CE95327 – PSoC4® Current Digital to Analog Converter

Objective

This code example demonstrates the use of the current digital to analog converter (IDAC).

Overview

This code example shows the capability of the Current Digital to Analog Converter (IDAC) to dynamically change its current output through the firmware. A button is used to double the current output.

Requirements

Tool: PSoC Creator™ 4.0 or higher

Programming Language: C (ARM® GCC 4.9.3)

Associated Parts: PSoC® 4

Hardware: CY8CKIT-042, CY8CKIT-042-BLE, CY8CKIT-044, CY8CKIT-046

Design

The example demonstrates one way of using the IDAC Component. It is configured as an 8-bit (total count of 255) IDAC with a range of 0–306 µA (1.2 µA/count), as shown in Figure 1. A button is also used so that when the button is pressed, the current output will double. The IDAC current output can also be set through the IDAC8_SetValue() API.

Figure 1. Top Design Schematic
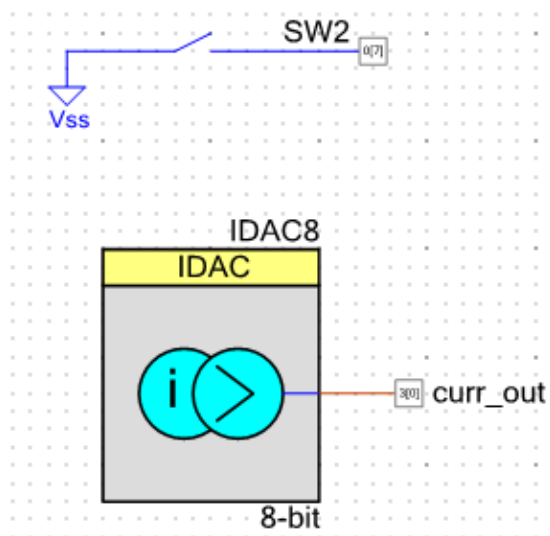
Kit Configuration and Pin Assignments

1. Select the appropriate device in the project's Design-Wide Resources file (.cydwr file) according to Table 1.

Table 1. Development Kits and Associated Devices

Development Kit	Device
CY8CKIT-042	CY8C4245AXI-483
CY8CKIT-042-BLE	CY8C4247LQI-BL483
CY8CKIT-044	CY8C4247AZI-M485
CY8CKIT-046	CY8C4248BZI-L489

2. The project is designed for the CY8CKIT-042. Edit the project's .cydwr file to modify the physical pins to match Table 2.

Table 2. Pin Assignments

Pin Name	Development Kit			
	CY8CKIT-042	CY8CKIT-042-BLE	CY8CKIT-044	CY8CKIT-046
curr_out	P0[0]	P0[0]	P0[0]	P1[2]
SW2	P0[7]	P2[7]	P0[7]	P0[7]

Components

Table 3 lists the PSoC Creator Components used in this example, as well as the hardware resources used by each.

Table 3. PSoC Creator Components

Component	Version	Hardware Resources
IDAC	1.1	Universal Analog Block
Pin	2.2	GPIO

The IDAC is configured for positive polarity, and the default current value is set to 120 µA, as shown in Figure 2.

Figure 2. IDAC Configuration
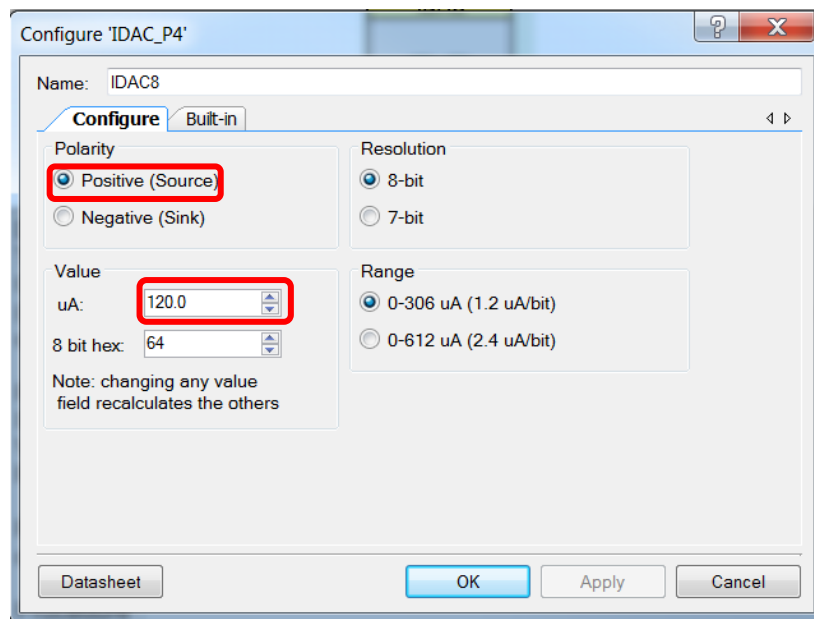
Operation

This example project requires a multimeter to measure the output current.

Follow these steps to communicate with the PC host.

1. Make sure that the kit has been configured as instructed in the Kit Configuration and Pin Assignments section.
2. Connect the USB cable between the PC and the kit.
3. Measure the current at pin 0[0] using a multimeter. The expected output current is 120 µA when the button is not pressed. If the button is pressed, the expected current is 240 µA.

    This current can also be changed by modifying the IDAC_VAL_UNPRESSED value in *main.c*.

Related Documents

Table 4 lists the relevant application notes, code examples, Component datasheets, and device and DVK documentation.

Table 4. Related Documents

Application Notes		
AN79953	Getting Started with PSoC 4	Describes PSoC 4 and shows how to build the attached code example
AN60590	PSoC 3, PSoC 4, and PSoC 5LP – Temperature Measurement with a Diode	Explains the use of a diode and an IDAC as a temperature sensor
Code Examples		
CE204022	PSoC 4 IDAC7 Sawtooth Waveform Generator	Shows the basics of using the IDAC7 available in some PSoC 4 devices. A simple sawtooth or voltage ramp waveform is generated using the IDAC7 current output digital-to-analog converter.
PSoC Creator Component Datasheets		
Current Digital to Analog Converter	Supports the IDAC Component	
Pins	Supports the 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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Document Number: 001-95327

Revision	ECN	Orig. of Change	Submission Date	Description of Change
**	5526019	WESL	10/24/16	New code example

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