

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 Wi-Fi-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 Wi-Fi-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 If you do not upgrade, you will see an error like “unable to find CMSIS-DAP device” or “KitProg firmware is out of date”.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

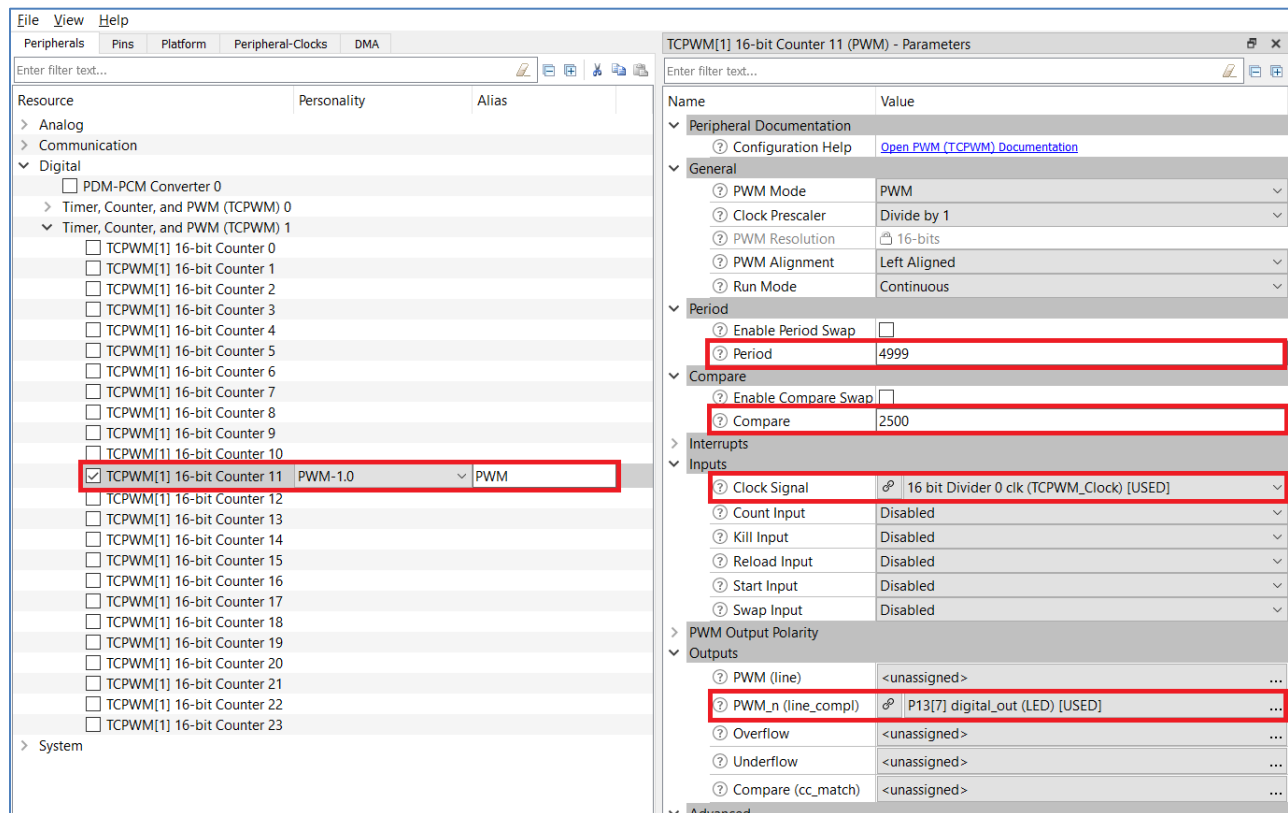


Figure 2. Pin Settings

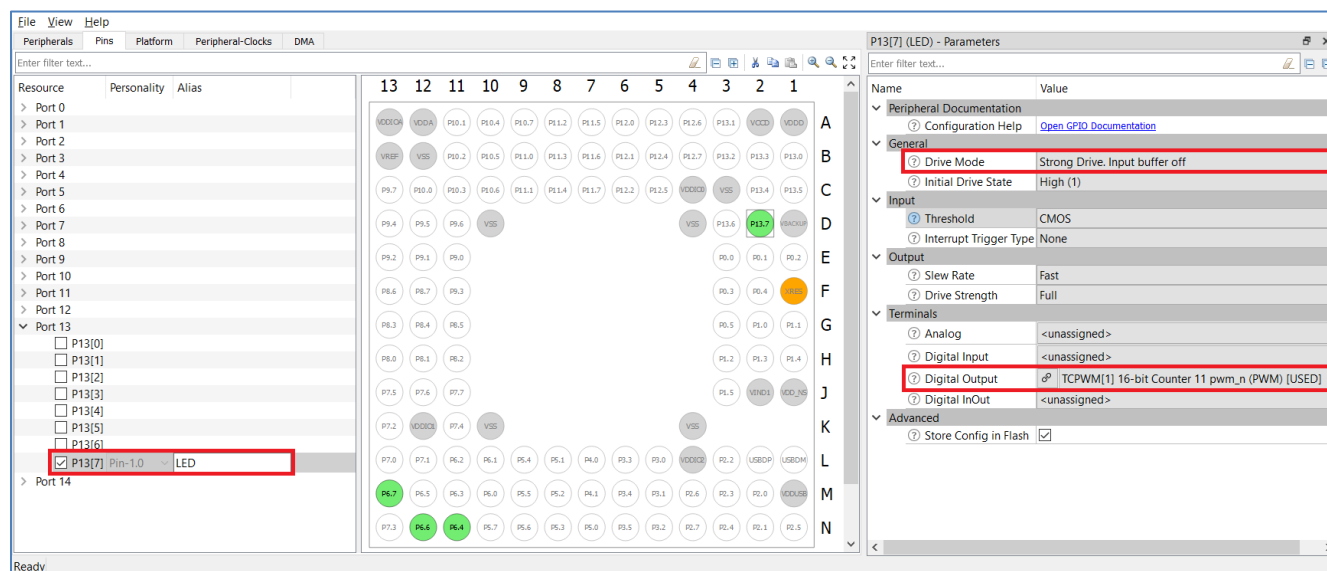


Figure 3. Peripheral-Clock Settings

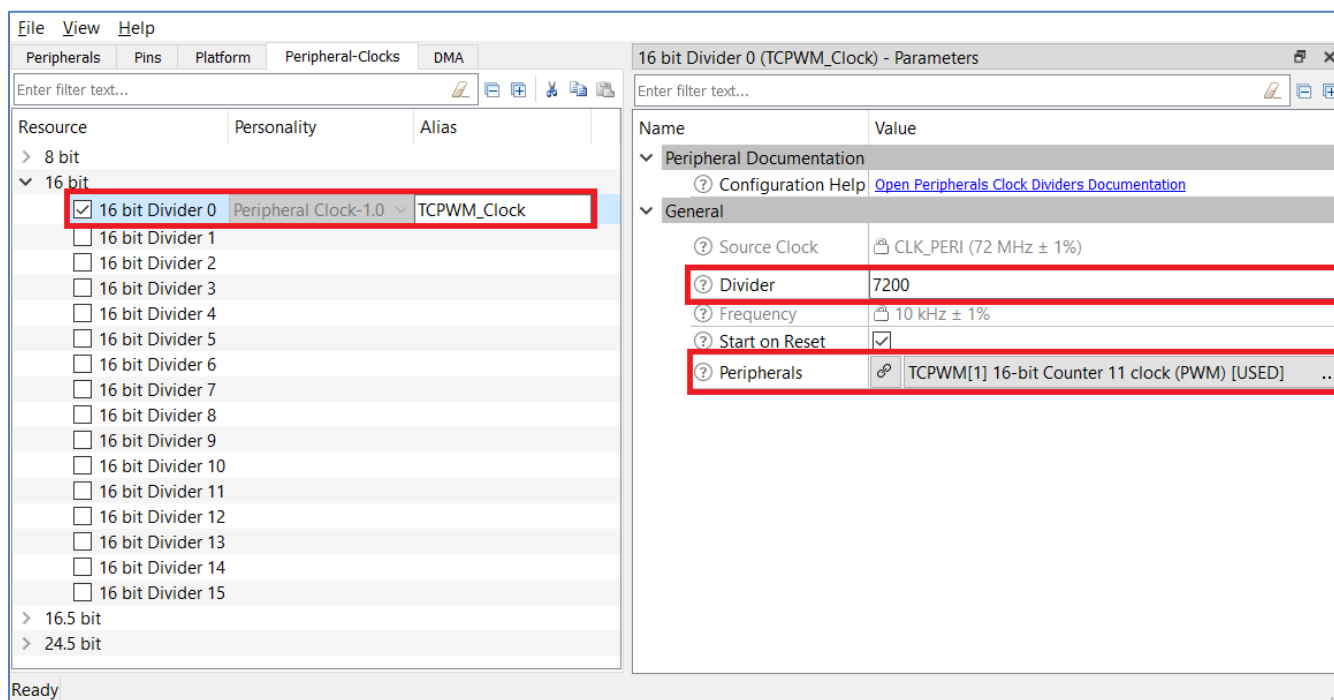


Table 2 shows the pin assignment for the project done through the **Pins** tab in the *design.modus* file.

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

Document Title: CE220291 – PSoC 6 MCU: TCPWM Square Wave

Document Number: 002-25649

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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