F²MC-8FX FAMILY
8-BIT MICROCONTROLLER
MB951XX SERIES

SYNCHRONOUS FLASH PROGRAMMING

APPLICATION NOTE
Revision History

<table>
<thead>
<tr>
<th>Date</th>
<th>Issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007-11-05</td>
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</tr>
</tbody>
</table>

This document contains 15 pages.
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1 Introduction

This application note describes how to program the Flash devices of the Fujitsu F²MC-8FX MB951xx series in serial synchronous mode by use of the BGM adapter MB2146-09.
2 Hardware Setup

This chapter explains how to setup hardware for flash programming.

2.1 System Configuration

![Configuration for synchronous programming](image1)

Using USB cable connection to the personal computer (Windows PC), flash memory data in the microcontroller mounted in the user system can be reprogrammed. Note that the user system must have a BGM Adapter MB2146-09 for communication with the microcontroller SIO.

2.2 BGM Adapter

For details, refer the following manual:
- BGM Adapter MB2146-09 Operation Manual

2.2.1 Connection to the Host Machine

Connect the adapter to the host machine using the USB cable.

![Connecting the USB Cable](image2)

If the BGM adapter is connected the first time to the host machine, it is possible the operation system searches for a valid device driver. This driver can be found in your Softune installation directory in subfolder [Drivers], for example “C:\Softune\Drivers\SiUSBdB.inf”. 
2.2.2 Connection to the User System

Connect the adapter to the user system. Plug the user interface connector of the adapter into the adapter interface connector on the user system.

When plugging the user interface connector, align its index mark (pin no. 1) with the adapter interface connector's counterpart.

2.2.3 Adapter Interface Specifications

Table 1 shows the pin out of the adapter interface connector to be mounted on the user system. Figure 4 shows the connector pins. Table 2 shows a list of recommended interface connectors. Use one of the devices or similar connector on your target hardware.

<table>
<thead>
<tr>
<th>Connector pin No.</th>
<th>MCU Pin Name</th>
<th>Input/output</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VCC</td>
<td>BGMA ← MCU</td>
<td>User power supply input</td>
</tr>
<tr>
<td>2</td>
<td>VSS</td>
<td>—</td>
<td>MCU GND</td>
</tr>
<tr>
<td>3</td>
<td>RSTX</td>
<td>BGMA → MCU</td>
<td>Tool reset output</td>
</tr>
<tr>
<td>4</td>
<td>N.C</td>
<td>—</td>
<td>Not connected</td>
</tr>
<tr>
<td>5</td>
<td>UO0</td>
<td>BGMA ← MCU</td>
<td>Serial data input (BGMA)</td>
</tr>
<tr>
<td>6</td>
<td>UCK0</td>
<td>BGMA → MCU</td>
<td>Synchronous Clock Output (BGMA)</td>
</tr>
<tr>
<td>7</td>
<td>UI0</td>
<td>BGMA → MCU</td>
<td>Serial data output (BGMA)</td>
</tr>
<tr>
<td>8</td>
<td>N.C</td>
<td>—</td>
<td>Not connected</td>
</tr>
<tr>
<td>9</td>
<td>GND</td>
<td>—</td>
<td>MCU GND (can be unconnected)</td>
</tr>
<tr>
<td>10</td>
<td>VCC</td>
<td>—</td>
<td>User power supply input (can be unconnected)</td>
</tr>
</tbody>
</table>

*: “BGMA” in the “Input/output” column in the table indicates the BGM adapter.

Table 1: Adapter Interface Connector Pin out
## Figure 4: Adapter Interface Connector Pins

<table>
<thead>
<tr>
<th>Part number</th>
<th>Specifications</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAP-1001-2202-0BF</td>
<td>Right-angle solder dip</td>
<td>Housing provided, Middle latch provided</td>
</tr>
<tr>
<td>FAP-1001-2204-0BF</td>
<td>Straight solder dip</td>
<td>Housing provided, Middle latch provided</td>
</tr>
<tr>
<td>FAP-10-08#2-0BF</td>
<td>Right-angle solder dip</td>
<td>Housing provided, Latch not provided</td>
</tr>
<tr>
<td>FAP-10-08#4-0BF</td>
<td>Straight solder dip</td>
<td>Housing provided, Latch not provided</td>
</tr>
</tbody>
</table>

**Table 2: Recommended adapter interface connectors**
2.3 Connection to Microcontroller

Use following connection of 10pin BGM connector to MB95F1xx MCU (MB95F128MB shown, but same for other 8FX flash devices).

![Connection of 10pin BGM connector to MCU](image)

*Figure 5: Connection of 10pin BGM connector to MCU*
To set the microcontroller into serial asynchronous programming mode the following pins have to be set according to the following table:

<table>
<thead>
<tr>
<th>Pin name</th>
<th>Pin description</th>
<th>Logical level</th>
</tr>
</thead>
<tbody>
<tr>
<td>P12 / UCK0</td>
<td>UART/SIO clock input</td>
<td>Direct connection to BGMA</td>
</tr>
<tr>
<td>MOD</td>
<td>Operation mode specification</td>
<td>High</td>
</tr>
<tr>
<td>P13</td>
<td></td>
<td>Low</td>
</tr>
<tr>
<td>P10 / UI0</td>
<td>Serial input</td>
<td>Direct connection to BGMA</td>
</tr>
<tr>
<td>P11 / UO0</td>
<td>Serial output</td>
<td>Direct connection to BGMA</td>
</tr>
</tbody>
</table>

Table 3: Configuration for serial synchronous programming mode

If using CONCERTO-Kit from Fujitsu please make sure that on-board RS232 driver on starterkit does not drive against BGM adapter signals. Therefore make sure jumpers JP4 TXD and JP5 RXD are not closed in position 3-4!
3 Software Setup

This chapter explains how to setup Fujitsu Flash BGM Programmer software.

3.1 Installation

To install the Fujitsu Flash BGM Programming Software you have to execute the setup program “BGMsetup.exe”. Then follow the steps of the setup dialog.

After successful installation you will find the Fujitsu Flash Programmer in folder:

“C:\Program Files\Fujitsu Limited\ FUJITSU USB PROGRAMMER \flash.exe”

To start Flash Programmer click ‘Windows Start button’ => ‘Programs’ => ‘FUJITSU USB Programmer’ => ‘USB Programmer’

The symbol of this tool looks like the following picture:
4 Flash Programmer

This chapter explains how to use Fujitsu Flash BGM Programmer Software.

When the Fujitsu Flash BGM Programmer is executed the following window occurs:

Select the target family, target microcontroller and crystal frequency from the shortlist.

Following entries can be chosen for the 8FX family:

<table>
<thead>
<tr>
<th>Product type</th>
<th>Crystal frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>MB95F108</td>
<td>2MHz, 3MHz, 3.58 MHz, 4MHz, 4.92MHz, 5MHz, 6MHz, 8MHz, 10MHz, 12MHz, 16MHz, 20MHz</td>
</tr>
<tr>
<td>MB95F118</td>
<td></td>
</tr>
<tr>
<td>MB95F128</td>
<td></td>
</tr>
<tr>
<td>MB95F136</td>
<td></td>
</tr>
<tr>
<td>MB95F146</td>
<td></td>
</tr>
<tr>
<td>MB95F156/M</td>
<td></td>
</tr>
<tr>
<td>MB95F168/M</td>
<td></td>
</tr>
<tr>
<td>MB95F176J</td>
<td></td>
</tr>
</tbody>
</table>
4.1 Programming

4.1.1 Full Operation

Flash Programmer can execute all needed steps like download, blank check, erase and program with only one button to be pressed.

To choose program file click [Open] and browse to the file (mhx, cnv or ahx format is possible) you want to program to the 8FX microcontroller.

Click the [Full Operation] button. Now all necessary steps are executed. After successful programming, following message appears in screen.

![Message: It ended normally completely]

Click [OK], set MOD pin of the microcontroller to low level to enter run mode and reset your microcontroller to start your application.

4.1.2 Single Steps

To choose program file click [Open] and browse to the file (mhx, cnv or ahx format is possible) you want to program to the 8FX microcontroller.

Click the [Download] button. Now a connection to the microcontroller is started and a control program is transferred.

![Message: Downloading (4 sum)]
To start next step click [Erase] button. A complete chip erase is executed.

After a completed erase click [OK]. Now a [Blank Check] can to be started. If flash is completely erased, the following window occurs.

Click [OK] to close window and start programming by clicking to [Program & Verify] button. If there are no errors, the following message is displayed.
Click [OK], set MOD pin of the microcontroller to low level to enter run mode and reset your microcontroller to start your application.

There are two additionally functions available:

Read & Compare: Compare Hex File with data in flash memory of microcontroller
Copy: Save data in flash memory of microcontroller to file