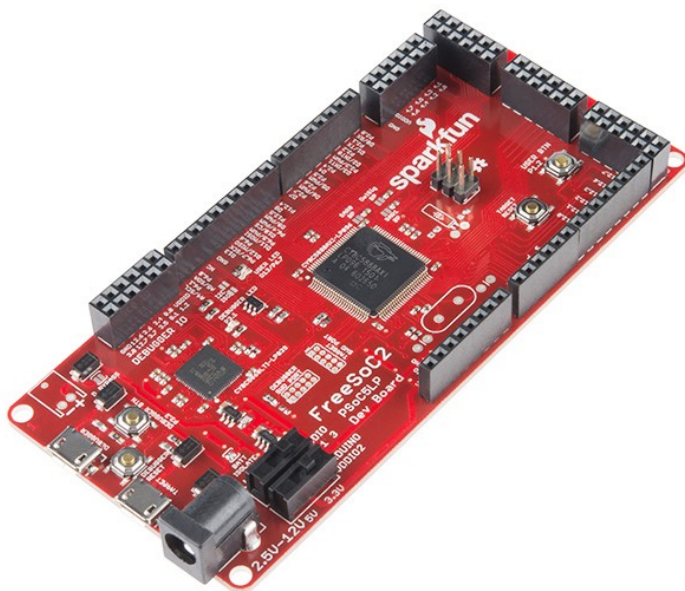




2016

Pulse Width Modulation (PWM) in FreeSoc2 (PSoC 5LP) using PSoC Creator



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Version: 1.0

Introduction:

The FreeSoC2 micro-controller based on the PSoC 5LP (Programmable System on a Chip) brings together features of the programmable devices and micro-controller-type systems on chips into one package. By placing a programmable fabric between the peripherals and the pins, the FreeSoC2 allows any function to be routed to any pin! Moreover, the on-board PSoC includes a number of programmable blocks which allow the user to define arbitrary digital and analog circuits for their specific application. To get the most out of the device, you will need to use the PSoC Creator IDE.

Step 1: Open PSOC creator IDE.

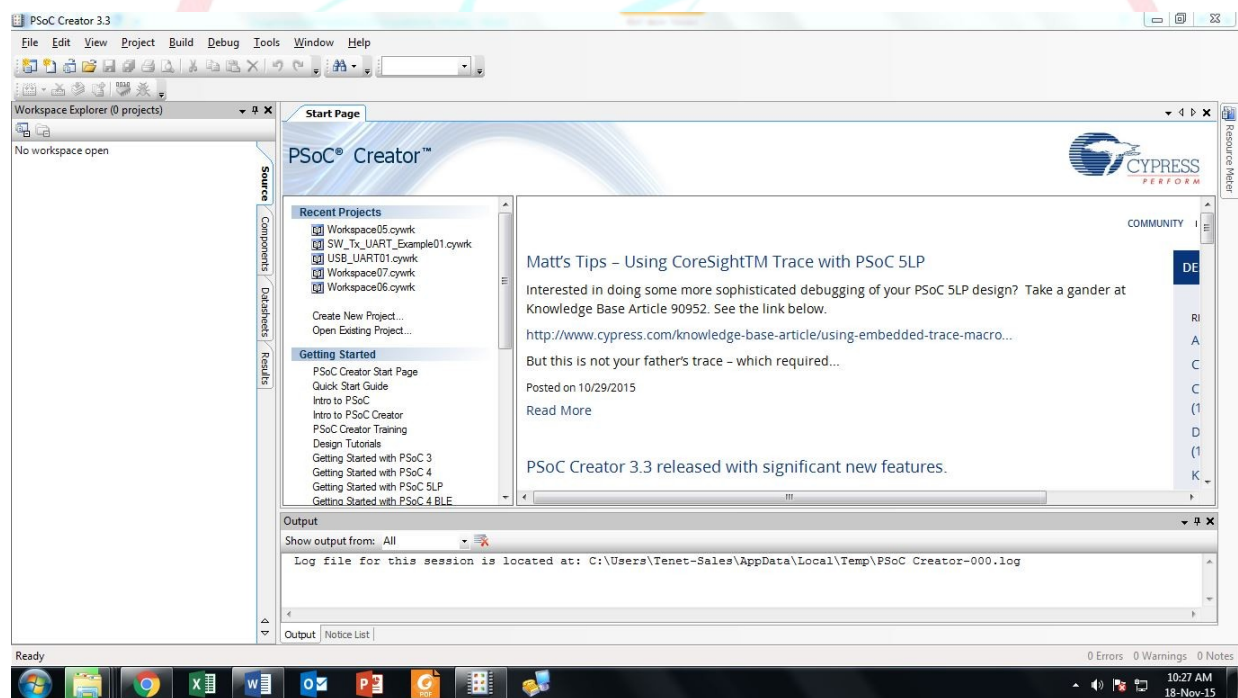


Figure 1

Step 2: File-> new project -> design -> PSoC 5LP design & save with desired name.

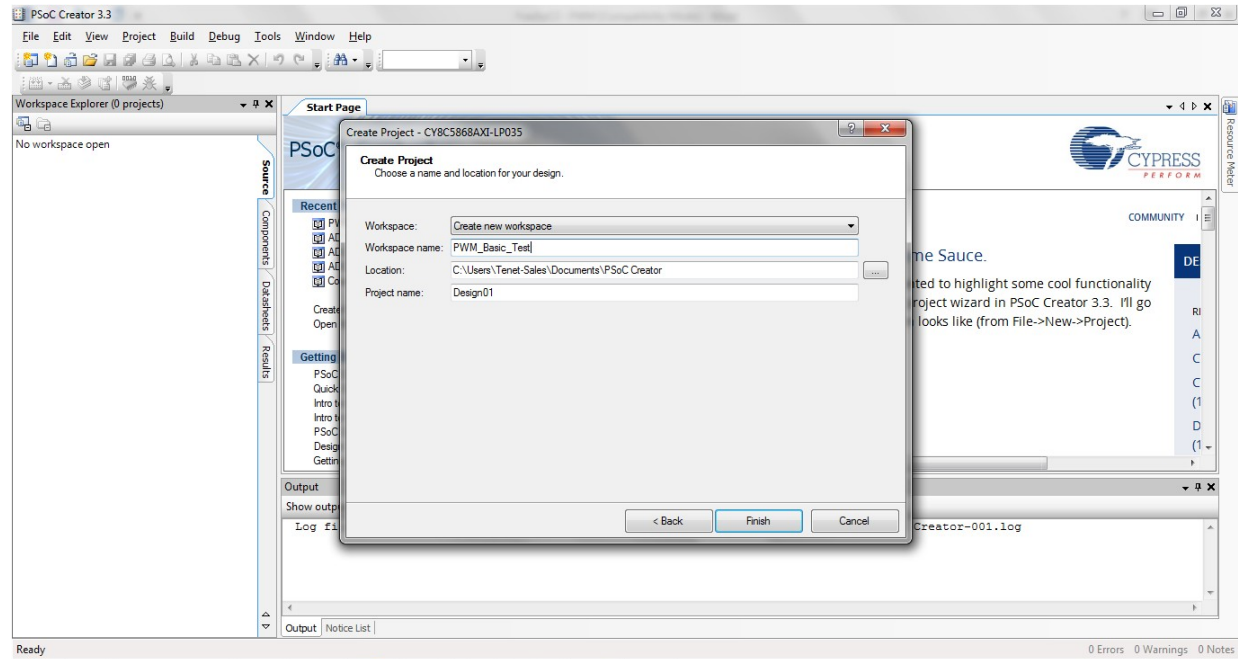


Figure 1

Step 3: Open TopDesign.cysch from workspace explorer.

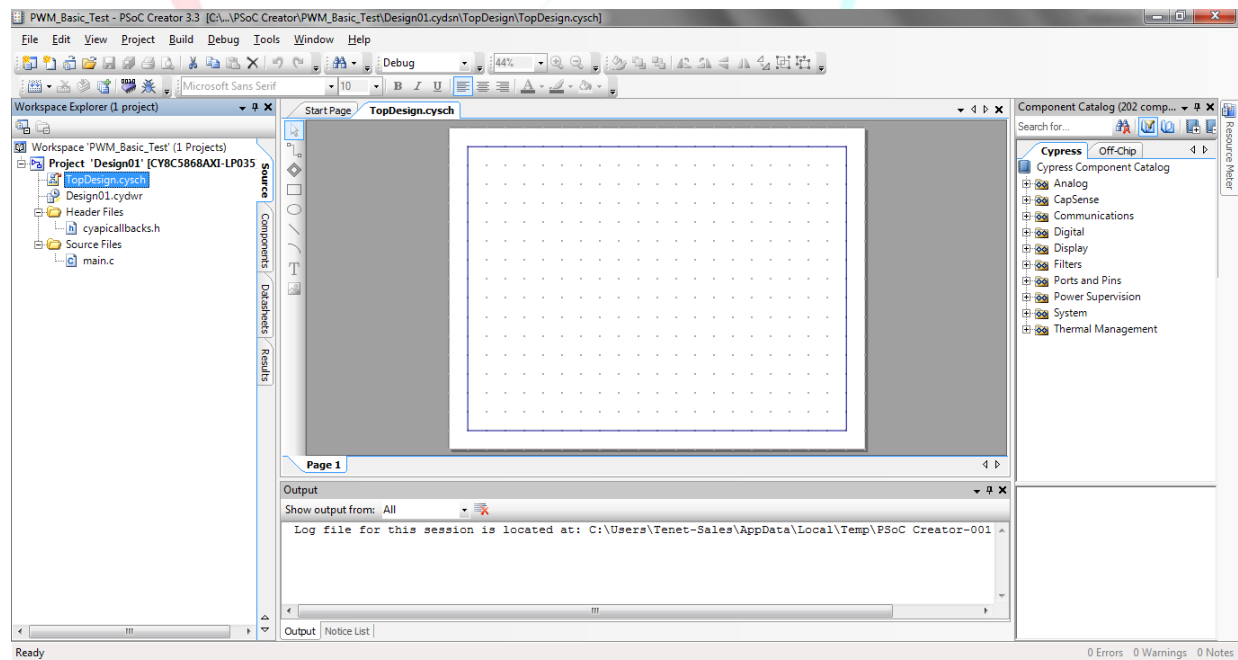


Figure 2

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Step 4: Search for a PWM block from Component catalog on right side of the window. The PWM component provides compare outputs to generate single or continuous timing and control signals in hardware. Drag the PWM block onto the workspace. Double click on the PWM block and change the name if you wish to. Configure it as shown below and in advanced configuration disable interrupts.

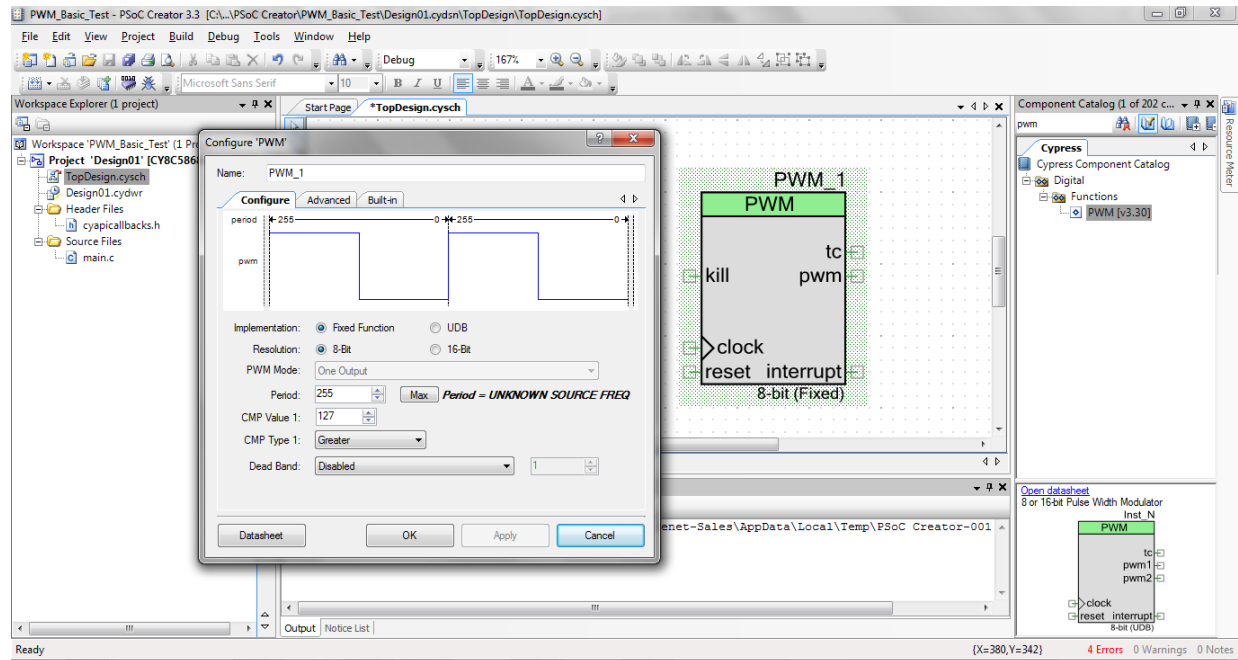


Figure 3

Step 5: Drag Logic low block, Digital pin and clock on to the workspace. Configure the clock as 1KHz.

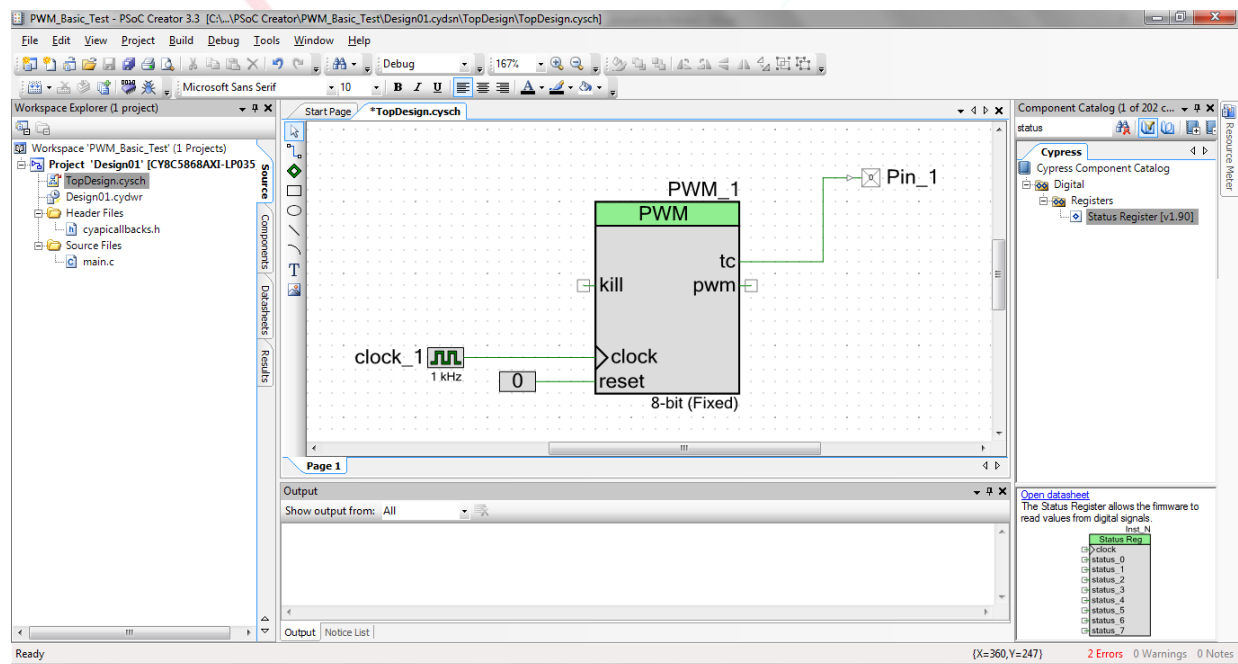


Figure 5

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Step 6: Similarly drag Control Register block on to the workspace and configure it to single output. The Control Register allows the firmware to output digital signals. In this it is used to enable the kill input.

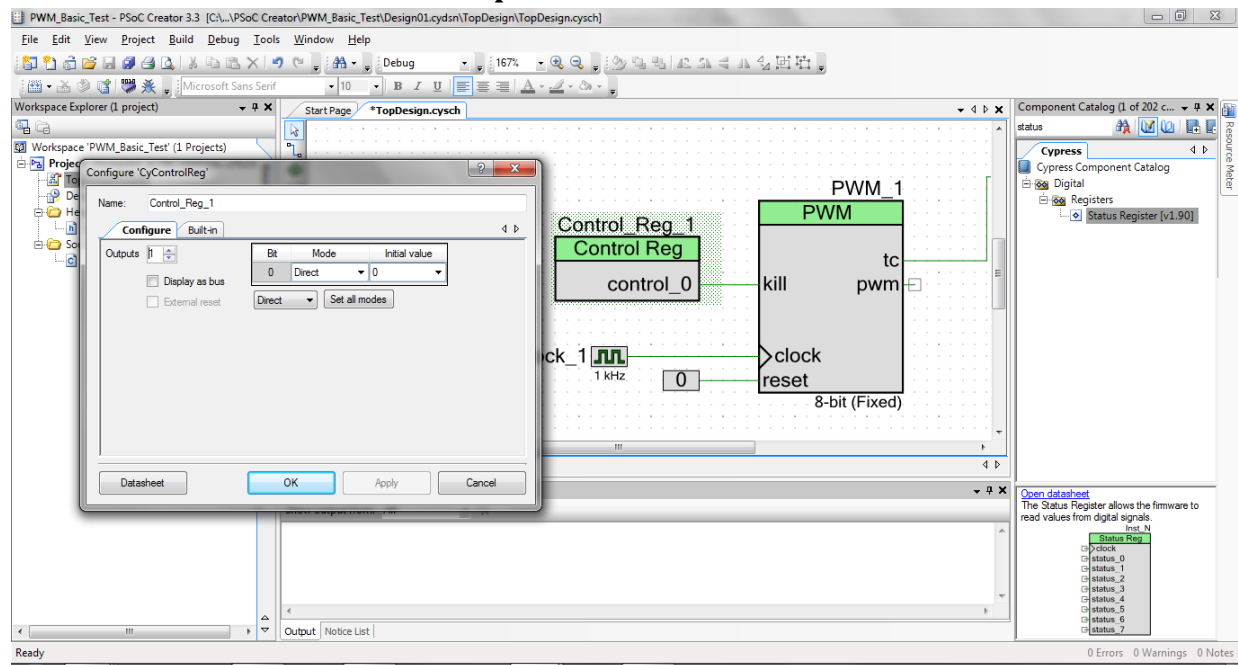


Figure 6

Step 7: Drag Status Register block on to workspace and configure it as single input. The Status Register allows the firmware to read digital signals. In this it is used to read the status of the PWM output.

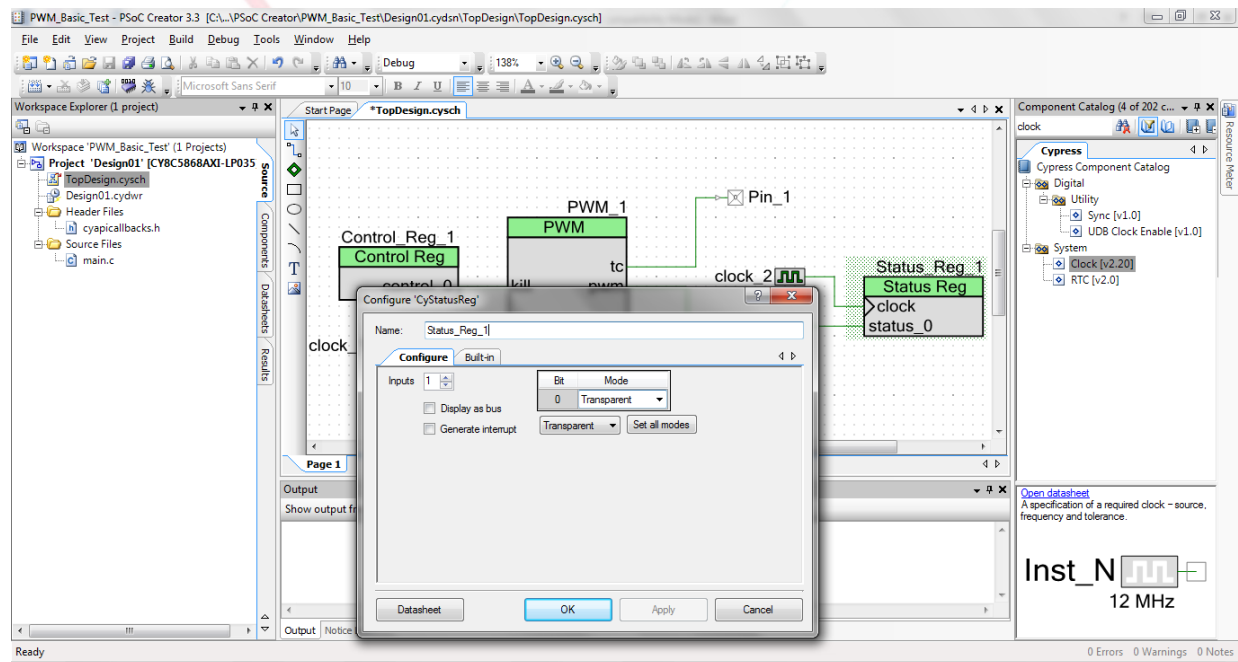


Figure 7

Step 8: Finally drag Character LCD from component catalog onto workspace. The Character LCD component is used to display current Period, Compare value and the current status of PWM output. After configuring build the project. As we can generate user-defined APIs which will ease us while writing code. We can see APIs generated in the Workspace Explorer on the left side of the window.

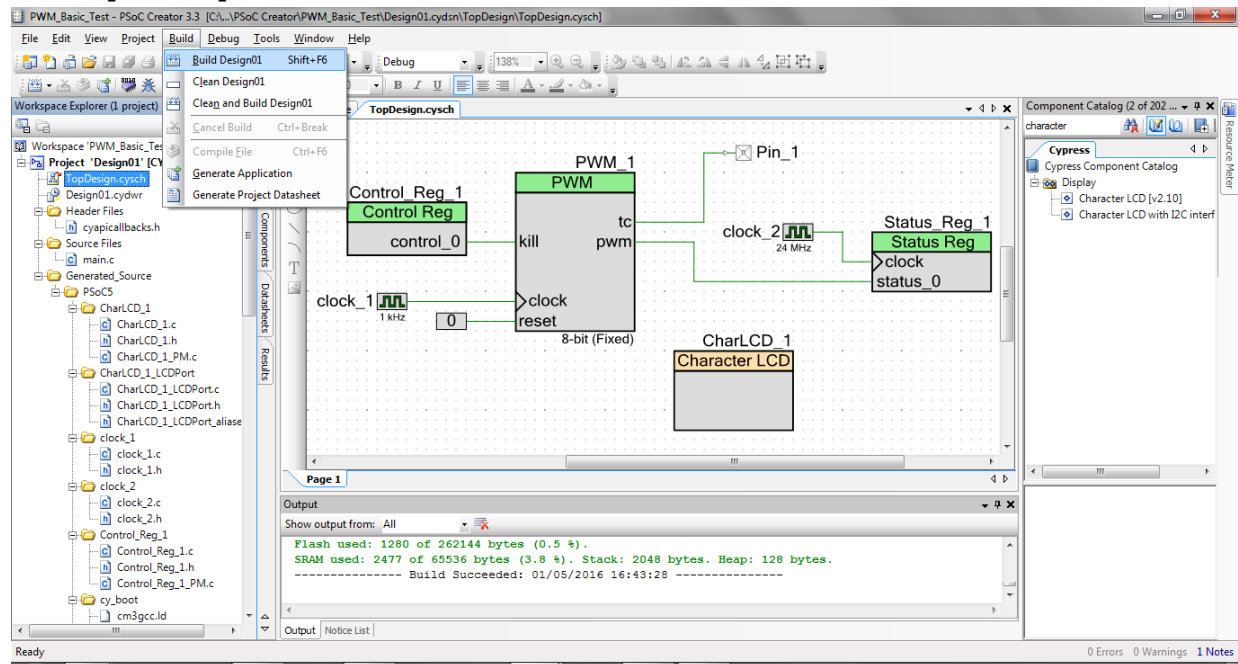


Figure 4

Step 9: Click on main.c from Workspace Explorer. Write the code and Build it.

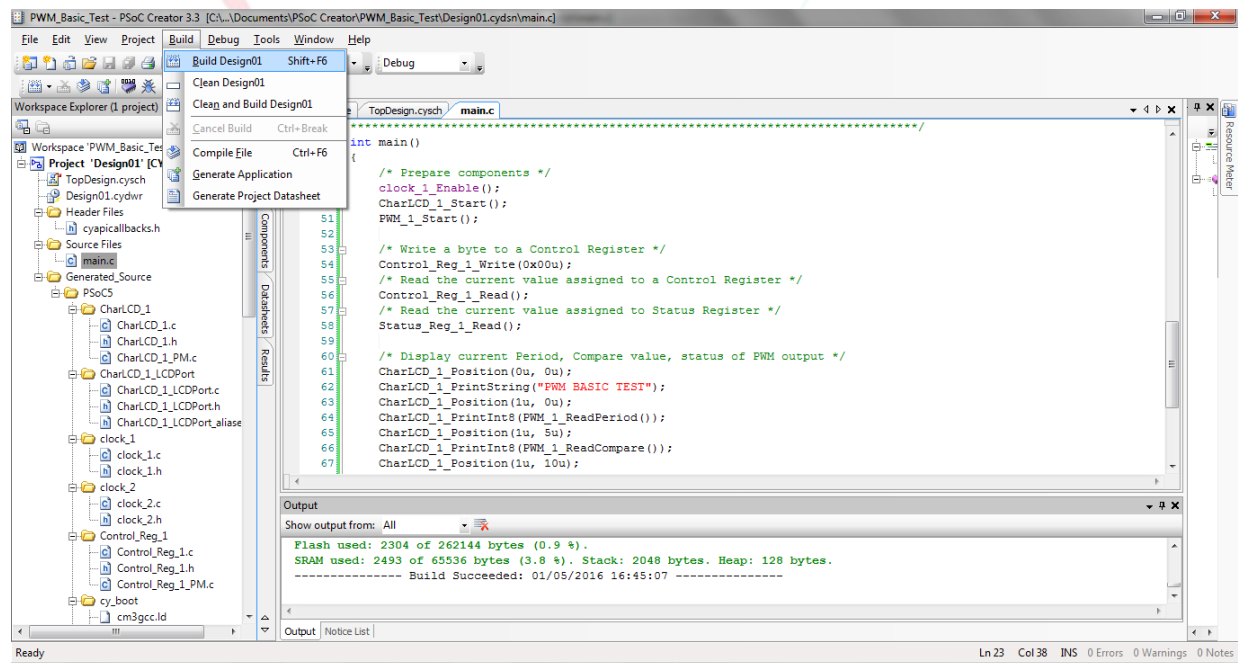


Figure 5

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CODE:

```
#include <project.h>
int main()
{
    clock_1_Enable();
    CharLCD_1_Start();
    PWM_1_Start();

    /* Write a byte to a Control Register */
    Control_Reg_1_Write(0x00u);

    /* Read the current value assigned to a Control Register */
    Control_Reg_1_Read();

    /* Read the current value assigned to Status Register */
    Status_Reg_1_Read();

    /* Display current Period, Compare value, status of PWM output */
    CharLCD_1_Position(0u, 0u);
    CharLCD_1_PrintString("PWM BASIC TEST");
    CharLCD_1_Position(1u, 0u);
    CharLCD_1_PrintInt8(PWM_1_ReadPeriod());
    CharLCD_1_Position(1u, 5u);
    CharLCD_1_PrintInt8(PWM_1_ReadCompare());
    CharLCD_1_Position(1u, 10u);
    CharLCD_1_PrintInt8(Status_Reg_1_Read());

    for (;;)
    {
        CharLCD_1_Position(1u, 10u);
        CharLCD_1_PrintInt8(Status_Reg_1_Read());
    }
}
```

Step 10: Finally, double click on Design01.cydw and assign pins to desired port and build it.

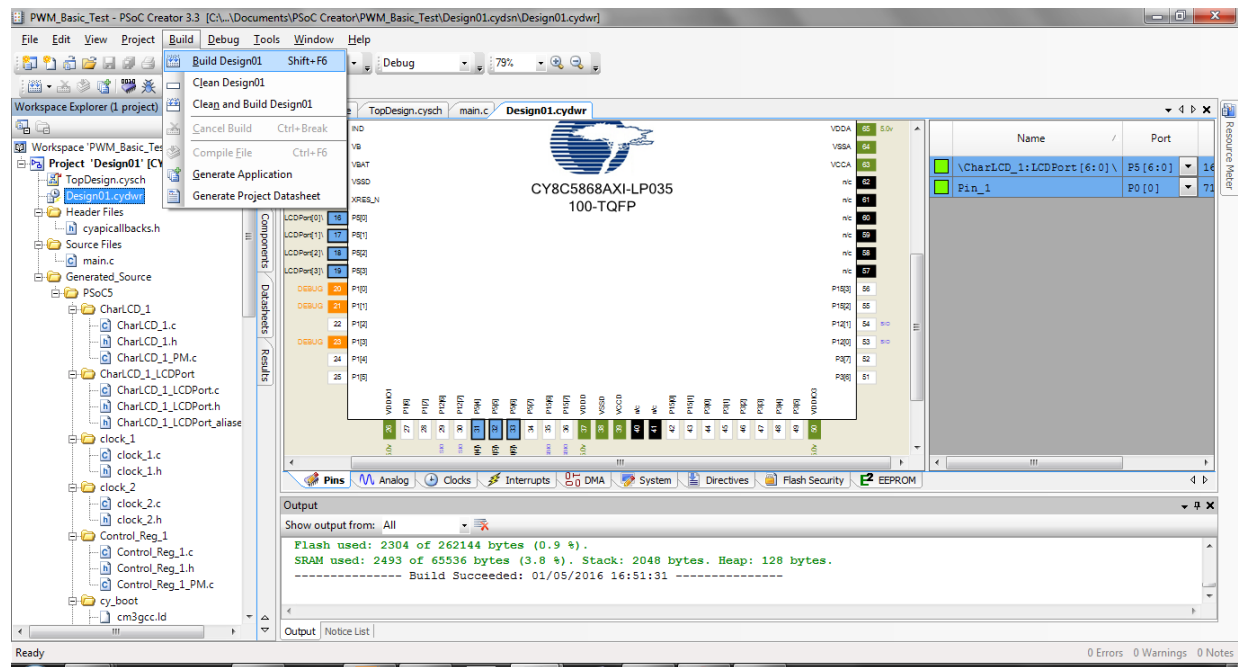


Figure 10

Step 11: If all goes well, go to Debug and click on Program.

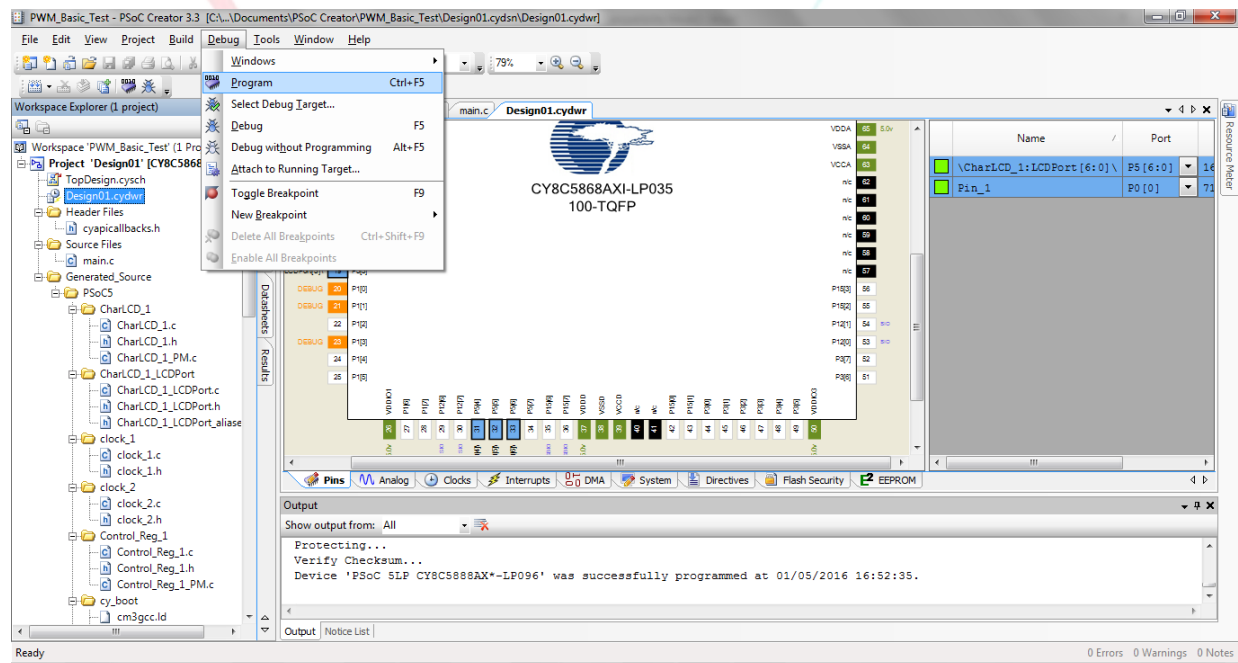


Figure 11

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LCD PINOUT:



Interfacing Character LCD with FreeSoC2

LCD pin out	FreeSoC2 Pin
1 - VSS (GND)	GND
2 - VDD (+ve)	5V
3 - VE (contrast voltage)	GND
4 - Register Select	P5.5
5 - Read/Write	P5.6
6 - Enable	P5.4
7 - Data 0	Left Open
8 - Data 1	Left Open
9 - Data 2	Left Open
10 - Data 3	Left Open

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11 - Data 4	P5.0
12 - Data 5	P5.1
13 - Data 6	P5.2
14 - Data 7	P5.3
15 - Back-light Anode	5V
16 - Back-light Cathode	GND

Table 1

Note: Connect an LED to P0.0 to observe the PWM output or connect P0.0 to Oscilloscope to observe the waveform. The LED connected to P0.0 shows the TC output. It turns on when the period counter is equal to zero.

OUTPUT:

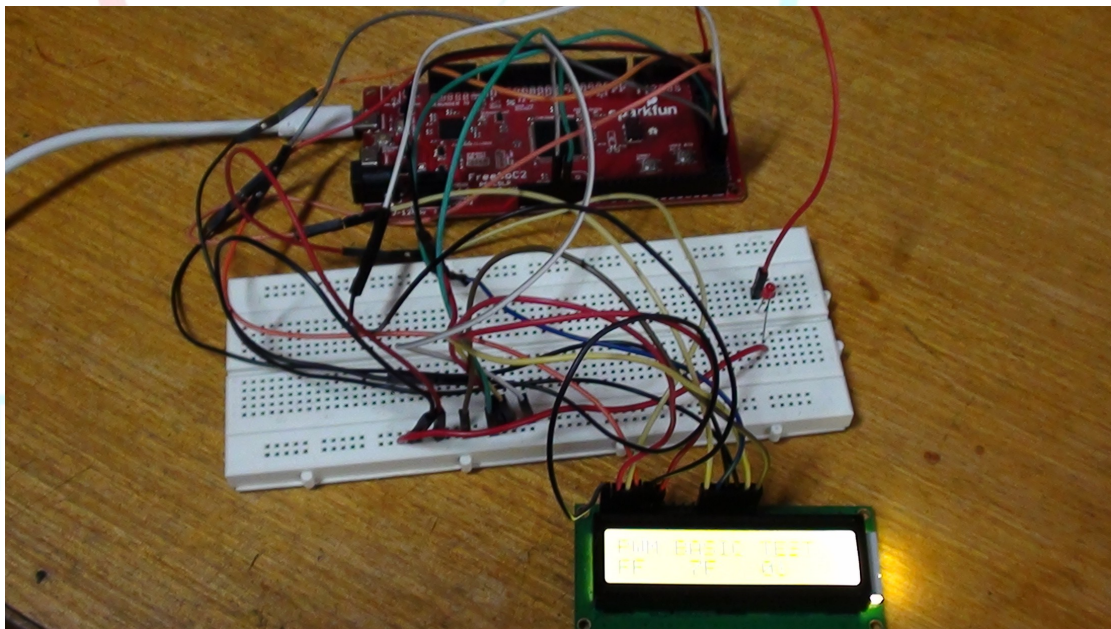


Figure 12

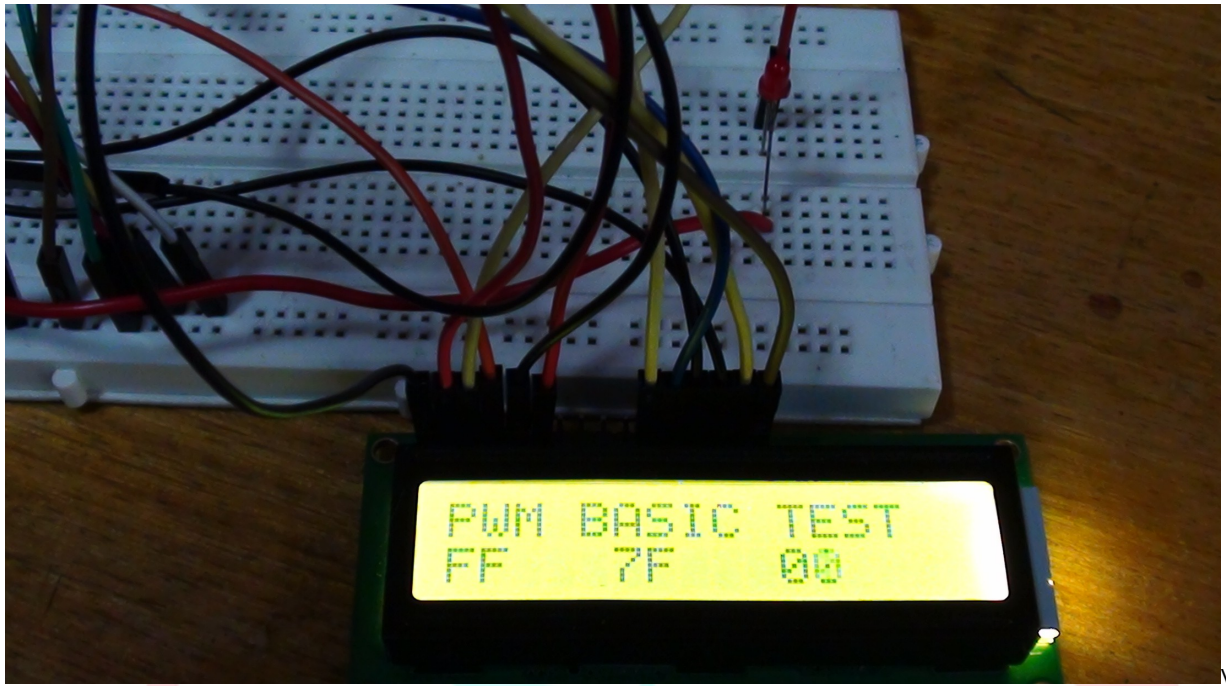


Figure 13

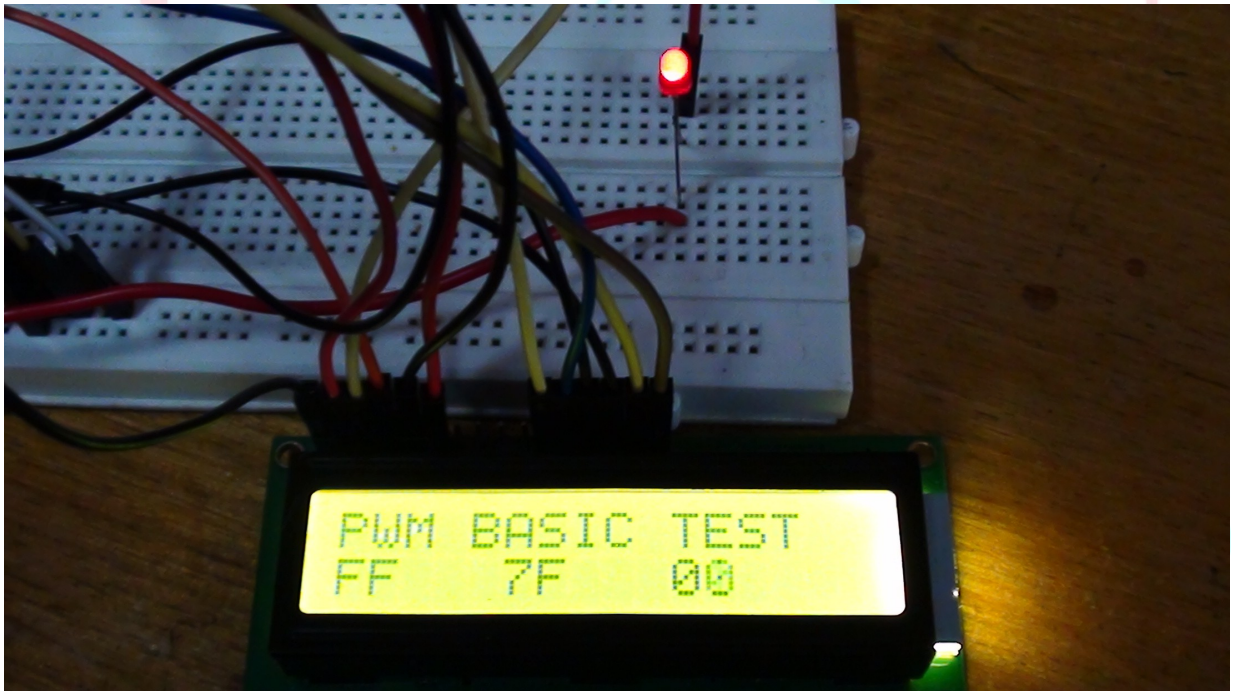


Figure 14

For product link:

1. <http://www.tenettech.com/product/7241/freesoc2-development-board-psoc5lp>
2. <http://tenettech.com/product/6655/universal-gpio-board>
3. <http://www.tenettech.com/product/2442/16-x-2-character-lcd-display-with-backlight-jhd162a-green>

For more information please visit: www.tenettech.com

For technical query please send an e-mail: info@tenettech.com



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