CE216168 – FM0+ Base Timer PWM Blinky

A PWM is implemented in a Base Timer to blink an LED using interrupts on duty value match (LED on) and underflow (LED off).

Overview

The application uses one of the Base Timers (BT) to blink an LED. The BT is configured to run in PWM mode with a 1/256 clock prescaler. The PWM generates interrupts that control the LED pin on both a duty value match (LED on) and underflow (LED off). The firmware sets the PWM period to one second and the duty cycle to 10%.

Requirements

Tool: PSoC Creator 4.0 and Peripheral Driver Library (PDL) 2.1

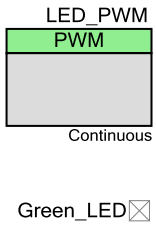
Programming Language: C (GCC 4.9.3)

Associated Parts: All S6E1 parts

Related Hardware: FM0-V48-S6E1A1 and FM0-64L-S6E1C3

Design

The schematic file includes the BT (PWM) and a GPIO component, renamed as shown below.



The firmware performs following functions:

1. Initialize the LED (off)
2. Initialize the PWM and set the cycle and duty values
3. Start (software trigger) the timer
4. Loop forever (each interrupt fires once per second)

Design Considerations

Pin Selection

The project includes control files to automatically place the LED IO onto the appropriate pin for the supported kit hardware. To change the pin selections, delete the control file or over-ride the control file selections in the Design Wide Resources Pin Editor.

PDL Installation

The project assumes that you have installed the PDL in the location specified in the **Project Management** panel of the **Tools** > **Options** dialog. If that location is incorrect you will see the build error “The given PDL path is invalid. Unable to find required PDSC file.” To correct this problem in a newly-created project open the **Project** > **Properties** dialog and enter the correct path to the PDL. To avoid the problem in projects you create in the future, make sure you put the correct path in the **Tools** > **Options** dialog.

Hardware Setup

The GPIO is connected to a green LED.

Table 1 lists the pin connections required to use this code example on FM0+ kits.

Table 1. List of Pins

Pin	FM0-V48-S6E1A1	FM0-64L-S6E1C3
Green_LED:GPIO	P61	P3E

Components

Table 2 lists the PSoC Creator Components used in this example, as well as the hardware resources used by each.

Table 2. List of PSoC Creator Components

Component	Version	Hardware Resources
PDL_BT (PWM mode)	1.0	Base Timer block
PDL_GPIO	1.0	GPIO pin

Parameter Settings

The PDL_BT Component uses default parameter settings, with these exceptions.

Table 3: Component Settings

Tab	Setting	Value
None	Name	LED_PWM
Basic	BTConfig	PWM
Interrupts	bPwmDutyMatchIrq	True
	bPwmUnderflowIrq	True
PWM	enPwmPres	1/256

Operation

Program the board and the green LED blinks for 1/10th of a second, once per second.

Related Documents

Table 4 lists relevant application notes, code examples, knowledge base articles, device datasheets, and Component datasheets.

Table 4. Related Documents

PSoC Creator Component Datasheets	
PDL_BT	Supports all Base Timer modes of operation (right-click on the Component to access)
PDL_GPIO	Supports firmware access to physical pins (right-click on the Component to access)
Device Documentation	
S6E1A	FM0+ S6E1A-Series 5 V Robust ARM® Cortex®-M0+ Microcontroller (MCU) Family
S6E1C	FM0+ S6E1C-Series Ultra Low Power ARM® Cortex®-M0+ Microcontroller (MCU) Family
Development Kit (DVK) Documentation	
FM0-V48-S6E1A1	ARM® Cortex®-M0+ FM0+ MCU Evaluation Board
FM0-64L-S6E1C3	ARM® Cortex®-M0+ MCU Starter Kit with USB and Digital Audio Interface

Document History

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Revision	ECN	Orig. of Change	Submission Date	Description of Change
**	5413341	YFS	08/29/16	New Code Example.
*A	5448702	YFS	9/29/16	Added workspace file.
*B	5775407	YFS	6/15/17	Added search keyword so that user can quickly find Code Examples from the component instance popup menu. Updated logo and copyright date.
*C	5987664	YFS	12/7/17	Removed S6E1B support.

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