CE218129 – PSoC 6 MCU Wakeup from Hibernate Using a Low-Power Comparator

Objective

This code example demonstrates wakeup from Hibernate mode using the LPComp resource in PSoC® 6 MCU, using ModusToolbox™ IDE.

Requirements

Tool: ModusToolbox™ IDE 1.1

Programming Language: C

Associated Parts: All PSoC 6 MCU parts

Related Hardware: PSoC 6 BLE Pioneer Kit, PSoC 6 WiFi-BT Pioneer Kit, PSoC 6 WiFi-Prototyping Kit

Overview

This code example demonstrates how to configure the LPComp internal reference voltage and how to set the external input from a GPIO using the LPComp driver. The code example uses one GPIO input to compare the input voltage and internal reference voltage to wake the PSoC 6 MCU from Hibernate mode. The LED indicates the current power mode.

Hardware Setup

This example uses the PSoC 6 BLE Pioneer Kit's default configuration. See the kit guide to ensure the kit is configured correctly.

Note: The PSoC 6 BLE Pioneer kit and the PSoC 6 WiFi-BT Pioneer kit ship with KitProg2. ModusToolbox only works with KitProg3. Before using this code example, make sure that the kit is upgraded to KitProg3. See ModusToolbox Help > ModusToolbox IDE Documentation > User Guide; section PSoC 6 MCU KitProg Firmware Loader. If you do not upgrade, you will see an error like "unable to find CMSIS-DAP device" or "KitProg firmware is out of date".

Software Setup

None.

Operation

Follow the instructions that came with your kit to make sure that your kit is connected to your PC.

1. On CY8CKIT-062-BLE, place a potentiometer on P5[6] to change the Vplus input voltage.
2. Import the code example into a new workspace. If you aren't familiar with this process, see KBA225201.
3. Program the PSoC 6 MCU device. In the project explorer, select the **mainapp** project. In the Quick Panel, scroll to the **Launches** section and click the **Program (KitProg3)** configuration.
4. Turn the knob of the potentiometer until the Vplus voltage is greater than the internal Vref.
5. Confirm that the LED is toggling.
6. Turn the knob of the potentiometer until the Vplus voltage is less than the internal Vref.
7. Confirm that the LED is OFF during Hibernate mode.
8. Repeat operations 4 to 7 to wake up from and enter Hibernate mode.

Design and Implementation

This code example uses one Low-Power Comparator (LPComp) resource, one status LED, one GPIO for the wakeup input, and one potentiometer. The main loop checks the output of LPComp channel 0 and toggles the LED when the output is high.

Otherwise, the system goes into Hibernate mode. The system wakes up immediately if the LPComp channel 0 output goes high during Hibernate mode.

Note: The internal reference voltage can vary from 0.4 V to 0.75 V, so the Vplus input should be high enough to cause a wakeup. In Hibernate mode, the LPComp resource cannot use the AMUXBUS, so the Vplus input should be either P5[6] (LPComp Channel 0) or P6[2] (LPComp Channel 1). These pins are dedicated to the LPComp GPIO positive terminal.

Resources and Settings

Table 1 lists the ModusToolbox resources used in this example and how they are used in the design. For pin usage and configuration, open the **Pins** tab of the *design.modus* file.

Table 1. ModusToolbox Resources

Resource	Alias	Purpose	Non-default Settings
Low Power Comparator	LPComp	Provide low power voltage comparison	See Figure 1
Analog Input Pin	Vplus	Provide user input	See Figure 2
Digital Output Pin	KIT_LED2	Provide visual feedback	See Figure 3

Figure 1 to Figure 3 show the non-default configuration settings for the ModusToolbox resources.

Figure 1. LPComp Configuration

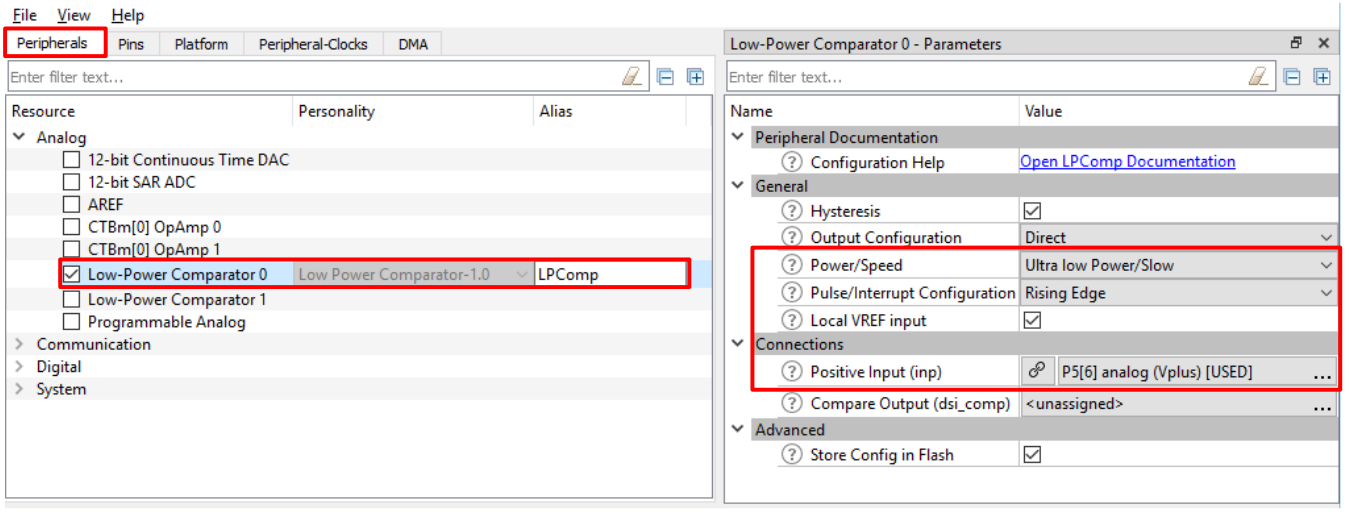


Figure 2. LPComp Vplus Pin Configuration

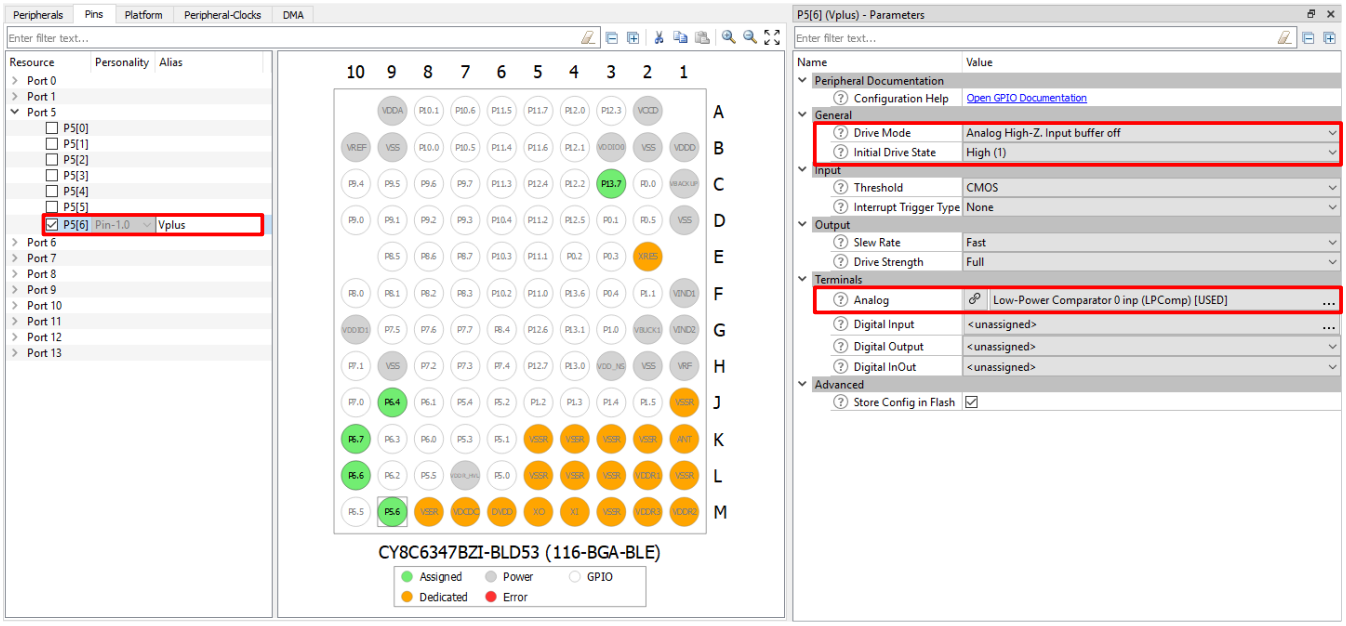
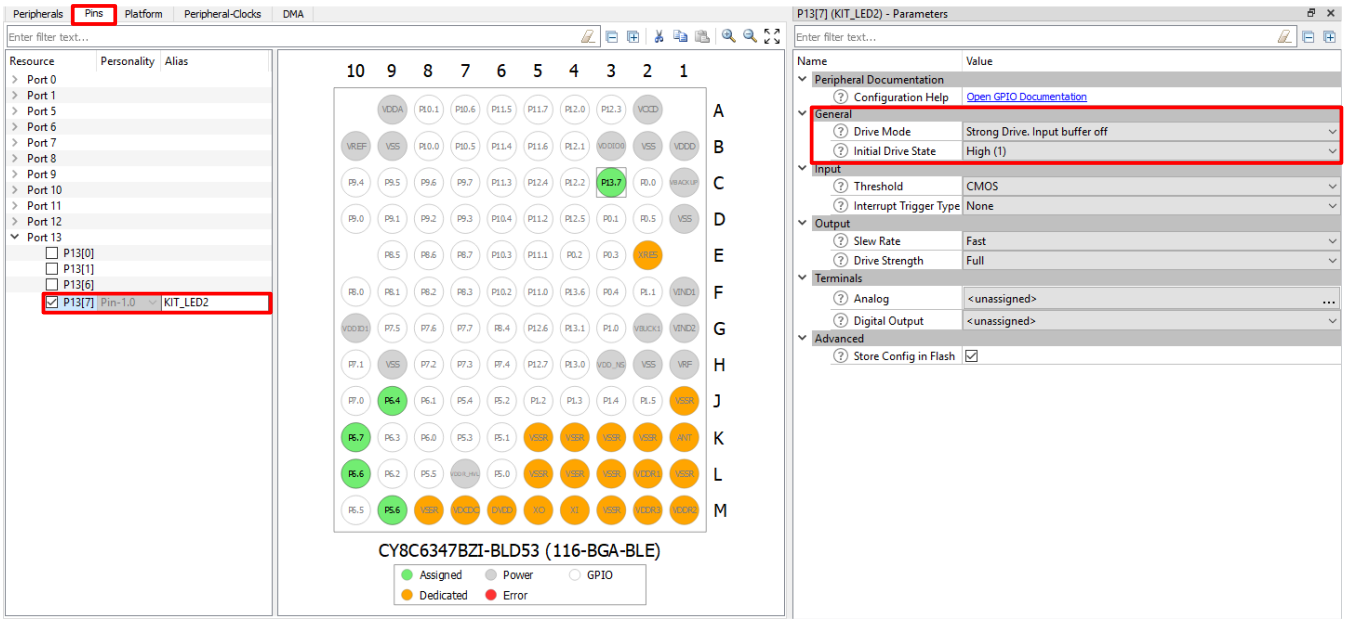


Figure 3. LED Pin Configuration



Reusing This Example

This example is designed for the supported kits. To port the design to a different PSoC 6 MCU device, right-click an application project and choose **Change Device**. If changing to a different kit, you may need to reassign pins.

Table 2. Device and Pin Mapping Table across PSoC 6 MCU Kits

Kit Name	Device Used	LED	Vplus
CY8CKIT-062-WiFi-BT	CY8C6247BZI-D54	P13[7]	P5[6]
CY8CKIT-062-BLE	CY8C6347BZI-BLD53	P13[7]	P5[6]
CY8CPROTO-062-4343W	CY8C624ABZI-D44	P13[7]	P5[6]

In some cases, a resource used by a code example (for example, an IP block) is not supported on another device. In that case the example will not work. If you build the code targeted at such a device, you will get errors. See the device datasheet for information on what a particular device supports.

Related Documents

For a comprehensive list of PSoC 6 MCU resources, see KBA223067 in the Cypress community.

Application Notes	
AN221774 – Getting Started with PSoC 6 MCU	Describes PSoC 6 MCU devices and how to build your first PSoC Creator project
AN210781 – Getting Started with PSoC 6 MCU with Bluetooth Low Energy (BLE) Connectivity	Describes PSoC 6 MCU with BLE Connectivity devices and shows how to build your first PSoC Creator project
AN215656 – PSoC 6 MCU: Dual-CPU System Design	Describes the dual-CPU architecture in PSoC 6 MCU and shows how to build a simple dual-CPU design
Code Examples	
CE218472 - PSoC 6 MCU Comparing External Voltages Using a Low-Power Comparator	
Visit the Cypress GitHub site for a comprehensive collection of code examples using ModusToolbox IDE	
Device Documentation	
PSoC 6 MCU: PSoC 63 with BLE Datasheet	PSoC 6 MCU: PSoC 63 with BLE Architecture Technical Reference Manual
Development Kit Documentation	
CY8CKIT-062-BLE PSoC 6 BLE Pioneer Kit	
CY8CKIT-062-WiFi-BT PSoC 6 WiFi-BT Pioneer Kit	
CY8CPROTO-062-4343W PSoC 6 Wi-Fi BT Prototyping Kit	
Tool Documentation	
ModusToolbox	The Cypress IDE for IoT designers

Cypress Resources

Cypress provides a wealth of data at www.cypress.com to help you to select the right device, and quickly and effectively integrate the device into your design.
For the PSoC 6 MCU devices, see KBA223067 in the Cypress community for a comprehensive list of PSoC 6 MCU resources.

Document History

Document Title: CE218129 – PSoC 6 MCU Wakeup from Hibernate Using a Low-Power Comparator

Document Number: 002-24748

Revision	ECN	Orig. of Change	Submission Date	Description of Change
**	6366959	AJYA	11/21/2018	New code example
*A	6489028	AJYA	02/19/2019	Code example updated for ModusToolbox 1.1

Worldwide Sales and Design Support

Cypress maintains a worldwide network of offices, solution centers, manufacturer's representatives, and distributors. To find the office closest to you, visit us at Cypress Locations.

Products

Arm® Cortex® Microcontrollers	cypress.com/arm
Automotive	cypress.com/automotive
Clocks & Buffers	cypress.com/clocks
Interface	cypress.com/interface
Internet of Things	cypress.com/iot
Memory	cypress.com/memory
Microcontrollers	cypress.com/mcu
PSoC	cypress.com/psoc
Power Management ICs	cypress.com/pmic
Touch Sensing	cypress.com/touch
USB Controllers	cypress.com/usb
Wireless Connectivity	cypress.com/wireless

PSoC® Solutions

PSoC 1 | PSoC 3 | PSoC 4 | PSoC 5LP | PSoC 6 MCU

Cypress Developer Community

Forums | Code Examples | Projects | Videos | Blogs | Training | Components

Technical Support

cypress.com/support

Cypress Semiconductor
198 Champion Court
San Jose, CA 95134-1709