CE220823 - PSoC 6 MCU SMIF Memory Write and Read Operation

Objective

This example demonstrates the write and read operations to the Serial Memory Interface (SMIF) in PSoC® 6 MCU using ModusToolbox™ IDE.

Requirements

Tool: ModusToolbox™ IDE 1.0

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

Demonstrates read/write operation to external memory by using Serial memory interface (SMIF) in Quad Serial peripheral interface (QSPI) mode. This example also checks the integrity of the read data against written data.

Hardware Setup

This example uses the PSoC 6 WiFi-BT Pioneer Kit's default configuration. Refer to the kit guide to ensure the kit is configured correctly. You can also use PSoC 6 BLE Pioneer Kit or PSoC 6 WiFi-BT Stamp Board Kit by modifying the application to use the corresponding device on the board.

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 If you do not upgrade, you will see an error like "unable to find CMSIS-DAP device" or "KitProg firmware is out of date".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

This example uses a terminal emulator program. Install one on your PC if you don't have one. The instructions use Tera Term.

Operation

1. Connect the Pioneer board to your PC using the provided USB cable through the USB connector.
2. Open your terminal program and select the KitProg COM port. Set the other serial port parameters as follows:
    a) Baud Rate: 115200bps
    b) Data: 8 bits
    c) Parity: None
    d) Stop: 1 bit
    e) Flow Control: None
3. Import the application into a new workspace. See KBA225201.
4. Build the application. Choose **Project** > **Build All**.
5. Program the PSoC 6 MCU device. Select the **mainapp** project. In the **QuickPanel**, scroll down and click the **Program Kitprog3** item.
6. Observe the KIT_LED2 to determine the status of the SMIF operation.

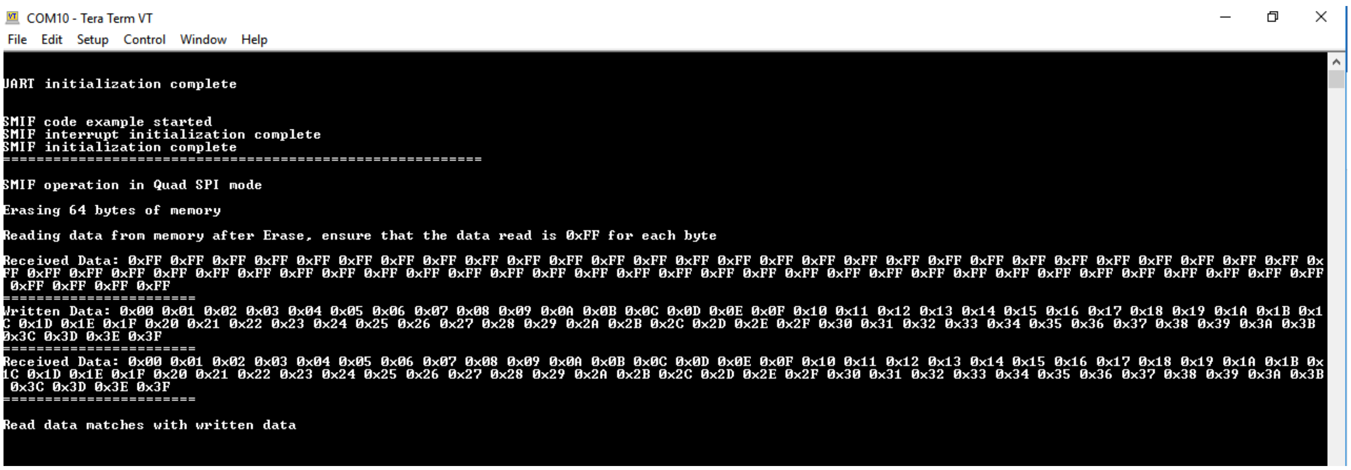
a) Blinking LED: Successful operation

b) ON LED: Failed operation

Make sure that debug messages display in the terminal window as expected.

Figure 1 is a snapshot of the debug UART terminal output.

Figure 1. Debug UART Terminal Output



Debugging

You can debug the example to step through the code. Use the **Debug (KitProg3)** configuration. See KBA224621 to learn how to start a debug session with ModusToolbox IDE.

Design and Implementation

The SMIF resource implements a SPI-based communication for interfacing external memory devices with PSoC. SMIF resource is configured with four data lines and single slave select line. This example writes 64 bytes of data to external memory in single Quad SPI mode. The written data is read back to check its integrity. The UART resource outputs debug information to a terminal window. An user LED is also used to indicate the status of read and write operation.

The firmware uses source code (*cycfg_qspi_memslot.c* and *cycfg_qspi_memslot.h* files) generated from the SMIF Configurator. This source code provides declarations for the SMIF driver memory configuration.

Resources

Table 1 lists the resources used in this example, and how they are used in the design.

Table 1. ModusToolbox Resources

Resource	Alias	Purpose	Non-Default Settings
Serial Memory Interface (SMIF)	KIT_QSPI	Transmit data to QSPI NOR Flash	Figure 2, Figure 3
SCB5	KIT_UART	Transmit debug data	Figure 4
General Purpose Input / Output (GPIO)	KIT_LED2	KIT_LED2	Figure 5

Parameter Settings

Non-default settings for each resource is outlined in red in the following figures.

Figure 2 shows the KIT_QSPI resource parameter settings.

ModusToolbox supports a stand-alone application called QSPI Configurator (star marked section in Figure 2), which enables a user to configure the SMIF through a GUI-based interface. This application is invoked from the SMIF resource. Configure the device as shown in the below image. Save the file in the *GeneratedSource* folder.

Figure 2. SMIF Resource Parameter Settings

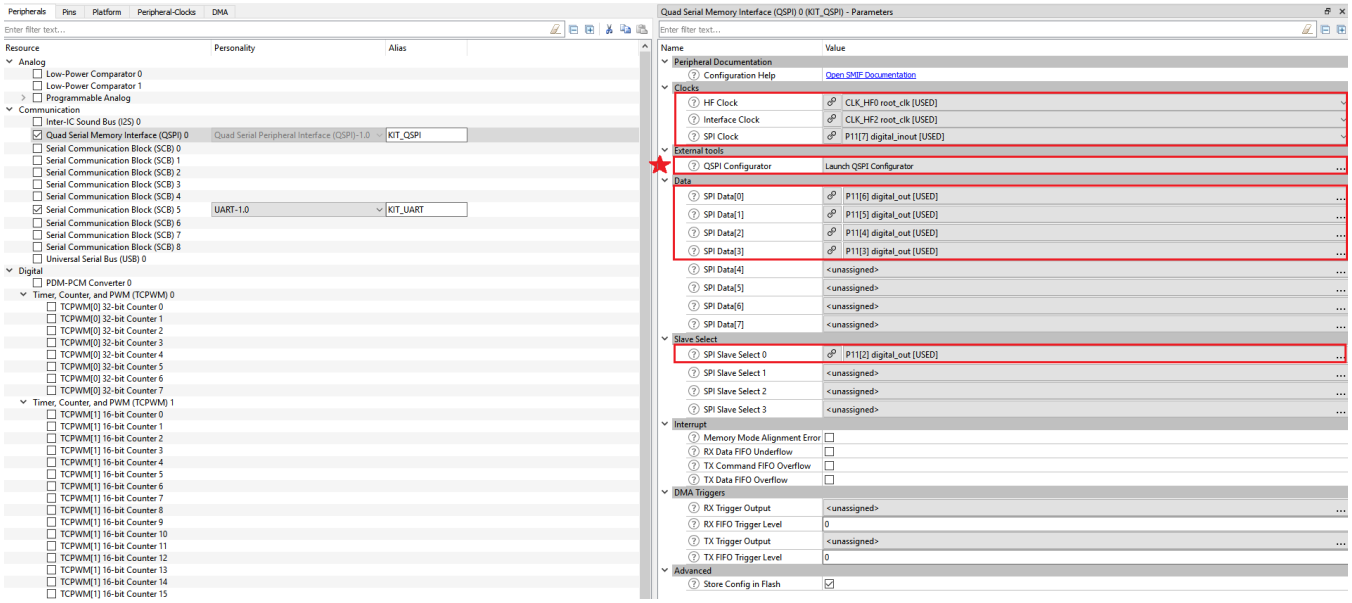


Figure 3 shows the QSPI Configurator.

Figure 3. QSPI Configurator

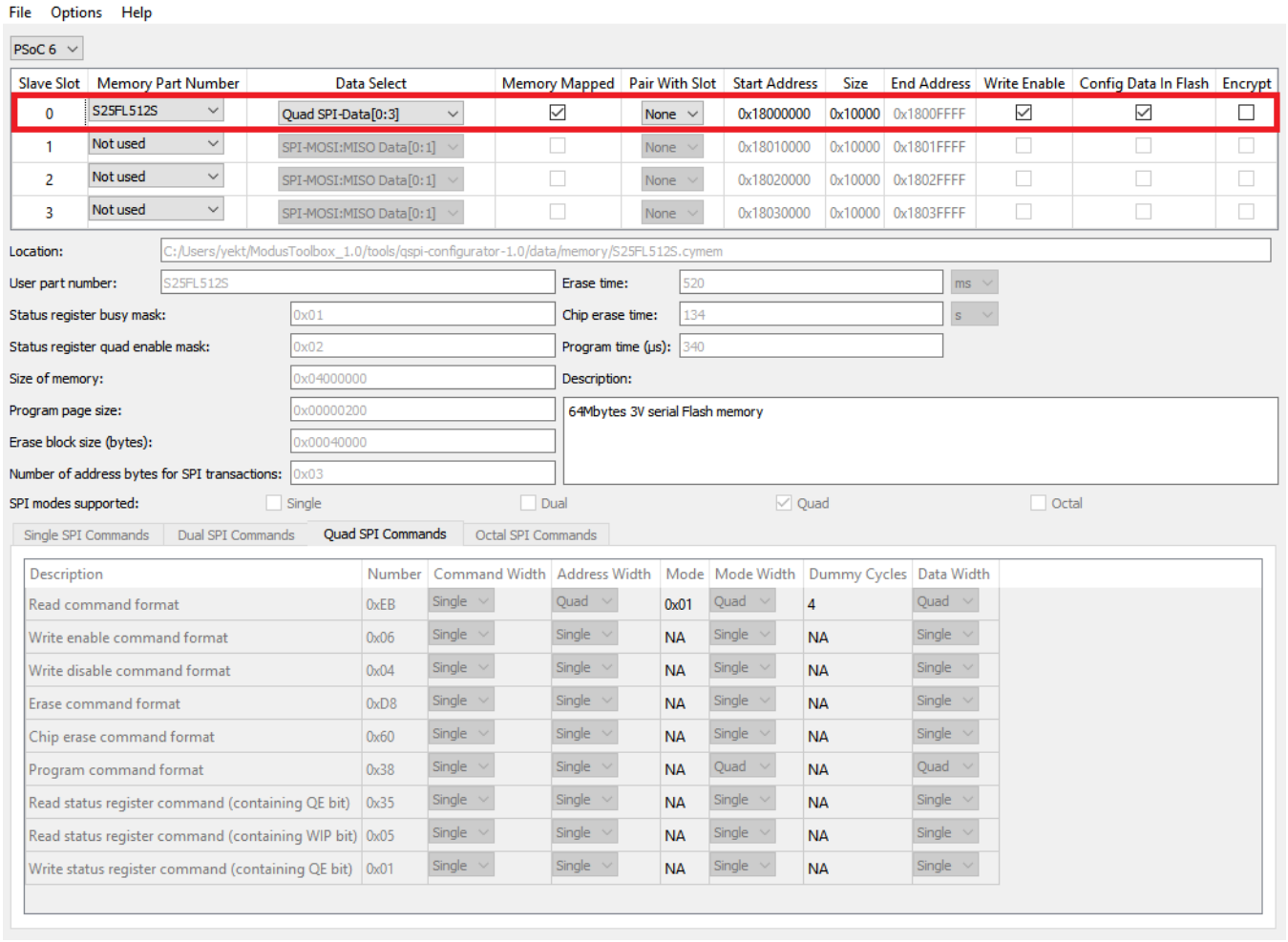


Figure 4. KIT_UART Configuration

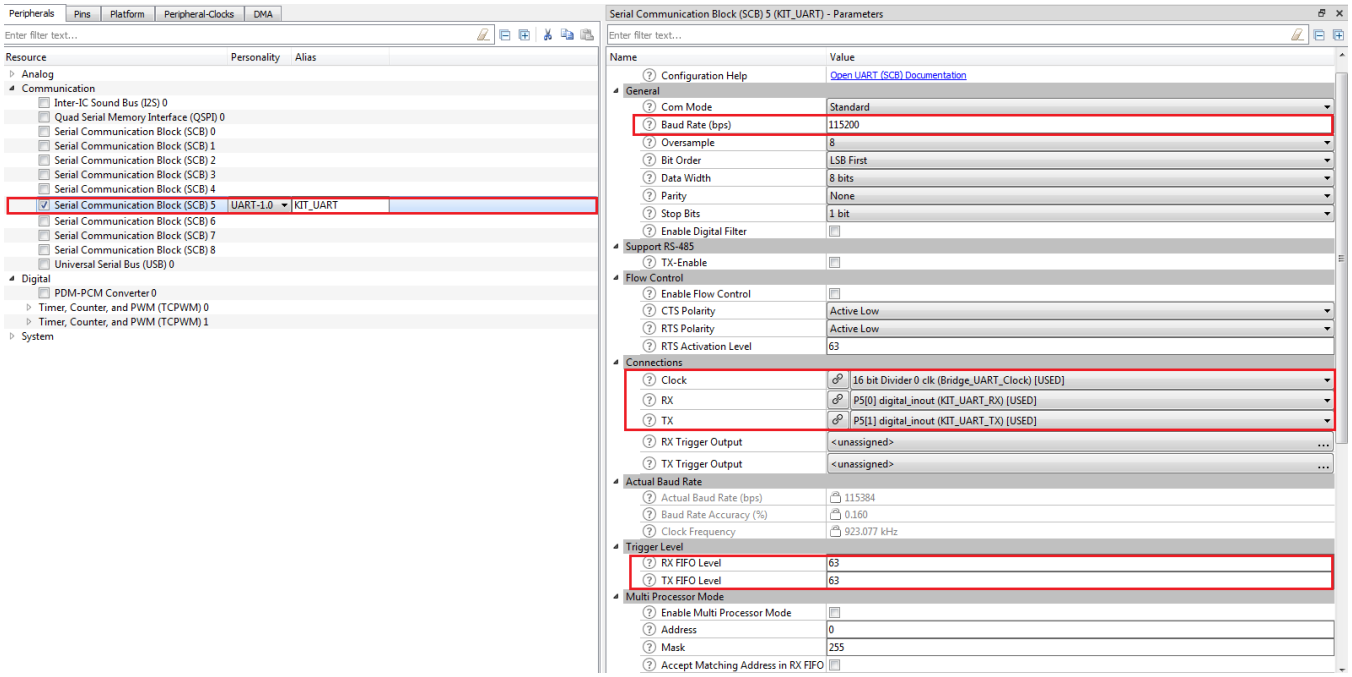
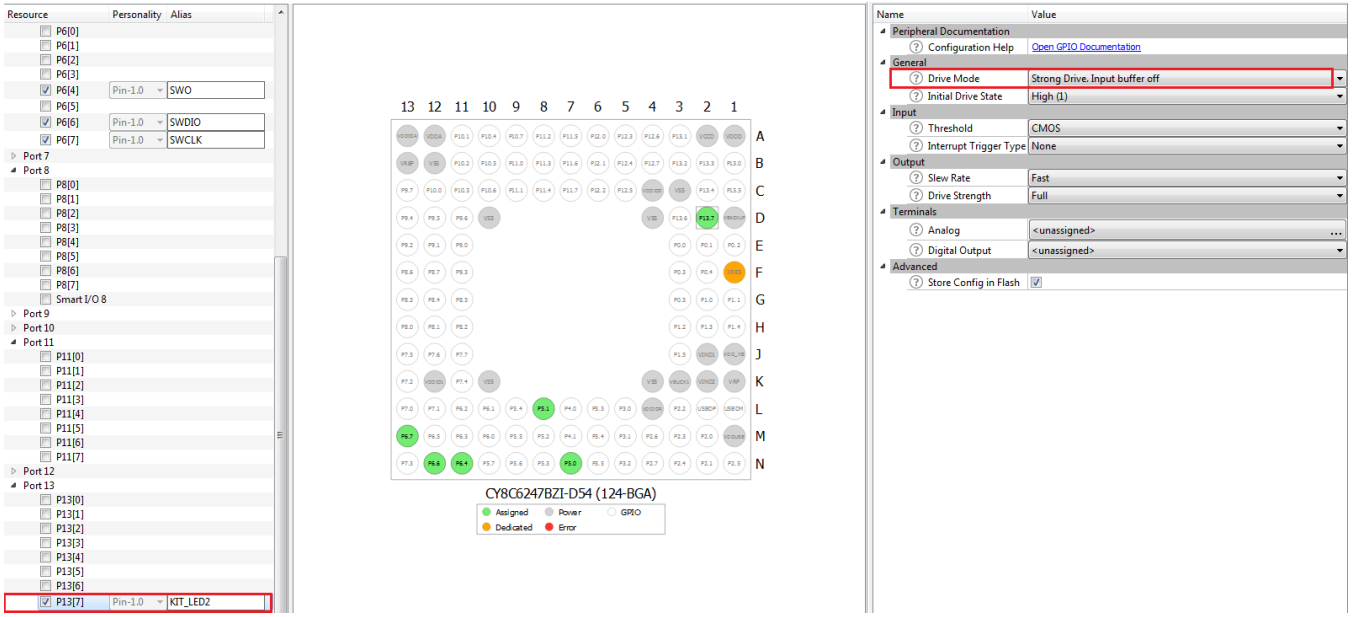


Figure 5. KIT_LED2 Configuration



Related Documents

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

Application Notes	
AN210781 – Getting Started with PSoC 6 MCU with Bluetooth Low Energy (BLE) Connectivity	Describes PSoC 6 MCU with BLE Connectivity devices.
AN221774 – Getting Started with PSoC 6 MCU	Describes PSoC 6 MCU devices and how to build your first ModusToolbox application and 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

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**	6369719	YEKT	11/02/2018	Initial public release

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