

Using MSP430 Flash Emulation Tools with Rowley's CrossWorks for MSP430 on Windows XP

Introduction

The programming and debugging interface to TI's MSP430 family of ultralow-power microcontrollers is via a low-cost Flash Emulation Tool (FET).

This Application Note Explains how to use FETs from different manufacturers with Rowley's CrossWorks for MSP430 v1.4.

The following popular FETs are covered in this application note:

- TI's MSP430 Parallel-Port Debugging Interface – MSP-FET430PIF¹
- TI's MSP430 USB Debugging Interface – MSP-FET430UIF
- SoftBaugh's USBP Programmer / Debugger
- Olimex's MSP430 JTAG Tiny
- Rowley's MSP430 USB CrossConnect

By following the instruction in this Application Note, you can run any combination of the MSP430 FETs listed above within CorssWorks for MSP430 without conflicts on a Windows XP PC.

Note The instructions contained herein – especially the details concerning MSP430 DLL files – may differ from those provided by the FET manufacturers. *Ignore these instructions at your own peril.*

MSP430 Devices

The various FETs support different MSP430 families. Newer (e.g. USB) FETs support the Spy-Bi-Wire feature included in newer MSP430s.

Note The examples in this Application Note are for the MSP430F169, a mature device in the MSP430F16x/16xx family that does *not* include Spy-Bi-Wire support.

USB Device Installation

Most modern Flash Emulation Tools connect to PCs via USB. When Windows XP discovers a new USB device, it attempts to identify and install the required driver(s) for each device. USB device vendors supply product-specific drivers for their USB devices.

Note Each time a different device is attached to a Windows XP PC,² or even to a USB port different from the one it was first attached to, it is recognized as a unique device requiring drivers. Thus, you may need to follow the procedures outlined below each time you plug in a new FET or an existing FET into a different USB port.

Other Operating Systems

Some FETs are also supplied with drivers for other operating systems (e.g. Windows 2000). Their use with operating systems other than Windows XP is likely to be similar to what is outlined in this Application Note.

Related Documents

Pumpkin Application Note AN-34

This Application Note discusses issues surrounding the correct interfacing of FETs to the Pumpkin CubeSat Kit when taking the CubeSat Kit's operating voltage into account.

Note In this Application Note, all interfaces are shown operating at +3.3V. This is also the recommended setting for interfacing a FET to Pumpkin's CubeSat Kit.

TI's MSP430 Parallel-port Debugging Interface MSP-FET430PIF

CrossWorks for MSP430 supports TI's MSP-FET430PIF (and all similar, compatible parallel-port MSP430 FETs) natively.

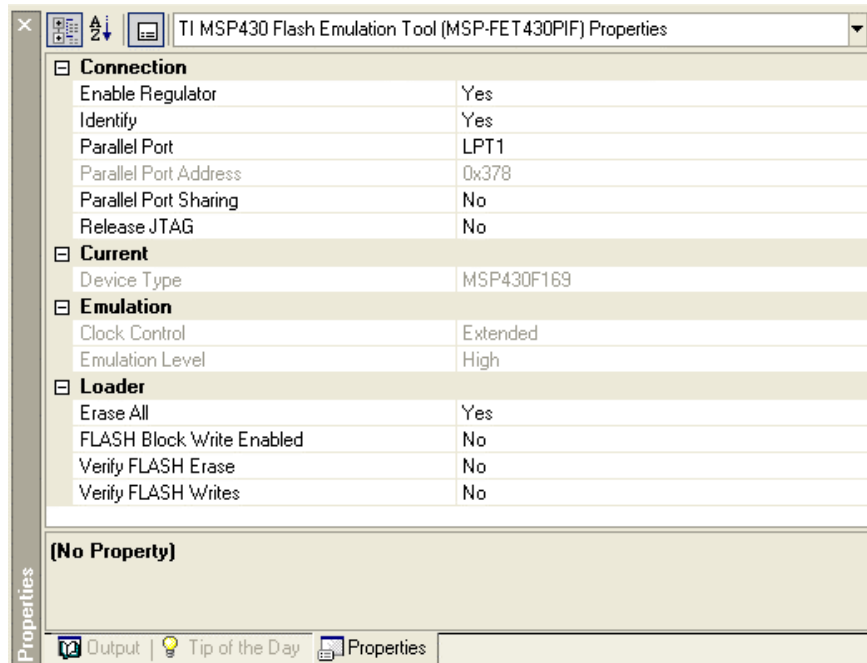
Drivers

No drivers are required for the MSP-FET430PIF. MSP430.DLL is included in every CrossWorks for MSP430 distribution.

Properties

To see the properties associated with the MSP-FET430PIF, select the MSP-FET430PIF in the **Targets** window and view the properties in the **Properties** window.

Normally no changes need to be made to the MSP-FET430PIF's properties.



**Figure 1: CrossStudio Properties Window for
MSP-FET430PIF**

Targets

To use the MSP-FET430PIF, simply select TI MSP430 Flash Emulation Tool (MSP-FET430PIF) in the Targets window and click on the connect icon or choose Targets → Connect TI MSP430 Flash Emulation Tool (MSP-FET430PIF). Alternately, double click on TI MSP430 Flash Emulation Tool (MSP-FET430PIF) to connect.

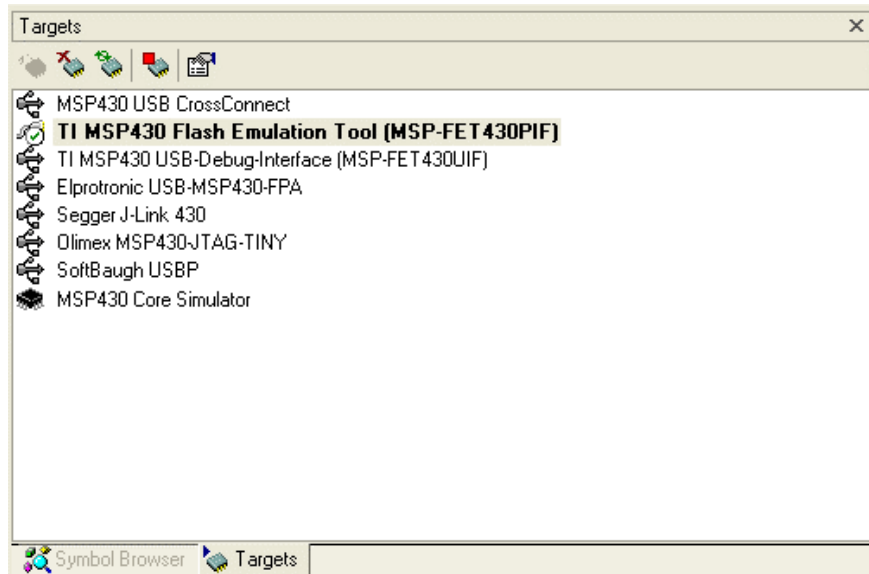


Figure 2: CrossStudio Targets Window for MSP-FET430PIF

When connected, you'll see a connected status window at the bottom of the CrossStudio screen.



Figure 3: MSP-FET430PIF Connected to Target

TI's MSP430 USB Debugging Interface MSP-FET430UIF

CrossWorks for MSP430 v1.4 and later supports TI's MSP-FET430UIF once the appropriate drivers have been installed.

Drivers

Drivers from the TI MSP430 CD-ROM are required for use with the MSP-FET430UIF.



Figure 4: TI MSP430 CD-ROM Splash Page

The MSP-FET430UIF drivers are located in the drivers/TIUSBFET/WinXP directory³ of the MSP430 CD-ROM.

Installing Drivers

The MSP-FET430UIF drivers are installed in two stages – first, the MSP-FET430UIF (TI USB FET) Adapter is installed as a Windows XP multi-port serial adapter. Thereafter, another driver is installed for the MSP-FET430UIF – Serial Port (COMn) as a Windows XP serial port.⁴ The instructions for each stage are essentially identical.

Multi-port Serial Adapter

To install the MSP-FET430UIF drivers, connect the MSP-FET430UIF to your WinXP PC via USB. The MSP-FET430UIF will be auto-detected and the Windows XP Found New Hardware Wizard will begin.



Figure 5: Windows XP Found New Hardware Wizard for MSP-FET430UIF (TI USB FET) Adapter Step 1

Select No, not at this time, and click on Next.

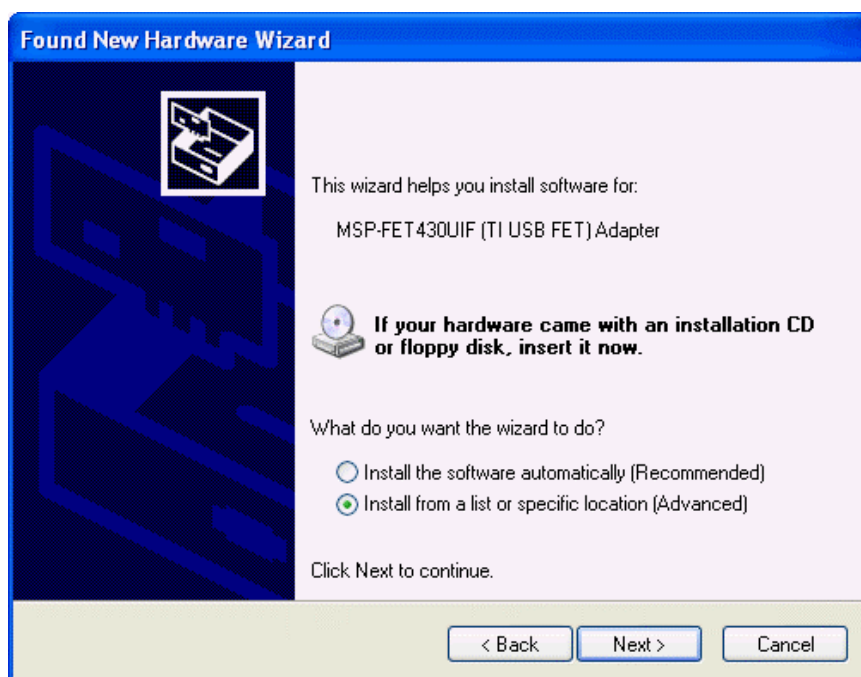


Figure 6: Windows XP Found New Hardware Wizard for MSP-FET430UIF (TI USB FET) Adapter Step 2

Select Install from a list or specific location (Advanced), and click on Next.

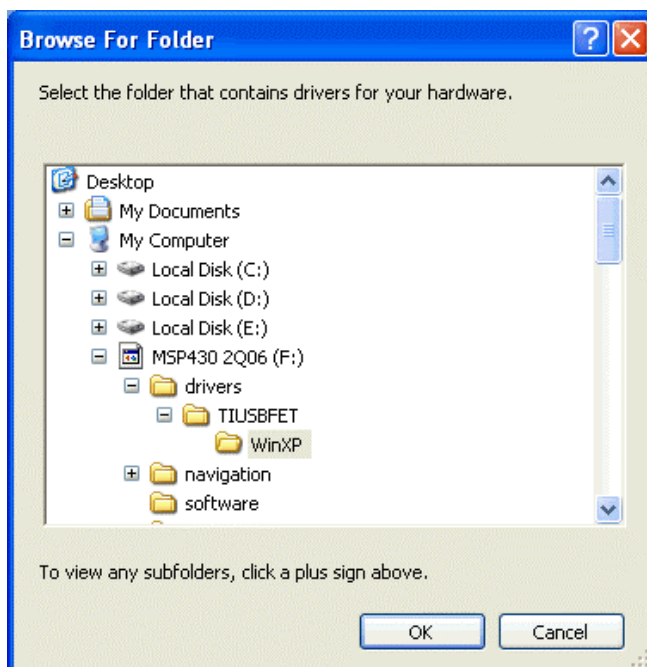


Figure 7: Windows XP Found New Hardware Wizard for MSP-FET430UIF (TI USB FET) Adapter Step 3

Browse to the drivers/TIUSBFET/WinXP directory of the MSP430 CD-ROM and click on OK.

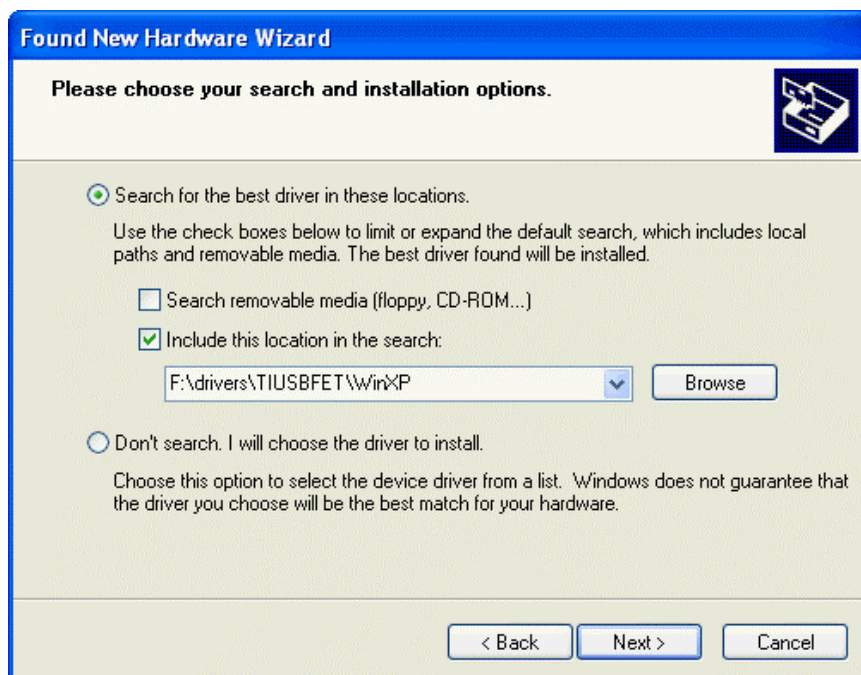


Figure 8: Windows XP Found New Hardware Wizard for MSP-FET430UIF (TI USB FET) Adapter Step 4

Now that you have identified the location of the drivers on the TI MSP430 CD-ROM, click on Next.



Figure 9: Windows XP Found New Hardware Wizard for MSP-FET430UIF (TI USB FET) Adapter Step 5

Click on Continue Anyway when faced with the Windows Logo testing screen. The drivers will be installed.

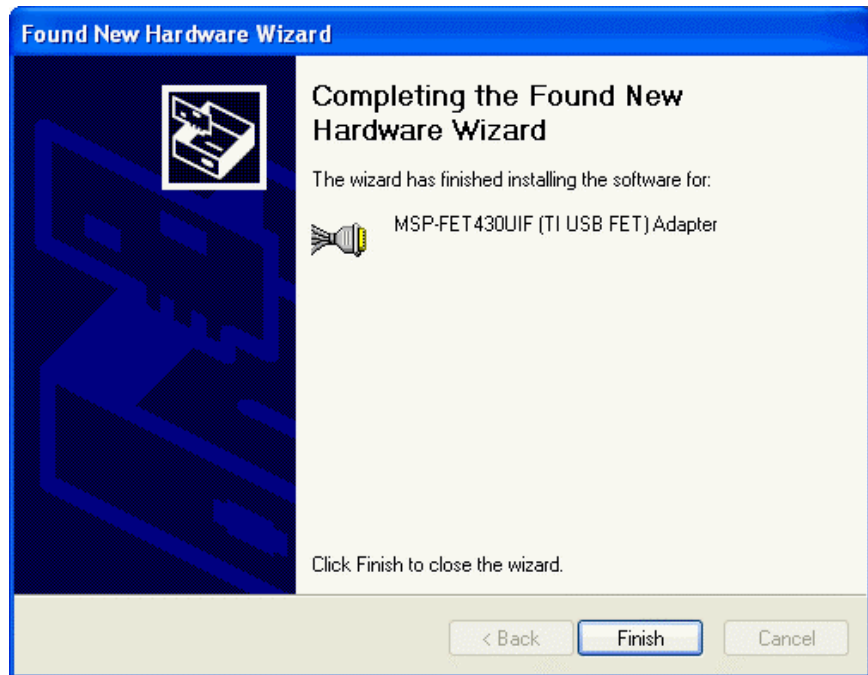


Figure 10: Windows XP Found New Hardware Wizard for MSP-FET430UIF (TI USB FET) Adapter Step 6

When the installation is complete click on **Finish** to exit the Found New Hardware Wizard.

Serial Port

The Found New Hardware Wizard will begin again, this time for the drivers to support the MSP-FET430UIF's connection via an emulated serial port over USB. Repeat the steps above, and the Found New Hardware Wizard will complete as shown below:

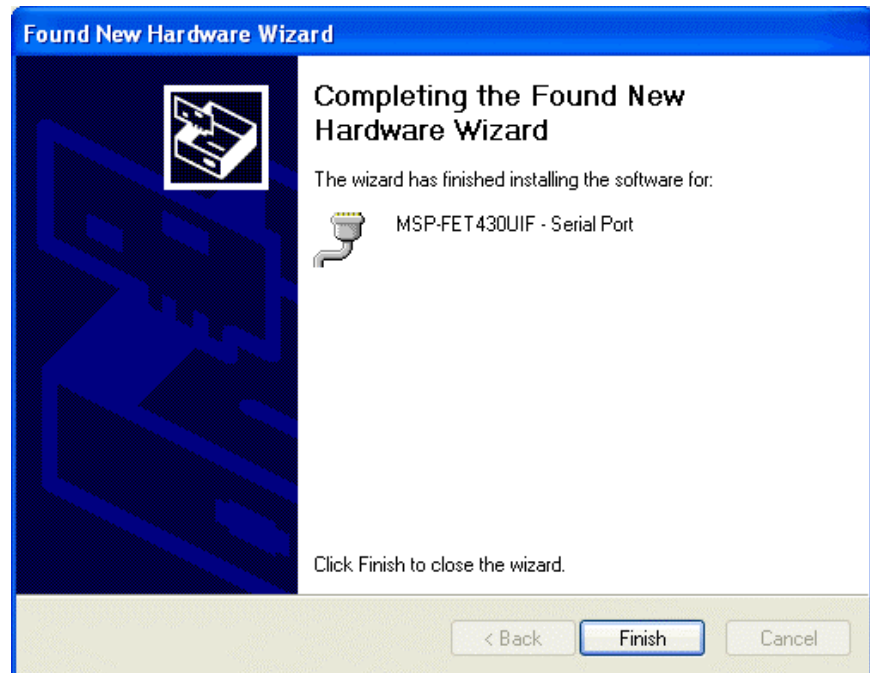


Figure 11: Windows XP Found New Hardware Wizard for MSP-FET430UIF – Serial Port Step 6

When the installation is complete click on Finish to exit the Found New Hardware Wizard.

Windows XP Hardware Manager

When finished, you can verify proper installation by opening Windows XP's Hardware Manager. By expanding the Multi-port serial adapters and Ports (COM & LPT) groups you can see the MSP-FET430UIF represented.⁵ As long as there are no question marks or exclamation points next to the MSP-FET430UIF entry, then installation has been successful.

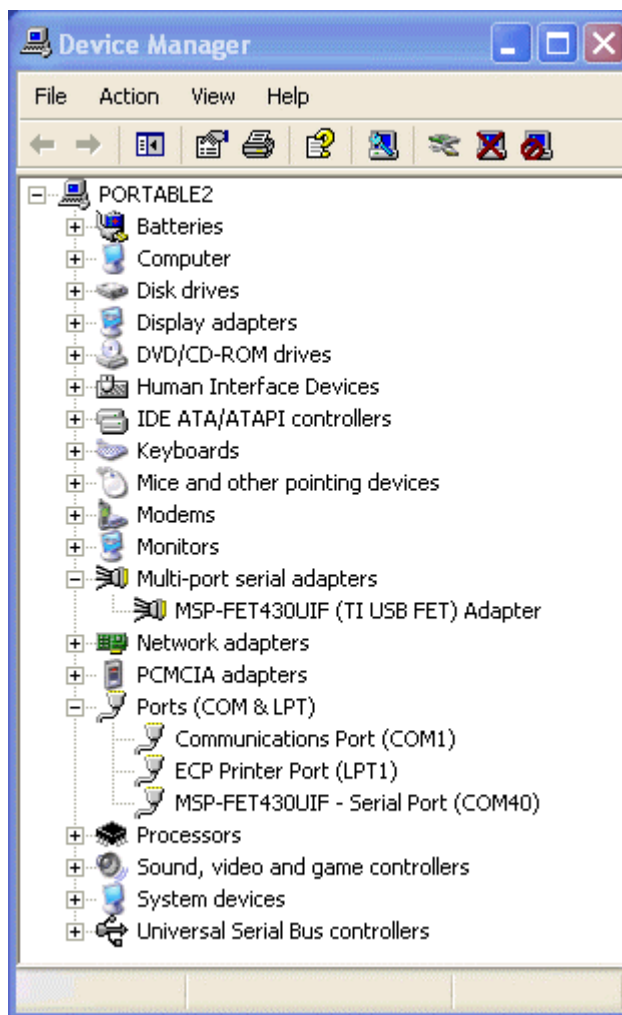


Figure 12: Windows XP Hardware Manager showing MSP-FET430UIF installed

Driver details for the MSP-FET430UIF (TI USB FET) Adapter and the MSP-FET430UIF – Serial Port are shown below.

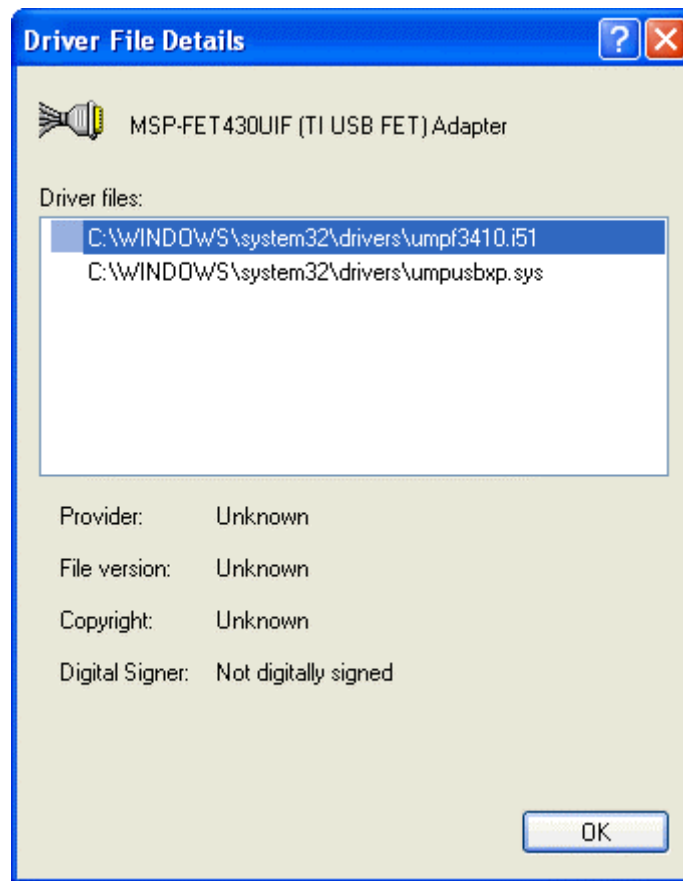


Figure 13: Driver Details for MSP-FET430UIF (TI USB FET) Adapter

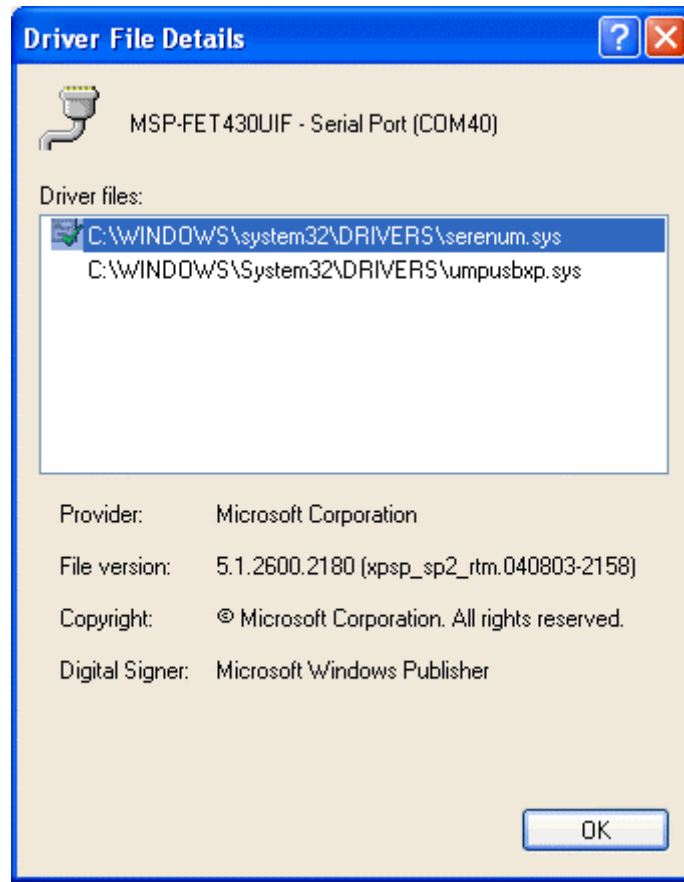


Figure 14: Driver Details for MSP-FET430UIF – Serial Port

Properties

To see the properties associated with the MSP-FET430UIF, select the MSP-FET430UIF in the **Targets** window and view the properties in the **Properties** window.

Select **Yes** or **No** for **Spy-Bi-Wire Supported** as appropriate for your MSP430 device. Also, ensure that **VCC (mV)** is correct for your device.

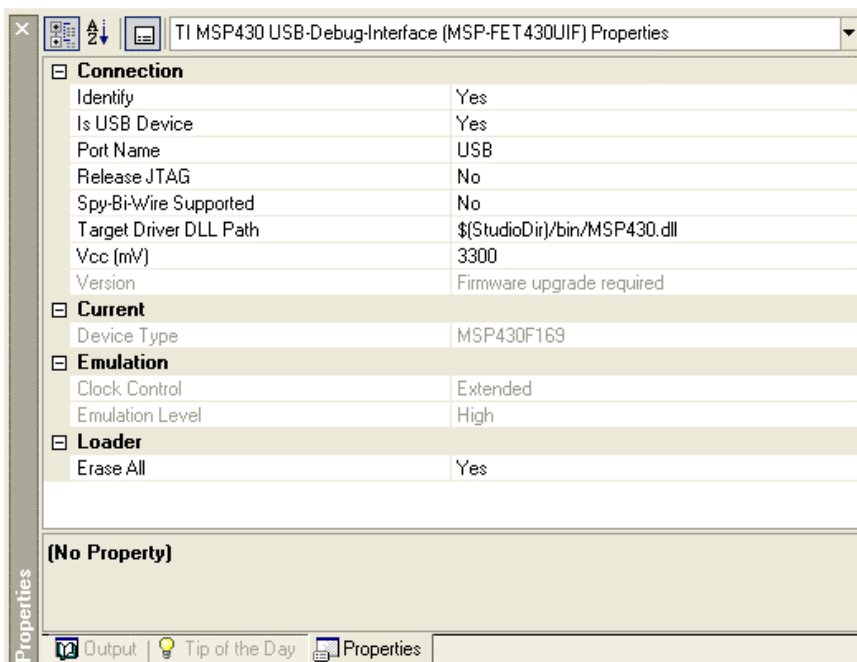


Figure 15: CrossStudio Properties Window for MSP-FET430UIF

Targets

To use the MSP-FET430UIF, simply select TI MSP430 USB-Debug-Interface (MSP-FET430UIF) in the Targets window and click on the connect icon or choose Targets → Connect TI MSP430 USB-Debug-Interface (MSP-FET430UIF). Alternately, double click on TI MSP430 USB-Debug-Interface (MSP-FET430UIF) to connect.

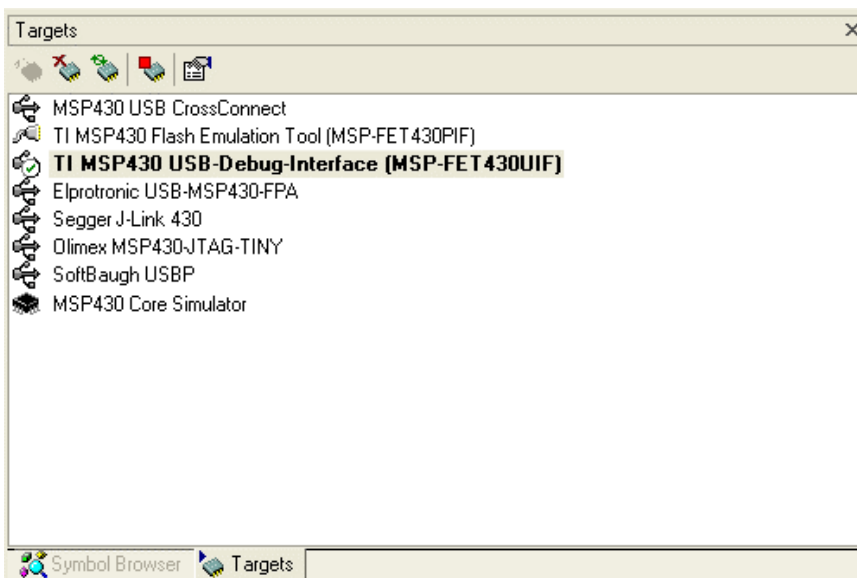


Figure 16: CrossStudio Targets Window for MSP-FET430UIF

When connected, you'll see a connected status window at the bottom of the CrossStudio screen.

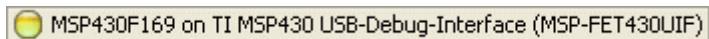


Figure 17: MSP-FET430UIF Connected to Target

SoftBaugh's USBP Programmer / Debugger

CrossWorks for MSP430 v1.4 and later supports SoftBaugh's USBP Programmer / Debugger once the appropriate drivers have been installed.

Drivers

Drivers for SoftBaugh's USBP are available directly from the SoftBaugh website on the USBP ordering and support page, in a file called `InstallSoftBaughUSBP.zip`.

Installing Drivers

The `InstallSoftBaughUSBP.zip` archive file includes a Windows installer with all of SoftBaugh's software for the USBP. Download and run the installer on your PC:

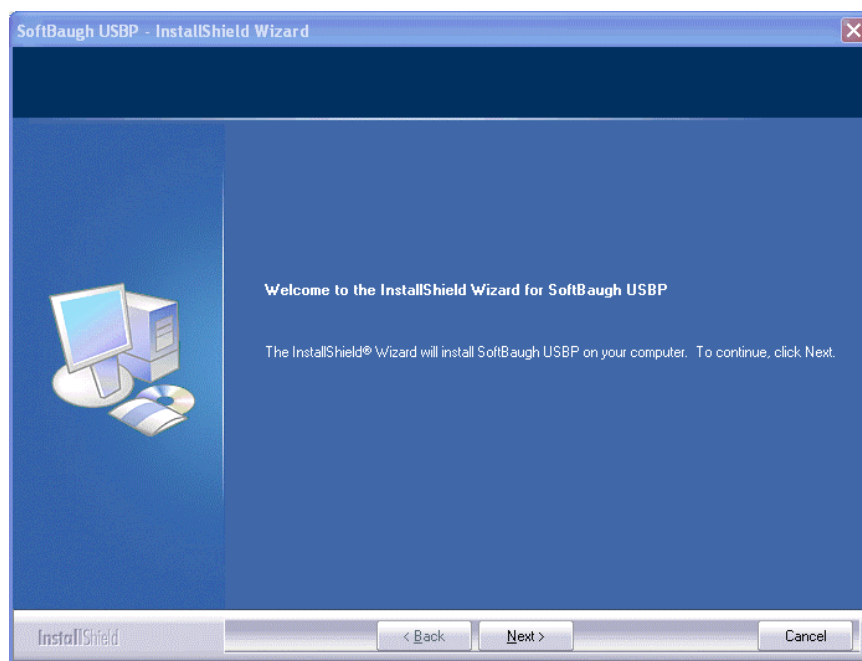


Figure 18: Launching SoftBaugh's USBP Installer

When finished, the SoftBaugh USBP installer will have placed⁶ files in `Program Files/SoftBaugh/USBP` and `Program Files/SoftBaugh/USBP_Driver`.

USBP – MSP430 Flash Programmer

To install the USBP drivers, connect the USBP to your WinXP PC via USB. The USBP will be auto-detected and the Windows XP Found New Hardware Wizard will begin.



Figure 19: Windows XP Found New Hardware Wizard for USBP Step 1

Select No, not at this time, and click on Next.

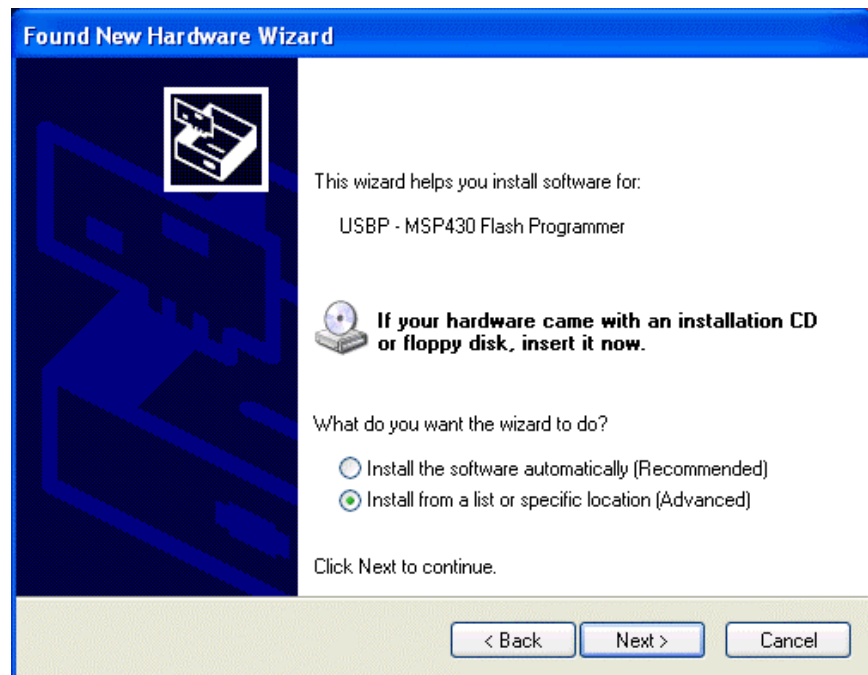


Figure 20: Windows XP Found New Hardware Wizard for USBP Step 2

Select Install from a list or specific location (Advanced), and click on Next.

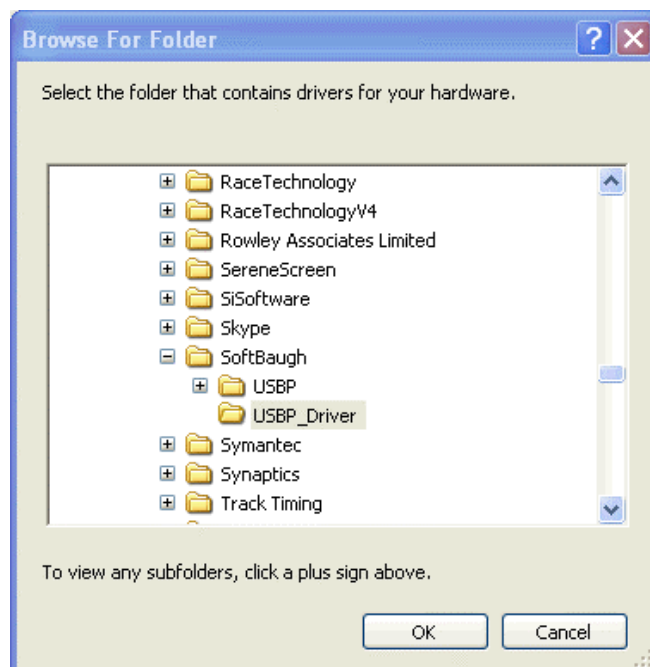


Figure 21: Windows XP Found New Hardware Wizard for USBP Step 3

Browse to the Program Files/SoftBaugh/USBP_Driver directory of your PC and click on OK.

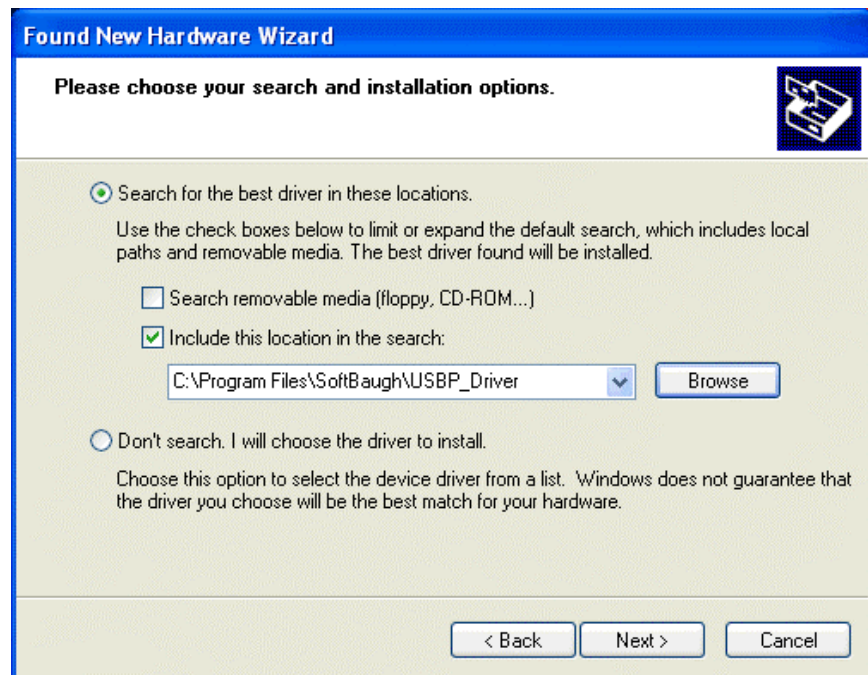


Figure 22: Windows XP Found New Hardware Wizard for USBP Step 4

Now that you have identified the location of the drivers on your PC, click on Next.



Figure 23: Windows XP Found New Hardware Wizard for USBP Step 5

Click on Continue Anyway when faced with the Windows Logo testing screen. The drivers will be installed.

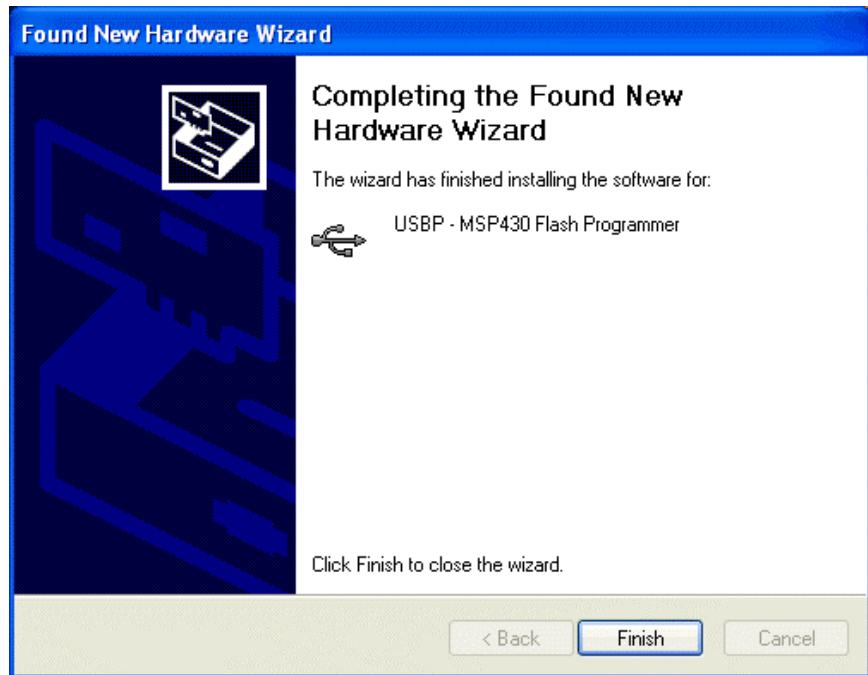


Figure 24: Windows XP Found New Hardware Wizard for USBP Step 6

When the installation is complete click on Finish to exit the Found New Hardware Wizard.

MSP430 DLL Files

The SoftBaugh software installation directory Program Files/SoftBaugh/USBP/ThirdPartyIDE includes three DLL's and two batch files.

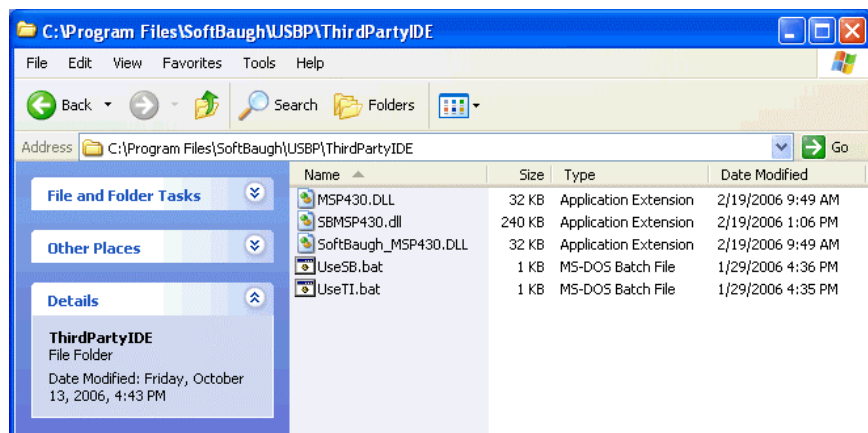


Figure 25: SoftBaugh USBP DLL Files

Copy only two files to the bin directory⁷ of your CrossWorks for MSP430 installation: SoftBaugh_MSP430.DLL and SBMSP430.DLL.

Note DO NOT COPY MSP430.DLL to the bin directory, or you will overwrite the existing MSP430.DLL. This file is used with TI's MSP-FET430PIF and MSP-FET430UIF, and overwriting it will cause them to no longer function within CrossStudio.

Properties

To see the properties associated with the USBP, select the USBP in the **Targets** window and view the properties in the **Properties** window.

Under **Target Driver DLL Path**, change to `$(StudioDir)/bin/SoftBaugh_MSP430.dll`. Select **Yes** or **No** for **Spy-Bi-Wire Supported** as appropriate for your MSP430 device. Also, ensure that **VCC (mV)** is correct for your device.

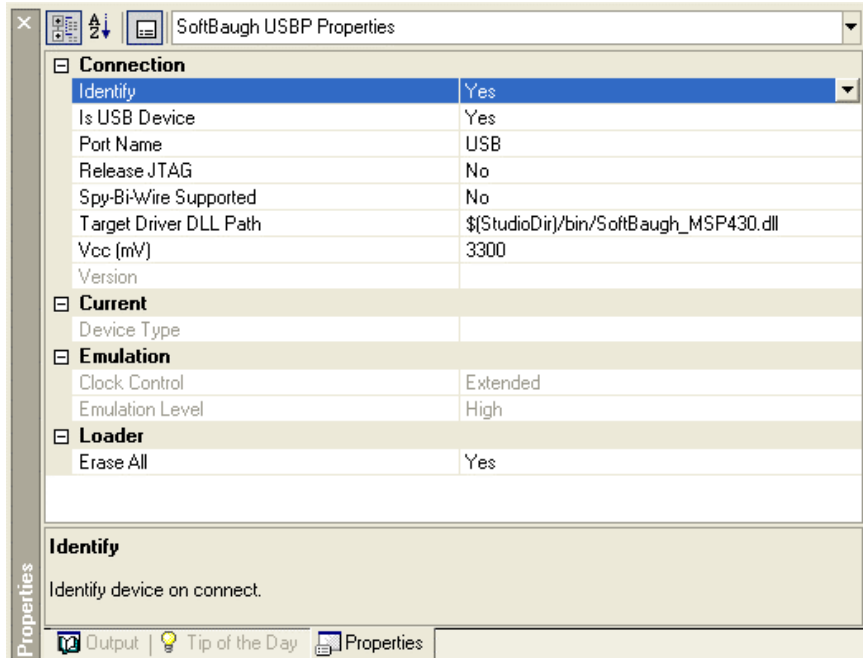


Figure 26: CrossStudio Properties Window for USBP

Targets

To use the USBP, simply select **SoftBaugh USBP** in the **Targets** window and click on the connect icon or choose **Targets → Connect SoftBaugh USBP**. Alternately, double click on **SoftBaugh USBP** to connect.

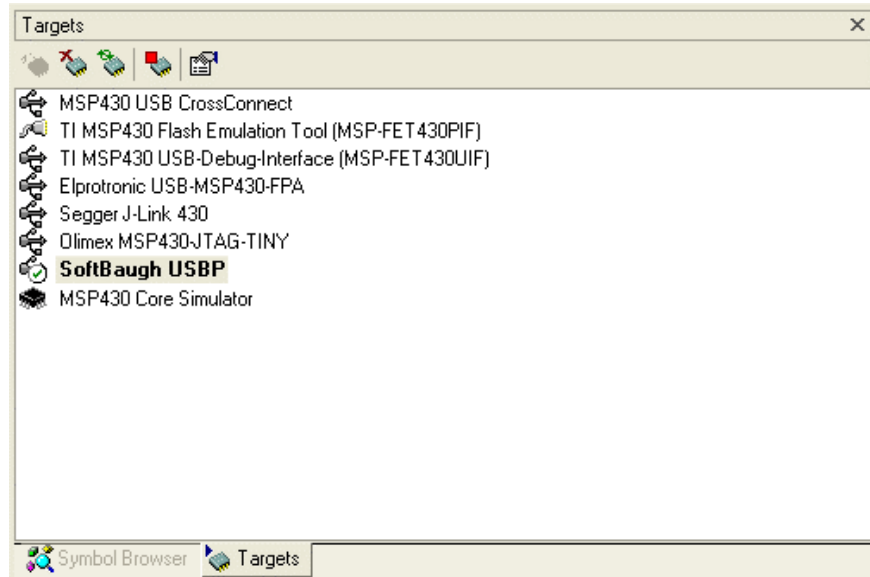


Figure 27: CrossStudio Targets Window for USBP

When connected, you'll see a connected status window at the bottom of the CrossStudio screen.

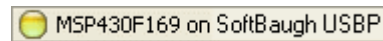


Figure 28: USBP Connected to Target

Olimex's MSP430 JTAG Tiny

CrossWorks for MSP430 v1.4 and later supports Olimex's MSP430 JTAG Tiny Programmer / Debugger once the appropriate drivers have been installed.

Drivers

Drivers for Olimex's MSP430 JTAG Tiny are available directly from the Olimex website on the MSP430 JTAG Tiny ordering and support page, in a file called OLIMEX MSP430 USB drivers 1-010.zip.⁸

Installing Drivers

Unzip Olimex's MSP430 JTAG Tiny files to a convenient location on your PC. In this example, we'll use Upgrades/Olimex/MSP430-USB-1-010. The files are grouped as the USB drivers (in the Drivers subdirectory) and the MSP430 DLL files.

OLIMEX MSP430 JTAG Tiny

To install the MSP430 JTAG Tiny drivers, connect the MSP430 JTAG Tiny to your WinXP PC via USB. The MSP430 JTAG Tiny will be auto-detected and the Windows XP Found New Hardware Wizard will begin.



Figure 29: Windows XP Found New Hardware Wizard for MSP430 JTAG Tiny Step 1

Select No, not at this time, and click on Next.

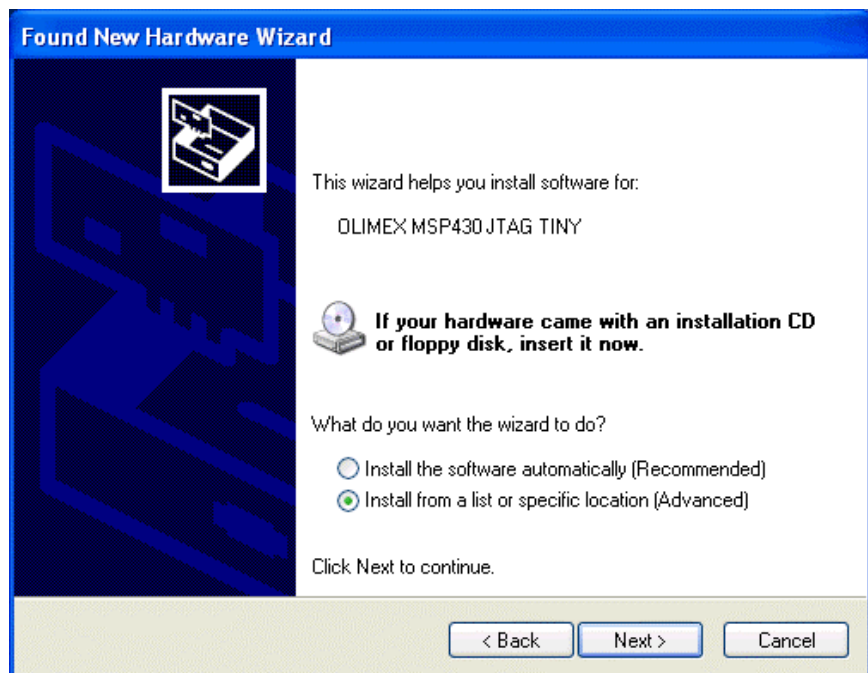


Figure 30: Windows XP Found New Hardware Wizard for MSP430 JTAG Tiny Step 2

Select Install from a list or specific location (Advanced), and click on Next.

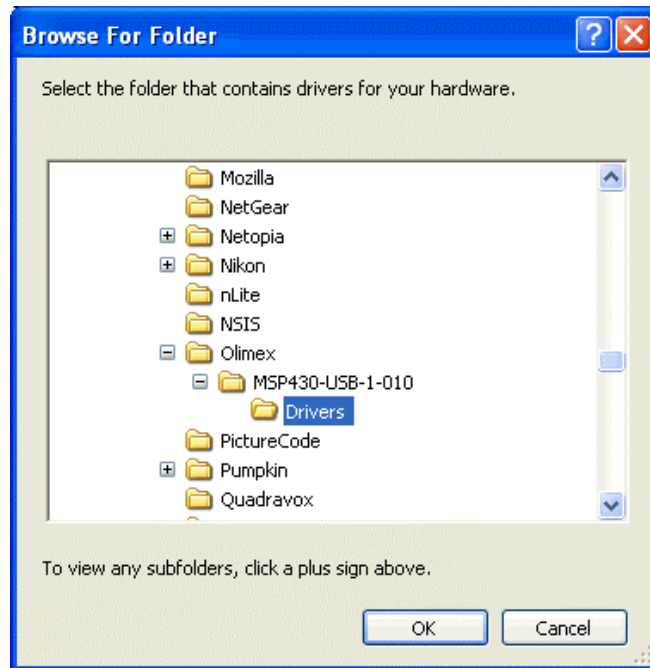


Figure 31: Windows XP Found New Hardware Wizard for MSP430 JTAG Tiny Step 3

Browse to the Program Files/SoftBaugh/USBP_Driver directory of your PC and click on OK.

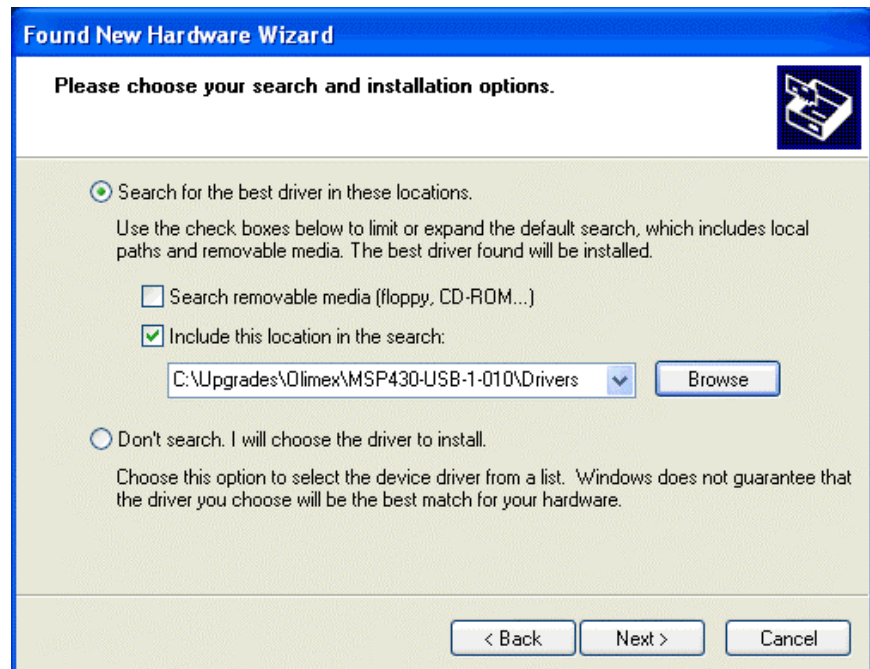


Figure 32: Windows XP Found New Hardware Wizard for MSP430 JTAG Tiny Step 4

Now that you have identified the location of the drivers on your PC, click on Next.



Figure 33: Windows XP Found New Hardware Wizard for MSP430 JTAG Tiny Step 5

Click on Continue Anyway when faced with the Windows Logo testing screen. The drivers will be installed.

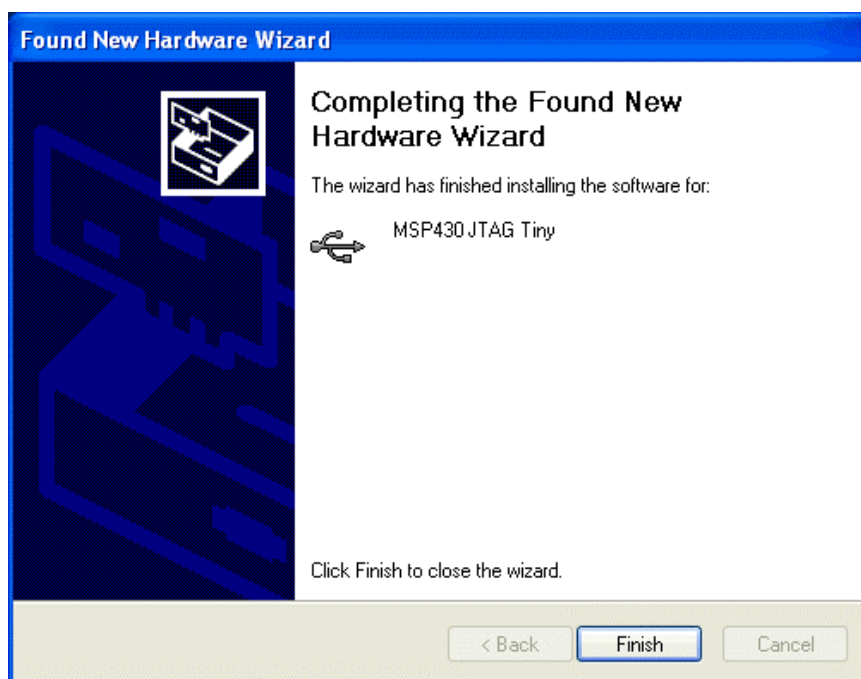


Figure 34: Windows XP Found New Hardware Wizard for MSP430 JTAG Tiny Step 6

When the installation is complete click on Finish to exit the Found New Hardware Wizard.

Windows XP Hardware Manager

When finished, you can verify proper installation by opening Windows XP's Hardware Manager. By expanding the **Universal Serial Bus Controllers** group you can see the **MSP430 JTAG Tiny** represented. As long as there are no question marks or exclamation points next to the **MSP430 JTAG Tiny** entry, then installation has been successful.

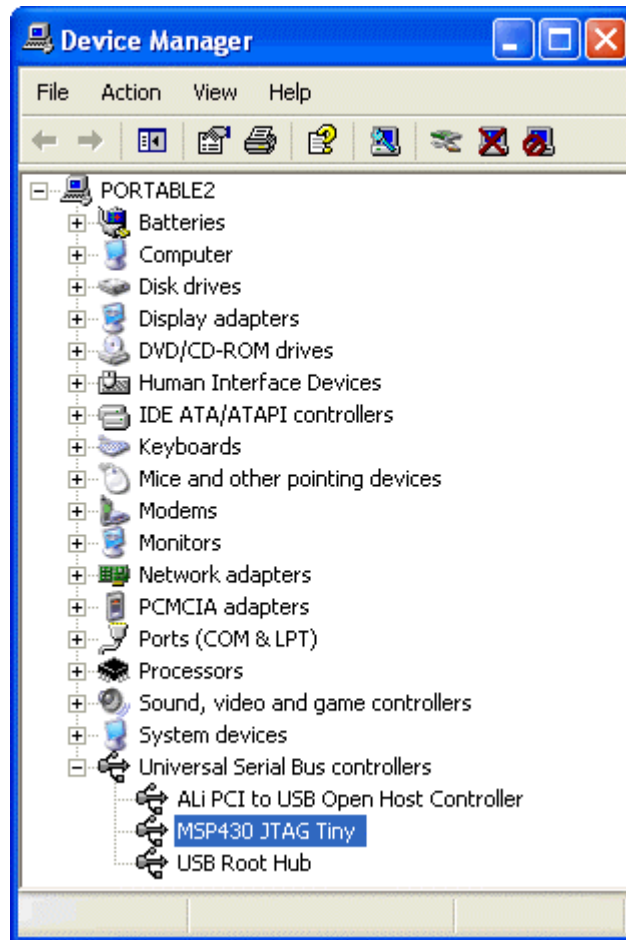


Figure 35: Windows XP Hardware Manager showing MSP-FET430UIF installed

Driver details for the MSP430 JTAG Tiny are shown below.

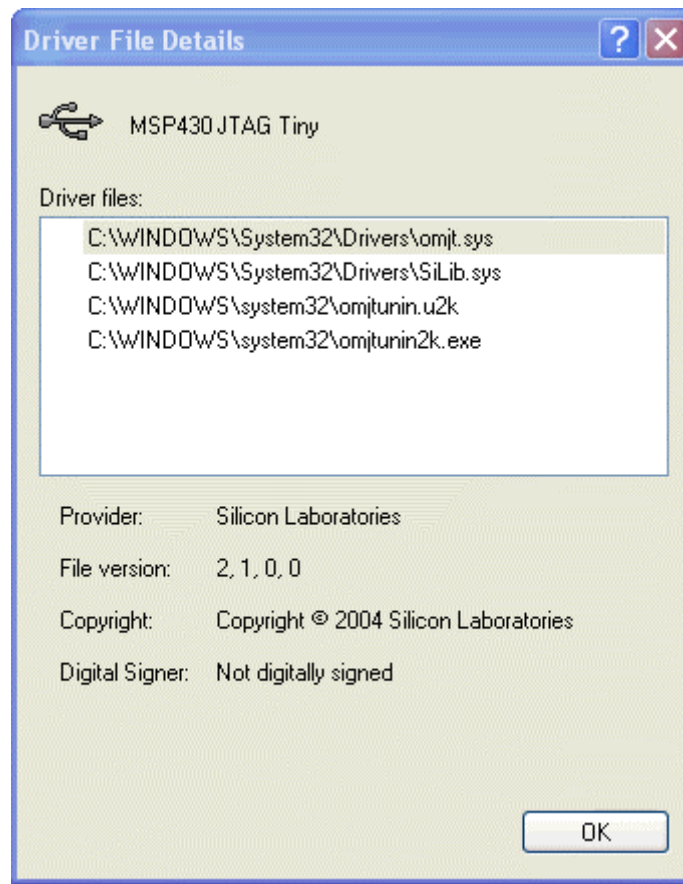


Figure 36: Driver Details for MSP430 JTAG Tiny

MSP430 DLL Files

The Olimex MSP430 USB Tiny files include four DLL's and a readme file.

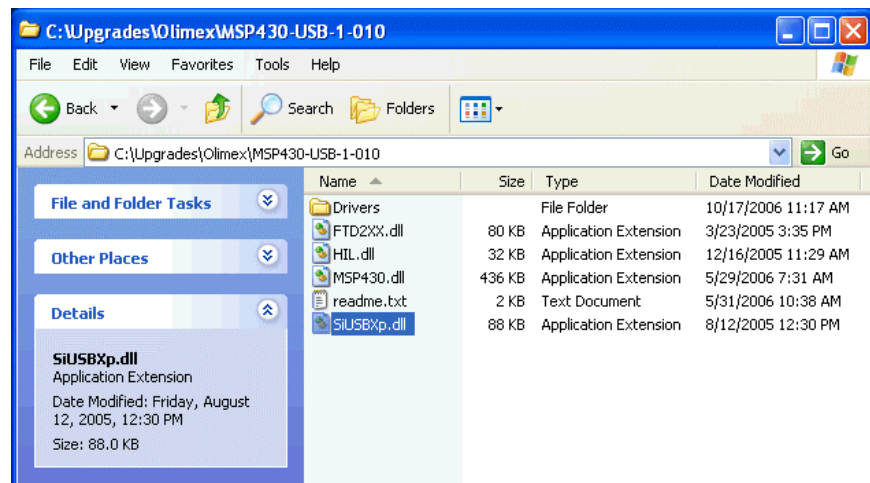


Figure 37: Olimex MSP430 JTAG Tiny DLL Files

Rename Olimex's MSP430.DLL to Olimex_MSP430.DLL. *Copy only three files* to the bin directory⁹ of your CrossWorks for MSP430 installation: Olimex_MSP430.DLL, FTD2XX.DLL¹⁰ and SiUSBXp.DLL.

Note DO NOT COPY Olimex's MSP430.DLL to the bin directory, or you will overwrite the existing MSP430.DLL. This file is used with TI's MSP-FET430PIF and MSP-FET430UIF, and overwriting it will cause them to no longer function within CrossStudio.

Properties

To see the properties associated with the MSP430 USB Tiny, select the MSP430 USB Tiny in the **Targets** window and view the properties in the **Properties** window.

Under **Target Driver DLL Path**, change to \$(StudioDir)/bin/Olimex_MSP430.dll. Select **Yes** or **No** for **Spy-Bi-Wire Supported** as appropriate for your MSP430 device. Also, ensure that **VCC (mV)** is correct for your device.

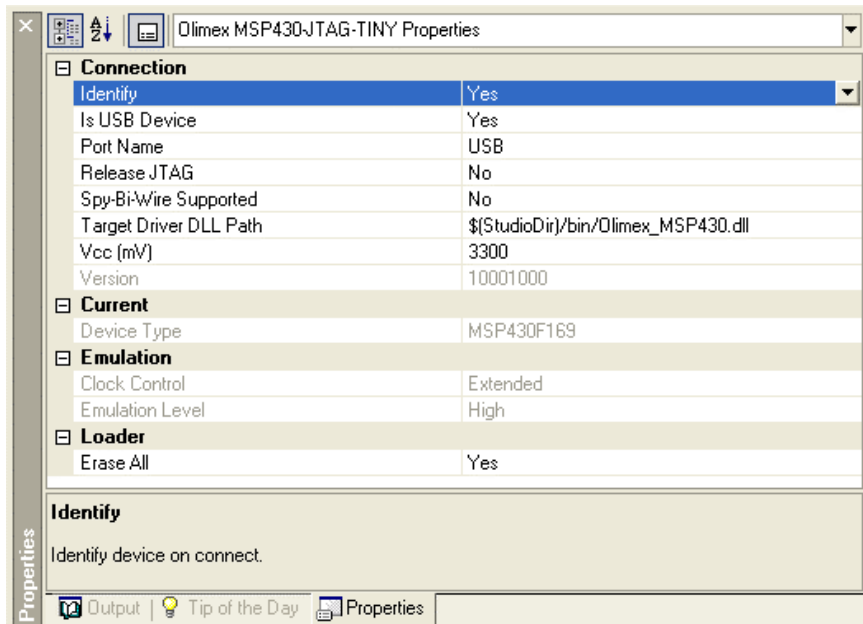


Figure 38: CrossStudio Properties Window for MSP430 JTAG Tiny

Targets

To use the MSP430 USB Tiny, simply select Olimex MSP430-JTAG-TINY in the **Targets** window and click on the connect icon or choose **Targets** → **Connect Olimex MSP430-JTAG-TINY**.

Alternately, double click on Olimex MSP430-JTAG-TINY to connect.

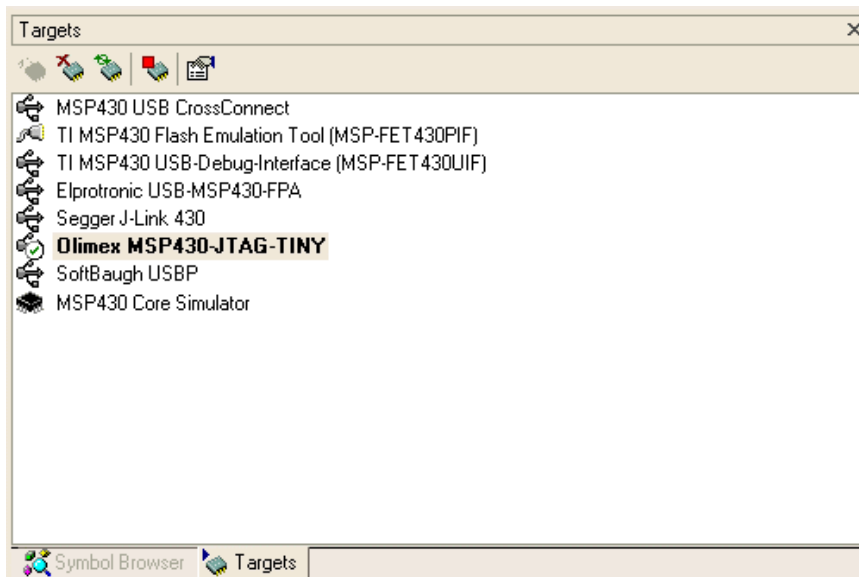


Figure 39: CrossStudio Targets Window for MSP430 JTAG Tiny

When connected, you'll see a connected status window at the bottom of the CrossStudio screen.



Figure 40: MSP430 JTAG Tiny Connected to Target

Rowley's MSP430 USB CrossConnect

CrossWorks for MSP430 supports MSP430 USB CrossConnect devices natively.

Drivers

The drivers required for the MSP430 USB CrossConnect are installed as part of a standard CrossWorks for MSP430 installation. Additionally, they are available from Rowley's website.

Properties

To see the properties associated with the MSP430 USB CrossConnect, select the MSP430 USB CrossConnect in the Targets window and view the properties in the Properties window.

Normally no changes need to be made to the MSP430 USB CrossConnect's properties.

Targets

To use the MSP430 USB CrossConnect, simply select MSP430 USB CrossConnect in the Targets window and click on the connect icon or choose Targets → Connect MSP430 USB CrossConnect. Alternately, double click on MSP430 USB CrossConnect to connect.

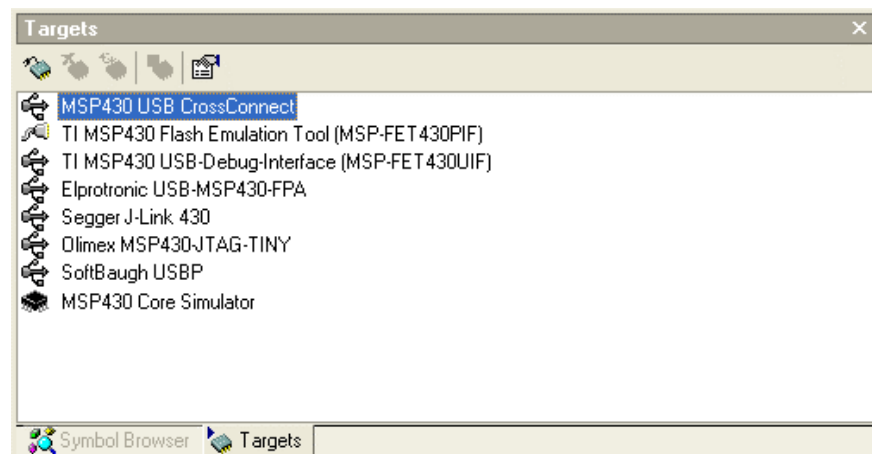


Figure 41: CrossStudio Targets Window for MSP430 USB CrossConnect

When connected, you'll see a connected status window at the bottom of the CrossStudio screen.

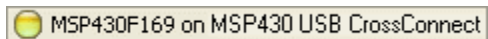


Figure 42: USB CrossConnect Connected to Target

Links

Pumpkin, Inc., <http://www.pumpkininc.com/>

CubeSat Kit home page, <http://www.cubesatkit.com/>

Olimex Ltd., <http://www.olimex.com/>

Rowley Associates Ltd, <http://www.rowley.co.uk/>

SoftBaugh, Inc., <http://www.softbaugh.com/>

Texas Instruments, <http://www.ti.com/>

References

1. *MSP-FET430 FLASH Emulation Tool (for use with IAR Version 3.x) User's Guide (Rev. C)*, Texas Instruments User's Guide slau138c.pdf, Texas Instruments, 2005.

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- ¹ The MSP-FET430PIF was previously called MSP-FETP430IF by TI.
 - ² This assumes that each USB device has a unique serial number, which is commonly the case with USB devices. Additionally, vendor-supplied USB PIDs and VIDs are used to uniquely define a USB product and identify which drivers are required for it.
 - ³ Forward slashes (/) are used as path separators in this document. You may need to use backward slashes (\) in your environment.
 - ⁴ This is common for USB peripherals. The Pumpkin CubeSat Kit's drivers have a similar two-step installation under Windows XP.
 - ⁵ The COM port number (e.g. COM40) will vary from one system to the next, based on how many emulated USB serial ports have been installed on the particular PC.
 - ⁶ Default locations.
 - ⁷ E.g. c:\Program Files\Rowley Associates Limited\CrossWorks for MSP430 1.4\bin.
 - ⁸ Note that the filename may change as its version number changes.
 - ⁹ E.g. c:\Program Files\Rowley Associates Limited\CrossWorks for MSP430 1.4\bin.
 - ¹⁰ FTD2XX.DLL are files for FTDI's family of USB silicon. Because of the popularity of FTDI's USB-to-serial chips, this file may already be installed elsewhere on your PC. We recommend that you place the FTD2XX.DLL file supplied by Olimex in the CrossWorks bin directory.