EE 444/645

Lab #6: MSP430 – Low Power Modes

Report due: 3/30/2023 by 2:00 pm

Introduction

The main goal of this lab is to learn more about the MSP430 power modes.

Equipment:

CrossStudio for MSP430, TI MSP-EXP430F5438 Experimenter Board, Multimeter

Procedure:

Write a program that goes through all power modes (LPM0, LPM1, LPM2, LPM3, LPM4, and Active Mode) at least once. The MCLK should be as close to 1 MHz as possible. The program should enter the next state each time the user presses one of the buttons on the experimenter board (if you know that your board has a good button, pick that one). To make sure the program works before you start measurements, make sure you can tell if the program is still alive (for example, blink the LED several times at the beginning of the program), and that you know that it is still going through the sequence (for example, blink the LED the number of times that corresponds to the LP mode you are entering).

Once you are convinced that program works, do everything you can (pins, clock sources, clocks on demand, etc.) to lower the power consumption. If necessary, re-read the appropriate sections from the MSP430 documentation (see the slides of Set 6 beginning with "Here's what TI says about low power"). How low can you go?

Still working? Great. Stop the project and follow the rest of the instructions carefully:

- Remove the JP1 jumper (430 PWR) and connect a multimeter instead so we can measure the current draw of the MSP430 microcontroller.
- Right-click on your project in the "Project Items" window and select "Properties." In the window that opens find "Target" in the left part of the window and click on it. In the right half of the window find "Release JTAG" and set it to "YES".
- Click on Target → Reset MSP-FET430UIF(V3)
- Comment on the results in your report. Are they what you expected to see after reading about low power modes and checking the datasheet for the MSP430F5438a?

NOTES:

- When using an external crystal, make sure it stabilizes at the beginning of your program

General Requirements:

1. The report should include all the programming files you wrote, all the measurements performed, answers to questions, detailed description of the program and the procedures used in completing this task.
2. Write a detailed report explaining what you have learned while working on this lab assignment and what steps you took to ensure the lowest current draw. Follow the template provided on Blackboard.
3. The code should be reasonably commented.

<p align="center"><strong style="color:red">PLEASE PUT THE JP1 JUMPER BACK</p>