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F^{2}MC-8FX Family

MCU Board for MB95FV100D-103 MB2146-303 Operation Manual

Doc. # 002-07365 Rev. *A

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Preface

Thank you for purchasing the MCU board for F^{2}MC-8FX family MB95FV100D-103 (model number: MB2146-303).

The MB2146-303 is a development support tool for developing and evaluating applied products based on the F^{2}MC-8FX family of microcontrollers manufactured by Cypress.

This manual is intended for engineers who use the MB2146-303 (referred to below as the MCU board) to develop applied products based on Cypress's F^{2}MC-8FX family microcontrollers. The manual explains how to handle the MCU board and its functions as well as the setting procedures. Be sure to read this manual before using the MCU board.

■ Using the product safely

This manual contains important information required for using the MB2146-303 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 document” 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.

■ Warranty and liability disclaimers

The specifications of the product are subject to change without notice.

In no event shall Cypress be liable for any loss or damages whatsoever directly or indirectly arising out of the use of the product.

■ Product operating environment

Use the product at an operating temperature between 5 ^{o}C and 35 ^{o}C and at an operating humidity between 20% to 80%. Avoid using it in a hot or humid environment and prevent condensation.

The product is a frameless PC board unit with all electronic components exposed. Therefore, neither put anything on the product nor touch or let an electrically charged material contact a metal part of it. Once the product has been powered, try to keep those objects away from it which can short-circuit it or easily catch fire and burn. Use the product as horizontal as possible and avoid operating it at a place exposed to strong vibration, dust, or explosive gas.

Note that using the product not in the above operating environment may unexpectedly cause personal injury to the user (or another person if present near the product) or physical damage to properties around the product.

You should also keep the packaging materials used for shipping the product. They work well as they are when you transport the product again, for example, if it becomes out of order and needs to be repaired.

■ Related manuals

Refer to the following manuals as well:

- ❒ Hardware Manual of the MCU used
- ❒ Data Sheet of the MCU used
- ❒ “MB2146-09 BGM Adapter Instruction Manual”
- ❒ Related “Header Board Instruction Manuals”
- ❒ “SOFTUNE Workbench Operation Manual”
- ❒ “SOFTUNE Workbench USER’S Manual”

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

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

⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided appropriately, may result in minor or moderate injury and/or damage to the product or the equipment to which the product is connected, to software resources such as data, or to other properties.

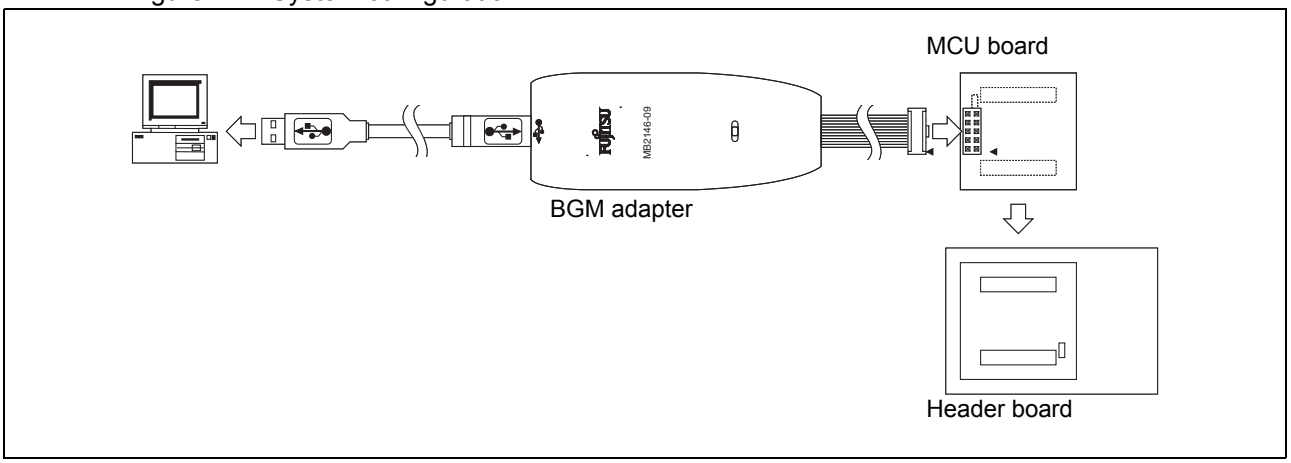
Cuts, Damage	Before moving the product, be sure to turn off all the power supplies and unplug the cables. Watch your steps when carrying the product. Do not use the product at an unstable location such as a place exposed to strong vibration or a sloping surface. Doing so may let the product fall, resulting in an injury or fault.
Cuts	The product has some sharp-pointed or edged parts inevitably exposed, such as jumper plugs. Use meticulous care in handling the product not to get injured with such pointed parts.
Damage	Neither put anything on or apply shock to the product. Once the product has been powered, do not carry it. Doing either may cause a fault due to a load or shock.
Damage	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. An adverse operating or storage environment can cause a fault.
Damage	Use the product within the ranges of its general specifications. Operating it outside the range of any general specification may cause a fault.
Damage	To prevent electrostatic breakdown, do not let your finger or an object touch any metal part of the connector. Before handling the product, touch a metal object (such as a door knob) to discharge static electricity from your body.
Damage	When turning the power on or off, follow the relevant procedure described in this document. Before turning the power on, in particular, be sure to finish making all the required connections. To set up and use the product, follow the instructions given in this document. Using the product incorrectly or inappropriately may cause a fault.
Damage	Before plugging or unplugging any cable for this product, be sure to turn the power supply off. When unplugging the cable, remove it while holding the connector without pulling the cable itself. Pulling the cable itself or bending it may expose or disconnect the cable core, resulting in a fault.
Damage	When stored, the product should be kept in its packaging box as it has no housing. Re-transporting the product may damage it to cause a fault. Keep the packaging materials used for shipment of the product and use them when re-transporting it.

Contents

1. Product Outline

MB2146-303 is the MCU board (model number : MB2146-303) mounting an evaluation MCU in the F^{2}MC-8FX Family of Cypress 8-bit microcontrollers. To build an F^{2}MC-8FX evaluation environment, combine three products : the header board, MCU board, and BGM adapter (model number : MB2146-09) as shown in Figure 1-1.

Figure 1-1. System configuration



■ Product configuration

Tables 1-1, and Table 1-2. list the product configuration in the MCU board package and options.

Table 1-1. Product configuration

Name	Part number	Description
F^{2}MC-8FX MCU board *	MB2146-303	MCU board with built-in MB95FV100D-103

* : Neither the oscillator nor the capacitor is bundled with this product. Therefore, preparately.

Table 1-2. Option (sold separately)

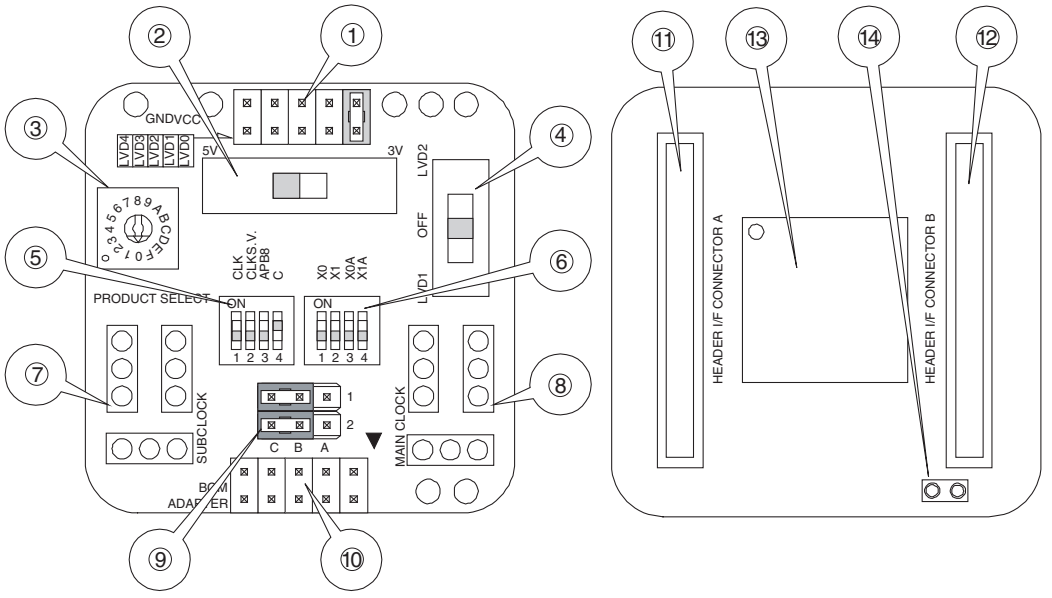
Name	Part number	Description
BGM adapter *1	MB2146-09	ICE unit for F2MC-8FX
Header board *2	MB2146-2xx	Connector/package conversion header board

*1To use the BGM adapter, you need additional tools such as debugger software.
*2The header board is an interface board to connect the emulator to your user system. Choose and purchase a type of header board which is applicable to the production MCU to be used.

■ Appearance and part name

The appearance of a MCU board and the name of each part are shown in Figure 1-2.

Figure 1-2. MCU board appearance figure



Top view

Bottom view

① LVD2 detection voltage selector jumper plug (it is not available, when debugging)
② Voltage selector switch
③ Product selector switch
④ LVD selector switch
⑤ Clock selector switch (SW1-1: CLK)
APB8 bus output selector switch (SW1-3: APB8) (for extension) (it is not available, when debugging)
C-pin selector switch (SW1-4: C)
⑥ Clock input selector switch (SW2-1: X0, SW2-2: X1, SW2-3: X0A, SW2-4: X1A)
⑦ Sub clock crystal oscillator mounting socket
⑧ Main clock crystal oscillator mounting socket
⑨ Sub clock selector jumper plug
⑩ BGM adapter connector
⑪ Header board I/F connector A
⑫ Header board I/F connector B
⑬ Evaluation MCU (MB95FV100D-103)
⑭ Incorrect insertion prevention guard

2. Checking the Delivered Product

Before using the MCU board,confirm that the following components are included in the box:

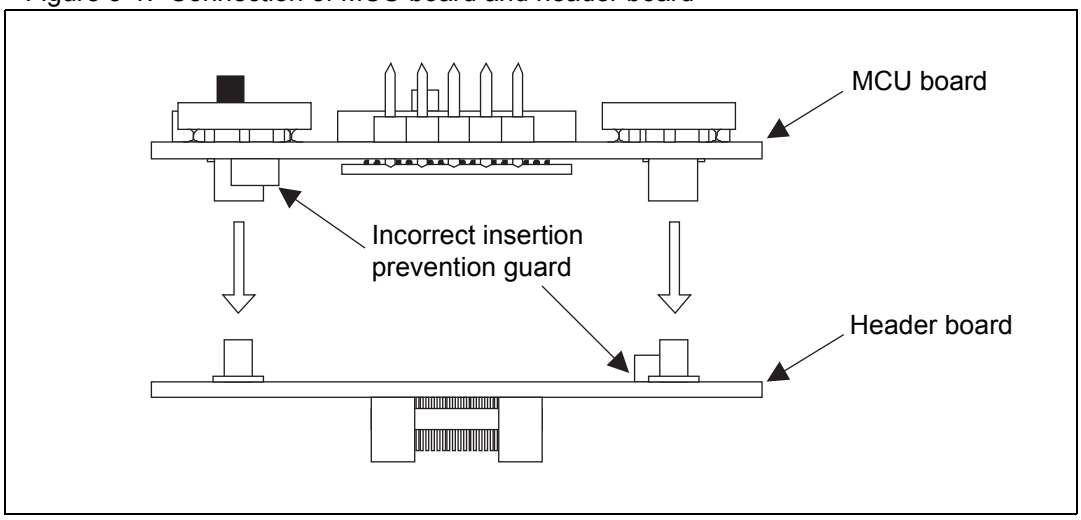
- MCU board: 1
- Operation manual (English version, this manual) : 1
- Operation manual (Japanese version) : 1

3. Procedure for Connecting the User System

■ **Connecting the MCU board to the header board**

Align the MCU board and the header board facing each other, then plug their mating connectors together. The connectors are provided with incorrect insertion prevention guards located diagonally. Position the two boards correctly without letting the incorrect insertion prevention guards interfere with each other and plug the connectors together completely (see “Figure 3-1”).

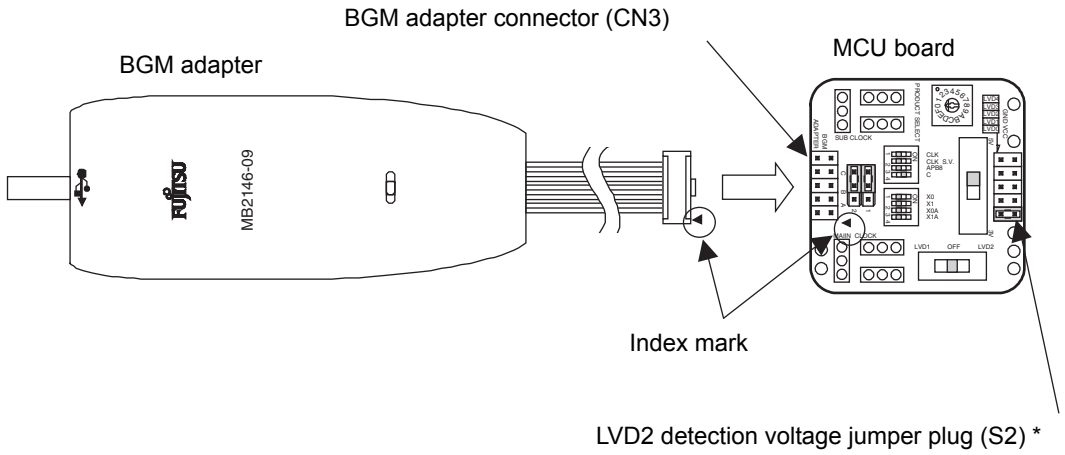
Figure 3-1. Connection of MCU board and header board



■ **Connecting the MCU board to the BGM adapter**

Connect the BGM adapter to the MCU board. Plug the BGM adapter's interface connector deep into the BGM adapter connector on the MCU board with their index marks (▼) aligned (see “Figure 3-2”).

Figure 3-2. Connection of MCU board and BGM adapter

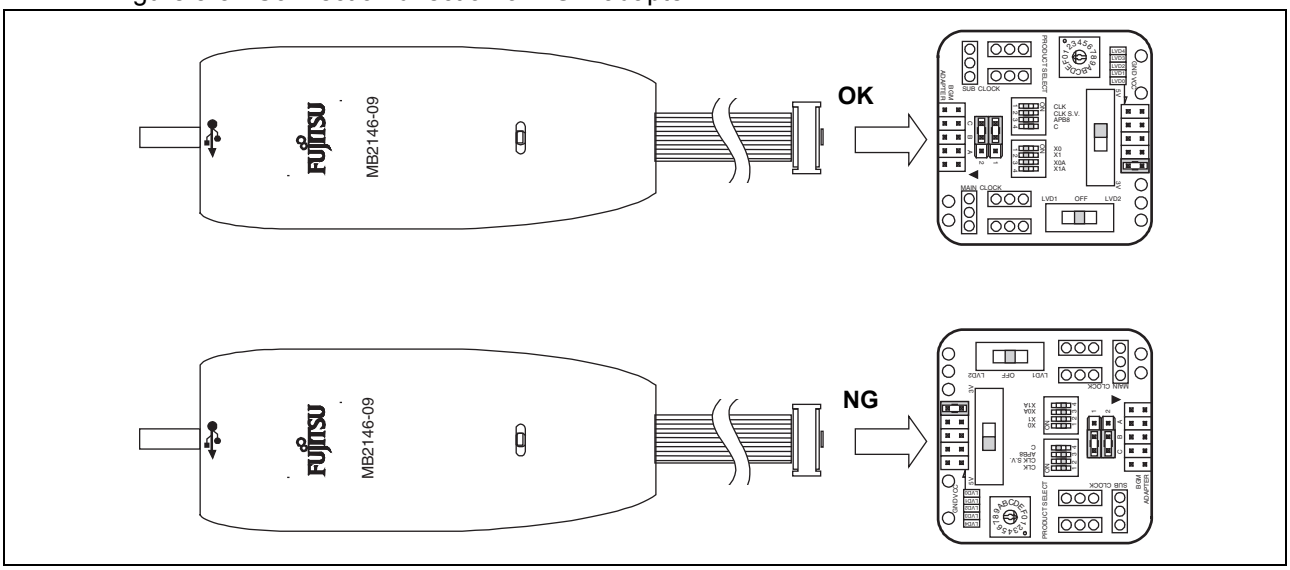


* : Be sure to connect the BGM adapter correctly to the BGM adapter connector (CN3) on the MCU board. Connecting it to the LVD2 detection voltage jumper plug (S2) by mistake can damage the

■ **Note on connection**

❒ Be sure to connect the BGM adapter connector (CN3) correctly. The BGM adapter connector and the LVD2 detection voltage selector jumper plug have the same shape (see “Figure 3-3”). The MCU board may break if the BGM adapter connector is accidentally plugged into the LVD2 detection voltage selector jumper plug (S2) on the other side of the board.

Figure 3-3. Connection direction of BGM adapter



❒ To supply a main clock signal from the user system, make an oscillation circuit on the user system such that it supplies the clock signal to the MCU board via a buffer circuit.

■ **Disconnection**

1. Remove the BGM adapter from the MCU board. Holding the MCU board firmly, pull the BGM adapter vertically from the BGM adapter connector on the MCU board.
2. Remove the header board from the MCU board. Remove it with uniform force without applying force to only one point.

4. How to setup

■ **How to the switch and jumper plug on a MCU board setup**

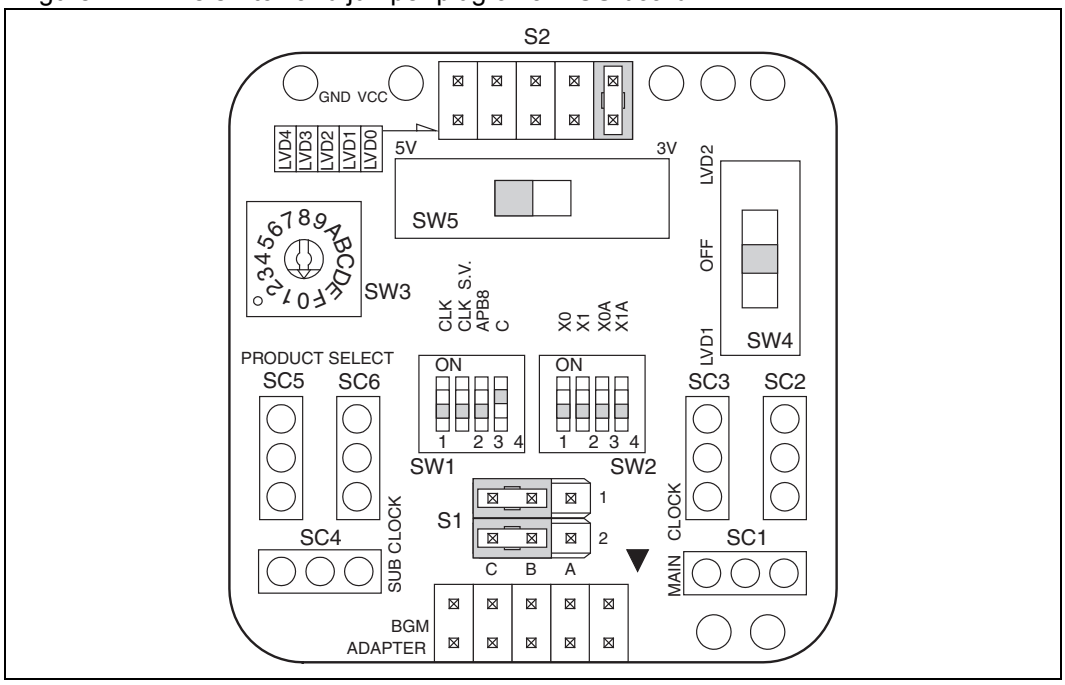
Please set the following switches referring to “Figure 6 The switch and jumper plug on a MCU board”.

1. Set the clock selector switch (SW1-1) to ON or OFF to disable or enable the sub clock, respectively.
2. Set the C-pin selector switch (SW1-4) to ON.
3. Set the clock input selector switch (SW2).
   Check that value with “5. Setting of the Switch and Jumper Plug ■ Setting of clock input selector switch (SW2)”.
4. Set the product selector switch (SW3) to the value corresponding to the number of pins on the production MCU.
   Check that value with “5. Setting of the Switch and Jumper Plug ■ Setting of the product selector switch (SW3)”.
5. Set the LVD selector switch (SW4) to LVD1 or OFF to enable or disable the sub clock, respectively.
6. Set the power supply selector switch (SW5) to 5 V.
7. Set the sub clock selector jumper plug (S1).
   Check that value with “5. Setting of the Switch and Jumper Plug ■ Settings of the sub clock selector jumper plug (S1)”.

Please use with following settings, so APB8 bus and LVD2 functions are not available.

- Set (SW1-2) to OFF (For reservation bit).
- Set the APB8 bus output selector switch (SW1-3) to OFF.
- Set the LVD2 detection voltage jumper plug (S2) to LVD0.
  Check that value with “5. Setting of the Switch and Jumper Plug ■ Settings of the LVD2 detection voltage jumper plug (S2)”.

Figure 4-1. The switch and jumper plug on a MCU board

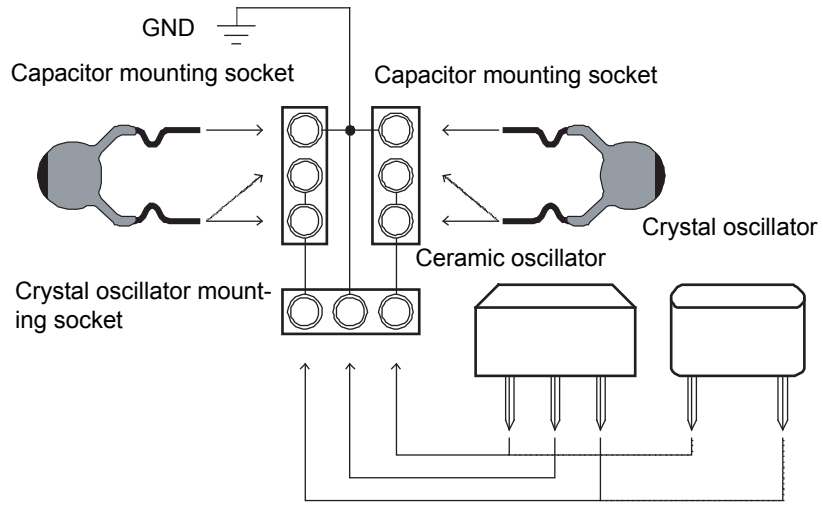


■ **How to oscillator mounting on a MCU board**

Mount the crystal or ceramic oscillator into the crystal oscillator mounting sockets (for the main clock and sub clock) on the MCU board.

The MCU board has one crystal oscillator mounting socket for the main clock and the other for the sub clock. To distinguish them from each other, the board has the “MAIN CLOCK” and “SUB CLOCK” labels printed near the main clock socket and sub clock socket, respectively. Mount the crystal or ceramic oscillator along with a capacitor on the MCU board (see “Figure 4-2”).

Figure 4-2. The example of mount of crystal or ceramic oscillator



- For information on the crystal oscillator such as its frequency, refer to the datasheet for the evaluation MCU.
- For the capacitance of the capacitor, refer to the datasheet for the crystal oscillator, etc.

■ **Handling Notes**

- Data can not be written/erased to lower banks (1000_H to $3FFF_H$) in the software development support environments for F^2MC-8FX (MB95FV100D and MB2146-09).
- Do not perform the chip erase when using the software development support environments for F^2MC-8FX (MB95FV100D and MB2146-09).

5. Setting of the Switch and Jumper Plug

■ **Position of the switch and jumper plug**

The positions of the switch and jumper plug on a MCU board is shown in Figure 5-1, and specifications are shown in Table 5-1.

Figure 5-1. Positions of switches and jumper plugs on MCU board

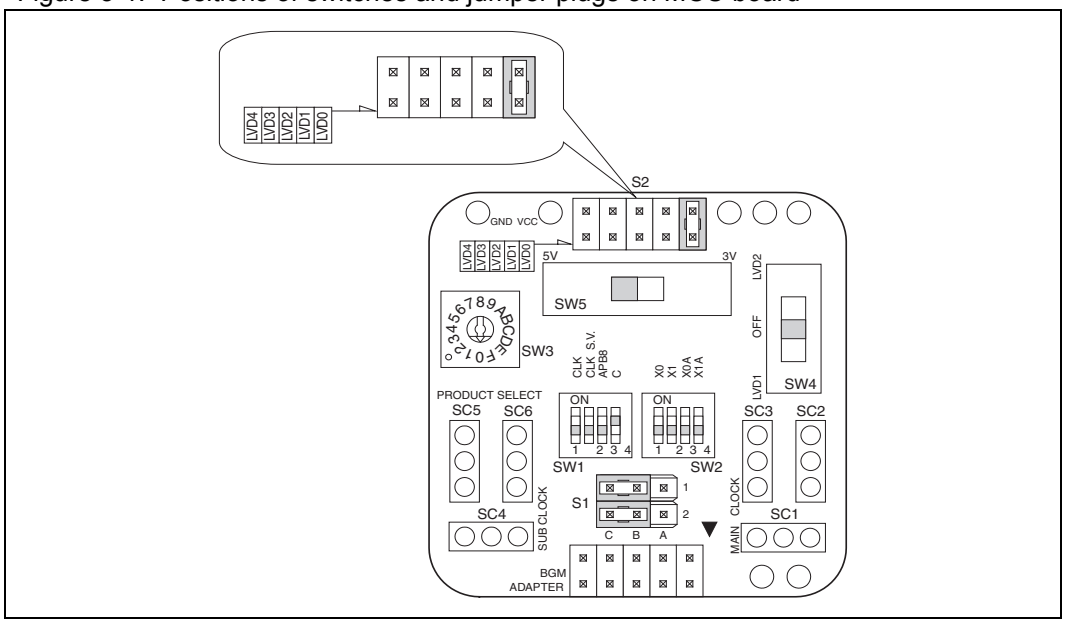


Table 5-1. Switch and Jumper plug settings

Item	SW/S name	Setting	Initial setting
Clock selector switch	(SW1-1)	ON : Disable the sub clock OFF : Enable the sub clock	OFF
-	(SW1-2)	For reserved bit, Please set to OFF at all times.	OFF
APB8 bus output selector switch	(SW1-3)	ON : Enable the APB8 bus OFF : Disable the APB8 bus	OFF
C-pin selector switch	(SW1-4)	ON : Connect the C pin and the on-board 0.1μF capacitor OFF : Disconnect the C pin and the on-board 0.1μF capacitor	ON
Clock input selector switch	(SW2)	Select the main clock and sub clock source on the MCU board or on the user system. (See "■ Setting of clock input selector switch (SW2)".)	OFF
Product selector switch	(SW3)	Set this switch depending on the number of pins on the target MCU to be used. (See "■ Setting of the product selector switch (SW3)".)	0

Item	SW/S name	Setting	Initial setting
LVD selector switch	(SW4)	Select the low-voltage detection function. LVD1 : LVD1 enabled OFF : LVD function disabled LVD2 : LVD2 enabled	OFF
Voltage selector switch	(SW5)	Select 5V or 3V supply on the operating voltage of the evaluation MCU. 5V : 5V supply 3V : 3V supply	5V
Sub clock selector jumper plug	(S1)	Select whether to use the sub clock. See the relevant table. (See "■ Settings of the sub clock selector jumper plug (S1)".)	Jumper of B-C
LVD2 detection voltage setting jumper plug	(S2)	Set the LVD2 detection voltage. (See "■ Settings of the LVD2 detection voltage jumper plug (S2)".)	LVD0

■ Setting of clock input selector switch (SW2)

Figure 5-2 shows the clock input selector switch. Table 5-2 lists switch positions and main clock supply clock source. Table 5-3 lists switch positions and sub clock.

Figure 5-2. Clock input selector switch (SW2)

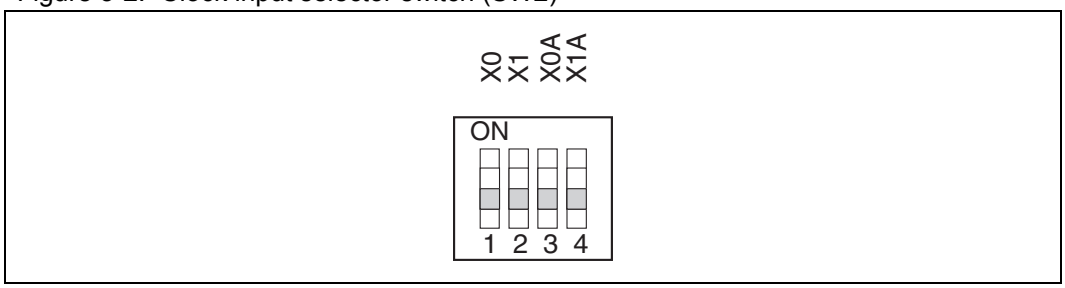


Table 5-2. Setting of main clock supply source

Main clock supply source	Settings of the clock input selector switch	
	SW2-1	SW2-2
Clock area	OFF	OFF
User system	ON	ON

Table 5-3. Setting of sub clock

Sub clock			Settings of the clock input selector switch	
Used	Supply source	M1 correspondence pin	SW2-3	SW2-4
enable	Clock area	X0A : R3 pin X1A : V1 pin	OFF	OFF
disable	-		ON	ON

■ Setting of the product selector switch (SW3)

Table 5-4 lists the setting of product selector switch and product type.

Table 5-4. Setting of the product selector switch

Switch setting	Product type
0	100-pin package type
1	80-pin package type
2	64-pin package type
3	48-pin, 52-pin package type
4	32-pin package type
5	28-pin package type
6	20-pin package type
7	Setting Prohibited
8	100-pin package , LCD function integrated type
9	80-pin package , LCD function integrated type
A	64-pin package , LCD function integrated type
B	48-pin package , LCD function integrated type
C	Setting Prohibited
D	
E	
F	

■ Setting of the sub clock selector jumper plug (S1)

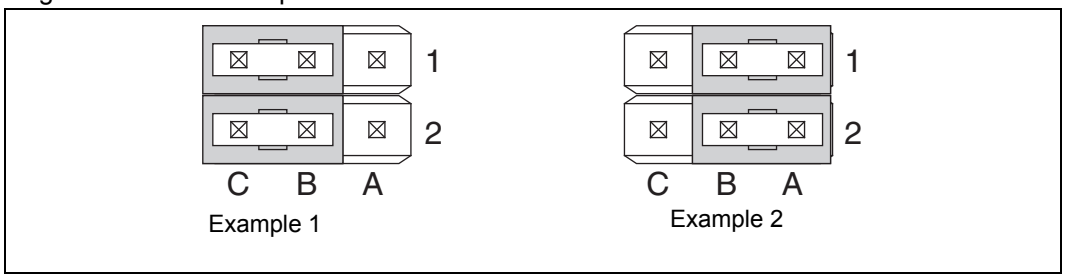
Table 5-5 lists jumper plug positions and sub clock selection. Figure 5-3 shows the examples of sub clock selection.

Table 5-5. Setting of sub clock selector

Sub clock			Settings of the sub clock selector jumper plug (S1)		Example of settings
Used	Supply source *	M1 correspondence pin	X0A	X1A	
enable	Clock area	X0A : R3 pin X1A : V1 pin	Jumper of 1:B - 1:C	Jumper of 2:B - 2:C	Example 1
disable			Jumper of 1:A - 1:B	Jumper of 2:A - 2:B	Example 2

* : Oscillation is not guaranteed when the crystal oscillator is mounted on the user system.

Figure 5-3. The example of sub clock selection



■ Settings of the LVD2 detection voltage jumper plug (S2)

Figure 5-4 shows the settings of the LVD2 detection voltage jumper plug (S2). Table 5-6 lists jumper plug positions and detection voltages.

(This setting is not available, when debugging. Please use with LVD0 setting.)

Figure 5-4. The LVD2 detection voltage jumper plug (S2)

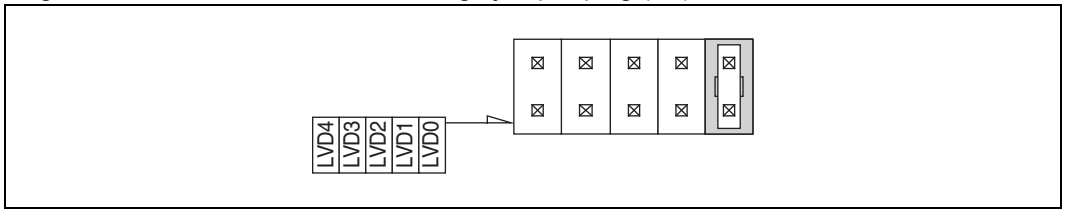


Table 5-6. Setting of the LVD2 detection voltage jumper plug

Jumper plug points	LVD2 setting value
LVD0	+ 4.17 V
LVD1	+ 3.74 V
LVD2	+ 3.3 V
LVD3	+ 2.9 V
LVD4	+ 2.6 V

6. Product Specifications

■ General specifications

The general specifications of a MCU board is shown in Table 6-1.

Table 6-1. General specifications

Item	Specification	
Name	The MCU board for F^{2}MC-8FX MB95FV100D-103	
Part number	MB2146-303	
Power supply	Evaluation MCU (MB95FV100D-103)	+ 5.0V (UVcc)
	MCU board power supply	+ 5.0V (It supplies from a user system)
Frequency of operation	Max. 16MHz	
Operating temperature	5 °C to 35 °C	
Operating humidity	20 % to 80 % (No condensation is allowed.)	
Dimensions	40.0mm (W) × 40.0mm (D) × 14.6mm (H)	
Weight	13g	

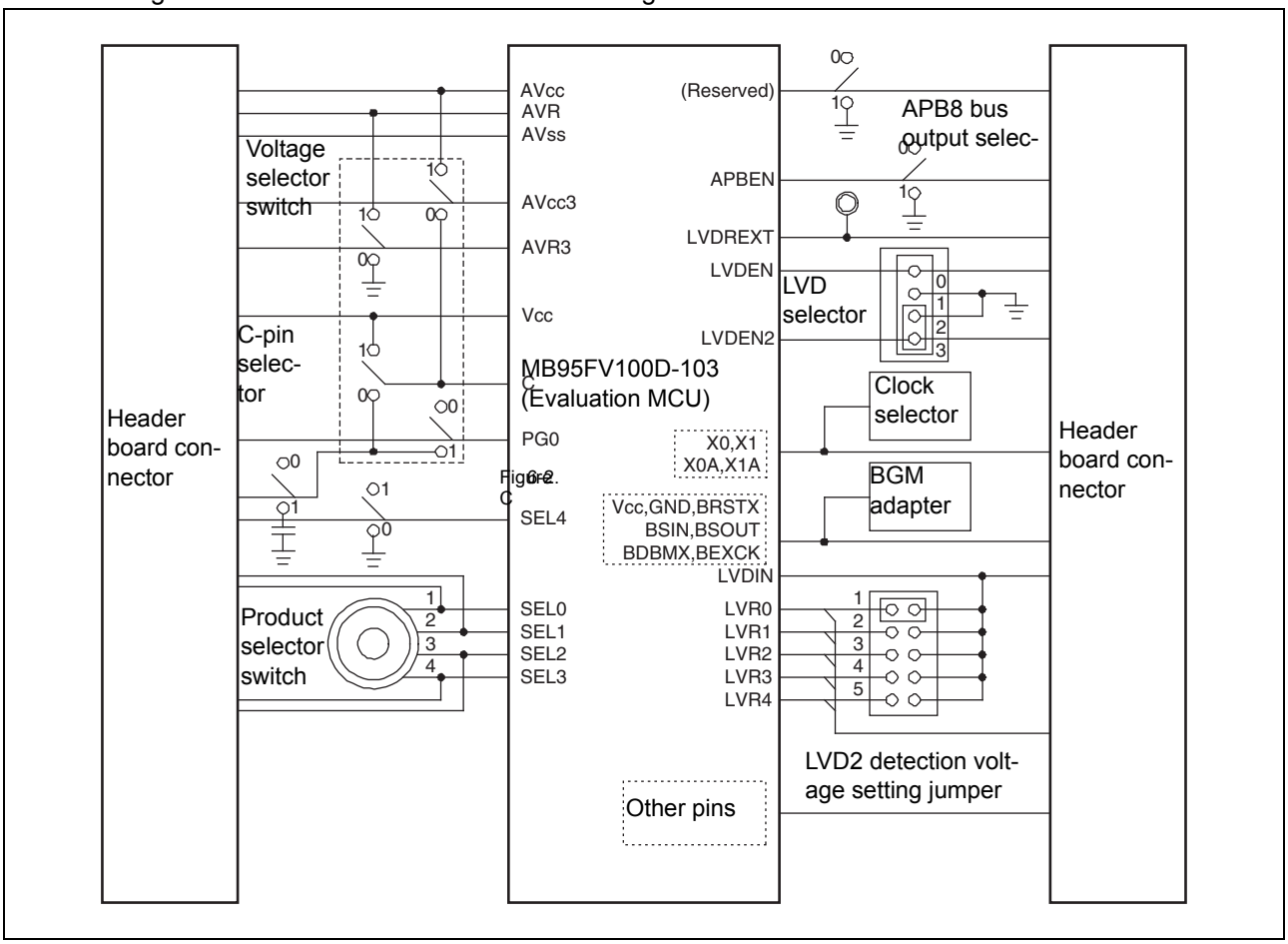
■ Functional explanation

The functional specifications of a MCU board is shown in Table 6-2, and the functional block diagram is shown in Figure 6-1.

Table 6-2. MCU board functional specifications

Item	Description
MCU board function	Serves as the adapter used in combination with the BGM adapter and header board to provide connection between the BGM adapter and evaluation MCU and between the evaluation MCU and user system.
Switches	Serve for clock selection, APB8 bus output selection, C-pin setting, clock selection, product selection, low-voltage detection setting, and voltage selection.
Jumper plugs	The jumper plugs on the MCU board can be used to make various settings for low-voltage detection and clock selection.
Clock mounting socket	The crystal oscillator mounted socket on the MCU board is used to supply clock signals to the main clock (X0/X1) and sub clock (X0A/X1A) pins on the evaluation MCU from the MCU board.

Figure 6-1. MCU board functional block diagram



■ Clock settings

Figure 6-3 shows the clock-related circuit diagram.

Figure 6-3. Clock selector circuit