

- Place the X430F5529 unit in the device socket present on the MSP-TS430PN80USB Target board
- Ensure the jumper settings on the target board are correct (default jumper settings). Refer to section 3 of this document
- Connect the 14-conductor cable between the JTAG connector on the target board and the MSP-FET430UIF FET tool.
- Make sure the USB cable (Type A to B) is used to connect the Type B USB connector on the target board and a spare USB port on the PC.

4.4 USB CDC API Firmware and Demo Applications

This section gives step by step instruction on how to use the MSP430 USB CDC stack and get the demo application up and running.

The USB Communications Device Class (CDC) API firmware serves as the foundation of a USB application on the MSP430. The CDC is a device class supported by the USB Implementers' Forum, as well as all major OSes, which causes a "virtual" COM port to be mounted on the PC. The COM port can then be accessed by applications. One such PC application is the HyperTerminal, which is installed as part of a Windows installation and is therefore available on any Windows-based PC.

All the demo example codes/applications that use the USB CDC API are present in their respective project folders. Refer to the document "USB CDC API Demo Examples Guide.pdf" that is present in the zip file location *<MSP430 USB CDC+HID API Stacks/ CDC API>* for more details regarding the CDC example applications.

The CCE project files of USB CDC API firmware and example codes are present in the *MSP430 USB CDC+HID API Stacks* zip file location:

<MSP430 USB CDC+HID API Stacks\ CDC API \ USB CDCv1.12 for CCE >

Similarly, the IAR project files of USB CDC API firmware and example codes are present in the *MSP430 USB CDC+HID API Stacks* zip file location:

<MSP430 USB CDC+HID API Stacks\ CDC API \ USB CDCv1.12 for IAR >

4.5 Using CCE/IAR to Compile/Download/Run the Firmware

If the default power jumper settings are used: make sure the USB cable is connected between the Type B connector on the target board and a spare serial port on the PC.

The following steps help compile and debug the API firmware in both CCE and IAR development platforms:

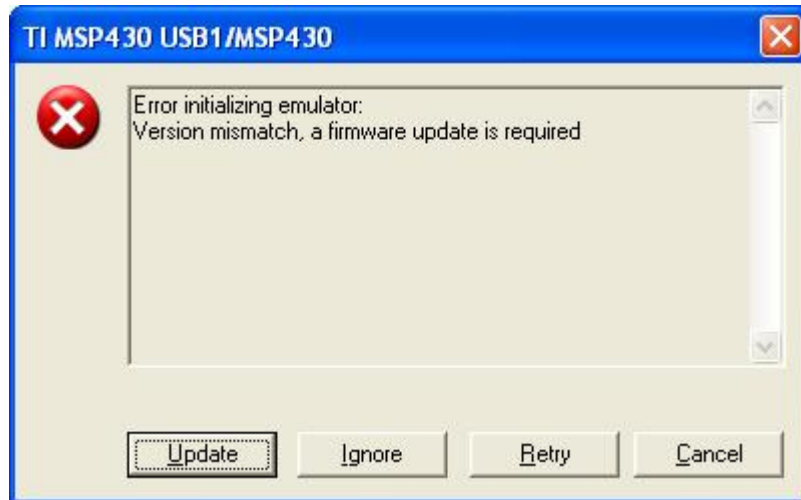
If using CCE:

- a) Copy and extract the contents of the USB CDC API firmware “USB CDCv1.12 for CCE .zip”, present at the zip file location <MSP430 USB CDC+HID API Stacks\ CDC API \ USB CDCv1.12 for CCE > to a known location on the PC <... Your Working Directory \ USB CDCv1.12 for CCE >
- b) Start CCE Core Edition (Start → Programs → Texas Instruments → Code Composer Essentials v3.1 SR1 → Code Composer Essentials v3.1 Core Edition)
- c) If opening the example projects for the first time:
 - Upon being asked to select a workspace directory in the “Workspace Launcher” dialog, use the ‘Browse’ button to select the folder path, <... Your Working Directory \ USB CDCv1.12 for CCE \ Workspace>. CCE creates a new workspace in this folder path.
 - Once CCE has created the workspace, import the project USB CDC_Example1 that is present at the PC location <... Your Working Directory \ USB CDCv1.12 for CCE > into the workspace using PROJECT → Open Existing Project. An “Open Existing Project” window appears; use the ‘Browse’ button next to the Select Root Directory option to select the folder path <... Your Working Directory \ USB CDCv1.12 for CCE \ USB CDC_Example1>. The project “USB CDC_Example1” gets selected in the ‘Projects:’ space. Then click ‘Finish’.
 - Multiple projects can be imported into this workspace
 - Jump to Step d)

If project is already linked to a workspace that you want to use:

- Upon being asked to select a workspace directory in the “Workspace Launcher” dialog, use the ‘Browse’ button to select the folder path, <... Your Working Directory \ USB CDCv1.12 for CCE \ Workspace> where the CCE workspace was previously created for the project.
 - Make sure the right project is select as the active project in the workspace.
- d) Make sure that in FILE → PROPERTIES → TI DEBUG SETTINGS → SETUP, the “Compose Target Configuration using Device/board and connection” is selected and ‘MSP430F5529’ appears in the DEVICE/BOARD box and ‘TI MSP430 USB1 in the CONNECTION box.
 - e) Use PROJECT → REBUILD ALL to build and link the source code. To view the source code, double-click on the project, and then double-click on the displayed source file.

- f) Use RUN → DEBUG ACTIVE PROJECT to start the debugger. The debugger will erase the device Flash, and then download the application object file to the device Flash.
- g) A firmware mismatch/update window may pop-up while trying to download the source code to device, for the first time. Refer figure below. Click on “Update” to update the emulator firmware



- h) Refer to the FET User's Guide, FAQ, Debugging #1) if the debugger is unable to communicate with the device.
- i) Use RUN → RUN to start the application. If the device is connected to the PC for the first time with the firmware running, device installation/first time enumeration occurs.
- j) Jump to Section 4.6

If using IAR:

- a) Copy and extract the contents of the USB CDC API firmware *USB CDCv1.12 for IAR.zip*, present at the zip file location *<MSP430 USB CDC+HID API Stacks\ CDC API \ USB CDCv1.12 for IAR >* to a known location on the PC *<... Your Working Directory \ USB CDCv1.12 for IAR >*
- b) Start the IAR Workbench which has the MSP430F5529 patch applied
Start → Programs → IAR Systems → IAR Embedded Workbench Kickstart for MSP430 4.20 → IAR Embedded Workbench
- c) If opening the example projects for the first time:
 - Use FILE → New → Workspace to open a new IAR workspace
 - Next import the IAR project into this workspace using PROJECT→ Add Existing Project...and select the appropriate folder path that specifies the IAR project file location. For the demo application that is discussed in this document, import the project 'USBCDC_Example1.ewp' from the PC location *<... Your Working Directory \ USB CDCv1.12 for IAR \ USBCDC_Example1>*
 - Make sure that under PROJECT→OPTIONS→Category: Debugger→Setup tab→Driver option, the “FET Debugger” is selected.

- Make sure that under PROJECT→OPTIONS→Category: FET Debugger→Setup tab→CONNECTION option, the Texas Instruments USB-IF or Texas Instruments LPT-IF is selected.
- Use PROJECT→REBUILD ALL to build and link the source code. This requires you to save the workspace that was created in the previous steps. A “Save Workspace As” pop-up window appears. Use the browse button to point workspace location to <... Your Working Directory \ USB CDCv1.12 for IAR \ Workspace>. IAR Workspace gets created at this location
- Multiple projects can be added to this workspace.
- Jump to step d)

If project is already linked to a workspace that you want to use:

- Open the workspace directly by navigating through File → Open → Workspace and selecting the folder path on the PC where the workspace was originally created.
 - Make sure the right project is select as the active project in the workspace.
 - Make sure that under PROJECT → OPTIONS → Category: Debugger → Setup tab → Driver option, the “FET Debugger” is selected.
 - Make sure that under PROJECT→OPTIONS→Category: FET Debugger→Setup tab→CONNECTION option, the Texas Instruments USB-IF or Texas Instruments LPT-IF is selected.
 - Use PROJECT→REBUILD ALL to build and link the source code.
- d) Use PROJECT → DOWNLOAD and DEBUG to start the download and debug process. The debugger will erase the device Flash, and then download the application object file to the device Flash.
- e) A firmware mismatch/update window may pop-up while trying to download the source code to device, for the first time. Refer figure below. Select “Yes” to update the emulator firmware



- f) Refer to the FET User's Guide, FAQ, Debugging #1) if the debugger is unable to communicate with the device.
- g) Use DEBUG→GO to start the application. If the device is connected to the PC for the first time with the firmware running, device installation/first time enumeration occurs. Refer Section 4.6

4.6 MSP430F5529 USB Device First-Time Enumeration

When a USB device is attached to a USB host (PC), the host *enumerates* it; that is, it queries the device as to what it is, and loads the corresponding drivers. The first time a device is attached, the OS may need help in locating the corresponding drivers so it can install the new device. Windows requests this by prompting the “Found New Hardware” wizard.

Drivers for CDC (Communications Device Class) are already installed within Windows, but Windows needs to be guided to an *.inf file (MSP430_CDC.inf) included with this kit. Using this *.inf file, Windows can finish loading the appropriate drivers.

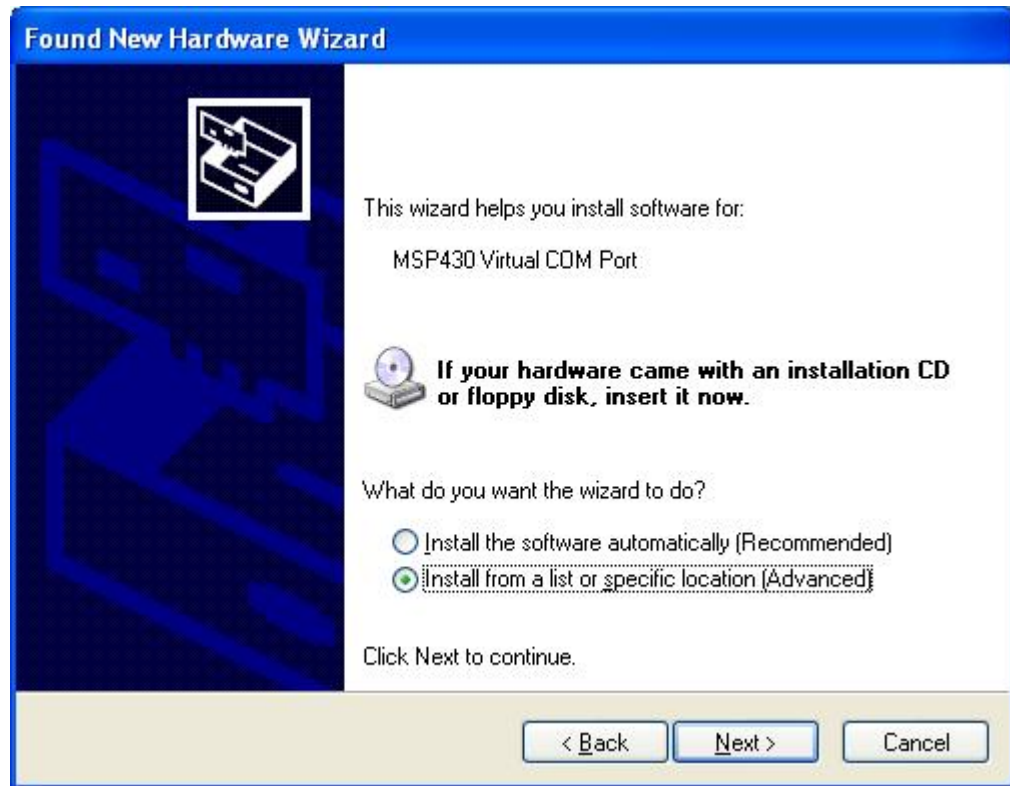
NOTE: The enumeration procedure discussed here, takes place only the first time a specific USB device is connected to the USB host (PC). Successive enumerations for the same USB device happen without any need for user intervention.

The following steps give a detailed description of the device installation/first-time enumeration procedure for MSP430F5529 (under Windows XP). The procedures are also somewhat similar for other Windows operating systems.

1. On connecting the MSP430F5529 target board to PC, Windows detects the new device attached to PC and initiates the “Found New Hardware Wizard” prompting the user to install the software for the detected USB Device.
2. Select "No, not this time" from the options available and then click "Next" to proceed with the installation.

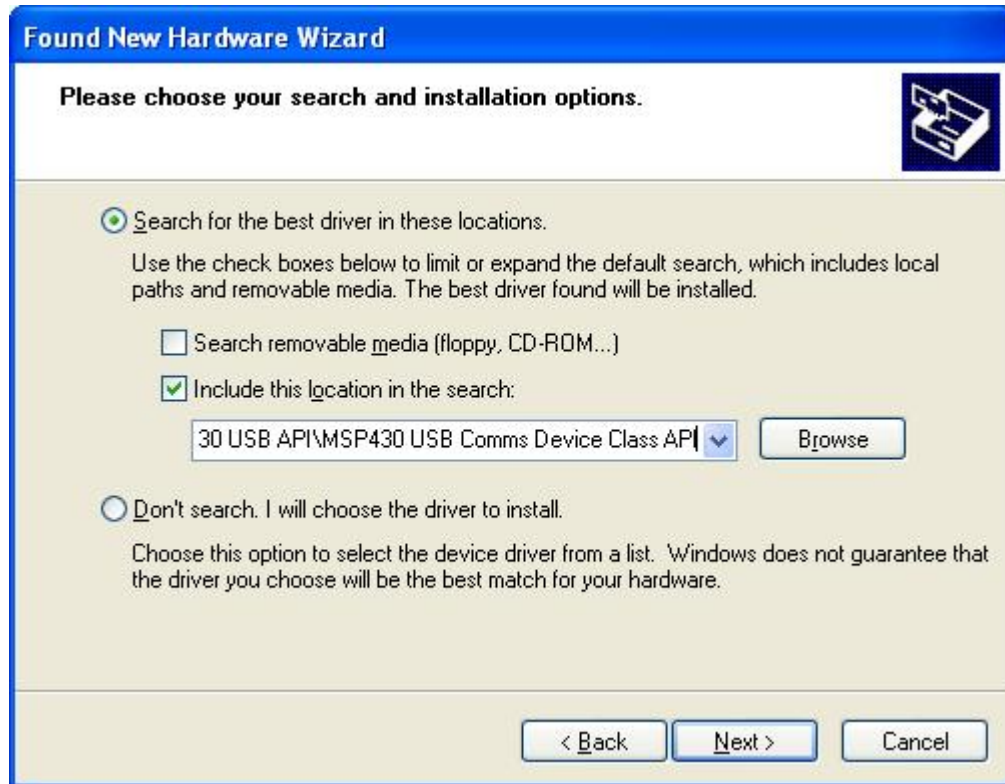


3. Select "Install from a list or specific location (Advanced)" as shown below and then click "Next".

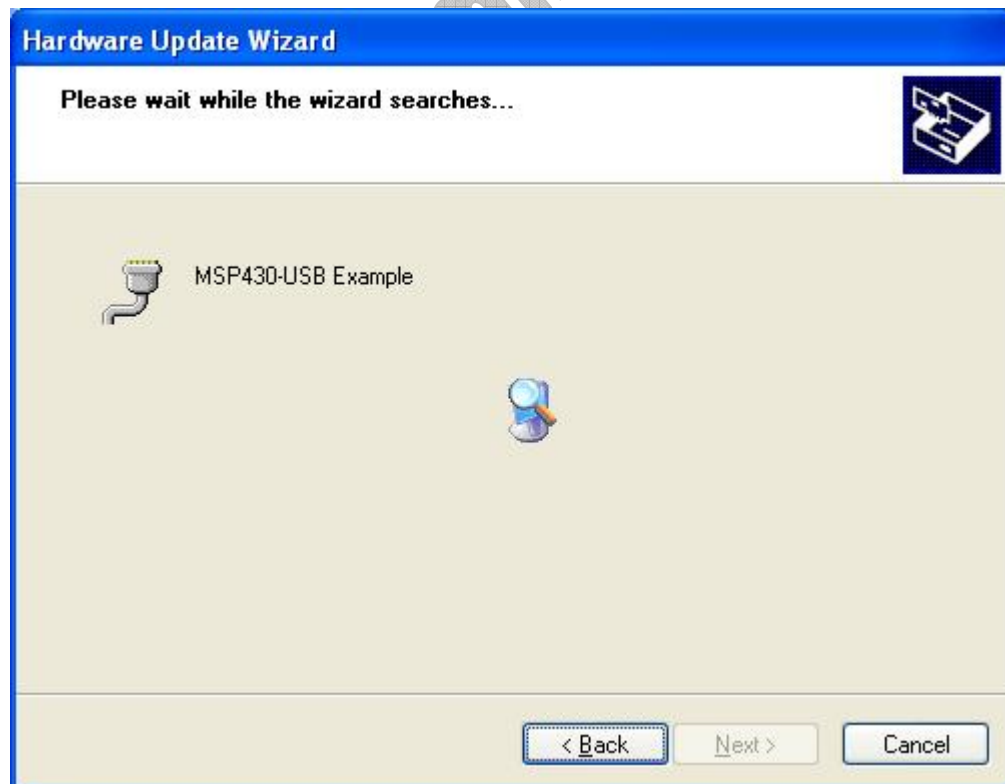


4. In the "Choose your search and installation options" window, select "Search for best driver in these locations" options and use the browse button to enter the file path that contains the USB API firmware in the combo-box. The *.inf file (MSP430_CDC.inf) is present in the zip file location: *<MSP430 USB CDC+HID API Stacks\ CDC API >*

Once the file path has been entered in the box, click "Next" to proceed



5. Wait while the wizard searches the driver files associated



6. If Windows XP is configured to warn when unsigned (non-WHQL certified) drivers are about to be installed, the following screen will be displayed unless installing a Microsoft WHQL certified driver. Click on "Continue Anyway" to continue with the installation. If Windows XP is configured to ignore file signature warnings, no message will appear.



7. The following screen will be displayed as Windows XP copies the required driver files.



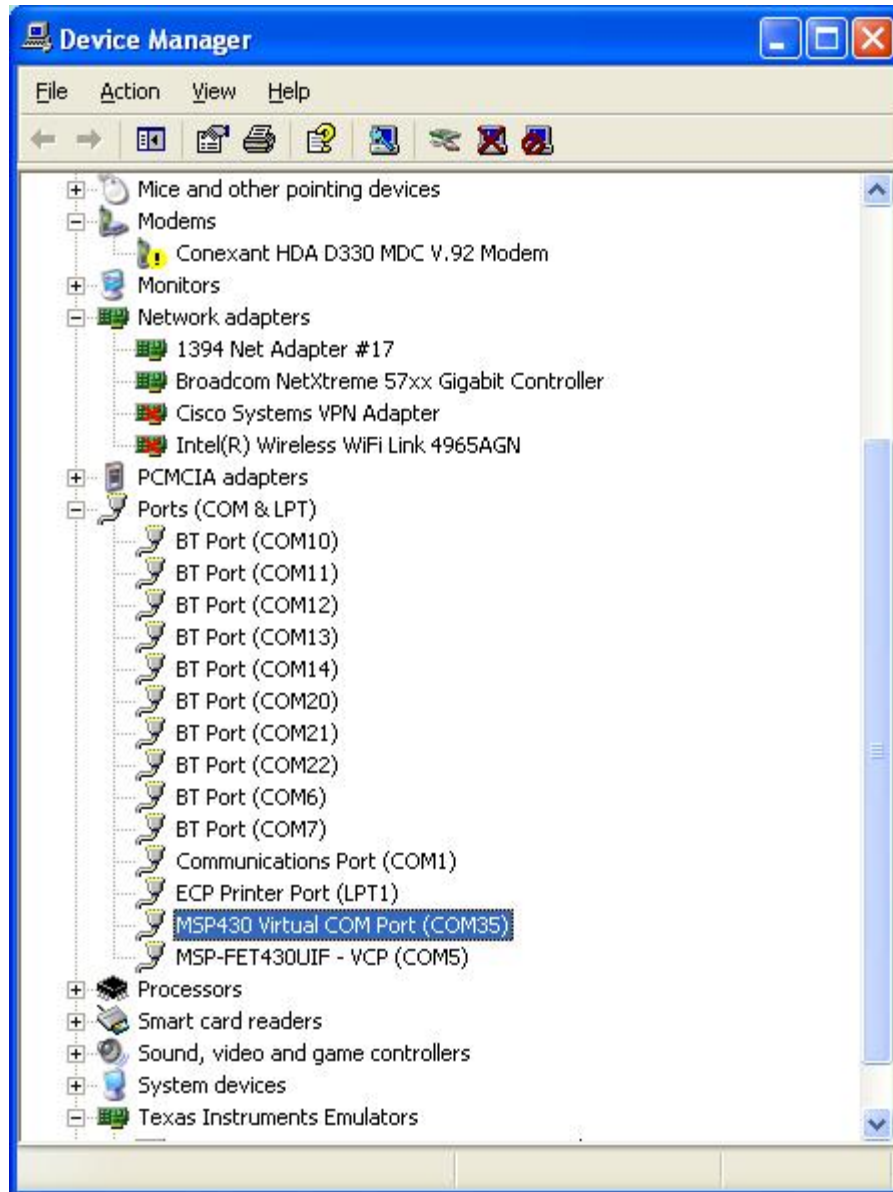
8. Windows should then display a message indicating that the installation was successful. Click "Finish" to complete the installation for the first port of the device.



4.7 Verifying USB Device Installation and Determining COM Port Assignment

To verify if the device is properly installed and to determine the COM port assignment of the device, use Device Manager, which is Windows' means of viewing all peripheral devices available in the system.

- In Windows, the Device Manager can be opened by browsing through Start → Control Panel\System, and then selecting the 'Hardware' tab and clicking 'Device Manager'.
- Select "View > Devices by Type" and the device appears as a "MSP430 Virtual COM port" under Ports (COM & LPT), as shown in figure below.



NOTE: The number assigned to the COM port (shown here as COM35) varies depending on the computer hardware configuration. Windows will check what COM ports are unused or free in the target PC and assigns that port number to the device.

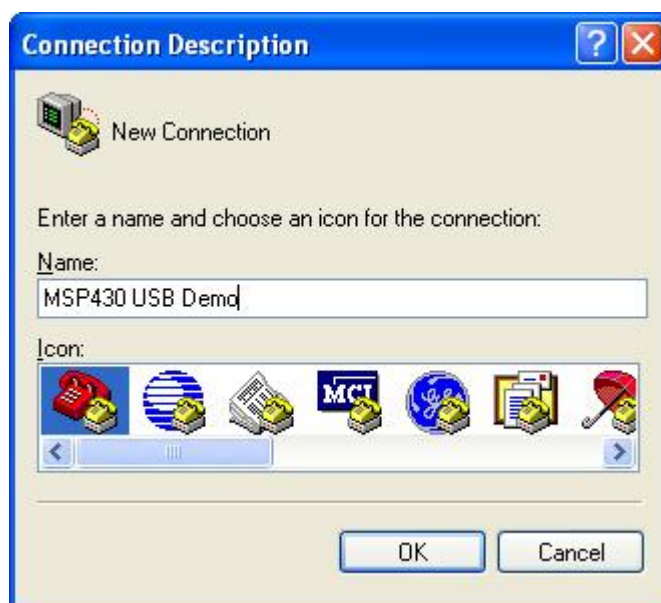
If the installation was successful, then unplugging and re-plugging the target board should alternatively cause the device to disappear and re-appear in the Device Manager (assuming the "Scan for new hardware" feature is selected).

5 USBCDC Demo Application using HyperTerminal

All the USBCDC examples that are provided with the USB API firmware interface with HyperTerminal application on the PC. The USBCDC_Example1 demo application is used to control the LED on the target board. Typing different phrases in the Hyper Terminal window is used to control the LED operation on the target board.

Here are steps to run the demo application:

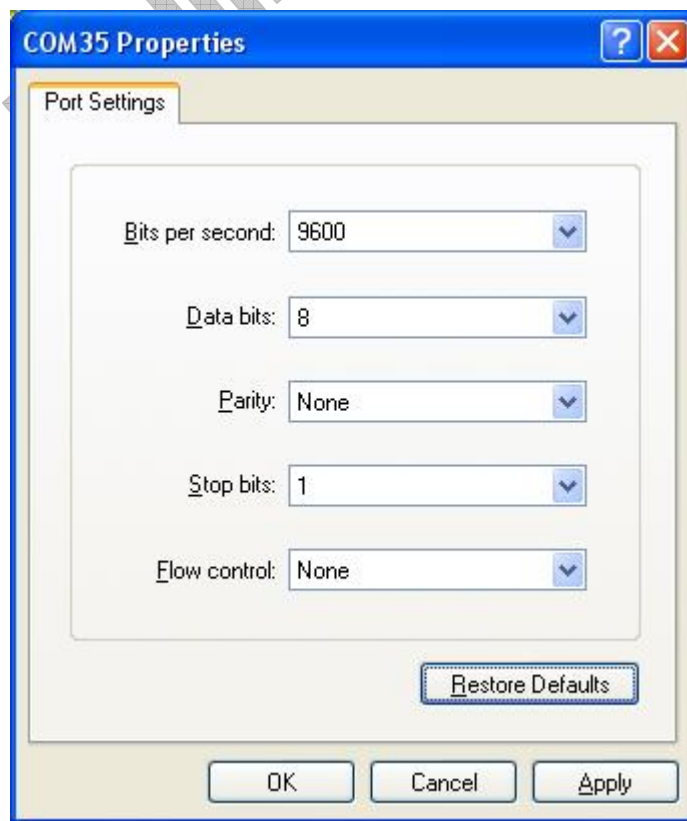
- Open HyperTerminal. (For Windows XP, browse through Start → All Programs → Accessories → Communications → HyperTerminal)
- Enter a name for the new connection and press OK



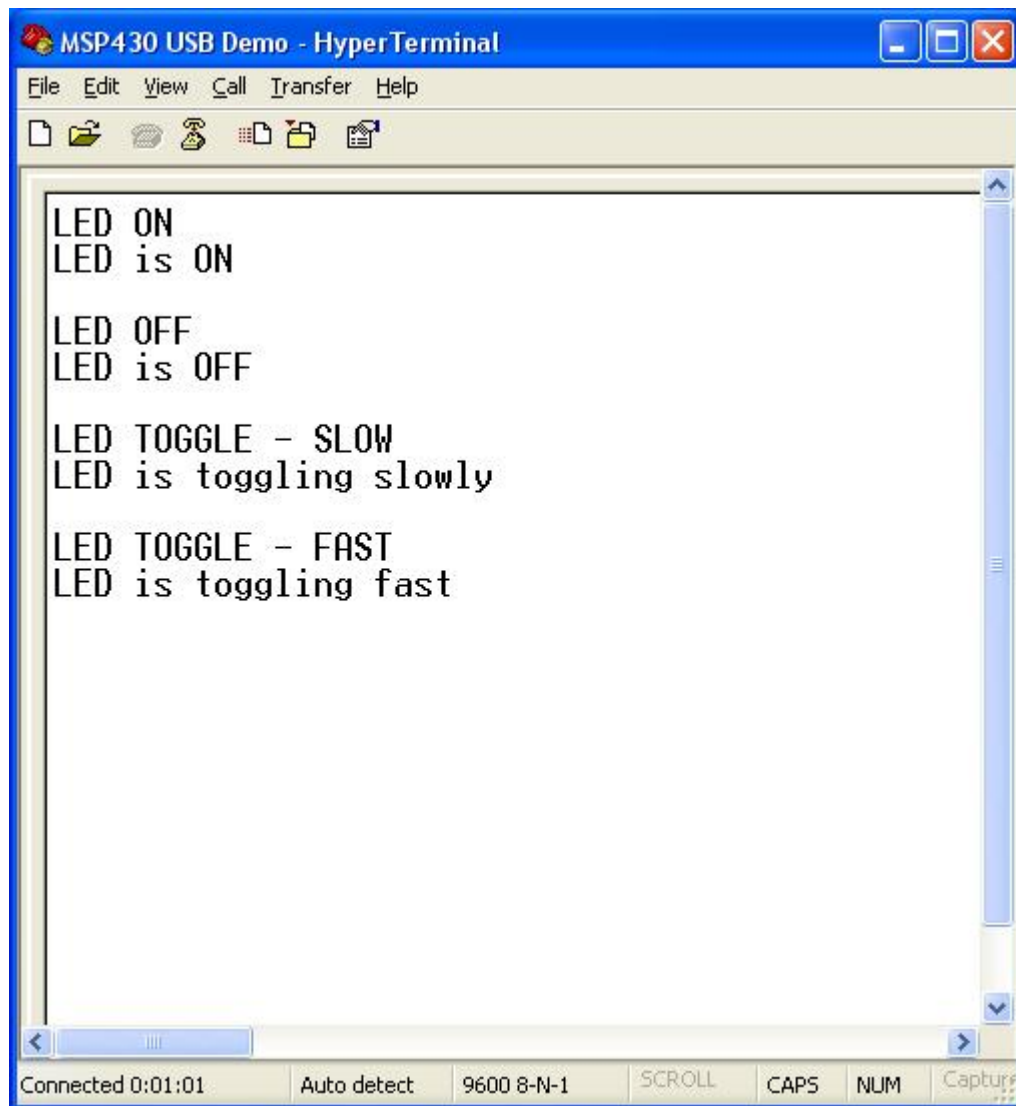
- Next select the drop down box for “CONNECT USING” to select the COM port that is assigned for the MSP430F5529 device (in this example, its COM35) and press OK



- Set appropriate PORT SETTINGS as shown below and press OK.



- Appropriate phrases entered in the HyperTerminal window help control the LED on the MSP430F5529 target board



Mentioned below are the valid LED control phrases that can be typed in the HyperTerminal Window:

- LED ON
- LED OFF
- LED TOGGLE – SLOW
- LED TOGGLE – FAST

Carriage Return/an Enter command followed by any of the above instructions results in the following:

- LED ON: Turns on the LED and returns the phrase "LED is ON" back to HyperTerminal
- LED OFF: Turns off the LED and returns the phrase "LED is OFF" back to HyperTerminal
- LED TOGGLE – SLOW: Turns on the timer used to toggle LED with a large period and returns the phrase "LED is toggling slowly" back to HyperTerminal
- LED TOGGLE – FAST: Turns on the timer used to toggle LED with a smaller period and returns the phrase "LED is toggling fast" back to HyperTerminal

NOTE: In case any other phrase (other than the ones discussed above) is typed in the HyperTerminal followed by the enter command, "No such command!" is returned back to the HyperTerminal.

6 Support

For additional support contact the TI technical support team at the following link:
http://www.ti.com/home_d_contact

Preliminary