CE195297 – PSoC 4000 1.2-V Comparator with Analog Multiplexer

Objective

This code example demonstrates how to use the 1.2-V Comparator and Analog Multiplexer Components to select the input voltage source.

Overview

This code example uses one 1.2-V Comparator to compare input voltages from two sources to internal reference. The firmware sequentially switches the input channels to the comparators' input and shows results of the voltage comparison using LEDs.

Requirements

Tool: PSoC® Creator™ 4.1 Update 1

Programming Language: C (GCC 5.4-2016-q2-update, MDK 5.06 update 5)

Associated Parts: PSoC 4000

Related Hardware: CY8CKIT-040

Hardware Setup

This example uses the kit's default configuration. Refer to the kit guide to ensure the kit is configured correctly.

Software Setup

None.

Operation

1. Plug the CY8CKIT-040 kit board into your computer's USB port.
2. Build the project and program it into the PSoC 4000 device. Choose **Debug** > **Program**. For more information on device programming, see PSoC Creator Help.
3. On the kit, connect VplusRed (P0[0]) and VplusBlue (P0[1]) to the Gnd terminal with jumper wires. Observe the OFF state of the on-board RGB LED.
4. Connect VplusRed or VplusBlue to the V3.3 or V5.0 terminal. Observe the LED's state depending on the voltage value of the VplusRed and VplusBlue pins: if the voltage on the input pin is greater than 1.2 V, then the corresponding LED turns ON; otherwise the LED turns OFF.

Note: You can use external variable voltage sources such as variable resistors to provide the input voltages for the Comparator.

Design and Implementation

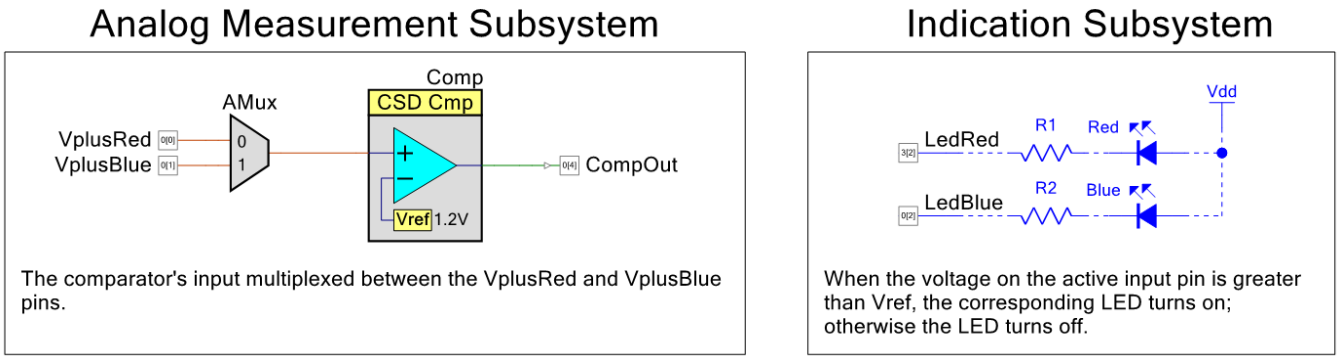
This code example compares input voltages from two sources using one comparator. This is achieved by switching the input channels to the comparators' input with the Analog Multiplexer Component.

The 1.2-V Comparator is present in the Capacitive Sensing Delta-Sigma Modulator (CapSense® CSD) block. This comparator's functionality is present only in the PSoC 4000 family and is available only when the CapSense CSD block for Capacitive Sensing is not used.

The firmware sequentially switches the comparators' input to one of the input channels, gets a compared value from the active channel and shows it on the corresponding LED. The comparators' digital output can also be directly monitored on the CompOut pin.

Figure 1 shows the PSoC Creator schematic for this code example.

Figure 1. Top Design Schematic



Components and Settings

Table 1 lists the PSoC Creator Components used in this example, how they are used in the design, and the non-default settings required for their proper functioning.

Table 1. PSoC Creator Components

Component	Instance Name	Purpose	Non-default Settings
1.2 Volt Comparator	Comp	To compare input voltage values to the voltage reference value.	Speed/Power: Fast/High
Analog Mux	AMux	To switch between the input pins.	AtMostOneActive: true Channels: 2
Analog Pin	VplusRed	The input pins of the Analog Multiplexer.	None.
	VplusBlue		
Digital Output Pin	CompOut	The output pin of the 1.2 Volt Comparator.	None.
	LedRed	To drive the indication LEDs,	HW Connection: Off
	LedBlue		

For information on the hardware resources used by each Component, see the Component datasheet.

Reusing This Example

This example is designed for the CY8CKIT-040 pioneer kit. To port the design to a different PSoC 4000 device, change the target device using the Device Selector and update the pin assignments in the Design Wide Resources settings as appropriate.

Related Documents

Application Notes	
AN79953 – Getting Started with PSoC 4	Introduces the PSoC 4 architecture and development tools
PSoC Creator Component Datasheets	
1.2 Volt Comparator (CSD Comp)	Provides a hardware solution to compare one input voltage with the internal 1.2 V reference
Analog Multiplexer (AMux)	Provide ability to connect analog signals to a different common analog signal
Pins	Supports connection of hardware resources to physical pins
Device Documentation	
PSoC 4: PSoC 4000 Family Datasheets	PSoC 4000 Family: PSoC 4 Technical Reference Manuals
Development Kit Documentation	
CY8CKIT-040: PSoC 4000 Pioneer Development Kit	

Document History

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Revision	ECN	Orig. of Change	Submission Date	Description of Change
**	5978753	MYKZTMP1	11/30/2017	New code example

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