

## **Graphical User Interface for SLLA363A**

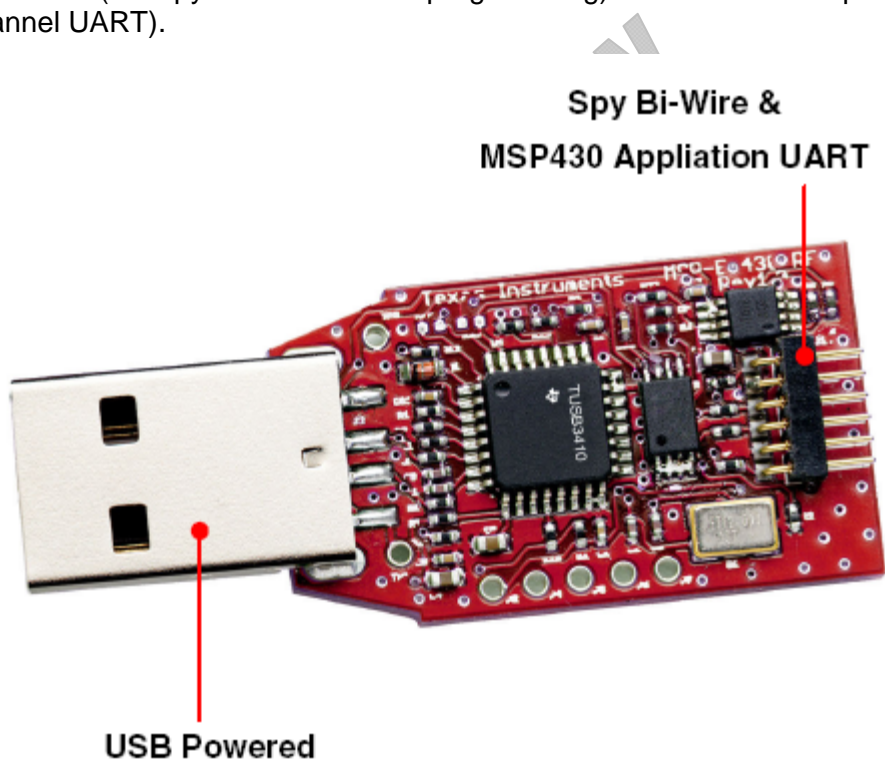
*MSP430*

### **ABSTRACT**

This document describes the setup and use of a graphical user interface to evaluate the slider implementation described in SLAA363A.

### **Overview**

This implementation is based upon the ez430-RF2500 USB emulation tool. The back-channel UART provides a 9600 baud communication link between the EVM and the PC. The PC communication port is then selected within the Labview application and the data presented on the graphical user interface. This provides a relatively simple means to change parameters within the MSP430 (via Spy Bi-Wire JTAG reprogramming) and evaluate the performance (via the backchannel UART).



**Figure 1. ez430-RF2500 USB Emulation Tool**

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## Configuring The MSP430F20x1 UART communication

The MSP430F20x1 can be configured to support many different UART baud rates. Definitions are found within the file to set the baud rate based upon the clock frequency.

msp430x20x1\_RC\_TA\_UART Slider.c

```
// Conditions for 9600 Baud SW TX-only UART, SMCLK = 1MHz
// #define Bitime 0x0068 // x us bit length ~ x baud
// Conditions for 57600 Baud SW TX-only UART, SMCLK = 4MHz
// #define Bitime 0x0045 // x us bit length ~ x baud
// Conditions for 57600 Baud SW TX-only UART, SMCLK = 8MHz
#define Bitime 0x008A // x us bit length ~ x baud
// Conditions for 115200 Baud SW TX-only UART, SMCLK = 8MHz
// #define Bitime 0x0045 // x us bit length ~ x baud
// Conditions for 115200 Baud SW TX-only UART, SMCLK = 16MHz
// #define Bitime 0x008A // x us bit length ~ x baud

...

// Function Transmits Character from RXTXData Buffer
void TX_Byte (unsigned char TX_DATA)
{
    BCSTL1 = (BCSTL1 & 0x0F0) + CALBC1_8MHZ; // Set DCO to 1, 8, 12 or 16MHz
    DCOCTL = CALDCO_8MHZ; // 1MHz used for UART comm
    // BCSTL2 |= DIVS_1; // SMCLK = DCO/2, 4MHz for UART
    CCTL1 = OUT; // TXD Idle as Mark
    TACTL = TASSEL_2 + MC_2; // SMCLK, continuous mode
    P1SEL |= TXD;
    P1DIR |= TXD;
    BitCnt = 0xA; // Load Bit counter, 8data + ST/SP
    CCR1 = TAR; // Current state of TA counter
    CCR1 += Bitime; // Some time till first bit
    RXTXData = TX_DATA;
    RXTXData |= 0x100; // Add mark stop bit to RXTXData
    RXTXData = RXTXData << 1; // Add space start bit
    CCTL1 = CCIS0 + OUTMOD0 + CCIE; // TXD = mark = idle
    while ( CCTL1 & CCIE )
    {
        LPM0;
    }
    P1SEL &= ~TXD;
    // BCSTL2 &= ~DIVS_1; // SMCLK = DCO
    BCSTL1 = (BCSTL1 & 0x0F0) + CALBC1_16MHZ; // Set DCO to 1, 8, 12 or 16MHz
    DCOCTL = CALDCO_16MHZ; // 1MHz used for UART comm
}
```

For this application demonstration the SMCLK is 8 Mhz and the desired baud rate is 9600. This option is not provided in the comments, but can be calculated:

$$8\text{Mhz} / 9600 = 833 \text{ or } 0x341$$

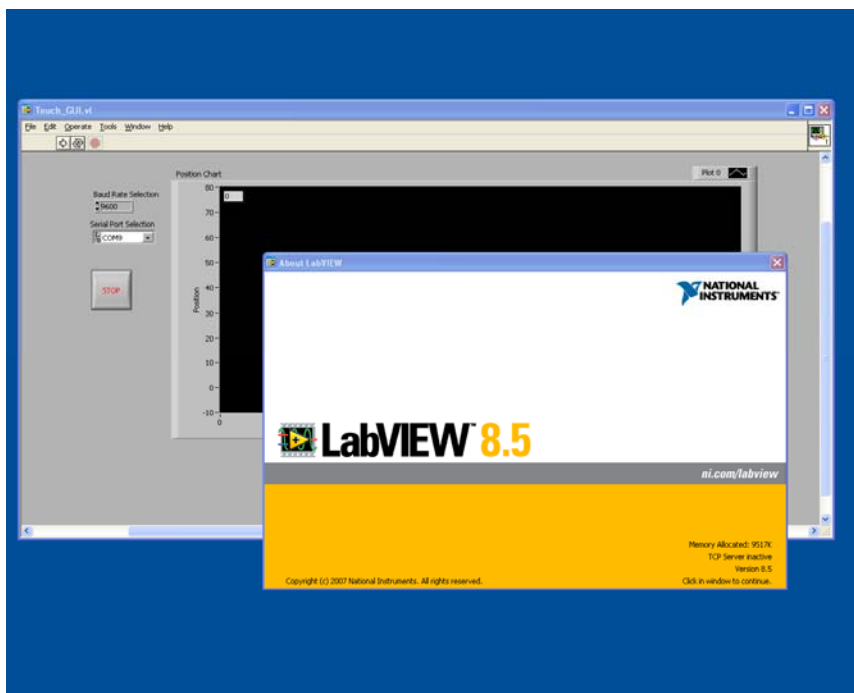
Update the Bitime definition with the following:

```
// Conditions for 9600 Baud SW TX-only UART, SMCLK = 8MHz
#define Bitime      0x0341                // x us bit length ~ x baud
```

## Setting Up the LabVIEW™ GUI<sup>1</sup>

The executables provided are stand alone and require the installation of the LabVIEW™ Runtime engine 8.5 as well as the NI-VISA run time engine 4.5 for the communication port. Both of these can be found on the National Instruments website: [www.ni.com](http://www.ni.com). Please be sure to install the LabVIEW™ runtime engine before the NI-VISA engine.

Running one of the provided executables and checking the 'About..' under the help tab will show that LabVIEW™ 8.5 is installed.



**Figure 2. Confirm Installation of LabVIEW 8.5**

The NI-VISA™ can be confirmed by examining the 'read-me' file found at C:\Program Files\IVI Foundation\VISA\WinNT\NIvisa\Readme.html.

<sup>1</sup> LabVIEW™ can be used with any operating system. This example is with Windows XP.

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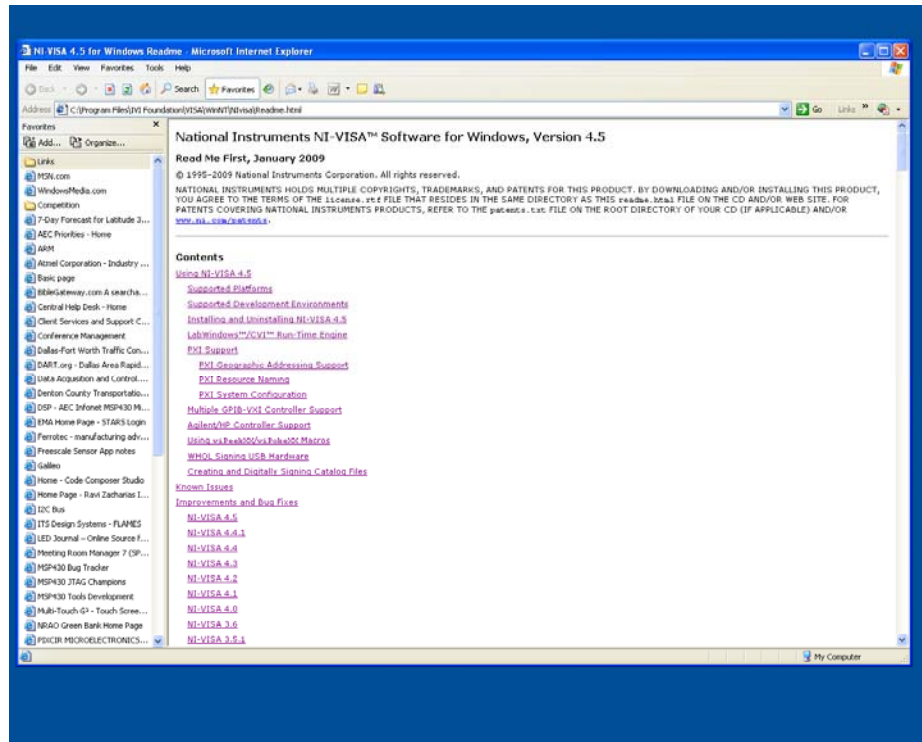
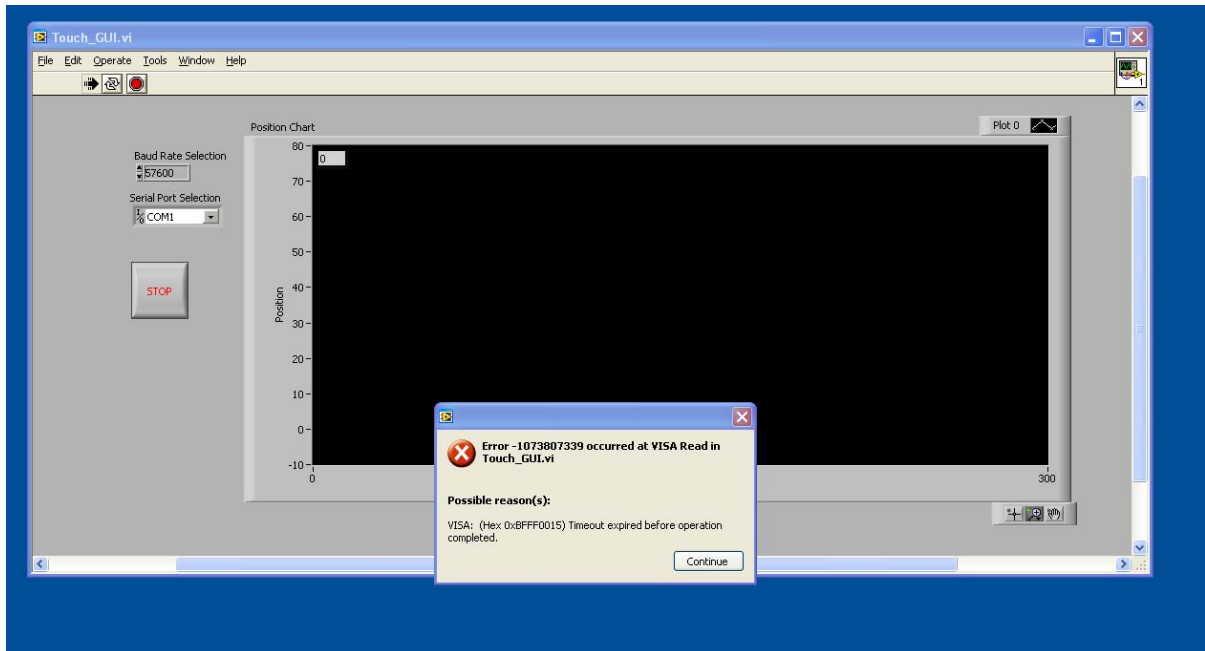


Figure 3. Confirmation that NI-VISA™ 4.5 is Installed

## Starting the Demonstration

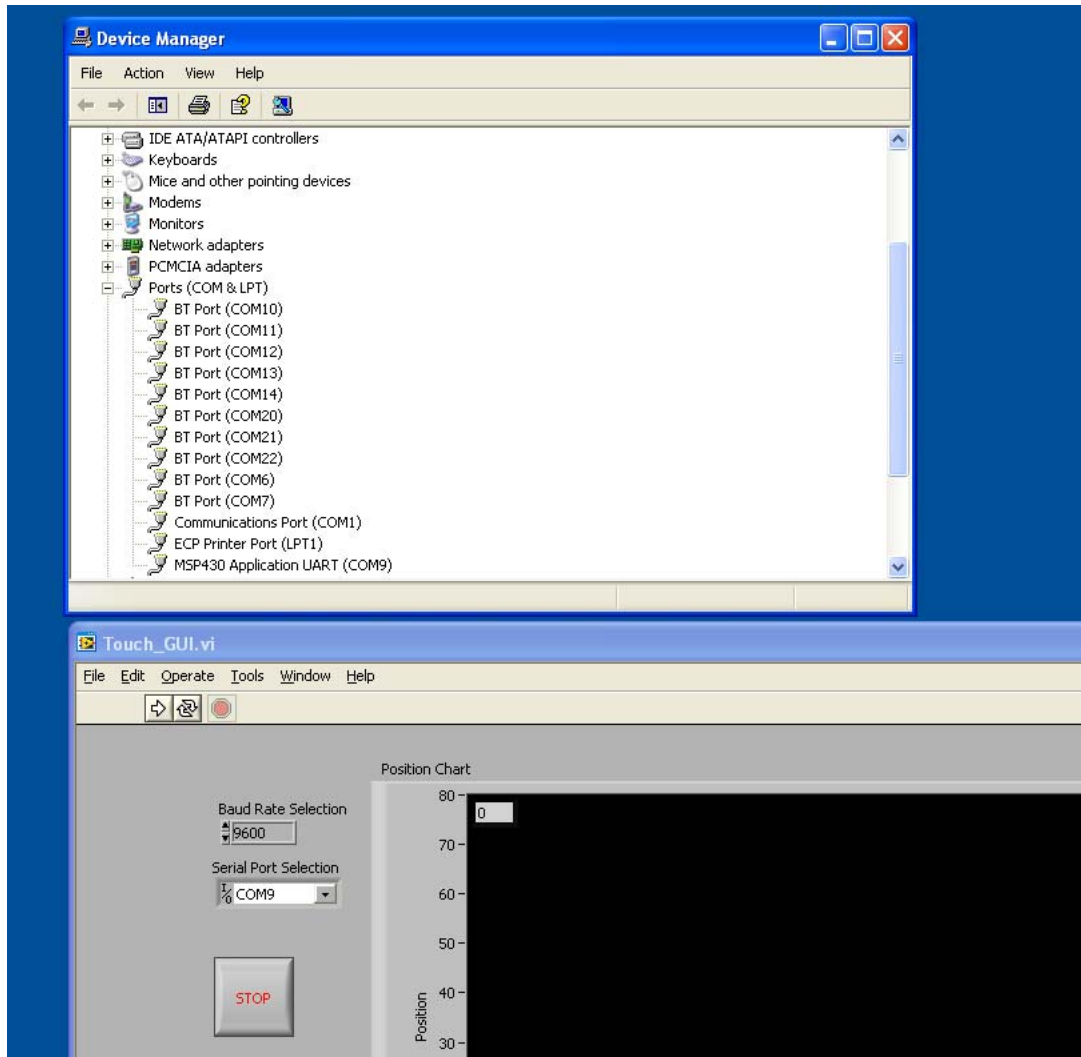
The default settings for the GUI are COM1 and a baud rate of 57600. With the eZ430-RF2500 the communication port will be something other than 1 and the baud rate will need to be updated to 9600.



**Figure 4. Initial Error Message when using the eZ430-RF2500**

- 1) Select Continue on the pop-up message.
- 2) Press the red 'stop' sign in the upper left hand corner near the drop down menus.
- 3) Adjust the baud rate and select the appropriate communication port.
- 4) Press the white arrow in the upper left hand corner near the drop down menus.

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**Figure 5. Setting the Baud rate to 9600 and selecting the correct COM port**

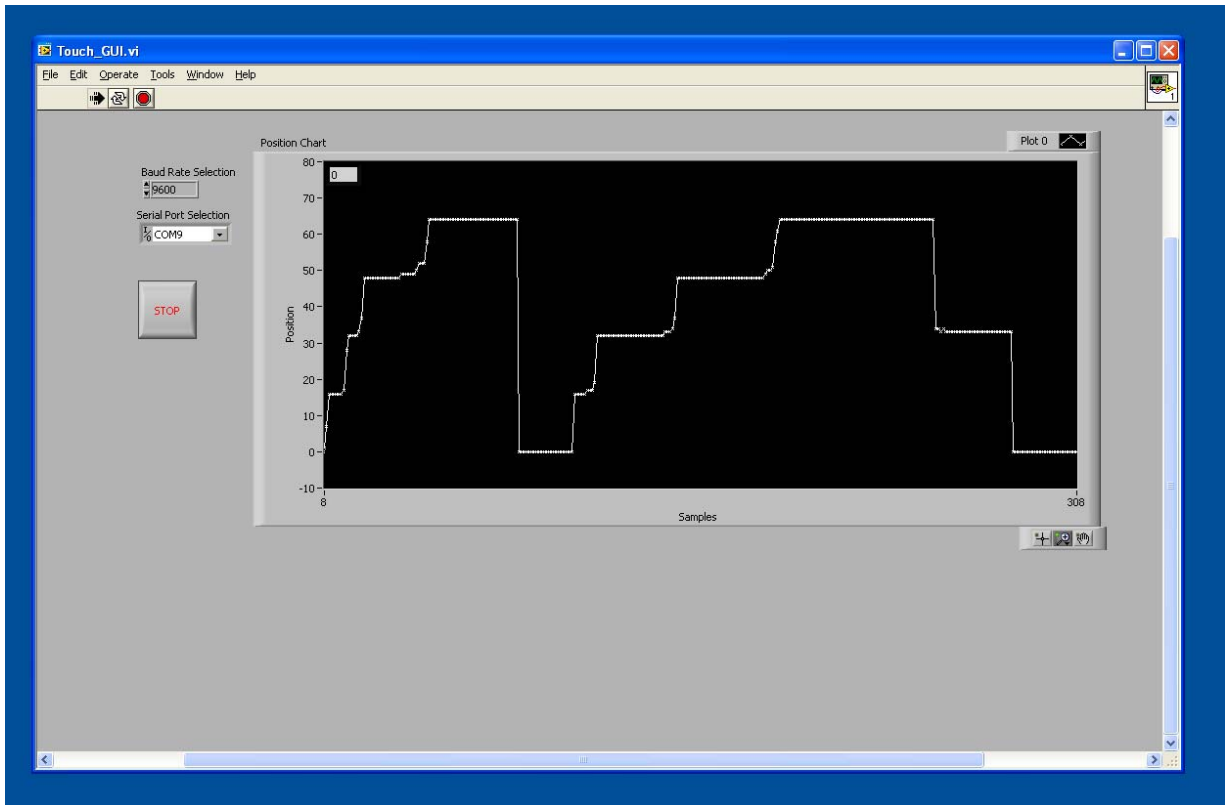
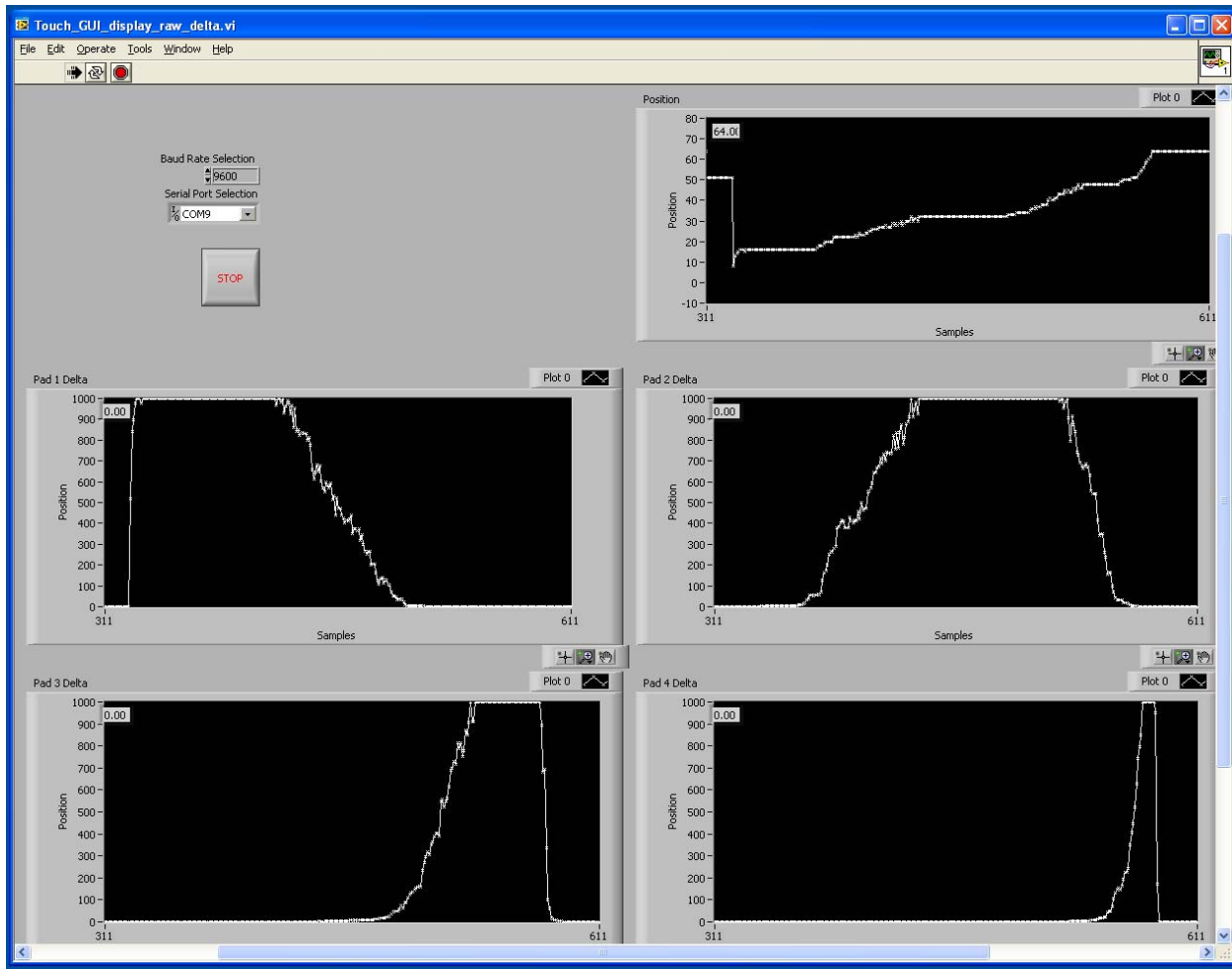


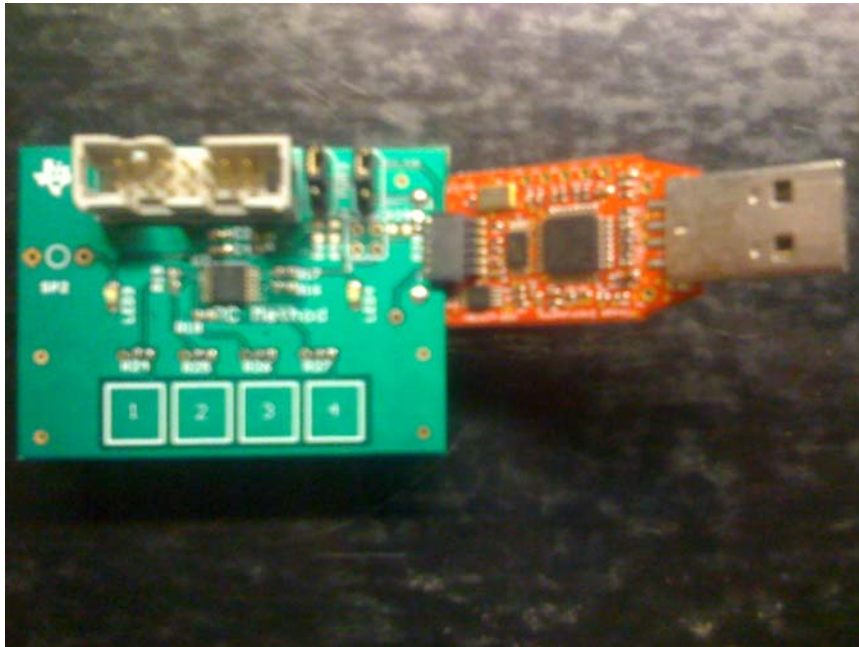
Figure 6. Slider display using SLAA363\_slider.exe and msp430x20x1\_RC\_TA\_UART Slider.c

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**Figure 7. Slider display using slider\_delta\_key\_display.exe and msp430x20x1\_RC\_Slider\_dataout12.c**





**Figure 8. EVM with eZ430-RF2500**