

EZ430-C7

Kionix KXSC7 Evaluation Board for the Texas Instruments MSP430 USB Stick Development Tool



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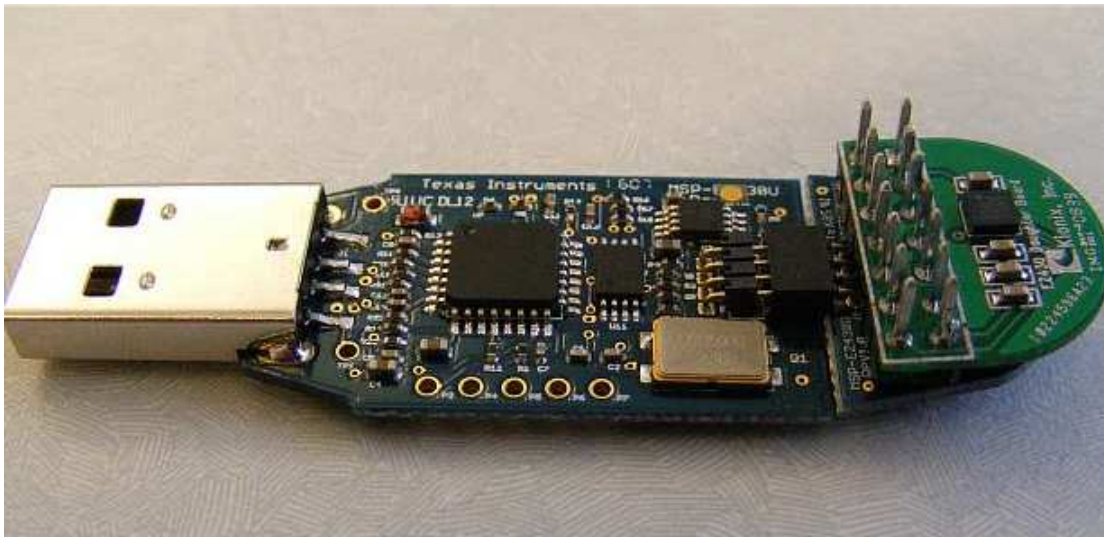
| | |
|---|-----------|
| CONTENTS | 4 |
| OVERVIEW | 4 |
| HARDWARE..... | 5 |
| DEVELOPMENT KIT COMPONENTS | 5 |
| TI EZ430-F2013 (NOT INCLUDED)..... | 5 |
| KIONIX EZ430-C7 EVALUATION BOARD | 6 |
| SOFTWARE | 8 |
| SYSTEM REQUIREMENTS | 8 |
| GETTING STARTED | 8 |
| READING ACCELERATION DATA DEMO | 8 |
| TECHNICAL SUPPORT | 11 |
| REVISION HISTORY | 11 |
| APPENDIX A: SCHEMATIC OF EZ EVAL | 12 |

Contents

1. Kionix EZ430-C7 Evaluation board
2. CD containing sample firmware for reading acceleration
3. Instruction sheet (this document)

Overview

The Texas Instruments (TI) eZ430-F2013 development kit with the Kionix KXSC7 Evaluation Board (EZ430-C7) provides a simple environment to quickly start sampling X, Y, and Z accelerations and create accelerometer applications using the MSP430F2012 in a convenient USB form factor.



Hardware

Development Kit Components

TI eZ430-F2013 (not included)

TI's eZ430 Development Tool consists of a MSP-EZ430U Debugging Interface, which connects to a detachable eZ430-T2012 target board all housed inside a plastic enclosure. The enclosure can be opened to attach/detach different target boards. It is to the eZ430-T2012 target board that the Kionix accelerometer evaluation board can be attached.

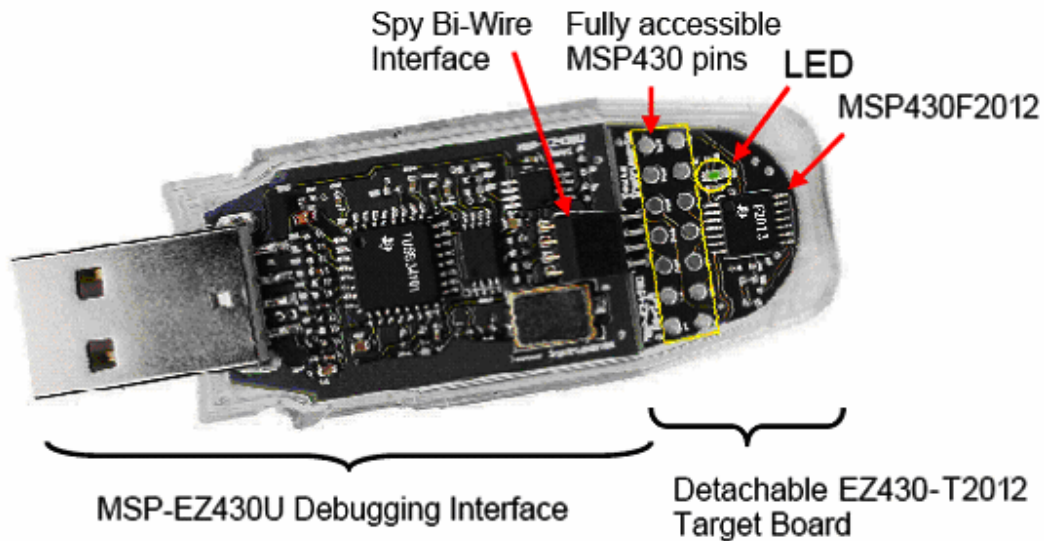


Figure 1. eZ430-F2013 Development Tool

The eZ430 Development Tool provides a real-time debugging and programming interface for the MSP430F2012 on the target board, and comes with the easy-to-use IAR Embedded Workbench Integrated Development Environment (IDE). The T2012 can be used to develop your personal project or to evaluate the MSP430 MCU.

The latest product information and ordering information about the ez430 Development Tool can be found at: <http://focus.ti.com/docs/toolsw/folders/print/ez430-f2013.html>

The latest product information and ordering information about the eZ430-T2012 target board can be found at: <http://focus.ti.com/docs/toolsw/folders/print/ez430-t2012.html>

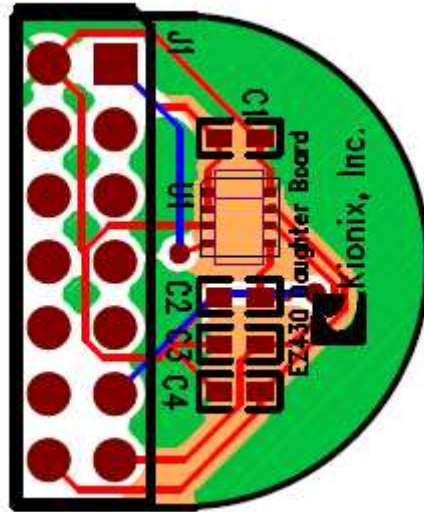
Kionix EZ430-C7 Evaluation Board

The Kionix EZ430-C7 Evaluation Board provides the connection between the KXSC7-2050 accelerometer and the MCU. The two boards (Kionix EZ430-C7 and the TI eZ430-T2012 target board) connect to each other through the 14-pin configuration. The pin configuration of both boards are compatible with each other, meaning pin 1 through pin 14 of the eZ430-T2012 connect to pin 1 through pin 14 of the EZ430-C7 respectively.



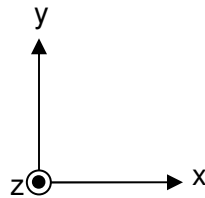
Power to the EZ430-C7 is provided through the target board. If the target board along with the EZ430-C7 is to function as a stand alone unit, then an external power supply can be connected appropriately to the 14-pin connection.

PCB board layout, pin description, and accelerometer axis orientation are shown below.



Outer Dimensions: 1.9cm x 1.6cm

| J1 Connector Pin Description | |
|------------------------------|-----|
| pin 1 | VDD |
| pin 2 | GND |
| pin 3 | P2 |
| pin 4 | P13 |
| pin 5 | P3 |
| pin 6 | P12 |
| pin 7 | P4 |
| pin 8 | P11 |
| pin 9 | P5 |
| pin 10 | P10 |
| pin 11 | X |
| pin 12 | P9 |
| pin 13 | Y |
| pin 14 | Z |



Orientation of accelerometer axes

The product data sheet and specifications for the KXSC7-2050 accelerometer can be found at: <http://www.kionix.com/sensors/accelerometer-products.html>

Software

System Requirements

It is highly recommended that your system meet the following minimum requirements:

Windows 2000 or greater

USB 2.0

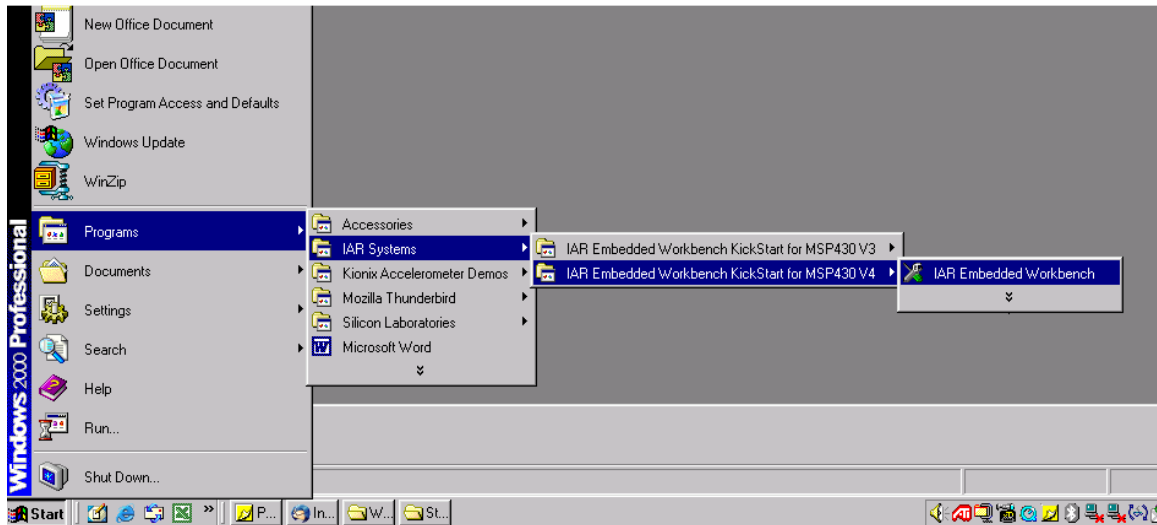
Getting Started

Install the IAR Workbench. The IDE can be obtained from TI's website. <http://focus.ti.com/docs/toolsw/folders/print/iar-kickstart.html>. More information about the IDE is available on the website as well.

Reading Acceleration Data Demo

A sample C file has been provided to help you get started in reading X, Y, and Z acceleration data. You will need to set up a project for the eZ430-T2012, and download the application onto the MSP430F2012. The following steps will guide you through the process:

1. Start the Workbench. (Start -> Programs -> IAR Systems -> IAR Embedded Workbench Kickstart for MSP430 V3 -> IAR Embedded Workbench).



2. Click on the File tab -> Open Workspace ->. Select the directory where you have unzipped the 'AccelDemo.zip'.
3. Select the 'KXSC7_F2012.eww' workspace.
4. Set the correct device by clicking on Projects -> Options -> General Options -> Target and select MSP430F2012 from the list.
5. In the Options window, go to FET Debugger -> Setup -> Connection -> TI USB FET to use the USB interface.
6. 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.
7. 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.
8. Place the cursor on the Xout variable. Use Run to cursor button to view the Xout, Yout, and Zout (X, Y, and Z acceleration) variables in the watch window.

The screenshot displays the IAR Embedded Workbench IDE interface during a debug session. The main window shows the source code for `main.c` in the project `KXSC7_F2012.d43`. The code includes initialization for WDT, ADC, and PIDIR, followed by a `while` loop that reads acceleration data into `Xaxis`, `Yaxis`, and `Zaxis`. The Watch window on the right shows the current values of these variables: `ADC10MEM` is 629, `Xaxis` is 514, `Yaxis` is 344, and `Zaxis` is 629. Red annotations highlight the 'Run to cursor' button in the toolbar, the `Xaxis = Zout();` line in the code, and the Watch window. A log window at the bottom shows system messages such as 'Device: MSP430F20x2' and 'Download complete'.

```

unsigned int Zaxis;

void main(void)
{
    WDTCTL = WDTPW + WDTHOLD;           // Stop WDT
    ADC10CTL0 = ADC10SHT_2 + ADC100W + ADC10IE; // ADC100W, interrupt enab
    PIDIR |= 0x01;                       // Set P1.0 to output direct

    while (1) {
        //get acceleration data
        Xaxis = Zout();
        Yaxis = Yout();
        Zaxis = Zout();
    }

    // ADC10 interrupt service routine
    #pragma vector=ADC10_VECTOR

```

| Expression | Value |
|------------|-------|
| ADC10MEM | 629 |
| Xaxis | 514 |
| Yaxis | 344 |
| Zaxis | 629 |

Log

```

Tue Dec 02 13:25:53 2008: Interface dll version 2.3.5.0
Tue Dec 02 13:25:53 2008: Device : MSP430F20x2
Tue Dec 02 13:25:53 2008: External voltage : 0.0 V
Tue Dec 02 13:25:53 2008: VCC voltage : 3.5 V
Tue Dec 02 13:25:54 2008: Download complete.
Tue Dec 02 13:25:54 2008: Loaded debuggee: C:\Documents and Settings\jicemer\My Documents\jicemer\F2012\Debug\Exe\KXSC7_F2012.d43
Tue Dec 02 13:25:54 2008: Target reset

```

Congratulations, you have successfully built and tested the AccelDemo application.

Technical Support

If you experience technical difficulties with the EZ430-C7 evaluation board, please contact your local Kionix Sales Office for technical support information.



For information about Kionix products, application notes, and evaluation boards, please visit www.kionix.com.



For information about Texas Instrument's MSP430 Third Party Developer Network please visit:

<http://focus.ti.com/mcu/docs/mcucodeexnewsltrbuglist.tsp?sectionId=96&tabId=1507>

Revision History

| Date | Revision | Modifications |
|------------|----------|-----------------|
| 12/18/2008 | - | Initial release |
| | | |

Appendix A: Schematic of eZ eval

