PSoC® 1: Interfacing an I²C EEPROM using I²C Software Module

Project Name: I2Cm_EEPROM
Programming Language: C
Associated Part Families: CY8C29466-24PXI
Software Version: PSoC® Designer™ 5.2
Related Hardware: CY3210 EvalBoard, 24C256 EEPROM,
Two 4.7 K Pull-up Resistors

Project Objective

This project demonstrates how to interface the PSoC® 1 to serial EEPROM (24C256) using software I²C Master (I2Cm) User Module.

Overview

I2Cm user module is used to write data stored in RAM to an external I²C EEPROM (24C256) and read the same data back to device's RAM. I2Cm implements a master I²C device in firmware.

The following block diagram shows the block level implementation of the project.
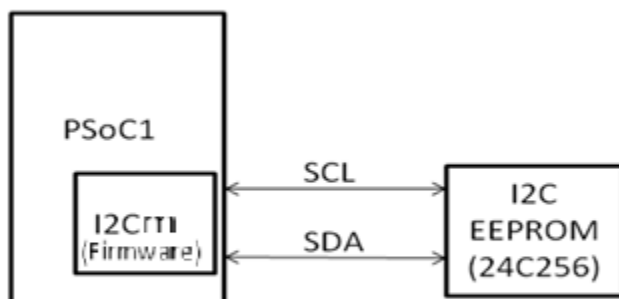
User Module List and Placement

This table lists the user modules used in this project and the hardware resources occupied by each user module.

User Module	Placement
I2Cm	Software
LCD	Software

User Module Parameter Settings

The following tables show the user module parameter settings for each user module used in the project.

I2Cm		
Parameter	Value	Comments
I2C_Port	Port_1	Port which has to be used for I2C pins.
SDA_Pin	Port_1_5	Pin which has to be used for I2C SDA.

SCL_Pin	Port_1_7	Pin which has to be used for I2C SCL.

| LCD		
Parameter	**Value**	**Comments**
LCDPort	Port 2	Use Port 2 to connect LCD.
Bar graph	Disable	Disable the Bar graph feature.

Note

■ For more details regarding User Module parameters, please refer to the UM datasheet which can be located from Start → All Programs → Cypress → PSoC Designer 5.1 → Documentation → User Module Datasheet → STDUM.

Global Resources

The project uses the default global resource settings provided in PSoC® Designer™.

Hardware Resources

The schematic for the project is shown in the following figure.
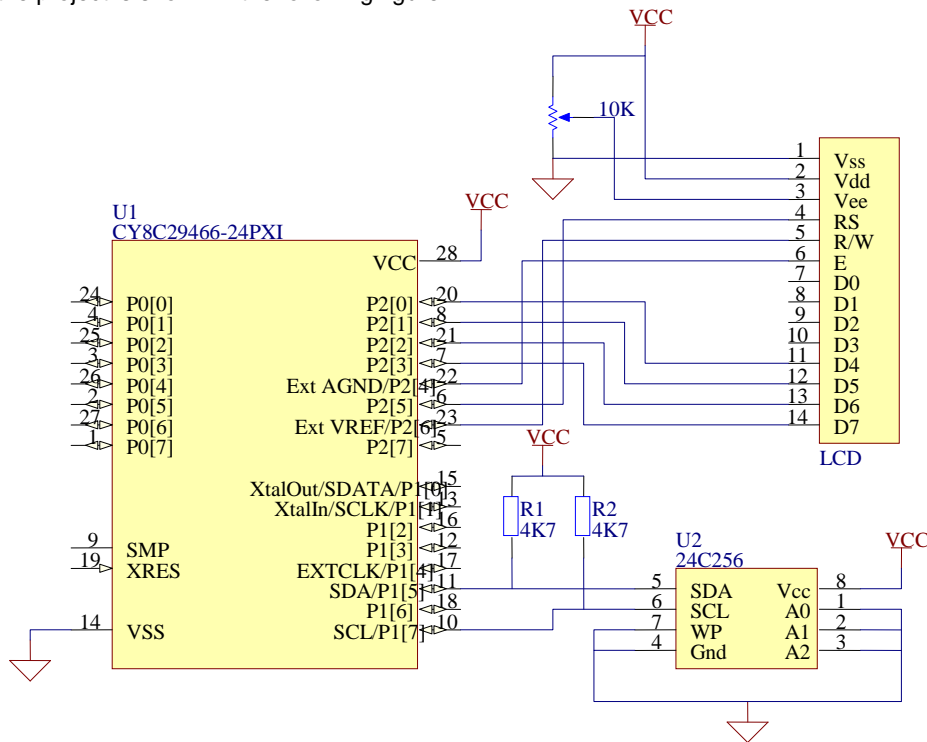
The schematic can be wired on any breadboard provided with the CY3210 EvalBoard. U2 is the serial EEPROM, 24C256. This device has 512 bytes of EEPROM with 16 byte page writes. Pins A0, A1, and A2 are used to connect multiple EEPROMs to a single I²C bus and to hard wire the three Least Significant Bits of the device address. In this example, these lines are tied to GND. The Write Protect (WP) pin is tied to GND so the EEPROM may be written. R1 and R2 are external pull-up resistors as the I²C bus operates in Open Drain mode.

Operation

An overview of the operation is given in this section. Refer to the example project "I2C_EEPROM" for complete details.

■ In the main routine, start the I2Cm (I2C Master) and LCD module. Initialize the EEPROM read address location to zero. Also, enable global interrupts.

■ Display a welcome message on LCD.

- Write data from the RAMBuffer to the EEPROM using the I2Cm_bWriteBytes function

- After the data is written to the EEPROM, the EEPROM enters a self-timed write cycle. Unless the internal write is complete, the EEPROM does not send an ACK to any Start conditions. Therefore, it is necessary to give a delay of about 50 ms for the EEPROM to complete the internal write operations

- Set the EEPROM address by performing a write operation to the EEPROM

- The 16 bytes written to the EEPROM at the given address are read back using the I2Cm_fReadBytes function

- Compare the data read back with data written to Flash, if all the BYTES match then display "Test Passed" else display "Test Failed".

Output

Data read back from the EEPROM is stored in the WriteBuffer. This data is then compared with data written to the flash and LCD is updated accordingly.