CE95352 - Fixed Function PWM with PSoC 3/5LP

Objective

This example demonstrates the operation of the fixed function PWMs in PSoC 3 and PSoC 5LP.

Overview

This is a straight forward example that demonstrates use of a fixed function PWM. The PWM is set up to output a 50% duty cycle digital signal with a period of 1 second. This signal can be used to drive an LED for visual testing of the PWM output. A switch is routed into the kill input of the PWM. When the switch is pressed the PWM output is shut off.

PSoC Resources

Cypress provides a wealth of data at www.cypress.com to help you to select the right PSoC device for your design, and quickly and effectively integrate the device into your design. For a comprehensive list of resources, see KBA86521, How to Design with PSoC 3, PSoC 4, and PSoC 5LP. The following is an abbreviated list for PSoC 3 and PSoC 5LP:

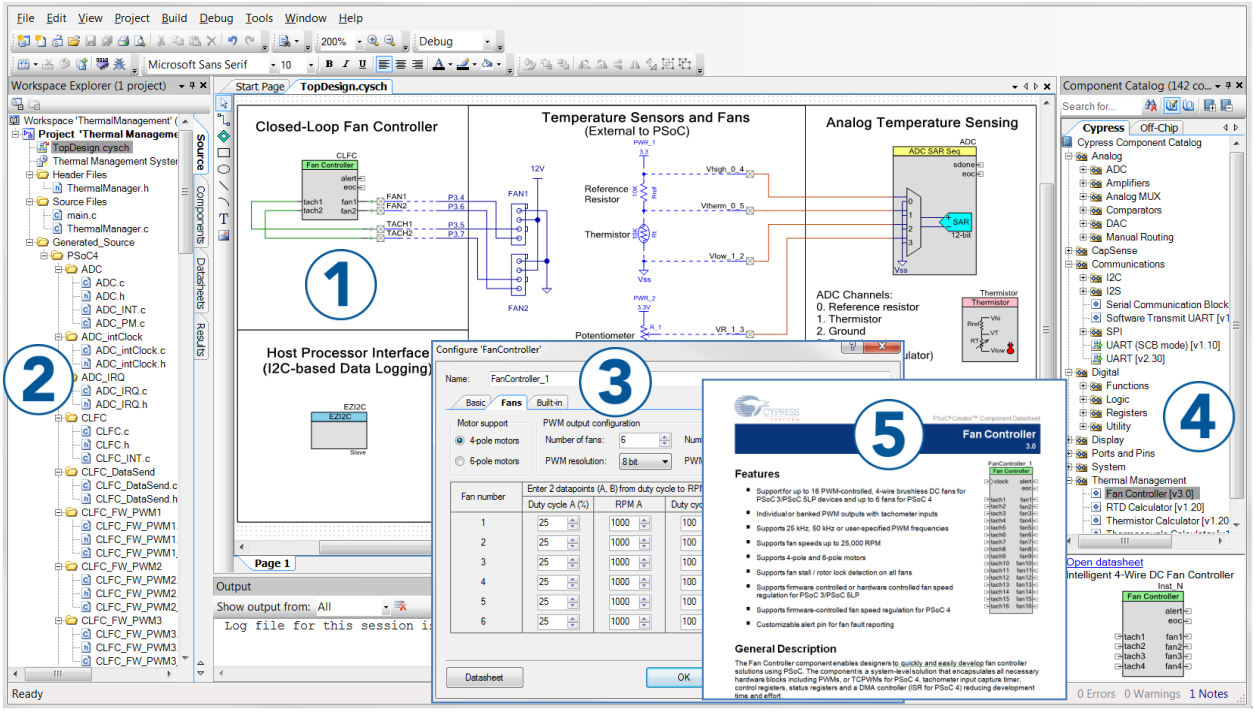
- **Overview:** PSoC Portfolio, PSoC Roadmap
- **Product Selectors:** PSoC 1, PSoC 3, PSoC 4, or PSoC 5LP. In addition, PSoC Creator includes a device selection tool.
- **Datasheets**: Describe and provide electrical specifications for the PSoC 5LP device family.
- **CapSense Design Guide:** Learn how to design capacitive touch-sensing applications with the PSoC 5LP family of devices.
- **Application Notes and Code Examples:** Cover a broad range of topics, from basic to advanced level. Many of the application notes include code examples.
- **Technical Reference Manuals (TRM):** Provide detailed descriptions of the architecture and registers in each PSoC 5LP device family.
- **Development Kits:**
  - CY8CKIT-001 is a common development platform for all PSoC family devices.
  - CY8CKIT-050 is a development platform targeted at analog intensive designs for PSoC 5LP.
  - CY8CKIT-030 is a development platform targeted at analog intensive designs for PSoC 3.
  - CY8CKIT-059 is a rapid prototyping kit for PSoC 5LP.
- The MiniProg3 device provides an interface for flash programming and debug.

PSoC Creator

PSoC Creator is a free Windows-based Integrated Design Environment (IDE). It enables concurrent hardware and firmware design of systems based on PSoC 3, PSoC 4, and PSoC 5LP. See Figure 1 – with PSoC Creator, you can:

1. Drag and drop Components to build your hardware system design in the main design workspace
2. Codesign your application firmware with the PSoC hardware
3. Configure Components using configuration tools
4. Explore the library of 100+ Components
5. Review Component datasheets

Figure 1. PSoC Creator Features



Requirements

Tool: PSoC Creator 3.1 SP2 or later

Programming Language: C (GCC 4.8.4 or later)

Associated Parts: All PSoC 3 and PSoC 5LP parts

Related Hardware: CY8CKIT-059, CY8CKIT-001, CY8CKIT-050, CY8CKIT-030

Design

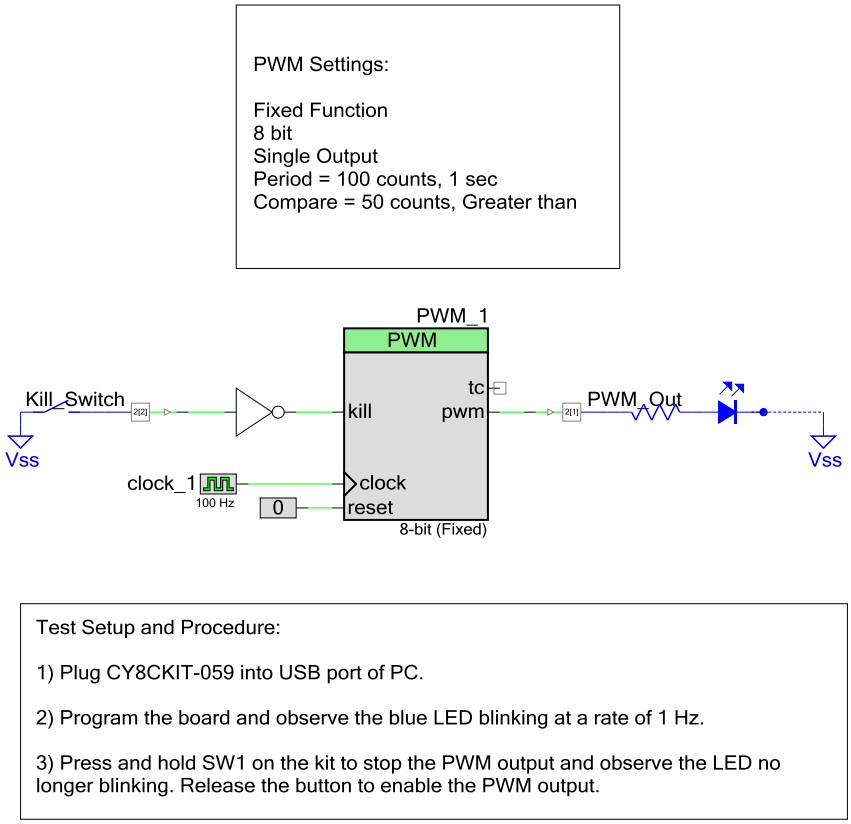


Figure 2 Creator Schematic

All of the functionality for this code example is implemented in hardware. The only firmware required is to start the PWM. After that the CPU enters an idle loop.

Design Considerations

This code example was created to operate completely in the hardware peripherals of the PSoC, specifically the universal digital blocks (UDB) and fixed function PWM. This frees the CPU to take care of other tasks. The inverter connecting the pin to the kill input of the PWM is contained within the UDBs. Using the UDBs in PSoC allows design of full circuits without requiring external components.

Hardware Setup

If using the CY8CKIT-059 no external hardware connections are required. If using a different kit or hardware platform two connections are required. An SPST switch needs to be connected to P2[2] to enable the kill functionality. The switch should be open when not pressed and should short the pin to ground when pressed. P2[1] should be connected to an LED to view the PWM output. An oscilloscope can also be used to view the output if an LED is not available.

If you are not using the CY8CKIT-059 then you made need to target a different PSoC device. To do so, right click the project in the Workspace Explorer and select Device Selector. Select the appropriate PSoC device for your hardware platform.

Software Setup

N/A

Components

Table 1 lists the PSoC Creator Components used in this example, as well as the placement used by each.

Table 1. List of PSoC Creator Components

Component or User Module	Placement
PWM	Fixed function PWM block
Inverter	UDB product term
Clock	Clock Divider
Digital Input Pin	P2[2]
Digital Output Pin	P2[1]

Parameter Settings

Table 2 Parameter Settings

Component	Non-default Parameter Settings
PWM	Fixed Function 8 bit Single Output Period = 100 counts, 1 sec Compare = 50 counts, Greater than
Clock	100 Hz
Digital Input Pin	Resistive Pull-up, Hardware Connection, Show External Terminal
Digital Output Pin	Strong Drive, Hardware Connection, Show External Terminal

Design-Wide Resources

Figure 3 shows the pin selections for the code example. This code example has been targeted towards the CY8CKIT-059 development kit. To target the project towards other PSoC development kits go to the CE95352.cydwr file and change the pin assignments accordingly.

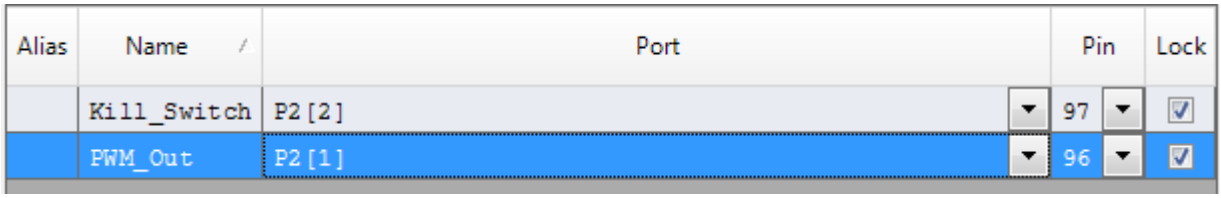


Figure 3 Pin Selection

Operation

After programming the device the PWM will start generating its output signal. Press and hold SW1 on the kit to stop the PWM output and observe the LED no longer blinking. Release the button to enable the PWM output.

Upgrade Information

NA

Related Documents

Table 3 lists all relevant application notes, code examples, knowledge base articles, device datasheets, and Component datasheets.

Table 3. Related Documents

Application Notes		
AN82156	PSoC® 3, PSoC 4, and PSoC 5LP - Designing PSoC Creator™ Components with UDB Datapaths	Create Digital components using PSoC universal digital blocks
AN81623	PSoC® 3, PSoC 4, and PSoC 5LP Digital Design Best Practices	Best practices when creating digital designs with PSoC
AN82250	PSoC® 3, PSoC 4, and PSoC 5LP – Implementing Programmable Logic Designs with Verilog	Programming PSoC digital resources with Verilog
Code Examples		
CE95294	7-bit Down Counter with PSoC 3/4/5LP	
CE95295	8-bit UDB Counter with PSoC 3/5LP	
CE95308	Digital Utility Components with PSoC 3/5LP	
CE95351	Fixed Function PWM with PSoC 4	
CE95298	Switch Debouncer with PSoC 3/4/5LP	
PSoC Creator Component Datasheets		
PWM	Details use of the PWM component	
Device Documentation		
PSoC 3 Datasheets	PSoC 3 Technical Reference Manuals	
PSoC 4 Datasheets	PSoC 4 Technical Reference Manuals	
PSoC 5LP Datasheets	PSoC 5LP Technical Reference Manuals	
Development Kit (DVK) Documentation		
PSoC 3 and PSoC 5LP Kits		
PSoC 4 Kits		

Document History

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Revision	ECN	Orig. of Change	Submission Date	Description of Change
**		KLMZ		New spec

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