Interfacing PSoC® 1 to an SPI EEPROM

Project Name: PSoC1_SPI_EEPROM
Programming Language: C
Software Version: PD5.2
Associated Part Families: CY8C29/27/24/22/21xxx, CY8C23x33, CY7C603xx CY7C64215, CYWUSB6953, CY8CLED02/04/08/16, CY8CLED04D01/02/03/04, CY8CTxx110, CY8CNP102
Related Hardware: CY3210 PSoC® Eval1 Board
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Objective

This project interfaces PSoC1 to an Atmel SPI EEPROM (AT25080A) and performs write and read operations.

Overview

A SPI communication is set up between PSoC and the SPI EEPROM (AT25080A) with the SPIM module in PSoC1 acting as the master and the EEPROM as the SPI slave. An array of 32 bytes is written to the EEPROM starting from location 0 to 31 and the same array is read back from the EEPROM.

User Module List and Placement

The following table lists user modules used in this code example and the hardware resources occupied by each user module:

User Module	Placement
LCD	--
SPIM	DCB02

User Module Parameter Settings

The following table shows the user module parameter settings for the user modules used in the code example.

SPIM		
Parameter	**Value**	**Comments**
Clock	VC2	This sets VC2 as the clock source for the SPIM. It is set to 1.5 MHz (VC1/16) in the code example.
MISO	Row_0_Input_1	MISO is connected to Row_0_Output_1 which is then connected to Serial Output pin of the EEPROM through P0 [1].
MOSI	Row_0_Output_0	MOSI is connected to Row_0_Output_0 which is then connected to Serial Input of the EEPROM through P0 [0].
SCLK	Row_0_Output_2	SCLK is connected to Clock input of EEPROM through Row_0_Output_2 and P0 [2].
Interrupt Mode	-	As polling mode is used in the firmware, this parameter is inconsequential.
Clock Sync	Sync to SysClk	Refer to the Clock Sync section of the SPIM data sheet.
Invert MISO	Normal	Implies we are not using the invert MISO option.

Notes

- It is not necessary to use only VC2 as the clock source; it can be any of the clock sources as listed in the SPIM datasheet. Note that the maximum clock rate supported is 8.2 MHz for the SPIM module in PSoC.
- The actual bit rate of the SPIM is half the clock input. Hence, for a clock of 1.5 MHz, the clock rate from the SPIM is 750 KHz.

LCD		
Parameter	**Value**	**Comments**
LCD port	Port 2	On the CY3210 boards, LCD is wired to Port 2
BarGraph	Disable	Not used in the code example

Global Resources

Important Global Resources		
Parameter	**Value**	**Comments**
VC2= VC1/N	16	Sysclk Divider, Divide VC1 Clock by 16.

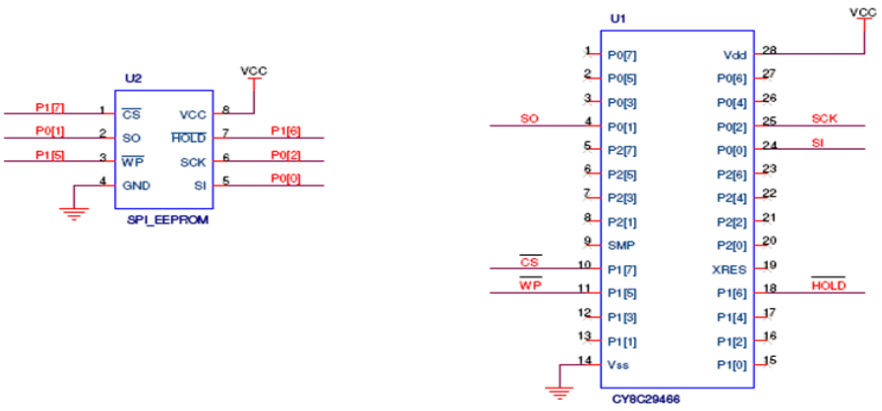
The other parameters can be retained at their default values or may be configured according to specific requirements.

Hardware Connections

U2 is an 8 Kb (1024 X 8) EEPROM from Atmel. It is an 8-pin part with the following pin configuration:

Pin Name	Function
CS	Chip Select
SCK	Serial Data Clock
SI	Serial Data Input
SO	Serial Data Output
GND	Ground
VCC	Power Supply
WP	Write Protect
HOLD	Suspends Serial Input

As shown in the following schematic, CS is connected to P1[7] ,SCK to P0[2] , SI to P0[0] , SO to P0[1] ,WP to P1[5], and Hold to P1[6]. WP and HOLD are made high in the firmware to enable write operation. The drive mode of pins used for WP, Hold, and Chip Select should be set to Strong.



The code example uses CY8C29466 PSoC1 microcontroller. This code example can be tested using the CY3210 Eval board.

Operation

On reset, all hardware settings from the device configuration are loaded into the device and *main.c* is executed.

The following operations are performed by the firmware:

- The required variables are declared and initialized. After this, the data to be transmitted to the EEPROM is stored in the Tx_Buf and the buffer to hold the data received from the EEPROM, Rx_Buf is initialized to '0'.
- WP and HOLD pins are made high and Chip Select is made to '1', where WP is 'Write protect'.
- The Status Register of the EEPROM is written with a value of 0x00 to disable write protection to all the blocks.
- Data from TX_Buf is written into the EEPROM inside the 'for' loop which iterates for 32 times. In each iteration, one byte of data is written from the buffer to the EEPROM. A 'for' loop of 32 iterations is used to write sequentially to EEPROM locations 0 to 31. For the sequence to be followed in the write operation, refer to the datasheet of AT25080A.
- After every write operation, wait for its completion by monitoring the RDY bit in the Status register.
- Data from the EEPROM is read back in Rx_Buf using another for loop which also iterates for 32 times, reading one byte of data for each iteration.
- The first 8 bytes of the Rx_Buf are displayed on the LCD.

Testing the Project

- Download the hex file 'PSoC1_SPI_EEPROM' to the CY8C29466 PSoC1.
- Make the connections between the EEPROM and CY8C29466 as shown in the Hardware Connections section.
- If you are using the CY3210, connect the LCD on the LCD jumper.
- On powering the board, the first line of the LCD should display '0001020304050607'.

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