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AN205236

FM3 MB9B500 Microcontroller with UART 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 UART interface. For FM3, there is a bootloader 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.

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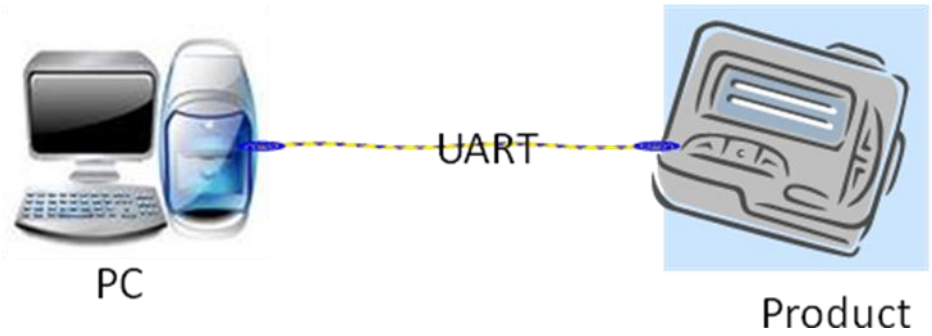
1 Introduction

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 UART interface.

For FM3, there is a bootloader 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 UART Flash Loader is developed for these users.

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 Cypress'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 3.3V and 5V 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 UART Flash Loader Demo

In the demo, the user can download the demo code onto the board to check the result.

1.4 About Document

This document mainly introduces the operation process.

2 UART Flash Loader Components

1. Cypress Flash MCU Programmer: download the UART Flash Loader (MCU) onto the board.
2. UART Flash Loader (MCU): the boot program running on the board to control the process (download user code/run user code/idle). (uartuptater.hex)
3. UART 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. (usercode.bin and usercode.hex)

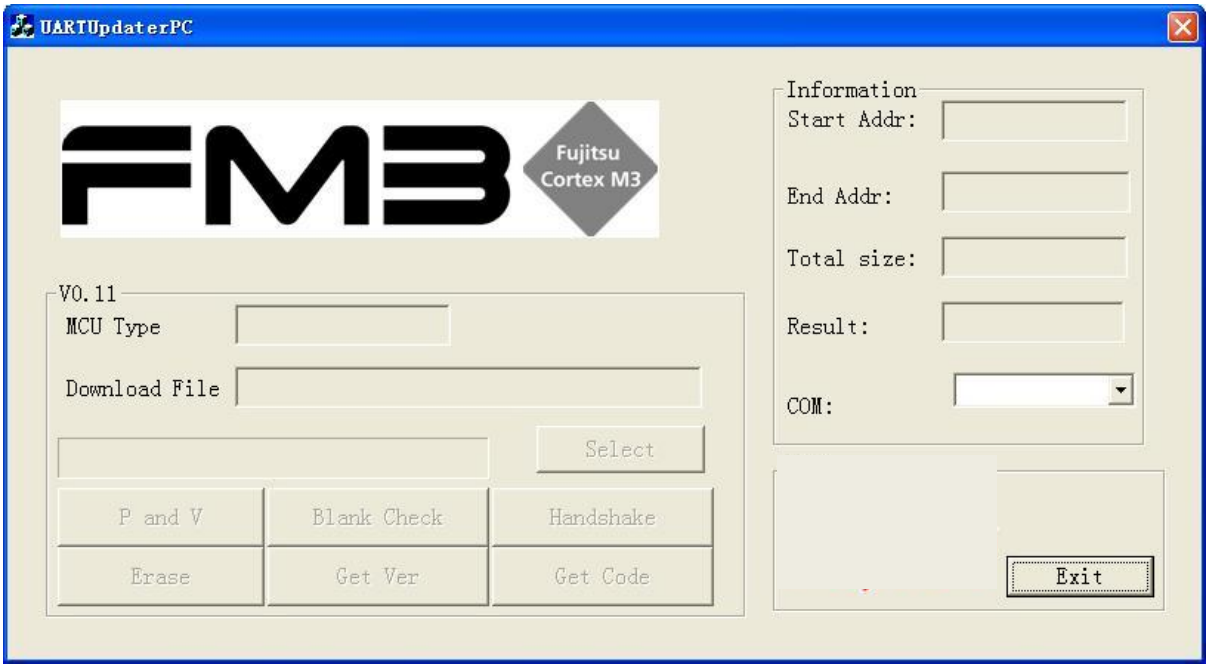
3 UART Flash Loader Overview

1. First of all, the user must download the UART Flash Loader (MCU) program onto the board
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 UART Flash Loader Usage Step

4.1 Interface Introduction

Figure 1. Start Up Interface



Operation steps:

1. After start the program, the user must select the valid COM port.
2. The program will init the selected valid COM port, the ‘Handshake’ button can be clicked.
3. Click the ‘Handshake’ button to start the connection process between the PC and the board.

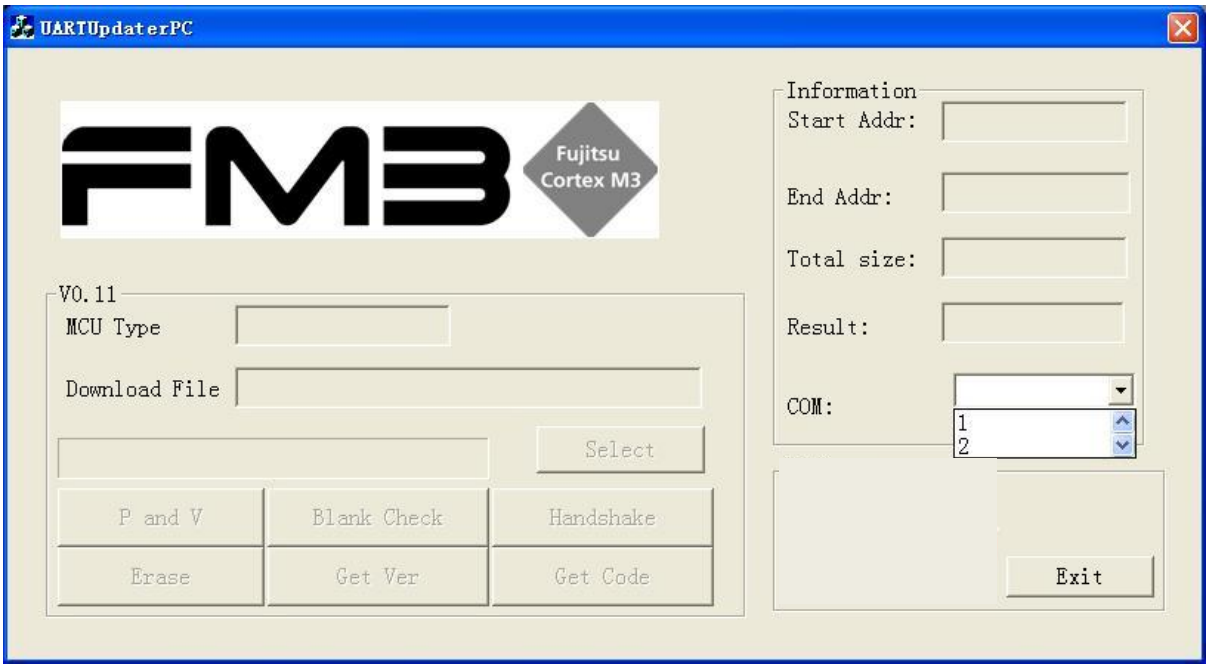
Note: Click the ‘Handshake’ button at first, reset the board within 5 seconds)

4. If connect OK, the MCU information will be displayed, and the ‘Blank Check’/’Erase’/’Get Version’/’Get Code’ buttons can be clicked.
5. The user can check whether the user code area of the board is blank by selecting ‘Blank Check’ button; erase the user code area of the board by selecting ‘Erase’ button; get the user code version of the board by selecting ‘Get Ver’ button; get the user code of the board by selecting ‘Get Code’ button.
6. 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.

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

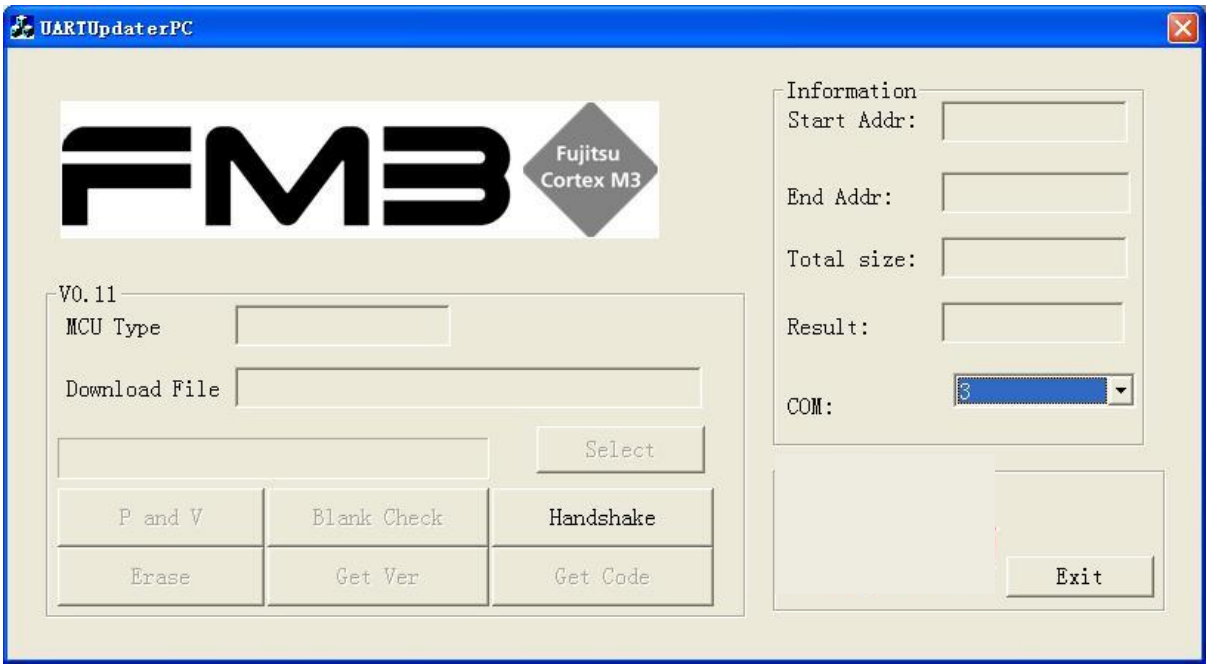
Figure 4. COM Port Init NG



4.3 Connect

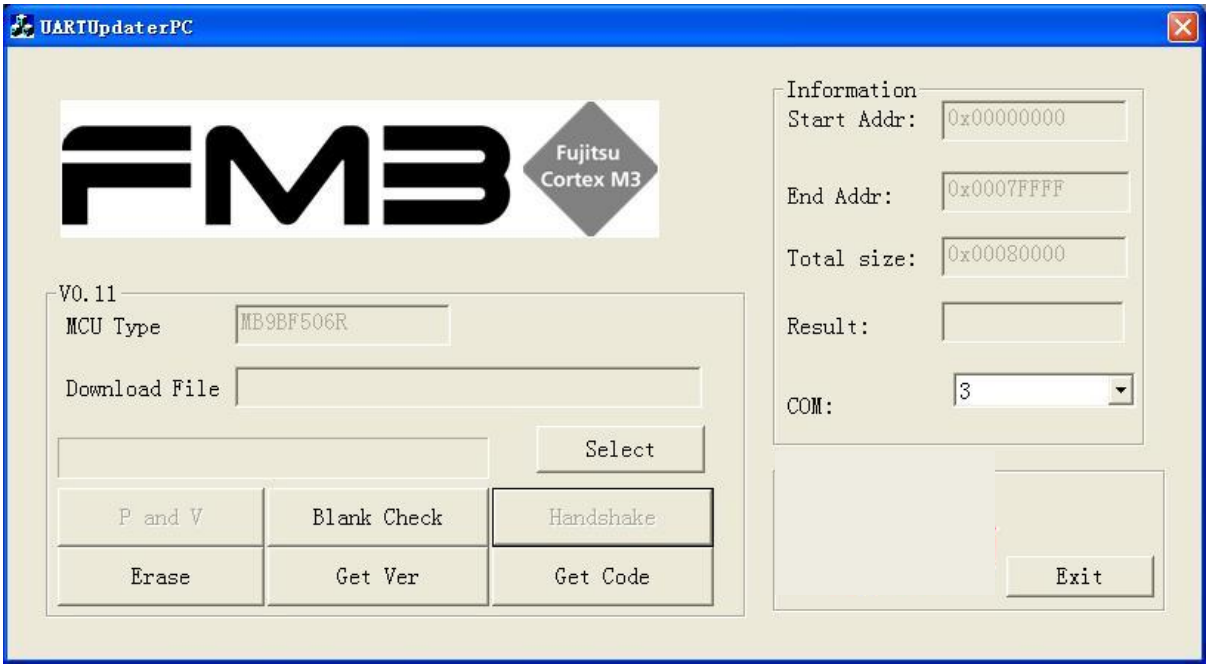
After the COM port init OK, the user shall connect the PC with the board at first, so the ‘Handshake’ can be clicked.

Figure 5. After COM Port Init OK



Click the ‘Handshake’ button, if connection 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 program in the user code area on the board, check the 'Result' text item.

Figure 8. User code area is blank

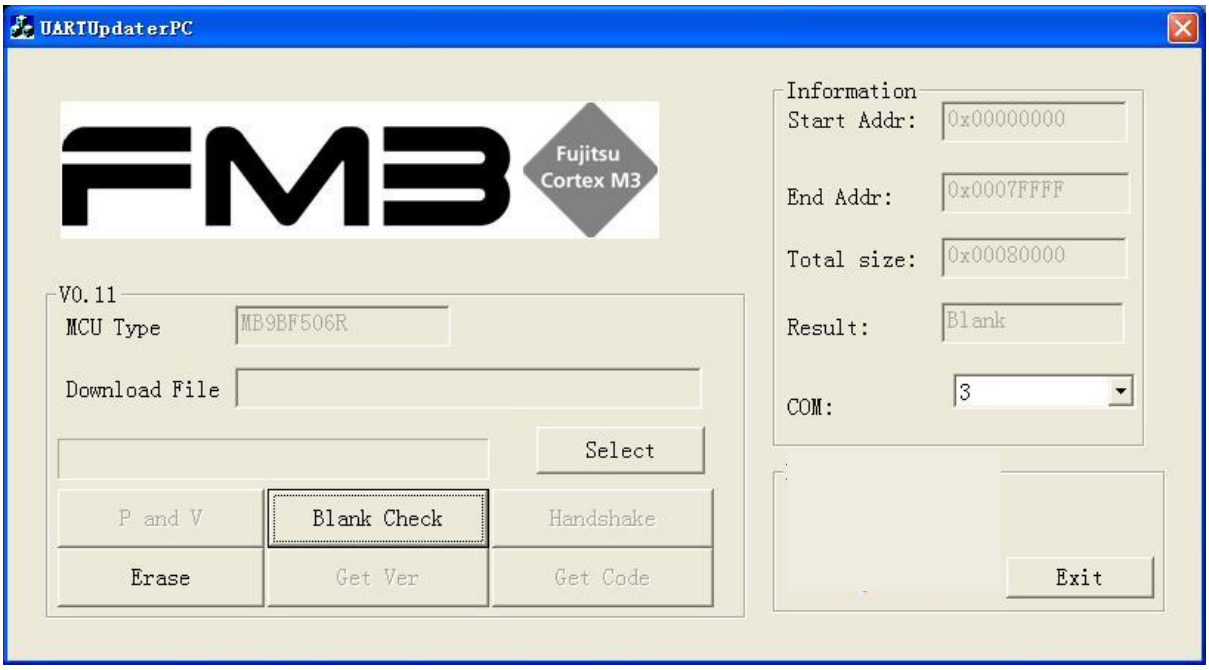
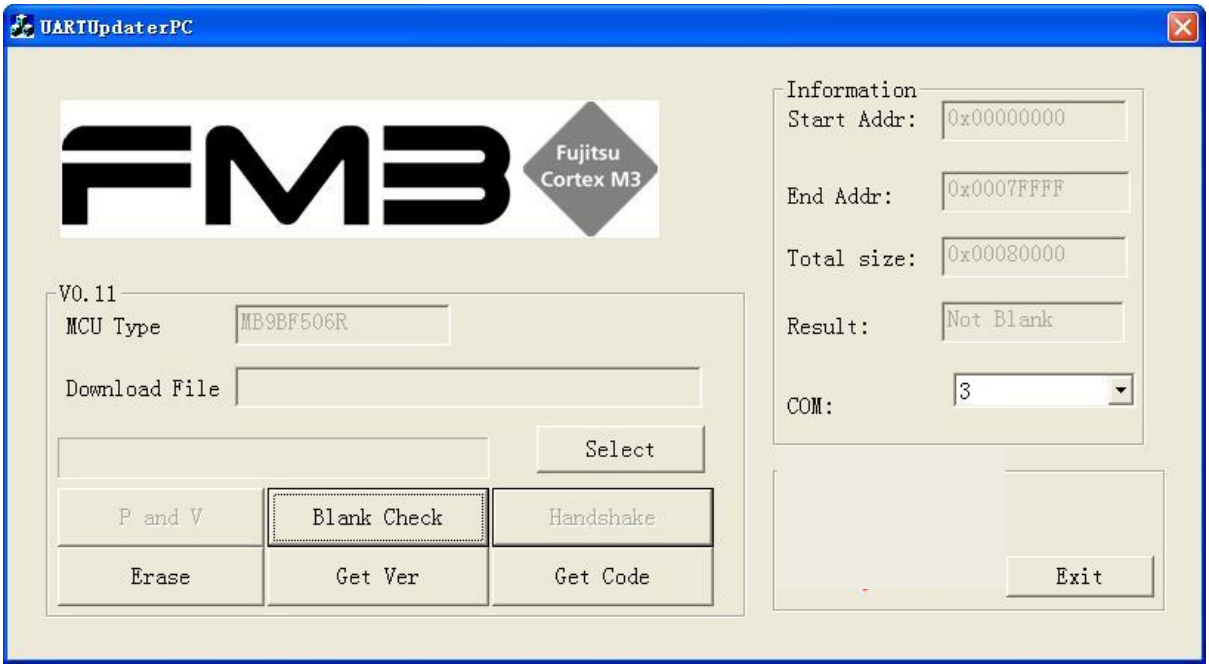


Figure 9. User code area is not blank



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

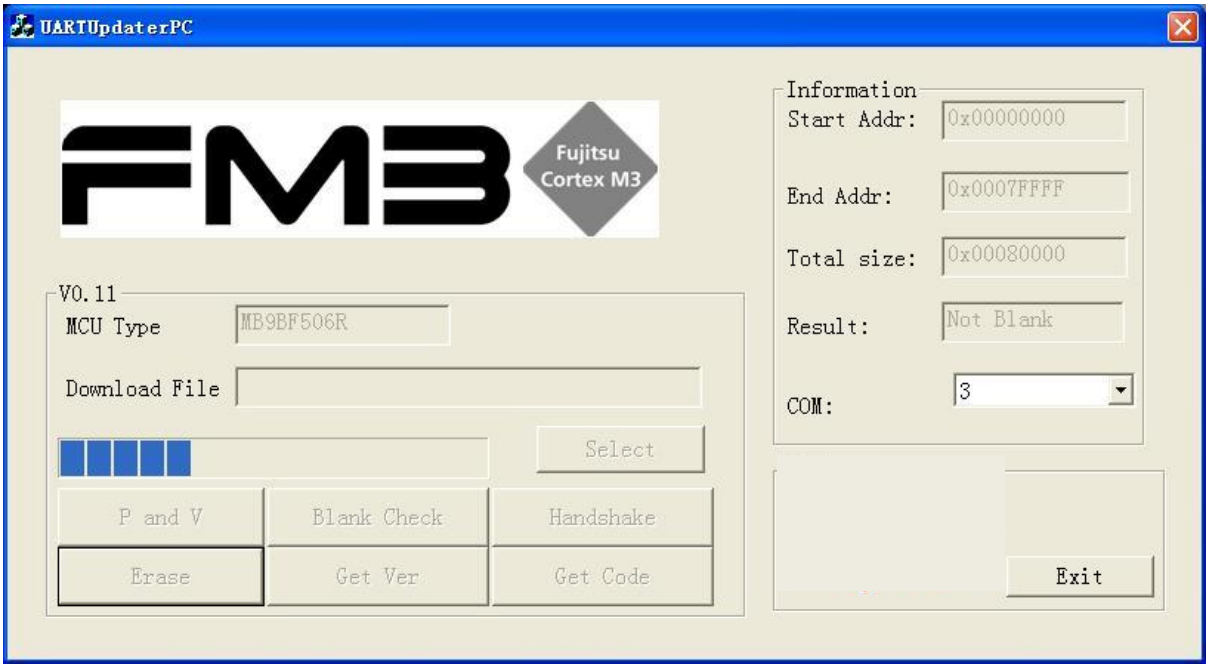
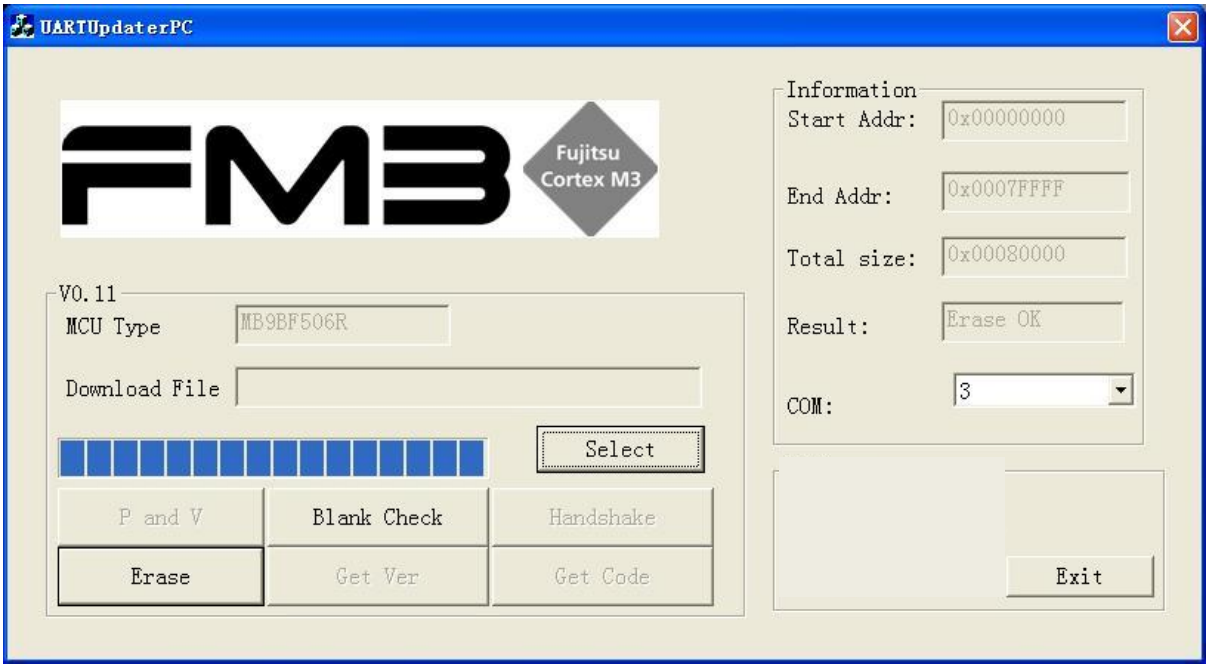


Figure 11. Erase OK



4.6 File Select

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

Figure 12. Select file

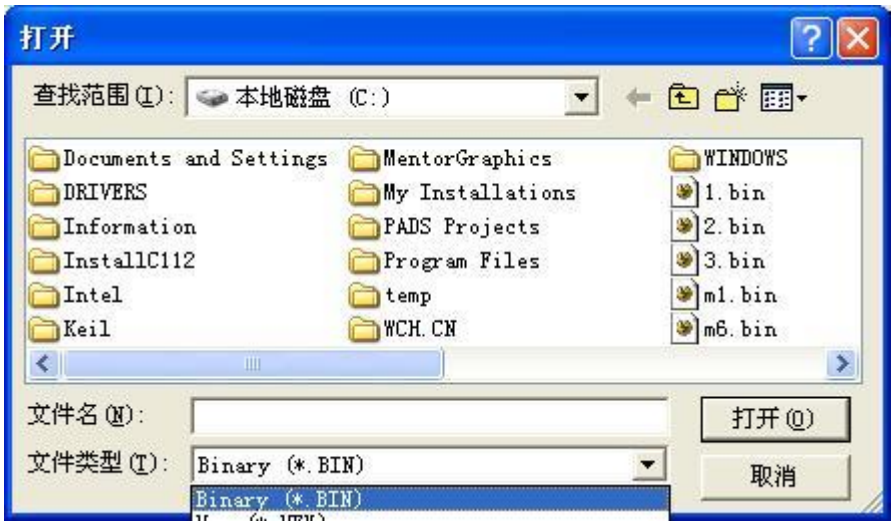
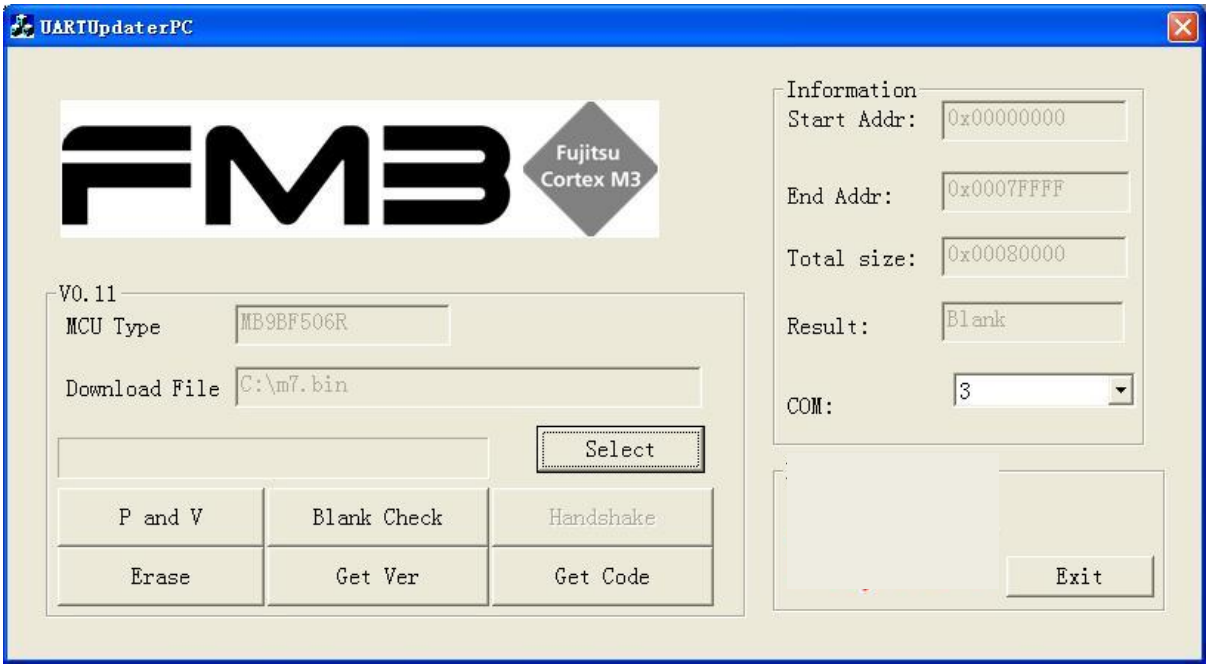


Figure 13. File slected



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

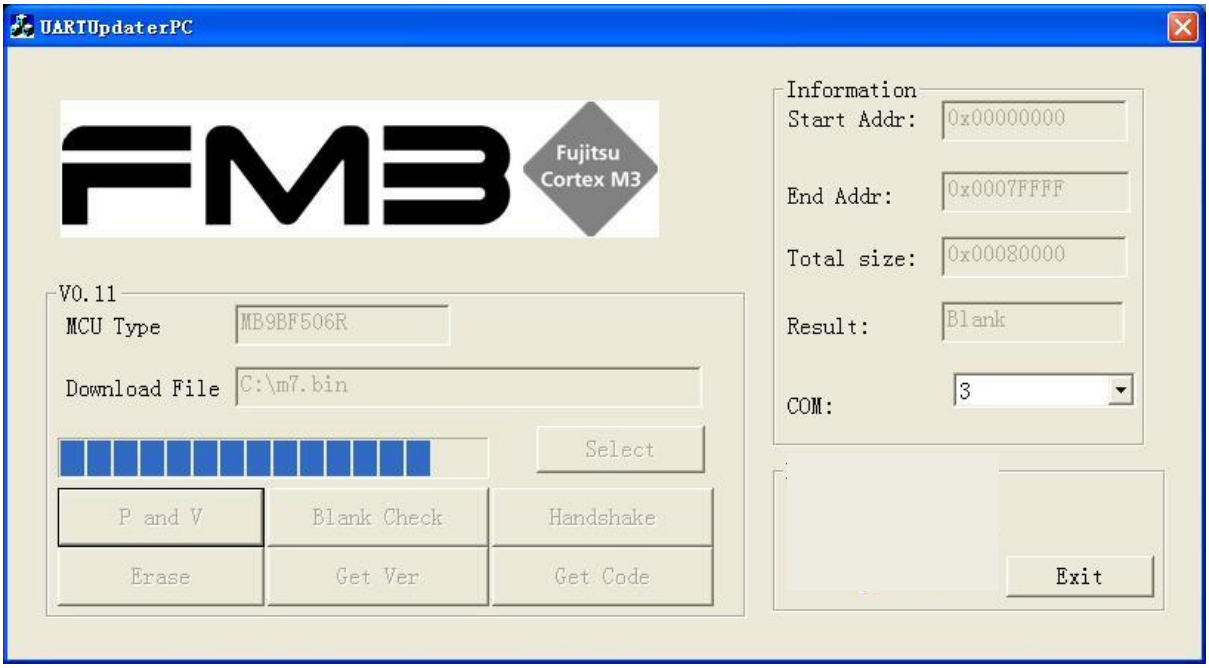
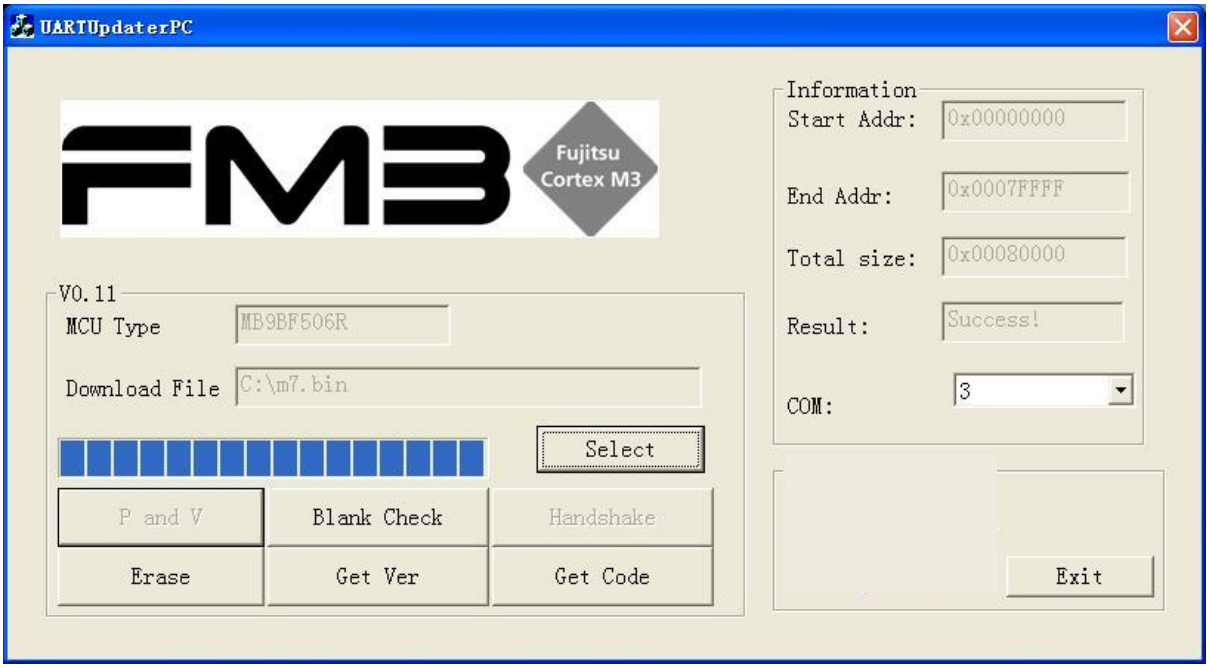


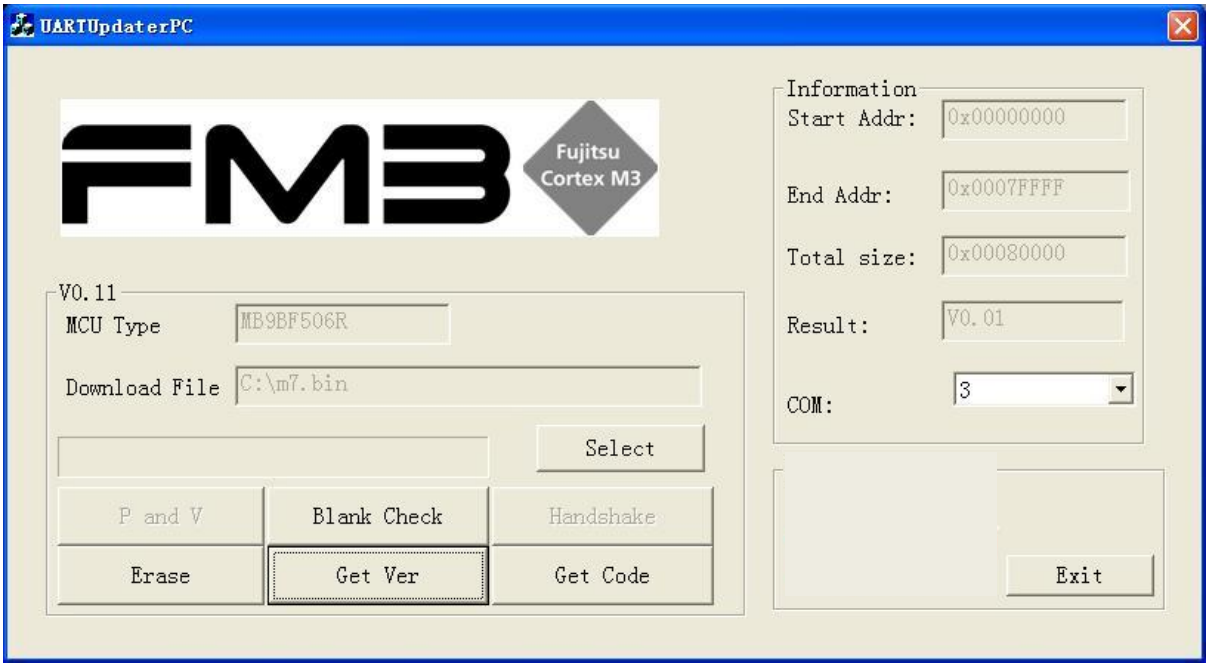
Figure 15. Program OK



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

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

Figure 17. Getting Code

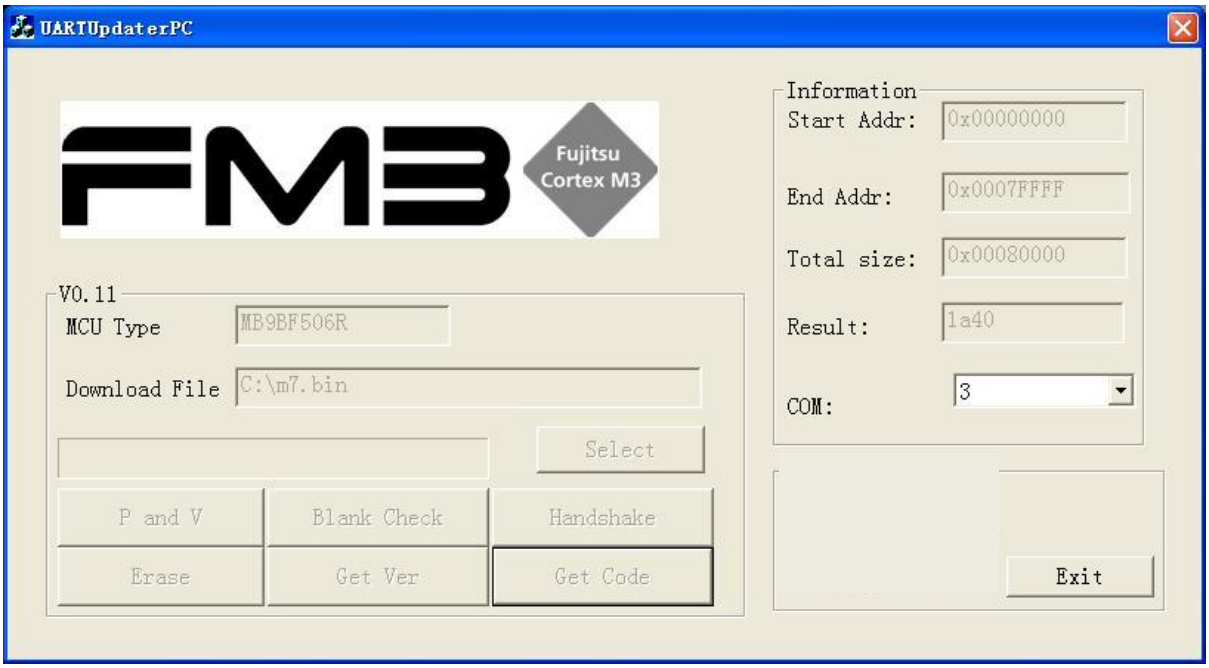


Figure 18. Code got OK

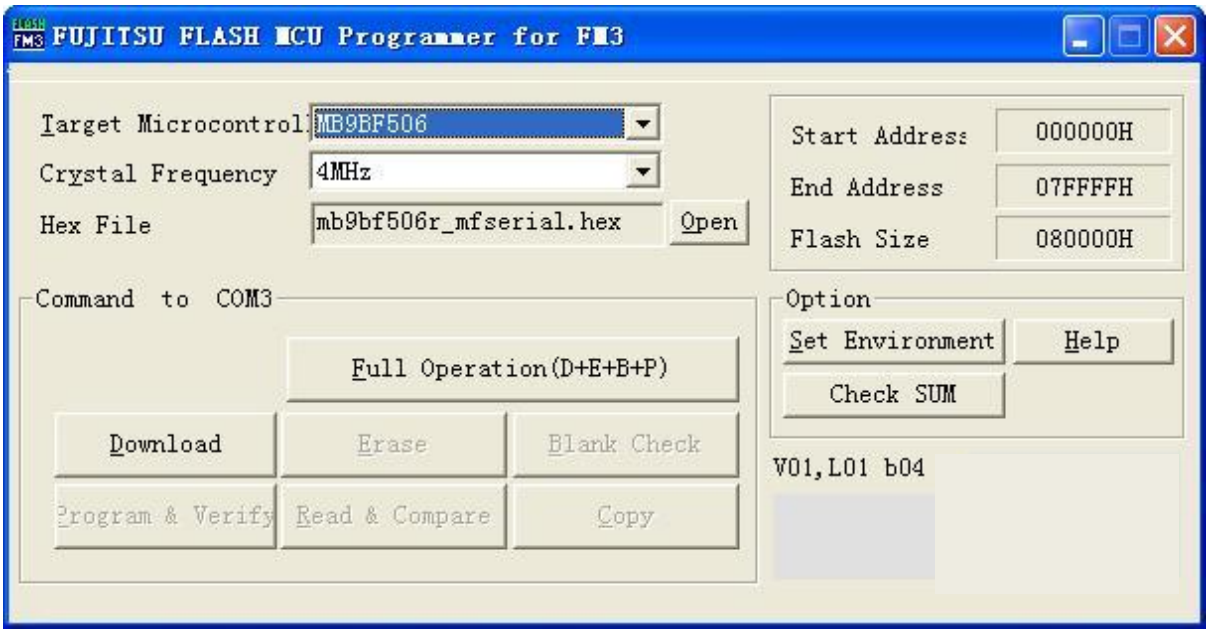


4.10 Operation Step

At first, please download the UART Flash Loader (MCU) program onto the board by the FM3 tool.

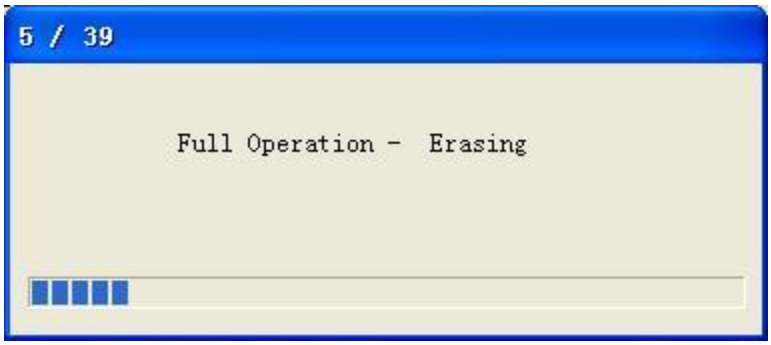
1. Start the program (Cypress Flash MCU Programmer)
2. Set the MCU information; select the hex file

Figure 19. Interface



3. Set the board (Connect the UART0; short the Mode pin); power on
4. Wait the result

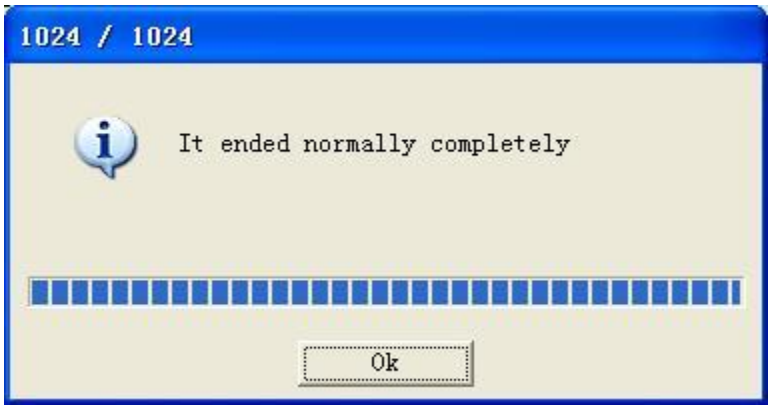
Figure 20. In process



5. Program OK

4.10.1 Normal Operation

Figure 21. Result



4.10.2 Exception Operation

If in the connection process, jump out the following figure:

Figure 22. Error



Please close and restart the UART Flash Loader (PC), or re-select the COM port to init the COM, and then re-click the ‘Handshake’ button to re-connect the PC with the board.

5 Example Project

5.1 Components

The package shall include:

UART Flash Loader (MCU) (uartuptater.hex)

UART Flash Loader (PC) installation files (disk1)

User code (usercode.bin and usercode.hex)

UART line

Cypress Flash MCU Programmer

FSSDC-9B506-EVB V1.0 demo board

5.1.1 UART Flash Loader (MCU)

After power on,

1. If connection OK, the LED3 will on
2. If connection fail and there is no user code, the LED3 will blink
3. If run user code, the LED3 will off

Please use the UART2 to connect the board with the PC.

5.1.2 UART 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 ‘User Code1’ on the LCD
2. Output the ‘PPPPP KKK’ through UART2 (test the interrupt)

5.2 Usage Scenario

5.2.1 Preparation

1. Prepare the board
2. Download the UART Flash Loader (MCU) (uartuptater.hex) onto the board
3. Connect the PC with the board
4. Start the UART 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. Connect 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

5.2.2 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: AN205236 - FM3 MB9B500 Microcontroller with UART Flash Loader Demonstration System

Document Number: 002-05236

Revision	ECN	Orig. of Change	Submission Date	Description of Change
**	-	CPQI	08/29/2011	Initial Release
*A	5043561	CPQI	12/09/2015	Migrated Spansion Application Note from MCU-AN-510016-E-10 to Cypress format

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