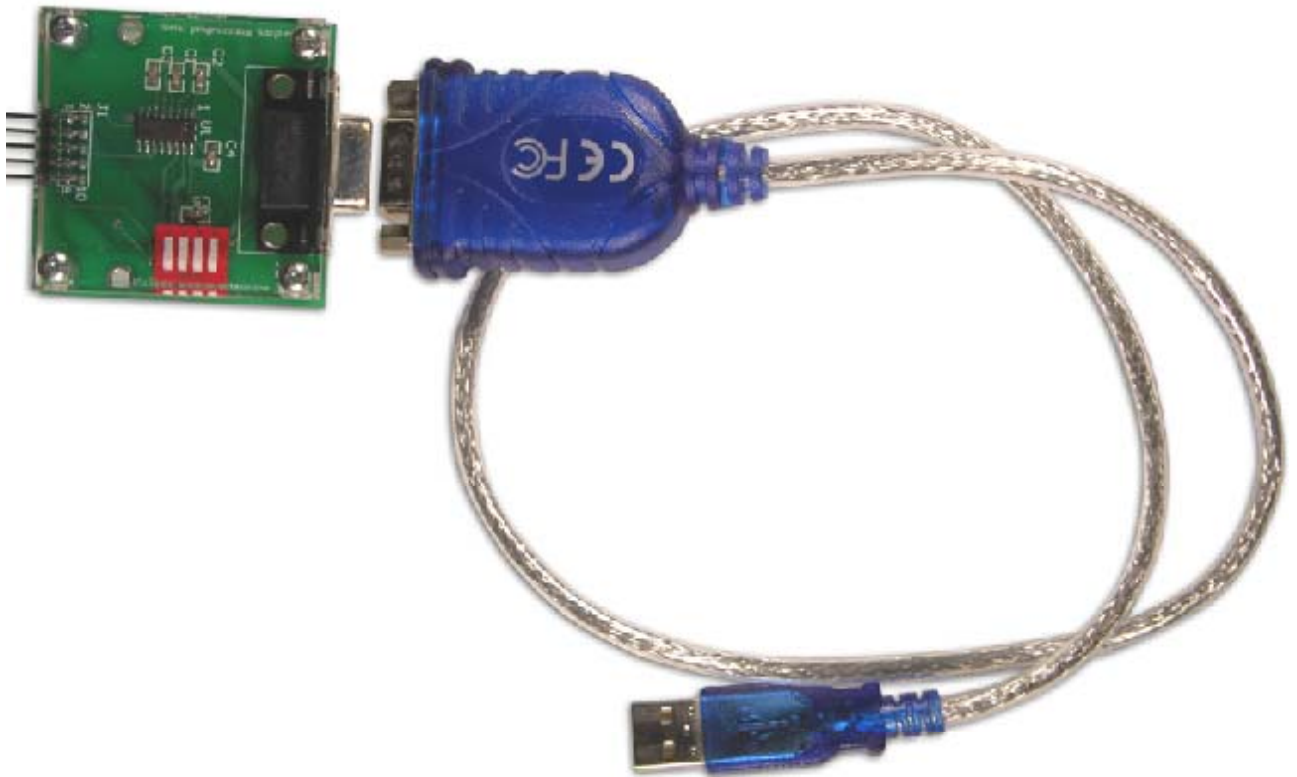


USER GUIDE
PC Serial Programming Adapter Cable for Fujitsu
Flash Microcontroller-
F²MC-16LX/FR Family

P/N:
Fujitsu Microelectronics America, Inc.



Revision History

Revision #	Date	Comment
1.0	03.25.2001	New Document
2.0	08.21.2003	Added devices in the Table
3.0	04.11.2005	Added devices in the Table and modified the layout of the document.
4.0	01.30.2006	Added USB to serial cable description

Warranty and Disclaimer

To the maximum extent permitted by applicable law, Fujitsu Microelectronics America Inc, Sunnyvale restricts its warranties and its liability for the Product [MB90455 series Evaluation Board Hardware and Software Tools], its performance and any consequential damages, on the use of the Product in accordance with (i) the terms of the License Agreement and the Sale and Purchase Agreement under which agreements the Product has been delivered, (ii) the technical descriptions and (iii) all accompanying written materials. This product has been created to work in laboratory environment only. In addition, to the maximum extent permitted by applicable law, Fujitsu Microelectronics America Inc Sunnyvale disclaims all warranties and liabilities for the performance of the Product and any consequential damages in cases of unauthorized decompiling and/or reverse engineering and/or disassembling.

1. Fujitsu Microelectronics America Inc San Jose warrants that the Product will perform substantially in accordance with the accompanying written materials [this manual] for a period of 90 days from the date of receipt by the customer. Concerning the hardware components of the Product, Fujitsu Microelectronics GmbH warrants that the Product will be free from defects in material and workmanship under use and service as specified in the accompanying written materials for a duration of 1 year from the date of receipt by the customer.
2. Should a Product turn out to be defect, Fujitsu Microelectronics America Inc San Jose's entire liability and the customer's exclusive remedy shall be, at Fujitsu Microelectronics America Inc San Jose's sole discretion, either return of the purchase price and the license fee, or replacement of the Product or parts thereof, if the Product is returned to Fujitsu Microelectronics America Inc San Jose in original packing and without further defects resulting from the customer's use or the transport. However, this warranty is excluded if the defect has resulted from an accident not attributable to Fujitsu Microelectronics America Inc San Jose, or abuse or misapplication attributable to the customer or any other third party not relating to Fujitsu Microelectronics America Inc San Jose.
3. To the maximum extent permitted by applicable law Fujitsu Microelectronics America Inc San Jose disclaims all other warranties, whether expressed or implied, in particular, but not limited to, warranties of merchantability and fitness for a particular purpose for which the Product is not designated.
4. To the maximum extent permitted by applicable law, Fujitsu Microelectronics America Inc San Jose's and its suppliers' liability is restricted to intention and gross negligence.

NO LIABILITY FOR CONSEQUENTIAL DAMAGES

To the maximum extent permitted by applicable law, in no event shall Fujitsu Microelectronics America Inc San Jose and its suppliers be liable for any damages whatsoever (including but without limitation, consequential and/or indirect damages for personal injury, assets of substantial value, loss of profits, interruption of business operation, loss of information, or any other monetary or pecuniary loss) arising from the use of the Product.

Should one of the above stipulations be or become invalid and/or unenforceable, the remaining stipulations shall stay in full effect.

Date: 22.01.99, V1.0

Overview

This document is intended to give an idea about in circuit serial programming of the Fujitsu F²MC16LX/FR family flash Microcontroller using an adapter cable. This method allows the user to program the microcontroller directly on the target system without additional RS232 circuit. This solution saves some space on the target board and minimizes the cost of the system required for serial programming.

Serial Interface of the Microcontroller to the PC via Cable

The diagram (figure1) below gives brief idea about all-necessary connections, which has to be done to program the on chip Flash memory.

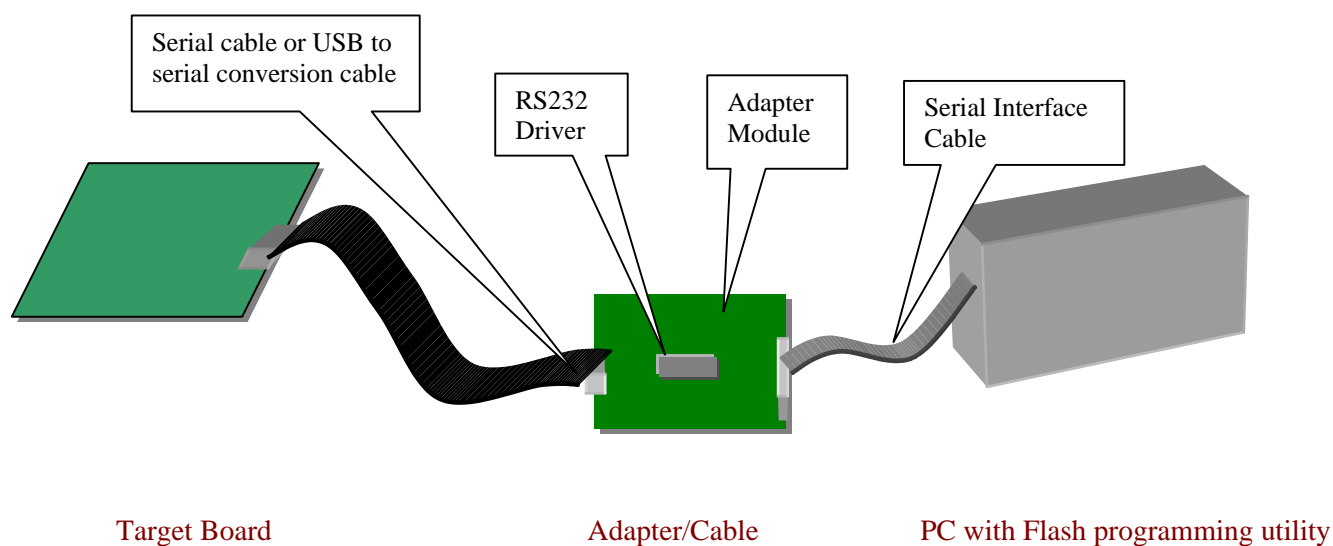


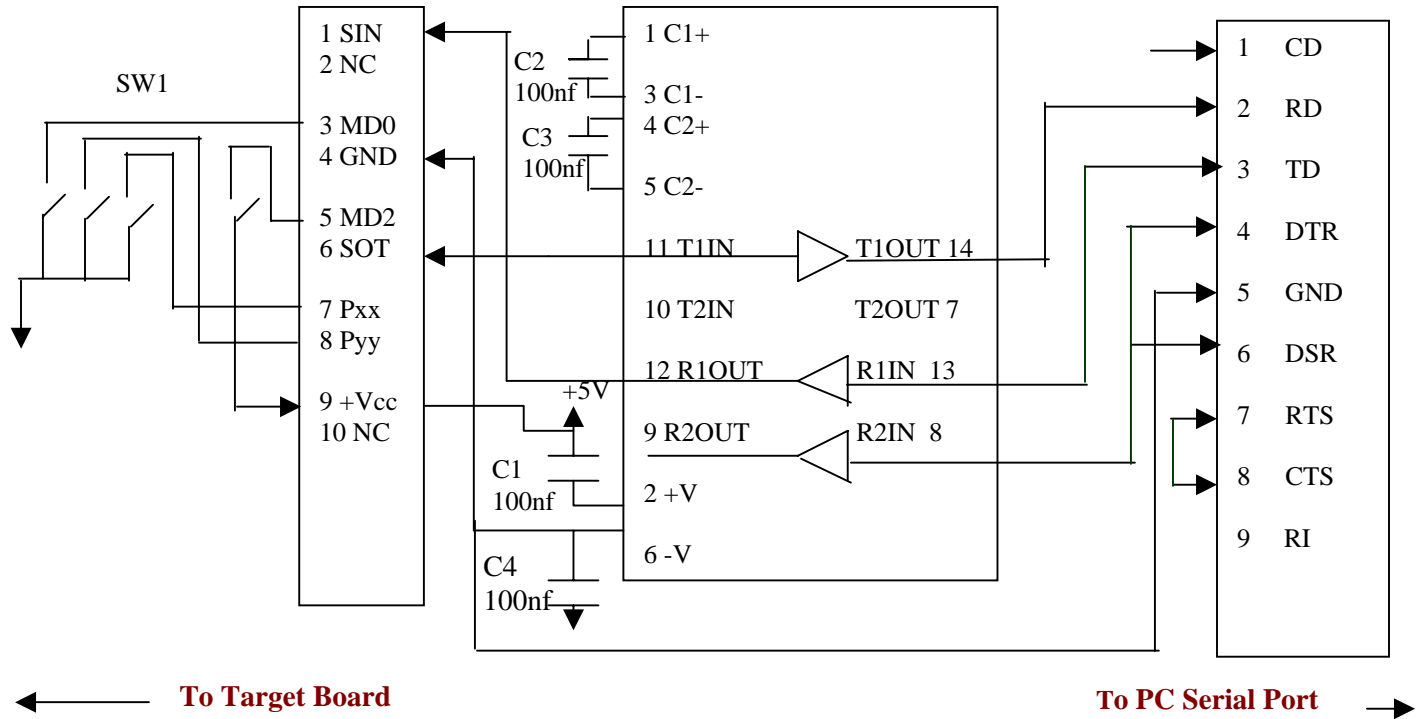
Figure 1- Interface Diagram

Fujitsu standard Serial programming utility provides the asynchronous method to program the microcontroller. In order to connect the Microcontroller on board to the utility software, only the serial interface lines SOT (Transmit) and SIN (Receive) are necessary. On the PC side to establish a connection to the Microcontroller the RTS and CTS line should be connected together. The DTR should be connected to the DSR line in order to avoid the communication error. The RD line has to be connected to the SOT, and the TD line has to be connected to the SIN via the RS232 driver to the microcontroller for voltage level conversion.

The above whole connection requires the extra component such as RS232 driver and supporting components for driver on target board. The adapter cable eliminates the above component requirement and provides the complete solution. Hence no need of extra component on the user system for in circuit programming the Flash Microcontroller.

The Schematic of the adapter cable is shown in figure 2.

Figure 2: Flash Adapter schematic Diagram



Procedure for Hardware/Software Setup of Flash Adapter

The following steps are required to set up the Hardware and software of the flash programming adapter.

1. Download the FLASH programming utility from the CD.
2. Connect one side of the ribbon cable to Adapter (J1) and other side to the user target board (Note: The user board should have the 10-pin header for the cable). The pin outs for the header is shown in the figure 4, and table1).
3. Connect '9 pin serial cable' or 'USB to serial cable' on one side to the adapter cable (J2) and other side to the PC.
4. Set all DIP switches SW1 (MD0, MD2, Pxx, and Pyy) position to ON. Pxx and Pyy pins are corresponds to the pins listed in the Appendix A and B for starting pin for programming.
5. Connect the power supply to the target board (Power supply on the adapter board comes from the User target Board via header).
6. Launch the flash programming utility on the PC.
7. Select the devices from the CPU list, and select the COM port (It depends on which port serial cable is connected).
8. Switch on the power supply. Execute the < download> command from the Flash-programming interface.
9. If download is okay select the .mhx file (this file has been created after compiling the program) from the user application software. Now select the <auto> command. A complete programming sequence will be executed (Erase complete flash memory, blank check write file to flash memory and verify data). These commands can be executed individually as well.
10. After successful execution of this command, set all the DIP switches to OFF, or disconnect the programming cable.
11. The power on reset or pressing the reset button on target board will start the application in the flash memory.

Requirement on Customer Target Board

In order to connect the adapter cable to the target board, it is required to have the 10-pin standard IDC header on the target board with the connection shown below. Figure 3 shows the connections from the microcontroller to header. For detail pin out refer to Appendix A/B.

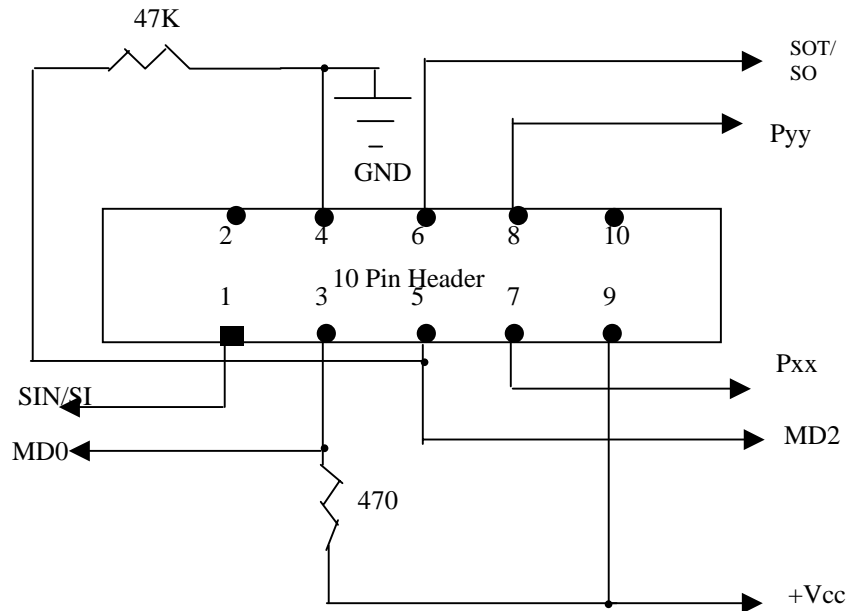


Figure 3: Schematic Diagram on the Target Board

Note:

- Pull up and pull down resistor value shown above in MD0 and MD2 line is for reference only. It is recommended to connect the low value of pull up resistor (Approx 470 ohm) to mode pins if required or connect these pins directly to Vcc or Vss directly as per the logic shown in the above diagram. MD1 should be connected to the power supply on the target board, as there is no change in the signal status for normal and flash-programming mode.
- The schematic diagram shown above is for reference only. If necessary, consider the 10-pin header pin out as a top view.
- Pxx and Pyy is the starting pin for programming. Please refer to appendix A and B for more detail about this.

Table 1: Pin Description of Header on the Target Board

Pin No.	Description	Details
1	SIN/SI	Connected to the SIN of the Microcontroller. Refer table-2 shown below.
2	NC	
3	MD0	Connected to the MD0 pin of the MCU
4	GND	Ground of the Target board and MCU
5	MD2	Connected to the MD2 pin of the MCU
6	SOT/SO	Connected to the SOT of the Microcontroller. Refer table-2 shown below.
7	Pxx	P00 of the MCU
8	Pyx	P01 of the MCU
9	+Vcc	Supply to the MCU
10	NC	-

Appendix A

MCU Pins used for Flash asynchronous Programming in F2MC Family

Microcontroller pins used for Serial Programming

Type	Serial Data Input Pin	Serial Data Output Pin	Starting Pin for Programming Program	Supply Voltage
MB90F334	P42/SIN0	P43/SOT0	P60=L, P61=L	3-V product
MB90F347/C/S/CS	P82/SIN0	P83/SOT0	P00=L, P01=L*1 P00=H, P01=L*2	5-V product
MB90F352/C/S/CS	P12/SIN3	P13/SOT3	P00=L, P01=L*1 P00=H, P01=L*2	5-V product
MB90F372	P70/UI1	P67/UO1	P00=L, P01=L*1 P00=H, P01=L*3	3-V product
MB90F387/S	P40/SIN1	P42/SOT1	P30=L, P31=L	5-V product
MB90F394/H	P36/SIN0	P34/SOT0	P00=L, P01=L*1 P00=H, P01=L*2	5-V product
MB90MF408	P82/SI0	P84/SO0	P80=L, P81=L	3-V product
MB90F423GA/GB/GC	P03/SIN1	P04/SOT1	P00=L, P01=L	5-V product
MB90F428GA/GB/GC	P03/SIN1	P04/SOT1	P00=L, P01=L	5-V product
MB90F438L/LS MB90F439/S	P43/SIN1	P45/SOT1	P00=L, P01=L	5-V product
MB90F443G	P43/SIN1	P45/SOT1	P00=L, P01=L	5-V product
MB90F455/S MB90F456/S MB90F457/S	P40/SIN1	P42/SOT1	P30=L, P31=L	5-V product
MB90F462	P40/SIN0	P41/SOT0	P00=L, P01=L	5-V product
MB90F474H/L MB90F476/A	P70/SIN0	P71/SOT0	P80=L, P81=L*1 P80=H, P81=L*2	3-V product
MB90F481	P70/SIN0	P71/SOT0	P80=L, P81=L*1 P80=H, P81=L*3	3-V product
MB90F482	P70/SIN0	P71/SOT0	P80=L, P81=L*3 P80=H, P81=L*2	3-V product
MB90F497/G	P40/SIN1	P42/SOT1	P00=L, P01=L	5-V product
MB90F498G	P40/SIN1	P42/SOT1	P00=L, P01=L	5-V product

Microcontroller pins used for Serial Programming

Type	Serial Data Input Pin	Serial Data Output Pin	Starting Pin for Programming Program	Supply Voltage
MB90F523B	P42/SIN0	P43/SOT0	P00=L, P01=L	5-V product
MB90F543/G/GS	P43/SIN1	P45/SOT1	P00=L, P01=L	5-V product
MB90F546G/GS	P43/SIN1	P45/SOT1	P00=L, P01=L	5-V product
MB90F548G/GS	P43/SIN1	P45/SOT1	P00=L, P01=L	5-V product
MB90F549/G/GS	P43/SIN1	P45/SOT1	P00=L, P01=L	5-V product
MB90F553A	P42/SIN	P41/SOT	P00=L, P01=L	5-V product
MB90F562/B	P60/SIN1	P61/SOT1	P00=L, P01=L	5-V product
MB90F568	P60/SIN1	P61/SOT1	P00=L, P01=L	3-V product
MB90F574/A	P40/SIN0	P41/SOT0	P00=L, P01=L	5-V product
MB90F583B/C/CA	P40/SIN0	P41/SOT0	P00=L, P01=L	5-V product
MB90F584C/CA	P40/SIN0	P41/SOT0	P00=L, P01=L	5-V product
MB90F591A/G	P36/SIN0	P34/SOT0	P00=L, P01=L	5-V product
MB90F594A/G	P36/SIN0	P34/SOT0	P00=L, P01=L	5-V product
MB90F598/G	P43/SIN1	P45/SOT1	P00=L, P01=L	5-V product
MB90F654A	P40/SIN0	P41/SOT0	P00=L, P01=L	3-V product
MB90F804	P54/SIO	P56/SO0	P65=L, P66=L*1 P65=H, P66=L*3	3-V product
MB90F867	P82/SIN0	P83/SOT0	P00=L, P01=L*1 P00=H, P01=L*2	5-V product
MB90F897/S	P40/SIN1	P42/SOT1	P30=L, P31=L	5-V product

Appendix B

MCU Pins used for Flash asynchronous Programming in FR Family

Microcontroller pins used for Serial Programming

Type	Serial Data Input pin	Serial data output pin	Starting pin for programming program
MB91F109	SI0/PF0/TRG0	SO0/PF1/TRG1	P20, P21
MB91F133	PI0/SIN1	P11/SOT1	P20, P21
MB91F233	P00/SIN0	PO1/SOT0	P10, P11
MB91F264	P20/SIN0	P21/SOT0	P44, P45
MB91FV310/F312	SI0	SO0	P33, P34
MB91F353/F355	PH3/SI3	PH4/SO3	PN0, PN2
MB91F362/365/366/367/368/369	SIN0	SOT0	