

Atmel SAM4L Xplained Pro – LCD and Light Sensor

ELC 4438 Lab Manual

February 8th, 2016

1. Download ATSAM4L Datasheet
http://www.atmel.com/Images/Atmel-42023-ARM-Microcontroller-ATSAM4L-Low-Power-LCD_Datasheet.pdf

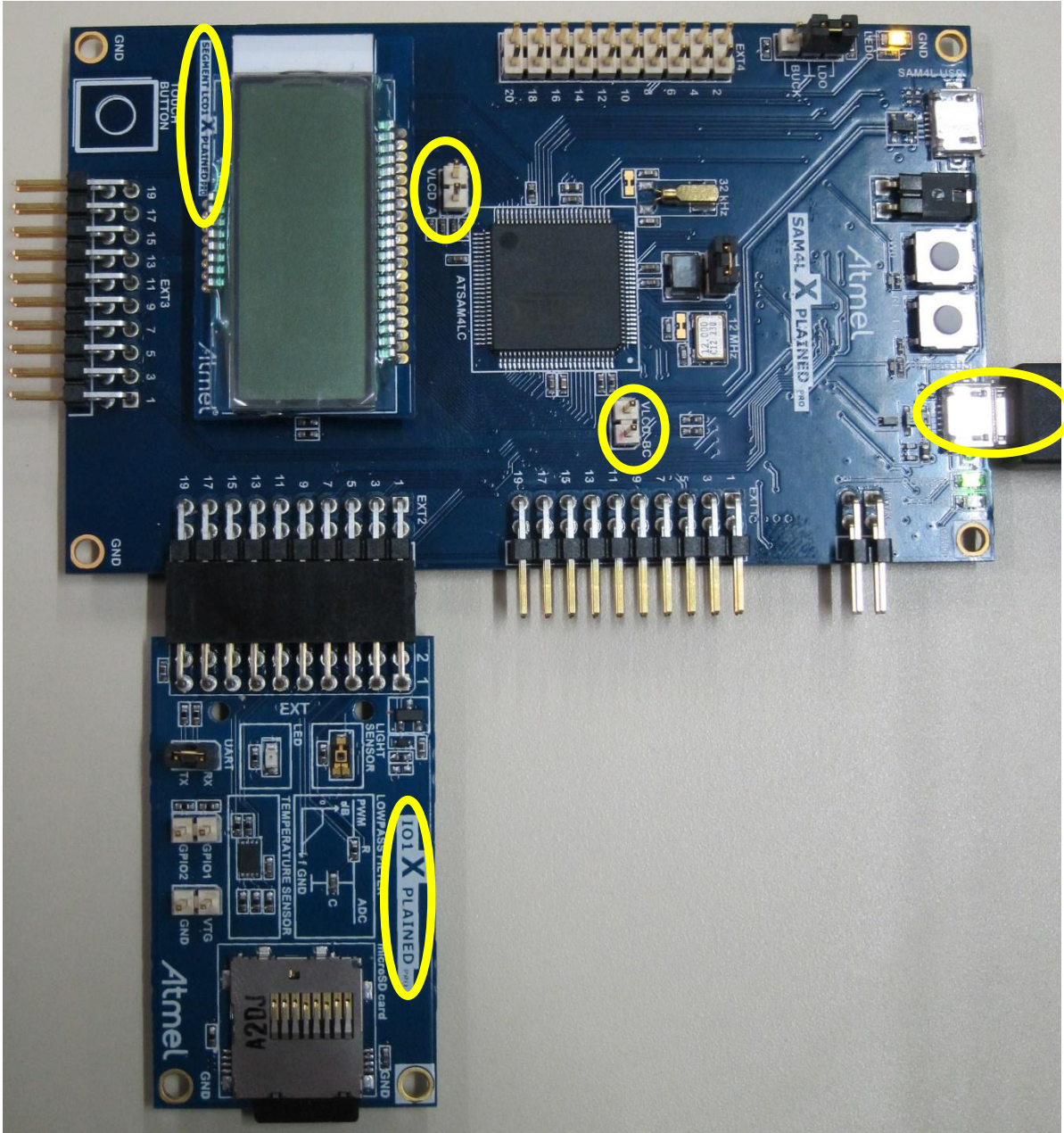
Refer to Chapter 23 about General-Purpose Input /Output Controller (GPIO), and refer to Chapter 39 about LCD Controller (LCDCA).

2. Read the user guide of **IO1 Xplained Pro board**
http://www.atmel.com/images/atmel-42078-io1-xplained-pro_user-guide.pdf

Download and read its schematic file

http://www.atmel.com/images/Atmel-42078-IO1-Xplained-Pro_User-Guide.zip

3. Open **Atmel Studio 6.2**.
Connect the Atmel SAM4L Xplained board with Atmel **IO1** and **SEGMENT LCD1** boards.
Take off **VLCD A** and **VLCD B** jumper.
Connect the Atmel board with the PC through **DEBUG USB**.
(See figure on the next page.)
4. Click **New Example Project** in the **Atmel Studio 6.2** (you can directly click the “New Example Project” link on the SAM4L Xplained Pro page).
Click on the small triangle before Atmel-Atmel Corp to see all available examples.
Choose **C42412 Display LCD Glass Example – SAM4L Xplained Pro**. Click **OK** to create this example.
Accept the license agreement and wait for the example to be created.

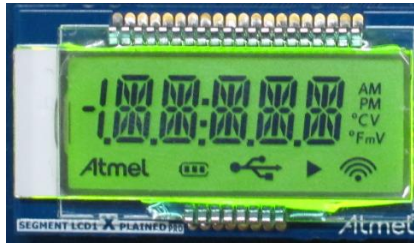


5. Click **No tool** on the menu toolbar and select **EDBG** for Selected debugger/programmer in the Tool Tab.

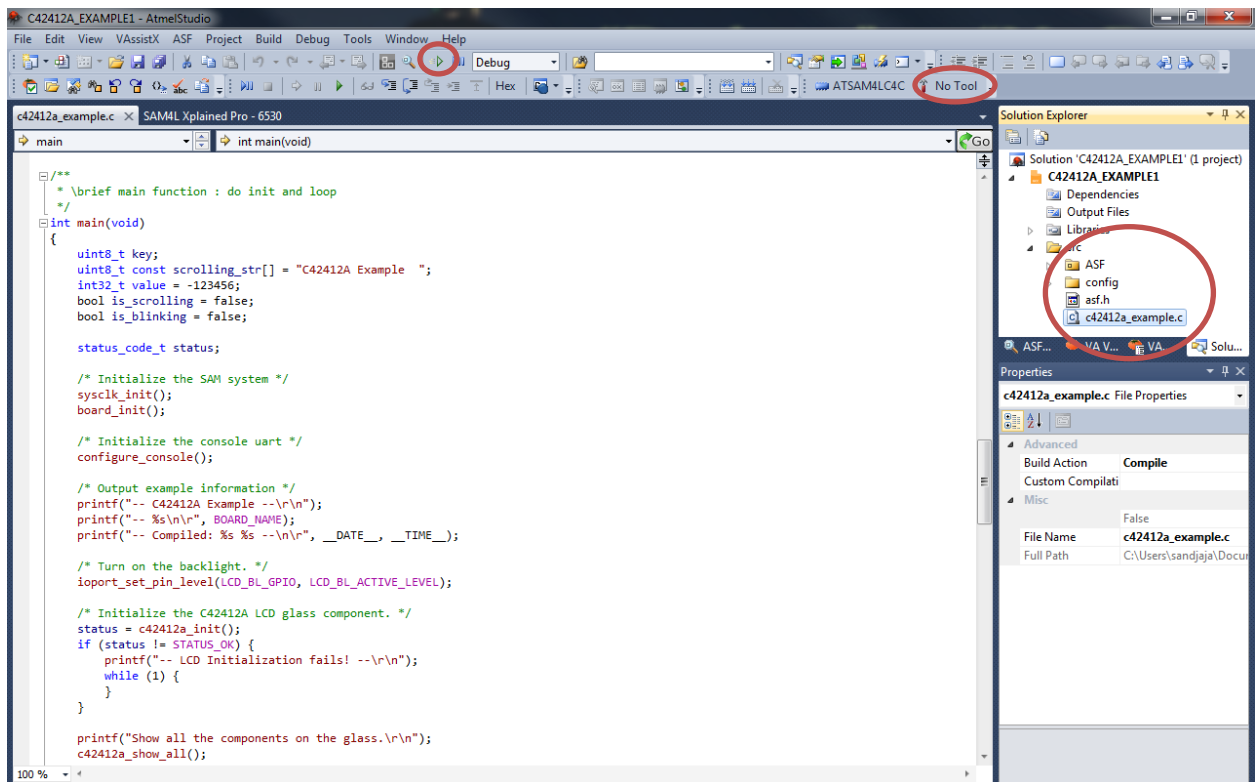
Open a PuTTY terminal on the PC.

Click **Start without debugging** (green triangle) in the menu toolbar.

6. The program will turn on all LCD segments and icons and wait for any keypress to continue.

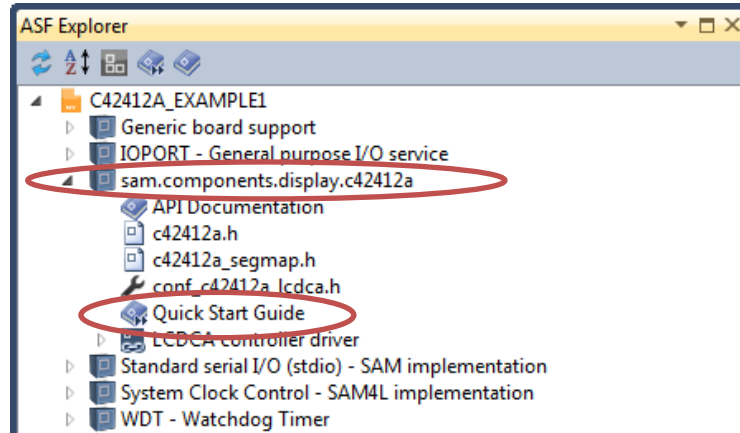


If you press any key in a PuTTY terminal, you will see the Menu. Try all options in the menu.



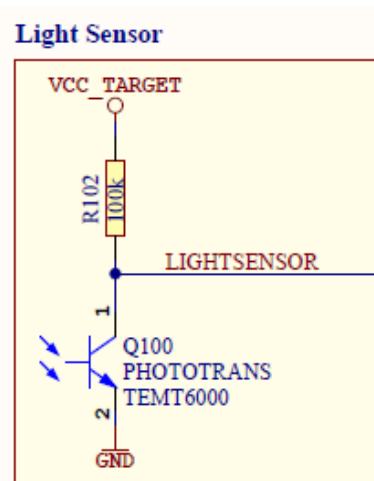
- Open and read the source code in Solution Explorer – src directory – **c42412a_example.c**. Briefly understand how the program works. Trace back all its implementations (**c42412a_lcdca.c**).

In **ASF Explorer**, open and read **Quick Start Guide** and **API Documentation** for **sam.components.display.c42412a**.



- Take input of the Light Sensor on the IO1 Xplained Pro board. Read the user guide of **IO1 Xplained Pro board** and find out what pin the light sensor is connected to. Be aware that some pins have shared function.

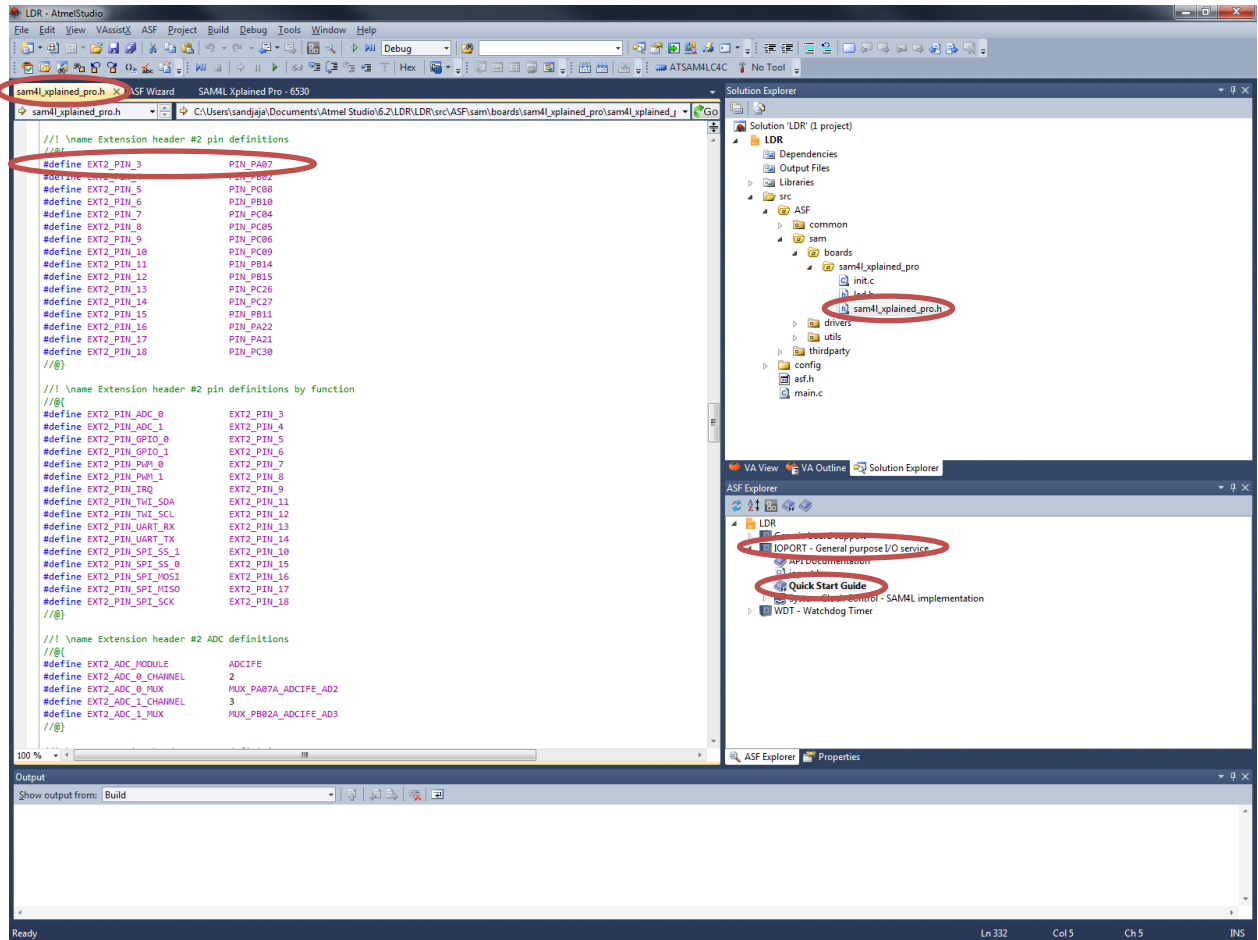
The light sensor acts like a switch or a button. When the sensor senses the light, Pin 1 and Pin 2 of Q100 PHOTOTrans will be connected (short circuit). If the light is blocked from reaching the sensor, Pin 1 and Pin 2 of Q100 PHOTOTrans will be disconnected.



9. Create a new project for the board that turns on LED0 when light is detected at Light Sensor.

See the definitions of all pins of all ports in `src` directory – `sam – boards – sam4l_xplained_pro.h`.

In **ASF Explorer**, refer to **IOPORT – General purpose I/O service - Quick Start Guide** to see how to initialize the pin as input and how to read the value of the pin.

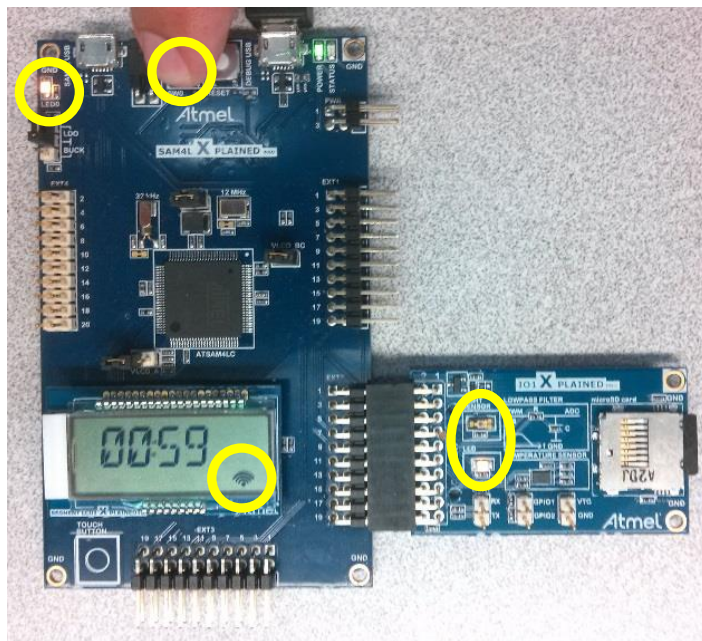


Show your programming result, i.e. LED0 controlled by Light Sensor, to your TA.

10. Now, you can take input from the light sensor on the IO1 Xplained Pro board. Let us use it to control the LCD output of the Segment LCD1 Xplained Pro board.

Create a program that can do the following.

- 1) When the program starts running, your group members' name is shown scrolling on the LCD screen;
- 2) When the light sensor detects light, the "WiFi icon" on the LCD blinks from a dot into "full signal power" and both LED0 on SAM4L Xplained Pro board and LED on IO1 Xplained Pro board are turned on;
- 3) When SW0 is pressed, the "play icon" is shown and a digital stopwatch starts counting on the LCD. You can use *Timer Counter* or *SysTick* in the code to program the digital stopwatch.



Show your programming results to your TA.