

User's Guide

USB-2-MDIO Software Tool



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ABSTRACT

The USB-2-MDIO software tool allows users of Texas Instruments' Ethernet™ PHYs to access MDIO status and control registers using an MSP430 LaunchPad™ interfaced with a lightweight GUI. This user's guide explains how to set up and use the USB-2-MDIO GUI for interfacing with Texas Instruments Ethernet PHYs.

Table of Contents

1 USB-2-MDIO Description	2
1.1 Components Needed for USB-2-MDIO Setup	2
2 Flashing MSP430 Launchpad	3
3 Hardware Setup	6
3.1 Power Sequencing	7
4 USB-2-MDIO Setup	8
4.1 Creating a Script	9
4.2 Opening and Running a Script File	9
4.3 Saving Data Results	10
5 Off-Board Flash Setup	11
6 Revision History	11

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1 USB-2-MDIO Description

The USB-2-MDIO software tool is used to configure the registers of a PHY using the MSP430 LaunchPad™. This development tool allows for simple hardware setup and software support for customers that do not have MDIO communication capability.

USB-2-MDIO allows access to all Texas Instruments' Ethernet PHYs that support MDIO bus serial management. USB-2-MDIO 2.0 allows users to read, write, script register read/write transactions and log data coming from the MDIO bus.

1.1 Components Needed for USB-2-MDIO Setup

An MSP430 LaunchPad can be required for use with this GUI and can be purchased at the TI eStore. The MSP430F5529 variant of the LaunchPad supports a range of VDDIO levels allowing communications with PHYs at 1.8V VDDIO (<https://store.ti.com/msp-exp430f5529lp.aspx>).

The following is a list of components that must be available for use of the USB-2-MDIO tool:

1. One [MSP430F5529 Launchpad](#)
2. A PC with the following installed or downloaded:
 - a. [USB-2-MDIO GUI](#) for register access
 - b. [Uniflash](#) for flashing the MSP430 launchpad
 - c. [MSP430 drivers](#) for interfacing with the MSP430 launchpad
 - d. [USB-2-MDIO firmware text file](#)
3. One USB to USB Micro-B cable to attach the PC to the MSP430 launchpad
4. Three socket-to-socket jumper wires
5. One Ethernet PHY platform with accessible MDC/MDIO (such as an EVM)

2 Flashing MSP430 Launchpad

For the GUI to properly work with the MSP430F5, the correct firmware needs to be installed on the microcontroller by following the procedure below.

1. Make sure the MSP430 launchpad is configured as shown in [Figure 2-1](#).

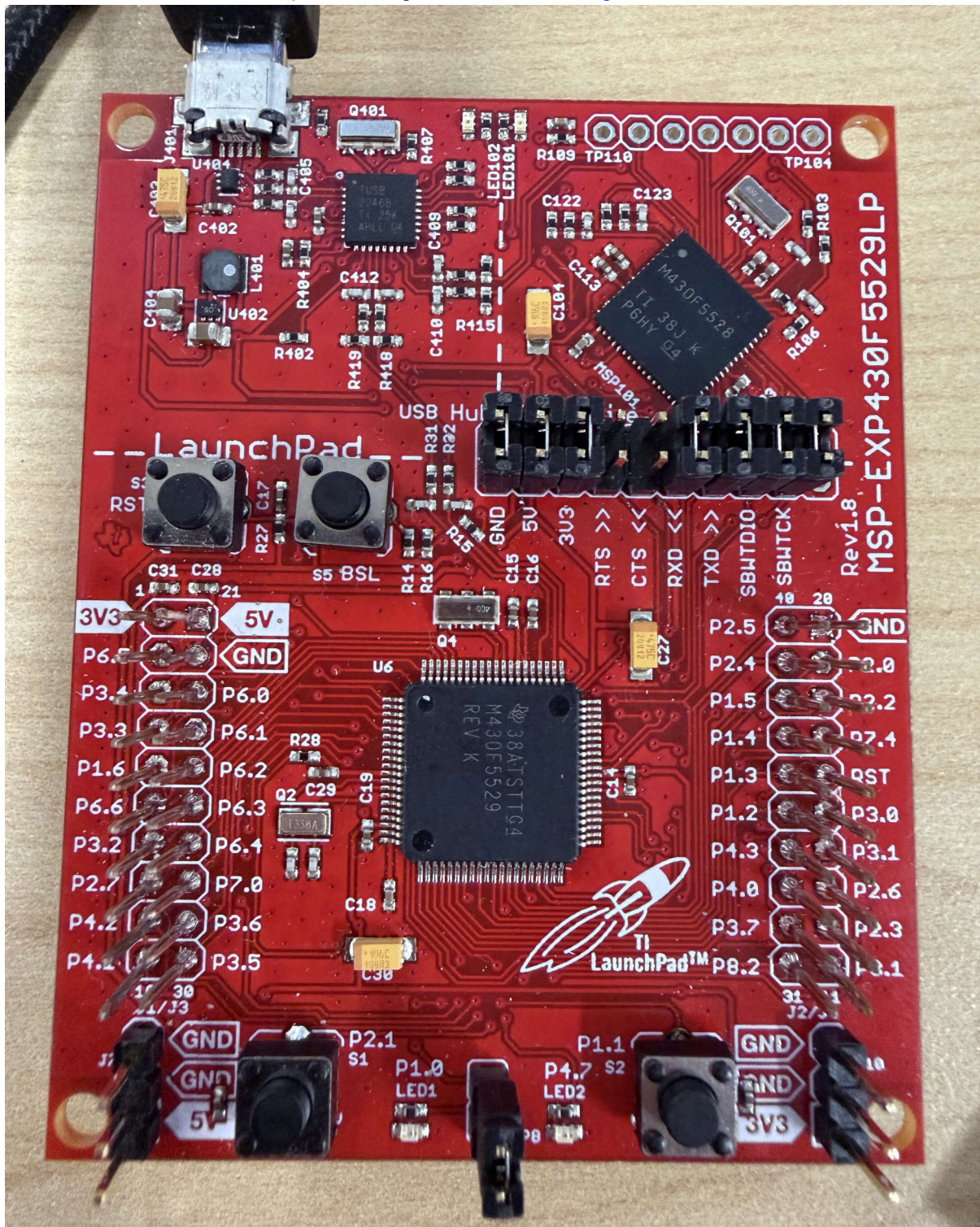


Figure 2-1. MSP430 Launchpad Configuration

2. Connect the MSP430 launchpad to a PC using a USB micro-B cable. Note that [MSP430 drivers](#) are required to properly connect the MSP430 LaunchPad.
3. Open Uniflash:
 - a. If the launchpad is detected under 'Detected devices,' press 'Start'
 - b. If not, manually configure by:
 - i. Searching 'F5529' and select MSP-EXP430F5529LP.
 - ii. Select TI MSP430 USB1 and press 'Start.'

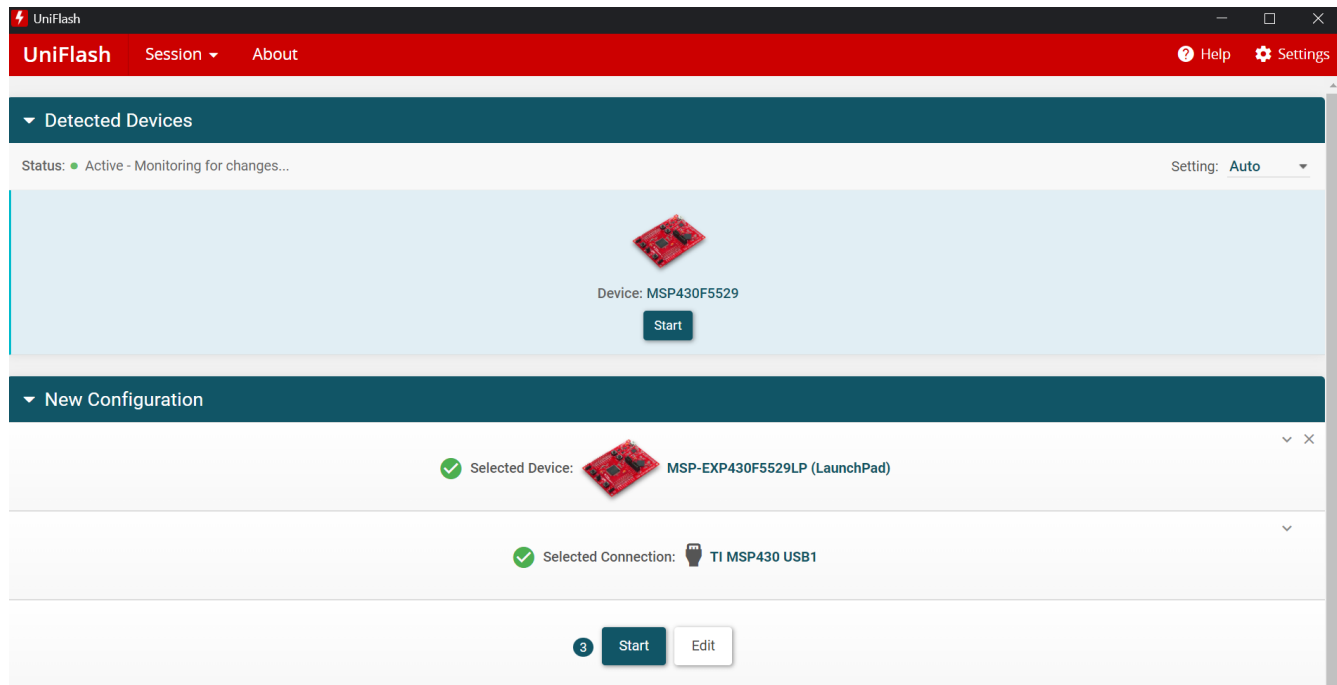


Figure 2-2. Uniflash Device Configuration

4. Load the [USB-2-MDIO firmware text file](#) by pressing 'Browse,' navigating to this file, and selecting 'Load Image.'
 - a. If prompted to update or flash EZ-FET, do so. MSP flashing follows shortly after.
5. After successfully loading the image, device manager must show three COM ports when the MSP430 launchpad is connected. The correct COM port for USB-2-MDIO to target is shown as 'USB Serial Device.'

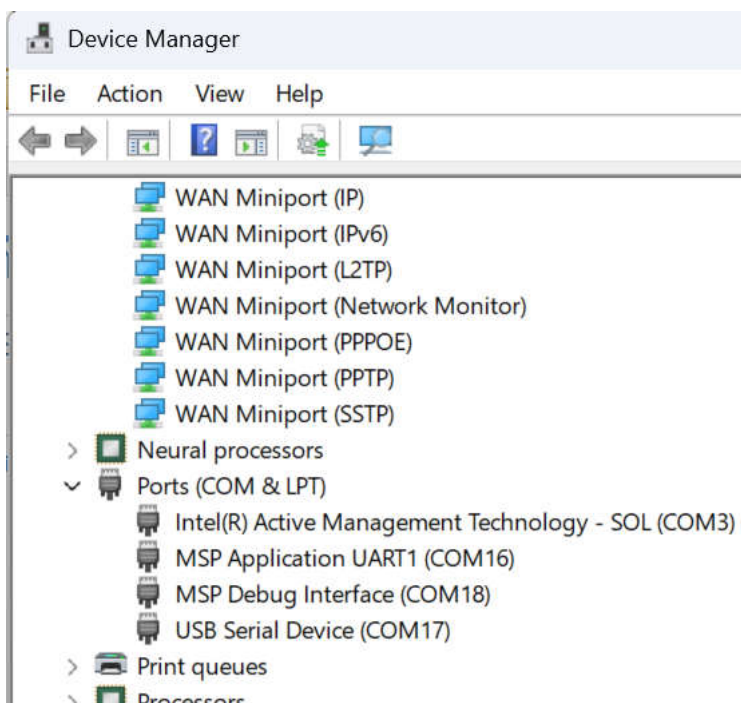


Figure 2-3. Flashed MSP430 COM Ports

The launchpad is now flashed correctly for USB-2-MDIO. Power cycling the launchpad can help to show the correct target COM port if not seen after flashing.

3 Hardware Setup

The MSP430F5 Series LaunchPad is capable of interfacing with a range of I/O voltages (3.3V to 1.8V). The MSP430F5 Series LaunchPad pin configurations are as follows:

- MDIO (EVM) Connect to P4.2 (LaunchPad)
- MDC (EVM) Connect to P4.1 (LaunchPad)
- GND (EVM) Connect to GND (LaunchPad)

Figure 3-1 illustrates the pin configuration connections on the board.

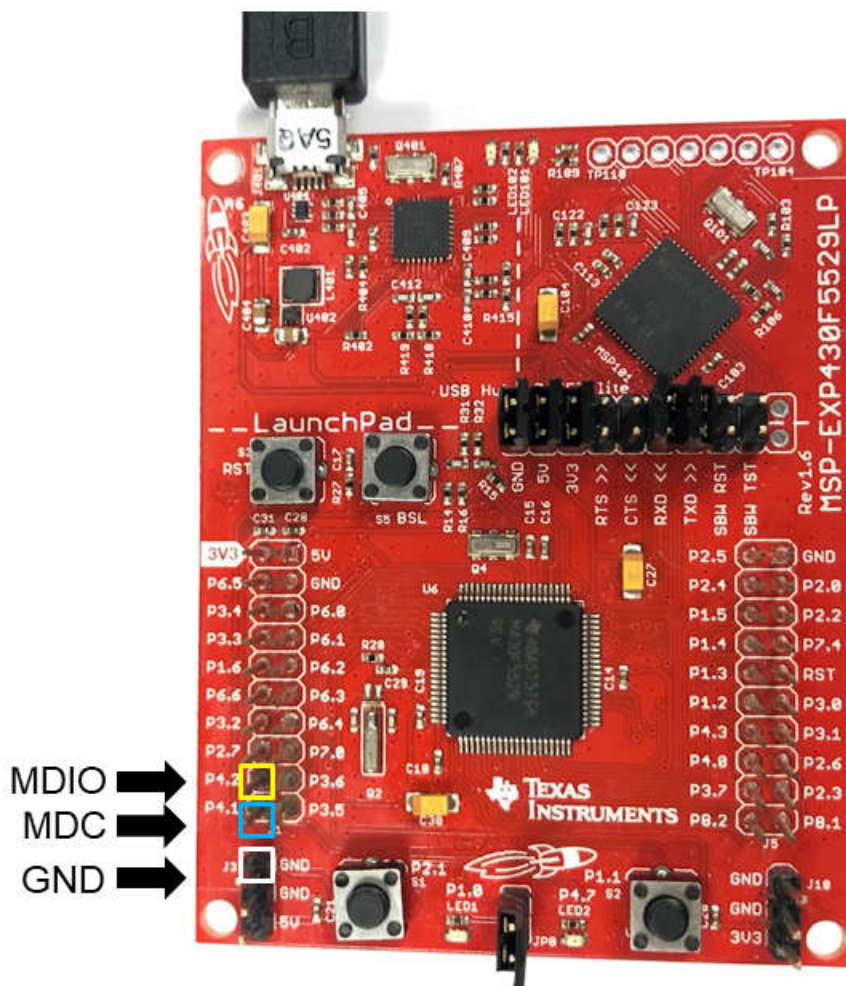
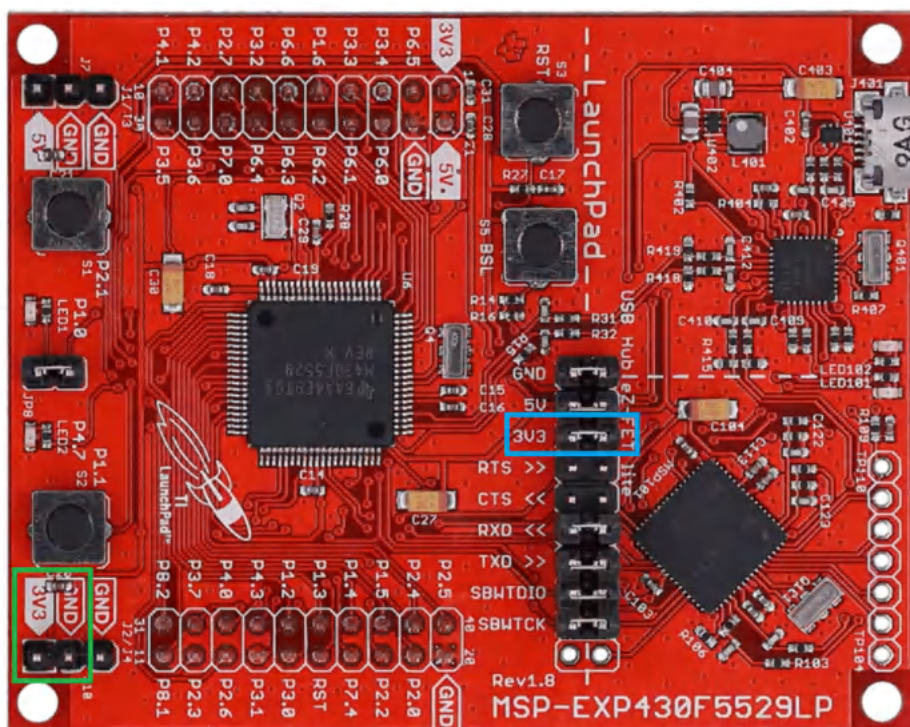


Figure 3-1. MSP430F5 LaunchPad™ Connections: MDC to P4.2 , MDIO to P4.1, and GND

These connections can be made with three socket to socket jumper wires between the MSP430 launchpad and an EVM. TI recommends to make these connections first, then power up the PHY EVM, then connect the MSP430 launchpad to a PC.

This configuration is sufficient for 3.3V and 2.5V PHY I/O voltages. For 1.8V I/O compatibility, disconnect the 3.3V on-board LDO supply from the MSP430 and supply an external 2.1V on the 3.3V Net as shown in [Figure 3-2](#):



Disconnect 3.3V jumper
Externally supply ~2.1V and GND

Figure 3-2. 1.8V I/O Connection

If the COM port does not appear in device manager when powering the MSP430 launchpad for 1.8V I/O compatibility, slowly increase the external supply. The COM port can appear around 2.1V or 2.2V.

3.1 Power Sequencing

The recommended power sequence for establishing a connection between the MSP430 launchpad and a PHY platform (such as an EVM) is shown below:

1. Make sure the MDIO, MDC, and GND connections between the MSP430 launchpad and the EVM are in-place.
2. Power the EVM, verifying the PHY is powered.
3. Power the MSP430 launchpad by connecting the launchpad to a PC through USB cable.

The USB-2-MDIO firmware has logic to scan and softlock if a PHY does not initially respond on the MDIO/MDC bus. Following the above power sequence prevents this condition.

4 USB-2-MDIO Setup

The USB-2-MDIO GUI allows communication to 32 different PHY IDs, register access to extended registers and standard registers, running scripts, and saving register data. After the above flashing and hardware connections have been completed, follow the procedure below to enable register access through USB-2-MDIO:

1. Open USB-2-MDIO and navigate to 'Settings.'
 - a. Set the COM port as the 'USB Serial Device' COM port that appears in device manager.
 - b. Set the Baud rate to 9600.

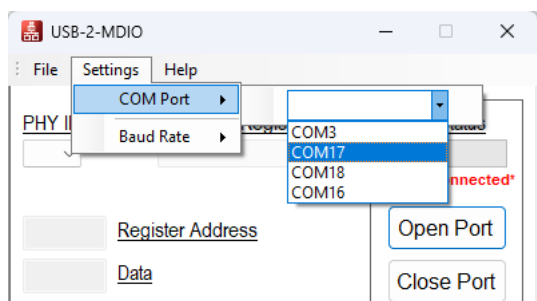


Figure 4-1. USB2MDIO Settings

2. Press the 'Open Port' button. The port status panel shows 'HW Connected.'
3. Open the PHY ID dropdown and select the PHY MDIO/MDC address to target.
4. Enter the register address to read within the Register Address text field. This must be a 4-digit hex value, such as 0000.
5. Press the 'Read' button. The bottom text panel shows the value contained within the register.

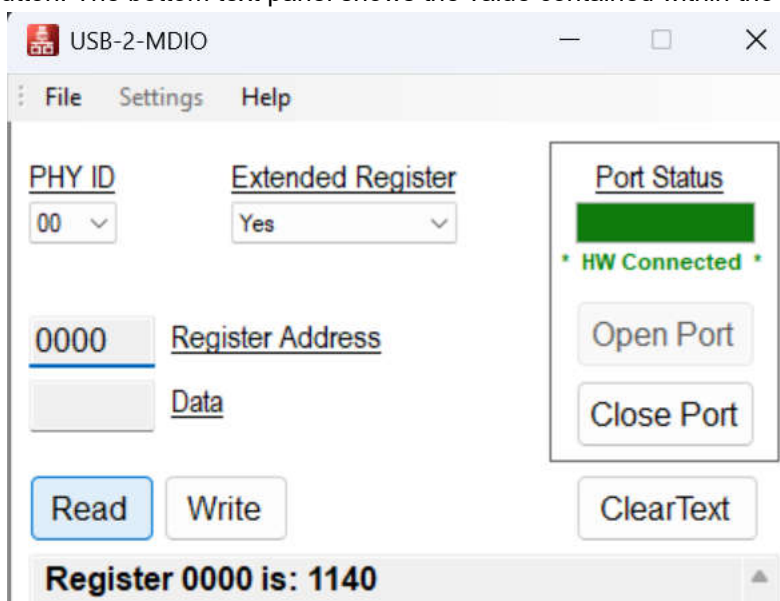


Figure 4-2. USB2MDIO Read

6. To write to a register, enter the register address within the Register address text field and enter the value to be written in the 'Data' text field.
7. Press the 'Write' button. The bottom text panel shows the new value contained within the register.

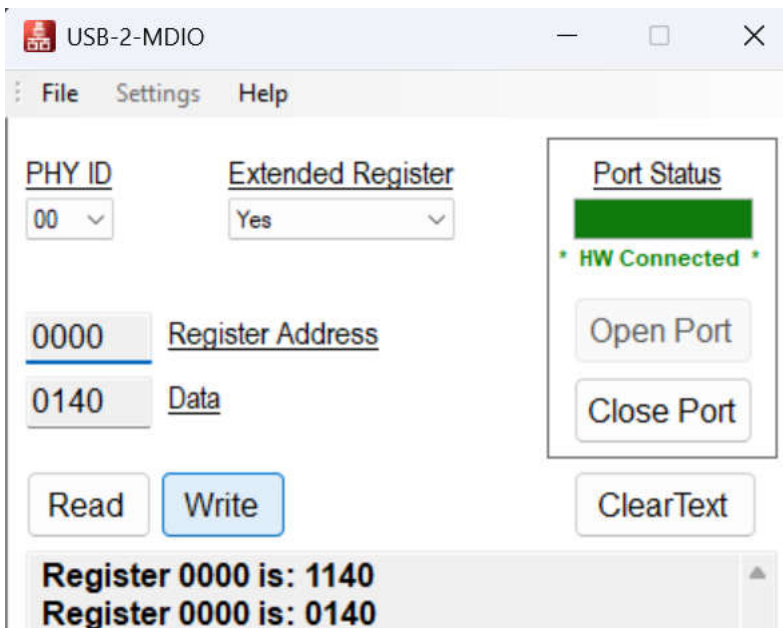


Figure 4-3. USB2MDIO Write

If the bottom text panel shows an error when reading or writing registers, verify the COM port and PHY address are set correctly. If these checks do not show issues, restart the USB-2-MDIO software and power cycle the MSP430 launchpad. Restarting the PC can help as well.

4.1 Creating a Script

USB-2-MDIO supports scripts for rapid register configuration. Scripts are created in a .txt format, where each line of text represents one read or write operation. Below is an example of how a USB-2-MDIO script is implemented.

```
//Example USB-2-MDIO Script
begin
0000 0140    //write 0x0140 to register 0x0000
0001        //Read register 0x0001
end
```

As shown in the above example, register operations begin with the 4-digit hex value of the register to be written to or read from. USB-2-MDIO interprets the operation as a read if only a register value is present on a line of text. If a register value is followed by a 4-digit data value, USB-2-MDIO interprets this as a write operation.

4.2 Opening and Running a Script File

To run a script file in USB-2-MDIO, navigate to File > Open at the top of the GUI. Select the .txt file containing the script to be run. Upon selection, the script must immediately run in the GUI, placing register data in the bottom text panel.

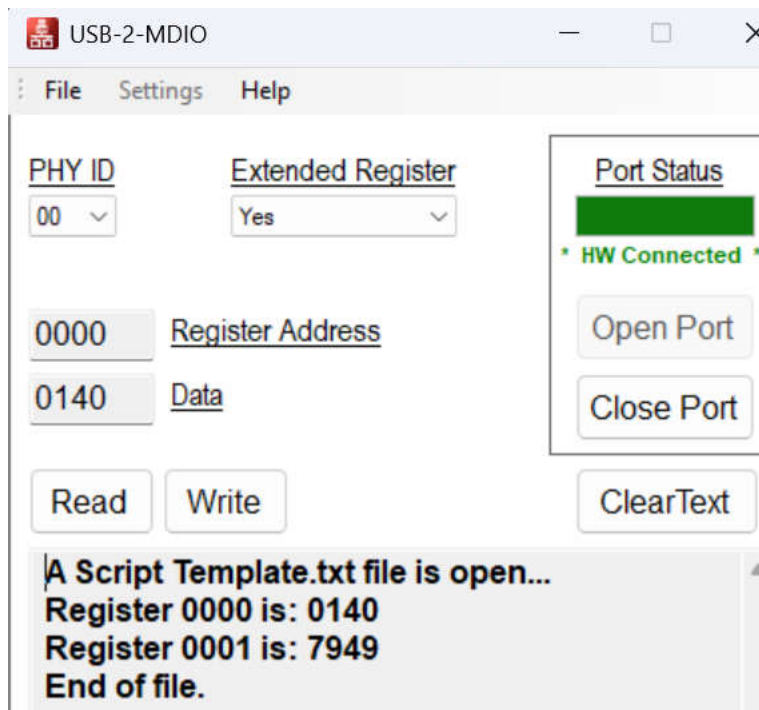


Figure 4-4. USB2MDIO Script Output

4.3 Saving Data Results

Saving data from a USB-2-MDIO session is done by copying text within the bottom text panel of the GUI. This text panel records register values until the 'ClearText' button is pressed within the GUI. Alternatively, navigate to File > Save to save data from the bottom text panel.

5 Off-Board Flash Setup

To flash an off-board MSP430 (such as the MSP430 on an Ethernet PHY EVM) using the MSP430F5 Series LaunchPad, connect the MSP430F5 LaunchPad to the EVM with the following configurations:

- 5V_MAX (EVM) to eZ-FET (LaunchPad)
- RST (EVM) Connect to RST (LaunchPad)
- TEST (EVM) Connect to TST (LaunchPad)
- GND (EVM) Connect to GND (LaunchPad)

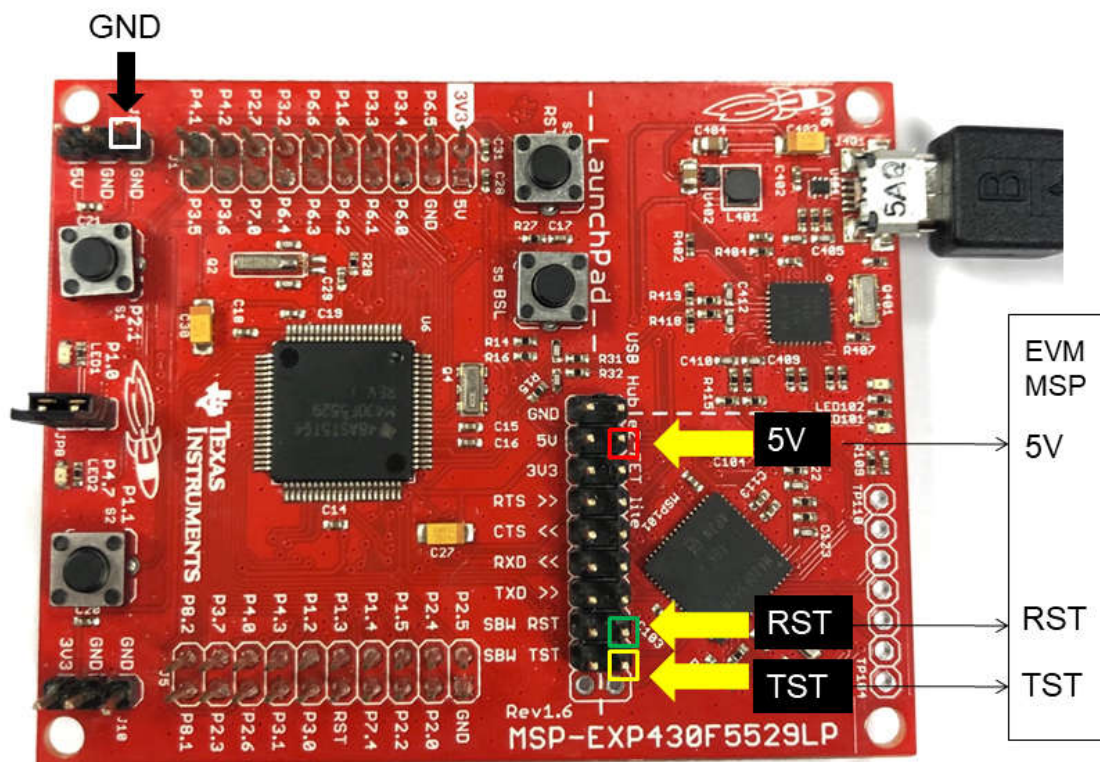


Figure 5-1. MSP430F5529LP LaunchPad™ Connections for Off-Board Flashing

6 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Revision * (February 2016) to Revision A (August 2026)	Page
• Updated document stylesheet in accordance with latest TI User's Guide standards.....	1
• Added <i>Abstract</i> section.....	1
• Added <i>Components Needed for USB-2-MDIO Setup</i> section.....	2
• Added Figure 2-1 in <i>Flashing MSP430 Launchpad</i> section.....	3
• Added <i>Creating a Script</i> section.....	9
• Added <i>Opening and Running a Script File</i> section.....	9
• Added <i>Saving Data Results</i> section.....	10
• Deleted <i>Flashing MSP430G2 LaunchPad</i> section	11

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Last updated 10/2025