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Cypress (NASDAQ: CY) delivers high-performance, high-quality solutions at the heart of today’s most advanced embedded systems, from automotive, industrial and networking platforms to highly interactive consumer and mobile devices. With a broad, differentiated product portfolio that includes NOR flash memories, F-RAM™ and SRAM, Traveo™ microcontrollers, the industry’s only PSoC® programmable system-on-chip solutions, analog and PMIC Power Management ICs, CapSense® capacitive touch-sensing controllers, and Wireless BLE Bluetooth® Low-Energy and USB connectivity solutions, Cypress is committed to providing its customers worldwide with consistent innovation, best-in-class support and exceptional system value.

New 8FX Family
8-bit MICROCONTROLLER
BGM ADAPTOR
MB2146-07-E
OPERATION MANUAL

PREFACE

Thank you for purchasing the New 8FX Family All Series BGM adapter (model number: MB2146-07-E).

The product is a development support tool for developing and evaluating applied products which use Fujitsu Semiconductor microcontrollers (hereafter MCU) that have a BDSU module. This manual describes how to handle the New 8FX Family All Series BGM adapter. Be sure to read it before using the product.

For information on the MCU supported by this product, contact the sales or support representative.

Note: This product does not correspond to the MB95200H/210H/220H series of the New 8FX family.

Please use MB2146-08-E for the MB95200H/210H/220H series.

■ Using the product safely

This manual contains important information required for using the product safely. Be sure to read through the manual before using the product and follow the instructions contained therein to use it correctly.

In particular, carefully read “■ Caution of the products described in this manual” at the beginning of this manual to understand the requirements for safe use of the product before using it.

After reading the manual, keep it handy for future reference.

■ TRADEMARK

- F²MC is the abbreviation of FUJITSU Flexible Microcontroller.
- REALOS, SOFTUNE are trademarks of Fujitsu Semiconductor Limited, Japan.

■ Related manuals

You should refer to the following manuals as well:

- “HARDWARE MANUAL” for each type of MCU
- “DATA SHEET” for each type of MCU
- “SOFTUNE Workbench OPERATION MANUAL”
- “SOFTUNE Workbench USER’S MANUAL”
- “SOFTUNE Workbench COMMAND REFERENCE MANUAL”

■ European RoHS compliance

Products with an -E suffix on the part number are European RoHS compliant products.

■ Notice on this document

All information included in this document is current as of the date it is issued. Such information is subject to change without any prior notice.

Please confirm the latest relevant information with the sales representatives.

■ **Caution of the products described in this document**

The following precautions apply to the product described in this manual.

 WARNING	<p>Indicates a potentially hazardous situation which could result in death or serious injury and/or a fault in the user's system if the product is not used correctly.</p>
Electric shock, Damage	<p>Before performing any operation described in this manual, turn off all the power supplies to the system. Performing such an operation with the power on may cause an electric shock or device fault.</p>
Electric shock, Damage	<p>Once the product has been turned on, do not touch any metal part of it. Doing so may cause an electric shock or device fault.</p>

 CAUTION	<p>Indicates the presence of a hazard that may cause a minor or moderate injury, damages to this product or devices connected to it, or may cause to loose software resources and other properties such as data, if the device is not used appropriately.</p>
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Cuts, Damage	<p>Before moving the product, be sure to turn off all the power supplies and unplug the cables. Watch your step when carrying the product. Do not use the product in an unstable location such as a place exposed to strong vibration or a sloping surface. Doing so may cause the product to fall, resulting in an injury or fault.</p>
Damage	<p>Do not place anything on the product or expose the product to physical shocks. Do not carry the product after the power has been turned on. Doing so may cause a malfunction due to overloading or shock.</p>
Damage	<p>Since the product contains many electronic components, keep it away from direct sunlight, high temperature, and high humidity to prevent condensation. Do not use or store the product where it is exposed to much dust or a strong magnetic or electric field for an extended period of time. Inappropriate operating or storage environments may cause a fault.</p>
Damage	<p>Use the product within the ranges given in the specifications. Operation over the specified ranges may cause a fault.</p>
Damage	<p>To prevent electrostatic breakdown, do not let your finger or other object come into contact with the metal parts of any of the connectors. Before handling the product, touch a metal object (such as a door knob) to discharge any static electricity from your body.</p>
Damage	<p>Before turning the power on, in particular, be sure to finish making all the required connections. Furthermore, be sure to configure and use the product by following the instructions given in this document. Using the product incorrectly or inappropriately may cause a fault.</p>
Damage	<p>Always turn the power off before connecting or disconnecting any cables from the product. When unplugging a cable, unplug the cable by holding the connector part without pulling on the cable itself. Pulling the cable itself or bending it may expose or disconnect the cable core, resulting in a fault.</p>
Damage	<p>It is recommended that it be stored in the original packaging. Transporting the product may cause a damage or fault. Therefore, keep the packaging materials and use them when re-shipping the product.</p>

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1. Checking the Delivered Product

Before using the product, make sure that the package contains the following items:

- BGM adaptor * : 1
- USB cable (1.0m) : 1
- Interface cable : 1
- Hardcopy (China RoHS report) : 1

* : Referred to as the adaptor.

2. Introduction

MB2146-07-E is a tool used for Fujitsu Semiconductor New 8FX MCU. It is updated from MB2146-08-E and similar to MB2146-08-E in appearance. MB2146-07-E has inherited all functions of MB2146-08-E. It is updated to obtain a better performance and new functions.

This operation manual is applicable to all series of FUJITSU SEMICONDUCTOR 8-bit microcontroller except MB95200H/210H/220H.

Notes : • The New 8FX series BGM adaptor (MB2146-07-E) has no compatibility with F²MC-8FX family B95100 series BGM adaptor (MB2146-09, MB2146-09A-E) and New 8FX family MB95200H/210H/220H types and its option parts.

If different MCUs and the BGM adaptor or the option parts are connected, there is the possibility that they will not operate correctly or damage devices.

Avoid using the combination of different types of BGM adaptors and devices.

- This product does not correspond to the MB95200H/210H/220H series in the New 8FX family. Use MB2146-08-E for the MB95200H series.

A variety of optional parts are available for this adaptor that may be purchased separately as needed. Consult a sales or support representative for details.

Following table describes the sort of New 8FX MCU.

MCU Type
MB95260 series
MB95310 series
MB95330 series
MB95370 series
MB95350 series
MB95390 series
MB95410 series
MB95430 series
MB95560 series
MB95630 series
Following develop product

3. System Configuration

■ Use as Emulator System

The adaptor is connected to the host computer and the user system, and it can be used as the emulator by control via the host computer. See "SOFTUNE Workbench OPERATION MANUAL" for the details on the emulation debugger software operation in the host computer.

Figure1 shows the system construction when used as the emulator system.

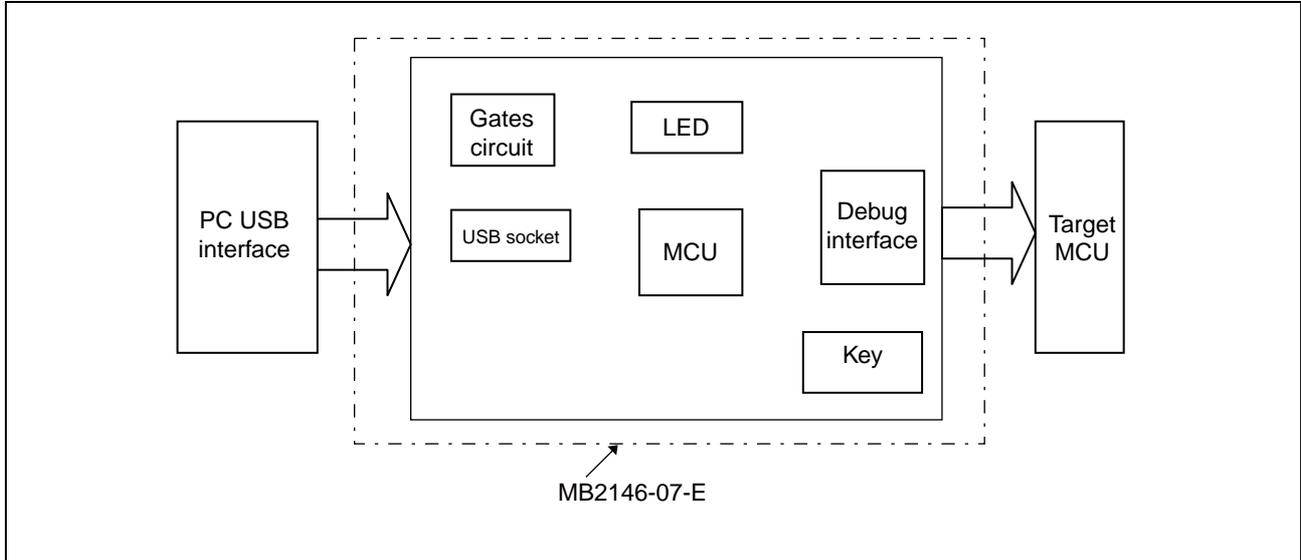


Figure 1 System Configuration

4. Interface Overview

This chapter describes the BGMA interface.

4.1 MB2146-07-E Appearance

Figure 2 shows the BGMA appearance

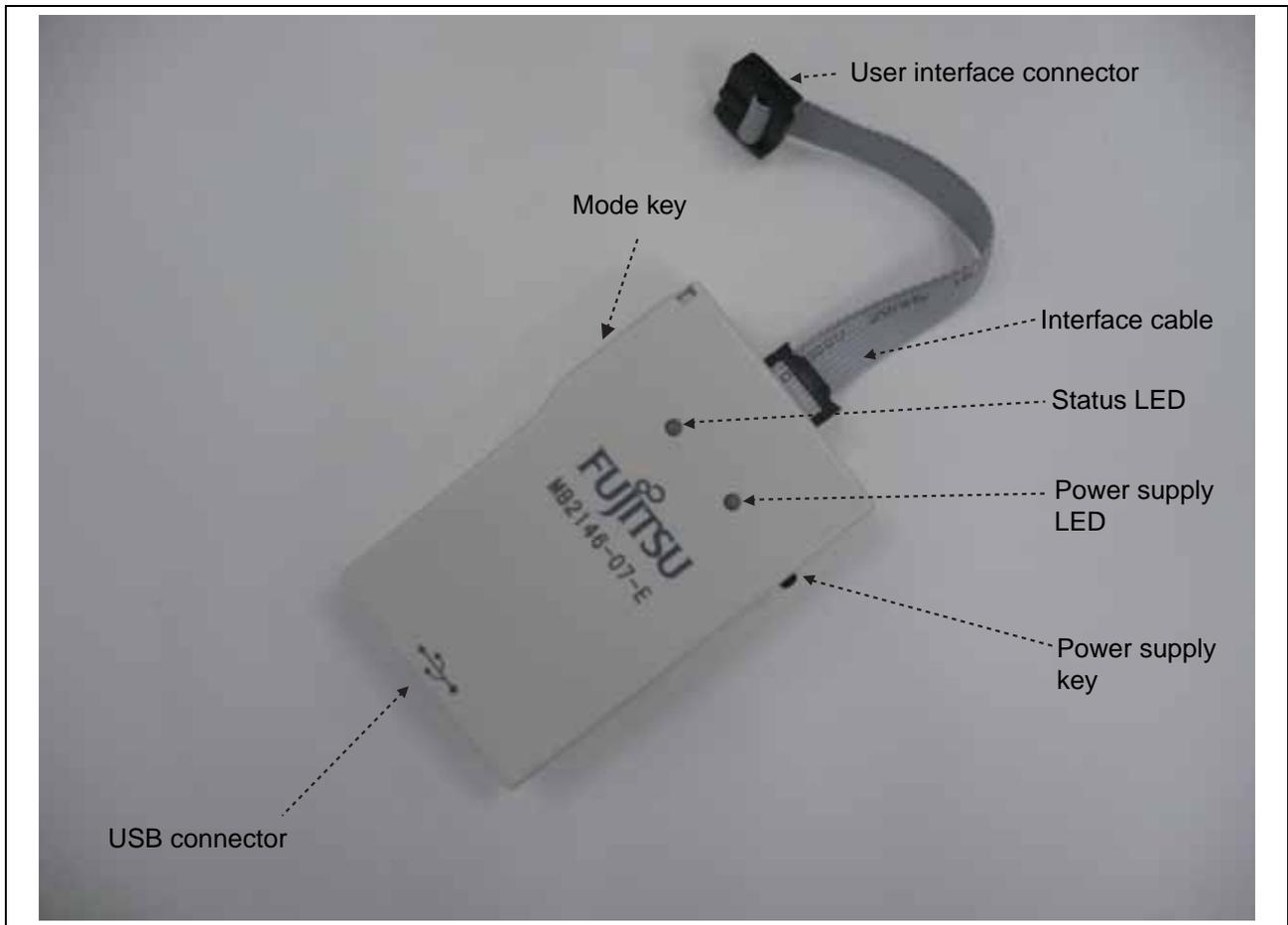


Figure 2 BGMA Appearance

4.2 BGMA UART Interface

The UART interface is mainly used between BGMA and MCU board. BGMA sends command to MCU by UART, and receives the MCU feedback by UART too.

The speed of UART communication is related to UART baud rate. Following table lists the baud rate.

Table 1 Baud Rate List

MCU Type	Baud Rate	Remark
MB95260 series	62500	While synchronization and start debug, 125kbps
MB95310 series		
MB95330 series		
MB95370 series		
MB95350 series		
MB95390 series		
MB95410 series		
MB95430 series	62500	While synchronization and start debug, 500kbps
MB95560 series		
MB95630 series and following develop MCU	500K	While synchronization and start debug, 1Mbps

When the adaptor interface connector is mounted on the user system, connect the MCU to the adaptor interface connector according to the following specifications.

Table 2 Pin Interface

Connector pin number	Input / output	Evaluation MCU connection pin name	Function	Remarks
1	BGMA* ¹ ← MCU* ²	UVCC	User power supply input	Connected to the MCU Vcc pin.
2	-	GND	Vss pin	Connected to the MCU Vss pin.
3	-	RSV	-	-
4	BGMA ← MCU	RSTOUT	User System reset input	Connected to user system reset circuit
5	-	RSV	-	-
6	BGMA → MCU	VCC	BGMA power output	BGMA supplies power to MCU Vcc
7	-	RSV	-	-
8	BGMA ← MCU, BGMA → MCU	DBG	Communication line	1 line UART
9	-	RSV	-	-
10	-	RSV	-	-

*1 : BGMA means the BGM adaptor.

*2 : MCU means the evaluation MCU.

Note : The MB2146-07-E pin assignment has no compatibility with the MB2146-09 and MB2146-09A-E pin assignments. It is impossible to use these two BGM adaptors for different MCUs. If used by mistake, there is a possibility that the debug system will not operate correctly or could be damaged.

Also, some functions are added and deleted as the MB2146-08-E upper compatibility product. See the MCU hardware manual in use for the details about the connection of the user system and adaptors.

5. Feature list

■ Function Description of BGMA

The MB2146-07-E BGMA is updated from MB2146-08-E. The updated features are described below.

- BGMA power supply is DC 5V (Power supply from the USB pin)
- UART Baud rate Max speed improved:
Data in MB95260H, MB95310L, MB95370L, MB95330H, MB95390H, MB95350L, MB95410H and MB95470H series are updated at 125kbps, data in MB95560H series is updated at 500kbps and data in MB95630H and later series are updated at 1Mbps.
- Baud rate selection between 500kbps and 1Mbps (in MB95630H series and following develop MCU)
- Clock up enable function
- RAM Monitoring Function
- 16 bytes data continuous read
- 8 bytes data continuous write
- Supply power to target board seletable
- Power supply key to control BGMA power
- LED to show BGMA operation result
- Update BGMA by connection to PCs
- Flexible operation voltage range to target MCU power supply : 1.8V*1 to 5.5V*2

*1 : for 3.3V power supply MCU, the voltage range is 1.8V to 3.6V

*2 : for 5V power supply MCU, the voltage range is 2.4V to 5.5V

The following shows the power supply state indicated by the BGMA LED.

Table3 Power supply indication of BGMA

LED	Status	Information
Green & Red	OFF	Both BGMA and target board power supply off
Green	ON	BGMA Power supply on only
Red	ON	Target board power supply on only
Orange	ON	Both BGMA and target board power supply on

The following shows the status indicated by the BGMA LED.

Table4 Status indication of BGMA

LED	Status	Information
Green & Red	OFF	Idle mode
Green	ON	Standalone mode
	Blinking	Standalone programming, target CR trimming
Red	ON	Program (standalone, USB programmer, Trimming) error, logging data write error
	Twinkling	Reserved
Orange	ON	Logging will full soon
	Twinkling	Logging data record time is over 255 × (8kbyte-9)

6. Performance Description

■ Operating Description of BGMA

This chapter describes the BGMA operation.

6.1 Debug Function

Open the project file in SOFTUNE Workbench which supports New 8FX and execute the setup related to the debug. The following shows the supplemental description about the special settings.

6.1.1 ICE Type

Select, the ICE type MB2146-07.

6.1.2 Monitor Program Auto-load

If a user wants to update the internal program code for the BGMA when starting debugging, check Setup Wizard Dialog Box in Monitor Program Auto-load, as shown in Figure 3.

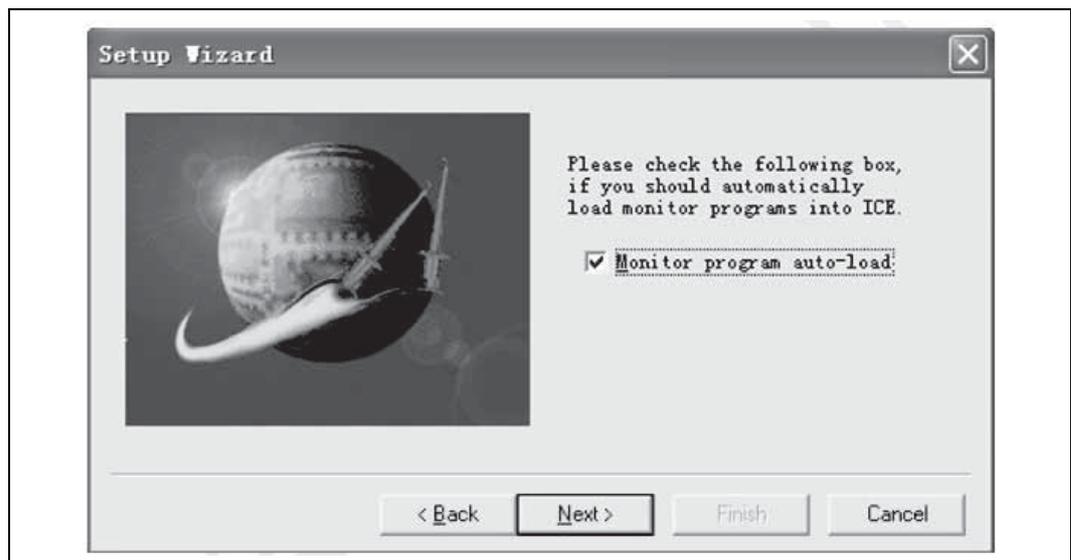


Figure 3 Monitor Program Auto-load

6.1.3 Device Type

Select the device name to USB in Type Field, as shown in Figure 4 below.

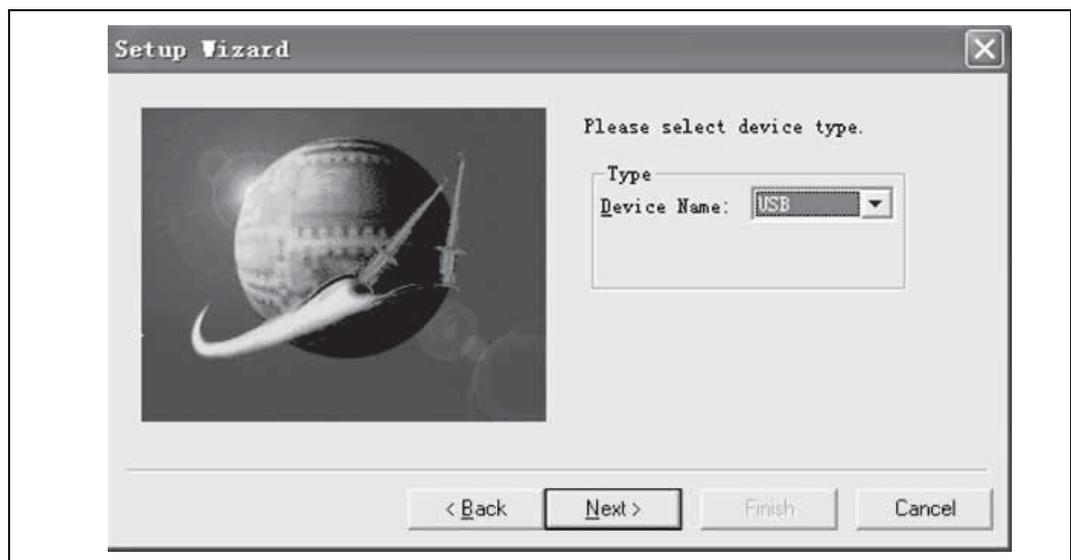


Figure 4 Device Type

6.1.4 Settings of Oscillation and Communication Speed

In this dialog box, a user can select MCU external clock value in Frequency (main) Field, and enable or disable clock up in Response Speed Optimization Field.

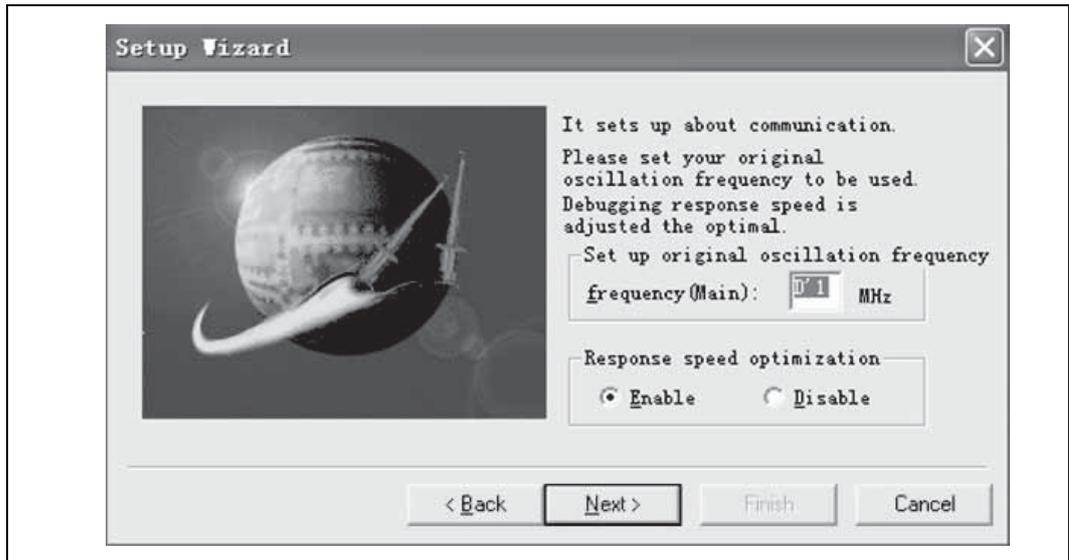


Figure 5 Clock Setting

6.1.5 Power Supply To Target

This item enables BGMA to supply power to the target MCU board.

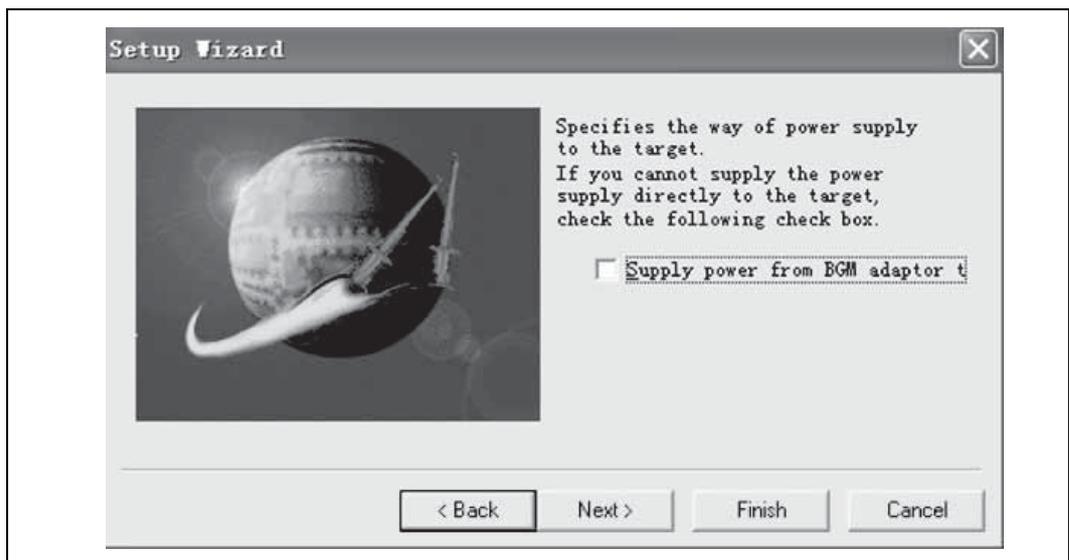


Figure 6 Power Supply

Note : If the user current is greater than the max current (200mA), the system will show the power error and stop the power supply.

6.1.6 Flash Memory Synchronization

This dialog box is used to select the Flash memory synchronous function when starting debug. If the dialog box is selected, the SOFTUNE will read all MCU flash data to SOFTUNE.

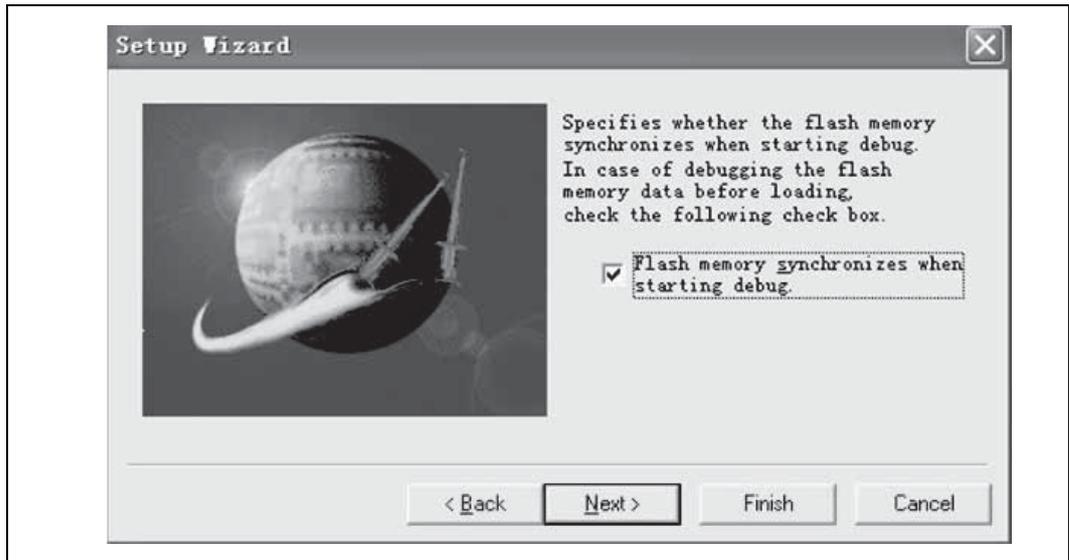


Figure 7 Flash Synchronization

6.2 RAM Monitoring Function

When debugging, a user can open RAM Monitoring Window to watch the MCU RAM status. User can watch 32 bytes RAMs on the RAM Monitoring at the same time.

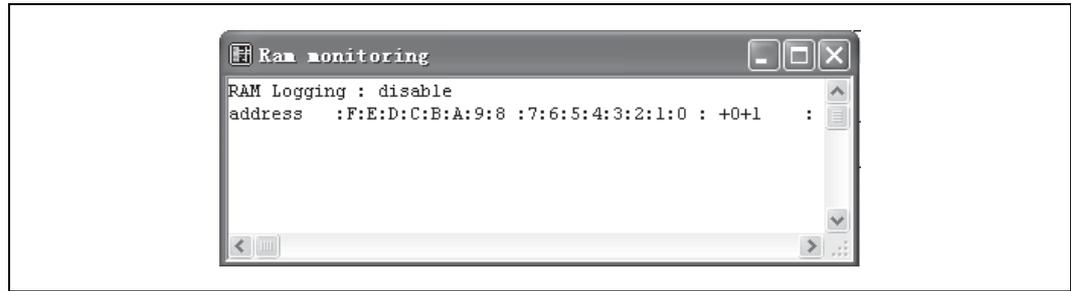


Figure 8 RAM Monitoring Window

6.2.1 Enable RAM Monitoring Function

Right-click the blank area in the RAM Monitoring Window and select monitoring from the shortcut menu to enable the RAM Monitoring function, as shown in Figure 9.

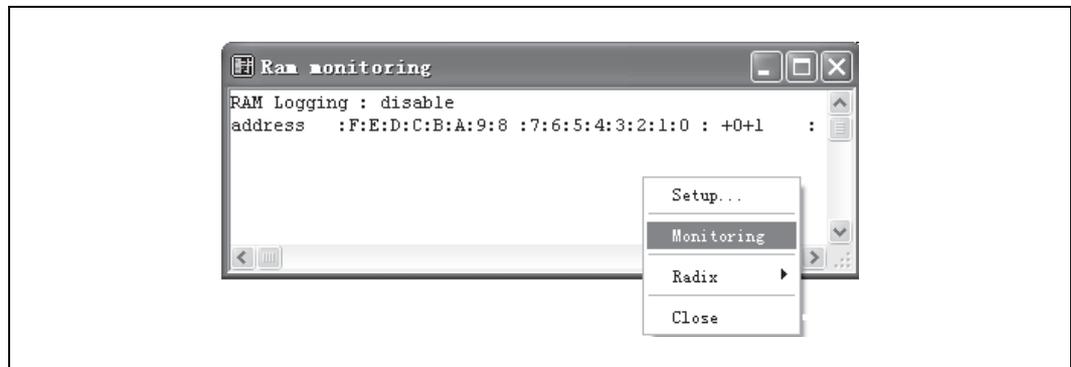


Figure 9 RAM Monitoring Function

6.2.2 Set Register

Select Setup from the shortcut menu in Figure 9, and RAM Monitoring Setup window pops up, as shown in Figure 10.

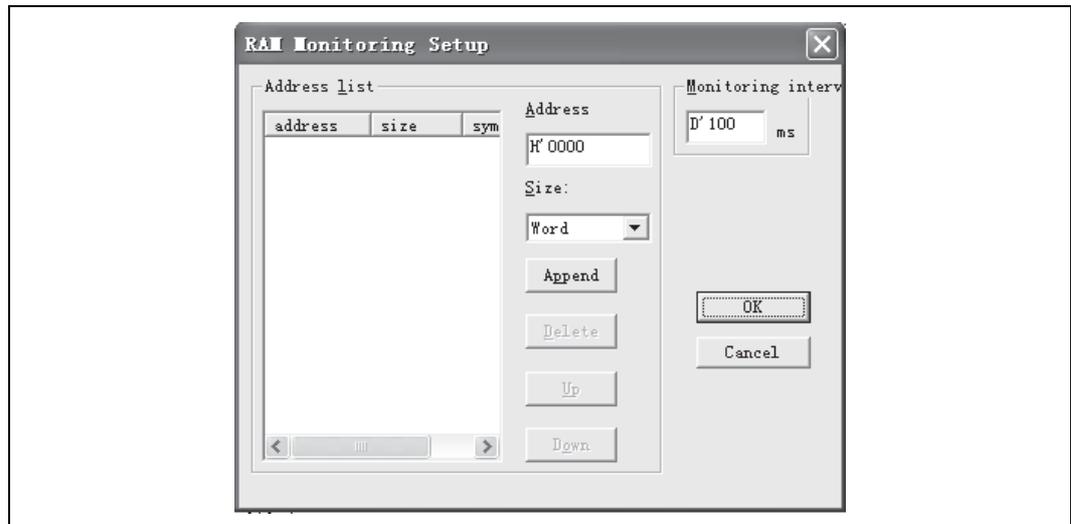


Figure 10 RAM Monitoring Setup

Set the RAM to be watched in Address field, and select Word from the Size Drop-down List Box. When the address and size are selected, a user can click “Append” to confirm this operation and can select another RAM address. When all RAMs are selected, a user can click “OK” key to ensure those settings and close the window.

After that, a user can monitor all selected RAMs in RAM Monitoring window, as shown in Figure 11.

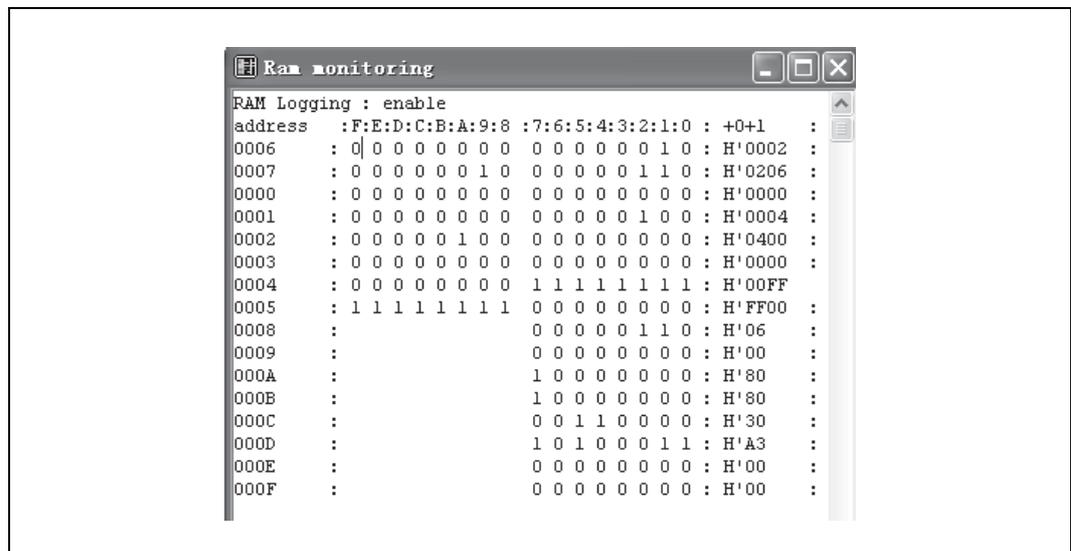


Figure 11 RAM Monitoring Status

7. How to Upgrade BGMA FW (firmware)

This chapter describes how to update the BGMA FW.
The BGMA FW can be updated by PC. The tool “PC Helper.exe” can be used to update the FW. The following section describes the upgrading of BGMA FW in detail.

7.1 Use SOFTUNE Upgrade FW

When using SOFTUNE, a user can upgrade the BGMA FW.
The following is the method:

- (1) Copy EmlCmnB_896.mhx file in the directory of ".\Softune\896" where Softune is installed.

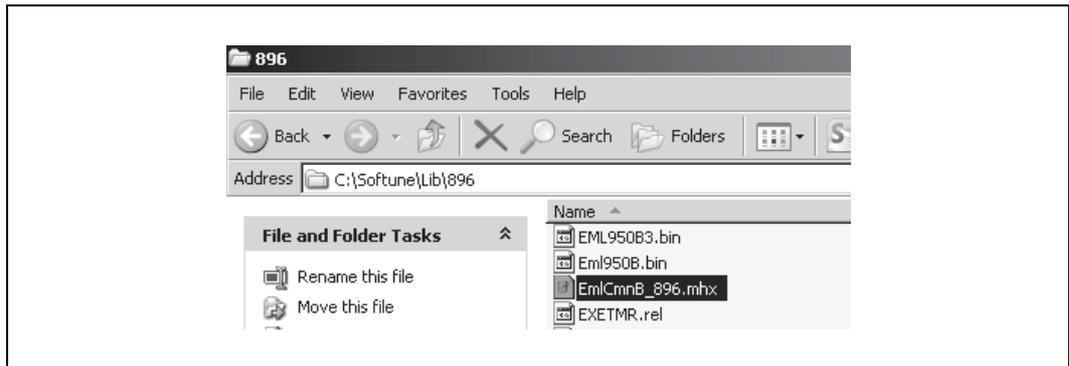


Figure 12 The example of adding HEX file

- (2) Connect BGMA to PC.
- (3) Turn on the BGMA power.



Figure 13 Power-on BGMA

(4) Enable SOFTUNE Upgrade function.

Select “Monitor program auto-loading” in SOFTUNE. For the detailed operation, see sector 6.1.2.

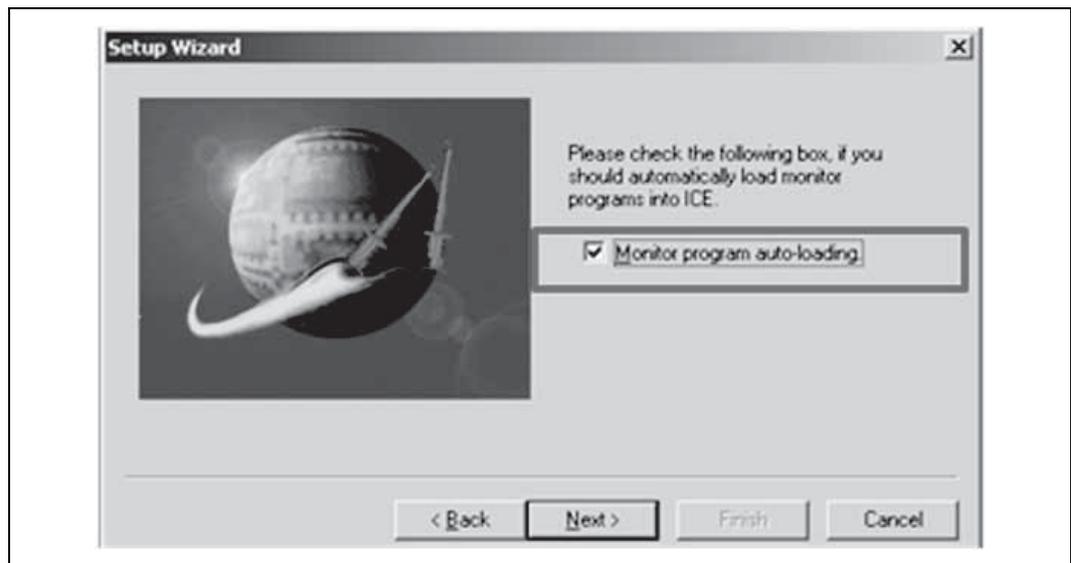


Figure 14 Enable Softune Upgrade function

(5) Right-click SOFTUNE “Debug” and select “start debug”.

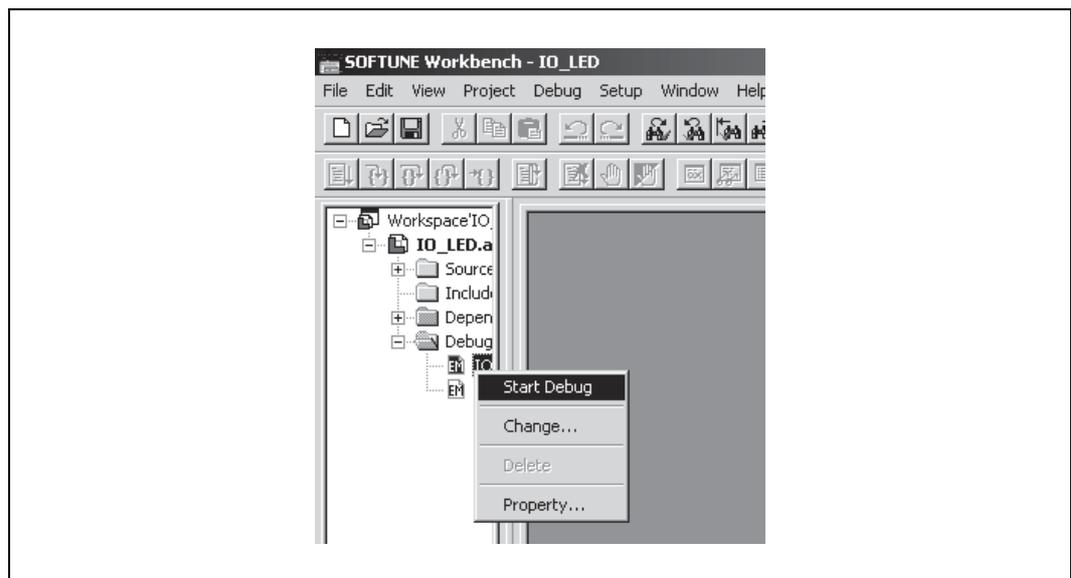


Figure 15 Start Debug Icon

(6) When the following window pops up, turn off the power supply of target board.

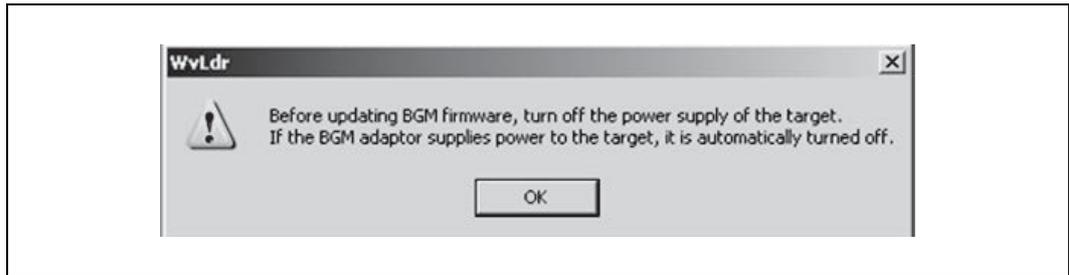


Figure 16 Power-off

(7) Press the "OK" button, the following sub-window will pop up.

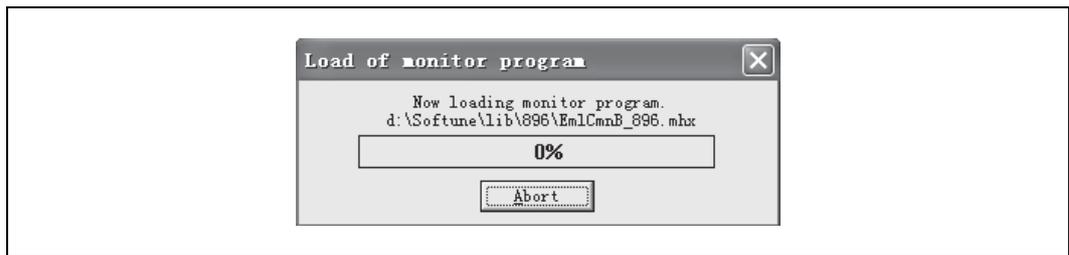


Figure 17 SOFTUNE Upgrade

(8) If a user wants to stop the upgrading, press the "Abort" button.

(9) If the "Abort" button is not pressed, the Softune continues upgrading.

(10) When 100% upgrade is finished, the BGMA FW upgrading is completed.

When the version of the monitor program is the same, updating is not done.

7.2 FW Upgrade Using PC Helper Programmer

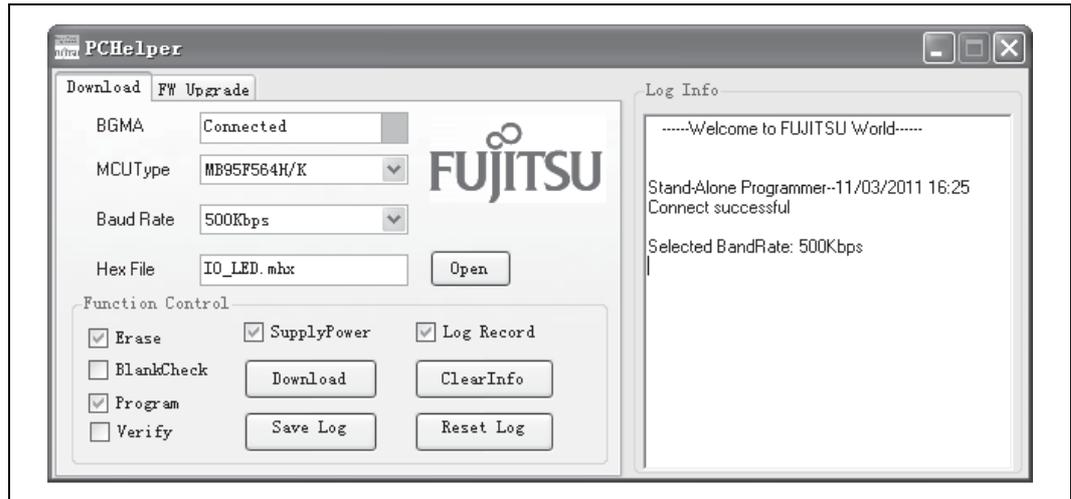


Figure 18 Tool Interface

Step:

- (1) Connect BGMA to PC.
- (2) Open PC Helper programmer.
- (3) Open “FW Upgrade”, like the following picture.

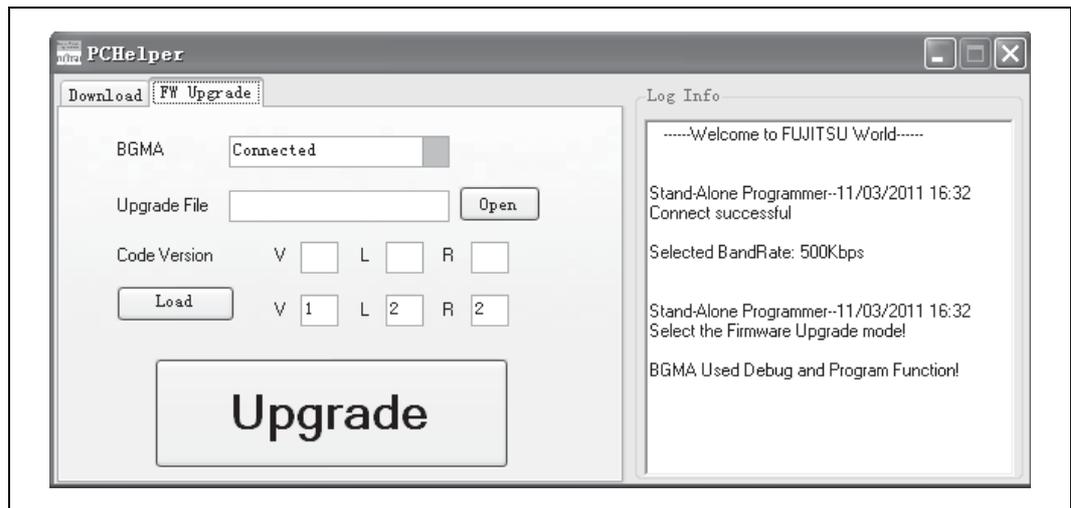


Figure 19 FW Upgrade Interface

- (4) If the BGMA item shows “Connected” and the color is green like the picture above, the BGMA and PC connect normally.
- (5) Press “Open” item to choose the BGMA HEX file, the following picture is a sample.



Figure 20 Hex File Sample

- (6) When the HEX file is chosen, press "Upgrade" item to upgrade BGMA FW.
- (7) When the sub-window pops up, select recommend item and "OK".
- (8) When downloading is successfully completed, "Download Successful" is shown as follows.

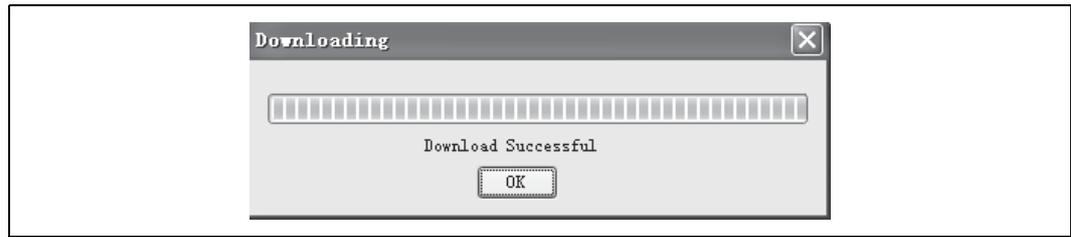


Figure 21 Successful Sample

SS702-00001-2v0-E

FUJITSU SEMICONDUCTOR • SUPPORT SYSTEM

New 8FX Family
8-bit MICROCONTROLLER
BGM ADAPTOR MB2146-07-E
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