CE221118 – PSoC 6 MCU TCPWM Event Counter

Objective

This example demonstrates the use of PSoC® 6 MCU TCPWM to count the number of external events.

Overview

The example shows how to use the TCPWM to count a number of external events and display the results over UART.

Requirements

Tool: PSoC Creator™ 4.2

Programming Language: C (ARM® GCC 5.4-2016-q2-update, ARM MDK 5.22)

Associated Parts: All PSoC 6 MCU parts

Related Hardware: CY8CKIT-062-BLE PSoC 6 BLE Pioneer Kit

Design

The design shown in Figure 1 consists of two TCPWM Components, EVENT_COUNTER and TIMER. The EVENT_COUNTER is configured to increment by one whenever there is a falling edge on its count input. The kit button SW2 is connected to the EVENT_COUNTER count input. The TIMER is configured to generate an interrupt every ten seconds. The EVENT_COUNTER counts the number of kit button presses every ten seconds and sends the data to serial terminal through UART. The ERROR_RED_LED switches ON if the UART initialization fails.

Figure 1. TCPWM Event Counter Example Schematic

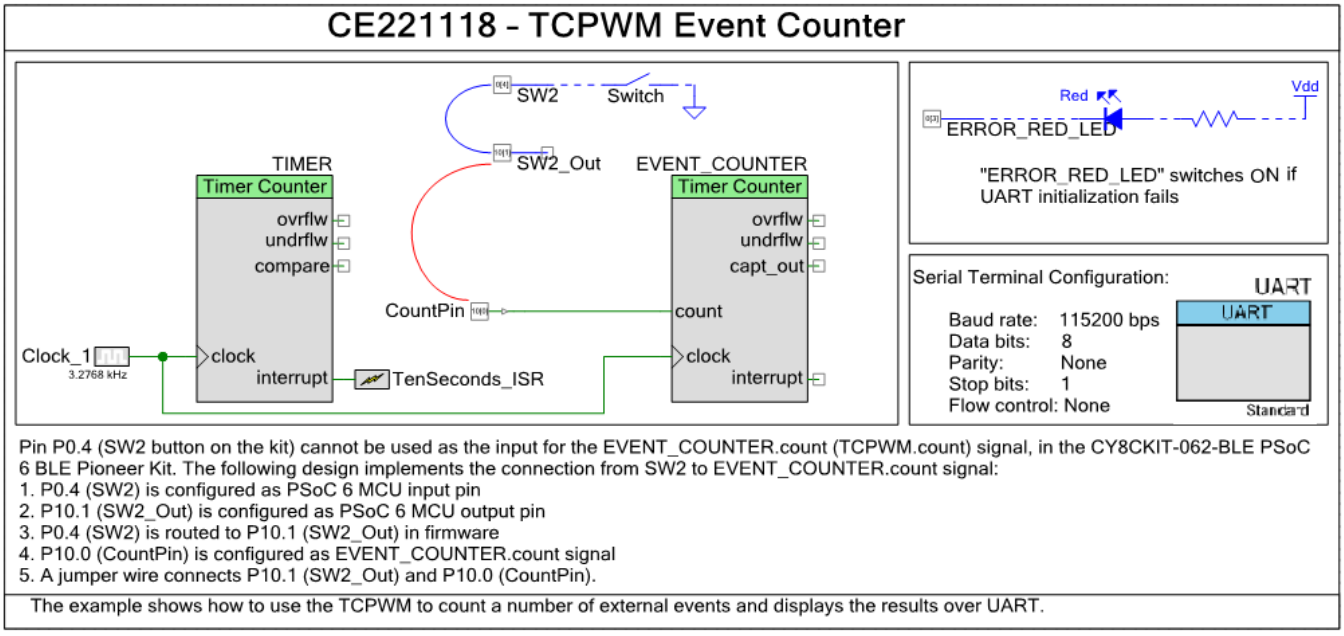
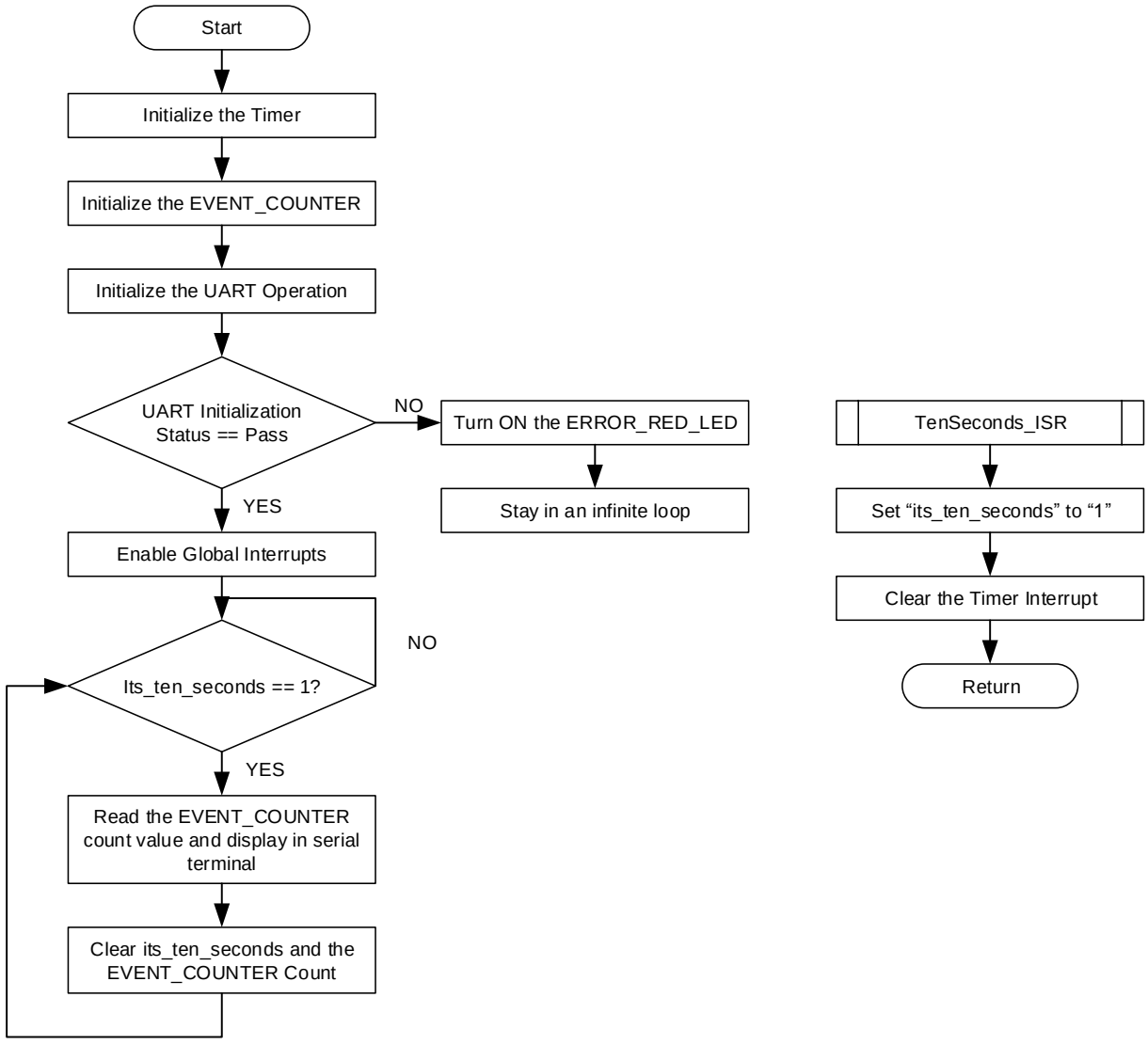


Figure 2 shows the firmware flowchart.

Figure 2. Firmware Flowchart



Design Considerations

This code example is designed to run on CY8CKIT-062-BLE with the PSoC 6 MCU device. To port the design to other PSoC 6 MCU family devices and kits, you must change the target device in Device Selector, and change the pin assignments in the *cydwr* settings. For single-core PSoC 6 MCU devices, port the code from *main_cm4.c* to *main.c* file as ARM Cortex® M0+ CPU is not used in this code example.

Pin P0.4 (SW2 button on the kit) cannot be used as the input for the EVENT_COUNTER.count (TCPWM.count) signal, in the CY8CKIT-062-BLE PSoC 6 BLE Pioneer Kit. The following design implements the connection from SW2 to EVENT_COUNTER.count signal:

1. P0.4 (SW2) is configured as PSoC 6 MCU input pin
2. P10.1 (SW2_Out) is configured as PSoC 6 MCU output pin
3. P0.4 (SW2) is routed to P10.1 (SW2_Out) in firmware

4. P10.0 (CountPin) is configured as EVENT_COUNTER.count signal
5. A jumper wire connects P10.1 (SW2_Out) and P10.0 (CountPin).

Hardware Setup

The code example works with the default settings on the CY8CKIT-062-BLE PSoC 6 BLE Pioneer Kit. If the settings are different from the default values, see the Selection Switches table in the kit guide to reset to the default settings.

Operation

1. Connect CY8CKIT-062 BLE to a USB port on your PC.
2. Open a serial port communication program such as Tera Term and select the corresponding COM port. Configure the terminal to match the UART: 115200 baud rate, 8N1, and Flow control – None. These settings must match the configuration of the PSoC Creator UART Component in the project.
3. Connect an external hardware jumper wire between P10.1 and P10.0 in CY8CKIT-062 BLE.
4. Build and program the application into CY8CKIT-062 BLE. For more information on building a project or programming a device, see PSoC Creator Help.
5. Count the number of times you press and release the SW2 switch within ten seconds. The terminal window should display the same count.
6. Repeat step 5 multiple times.

Components

Table 1 lists the PSoC Creator Components used in this example and the hardware resources used by each Component.

Table 1. PSoC Creator Components

Component	Instance Name	Hardware Resources
Timer / Counter (TCPWM_Counter_PDL)	TIMER, EVENT_COUNTER	Two Timer Counter Pulse Width Modulation peripheral blocks
UART (SCB_UART_PDL)	UART	Single SCB peripheral block
Clock (SysClk_PDL)	Clock_1	A single clock divider
System Interrupt (SysInt)	TenSeconds_ISR	One entry in the device interrupt vector table
General-Purpose Input / Output (GPIO)	ERROR_RED_LED, SW2, SW2_Out, CountPin	Four physical pins

Parameter Settings

Non-default settings for each Component are outlined in red in the following figures.

Figure 3 shows the TIMER Component parameter settings.

Figure 3. TIMER Component Parameter Settings

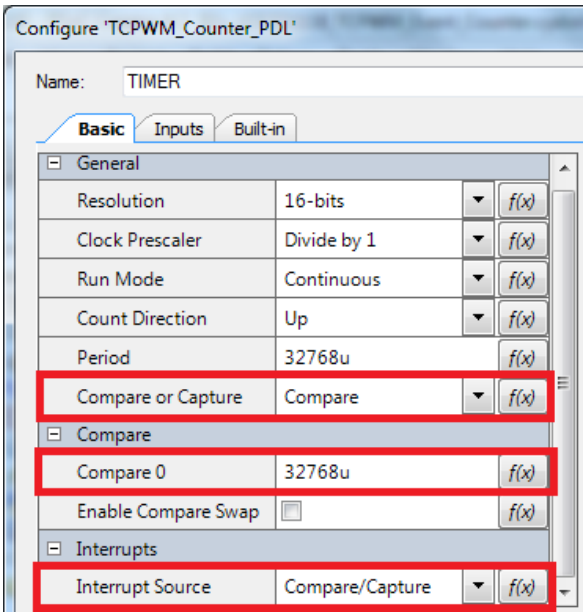


Figure 4 shows the EVENT_COUNTER Component parameter settings.

Figure 4. EVENT_COUNTER Component Parameter Settings

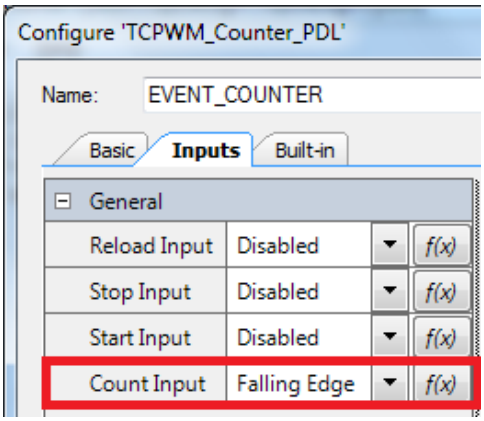


Figure 5 shows the UART Component parameter settings.

Figure 5. UART Component Parameter Settings

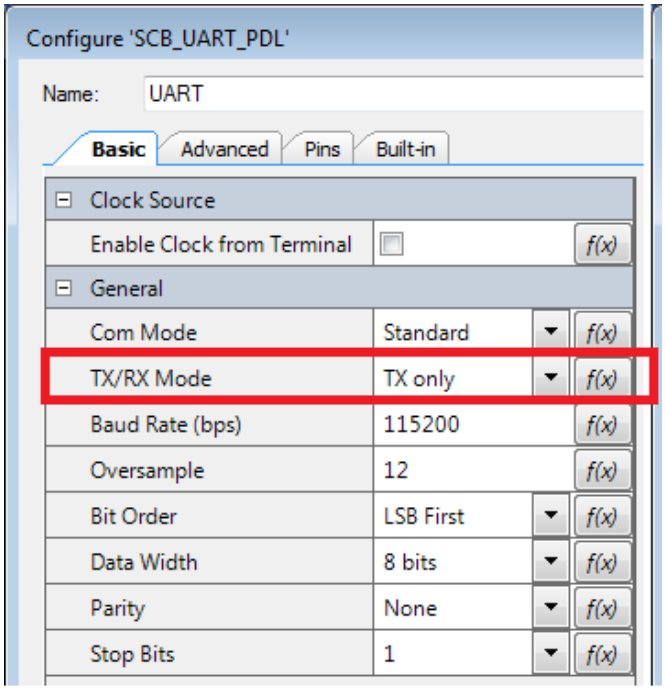
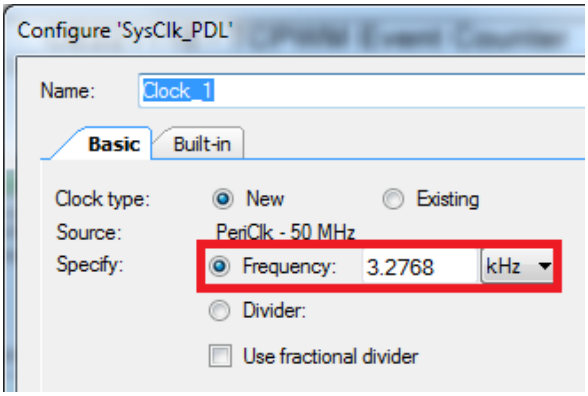


Figure 6 shows the Clock_1 Component parameter settings.

Figure 6. Clock_1 Component Parameter Settings



Design-Wide Resources

Table 2 shows the pin assignment for the code example.

Table 2. Pin Names and Locations

Pin Name	Location
UART:tx	P5[1]
CountPin	P10[0]
ERROR_RED_LED	P0[3]
SW2	P0[4]

Pin Name	Location
SW2_Out	P10[1]

Related Documents

Application Notes	
AN210781 Getting Started with PSoC 6 MCU with Bluetooth Low Energy (BLE) Connectivity	Describes PSoC 63 with Bluetooth Low Energy (BLE) Connectivity and how to build your first PSoC Creator project
PSoC Creator Component Datasheets	
TCPWM	Supports 16- or 32-bit Timer/Counter
Clock	Supports programmable clock dividers
System Interrupt	Interrupt vectoring and control
UART	Supports UART communication
General-Purpose Input / Output	Supports Analog, Digital I/O and Bidirectional signal types
Device Documentation	
PSoC 6 MCU: PSoC 63 with BLE Datasheet	PSoC 6 MCU: PSoC 63 with BLE Architecture Technical Reference Manual
Development Kit (DVK) Documentation	
CY8CKIT-062-BLE PSoC 6 BLE Pioneer Kit	

Document History

Document Title: CE221118 – PSoC 6 MCU TCPWM Event Counter

Document Number: 002-21118

Revision	ECN	Orig. of Change	Submission Date	Description of Change
**	5894785	VJYA	11/03/2017	New code example

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