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Spec No: 002-05237

Spec Title: AN205237 - FM3 MB9B500 Microcontroller with USB Flash Loader Demonstration System

Replaced by: None

AN205237

FM3 MB9B500 Microcontroller with USB Flash Loader Demonstration System

This document mainly introduces the operation process. The Flash Loader is used for the user to download the user code from the PC to the board by the USB interface.

Contents

1 Introduction

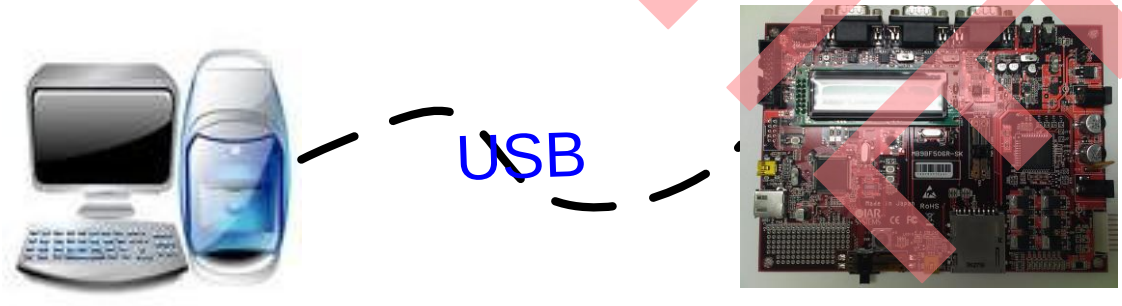
1.1 About UART Flash Loader

The Flash Loader is used for the user to download the user code from the PC to the board by the USB interface.

For FM3, there is a boot loader program embedded in the MCU, and this program can be used for the customer to download the code from the PC to the board, but mode pin must be used in this operation mode. For some users, they hope no other H/W resource to be used in program update process, so the USB Flash Loader is developed for these users.

In this application, the USB port of the target board is worked as a virtual com port. Though the PC connect the board with the USB line, the board is recognized as a COM port device for the PC.

Rough view:



1.2 About MB9B500 Series MCU

MB9B50X series MCU is 32-bit general purpose MCU of FM3 family that features the industry's leading-edge ARM Cortex-M3TM CPU and integrates Fujitsu's highly reliable and high-speed secure embedded flash technology. This MCU can operate at up to 80MHz CPU frequency and work at a wide voltage range (2.7-5.5V), which can be both compatible with 3.3 V and 5 V system.

It includes a host of robust peripheral features, including motor control timers (MFT), base timer (can be configured to PWM, PPG, Reload, PWC timer), ADCs, on-chip memory (up to 512K Flash, up to 64K SRAM) and a wide range of communication interfaces (USB, I2C, SIO, LIN, CAN).

The size of on-chip memory can be configured according to different part number and the package is available in LQFP and BGA, shown in Table 1

Table 1. FM3 Product List

Product	Flash	SRAM	Package
MB9BF504N/R	256kB	32kB	N: LQFP-100/BGA-112 R: LQFP-120
MB9BF505N/R	384kB	48kB	N: LQFP-100/BGA-112 R: LQFP-120
MB9BF506N/R	512kB	64kB	N: LQFP-100/BGA-112 R: LQFP-120

1.3 About USB Flash Loader Demo

In the demo, the user can download the demo code onto the board to check the result (display the user code content and communicate with the PC with USB as virtual com).

1.4 About Document

This document mainly introduces the operation process.

2 USB Flash Loader Demo System Components

1. IAR 6.XX: download the USB Flash Loader (MCU) onto the board.
2. USB Flash Loader (MCU) Project: the boot loader program.
3. USB Flash Loader (PC): the program running on the PC to communicate with the board to process the user command. (disk1)
4. User code: demo code. (VirtualCom.bin and VirtualCom.hex)

3 USB Flash Loader Overview

1. First of all, the user must download the USB Flash Loader (MCU) program onto the board by IAR.
2. Then the user can contact the PC with the board to operate the board.
3. After downloading the user code, the user can run the code.

4 USB Flash Loader Usage Step

4.1 Interface Introduction

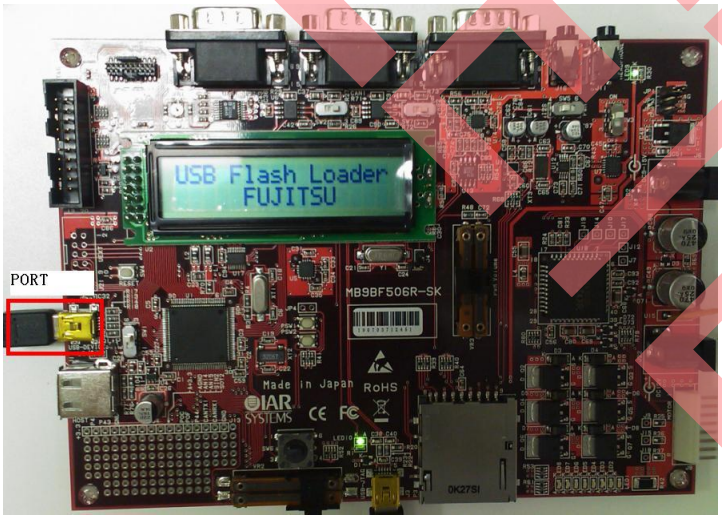
(Due to this application is derived from UART Updater, so in some place you can find the word: UARTUpdater, it's no problem.)

Figure 1. Start Up Interface

Operation steps:

1. Connect the USB line between the board and the PC as following. (the USB device port is identified as red frame.

Note: This port must be connected before power on the board



2. Power on the board.
3. Start the USBFlashLoader (PC) software.
4. After start the program, the user must select the valid COM port.

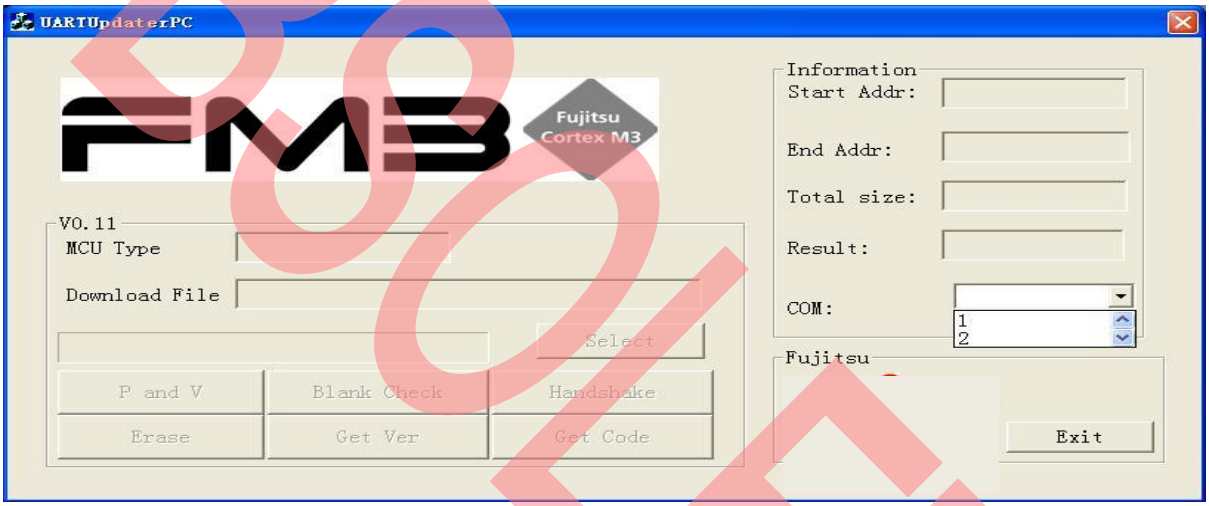
5. The program will init the selected valid COM port, and the ‘Handshake’ button can be clicked.
6. Click the ‘Handshake’ button to start the working process between the PC and the board.
7. If connection OK, the MCU information will be displayed, and the ‘Blank Check’/’Erase’/’Get Version’/’Get Code’ buttons can be clicked.
8. The user can select the downloaded file (bin or hex format) by select ‘Select’ button, then click ‘P and V’ button to download the file onto the board and get the program/verify result.

Note: If there is no response got from the board (i.e. click the ‘Blank’ button to check the user code area of the board, but there is no response got in the ‘Result’ edit box), the user can start the step 1 – 6 to re-connect the PC with the board.

4.2 COM Select

Select the COM port by select the combo list behind ‘COM:’

Figure 2. COM Port Select



If COM port init OK

Figure 3. COM Port Init OK

If invalid COM port is selected

Figure 4. COM Port Init NG

4.3 Connection

After the COM port init OK, the user shall connect the PC with the board at first, so the ‘Handshake’ can be clicked.

Figure 5. After COM Port Init OK

Click the ‘Handshake’ button, if COM init OK

Figure 6. Handshake OK

If can't get the response from the board within 5 seconds, display the overtime message

Figure 7. Handshake Overtime

4.4 Blank Check

After connection OK, click the 'Blank Check' button to check whether there exists the data in the user code area on the board, check the 'Result' text item.

Figure 8. User code area is blank

Figure 9. User code area is not blank

4.5 Erase

After connection OK, click the ‘Erase’ button to erase the user code area of the board, check the ‘Result’ text item.

Figure 10. Erasing

Figure 11. Erase OK

4.6 File Select

After connection OK, click the ‘Select’ button to select the downloaded file.

Figure 12. Select file

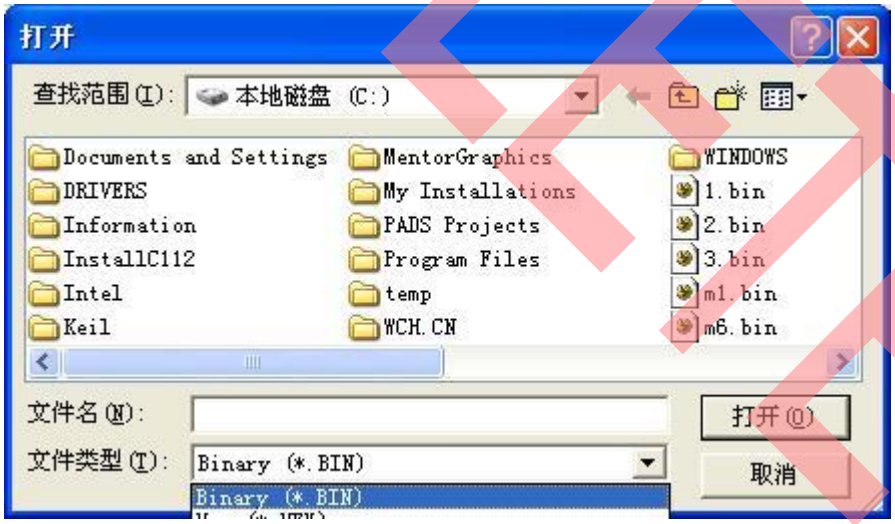


Figure 13. File slected

4.7 Program and Verify

After the file is selected, click the ‘P and V’ to download the file onto the board.

Figure 14. Programming

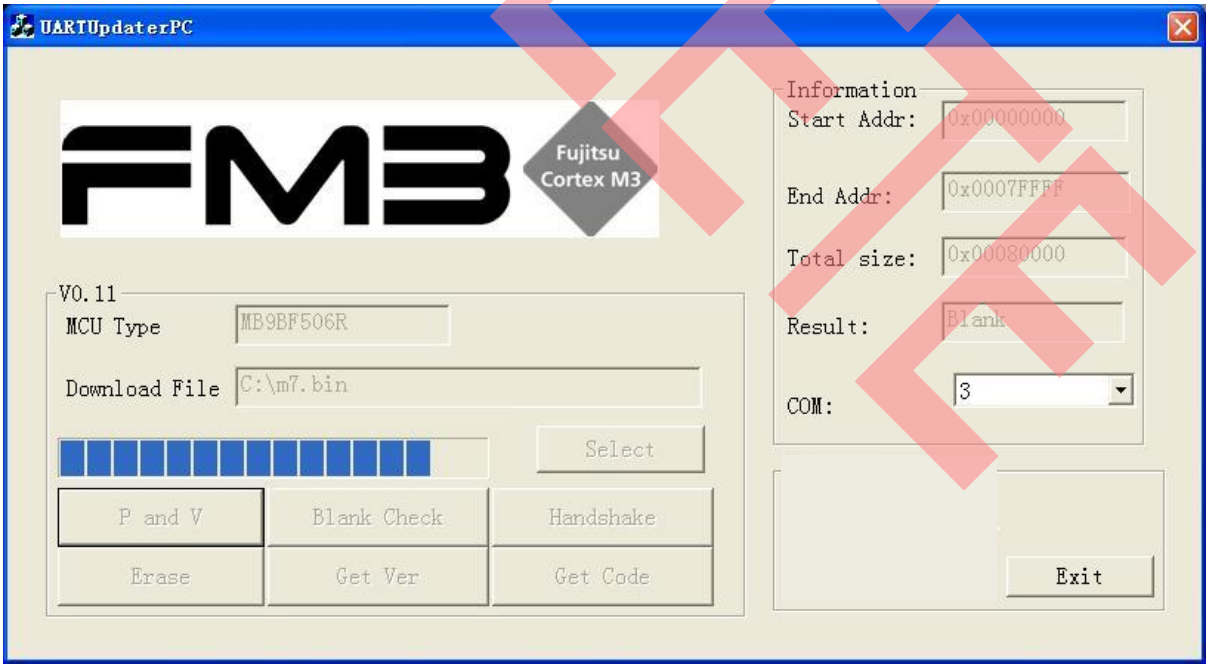
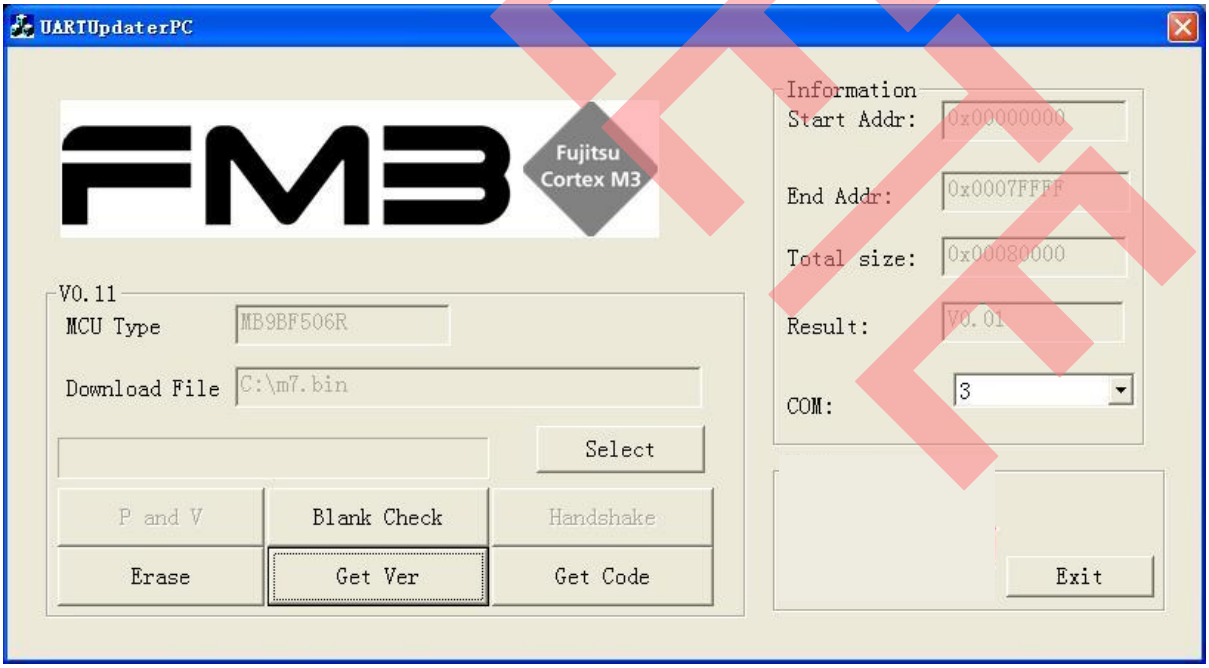


Figure 15. Program OK

4.8 Get Version

After connection OK, click the ‘Get Ver’ button to get the user code version information.

Figure 16. Get Version



4.9 Get Code

Note: Not fully supported in this version!)

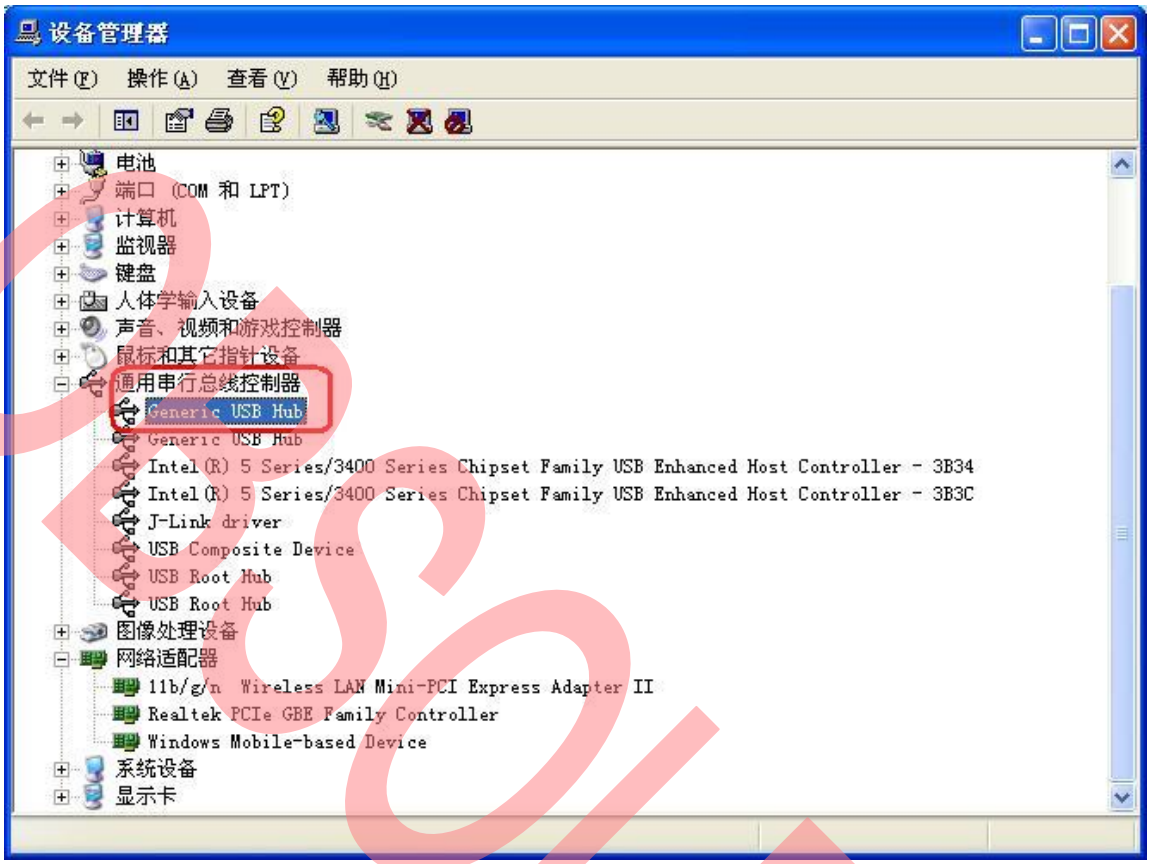
After connection OK, click the ‘Get Code’ button to get the program at the user code area.

Figure 17. Getting Code

Figure 18. Code got OK

Note: Due to some reason (driver or some unexpected reason), sometimes maybe the connection is not OK, in this situation, the user can:

1. Power off → Power on
2. f after power off/on, the board still can’t work, please check the ‘Device Manager’ to confirm whether the device is correctly recognized, if not, the user can stop/start the ‘Generic USB Hub’ of this connected USB port.

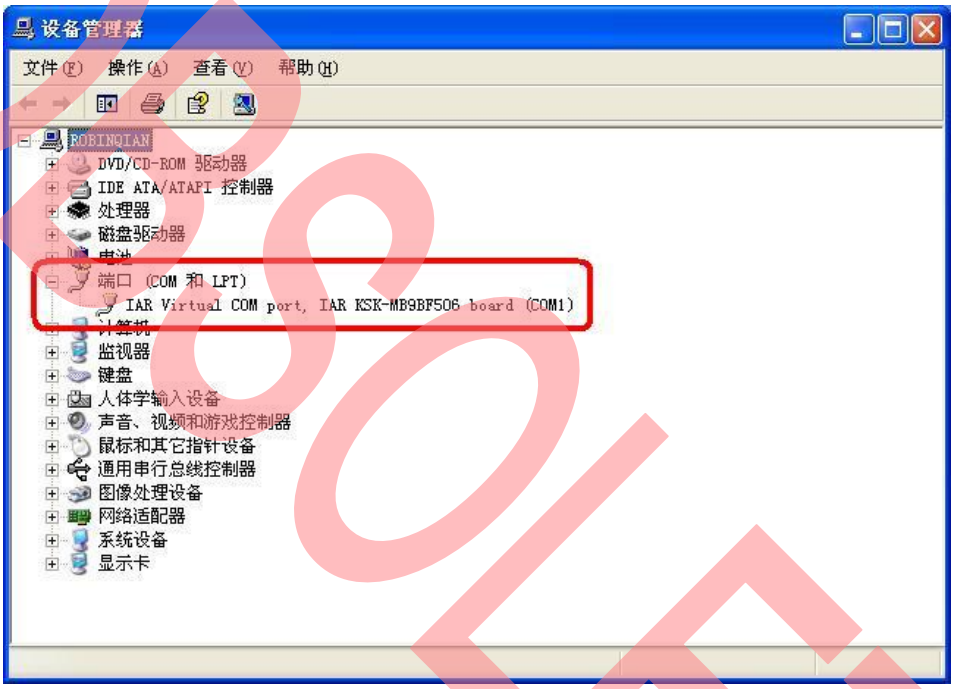

设备管理器
文件(F) 操作(A) 查看(V) 帮助(H)
电池
端口 (COM 和 LPT)
计算机
监视器
键盘
人体学输入设备
声音、视频和游戏控制器
鼠标和其它指针设备
通用串行总线控制器
Generic USB Hub
Generic USB Hub
Intel(R) 5 Series/3400 Series Chipset Family USB Enhanced Host Controller - 3B34
Intel(R) 5 Series/3400 Series Chipset Family USB Enhanced Host Controller - 3B3C
J-Link driver
USB Composite Device
USB Root Hub
USB Root Hub
图像处理设备
网络适配器
11b/g/n Wireless LAN Mini-PCI Express Adapter II
Realtek PCIe GBE Family Controller
Windows Mobile-based Device
系统设备
显示卡

4.10 Preparation

4.10.1 Driver installation

Due to in this application, the board is worked as a USB virtual com device, so the user must install the correct driver on the working PC before using the flash load function. Please install the 'iarvircomport.inf' and note that the driver only supports the WinXP (Win2000).

After the correct installation, if connect the board and the PC with USB line, then power on, you can find this device in the 'Device Manager'



4.10.2 Program preparation

Please use the IAR to download the USB Flash Loader bin code onto the board.

5 Example Project

5.1 Components

The package shall include:

USB Flash Loader (MCU) Project

USB Flash Loader (PC) installation files (disk1)

User code (VirtualCom.bin and VirtualCom.hex)

USB line

IAR 6.XX

MB9BF506R-SK board

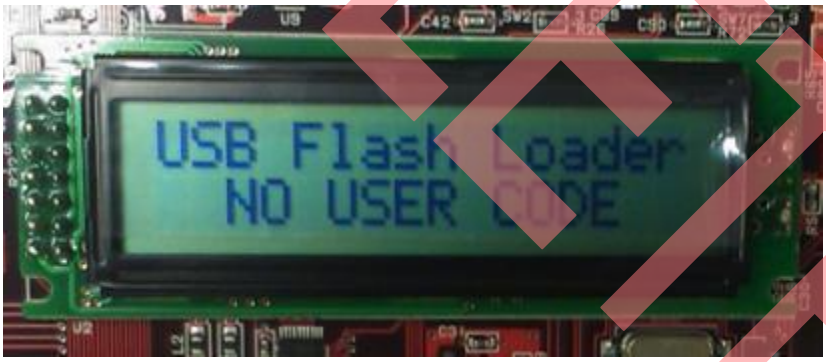
5.1.1 USB Flash Loader (MCU)

After power on,

1. USB line connected before power on, LCD display as following:

2. USB line not connected before power on with valid user code, LCD display as following:

3. USB line not connected before power on with invalid user code, LCD display as following:



Note: Please notice use the correct USB port of the board.

5.1.2 USB Flash Loader (PC)

After start the program, please operate the software as Chapter 4 described.

5.1.3 User Code

The function of the user code:

1. Display the following content on the LCD

2. The user can start the COM debug tools (configured as: 115200/8 bits/1 stop bit/None parity/custom flow control) and send some content to the board, the board will send back the received data to the PC.

5.2 Usage Scenario

5.2.1 Preparation

1. Prepare the board
2. Download the USB Flash Loader (MCU) onto the board
3. Connect the PC with the board
4. Start the USB Flash Loader (PC) software on the PC
5. Select the valid COM port
6. Click the 'Handshake' button; power on/reset the board **within 5 seconds**
7. Connection OK
8. Click the 'Blank Check' button to check whether the user code area of the board is blank, if not blank, click the 'Erase' button to erase the user code area
9. Select the user code (bin/hex format are supported) (usercode.bin/usercode.hex)
10. Click the 'P and V' to download the program and check the result

5.3 User code make

1. Prepare the normal project
2. Add the following code at the start of Reset Handler

```
LDR    R0,=0xE000ED08
LDR    R1,=0x4000
STR    R1,[R0]
```

3. Define the section for storing the version information

In .c file, add

```
#pragma location = ".INFORSEC"
const char sVersion[16] = {'V','0','.','0','1', 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0};
```

in .icf file, add

```
place at address mem:0x00004100 { section .INFORSEC};
```

4. Output can be selected as .hex or .bin

6 Document History

Document Title: AN205237 - FM3 MB9B500 Microcontroller with USB Flash Loader Demonstration System

Document Number: 002-05237

Revision	ECN	Orig. of Change	Submission Date	Description of Change
**	-	HUAL	10/24/2011	Initial Release
			10/26/2011	Refine the section 4.1
*A	5043575	HUAL	06/28/2016	Migrated Spansion Application Note from MCU-AN-510017-E-11 to Cypress format. Links to Hardware and firmware doesn't exist and this AN to be Obsolete.

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