Objective

This code example demonstrates how to generate a square wave using the TCPWM resource on PSoC® 6 MCU.

Requirements

Tool: ModusToolbox™ 1.1

Programming Language: C

Associated Parts: All PSoC 6 MCU parts

Related Hardware: PSoC 6 BLE Pioneer Kit, PSoC 6 WiFi-BT Pioneer Kit, PSoC 6 Wi-Fi BT Prototyping Kit

Overview

This code example generates a square wave using the TCPWM resource configured as a PWM. An LED connected to the PWM output pin blinks at 2 Hz.

Hardware Setup

This example uses the kit's default configuration. Refer to the kit guide to ensure that the kit is configured correctly.

Note: The PSoC 6 BLE Pioneer Kit and the PSoC 6 WiFi-BT Pioneer Kit ship with KitProg2. ModusToolbox only works with KitProg3. Before using this code example, make sure that the kit is upgraded to KitProg3. See ModusToolbox Help > ModusToolbox IDE Documentation > User Guide; section PSoC 6 MCU KitProg Firmware Loader. If you do not upgrade, you will see an error like "unable to find CMSIS-DAP device" or "KitProg firmware is out of date".

Operation

1. Connect the kit to your PC using the USB cable provided.

2. Import the project into a new workspace. If you aren't familiar with this process, see KBA225201.

3. Program the PSoC 6 MCU device. In the project explorer, select the **mainapp** project. In the Quick Panel, scroll to the **Launches** section and click the **Program (KitProg3)** configuration.

4. Observe that the red LED blinks at half-second intervals (2 Hz).

Debugging

You can debug the example to step through the code. Use the **Debug (KitProg3)** configuration. If you are unfamiliar with how to start a debug session on the PSoC 6 MCU with ModusToolbox IDE, see KBA224621.

Design and Implementation

The TCPWM resource is connected to a 10-kHz clock with its period set to 4999 to give a 2-Hz PWM output (Input Clock/Period). In this example, the PWM is left-aligned; therefore, the PWM starts counting from 0 to the period value. To count N cycles (5000 counts in this example), the period should be set to N-1. The compare value is set to 2500 so that the PWM output has a 50% duty cycle. The output of the PWM is connected to an LED that blinks at 500 ms (1/PWM output frequency).

Resources and Settings

This example uses the *EmptyPSoC6App* application available in the ModusToolbox IDE as base application and configures the resources used in this example. Table 1 lists the ModusToolbox resources used in this example, how they are used in the design, and the non-default settings required so they function as intended. Open the *design.modus* file from the project and review the settings. See ModusToolbox IDE Documentation for details on how to create new application and configure the resources.

Table 1. ModusToolbox Resources

Resource	Alias	Purpose	Non-default Settings
Timer, Counter, and PWM (TCPWM[1] 16-bit Count 1)	PWM	Generate square wave and bring out the signal to GPIO	See Figure 1
Digital Output Pin (P13[7])	KIT_LED1	Drive the PWM signal to LED	See Figure 2
Peripheral Clock (16 bit Divider 1)	TCPWM_Clock	Drive the PWM at 10kHz	See Figure 3

Figure 1 through Figure 3 highlight the non-default settings for each resource in this example.

Figure 1. TCPWM Settings
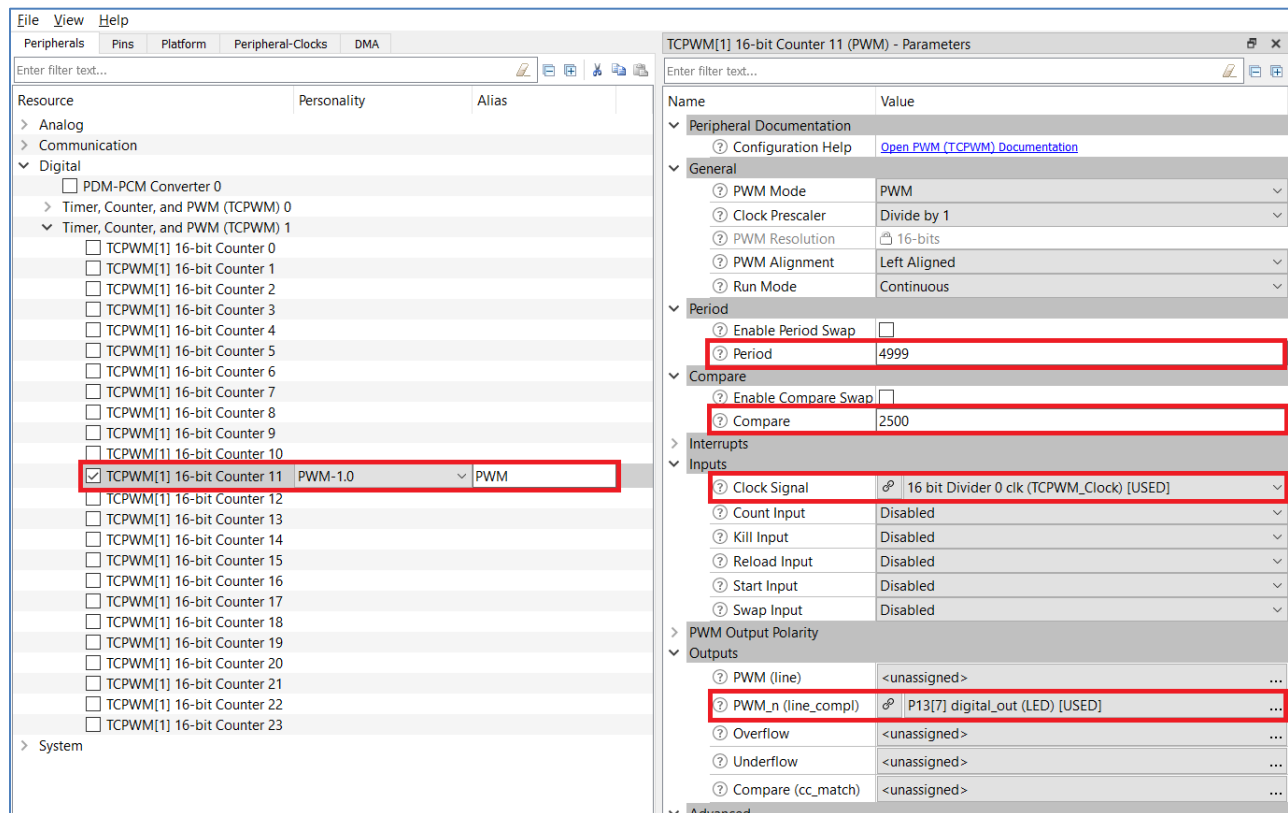
Figure 2. Pin Settings
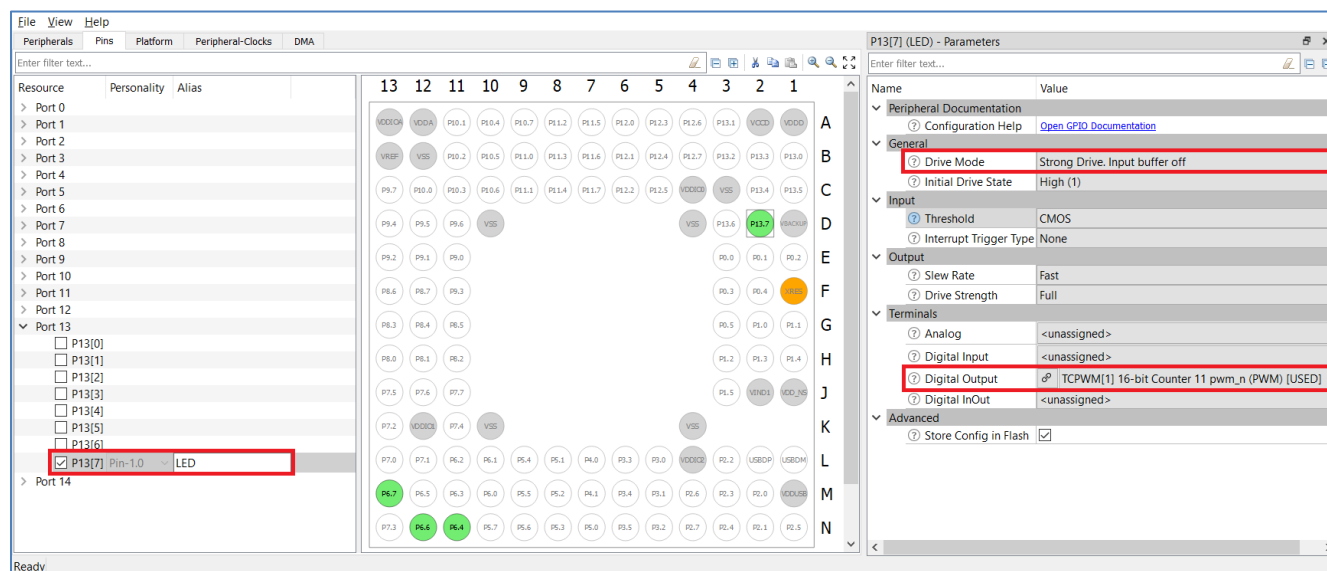
Figure 3. Peripheral-Clock Settings
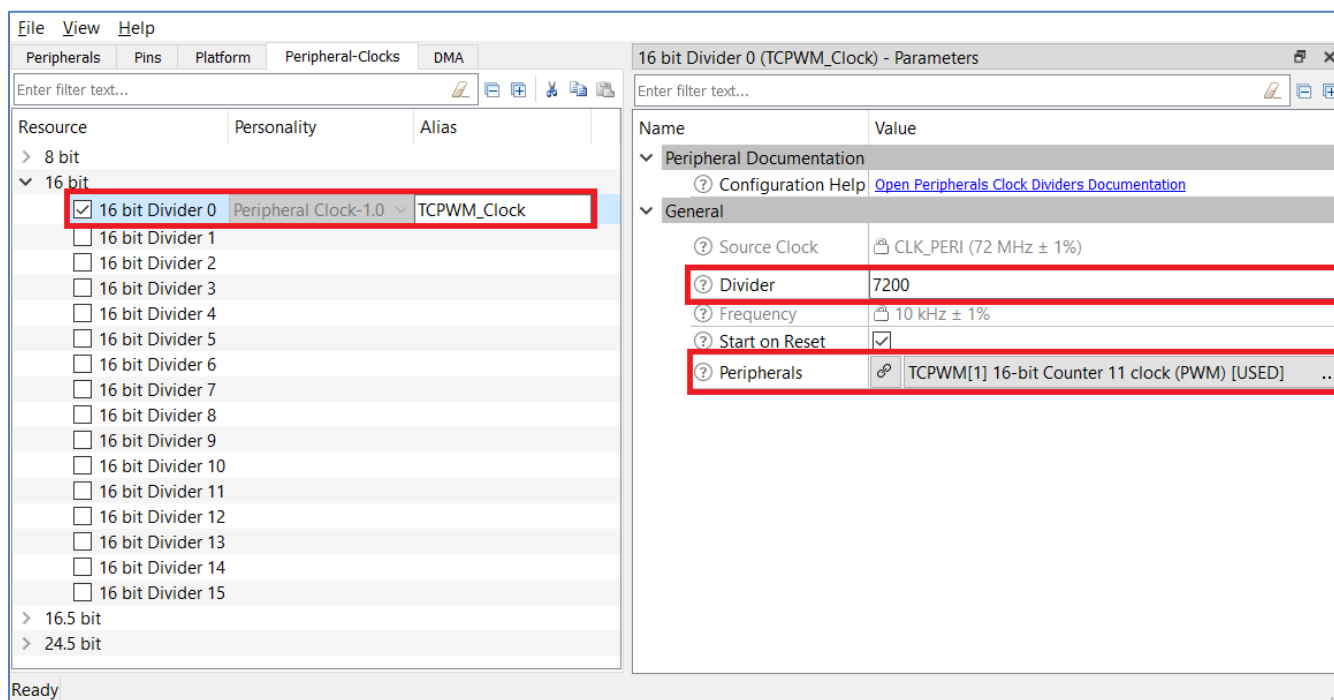
Table 2 shows the pin assignment for the project done through the **Pins** tab in the *design.modus* file.

Table 2. Pin Names and Location

Pin Name	Location
LED	P13[7]

Reusing This Example

This example is configured for the supported kits. To port the design to a different PSoC 6 MCU device, right-click an application project and choose **Change ModusToolbox Device**. If changing to a different kit, you may need to reassign pins.

Table 3. Device and Pin Mapping across PSoC 6 MCU Kits

Kit Name	Device Used	LED
CY8CKIT-062-WiFi-BT	CY8C6247BZI-D54	P13[7]
CY8CKIT-062-BLE	CY8C6347BZI-BLD53	P13[7]
CY8CPROTO-062-4343W	CY8C624ABZI-D44	P13[7]

In some cases, a resource used by a code example (for example, an IP block) is not supported on another device. In that case the example will not work. If you build the code targeted at such a device, you will get errors. See the device datasheet for information on which resources a device supports.

Related Documents

For a comprehensive list of PSoC 6 MCU resources, see KBA223067 in Cypress Community.

Application Notes	
AN210781 – Getting Started with PSoC 6 MCU with Bluetooth Low Energy (BLE) Connectivity	Describes PSoC 6 MCU with BLE Connectivity devices and how to build your first PSoC Creator project
AN215656 – PSoC 6 MCU: Dual-CPU System Design	Describes the dual-CPU architecture in PSoC 6 MCU, and shows how to build a simple dual-CPU design
Code Examples	
Visit the Cypress GitHub repository for a comprehensive collection of code examples using ModusToolbox IDE	
Device Documentation	
PSoC 6 MCU: PSoC 62 Datasheet	PSoC 6 MCU: PSoC 62 Architecture Technical Reference Manual
PSoC 6 MCU: PSoC 63 with BLE Datasheet	PSoC 6 MCU: PSoC 63 with BLE Architecture Technical Reference Manual
Development Kits	
CY8CKIT-062-BLE PSoC 6 BLE Pioneer Kit	
CY8CKIT-062-WiFi-BT PSoC 6 WiFi-BT Pioneer Kit	
CY8CPROTO-062-4343W PSoC 6 Wi-Fi BT Pioneer Kit	
Tool Documentation	
ModusToolbox	The Cypress IDE for IoT designers

Cypress Resources

Cypress provides a wealth of data at www.cypress.com to help you to select the right device, and quickly and effectively integrate the device into your design.

For the PSoC 6 MCU devices, see KBA223067 in the Cypress community for a comprehensive list of PSoC 6 MCU resources.

Document History

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Revision	ECN	Orig. of Change	Submission Date	Description of Change
**	6288280	SRDS	11/21/2018	New code example
*A	6481845	SRDS	02/18/2019	Updated to ModusToolbox 1.1

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