CE95285 - PSoC® 4 CapSense_CSD Slider

Objective

This code example demonstrates the use of the CapSense_CSD Component as a Linear Slider. The position of the finger on the linear slider is used to control the LED.

Features

- Sensing elements: CapSense® 5-segment linear slider:
  - CY8CKIT-042 and CY8CKIT-042-BLE use the linear slider on the kit board
  - CY8CKIT-040 uses five rows of the trackpad on the Trackpad Shield (included with CY8CKIT-040)
- Visual indication of the slider touch position using a tri-color LED

Requirements

Tool: PSoC® Creator™ 3.3 CP3 or higher

Programming Language: C (ARM® GCC 4.9.3)

Associated Parts: PSoC 4

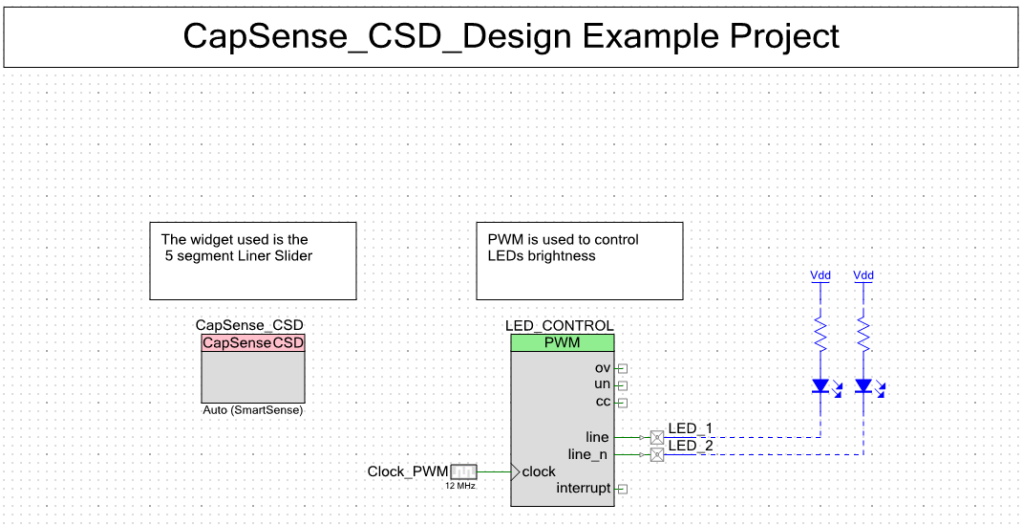
Hardware: CY8CKIT-040, CY8CKIT-042, CY8CKIT-042-BLE

Design

This project demonstrates the use of the PSoC Creator CapSense_CSD Component, which is configured as a 5-segment linear slider with SmartSense™ auto tuning. The Component determines the finger position on the slider traces on the kit. The results are communicated to a PWM Component to control the brightness of the two LEDs within the tri-color LED.

The PSoC Creator top design schematic is shown in Figure 1.

Figure 1. Top Design Schematic



The linear slider in the project is implemented using five sensor elements that use five sensor pins (CapSense_CSD_Sns[0:4]). Capsense_CSD needs a modulation capacitor for its functioning, which is connected to the Cmod pin. There are also two pins to connect to the two LEDs (see Figure 1).

Pin Assignments

The project is designed for CY8CKIT-042 and therefore, the pin assignments are made accordingly in the project. However, this project can be made to work with CY8CKIT-040; see Using CY8CKIT-040 for details.

Edit the project's design-wide resource file (.cydwr file) to modify the physical pins for CapSense_CSD, LED_1 (green), and LED_2 (blue) according to Table 1 corresponding to the kit being used.

Table 1. Pin Assignment for the CapSense_CSD_P4_Design Project

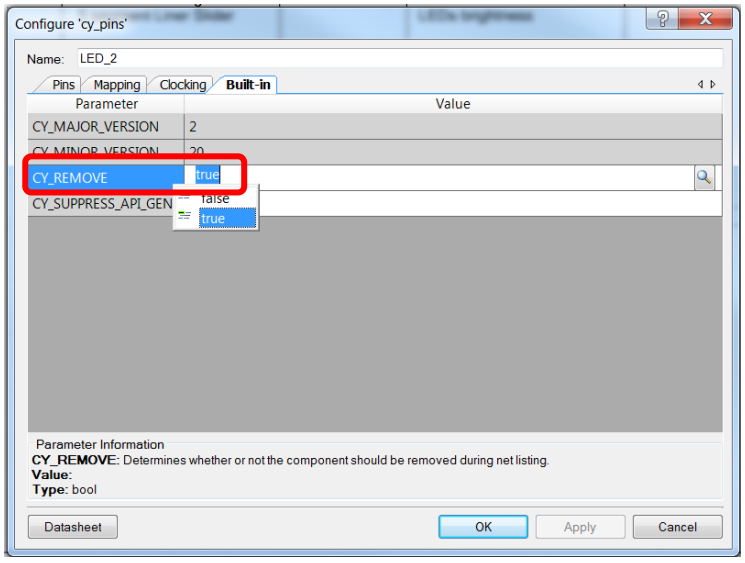
Pin Name	Development Kit		
	CY8CKIT-042	CY8CKIT-042-BLE	CY8CKIT-040
\Capsense_CSD:Cmod\	P4[2]	P4[0]	P0[4]
\Capsense_CSD:Sns[0]\	P1[1]	P2[1]	P1[4]
\Capsense_CSD:Sns[1]\	P1[2]	P2[2]	P1[5]
\Capsense_CSD:Sns[2]\	P1[3]	P2[3]	P1[6]
\Capsense_CSD:Sns[3]\	P1[4]	P2[4]	P1[0]
\Capsense_CSD:Sns[4]\	P1[5]	P2[5]	P1[7]
LED_1	P0[2]	P3[6]	P1[1]
LED_2	P0[3]	P3[7]	-

Using CY8CKIT-040

CY8CKIT-040 does not support a linear slider; however, you can use the track pad shield shipped along with the kit that implements a track pad. The project uses column sensors of the track pad to implement a linear slider with the assignment of sensor pins associated with the CY8CKIT-040 shown in Table 1.

In addition, CY8CKIT-040 does not support hardware routing from the TCPWM to a second LED; this requires you to remove LED_2. To remove the LED_2 pin from the project schematic, double-click the LED_2 pin, select the Built-in tab, and set the "CY_REMOVE" parameter to "true". Figure 2 shows this setting.

Figure 2. LED_2 Configuration



Components

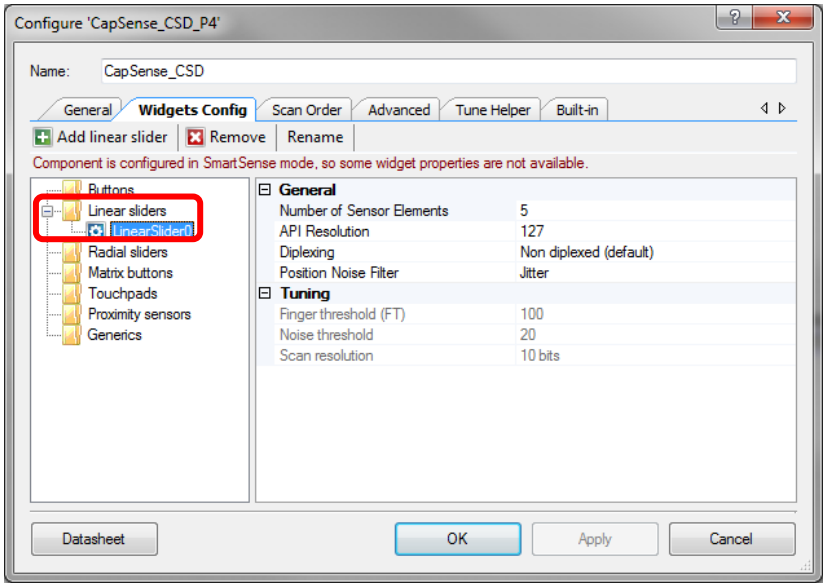
Table 2 lists the PSoC Creator Components used in this example, as well as the hardware resources used by each.

Table 2. List of PSoC Creator Components

Component	Version	Hardware Resources
CapSense_CSD	2.4	CapSense
PWM	2.1	TCPWM
Clock	2.2	Clock
LED_1	2.2	GPIO
LED_2	2.2	GPIO

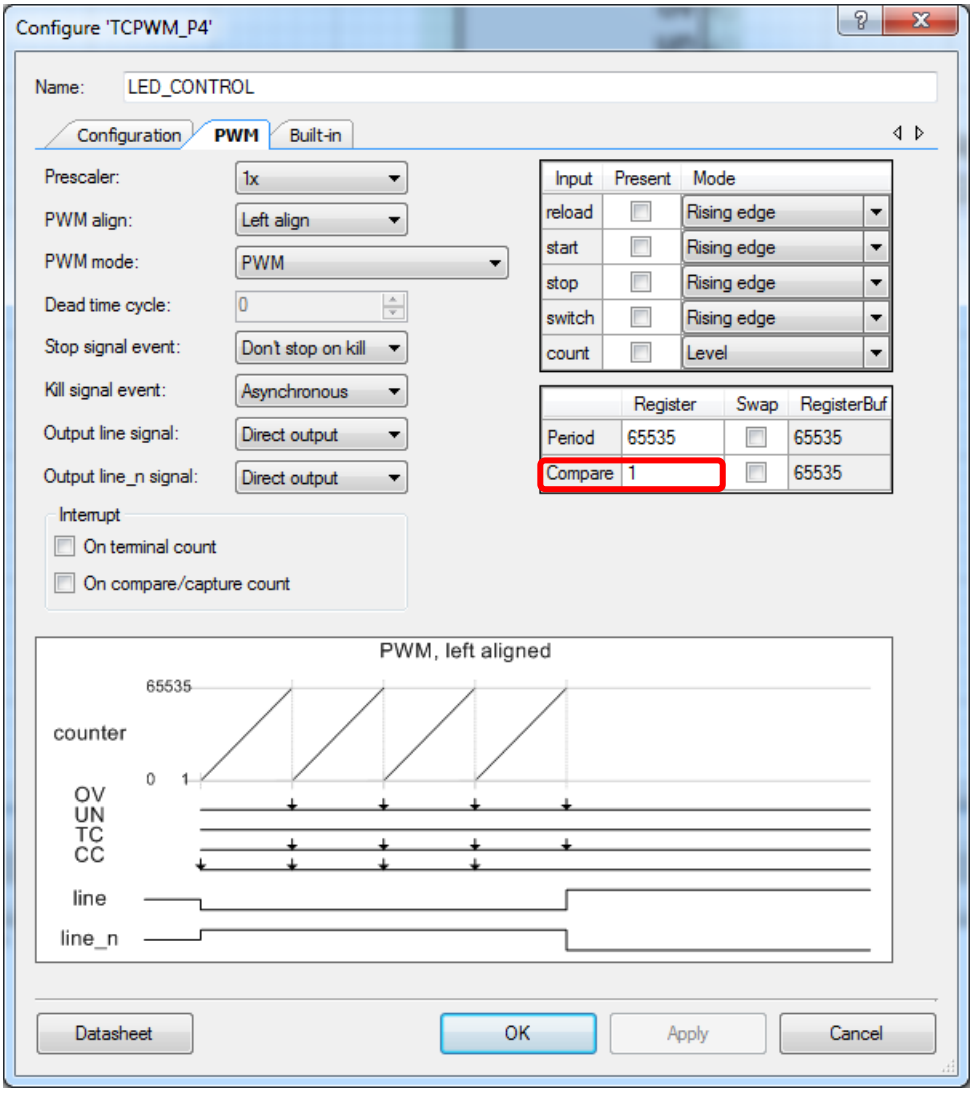
The CapSense_CSD Component is configured as a linear slider, configured to use five sensor elements by default. The project uses the default configuration of the linear slider and therefore requires no changes to the Component configuration.

Figure 3. CapSense_CSD Widget Config Tab



The PWM is configured to drive two LEDs (one LED for CY8CKIT-040) from the tri-color LED. The compare value is initially set to '1' to display the green LED.

Figure 4. PWMs Configuration



Operation

Build and compile the project in PSoC Creator and program it to the device on the development kit. Refer the kit user guide for details on how to connect the kit to the computer and program it.

Using CY8CKIT-042 and CY8CKIT-042 BLE

There are no additional hardware connections required in the kit because the pins are already routed to the respective sensors/LEDs. After programming the kit, verify that the color of the LED changes as the finger position on the linear slider changes. The LED should show blue when the finger is at P1.5 on the kit and should show green when the finger is at P1.1 for the CY8CKIT-042 kit. The LED should show blue when the finger is at P2.5 on the kit and should show green when the finger is at P2.1 for the CY8CKIT-042.

Using CY8CKIT-040

Mount the trackpad shield onto the kit. Verify that on the trackpad shield, as the touch position changes vertically (as indicated as the brightness label on the shield), the brightness of the green LED changes.

Related Documents

Table 3 lists all relevant application notes, code examples, device datasheets, and Component datasheets.

Table 3. Related Documents

Application Notes		
AN79953	Getting Started with PSoC 4	Describes PSoC 4, and how to build the code example attached with it.
AN64846	Getting Started with CapSense	Describes CapSense, and provides a list of related documents
AN210998	PSoC 4 Low-Power CapSense Design	Describes how to design low-power CapSense applications with PSoC 4 devices.
Code Examples		
CE210289	PSoC 4 CapSense Linear Slider	Shows how to configure and use the CapSense linear slider
CE210291	PSoC 4 CapSense One Button	Shows how to achieve very low power consumption for a single CapSense button
PSoC Creator Component Datasheets		
CapSense® CSD	Supports capacitance measurement and finger detection	
TCPWM	A block that supports Timer/Counter, PWM, and Quadrature Decoder	
Pins	Supports connection of hardware resources to physical pins	
Device Documentation		
PSoC 4 Datasheets	PSoC 4 Technical Reference Manuals	
Development Kit (DVK) Documentation		
PSoC 4 Kits		

Document History

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Revision	ECN	Orig. of Change	Submission Date	Description of Change
**	5422975	WESL	09/13/2016	New Spec

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