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AN204730

F²MC-8FX Family 8-Bit Microcontroller MB95310/370 Series I²C Library Usage API

Associated Part Family: MB95310/370 Series

This document introduces API for I²C library.

Contents

1 Introduction....1
2 I²C Library Function List....1
3 I²C Function Detail....2
3.1 Initial_I²C Function....2
3.2 Write_I²C Function....2
3.3 Read_I²C Function....3
4 Usage Demo....4
4.1 Usage Steps of MB95F310 MCU....4
4.2 Software Usage Attention....6
4.3 Sequence of Data Transfer....6
5 Debugging....7
6 Additional Information....9
Document History....10

1 Introduction

This document introduces API for I²C library.

Cypress MCU MB95F310 has I²C module and it can be used by connecting master device to slave device. In following chapter we will describe the library of Cypress MCU MB95F310.

2 I²C Library Function List

This section introduces all functions in I²C library in project Simulate LCD EVBoard.prj which uses MB95F310 as MCU.

Table 1 lists the I²C functions.

Table 1. I²C Functions

Function name	Description
void initial_I²C(void)	Initializes I²C and sets shift clock frequency
void Write_I²C(unsigned char addr, unsigned char subadd, unsigned char data)	Writes data to slave chip
unsigned char Read_I²C(unsigned char addr, unsigned char subaddr)	Reads data from slave chip

3 I²C Function Detail

This section introduces the detail of I²C functions.

3.1 Initial_I²C Function

Table 2 describes initial_I²C function.

Table 2. AD_Init Function

Function name	Initial_I²C
Function prototype	void initial_I²C(void)
Behavior description	Initializes I²C and sets shift clock frequency
Input parameter	None
Return value	None
Example	Sets shift clock frequency to 23 KHz when MCLK is 6 MHz: initial_I²C();

This function is to initialize I2C. In this function default shift clock frequency is 23 K when MCLK is 6 MHz, and it can be decided by setting register ICCR.

The shift clock frequency can be decided by following formula:

FSCLK = MCLK / (m*n+2)

The parameter m and n are decided by register ICCR0, which is used in initial function. User can ignore it when using 6M MCLK and 23 KHz shift clock frequency.

3.2 Write_I²C Function

Table 3 describes Write_I²C function.

Table 3. Write_I²C Function

Function prototype	void Write_I²C (unsigned char addr, unsigned char subadd, unsigned char data)
Behavior description	Writes data to slave chip
Input parameter1	addr, address of slave chip, range is 0x00 to 0xff
Input parameter2	subadd, sub address of slave chip, range is 0x00 to 0xff
Input parameter3	data, data which write to slave chip, range is 0x00 to 0xff
Return value	None
Example	In case slave chip is EEPROM and it's address is 0xa0, then write 0x25 to EEPROM sub-address 0x01: Write_I2C(0xa0,0x01,0x25);

3.3 Read_I²C Function

Table 4 describes Read_I²C function.

Table 4. Read_I²C Function

Function name	AD_Read
Function prototype	unsigned char Read_I²C (unsigned char addr, unsigned char subaddr)
Behavior description	Read data from slave chip
Input parameter1	addr, address of slave chip, rang is 0x00 to 0xff
Input parameter2	subadd, sub address of slave chip, rang is 0x00 to 0xff
Return value	Data saved in slave chip sub-address
Example	Read data from EEPROM and sub-address is 0x01: [variable]= Read_I²C(0xa0,0x01);

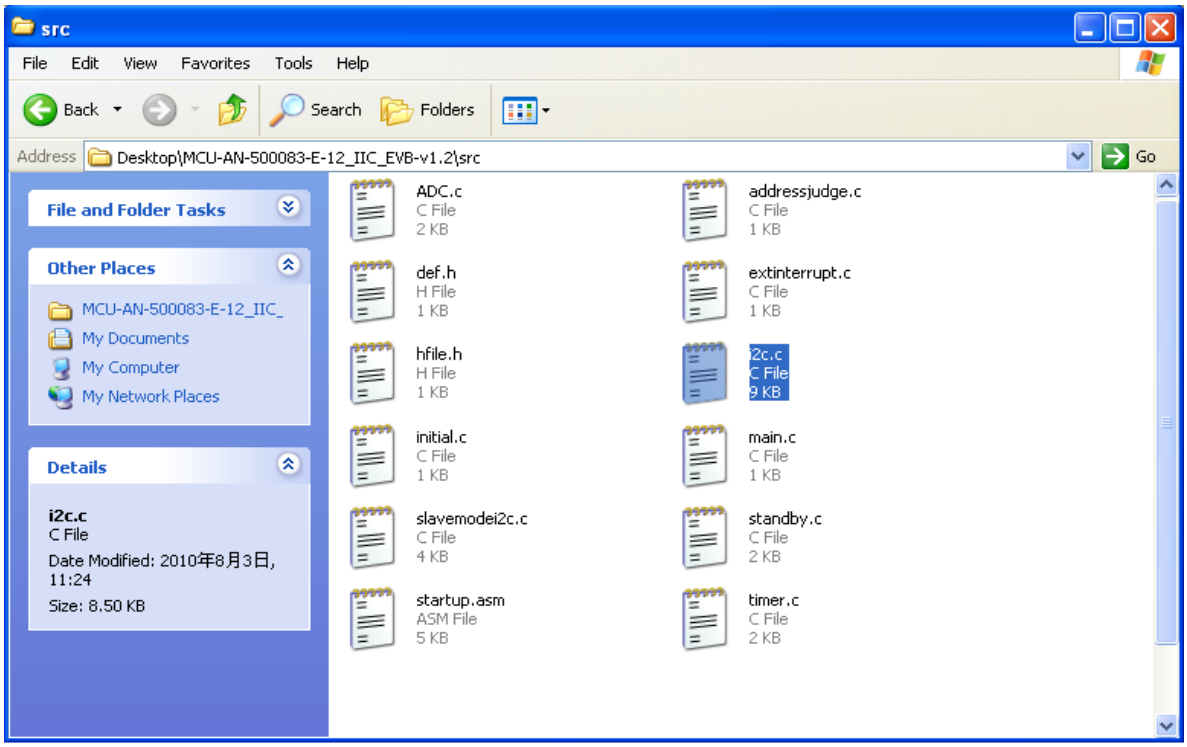
4 Usage Demo

This section describes the steps of how to use this library and some usage cautions.

4.1 Usage Steps of MB95F310 MCU

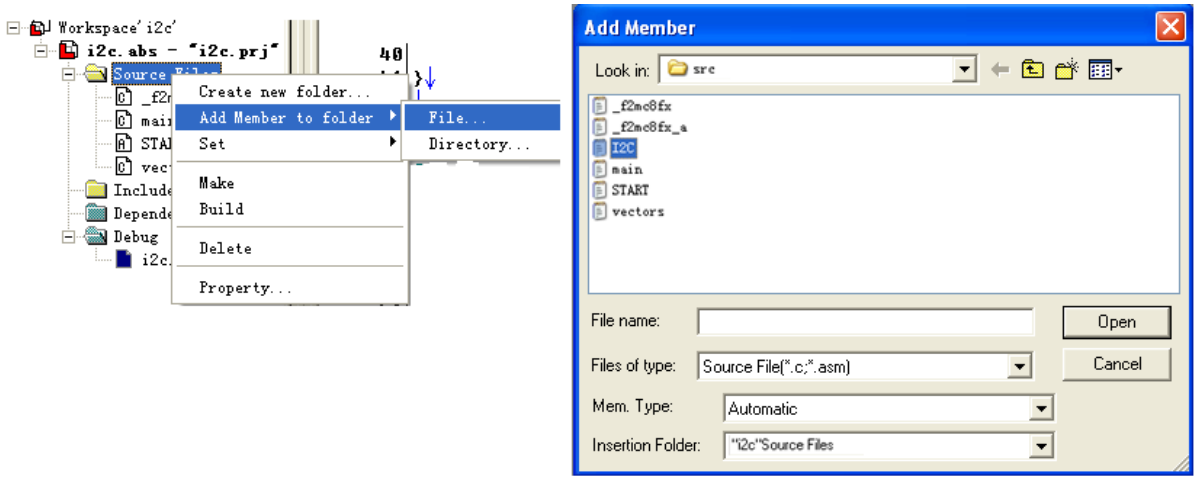
- First step is adding I²C library to project document, Figure 1 is a sample for adding this library.

Figure 1. First Step of Use I2C Library



- Second step is adding I²C library to project, Figure 2 is a sample for this work

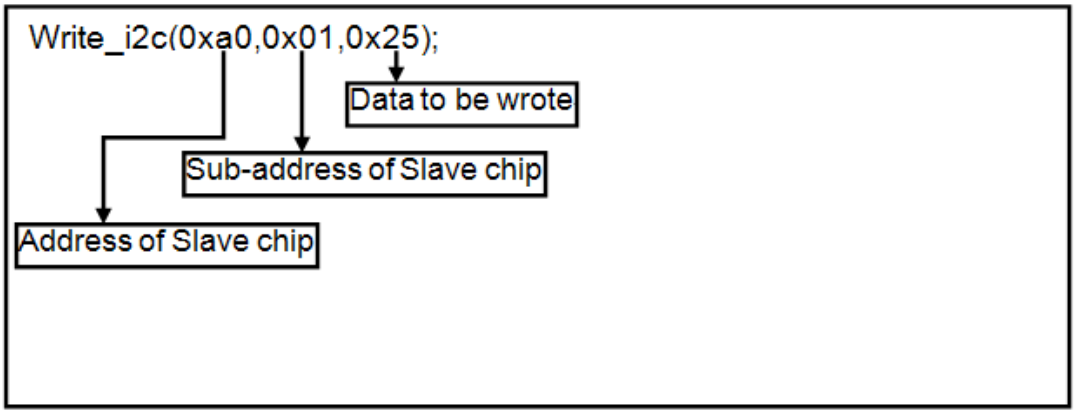
Figure 2. Second Step of Use I2C Library



- Third step is using the I²C library, for detailed library please refer to Table 1. About the initial function it is used in the library internally, so user can ignore it.

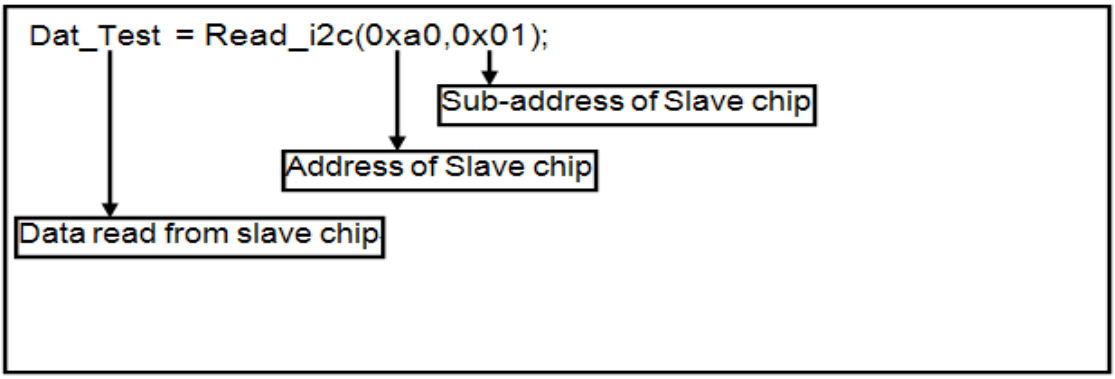
  If user wants to write data, please use Write_I²C function, Figure 3 is an example which writes data 0x25 to EEPROM sub-address 0x01.

Figure 3. Example of Writing



If user wants to read data from slave device, Figure 4 is an example which reads data from EEPROM sub-address 0x01.

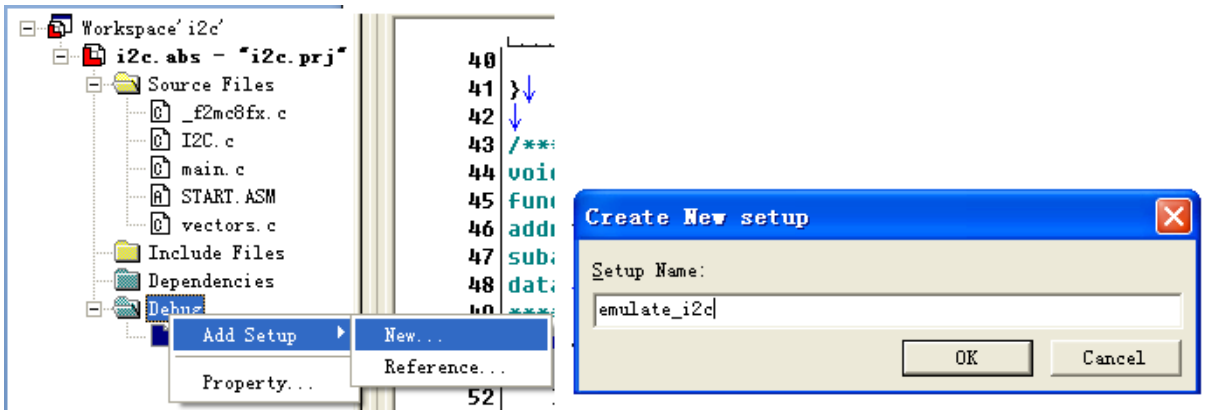
Figure 4. Example of Reading



- Fourth step is debugging,

  User needs to add debug document. Debugging mode includes serial interface, USB interface and LAN interface. Figure 5 is an example for creating serial interface debug document.

Figure 5. Step of Setting Debug Environment



For detailed debug information please refer to 5. Debugging.

4.2 Software Usage Attention

When writing data to slave device, if the slave device didn't generate acknowledge sign to master, the following items may cause it:

- The connect of I^2C is not steady
- The power of slave chip maybe not normal
- I^2C is not initialized, I^2C bus is busy
- Shift frequency clock is not suitable for slave chip

4.3 Sequence of Data Transfer

When transmitting, the MSB bit is transmitted first.

5 Debugging

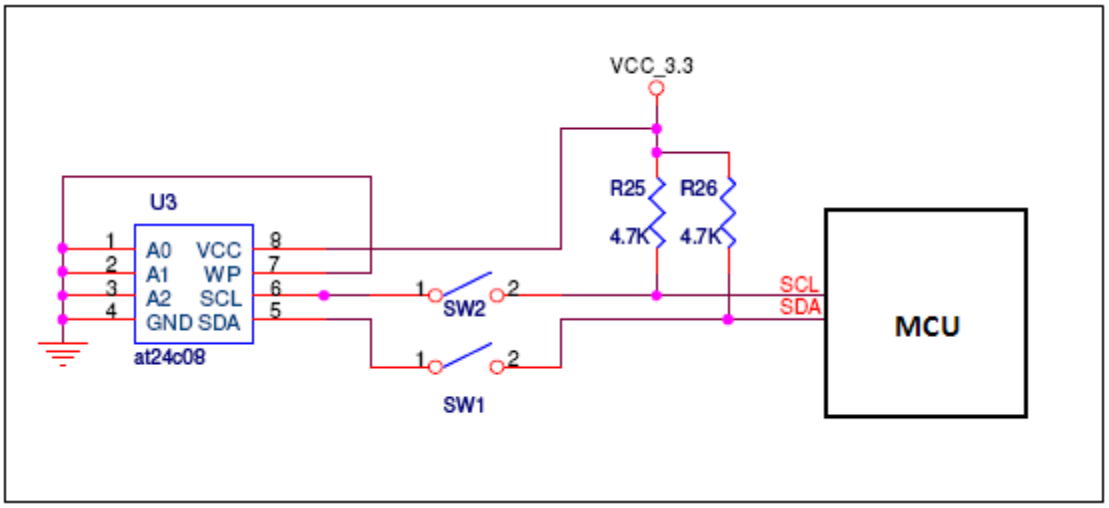
This section describes how to debug the sample code I²C.prj on start kit and what will happen when the code is running.

Attachment is the sample project I²C.prj.

This project is based on our start-kit MB2146-450-E and the target MCU is MB95F310. For detailed information, you can access our website or contact with our sales window person.

When debugging, user must connect slave device and master chip by I²C. Figure 6 describes the connecting.

Figure 6. Hardware Description

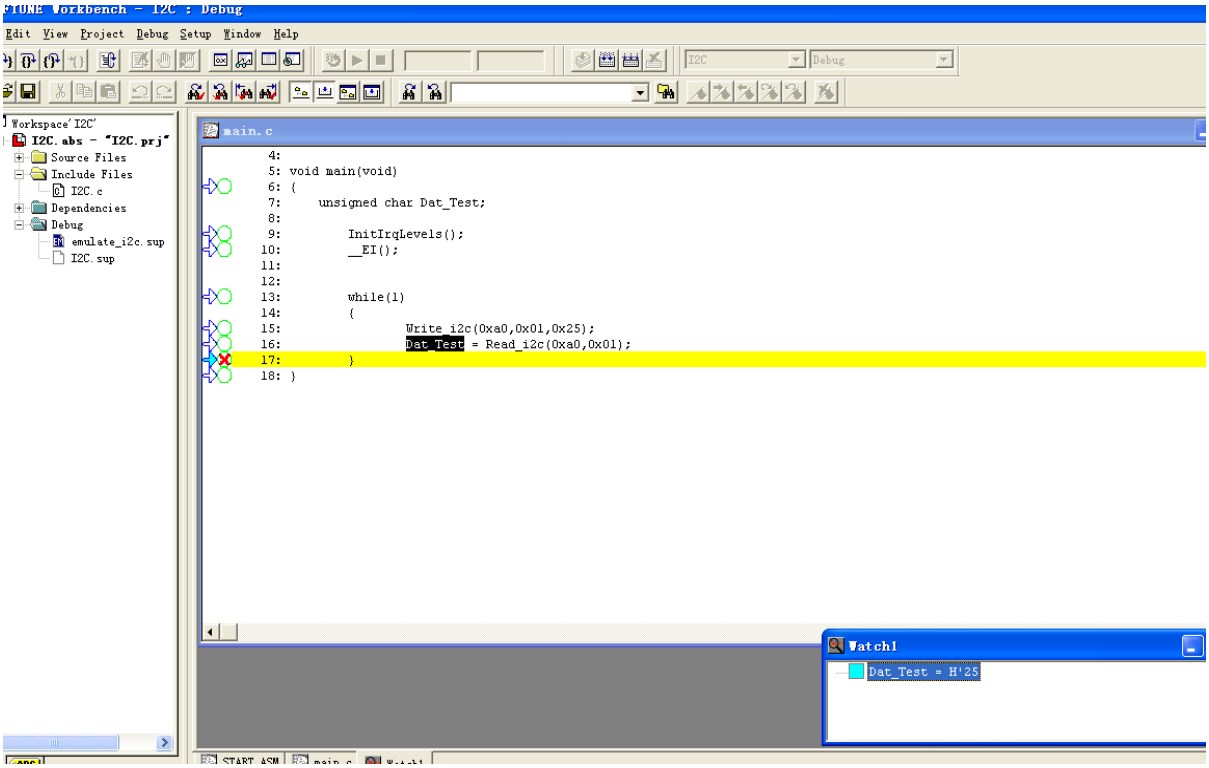


The value of pull up resister R25 and R26 can select from 1 KΩ to 10 KΩ.

When debugging user can write or read data from EEPROM. In this project global variable Dat_Test is used to save the data read from slave device.

Figure 7 is a debugging picture. User can see read result in watch window.

Figure 7. See Variable Dat_Test



6 Additional Information

For more information about how to use MB95310 EV-board, BGM Adaptor and SOFTUNE, please refer to EV-Board MB2146-450-E User Manual, or visit website:

http://www.cypress.com/documentation/application-notes/mb95310370-mb2146-450-e-lcd-evb-user-manual

Document History

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Revision	ECN	Orig. of Change	Submission Date	Description of Change
**	-	HUAL	11/10/2009	Initial release
			03/17/2011	Modified Chinese remark
*A	5249905	HUAL	05/18/2016	Migrated Spansion Application Note MCU-AN- 500052-E-10 to Cypress format.

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