# CE216970 – FM0+ Watch Counter Code Example

The Watch Counter (WC) is configured to generate an interrupt request once per second. The interrupt toggles the state of the LED pin.

## Overview

The component is configured to generate interrupts and use the WCCk2 input clock source. The firmware sets up the input clock divider and Watch Counter reload value to generate the interrupt once every second. The interrupt callback function simply toggles the state of the green LED (0.5 Hz).

## Requirements

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

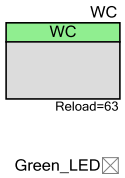
**Programming Language:** C (GCC 4.9.3)

**Associated Parts:** All S6E1A parts

**Related Hardware:** FM0-V48-S6E1A1

## Design

The schematic file includes the WC and a GPIO component, renamed as shown below.




The firmware performs following functions:

1. Initialize the LED (off)
2. Select the input clock source and prescaler value
3. Start the prescaler input clock
4. Set up the WC to interrupt once per second
5. Start the Watch Counter (the interrupt toggles the LED)

### 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 selection, 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 LED GPIO is connected to a green LED.

Table 1 lists the pin connection required to use this code example on an FM0+ kit.

Table 1. List of Pins

| Pin | FM0-V48-S6E1A1 |
|---|---|
| Green_LED:GPIO | P61 |

## 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_WCC | 1.0 | Watch Counter block |
| PDL_GPIO | 1.0 | GPIO pin |

### Parameter Settings

The GPIO component uses the default parameter settings. Only the component instance name has been changed for readability.

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

Table 3: Component Settings

| Tab | Setting | Value |
|---|---|---|
| None | Name | WC |
| Basic | enCntClk | WCCk2 clock source |
| | enIrqEnable | True |
| | bTouchNvic | True |

Note that the counter clock (enCntClk) is a selection of a source from the prescaler (selects one of four choices). The prescaler is set up in firmware.

## Operation

After programming and reset, the LED state toggles every second (0.5 Hz rate).

## 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_WC | Watch Counter with selectable and scalable input clock source (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 |
| **Development Kit (DVK) Documentation** | |
| FM0-V48-S6E1A1 | ARM® Cortex®-M0+ FM0+ MCU Evaluation Board |

## Document History

Document Title: CE216970 – FM0+ Watch Counter Code Example

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| Revision | ECN | Orig. of Change | Submission Date | Description of Change |
|---|---|---|---|---|
| ** | 5469329 | YFS | 10/10/16 | New Code Example. |
| *A | 5776729 | YFS | 6/16/17 | Added search keyword so that user can quickly find Code Examples from the component instance popup menu.<br>Updated logo and copyright date. |
| *B | 5988609 | YFS | 12/8/17 | Removing S6E1B support. |

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