TEXAS INSTRUMENTS

eZ430-F2013 Development Tool

User's Guide

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If You Need Assistance

Support for the MSP430 device and the eZ430-F2013 is provided by the Texas Instruments Product Information Center (PIC). Contact information for the PIC can be found on the TI web site at www.ti.com. Additional device-specific information can be found on the MSP430 web site at www.ti.com/msp430 and www.ti.com/ez430.

Note: Kickstart is supported by Texas Instruments

Although Kickstart is a product of IAR, Texas Instruments provides the support for it. Therefore, please do not request support for Kickstart from IAR. Please consult the extensive documentation provided with Kickstart before requesting assistance.

FCC Warning

This equipment is intended for use in a laboratory test environment only. It generates, uses, and can radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to subpart J of part 15 of FCC rules, which are designed to provide reasonable protection against radio frequency interference. Operation of this equipment in other environments may cause interference with radio communications, in which case the user at his own expense will be required to take whatever measures may be required to correct this interference.

1. Kit Contents, eZ430-F2013

- One eZ430-F2013. The hardware is housed inside a plastic enclosure that may be opened in order to separate the MSP-EZ430D target board from the MSP-EZ430U debugging interface.

- One MSP430 Development Tool CD-ROM which contains several documents including the following related to the eZ430-F2013:

  - MSP430x2xx Family User's Guide, SLAU144B

  - MSP-FET430 FLASH Emulation Tool User's Guide, SLAU138C

  - MSP-FET430 FLASH Emulation Tool User's Guide Errata, SLAZ027

  - eZ430-F2013 User's Guide (this document)

  - IAR Embedded Workbench (Kickstart Version)

2. eZ430-F2013 Overview

The eZ430-F2013 is a complete MSP430 development tool providing all the hardware and software to evaluate the MSP430F2013 and complete an entire project in a convenient USB stick form factor. The eZ430-F2013 uses the IAR Embedded Workbench Integrated Development Environment (IDE) to provide full emulation with the option of designing a stand-alone system or detaching the removable target board to integrate into an existing design. The USB port provides power to operate the ultra-low-power MSP430 so no external power supply is required.

All 14-pins on the MSP430F2013 are accessible on the MSP-EZ430D target board for easy debugging and interfacing with peripherals. Additionally, one of the digital I/O pins is connected to an LED for visual feedback. The MSP430F2013 includes 16-MIPS performance, a 16-bit Sigma Delta Analog-to-Digital converter, a 16-bit timer, Watchdog timer, brownout detector, a USI module supporting SPI and I^2C, and five low power modes drawing as little as 0.5 µA standby.
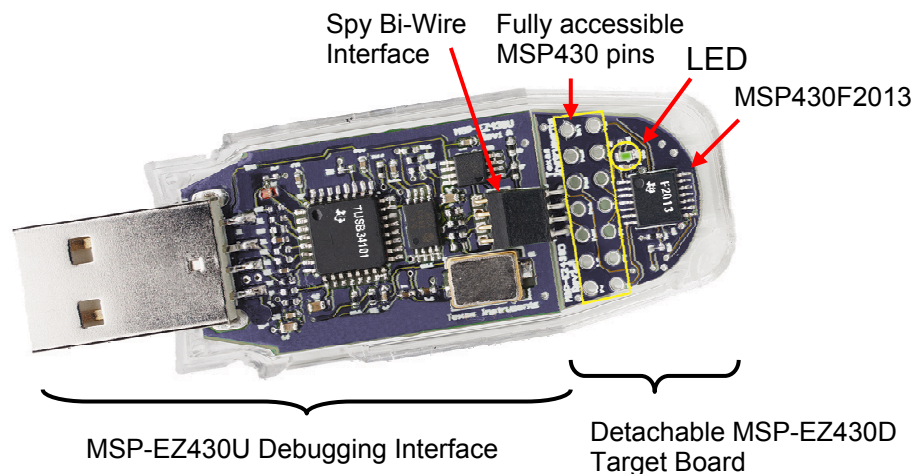

Figure 1. eZ430-F2013 Development Tool

3. Software Installation

1. Insert the MSP430 CD-ROM into your computer. It should start automatically, and the MSP430 start page will then be displayed. You can also use a browser to open "index.htm" that is located in the root directory of the MSP430 CD-ROM.

   The eZ430-F2013 is compatible with Windows 2000 and XP.

2. Select **Software → IAR Workbench Kickstart** and follow the instructions.

3. Respond to the prompts to install the software. The installation procedure will install IAR and TI files. Finish the installation.

   Read the file C:\Program Files\IAR Systems\Embedded Workbench 4.0\430\doc\readme.htm from IAR for the latest information about the Workbench. The term Kickstart is used to refer to the function-limited version of Embedded Workbench including the C-SPY debugger. Kickstart is supplied on the CD-ROM included with each MSP430 tool. The latest version is available from the MSP430 web site at www.ti.com/msp430.

   The above documents are accessible using: **Start → Programs → IAR Systems → IAR Embedded Workbench Kickstart for MSP430 V3**

4. Hardware Installation

1. Connect the eZ430-F2013 to a USB port of your PC.

2. If the Hardware Wizard starts, respond to the prompts and point the wizard to the drivers located in the following directory on a default installation:

   C:\Program Files\IAR Systems\Embedded Workbench 4.0\430\drivers\TIUSBFET\WinXP

   Two devices will be detected; however, the same directory is used for both devices. Section 11 of the eZ430-F2013 User's Guide gives detailed instructions on how to install the USB drivers under Windows 2000 and XP.

5. Flashing the LED Demo

This section demonstrates how to setup a project for the eZ430-F2013 and download the application to the MSP430F2013. The sample program will blink the LED on the MSP-EZ430D target board.

Start the Workbench (**Start → Programs → IAR Systems → IAR Embedded Workbench Kickstart for MSP430 V3 → IAR Embedded Workbench**).

1. Use **File → Open Workspace** to open the file at **C:\Program Files\IAR Systems\Embedded Workbench 4.0\430\ FET_examples\Flashing the LED.eww**. The workspace window will open.

2. Click the **msp430x2xx (C – SpyBiWire)** tab at the bottom of the workspace window that corresponds to the eZ430-F2013.

3. Set the correct device by clicking on **Projects → Options → General Options → Target** and select the **MSP430F2013** from the device list.

4. In the Options windows, go to **FET Debugger → Setup → Connection → TI USB FET** to use the USB Interface.

5. Use **Project → Rebuild All** to build and link the source code. You can view the source code by double-clicking on the project, and then double-clicking on the displayed source file.

6. Use **Project → Debug** to start the C-SPY debugger. C-SPY will erase the device Flash, and then download the application object file to the device Flash.

7. Use **Debug → Go** to start the application. The LED should flash!

8. Use **Debug → Stop Debugging** to stop debugging, to exit C-SPY and to return to the Workbench.

9. Use **File → Exit** to exit the Workbench.

Congratulations, you've just built and tested your first MSP430 application.

6. Using the MSP430F2013 Target Board & Debugging Interface Independently

The eZ430-F2013 may be used as a stand-alone development board. Additionally, the MSP-EZ430D target board may also be detached from the debugging interface and integrated into another design.

The plastic enclosure can be removed to expose the MSP-EZ430U debugging interface and the MSP-EZ430D target board. The MSP-EZ430D target board is disconnected from the debugging interface by gently pulling the two boards apart.

The target board can be used in a stand-alone design by interfacing to the 14-pins of the MSP430F2013. Holes in the MSP-EZ430D target board provide direct access to each pin of the MSP430F2013. Please refer to the MSP430F2013 Data Sheet for descriptions of each pin's function.

The MSP-EZ430U debugging interface may also be used as a standard Flash Emulation Tool for all devices in the MSP430F20xx family of microcontrollers. Target boards using other supported MSP430F20xx devices may be designed and flashed using the MSP-EZ430U debugging interface.

7. Where To Go For More Information

The primary sources of MSP430 information are the device-specific data sheets and User's Guides. The most up to date versions of the User's Guide documents available at the time of production have been provided on the CD-ROM included with this tool. The most current information is found at www.ti.com/msp430. Information specific to the eZ430-F2013 development tool can be found at www.ti.com/ez430.

MSP430 device User's Guides and the FET User's Guide may be accessed from the main page on the CD-ROM under the **User's Guides** section. The FET User's Guide includes detailed information on setting up a project for the MSP430 using IAR.

Documents describing the IAR tools (Workbench/C-SPY, the assembler, the C compiler, the linker, and the librarian) are located in common\doc and 430\doc. The documents are in PDF-format. Supplements to the documents (i.e., the latest information) are available in HTML-format within the same directories. 430\doc\readme_start.htm provides a convenient starting point for navigating the IAR documentation.

4

8. Frequently Asked Questions

1) **What devices can be programmed with the MSP-EZ430U debugging interface?**
   The MSP-EZ430U debugging interface was designed to communicate with devices over a Spy Bi-Wire interface. All members of the MSP430F20xx family of microcontrollers have been tested and are supported.

2) **Does the eZ430-F2013 support fuse blow?**
   The MSP-EZ430U debugging interface lacks the JTAG security fuse blow capability. To ensure firmware security on devices going to production, the USB Flash Emulation Tool or the Gang Programmer, which include the fuse blow feature are recommended.

3) **What is the voltage supplied to the MSP-EZ430D target board from the debugging interface?**
   The MSP-EZ430U debugging interface supplies a regulated 3.6V to the MSP-EZ430D target board.

4) **Can other programming tools interface to the MSP-EZ430D target board?**
   The MSP-EZ430D target board will work with any programming tool supporting the 2-wire Spy Bi-Wire interface. Both the MSP430 USB FET and the Gang Programmer support these devices.

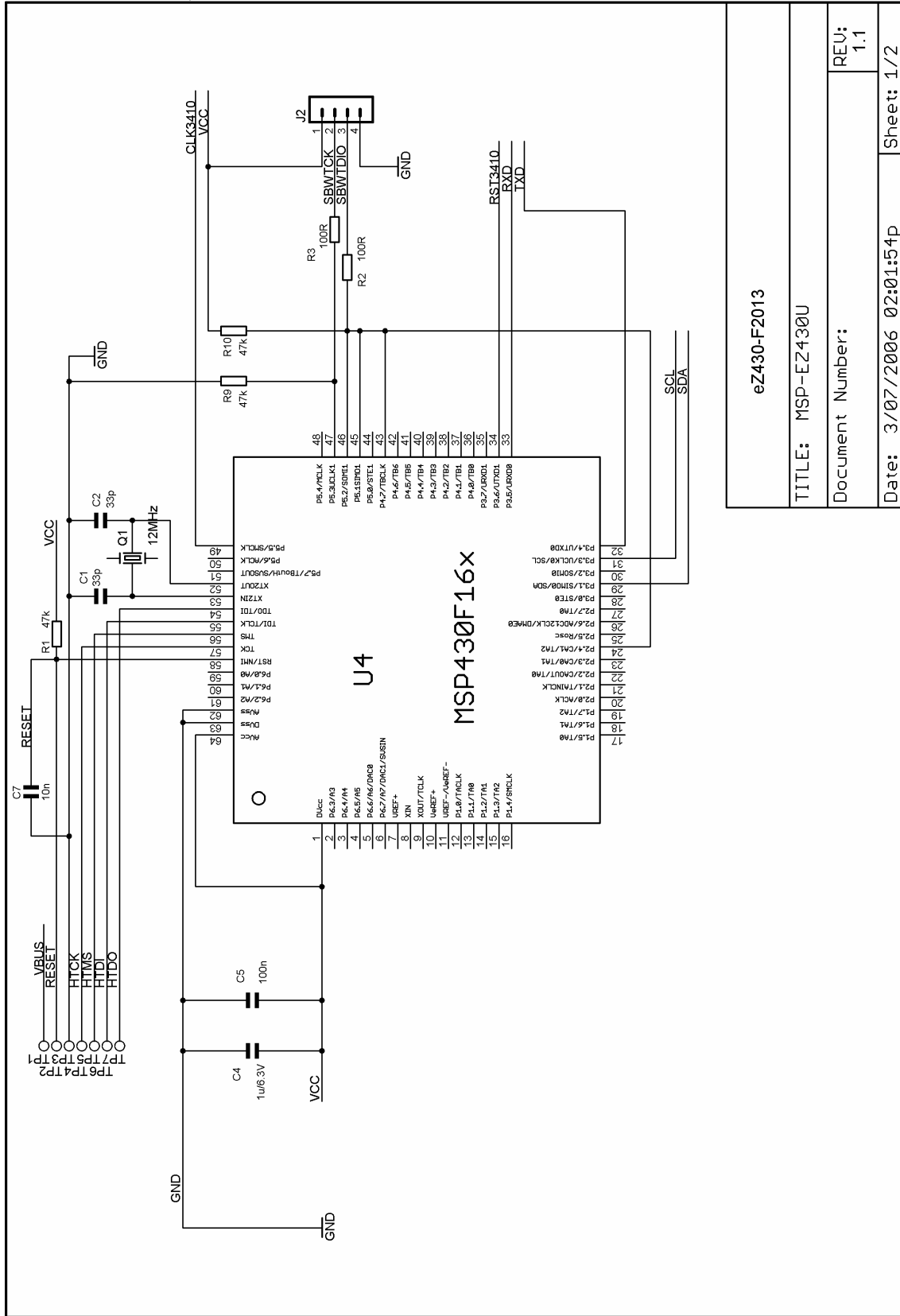5) **What versions of IAR Embedded Workbench are supported?**
   The eZ430-F2013 is supported by IAR Embedded Workbench 3.40A and IAR Embedded Workbench (Kickstart Version) FET_R449 or higher.

6) **What are the part numbers for the connectors between the MSP-EZ430U emulator and the MSP-EZ430D target board?**

   - Header: Mill-Max 850-10-004-20-001000

   - Socket: Mill-Max 851-93-004-20-001000

   Mill-Max: http://www.mill-max.com

7) **Why does can't the debugger get started (IAR Error: Failed to initialize device)?**
   First, check in the Device Manager that the COM Port assigned to the eZ430 does not conflict with port already in use. You may disable the conflicting port or assign a new COM port to the device. Check all devices that use a serial port; even devices that do not show up in the Device Manager.
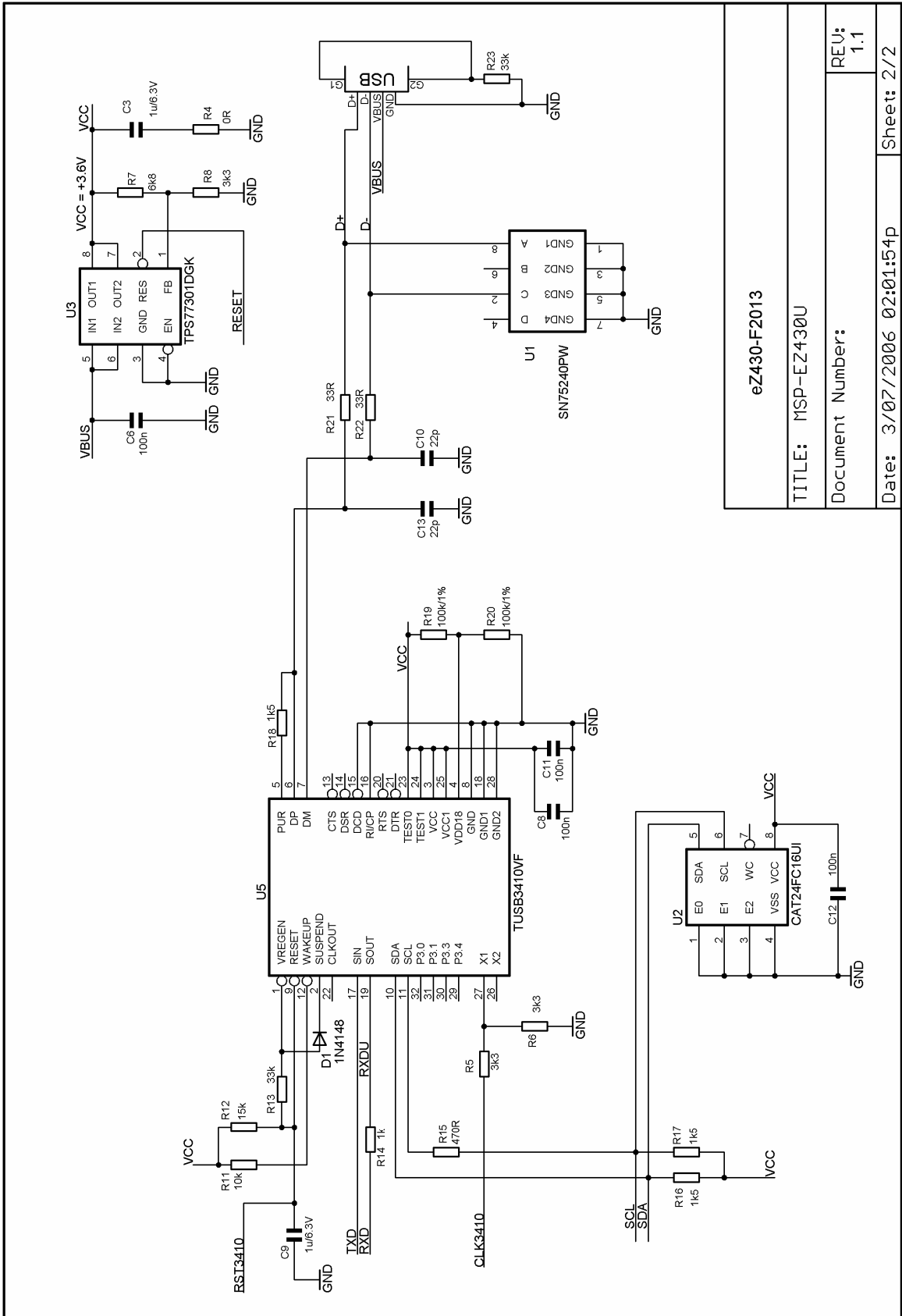
   Second, check if capacitors C6 or C9 are missing on the MSP-EZ430U debugging interface are populated. These capacitors may have been unknowingly removed while opening the enclosure.

9. eZ430-F2013, Schematic

Figure 2. MSP-EZ430U, Schematic

Figure 3. MSP-EZ430U, Schematic

Remove R61 if U1 is supplied externally

BU1274VPE

J1

GND

VCC

SBWTCK
SBWTDIO

R1
0R

R3
47k

GND

C1
100n

U1
MSP430x20x1

VCC
P1.0
P1.1
P1.2
P1.3
P1.4
P1.5

GND
XIN
XOUT
TEST
RST
P1.7
P1.6

DXIN
DXOUT

P1.7
P1.6

SBWTCK
SBWTDIO

VCCOUT_D

P1.0
P1.1
P1.2
P1.3
P1.4
P1.5

R2
330R

D1
green

GND

VCCOUT_D
P1.0
P1.1
P1.2
P1.3
P1.4
P1.5

P8
P9
P1.0
P1.1
P1.2
P1.3
P1.4

P1.6
P1.7
SBWTDIO
SBWTCK
DXOUT
DXIN
GND

TITLE: MSP-EZ430D - eZ430-T2012

eZ430-F2013 | eZ430-T2012

Document Number:

Date: 12/12/2006 04:22:13p

REV: 1.0

Sheet: 1/1

Figure 4. MSP-EZ430D / eZ430-T2012, Schematic

10. eZ430-F2013, PCB Pictorial

PCB dimension: 35x20mm

PCB dimension: 15x20mm

PCB dimension: 35x20mm
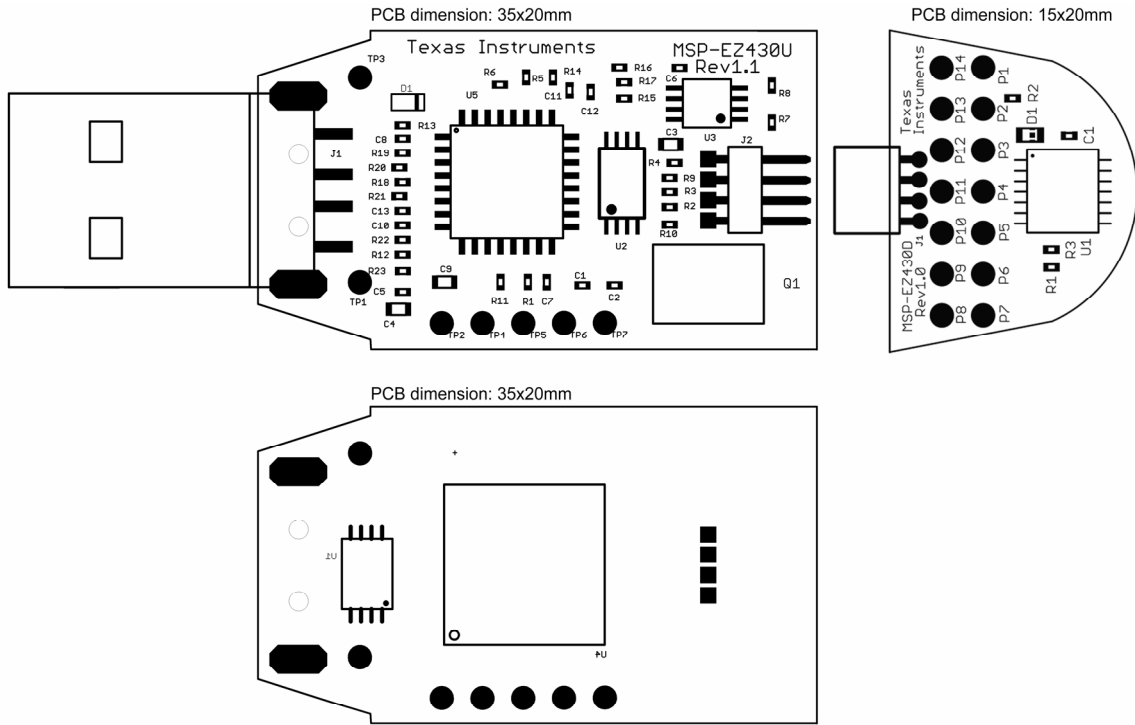
Figure 5. eZ430-2013, PCB Pictorial

11. Detailed Hardware Installation Guide

1. Install IAR Embedded Workbench (Kickstart Version) included on the CD.

2. Insert the eZ430-F2013 into a USB port of your PC.

3. Windows should recognize the new hardware as MSP-FET430UIF JTAG Tool (Figure 6)

Figure 6. Windows XP Hardware Recognition

4. The "Found New Hardware Wizard" should pop up with a dialog window.

5. Select "**Install from a list or specific location [Advanced]**" (Figure 7).
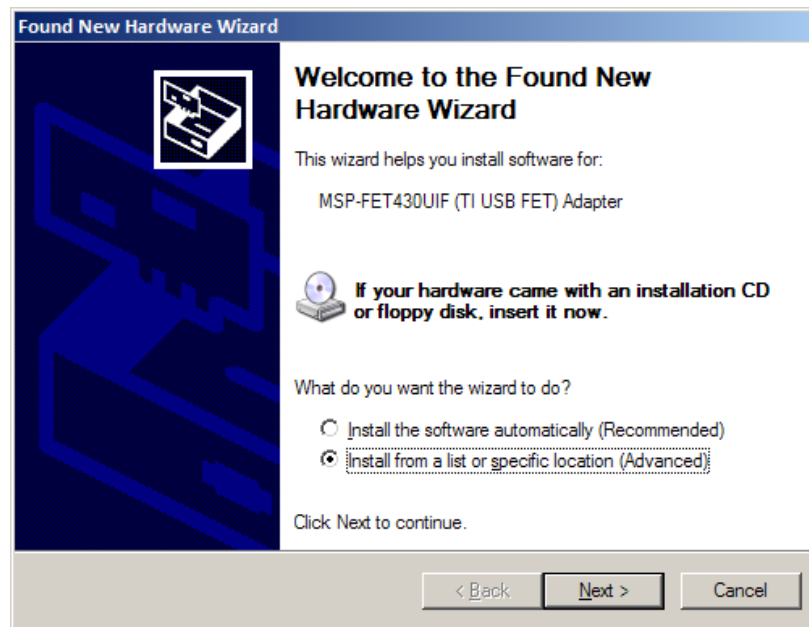
Figure 7. Hardware Wizard

6. Point the Hardware Wizard to the folder containing the MSP-FET430UIF/eZ430-F2013 driver. If you have already installed the IAR Kickstart Edition, the driver will be found at the following default location: **C:\Program Files\IAR Systems\Embedded Workbench 4.0\430\drivers\TIUSBFET\WinXP**
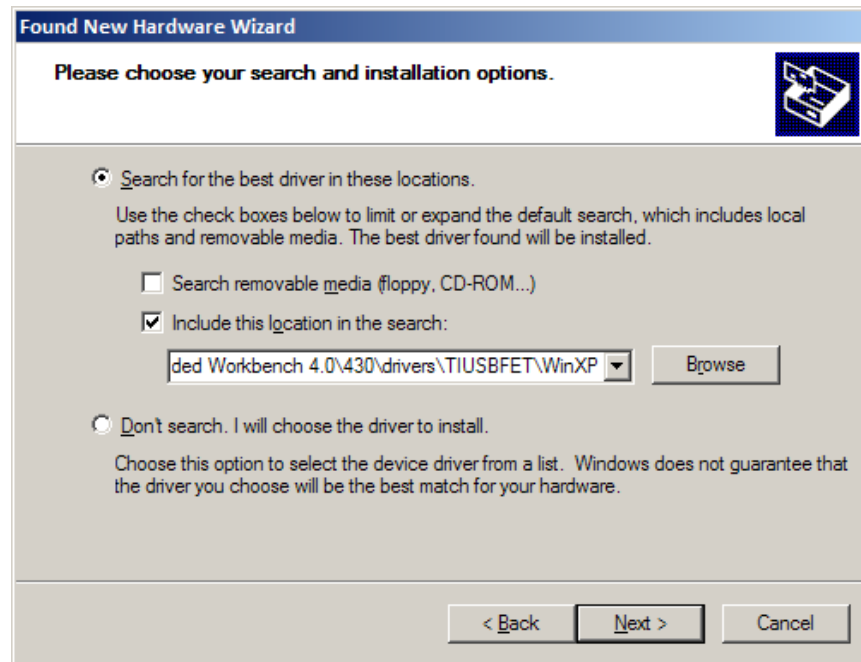

Figure 8. Specify driver location

7. The Wizard should find the appropriate driver and on Windows XP system, it will prompt you with a warning that Microsoft did not certify the driver. The drivers have been tested exhaustively and you may ignore this warning and click "**Continue Anyway**" (Figure 9).
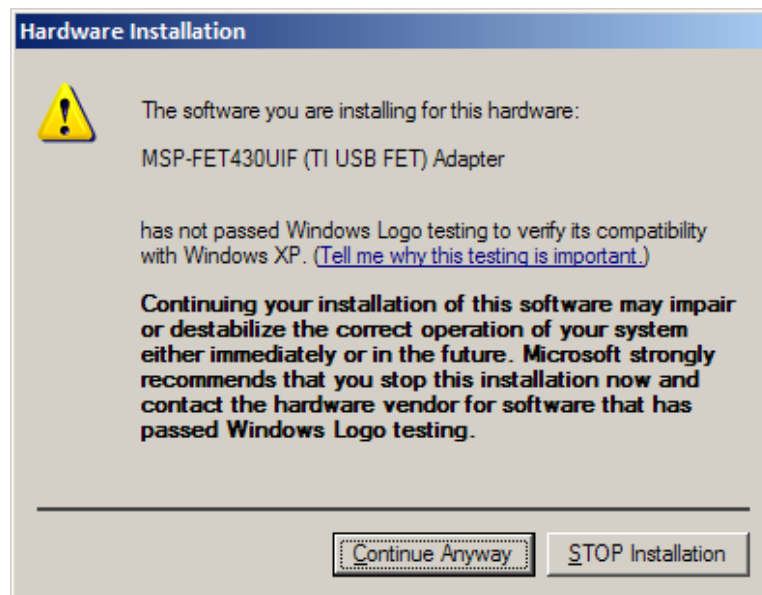

Figure 9. Windows XP Warning

8. The Wizard will continue to install the driver and notify you that it has finished the installation of the software.

9. After closing the Hardware Wizard, Windows will automatically recognize another new hardware device called the "MSP-FET430UIF – Serial Port"

10. Repeat steps 4 – 8 for the second hardware detection.

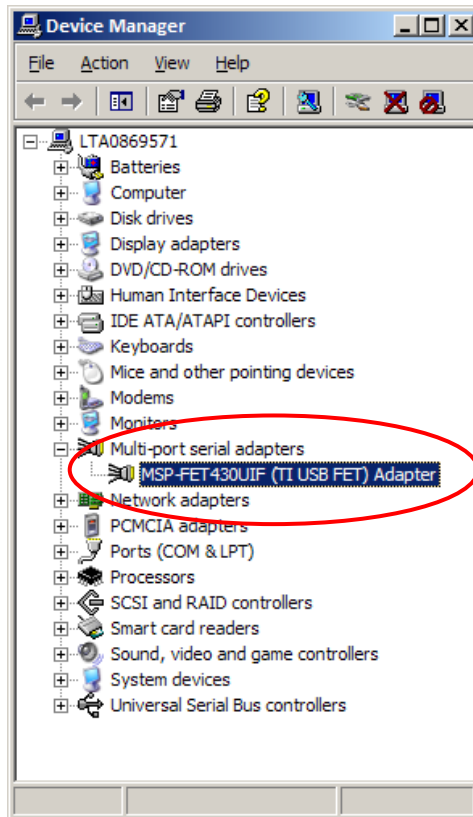11. The eZ430-F2013 is now installed and ready to use. The Device Manager should list a new entry as shown in Figure 10.

Figure 10. Device Manager