FR Family MB91460 Series, Flash Programming

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Contents

1. Introduction

This document describes various possibilities programming the internal flash memory of the Cypress 32-bit microcontrollers of the MB91460 series.

In the first chapter some basic information for the connection of the microcontroller to the PC and a short description of the internal Boot ROM of the MCU are given.

The second chapter describes the handling of the ‘FME-FR Programmer’ for serial asynchronous programming.

In the third chapter another serial asynchronous programming tool, the ‘Cypress FR Flash Programmer’, is explained.

Chapter four describes the third-party programming tools GALEP-4 and GALEP-5 which can be used for serial synchronous and asynchronous as well as parallel programming.

The next chapters list the needed settings for serial asynchronous programming on the different starterkits for the flash derivates of the MB91460 series.

The last chapter gives some hints on additional literature.

2. Background Information

This chapter gives some information for connection of the microcontroller to the PC and the internal Boot ROM of the MCU.

2.1 Connection to PC

For serial asynchronous programming of the internal Flash, UART channel 4 is used on MB91460 series flash devices. Therefore UART pins SIN4 (serial input) and SOT4 (serial output) have to be connected to the PC's COM port via RS232 transceiver.

The figure below shows an example for this connection. You can also connect the RS232 signals DTR or RTS to the reset input of the microcontroller for controlling the reset signal by the programmer software.

Some terminal applications also need a connection between Pin 7 (RTS) and Pin 8 (CTS) on connector side.

Figure 2-1. Example of UART Connection

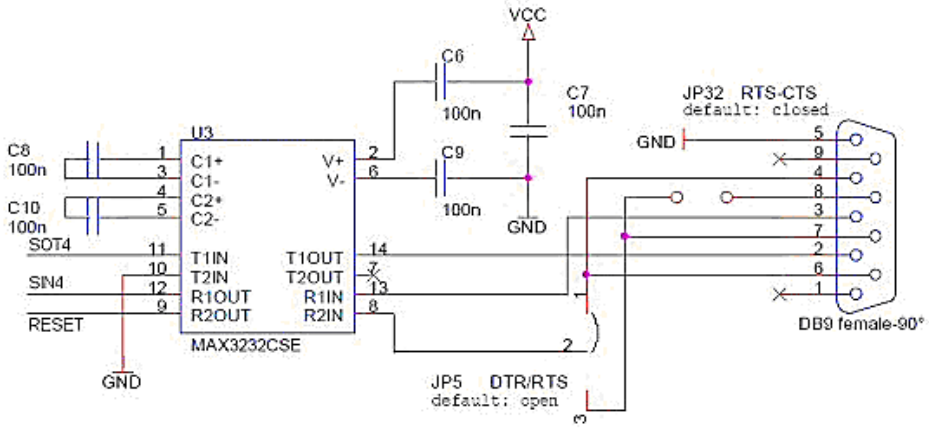
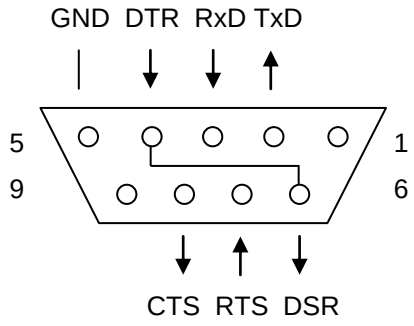


Figure 2-2. RS232 Signal Connection



2.2 Boot ROM

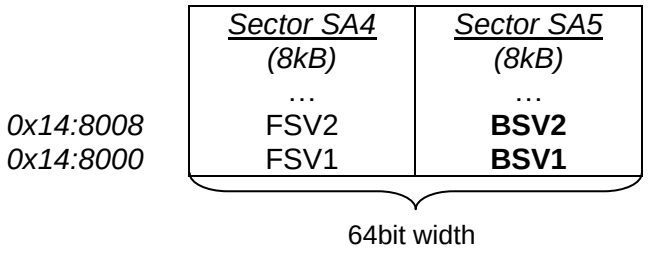
The Boot ROM is a fixed start-up routine, which is executed always after the Reset Cancellation Sequence of every INIT or RST reset if the device is configured with the mode pins set to MD[2:0]=”000” (internal ROM/vector mode).

The purpose of the Boot ROM is to configure the device after a reset and to provide a simple serial bootloader for programming the embedded flash memories.

After the chip initialization and saving the RSRR (Reset Cause Register) to CPU register R4, there is a check for boot conditions.

All Flash devices have two Boot Security Vectors (BSV1, BSV2). These vectors are located in parallel sector to the Flash Security Vectors (FSV1, FSV2):

Figure 2-3: Location of the Boot Security Vectors on MB91F467D



At first, BSV1 is checked: if the data of this vector represents a valid address in the specified address range (depending on Flash-ROM size), the Boot Security Vector itself becomes valid.

Table 2-1. Boot Security Vector Addresses and Flash Address Valid Range

Device	Valid Boot Security Vector address range	BSV1 address	BSV2 address
MB91F464A	0x0A:0000 – 0x0F:FFFF 0x14:8000 – 0x14:FFFF	0x14:8004	0x14:800C
MB91F465B	0x08:0000 – 0x0F:FFFF 0x14:8000 – 0x14:FFFF	0x14:8004	0x14:800C
MB91F467B	0x04:0000 – 0x14:FFFF	0x14:8004	0x14:800C
MB91F463C	0x0C:0000 – 0x0F:FFFF 0x14:8000 – 0x14:FFFF	0x14:8004	0x14:800C
MB91F465C	0x08:0000 – 0x0F:FFFF 0x14:8000 – 0x14:FFFF	0x14:8004	0x14:800C
MB91F467C	0x04:0000 – 0x14:FFFF	0x14:8004	0x14:800C
MB91F465D	0x08:0000 – 0x0F:FFFF 0x14:8000 – 0x14:FFFF	0x14:8004	0x14:800C
MB91F467D	0x04:0000 – 0x14:FFFF	0x14:8004	0x14:800C
MB91F469G	0x04:0000 – 0x24:FFFF	0x24:8004	0x24:800C

Device	Valid Boot Security Vector address range	BSV1 address	BSV2 address
MB91F464H	0x0A:0000 – 0x0F:FFFF 0x14:8000 – 0x14:FFFF	0x14:8004	0x14:800C
MB91F465K	0x08:0000 – 0x0F:FFFF 0x14:8000 – 0x14:FFFF	0x14:8004	0x14:800C
MB91F467M	0x04:0000 – 0x14:FFFF	0x14:8004	0x14:800C
MB91F465P	0x08:0000 – 0x0F:FFFF 0x14:8000 – 0x14:FFFF	0x14:8004	0x14:800C
MB91F467P	0x04:0000 – 0x14:FFFF	0x14:8004	0x14:800C
MB91F465X	0x08:0000 – 0x0F:FFFF 0x14:8000 – 0x14:FFFF	0x14:8004	0x14:800C

MB91F467R and MB91F463N do NOT contain this version of Boot ROM and do NOT support Boot Security Vector functionality! Please note that the programming UART is changed to UART0 on these devices and that the dial-up procure is different!

If BSV1 is valid, there will be an additional check before entering user program at the entry address given by BSV1 (1). Otherwise checks for entering the internal bootloader will be done (2).

The purpose of this feature is to disable the execution of the internal bootloader due to security reasons or to minimize startup time of application. If the user sets BSV1 to a valid address range, this bootloader cannot be entered any more.

(1) If the check for BSV1 is valid, the Magic Number, which should be located on the four bytes before the address BSV1 points to, is compared to 0x000A897A. If the Magic Number matches this value, the user application is entered at the address given by BSV1.

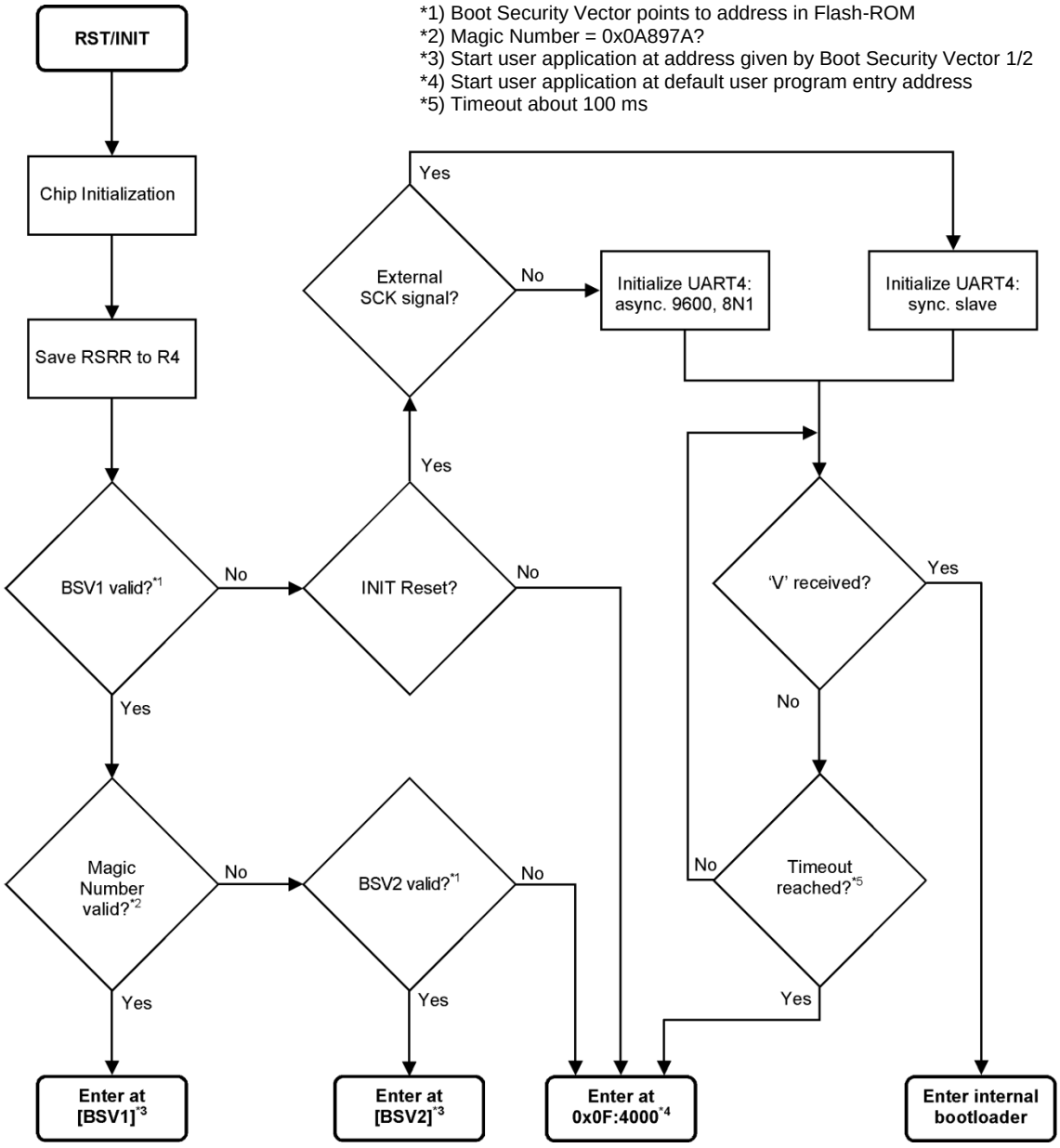
The Magic Number is used as flag for a valid user application, or especially for a user bootloader. If you want to re-program this user bootloader, a second user bootloader, which handles the re-programming of the first user bootloader, has to be located at the address BSV2 points to. If BSV2 does not point to a valid address range, then application is started at default user program entry address 0x0F:4000.

(2) If the check for BSV1 is not valid, the reset cause will be checked as second boot condition. Only if the reset cause was an INIT reset (external INITX input, RSRR=0x80), the check for boot conditions will go on. Otherwise Boot ROM is left and application is started at default user program entry address 0x0F:4000.

If the reset cause was an INIT reset, serial clock pin SCK4 is checked for an external clock signal. Therefore logic level at this pin is monitored for about 1ms. If port level is constant, UART4 is initialized to asynchronous mode: 9600 baud, 8 data bits, 1 stop bit, no parity. If port level changes, UART4 is initialized to synchronous slave mode. UART-reception is checked for about 100 ms. If during this time period the ASCII-character “V” (0x56) is received, the internal bootloader is entered and ASCII-character “F” (0x46) is sent back as acknowledge sign. Otherwise Boot ROM is left and application is also started at default user program entry address 0x0F:4000.

The following flow chart shows more detailed the checking conditions:

Figure 2-4. Flow chart of Boot ROM



The internal bootloader provides some basic functions for reading and writing the internal RAM, function calling or changing the communication speed. These functions are normally used to write a programming kernel to the internal RAM of the microcontroller which handles the programming of the flash memory.

Table 2-2. Internal bootloader functions

Command	PC to MCU	MCU to PC	Remark
READ	1 (0x01) 2 (0x02) Address (4 bytes) Size (2 bytes)	241 (0xF1) 130 (0x82)	 Lo, MidLo, MidHi, Hi Lo, Hi
		Binary Dump CheckSum (2 bytes)	Direct read and dump Bootloader sends 16bit checksum
WRITE	1 (0x01) 3 (0x03) Address (4 bytes) Size (2 bytes) Binary Dump	241 (0xF1) 131 (0x83)	 Lo, MidLo, MidHi, Hi Lo, Hi Receive and store dump in RAM
		CheckSum (2 bytes)	Bootloader sends 16bit checksum
CALL	1 (0x01) 4 (0x04) Address (4 bytes)	241 (0xF1) 132 (0x84)	 Lo, MidLo, MidHi, Hi
		Return Parameter	Calls specified Address and waits for a return The returned parameter in R4 will be echoed to the PC
CHECKSUM	1 (0x01) 5 (0x05)	241 (0xF1) 133 (0x85) CheckSum (2 bytes)	 MCU re-dumps 16bit checksum (Lo, Hi) calculated at last write or read operation
BAUDRATE	1 (0x01) 6 (0x06) Baudrate (4 bytes)	241 (0xF1) 134 (0x86)	 Lo, MidLo, MidHi, Hi Initializes UART with new baudrate value

3. FME-FR Programmer

This chapter explains the usage of the ‘FME-FR Programmer’ for serial asynchronous programming of the MB91460 series flash devices.

The ‘FME-FR Programmer’ is a serial asynchronous programming tool for the Cypress FR flash microcontrollers of the MB91360 and MB91460 series. It uses the internal bootloader functions to set up communication.

The ‘FME-FR Programmer’ can be used for development purposes free-of-charge and is not released for any mass-production purposes.

Figure 3-1: FME-FR Programmer Icon

There are two ways of programming:

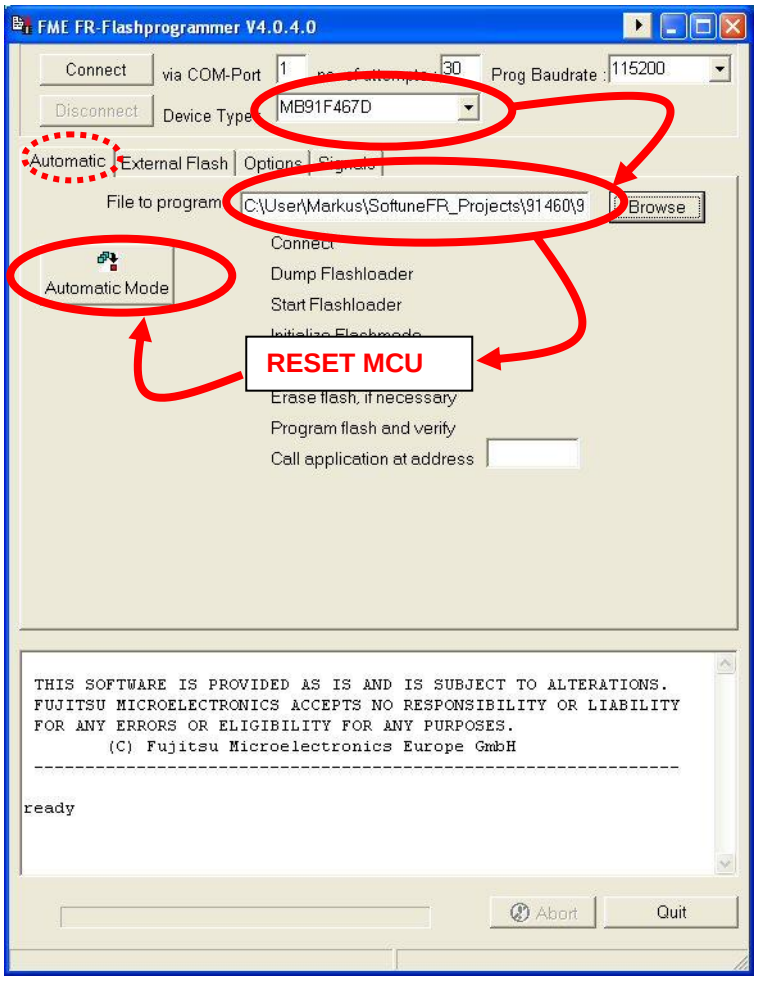
Automatic mode

Manual mode (step-by-step)

3.1 Automatic Mode

The automatic mode is the easiest way of using the programmer software. There are only some user settings needed on the “Automatic” sheet.

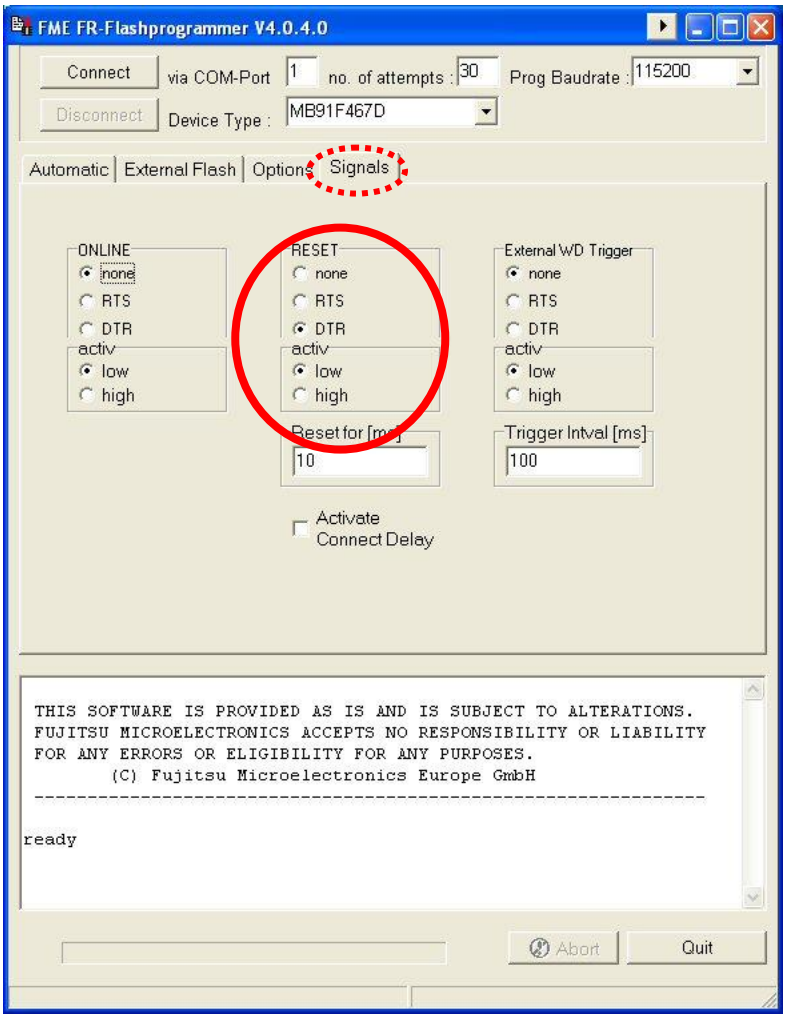
Figure 3-2. Settings for Automatic Mode



Choose the microcontroller device (e.g. “MB91F467D”) as device type and browse to the mhx-file you want to program to the embedded flash memory of the microcontroller. After that reset the microcontroller and press button “Automatic Mode” to start programming.

If your hardware supports MCU reset via DTR or RTS signal lines of the PC’s COM port, go to sheet “Signals” and select the appropriate reset signal line. The programmer now resets the microcontroller automatically before starting the programming sequence and you do not have to reset the MCU manually.

Figure 3-3. Reset Signal Settings



The software now automatically writes a flash loader to the microcontroller, does a blank check and erases the flash memory if necessary. After that the user application is programmed to the embedded flash memory.

During this sequence the actual progress status can be seen by checked off steps on the “Automatic” sheet and the messages below in the message box.

If the programming sequence is ended successfully, you will receive the output shown in figure 7.

MB91F464A/H, MB91F465B/C/D/K/P/X, MB91F467B/C/D/M/P/S/T:

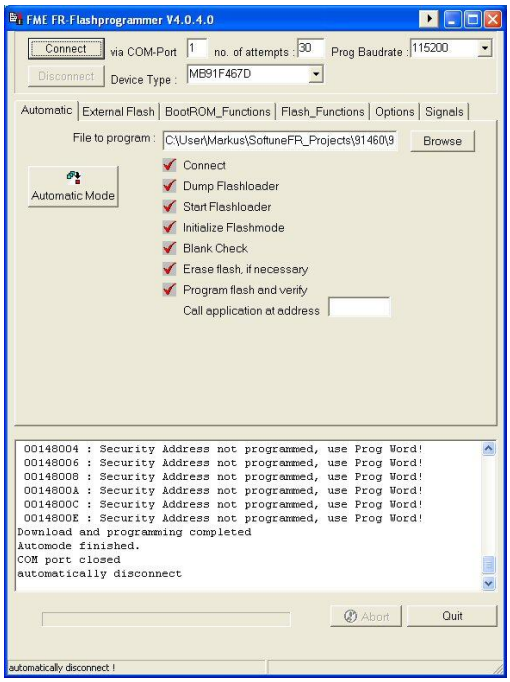
Addresses 0x14:8000 to 0x14:800F cannot be written in automatic mode.

MB91F469G:

Addresses 0x24:8000 to 0x24:800F cannot be written in automatic mode.

This is a built in security feature to prevent unintended writing to the Flash Security Vectors and Boot Security Vectors. Otherwise it would be possible to secure flash content and to lock the microcontroller for serial programming/reading/erasing by not being able to enter the internal loader anymore. If you want to use these features explicitly, you have to program these dedicated addresses by using the “Prog Word” Function of the step-by-step mode.

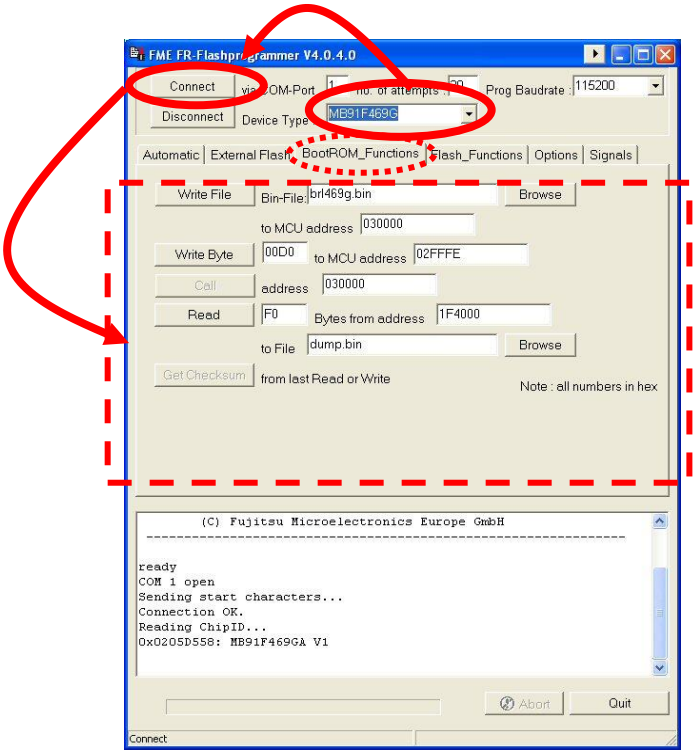
Figure 3-4: Successful Programming in Automatic Mode



3.2 Manual Mode (Step-by-Step)

The manual mode provides each function of the internal bootloader and the downloaded flash loader kernel as single steps.

Figure 3-5. Connect to internal bootloader



Select the device type, e.g. “MB91F467D”, reset the microcontroller and press “Connect” button. You can also use the DTR or RTS lines for resetting the MCU. Refer to chapter 3.1 for needed settings.

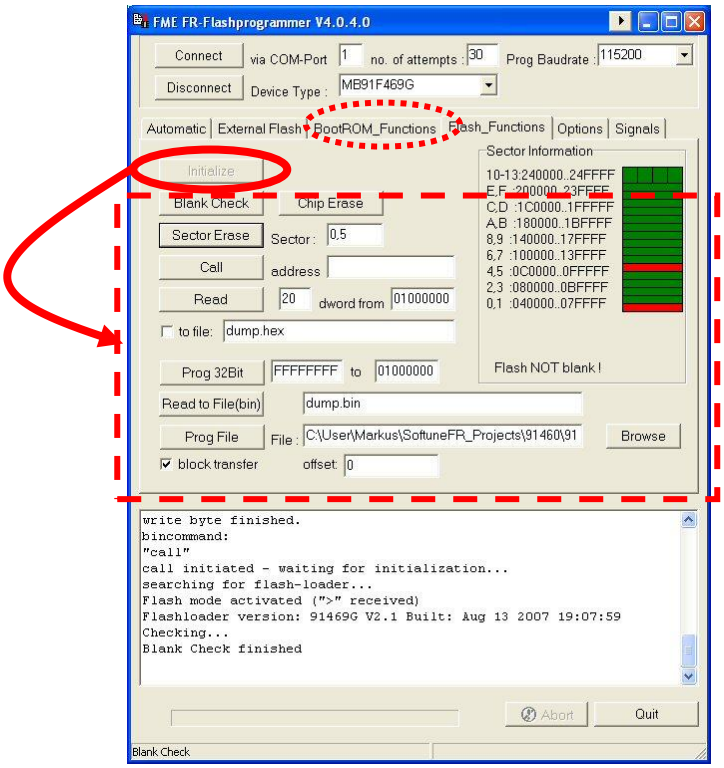
If connection is successful the functions on sheet “BootROM_Functions” become enabled. To program embedded flash memory execute the functions “Write File”, “Write Byte” and “Call” with the default settings.

Table 3-1: BootROM Functions of FME-FR Programmer

Function	Description
Write File	Dumps a binary file into the internal RAM beginning at the specified address. The transmission will be verified by a checksum.
Write Byte	Writes one single byte to the given location (RAM).
Call	Calls the program or function at the given address. If there is a “RET”-statement at the end, the operation will continue (return value is displayed).
Read	Reads out a number of bytes from a given address and creates a binary file.
Checksum	Displays the checksum from the last operation.

If you have performed the above mentioned steps and the appropriate bin-file (e.g. “brl467d.bin” for the MB91F467D) is successfully loaded to RAM and started, go to sheet “Flash_Functions”.

Figure 3-6. Flash_Functions of FME-FR Programmer



Press button “Initialize”. If the command prompt of the flash loader is received, all the flash loader functions become enabled. See table 3 for a short description of each function. MB91460 series devices do not support “Autodetect” function!

Table 3-2: Flash Loader Functions of FME-FR Programmer

Function	Description
Initialize	Checks if the flash loader, which was dumped to RAM, is available, initialized at the correct baudrate and ready to operate. This function checks for a prompt character (“>”). If this operation fails (e.g. no flash loader present), none of the following functions will be enabled.
Blank Check	Reads out every byte of each flash-sector to check for non-blank cells. The result is displayed in the flash-diagram on the right side (red = not blank sectors; green=blank sectors).
Chip Erase	Erases the entire flash-ROM (all sectors).
Sector Erase	Erases one sector indicated by the sector number.
Call	This function will divert operation of the device to the specified location. This terminates the flash loader.
Read	Reads out a given number of bytes beginning at the specified address and displays the results in hexadecimal format on the log-window.
Prog 32bit	Programs one word to flash at the specified address.
Read to File	Reads out the Flash content and writes to the given bin-file.
Prog File	Handles the transfer of the specified MHX-file to the flash loader.

To program user application to the flash memory browse to correct mhx-file and use “Prog File” function. After successful programming press “Disconnect” button to close COM port.

For further information on the FME-Flash Programmer software please refer to the user guide

.

4. Cypress FR Flash Programmer

This chapter explains the usage of the ‘Cypress FR Flash Programmer’ for serial asynchronous programming of the MB91460 series flash devices.

The ‘Cypress FR Flash Programmer’ is a serial asynchronous programming tool for the Cypress FR flash microcontrollers. It supports a lot of FR series.

The ‘Cypress FR Flash Programmer’ can be used for development purposes free-of-charge and is not released for any mass-production purposes.

Figure 4-1: Cypress FR Flash Programmer Icon

FR

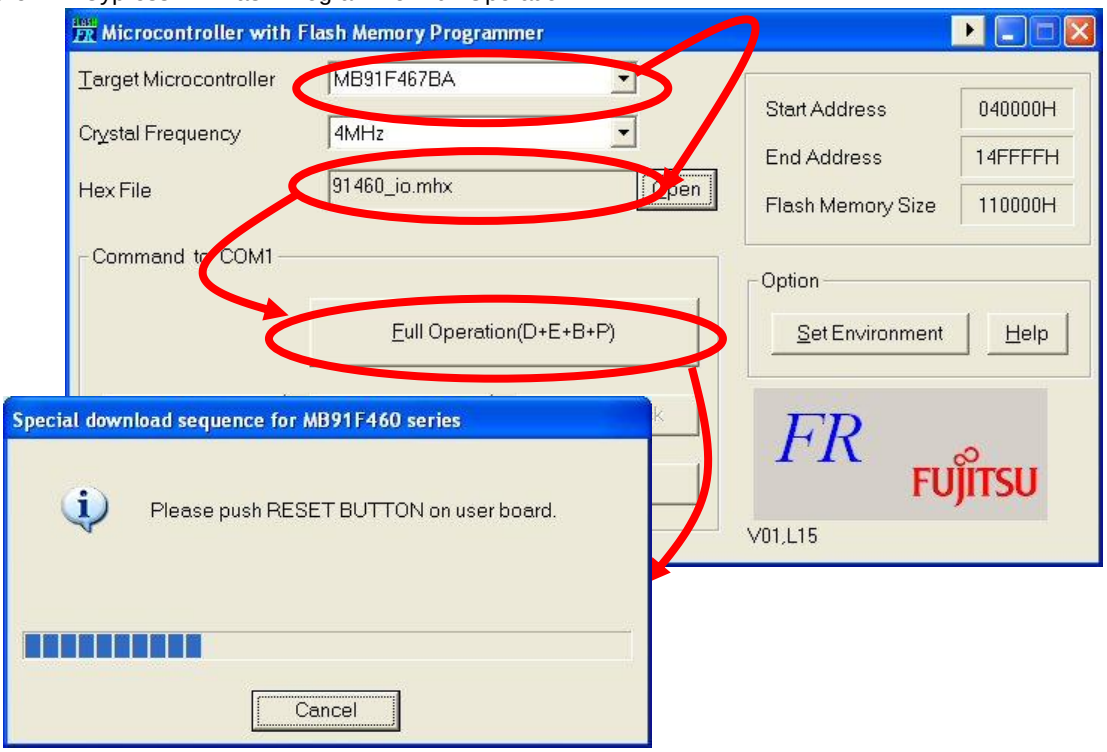
There are two ways of programming:

- Full Operation
- Manual (step-by-step)

4.1 Full Operation

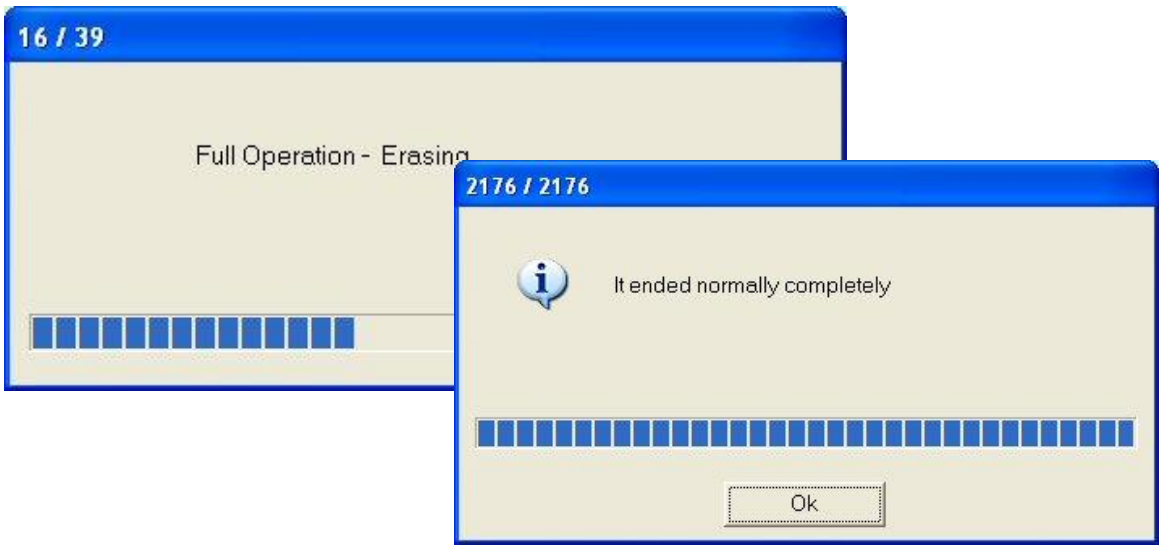
Full Operation is the easiest way to use this programmer software. You only have to select the target microcontroller device (e.g. “MB91F467D”) and the mhx-file you want to program to the embedded flash memory.

Figure 4-2. Cypress FR Flash Programmer Full Operation 1



Press button “Full Operation”. A new window pops up which gives the order to reset the microcontroller. Reset the MCU and the software starts the sequences of the programming progress. In case of a blank chip, processing is performed in order of *Download*, *Blank Check*, and *Program & Verify*. When it is not a blank chip, processing is performed in order of *Download*, *Blank Check*, *Erase*, *Blank Check*, and then *Program & Verify*. The actual status can be seen on the progress bars.

Figure 4-3. Cypress FR Flash Programmer Full Operation 2



4.2 Manual (Step-by-step) Operation

The above mentioned steps can also be executed as single steps. But nevertheless, as first operation always the *Download* function has to be executed to set up communication and to write flash loader kernel to RAM.

Table 4-1: Functions of Cypress FR Flash Programmer

Function	Description
Download	Sets up communication and downloads flash loader kernel to RAM.
Erase	Does a chip erase of the flash memory.
Blank Check	Checks that all flash memory areas are blank.
Program & Verify	Writes the selected mhx-file to flash ROM and does block wise CRC checking.
Read & Compare	Reads out flash memory and compares content with selected mhx-file.
Copy	Reads out flash memory and writes it to mhx-file.

5. GALEP-Programmer

This chapter explains the usage of the ‘GALEP-4’ and ‘GALEP-5’ programmer for serial synchronous/ asynchronous programming and parallel programming of the MB91460 series flash devices.

5.1 GALEP-4

GALEP-4 Programmer is a third party tool developed by ‘Conitec’ (www.conitec.com).

This programmer allows parallel as well as serial programming of several Cypress microcontrollers.

In case of parallel programming, different socket-adapters are available, depending on the microcontroller family and device package.

In case of serial programming both synchronous and asynchronous modes are supported. For serial-synchronous programming an optional ISP-adapter is offered. For serial-asynchronous programming the programmer itself behaves like a dongle, the programming is done directly via the PC’s COM-port connected to the microcontroller.

The GALEP-4 is a PC-controlled programmer using the parallel-port (LPTx). It can be powered by an external power-supply (12V, 400mA) but also by accumulators (6x Type AAA NiMh 1.2V).

Figure 5-1: Conitec GALEP-4 Programmer

Software used together with the GALEP-4 programmer is GALEP32. This software supports all programming modes available for the adequate device.

Figure 5-2: GALEP32 programmer software

5.1.1 Parallel Programming with GALEP-4 Programmer

The GALEP-4 programmer includes a 40-pin Textool™-socket, for devices with Dual-Inline-Packages (DIP). For other packages optional adapters are available, e.g.:

Table 5-1: Parallel Programming Adapters

Package	GALEP-Adapter	Remark
QFP208	210881	MB91F465D, MB91F467D
LQPF100	210882	MB91F464A, MB91F465X
LQFP120	210883	MB91F465K
BGA256	210884	MB91F469G
LQFP64	210889	MB91F463N
LQFP144	210890	MB91F465B, MB91F467B
LQFP176	210891	MB91F467R
LQFP144	210892	MB91F465C, MB91F467C
LQFP176	210898	MB91F465P, MB91F467P
LQFP176	210899	MB91F467S

Connect the adapter to the Textool™ –socket (take care pin 1 marking), place the MCU in the adapter and close the adapter's cover. Start the GALEP32 programmer software and use 'Load' command to load a bin or hex file. Select tab 'Devices' and browse to the correct device, e.g. MCU → Cypress → MB91F467D. Choose QFP208 (or correct package) for parallel programming. In the information window below the correct programming adapter is listed. Use 'Select Device!' button to accept current selection.

Figure 5-3: GALEP-4 with adapter 210881

Figure 5-4. GALEP32 device selection

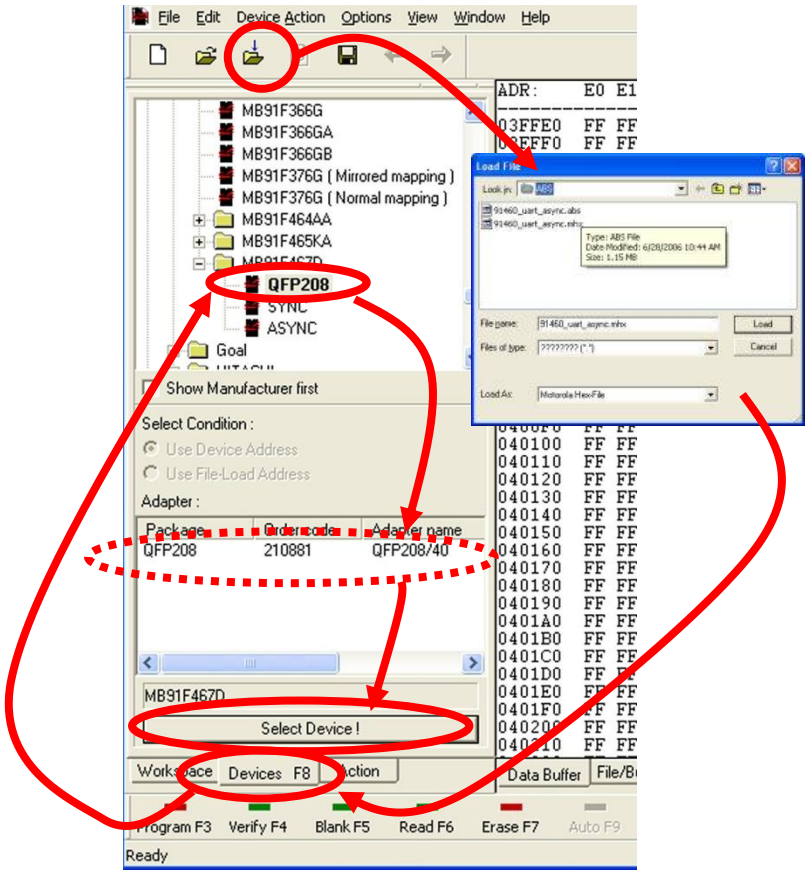
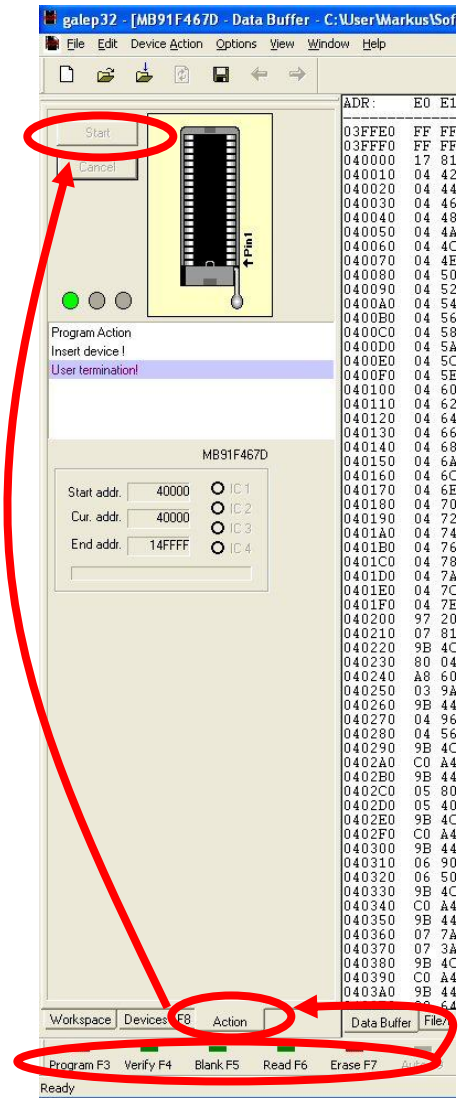


Figure 5-5. Programmer action



Use the functions now enabled on the bottom of the window to select action:

Program: write loaded mhx/bin-file to MCU

Verify: compare loaded file to Flash contents

Blank: do a blank check

Read: read-out Flash content

Erase: perform a chip erase

After selecting a operation, tab ‘Action’ is automatically activated. Press ‘Start’ button to start operation.

For further information on available settings in software and jumper settings on starterkits have a look at ‘Options” → ‘MB91F467D Options” (or other MCU type) and ‘Device Help’.

5.1.2 Serial Synchronous Programming with GALEP-4 Programmer

Conitec offers an ISP-adapter (210865) for all devices with serial-synchronous burn-in bootloader. This adapter will be put into the Textool™ socket and a 10-pin cable-connector is used for the connection to the microcontroller.

All MB91460 series starterkits provide a 10pin connector to connect the programmer tool.

Figure 5-6: 10pin connector for serial synchronous programming

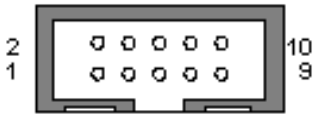
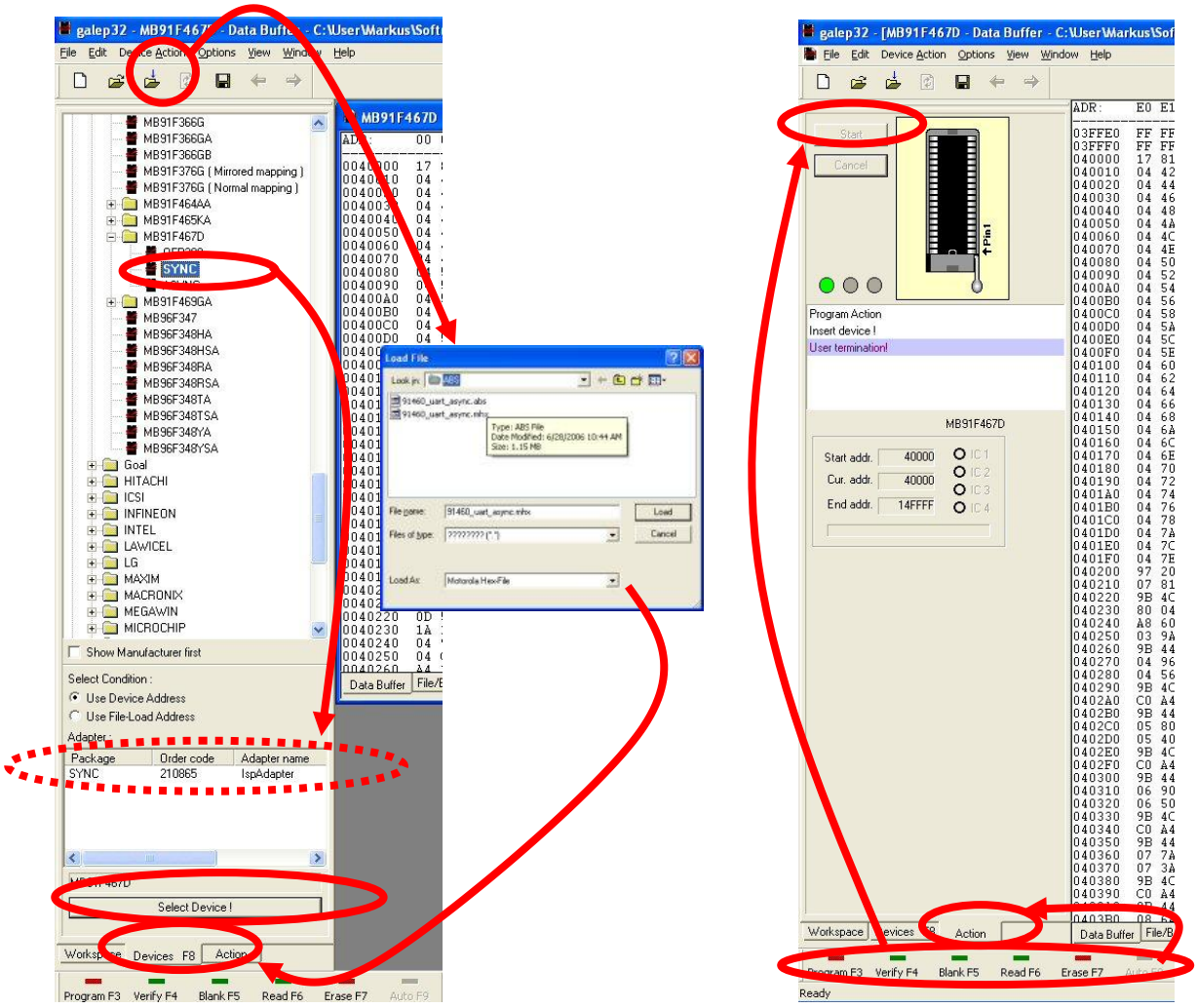


Table 5-2: Pining of 10pin connector

Pin Number	Pin Signal	Description
1	NC	Not used
2	NC	Not used
3	MD0	MCU mode-pin 0
4	MD2	MCU mode-pin 2
5	INITX	MCU reset signal
6	SIN4	UART4 receive data
7	SOT4	UART4 transmit data
8	SCK4	UART4 clock
9	VCC	Board supply voltage
10	GND	Ground

Figure 5-7: Serial Synchronous Programming on SK-91F467D-208PFV

Figure 5-8: Serial Synchronous Programming



Connect the adapter to the Textool™ –socket (take care pin 1 marking) and connect the adapter to the starterkit using flat cable. Start the GALEP32 programmer software and use ‘Load’ command to load a bin or hex file. Select tab ‘Devices’ and browse to the correct device, e.g. MCU → Cypress → MB91F467D. Choose SYNC for serial synchronous programming. In the information window below the correct programming adapter is listed. Use ‘Select Device!’ button to accept current selection.

Use the functions now enabled on the bottom of the window to select action:

- Program: write loaded mhx/bin-file to MCU
- Verify: compare loaded file to Flash contents
- Blank: do a blank check
- Read: read-out Flash content
- Erase: perform a chip erase

After selecting a operation, tab ‘Action’ is automatically activated. Press ‘Start’ button to start operation.

For further information on available settings in software and jumper settings on starterkits have a look at ‘Options” → ‘MB91F467D Options” (or other MCU type) and ‘Device Help’.

5.1.3 Serial Asynchronous Programming with GALEP-4 Programmer

For serial asynchronous programming no adapter is needed. Connect the starterkit via serial cable to free COM port on your PC and do jumper settings as described in following chapters depending on your board type. Additionally set DTR signal as reset signal. GALEP-4 programmer has also to be connected to the PC to act as kind of hardware dongle.

Figure 5-9: Serial Asynchronous Programming with GALEP-4 Programmer

Start the GALEP32 programmer software and use ‘Load’ command to load a bin or hex file. Select tab ‘Devices’ and browse to the correct device, e.g. MCU → Cypress → MB91F467D. Choose ASYNC for serial asynchronous programming. Use ‘Select Device!’ button to accept current selection.

Use the functions now enabled on the bottom of the window to select action:

- Program: write loaded mhx/bin-file to MCU
- Verify: compare loaded file to Flash contents
- Blank: do a blank check
- Read: read-out Flash content
- Erase: perform a chip erase

After selecting a operation, tab ‘Action’ is automatically activated. Press ‘Start’ button to start operation.

For further information on available settings in software and jumper settings on starterkits have a look at ‘Options” → ‘MB91F467D Options” (or other MCU type) and ‘Device Help’.

5.2 GALEP-5

GALEP-5 Programmer is a third party tool developed by ‘Conitec’ (www.conitec.com).

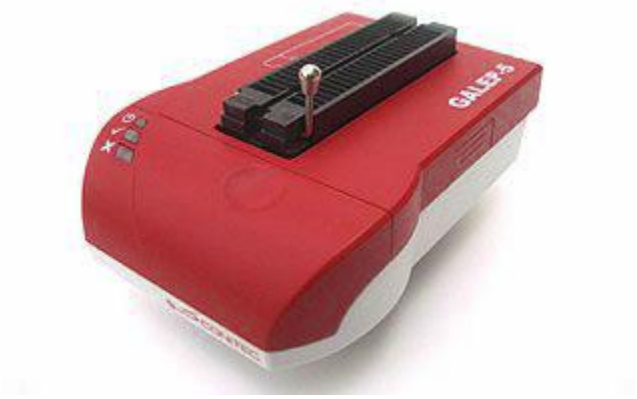
This programmer allows parallel as well as serial programming of several Cypress microcontrollers.

In case of parallel programming, different socket-adapters are available, depending on the microcontroller family and device package.

In case of serial programming both synchronous and asynchronous modes are supported. For serial programming an optional ISP-adapter is offered.

The GALEP-5 is a PC-controlled programmer using USB connection. It can be powered by USB port or by an external power-supply, but also by accumulators (6x Type AAA NiMh 1.2V).

Figure 5-10: Conitec GALEP-5 Programmer



Software used together with the GALEP-5 programmer is GALEP5. This software supports all programming modes available for the adequate device.

Figure 5-11: GALEP-5 programmer software

5.2.1 Parallel Programming with GALEP-5 Programmer

The GALEP-5 programmer includes a 48-pin Textool™-socket, for devices with Dual-Inline-Packages (DIP). For other packages optional adapters are available, e.g.:

Table 5-3: Parallel Programming Adapters

Package	GALEP-Adapter	Remark
QFP208	210881	MB91F465D, MB91F467D
LQPF100	210882	MB91F464A, MB91F465X
LQFP120	210883	MB91F465K
BGA256	210884	MB91F469G
LQFP64	210889	MB91F463N
LQFP144	210890	MB91F465B, MB91F467B
LQFP176	210891	MB91F467R
LQFP144	210892	MB91F465C, MB91F467C

Package	GALEP-Adapter	Remark
LQFP176	210898	MB91F465P, MB91F467P
LQFP176	210899	MB91F467S

Connect the adapter to the Textool™ –socket (take care of correct connection), place the MCU in the adapter and close the adapter's cover. Start the GALEP5 programmer software and use 'Load' command to load a bin or hex file. Select tab 'Devices' and browse to the correct device, e.g. MCU → Cypress → MB91F467D. Choose QFP208 (or correct package) for parallel programming. In the information window below the correct programming adapter is listed. Use 'Select Device!' button to accept current selection.

Figure 5-12: GALEP-5 with adapter 210881

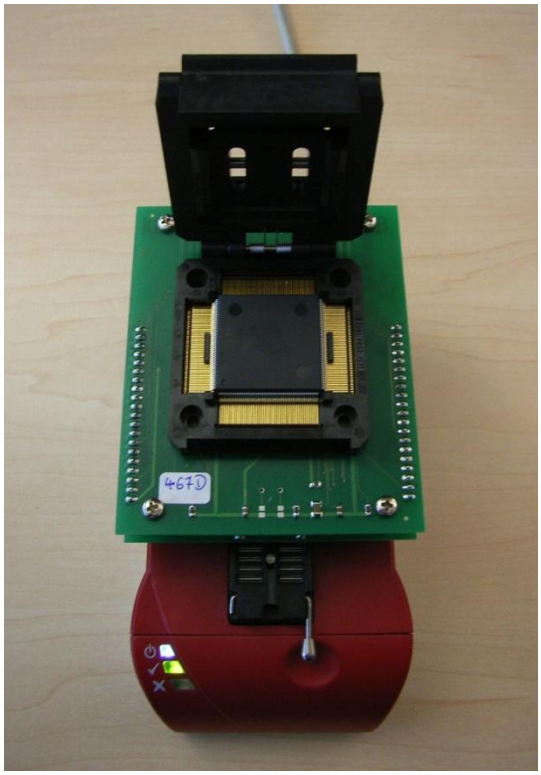


Figure 5-13. GALEP5 device selection

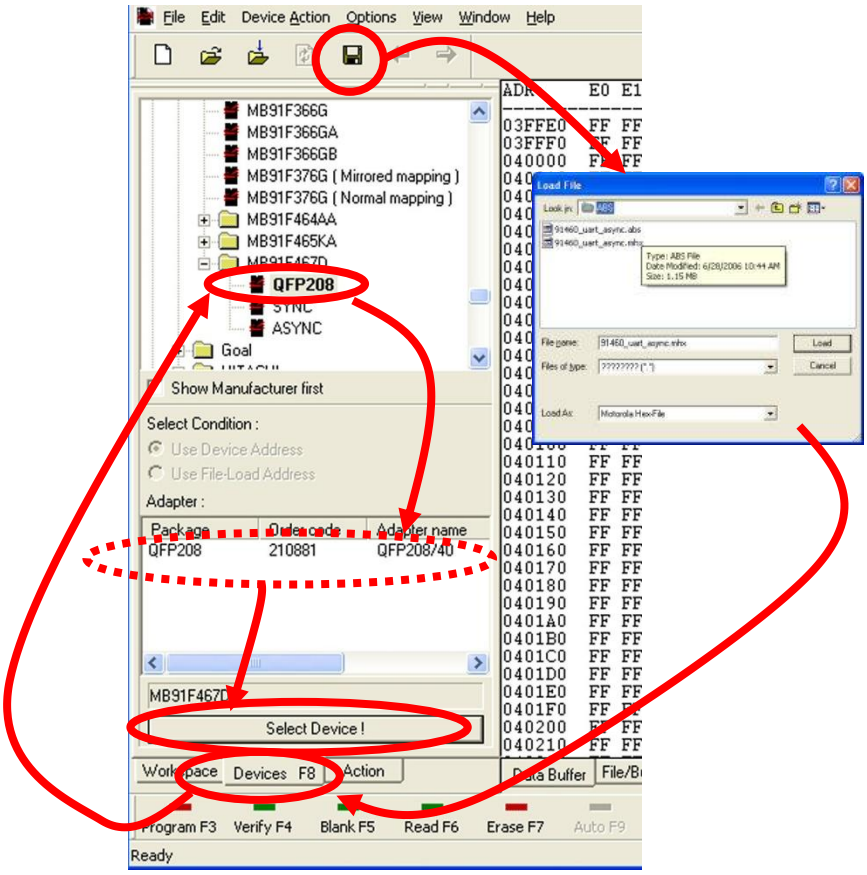
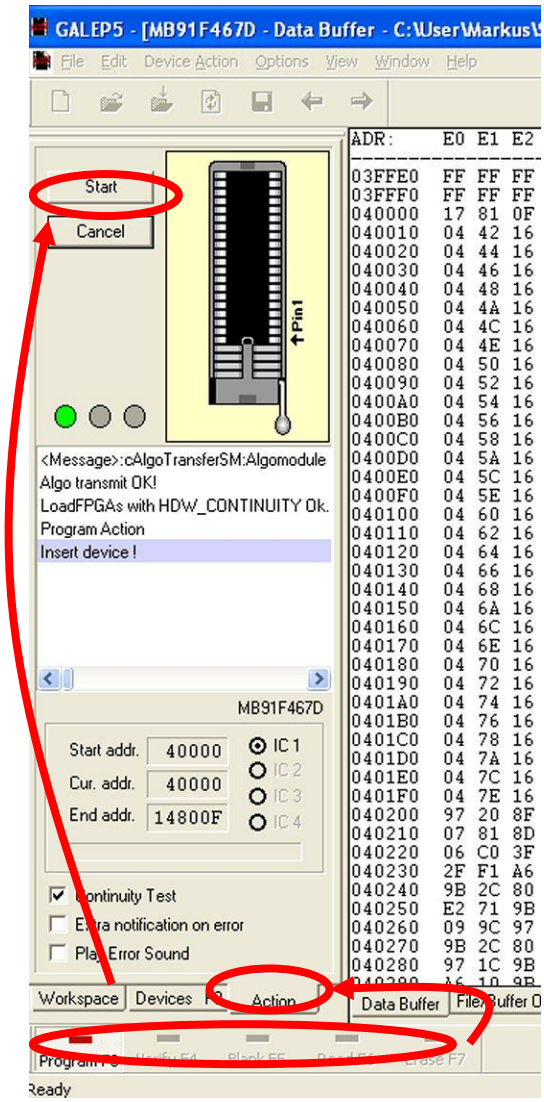


Figure 5-14. Programmer action



Use the functions now enabled on the bottom of the window to select action:

- Program: write loaded mhx/bin-file to MCU
- Verify: compare loaded file to Flash contents
- Blank: do a blank check
- Read: read-out Flash content
- Erase: perform a chip erase

After selecting a operation, tab ‘Action’ is automatically activated. Press ‘Start’ button to start operation.

For further information on available settings in software and jumper settings on starterkits have a look at ‘Options” → ‘MB91F467D Options” (or other MCU type) and ‘Device Help’.

5.2.2 Serial Synchronous Programming with GALEP-5 Programmer

Conitec offers an ISP-adapter (210915) for all devices with serial-synchronous burn-in bootloader. This adapter will be put into the Textool™ socket and a 10-pin cable-connector is used for the connection to the microcontroller.

All MB91460 series starterkits provide a 10pin connector to connect the programmer tool.

Figure 5-15: 10pin connector for serial synchronous programming

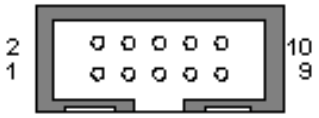


Table 5-4: Pining of 10pin connector

Pin Number	Pin Signal	Description
1	NC	Not used
2	NC	Not used
3	MD0	MCU mode-pin 0
4	MD2	MCU mode-pin 2
5	INITX	MCU reset signal
6	SIN4	UART4 receive data
7	SOT4	UART4 transmit data
8	SCK4	UART4 clock
9	VCC	Board supply voltage
10	GND	Ground

Figure 5-16: Serial Synchronous Programming on SK-91F467D-208PFV

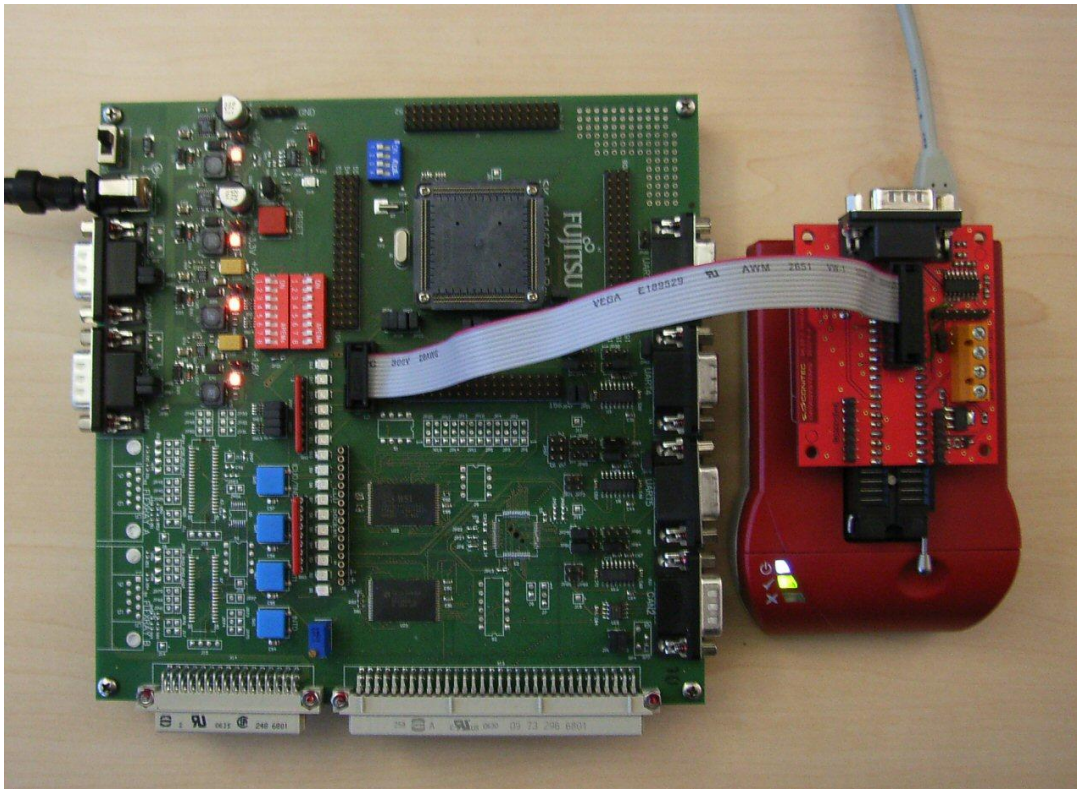
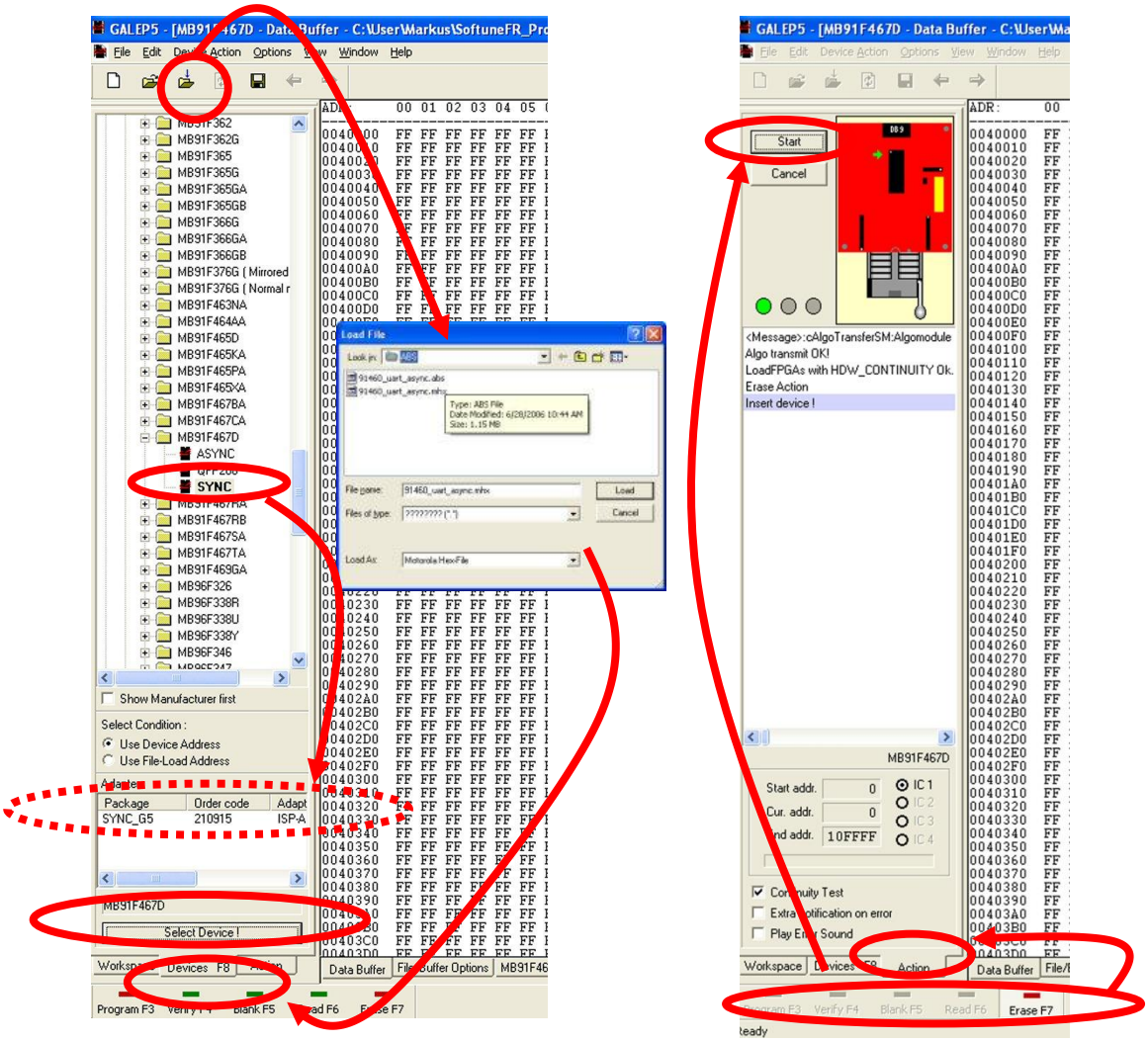


Figure 5-17. Serial Synchronous Programming



Connect the adapter to the Textool™ –socket (pins 5-44) and connect the adapter to the starterkit using flat cable. Start the GALEP5 programmer software and use ‘Load’ command to load a bin or hex file. Select tab ‘Devices’ and browse to the correct device, e.g. MCU → Cypress → MB91F467D. Choose SYNC for serial synchronous programming. In the information window below the correct programming adapter is listed. Use ‘Select Device!’ button to accept current selection.

Use the functions now enabled on the bottom of the window to select action:

- Program: write loaded mhx/bin-file to MCU
- Verify: compare loaded file to Flash contents
- Blank: do a blank check
- Read: read-out Flash content
- Erase: perform a chip erase

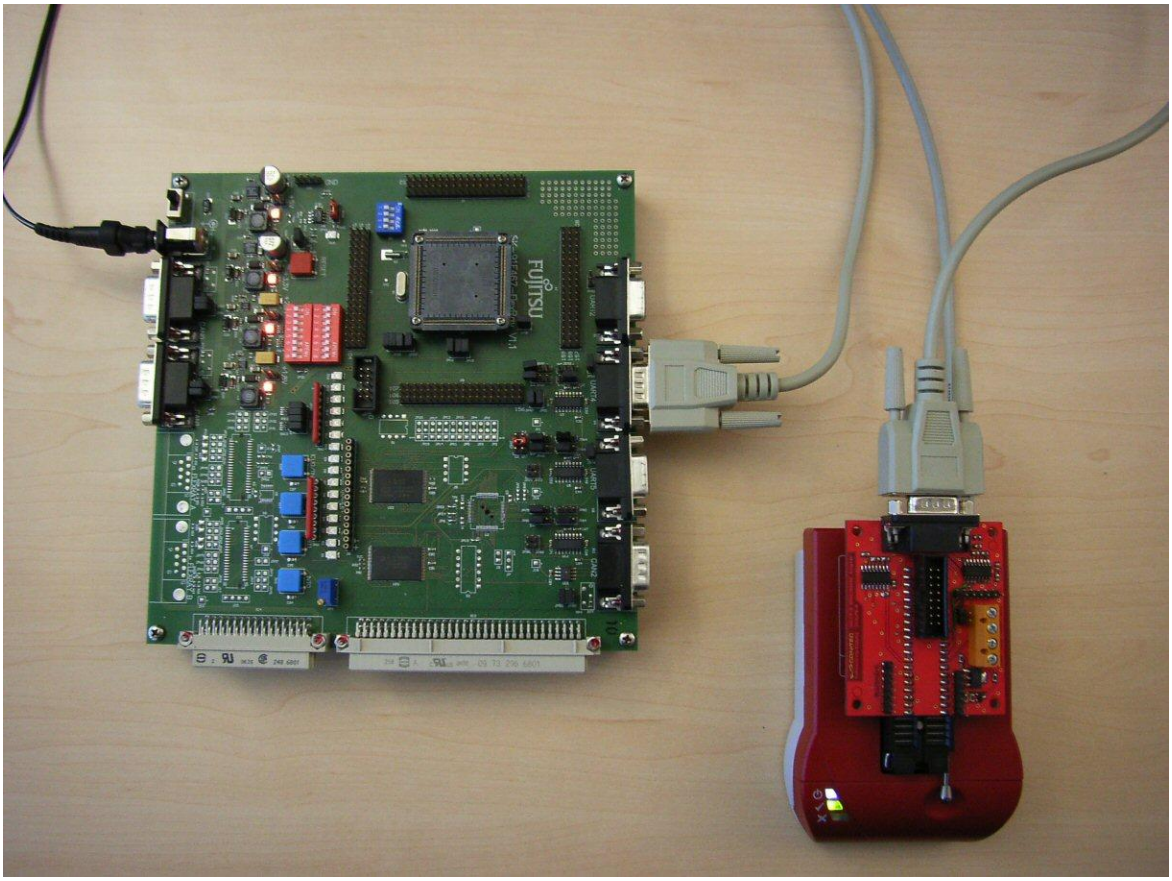
After selecting a operation, tab ‘Action’ is automatically activated. Press ‘Start’ button to start operation.

For further information on available settings in software and jumper settings on starterkits have a look at ‘Options” → ‘MB91F467D Options” (or other MCU type) and ‘Device Help’.

5.2.3 Serial Asynchronous Programming with GALEP-5 Programmer

For serial asynchronous programming also the ISP adapter is needed. Connect the starterkit via serial cable to the DSBU9 connector on the ISP adapter. Do jumper settings on starterkit as described in following chapters depending on your board type. Additionally set DTR signal as reset signal.

Figure 5-18: Serial Asynchronous Programming with GALEP-5 Programmer



Start the GALEP5 programmer software and use ‘Load’ command to load a bin or hex file. Select tab ‘Devices’ and browse to the correct device, e.g. MCU → Cypress → MB91F467D. Choose ASYNC for serial asynchronous programming. Use ‘Select Device!’ button to accept current selection.

Use the functions now enabled on the bottom of the window to select action:

- Program: write loaded mhx/bin-file to MCU
- Verify: compare loaded file to Flash contents
- Blank: do a blank check
- Read: read-out Flash content
- Erase: perform a chip erase

After selecting a operation, tab ‘Action’ is automatically activated. Press ‘Start’ button to start operation.

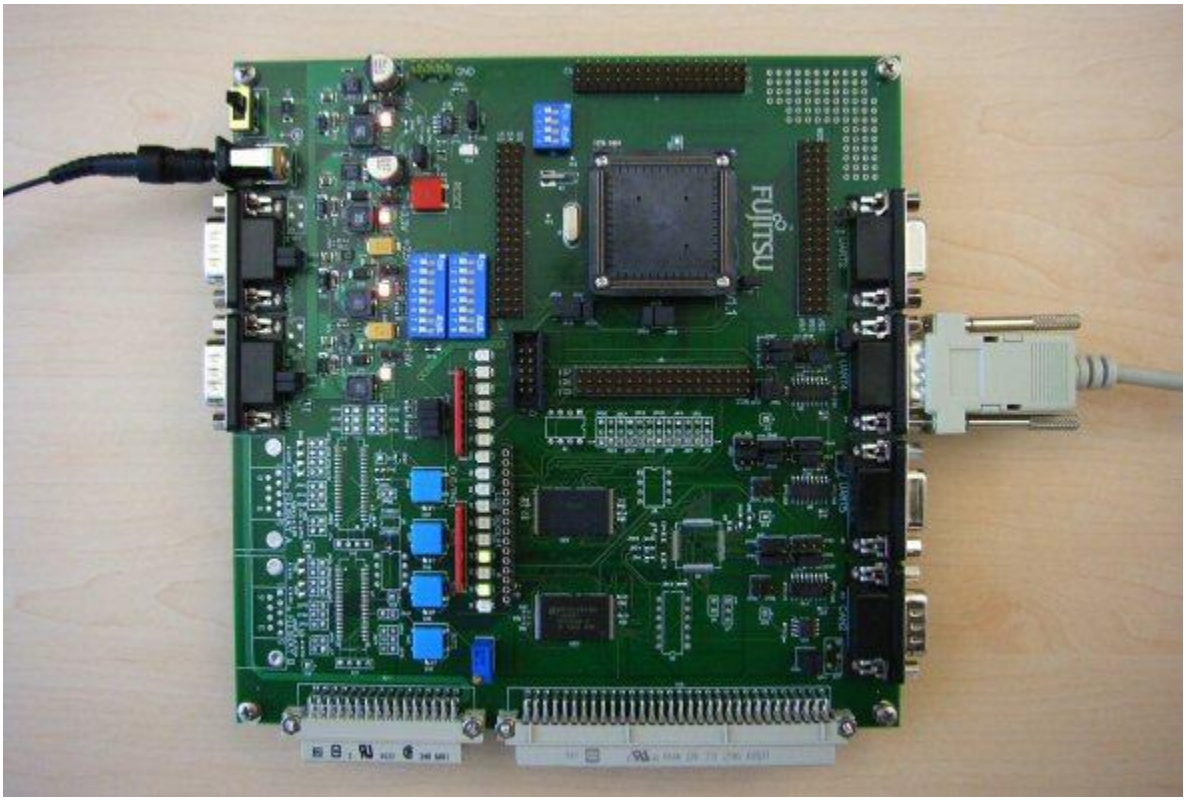
For further information on available settings in software and jumper settings on starterkits have a look at ‘Options” → ‘MB91F467D Options” (or other MCU type) and ‘Device Help’.

6. SK-91F467D-208PFV (-GPIO) / SK-91F467-FlexRay

This chapter describes the needed settings for programming the MB91F465D or MB91F467D on the starterkit SK-91F467D-208PFV (or SK-91F467D-208PFV-GPIO, SK-91F467D-Flexray)

The starterkit SK-91F467D-208PFV is a multifunctional development board for the CYPRESS 32bit flash microcontroller MB91F465D/MB91F467D in QFP208 package. It can be used stand-alone for software development and testing or together with monitor debugger software.

Figure 6-1: Connection to starterkit SK-91F467D-208PFV



For serial asynchronous programming SUB-D9 connector X4 which is connected to UART4 has to be used. Following jumper setting is needed:

Table 6-1: Jumper setting on starterkit SK-91F467D-208PFV

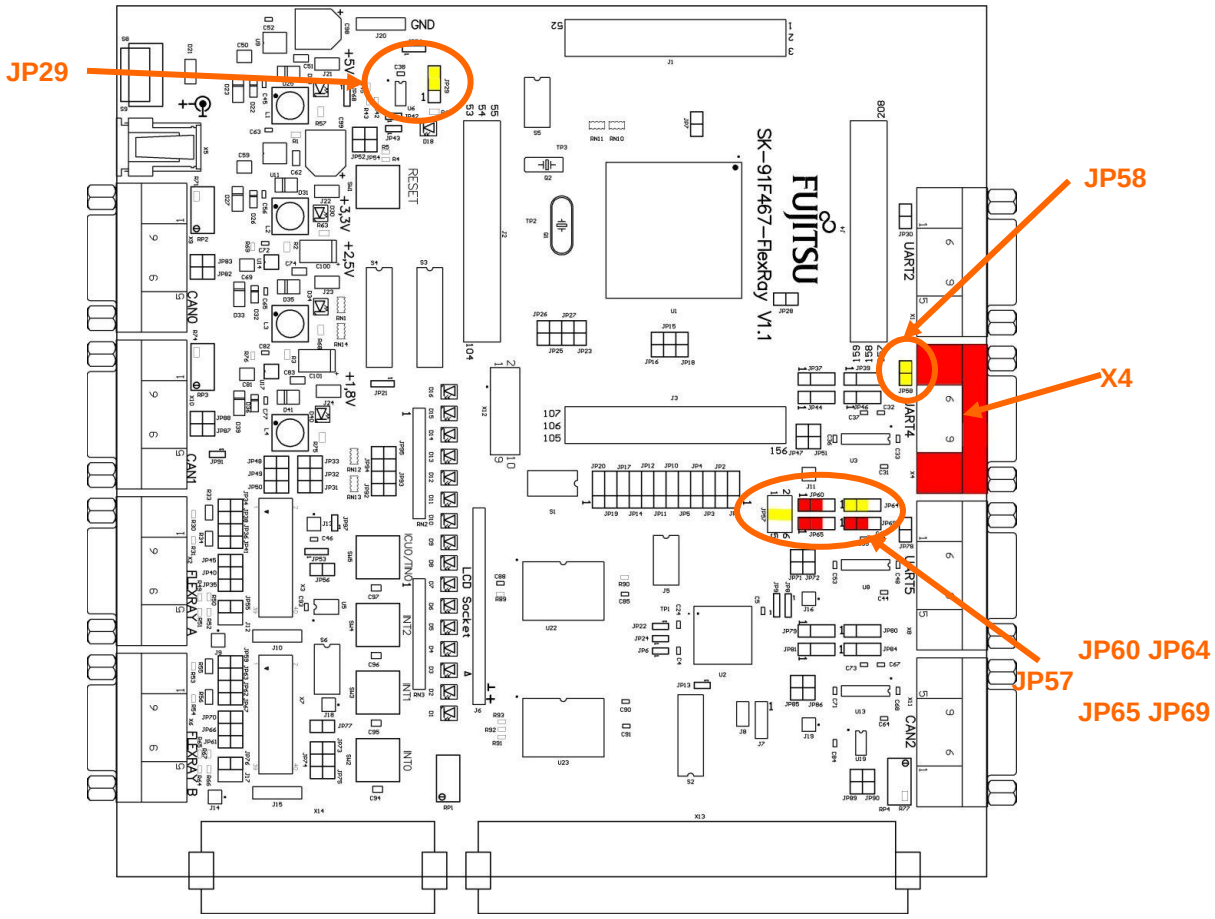
Jumper	Setting	Description
JP60	1-2 closed	MCU SIN4 connected to RS-232 transceiver
JP65	1-2 closed	MCU SOT4 connected to RS-232 transceiver
JP69	1-2 closed	X4 pin2 is connected to RS-232 transceiver

If your programming software needs connection of RTS and CTS or if it generates reset signal on RTS or DTR line, refer to the following jumper list:

Table 6-2: Jumper settings for reset signal on starterkit SK-91F467D-208PFV

Jumper	Setting	Description
JP58	closed	RTS and CTS is shortcut at connector X4
	open	RTS and CTS is not shortcut at connector X4
JP64	1-2 closed	DTR can be used for system reset
	2-3 closed	RTS can be used for system reset
JP57	3-4 closed	Reset will be done via UART4
JP29	1-2 closed	No polarity inversion for the DTR/RTS signal
	2-3 closed	Polarity inversion for the DTR/RTS signal

Figure 6-2. Jumper setting on starterkit SK-91F467D-208PFV



7. SK-91460-MAIN with SK-91460-91F467D-208PFV

This chapter describes the needed settings for programming the MB91F465D or MB91F467D on the starterkit SK-91460-MAIN with adapter board SK-91460-91F467D-208PFV.

The SK-91460-MAIN is a multifunctional evaluation board that has to be used together with the emulator system or a separated microcontroller board for the Cypress 32-bit microcontroller of MB91460 Series.

The SK-91460-91F467D-208PFV was build as an adapter board that can be used together with the SK-91460-MAIN. It is also possible to use the SK-91460-91F467D-208PFV as a stand-alone system with some limitations. The board allows the designer immediately to start with the software development before his own final target system is available.

The SK-91460-91F467D-208PFV supports the MB91F465D and MB91F467D in the QFP208 packages.

To program the flash memory of the microcontroller there are two ways in this combination. You can use the SUB-D9 connector on the main board or on the adapter board. The second method can also be used if the adapter board is used as standalone system.

7.1 Connection to SK-91460-MAIN

Figure 7-1: Connection to main board

For flash programming, the default setting of UART assignment can be used. With this configuration, UART4 is connected to connector ‘UART A’. You can also use one of the other UART connectors if you change the assignment of UART and connectors.

Table 7-1 shows the default settings for UART4 with connector ‘UART A’.

Table 7-1: Jumper setting for connection on main board

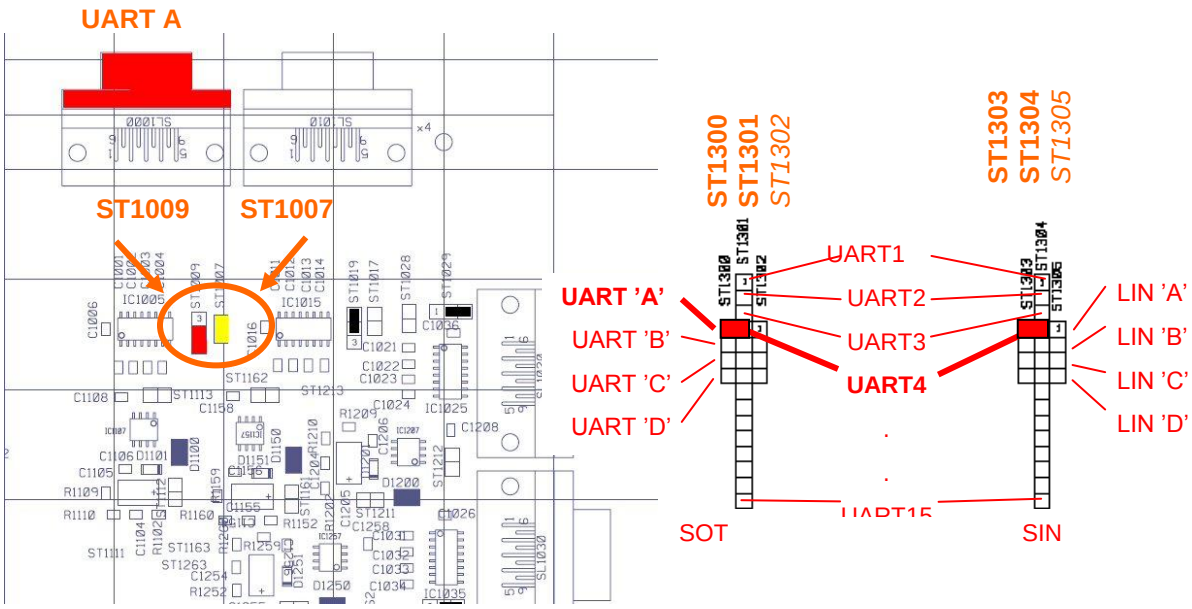
Jumper	Setting	Description
ST1300 – Pin 1 UART ”A”: SOT	ST1301 - Pin 4	UART “A” is connected to SOT 4
ST1303 – Pin 1 UART ”A”: SIN	ST1304 - Pin 4	UART “A” is connected to SIN 4
ST1009 UART/LIN “A”	1-2	LIN/UART “A” uses the RS232 output

If your programming software expects connection of RTS and CTS signal, close jumper ST1007. Connection does not support a reset of microcontroller via RTS or DTR signal.

Table 7-2: Additional jumper setting on main board

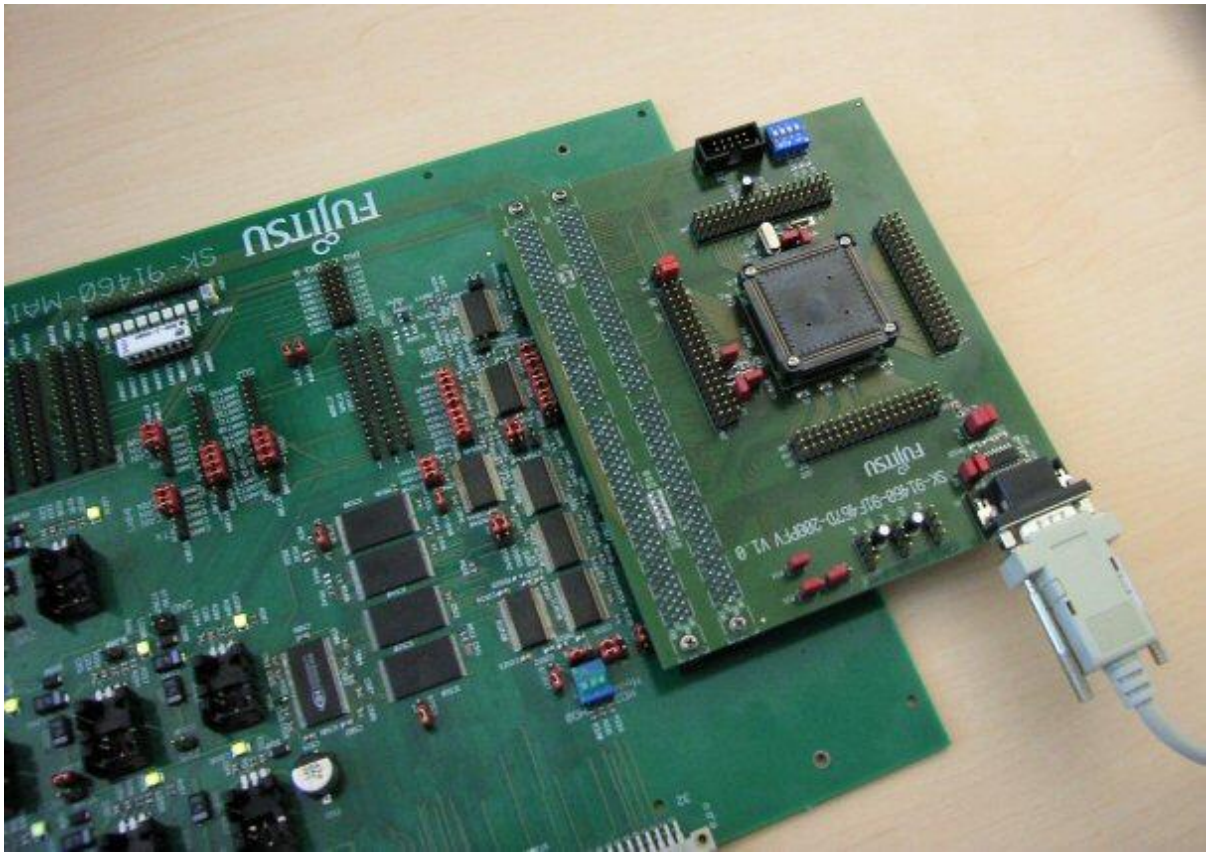
Jumper	Setting	Description
ST1007 UART ”A”: RTS-CTS	ON (closed)	RTS and CTS is shortcut on UART “A” / SL1000
	OFF (open)	RTS and CTS is not shortcut

Figure 7-2. Jumper setting For Connection with Main Board



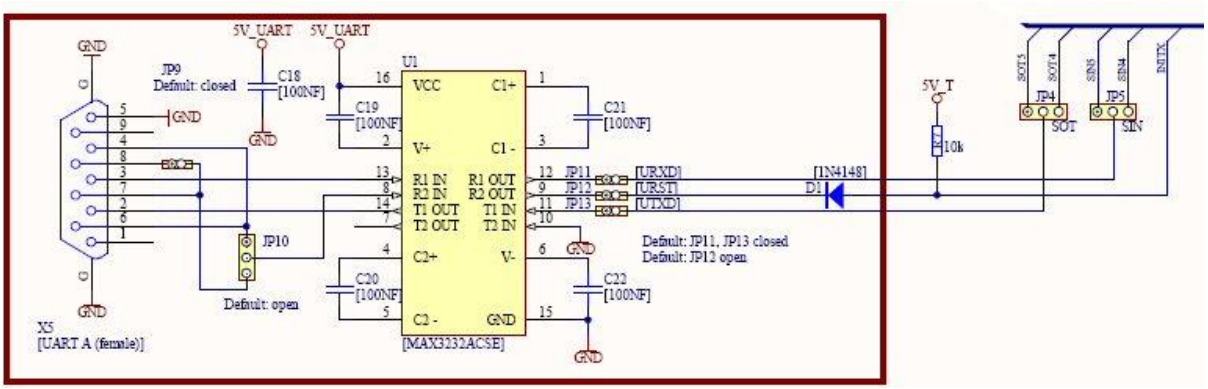
7.2 Connection to SK-91460-91F467D-208PFV

Figure 7-3: SK-91460-MAIN with adapter board SK-91460-91F467D-208PFV



On the adapter board a SUB-D9 female connector and a RS232 transceiver is mounted. Refer to figure below for connection.

Figure 7-4: Connection on adapter board



To use the SUB-D9 connector (X5) on the adapter board, following jumpers have to be set:

Table 7-3: Jumper setting for connection to adapter board

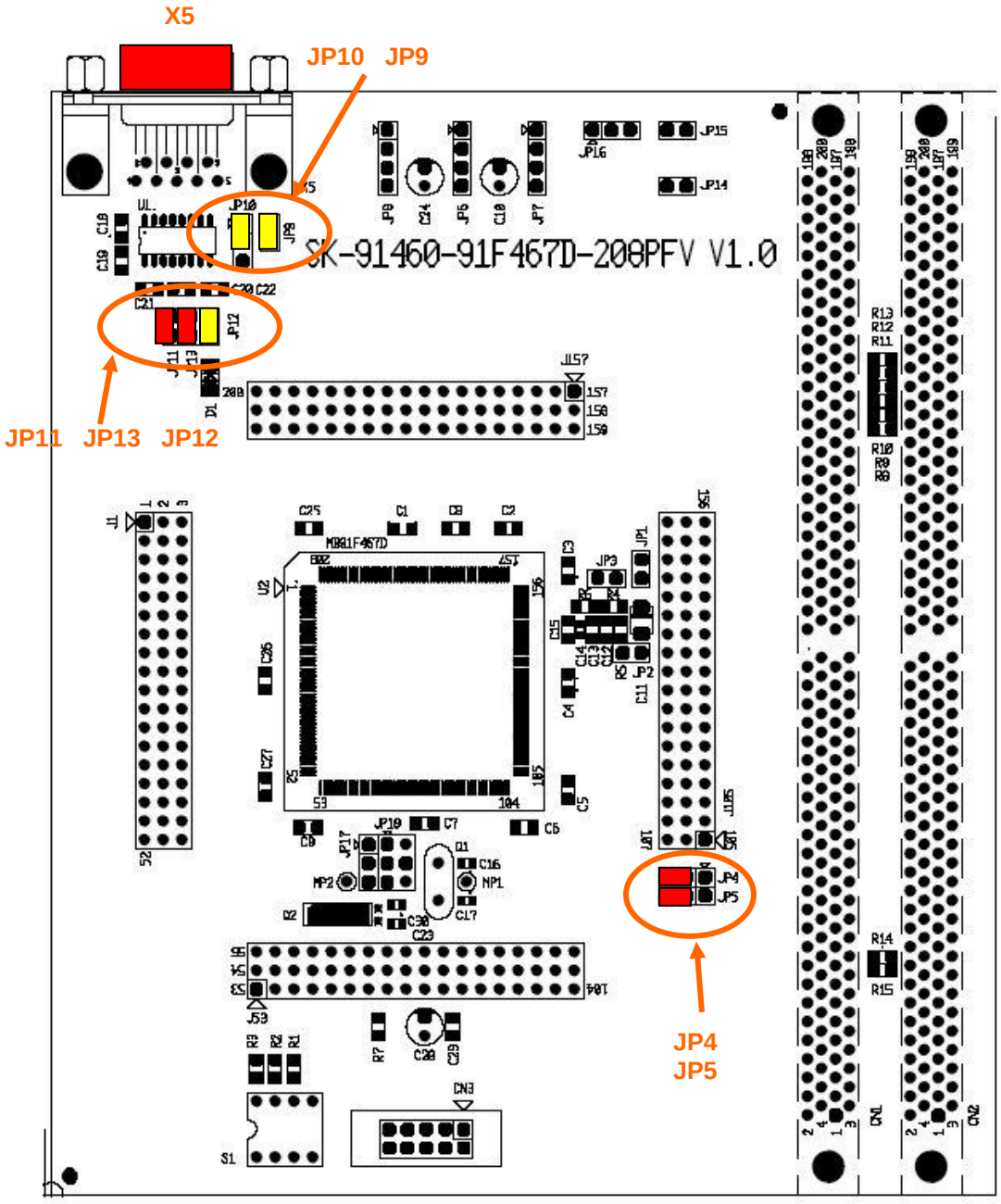
Jumper	Setting	Description
JP4 (SOT)	2 – 3 closed	SOT4 connected to RS232-Transceiver/SUB-D9 connector on adapter board
JP5 (SIN)	2 – 3 closed	SIN4 connected to RS232-Transceiver/SUB-D9 connector on adapter board
JP11 (URXD)	closed	URXD (receive data SIN4) connected to MAX3232 R1OUT
JP13 (UTXD)	closed	UTXD (transmit data SOT4) connected to MAX3232 T1IN

If you want to use RS232 signals RTS or DTR to reset microcontroller by programming software (e.g. FME-FR Programmer) please check the following table for needed jumper setting:

Table 7-4: Jumper setting for reset signals on adapter board

Jumper	Setting	Description
JP12 (URST)	closed	URST (INITX) connected to MAX3232 R2OUT
JP9 (RTS/CTS)	closed	X5 Pin8 (CTS) connected with X5 Pin7 (RTS)
	open	X5 Pin8 (CTS) disconnected with X5 Pin7 (RTS)
JP10 (DTR/DSR)	open	MAX 3232 R2input NC
	1 – 2 closed	SUB-D X5 Pin4 DTR (data terminal ready) and 6 DSR (data set ready) are connected to R2input -> reset by DTR signal
	2 – 3 closed	SUB-D X5 Pin7 RTS (and Pin 8 CTS) are connected to R2input -> reset by RTS signal

Figure 7-5. Jumper Setting On Adapter Board

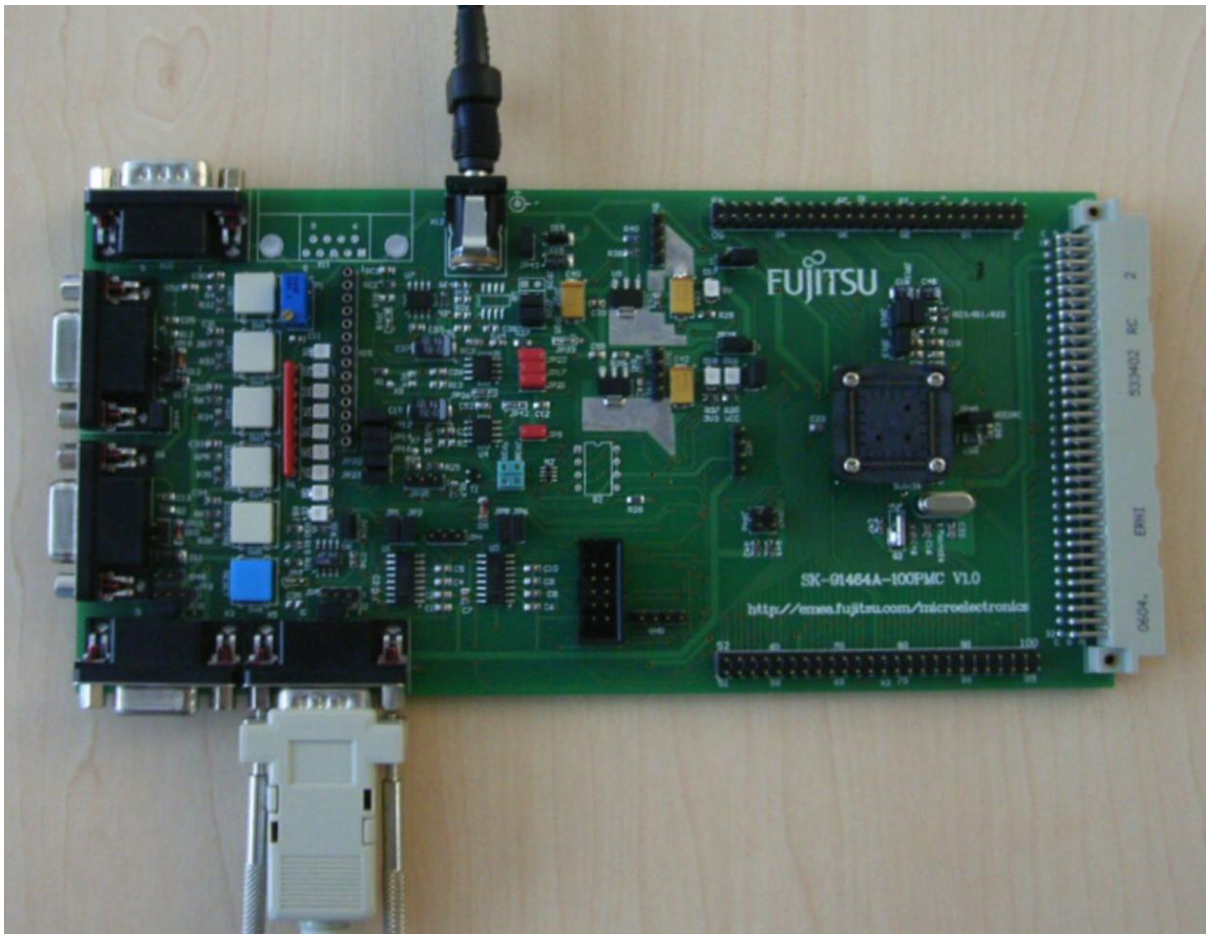


8. SK-91464A-100PMC

This chapter describes the needed settings for programming the MB91F464A on the starterkit SK-91464A-100PMC.

The SK-91464A-100PMC is a multifunctional evaluation board for the Cypress 32bit flash microcontroller MB91F464A in LQFP100 package. It is used stand-alone for software development and testing.

Figure 8-1: Connection to starterkit SK-91464A-100PMC



For serial asynchronous programming SUB-D9 connector X5/UART “B” which is connected to UART4 has to be used. Following jumper setting is needed:

Table 8-1: Jumper setting on starterkit SK-91464A-100PMC

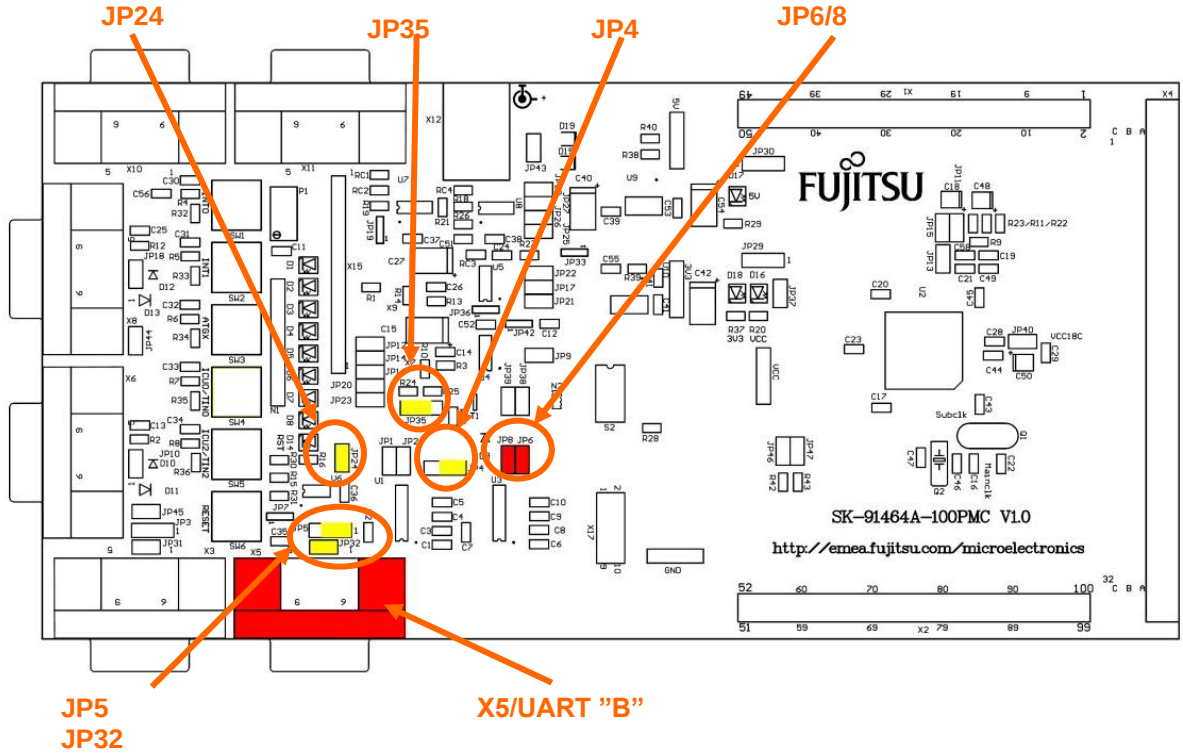
Jumper	Setting	Description
JP6 (UART”B”RxD)	Closed	SIN4 of the MCU is connected to UART”B”
JP8 (UART”B”TxD)	Closed	SOT4 of the MCU is connected to UART”B”

If your programming software needs connection of RTS and CTS or if it generates reset signal on RTS or DTR line, refer to the following jumper list:

Table 8-2: Jumper settings for reset signal on starterkit SK-91464A-100PMC

Jumper	Setting	Description
JP32 (RTS-CTS)	Closed	RTS and CTS of X5 are connected
	Open	RTS and CTS of X5 are not connected
JP4 (UART”A”/”B”)	2-3	UART”B” is used to generate Reset
JP5 (DTR / RTS “B”)	1-2	DTR of UART”B” is selected
	2-3	RTS of UART”B” is selected
JP24 (Main Reset)	Closed	External Reset generation is active
JP35 (Polarity)	1-2	No negation for the DTR/RTS signal
	2-3	DTR/RTS signal is negated

Figure 8-2. Jumper setting on starterkit SK-91464A-100PMC

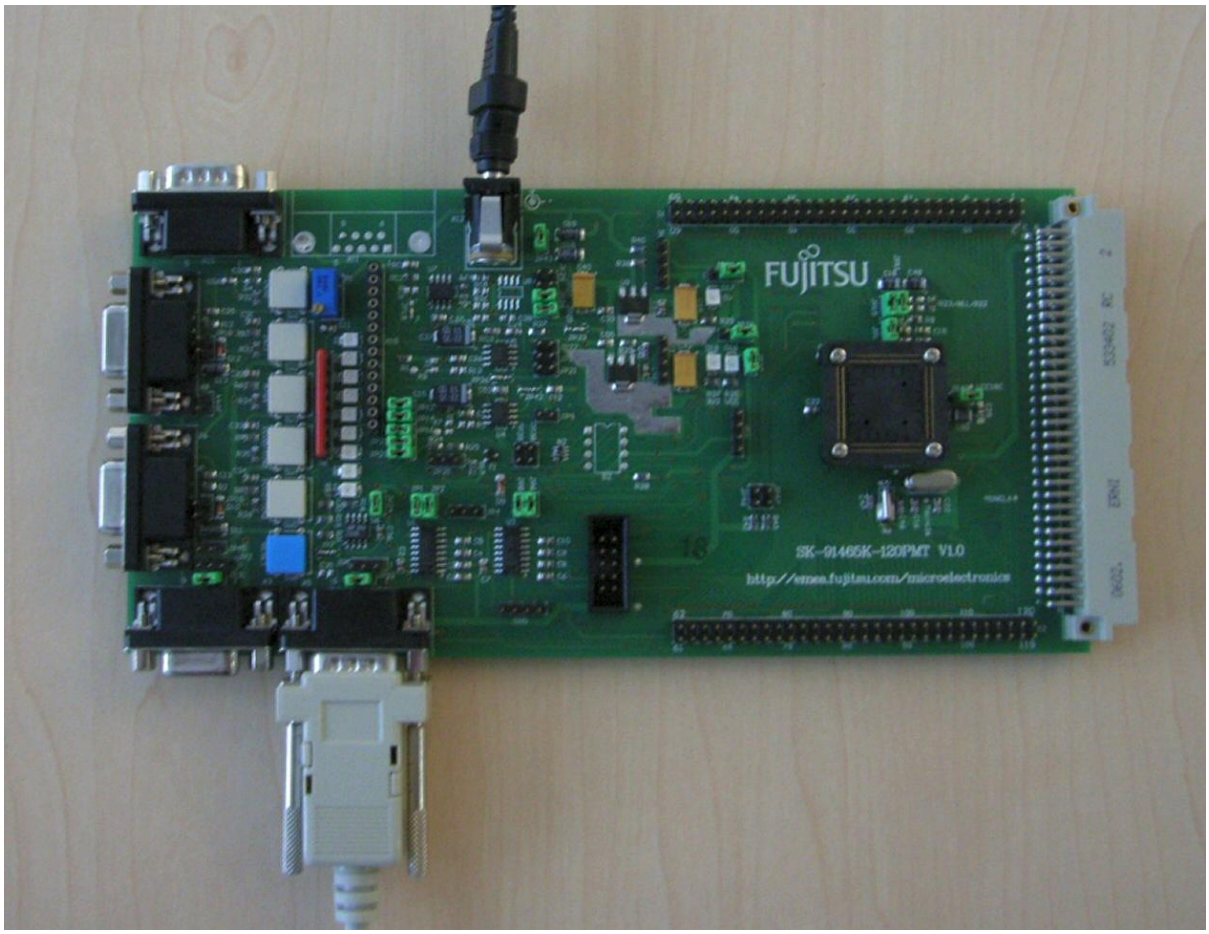


9. SK-91465K-120PMT

This chapter describes the needed settings for programming the MB91F465K on the starterkit SK-91465K-120PMT.

The SK-91465K-120PMT is a multifunctional evaluation board for the Cypress 32bit flash microcontroller MB91F465K in LQFP120 package. It is used stand-alone for software development and testing.

Figure 9-1: Connection to starterkit SK-91465K-120PMT



For serial asynchronous programming SUB-D9 connector X5/UART “B” which is connected to UART4 has to be used. Following jumper setting is needed:

Table 9-1: Jumper setting on starterkit SK-91465K-120PMT

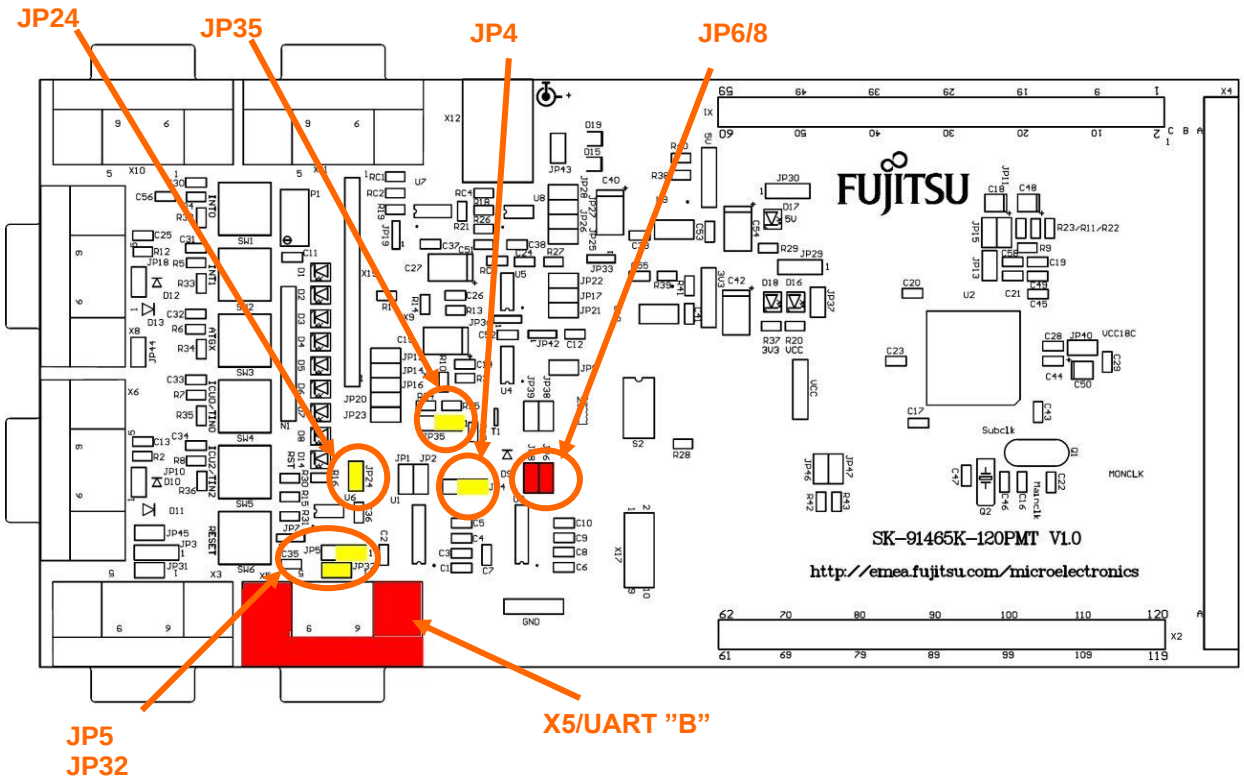
Jumper	Setting	Description
JP6 (UART”B”RxD)	Closed	SIN4 of the MCU is connected to UART”B”
JP8 (UART”B”TxD)	Closed	SOT4 of the MCU is connected to UART”B”

If your programming software needs connection of RTS and CTS or if it generates reset signal on RTS or DTR line, refer to the following jumper list:

Table 9-2: Jumper settings for reset signal on starterkit SK-91465K-120PMT

Jumper	Setting	Description
JP32 (RTS-CTS)	Closed	RTS and CTS of X5 are connected
	Open	RTS and CTS of X5 are not connected
JP4 (UART”A”/”B”)	2-3	UART”B” is used to generate Reset
JP5 (DTR / RTS “B”)	1-2	DTR of UART”B” is selected
	2-3	RTS of UART”B” is selected
JP24 (Main Reset)	Closed	External Reset generation is active
JP35 (Polarity)	1-2	No negation for the DTR/RTS signal
	2-3	DTR/RTS signal is negated

Figure 9-2. Jumper setting on starterkit SK-91465K-120PMT



10. SK-91469G-256BGA

This chapter describes the needed settings for programming the MB91F469G on the starterkit SK-91469G-256BGA.

The starterkit SK-91469G-256BGA is a multifunctional development board for the CYPRESS 32bit flash microcontroller MB91F469G in BGA256 package. It can be used stand-alone for software development and testing or together with a monitor debugger software.

The board allows the designer immediately to start software development before his own final target system is available.

Figure 10-1: Connection to starterkit SK-91469G-256BGA

For serial asynchronous programming SUB-D9 connector X2 which is connected to UART4 has to be used. Following jumper setting is needed:

Table 10-1: Jumper setting on starterkit SK-91469G-256BGA

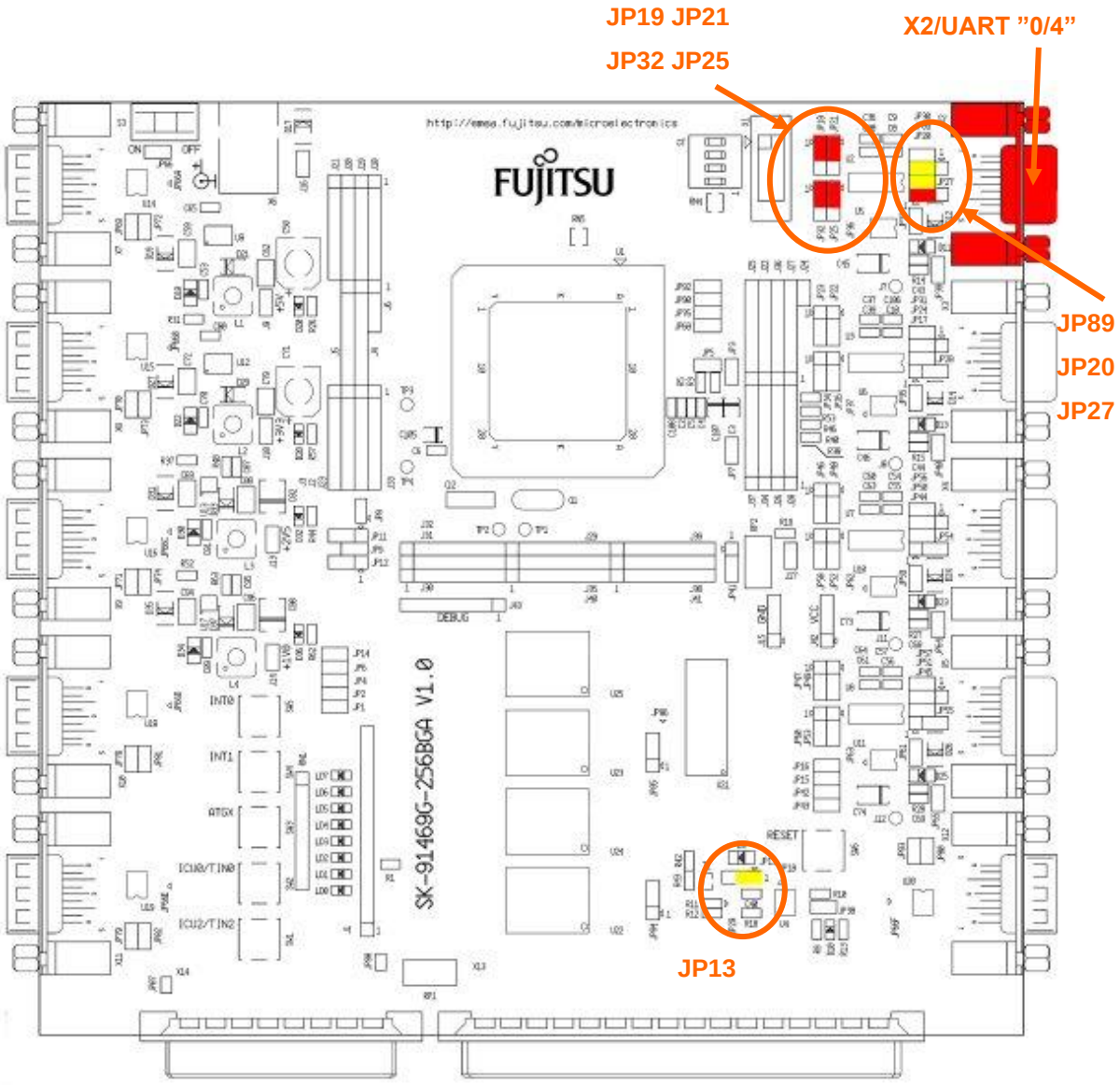
Jumper	Setting	Description
JP19 (SIN0/4)	1-2	SIN4 of the MCU is connected to LIN/UART 0/4
JP32 (SOT0/4)	1-2	SOT4 of the MCU is connected to LIN/UART 0/4
JP21 (RXD)	1-2	SIN0/4 is connected to RS232 transceiver
JP25 (TXD)	1-2	SOT0/4 is connected to RS232 transceiver
JP27 (RS232/LIN)	1-2	X2 Pin2 is connected to RS232 transceiver (T1out)

If your programming software needs connection of RTS and CTS or if it generates reset signal on RTS or DTR line, refer to the following jumper list:

Table 10-2: Jumper settings for reset signal on starterkit SK-91469G-256BGA

Jumper	Setting	Description
JP20 (RTS-CTS)	Closed	RTS and CTS of X2 are connected
	Open	RTS and CTS of X2 are not connected
JP89 (DTR/RTS)	1-2	DTR signal (Pin 6 of X2) is used as reset source
	2-3	RTS signal (Pin 7 of X2) is used as reset source
JP16 (RST 0/4)	Closed	LIN-UART 0/4 (X2) connected to reset circuit
	Open	LIN-UART 0/4 (X2) not connected to reset circuit
JP13 (DTR / DTRx)	1-2	No negation for the DTR/RTS signal
	2-3	DTR/RTS signal is negated
JP38	Closed	External reset generation is active

Figure 10-2. Jumper setting on starterkit SK-91469G-256BGA

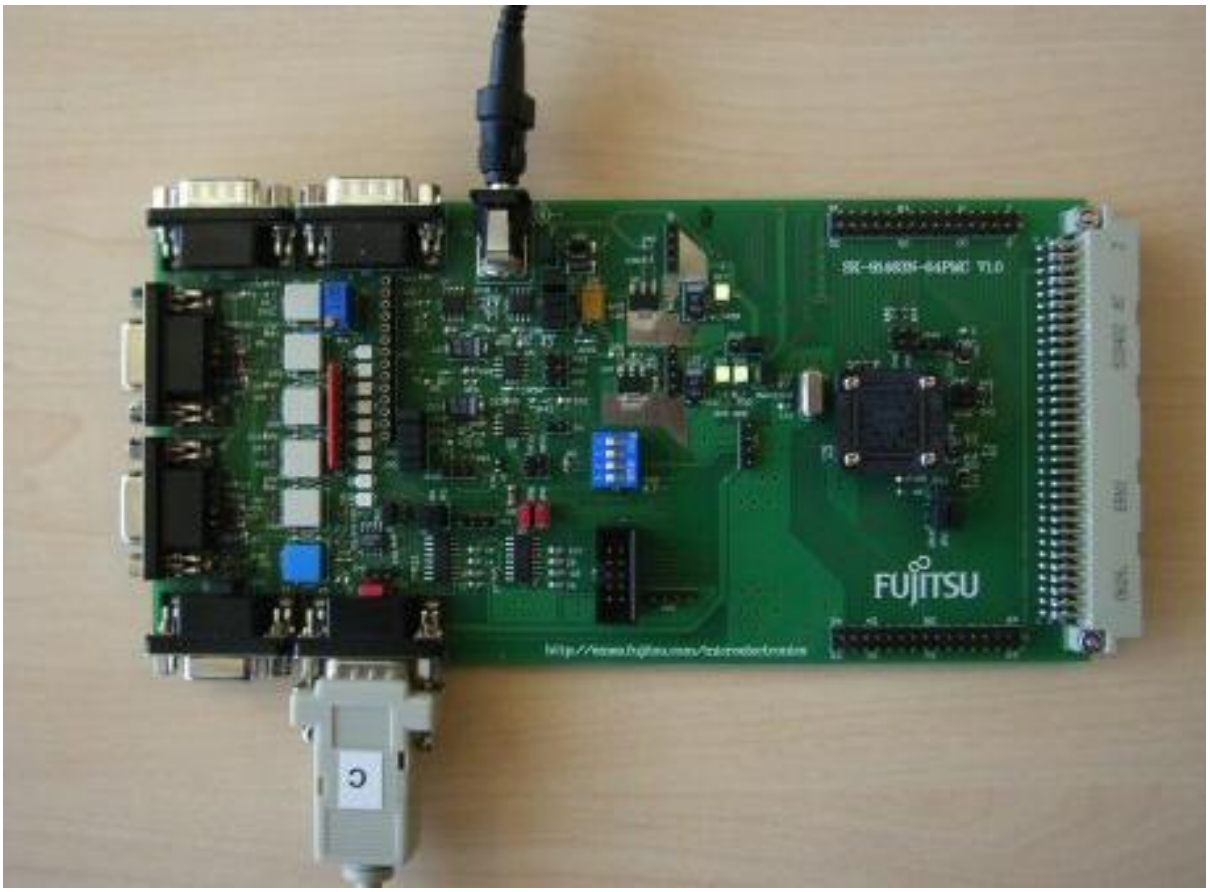


11. SK-91463N-64PMC

This chapter describes the needed settings for programming the MB91F463N on the starterkit SK-91463N-64PMC.

The starterkit SK-91463N-64PMC is a multifunctional development board for the CYPRESS 32bit flash microcontroller MB91F463N in LQFP64 package. It can be used stand-alone for software development and testing.

Figure 11-1: Connection to starterkit SK-91463N-64PMC



For serial asynchronous programming SUB-D9 connector X5/UART B which is connected to UART0 has to be used. Following jumper setting is needed:

Table 11-1: Jumper setting on starterkit SK-91463N-64PMC

Jumper	Setting	Description
JP6	closed	SIN0 of the MCU connected to UART B
JP8	closed	SOT0 of the MCU connected to UART B

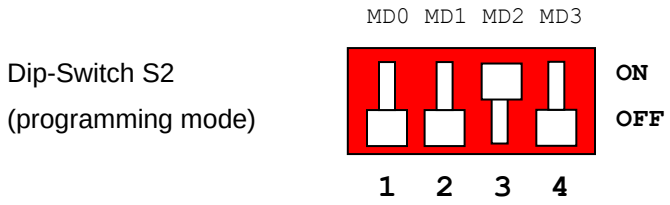
If your programming software needs connection of RTS and CTS or if it generates reset signal on RTS or DTR line, refer to the following jumper list:

Table 11-2: Jumper settings for reset signal on starterkit SK-91463N-64PMC

Jumper	Setting	Description
JP32	closed	RTS and CTS is shortcut at connector X5
	open	RTS and CTS is not shortcut at connector X5
JP4	2-3 closed	UART B is used to generate reset
JP5	1-2 closed	DTR can be used for system reset
	2-3 closed	RTS can be used for system reset
JP35	1-2 closed	No polarity inversion for the DTR/RTS signal
	2-3 closed	Polarity inversion for the DTR/RTS signal
JP24	Closed	External reset generation is active

MB91F463N needs a special mode pin setting for entering programming mode. Therefore set Dip Switch S2 (Mode Switch) for serial programming: (0,0,1,0) and press reset button before starting programming sequence:

Figure 11-2: Mode Pin setting for programming mode on SK-91463N-64PMC



Please note to set mode pins back to run mode (0,0,0,0) after successful programming:

Figure 11-3. Mode Pin setting for run mode on SK-91463N-64PMC

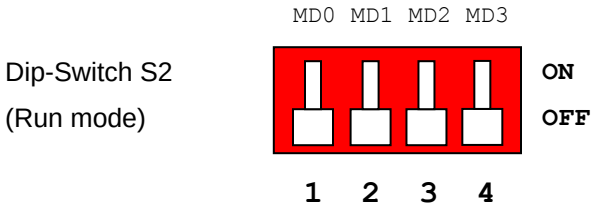
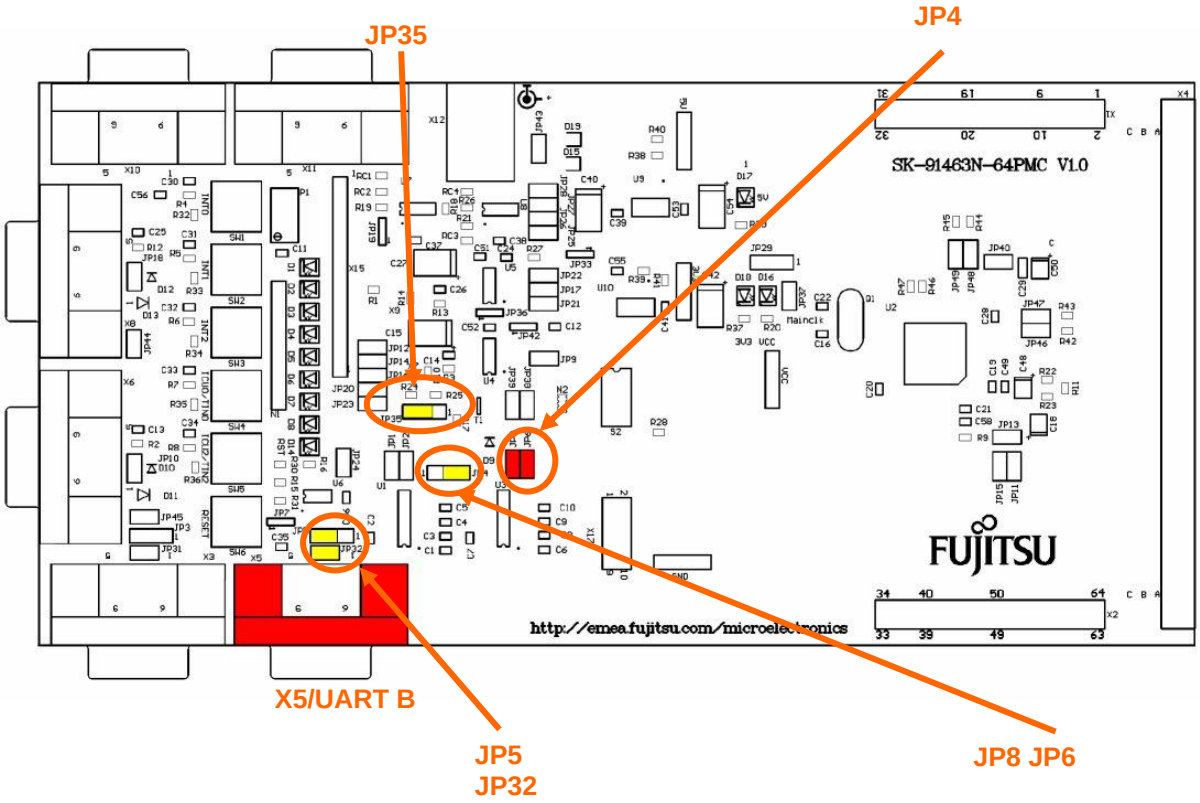


Figure 11-4: Jumper setting on starterkit SK-91463N-64PMC

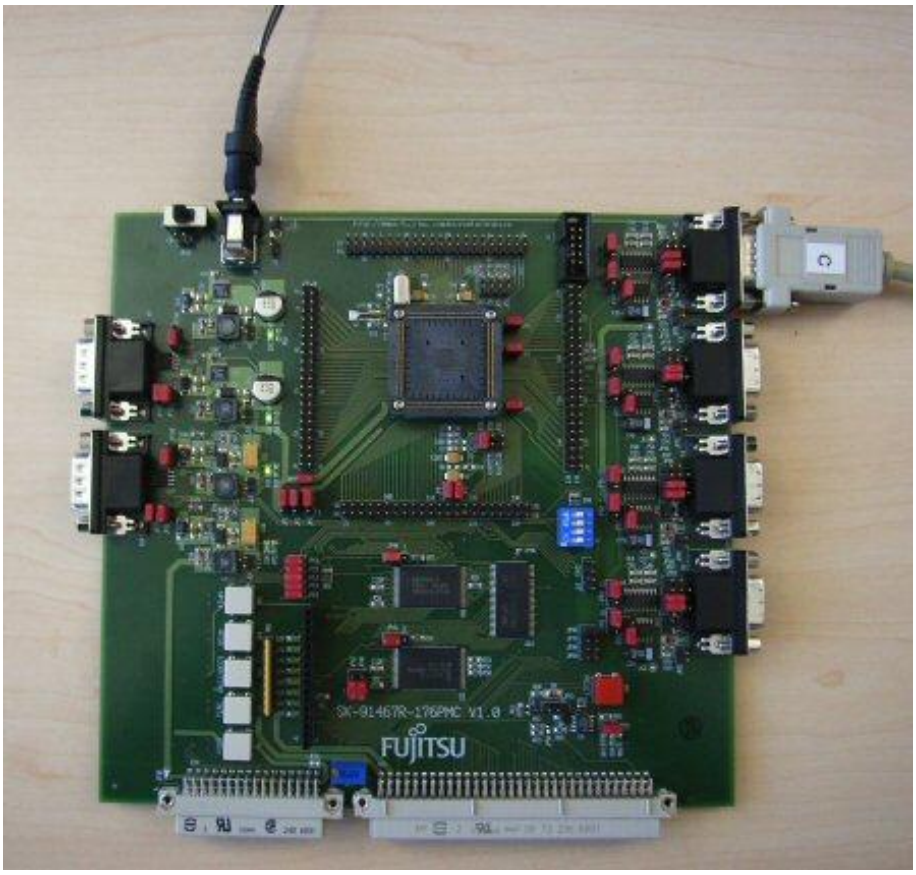


12. SK-91467R-176PMC

This chapter describes the needed settings for programming the MB91F467R on the starterkit SK-91467R-176PMC.

The starterkit SK-91467R-176PMC is a multifunctional development board for the CYPRESS 32bit flash microcontroller MB91F467R in LQFP176 package. It can be used stand-alone for software development and testing.

Figure 12-1: Connection to starterkit SK-91467R-176PMC



For serial asynchronous programming SUB-D9 connector X2/LIN-UART0 which is connected to UART0 has to be used. Following jumper setting is needed:

Table 12-1: Jumper setting on starterkit SK-91467R-176PMC

Jumper	Setting	Description
JP81	1-2 closed	SIN0 is connected to RS232 transceiver
JP82	1-2 closed	SOT0 is connected to RS232 transceiver
JP86	1-2 closed	X2 Pin 4/6 is connected to RS232 transceiver

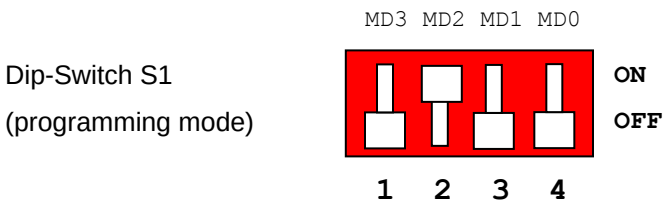
If your programming software needs connection of RTS and CTS or if it generates reset signal on RTS or DTR line, refer to the following jumper list:

Table 12-2: Jumper settings for reset signal on starterkit SK-91467R-176PMC

Jumper	Setting	Description
JP88	closed	RTS and CTS is shortcut at connector X2
	open	RTS and CTS is not shortcut at connector X2
JP87	1-2 closed	DTR can be used for system reset
	2-3 closed	RTS can be used for system reset
JP80	closed	Reset will be done via UART0
JP51	1-2 closed	No polarity inversion for the DTR/RTS signal
	2-3 closed	Polarity inversion for the DTR/RTS signal
JP53	Closed	External reset generation is active

MB91F467R needs a special mode pin setting for entering programming mode. Therefore set Dip Switch S1 (Mode Switch) for serial programming: (0,1,0,0) and press reset button before starting programming sequence:

Figure 12-2: Mode Pin setting for programming mode on SK-91467R-176PMC



Please note to set mode pins back to run mode (0,0,0,0) after successful programming:

Figure 12-3: Mode Pin setting for run mode on SK-91467R-176PMC

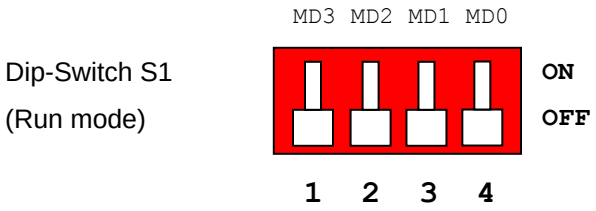
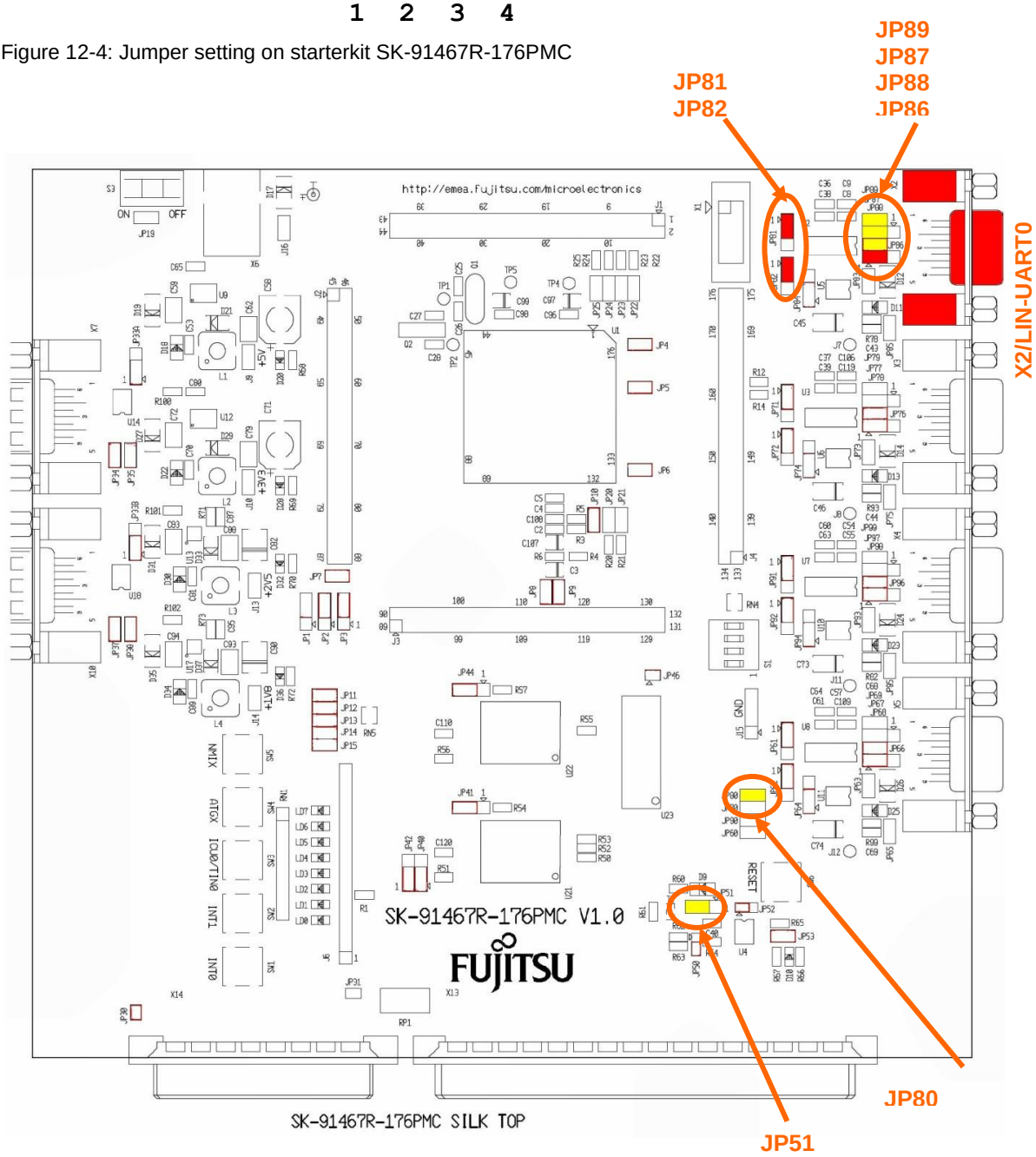


Figure 12-4: Jumper setting on starterkit SK-91467R-176PMC

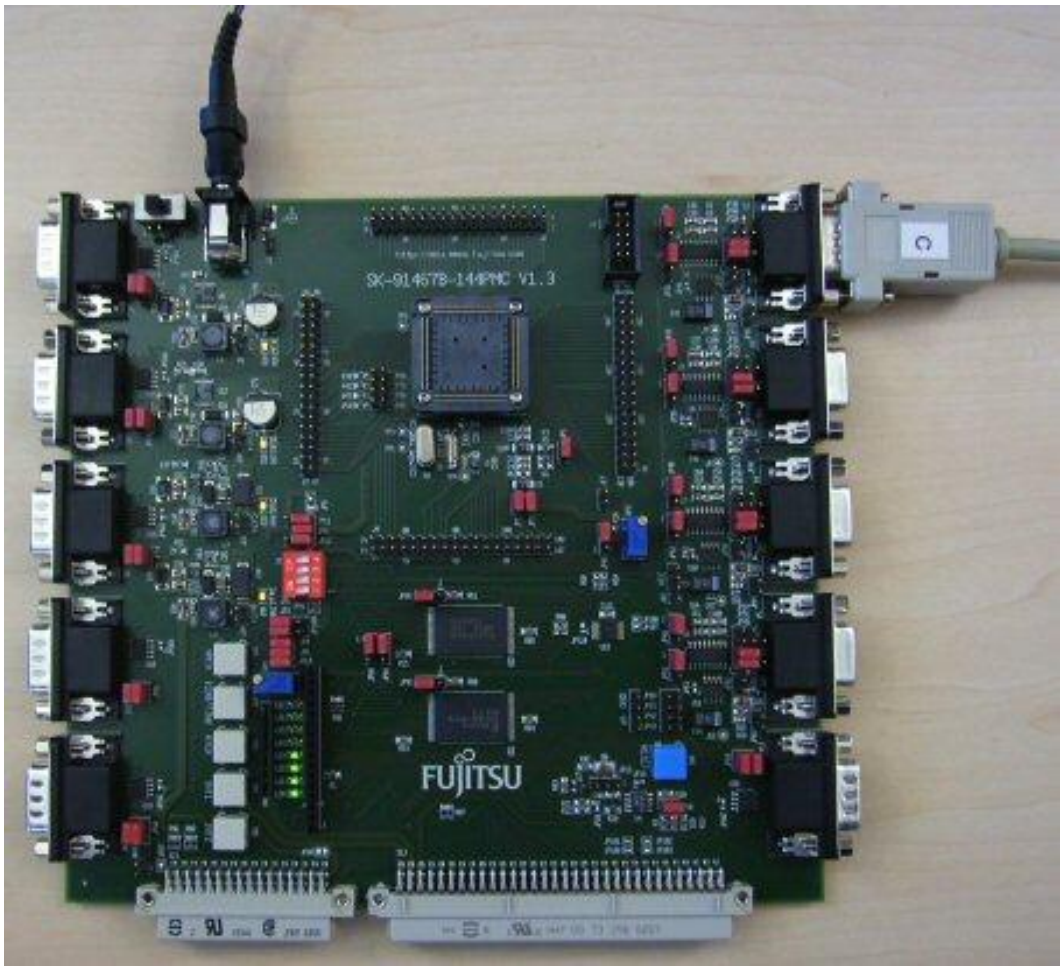


13. SK-91467B-144PMC

This chapter describes the needed settings for programming the MB91F465B, MB91F467B or MB91F464H on the starterkit SK-91467B-144PMC.

The starterkit SK-91F467B-144PMC is a multifunctional development board for the CYPRESS 32bit flash microcontroller MB91F465B/MB91F467B and MB91F464H in QFP144 package. It can be used stand-alone for software development and testing or together with monitor debugger software.

Figure 13-1: Connection to starterkit SK-91F467B-144PMC



For serial asynchronous programming SUB-D9 connector X2/LIN-UART4 which is connected to UART4 has to be used. Following jumper setting is needed:

Table 13-1: Jumper setting on starterkit SK-91F467B-144PMC

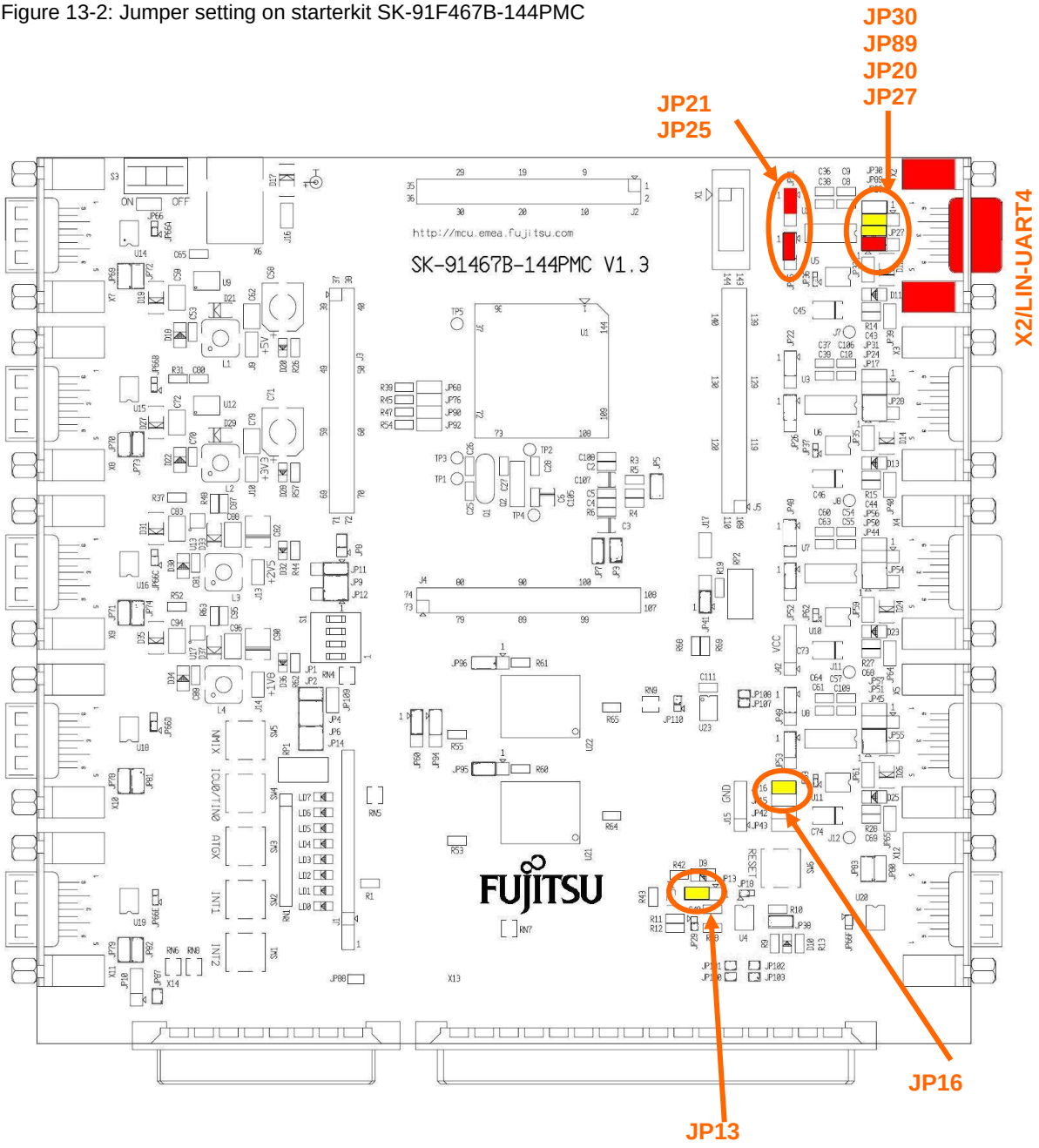
Jumper	Setting	Description
JP21	1-2 closed	MCU SIN4 connected to RS-232 transceiver
JP25	1-2 closed	MCU SOT4 connected to RS-232 transceiver
JP27	1-2 closed	X4 pin2 is connected to RS-232 transceiver

If your programming software needs connection of RTS and CTS or if it generates reset signal on RTS or DTR line, refer to the following jumper list:

Table 13-2: Jumper settings for reset signal on starterkit SK-91F467B-144PMC

Jumper	Setting	Description
JP20	closed	RTS and CTS is shortcut at connector X4
	open	RTS and CTS is not shortcut at connector X4
JP89	1-2 closed	DTR can be used for system reset
	2-3 closed	RTS can be used for system reset
JP16	closed	Reset will be done via UART4
JP13	1-2 closed	No polarity inversion for the DTR/RTS signal
	2-3 closed	Polarity inversion for the DTR/RTS signal
JP38	closed	External reset generation is active

Figure 13-2: Jumper setting on starterkit SK-91F467B-144PMC



14. SK-91465X-100PMC

This chapter describes the needed settings for programming the MB91F465X on the starterkit SK-91465X-100PMC.

The SK-91465X-100PMC is a multifunctional evaluation board for the Cypress 32bit flash microcontroller MB91F465X in LQFP100 package. It is used stand-alone for software development and testing.

Figure 14-1: Connection to starterkit SK-91465X-100PMC

For serial asynchronous programming SUB-D9 connector X6/UART “A” which is connected to UART4 has to be used. Following jumper setting is needed:

Table 14-1: Jumper setting on starterkit SK-91465X-100PMC

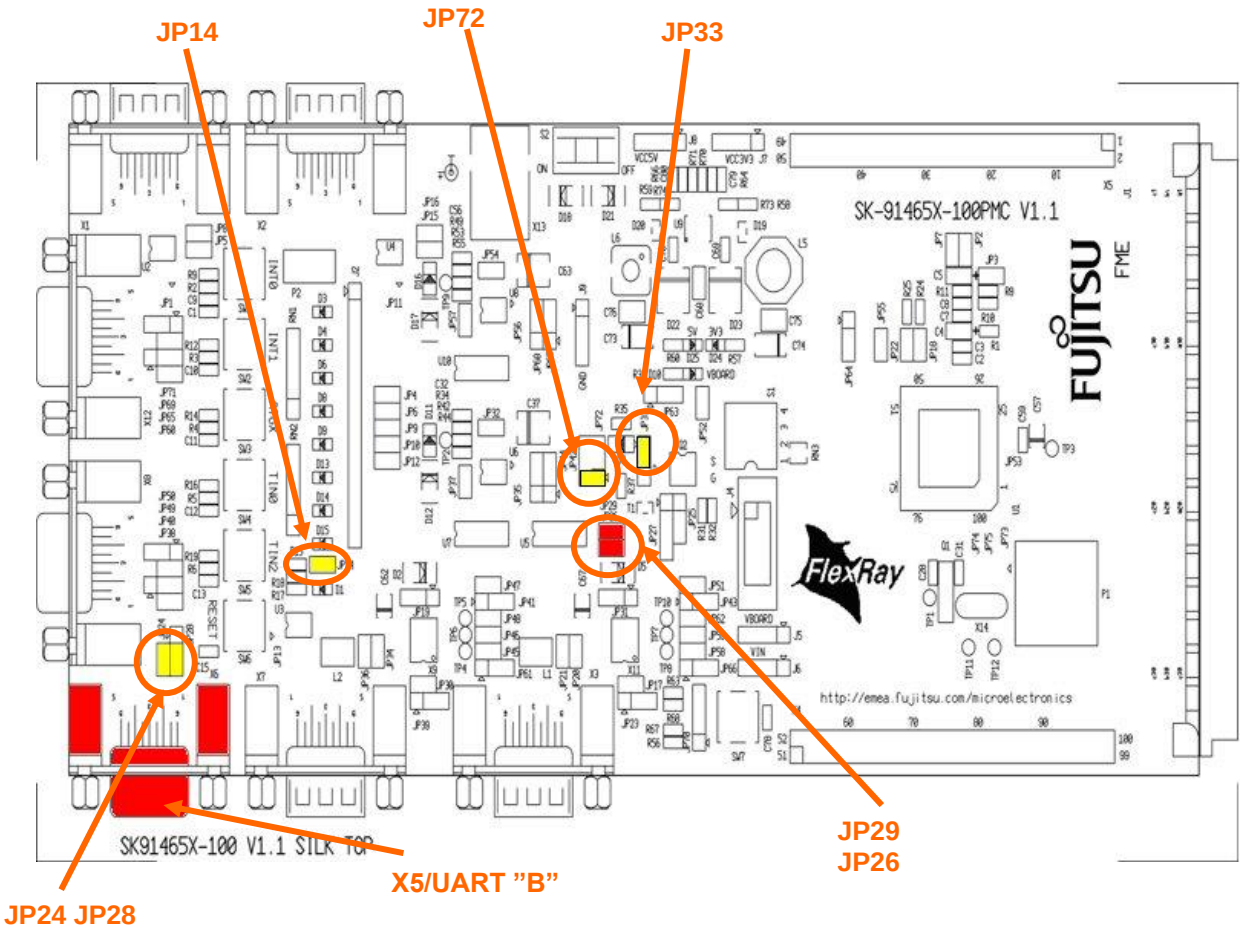
Jumper	Setting	Description
JP26	Closed	SIN4 of the MCU is connected to UART"A"
JP29	Closed	SOT4 of the MCU is connected to UART"A"

If your programming software needs connection of RTS and CTS or if it generates reset signal on RTS or DTR line, refer to the following jumper list:

Table 14-2: Jumper settings for reset signal on starterkit SK-91465X-100PMC

Jumper	Setting	Description
JP24	Closed	RTS and CTS of X5 are connected
	Open	RTS and CTS of X5 are not connected
JP72	1-2	UART"A" is used to generate Reset
JP28	1-2	DTR of UART"A" is selected
	2-3	RTS of UART"A" is selected
JP14	Closed	External Reset generation is active
JP33	1-2	No negation for the DTR/RTS signal
	2-3	DTR/RTS signal is negated

Figure 14-2: Jumper setting on starterkit SK-91465X-100PMC



15. SK-91467C-144PMC

This chapter describes the needed settings for programming the MB91F463C, MB91F465C or MB91F467C on the starterkit SK-91467C-144PMC.

The SK-91467C-144PMC is a multifunctional evaluation board for the Cypress 32bit flash microcontroller MB91F463C, MB91F465C and MB91F467C in LQFP100 package. It supports also MB91F465B, MB91F467B and MB91F464H if the external bus interface is not used. The board is used stand-alone for software development and testing.

Figure 15-1: Connection to starterkit SK-91467C-144PMC

For serial asynchronous programming SUB-D9 connector X6/UART “A” which is connected to UART4 has to be used. Following jumper setting is depending on the used device needed:

Table 15-1: Jumper setting on starterkit SK-91467C-144PMC

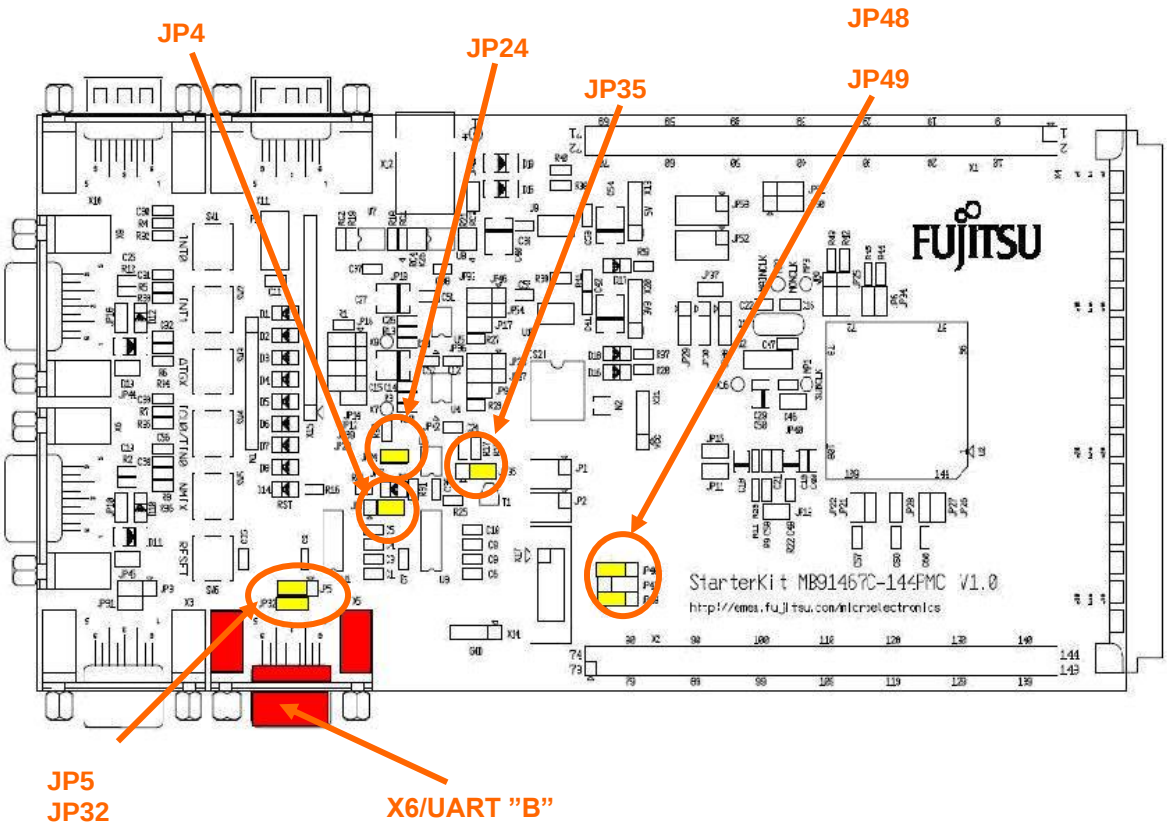
Jumper	Setting	Description
JP48	1 - 2	SIN4 of MB91F46xC is connected to UART"B"
	2 - 3	SIN4 of MB91F46xB is connected to UART"B"
JP49	1 - 2	SOT4 of MB91F46xC is connected to UART"B"
	2 - 3	SOT4 of MB91F46xB is connected to UART"B"

If your programming software needs connection of RTS and CTS or if it generates reset signal on RTS or DTR line, refer to the following jumper list:

Table 15-2: Jumper settings for reset signal on starterkit SK-91467C-144PMC

Jumper	Setting	Description
JP32	Closed	RTS and CTS of X6 are connected
	Open	RTS and CTS of X6 are not connected
JP4	2-3	UART"B" is used to generate Reset
JP5	1-2	DTR of UART"B" is selected
	2-3	RTS of UART"B" is selected
JP24	Closed	External Reset generation is active
JP35	1-2	No negation for the DTR/RTS signal
	2-3	DTR/RTS signal is negated

Figure 15-2: Jumper setting on starterkit SK-91467C-144PMC (for MB9146xC)

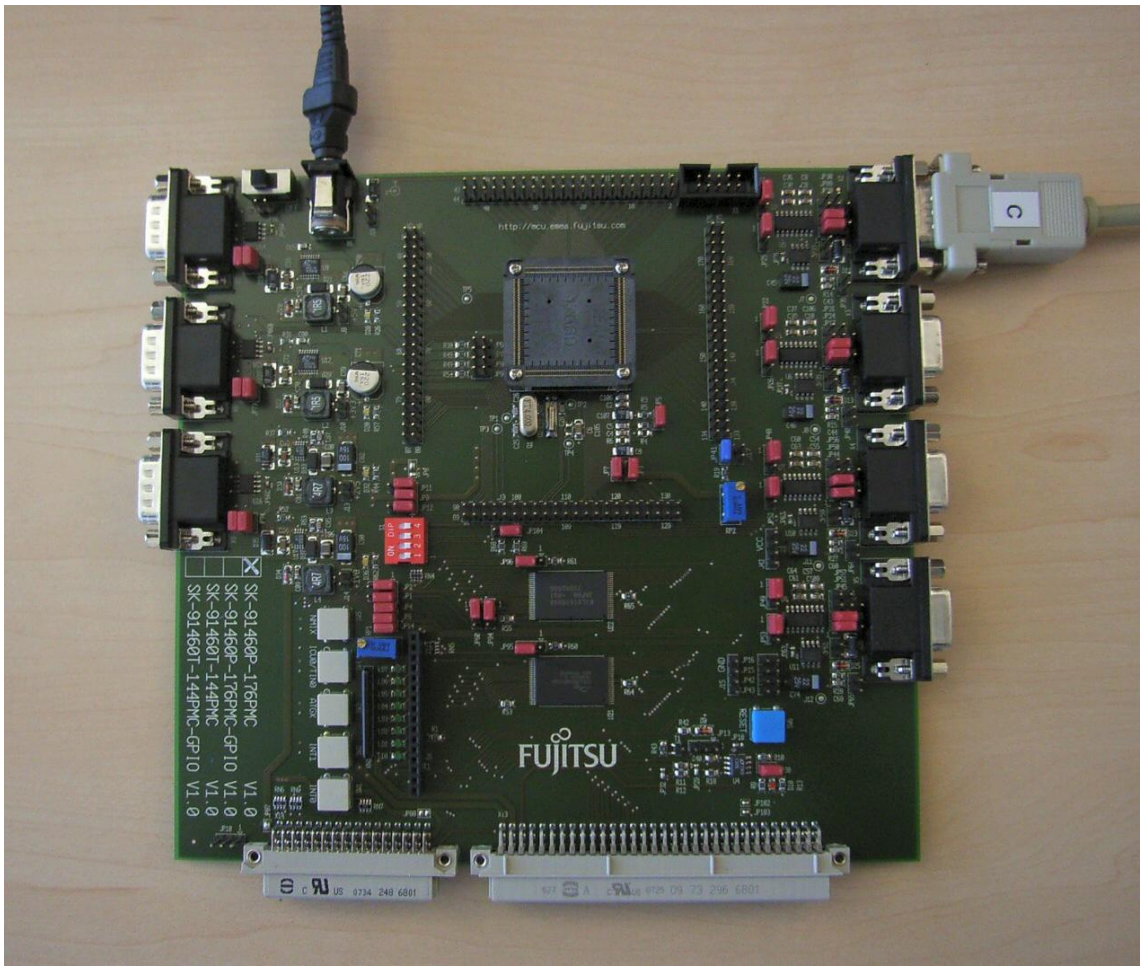


16. SK-91460P-176PMC(-GPIO)

This chapter describes the needed settings for programming the MB91F465P or MB91F467P on the starterkit SK-91460P-176PMC.

The SK-91460P-176PMC is a multifunctional evaluation board for the Cypress 32bit flash microcontroller MB91F465P and MB91F467P in LQFP176 package. The board is used stand-alone for software development and testing.

Figure 16-1: Connection to starterkit SK-91460P-176PMC



For serial asynchronous programming SUB-D9 connector X2/LIN-UART4 which is connected to UART4 has to be used. Following jumper setting is needed:

Table 16-1: Jumper setting on starterkit SK-91460P-176PMC

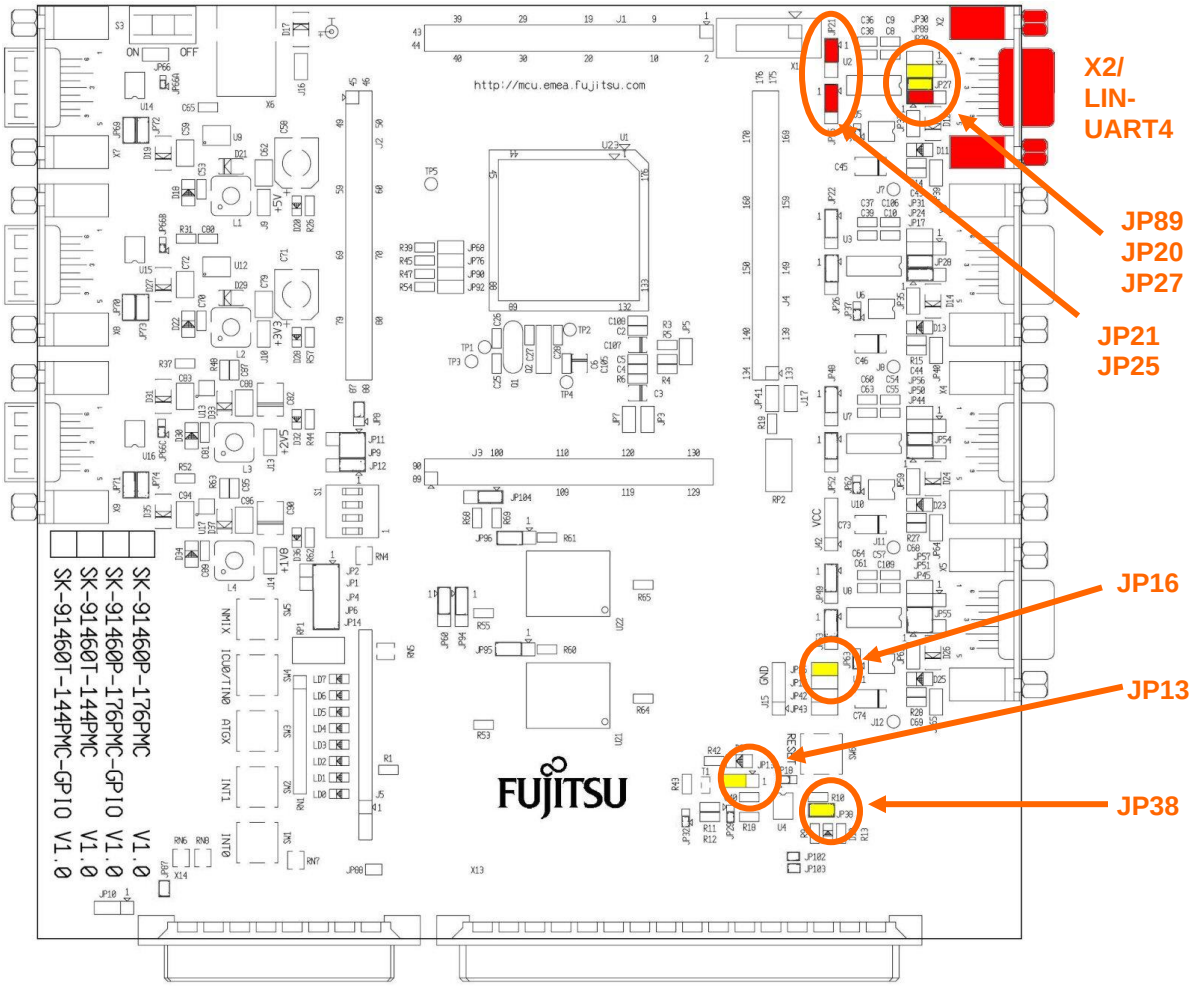
Jumper	Setting	Description
JP21	1 - 2	SIN4 is connected to RS232 transceiver
JP25	1 - 2	SOT4 is connected to RS232 transceiver
JP27	1 - 2	X2 pin 2 is connected to RS232 transceiver

If your programming software needs connection of RTS and CTS or if it generates reset signal on RTS or DTR line, refer to the following jumper list:

Table 16-2: Jumper settings for reset signal on starterkit SK-91460P-176PMC

Jumper	Setting	Description
JP20	Closed	RTS and CTS of X2 are connected
	Open	RTS and CTS of X2 are not connected
JP89	1-2	DTR signal (pin 6 of X2) is used as reset source
	2-3	RTS signal (pin 7 of X2) is used as reset source
JP16	Closed	LIN-UART4 (X2) connected to reset circuit
JP38	Closed	External Reset generation is active
JP13	1-2	No negation for the DTR/RTS signal
	2-3	DTR/RTS signal is negated

Figure 16-2: Jumper setting on starterkit SK-91460P-176PMC

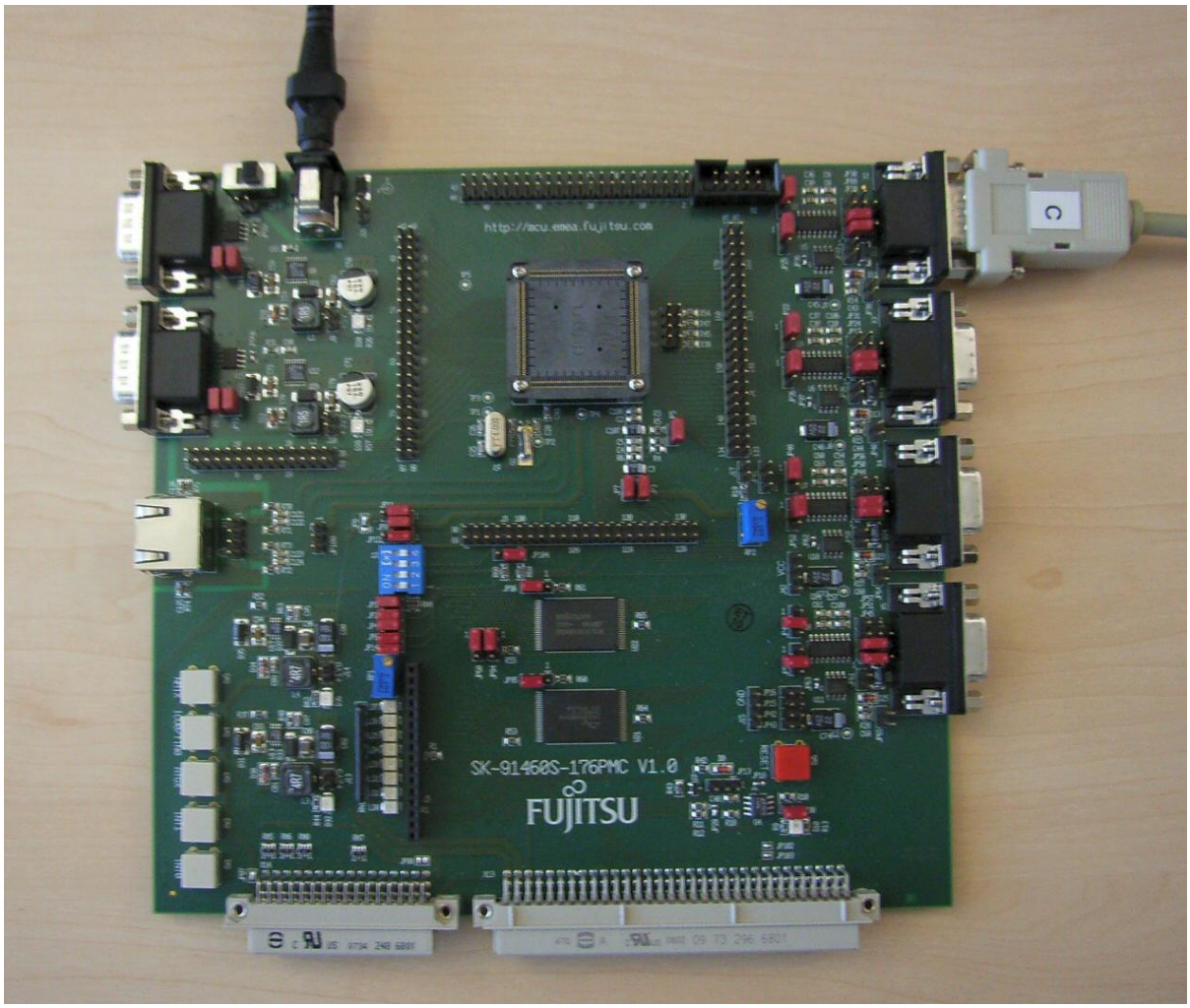


17. SK-91460S-176PMC

This chapter describes the needed settings for programming the MB91F467S on the starterkit SK-91460S-176PMC.

The SK-91460S-176PMC is a multifunctional evaluation board for the Cypress 32bit flash microcontroller MB91F467S in LQFP176 package. The board is used stand-alone for software development and testing.

Figure 17-1: Connection to starterkit SK-91460S-176PMC



For serial asynchronous programming SUB-D9 connector X2/LIN-UART4 which is connected to UART4 has to be used. Following jumper setting is needed:

Table 17-1: Jumper setting on starterkit SK-91460S-176PMC

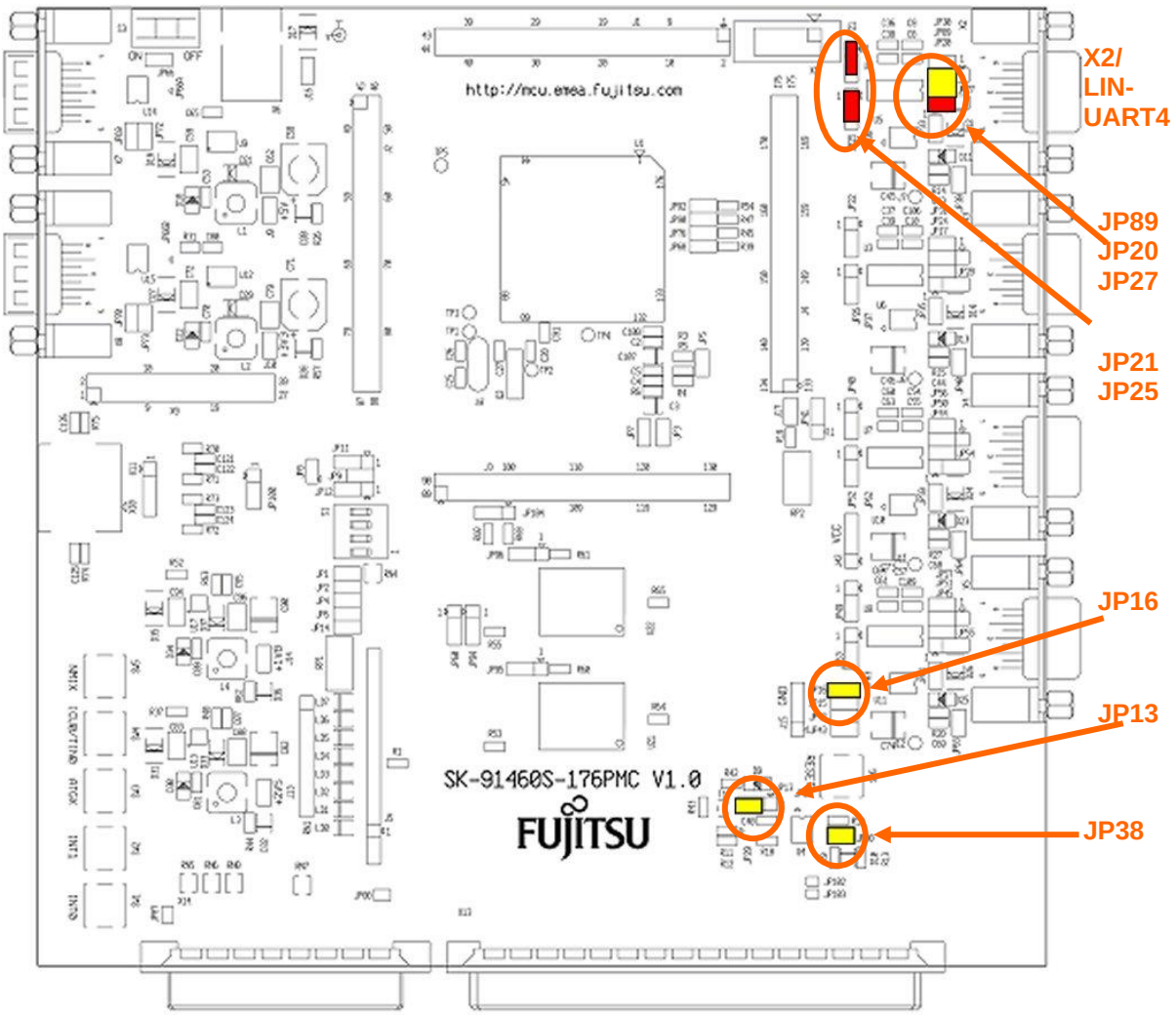
Jumper	Setting	Description
JP21	1 - 2	SIN4 is connected to RS232 transceiver
JP25	1 - 2	SOT4 is connected to RS232 transceiver
JP27	1 - 2	X2 pin 2 is connected to RS232 transceiver

If your programming software needs connection of RTS and CTS or if it generates reset signal on RTS or DTR line, refer to the following jumper list:

Table 17-2: Jumper settings for reset signal on starterkit SK-91460S-176PMC

Jumper	Setting	Description
JP20	Closed	RTS and CTS of X2 are connected
	Open	RTS and CTS of X2 are not connected
JP89	1-2	DTR signal (pin 6 of X2) is used as reset source
	2-3	RTS signal (pin 7 of X2) is used as reset source
JP16	Closed	LIN-UART4 (X2) connected to reset circuit
JP38	Closed	External Reset generation is active
JP13	1-2	No negation for the DTR/RTS signal
	2-3	DTR/RTS signal is negated

Figure 17-2: Jumper setting on starterkit SK-91460S-176PMC

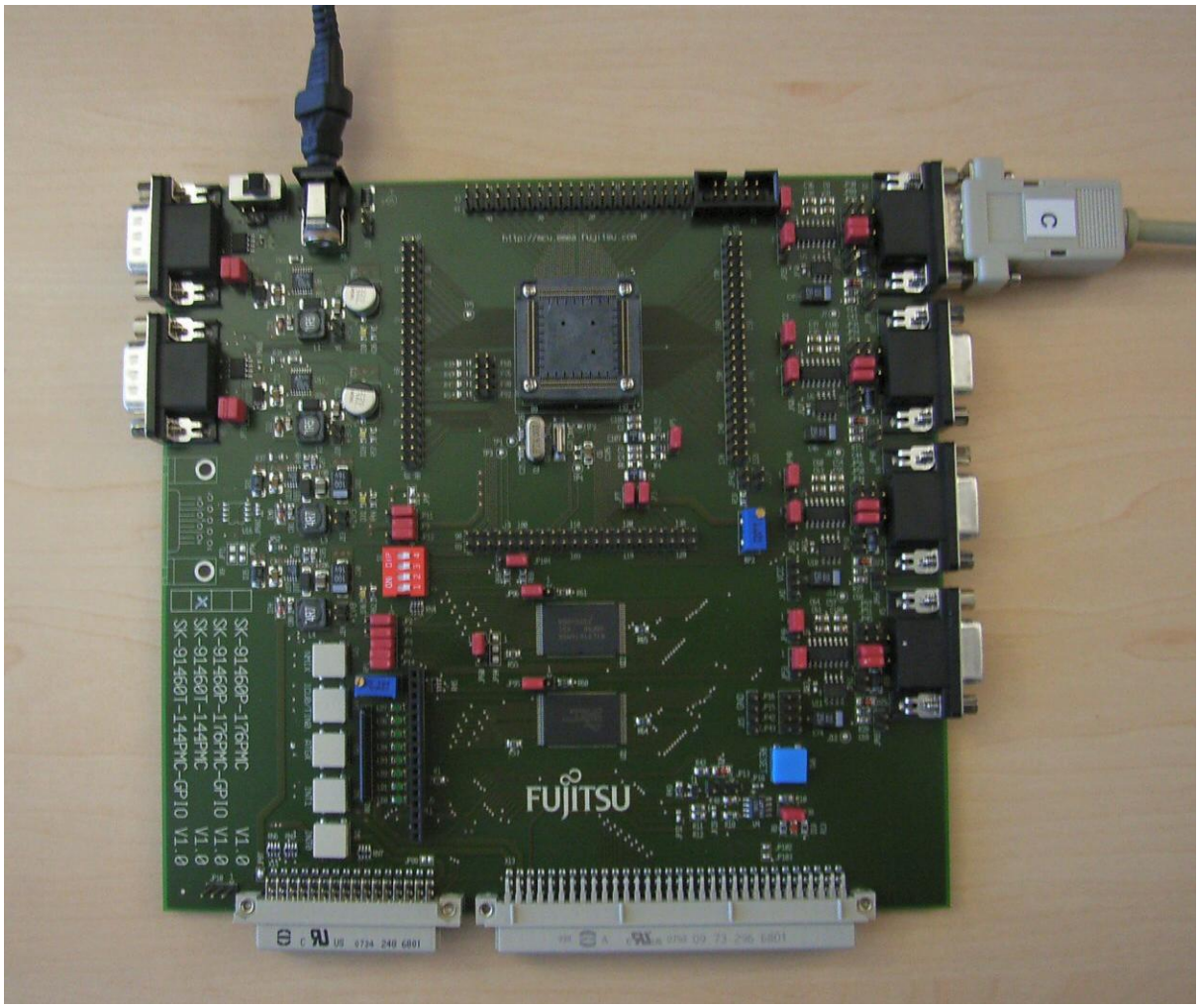


18. SK-91460T-144PMC(-GPIO)

This chapter describes the needed settings for programming the MB91F467T on the starterkit SK-91460T-144PMC.

The SK-91460T-144PMC is a multifunctional evaluation board for the Cypress 32bit flash microcontroller MB91F467T in LQFP144 package. The board is used stand-alone for software development and testing.

Figure 18-1: Connection to starterkit SK-91460T-176PMC



For serial asynchronous programming SUB-D9 connector X2/LIN-UART4 which is connected to UART4 has to be used. Following jumper setting is needed:

Table 18-1: Jumper setting on starterkit SK-91460P-144PMC

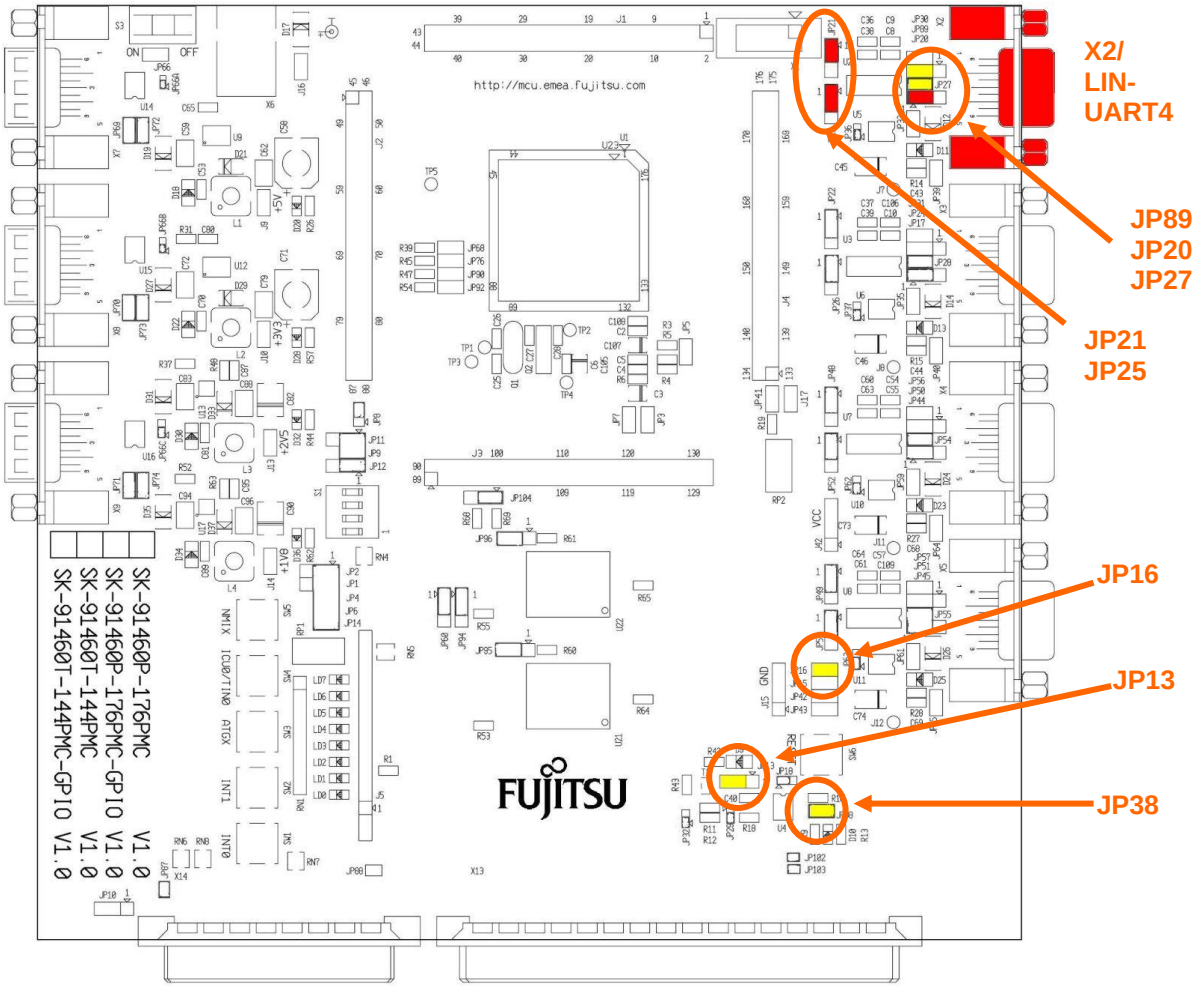
Jumper	Setting	Description
JP21	1 - 2	SIN4 is connected to RS232 transceiver
JP25	1 - 2	SOT4 is connected to RS232 transceiver
JP27	1 - 2	X2 pin 2 is connected to RS232 transceiver

If your programming software needs connection of RTS and CTS or if it generates reset signal on RTS or DTR line, refer to the following jumper list:

Table 18-2: Jumper settings for reset signal on starterkit SK-91460T-144PMC

Jumper	Setting	Description
JP20	Closed	RTS and CTS of X2 are connected
	Open	RTS and CTS of X2 are not connected
JP89	1-2	DTR signal (pin 6 of X2) is used as reset source
	2-3	RTS signal (pin 7 of X2) is used as reset source
JP16	Closed	LIN-UART4 (X2) connected to reset circuit
JP38	Closed	External Reset generation is active
JP13	1-2	No negation for the DTR/RTS signal
	2-3	DTR/RTS signal is negated

Figure 18-2: Jumper setting on starterkit SK-91460T-144PMC



19. Appendix

19.1 Additional Documents

User Guides for:

- FME-FR Programmer
  (FME_FR_FLASH_Programmer_V*xx*.pdf)
- Cypress FR Flash Programmer
  (PCWFRe.pdf)
- Starterkit SK-91F467D-208PFV
  (ug-910014-*xx*-sk-91f467d-208pfv.pdf)
- Starterkit SK-91460-MAIN
  (ug-910010-*xx*-SK-91460-Main.pdf)
- Adapter board SK-91460-91F467D-208PFV
  (ug-910018-*xx*-SK-91460-91F467D-208PFV.pdf)
- Starterkit SK-91464A-100PMC
  (ug-910025-*xx*-sk-91464a-100pmc.pdf)
- Starterkit SK-91465K-120PMT
  (ug-910026-*xx*-sk-91465k-120pmt.pdf)
- Starterkit SK-91469G-256BGA
  (ug-910027-*xx*-sk-91469g-256bga.pdf)
- Starterkit SK-91463N-64PMC
  (ug-910050-*xx*-SK-91463N-64PMC.pdf)
- Starterkit SK-91465X-100PMC
  (ug-910056-*xx*-sk-91465x-100pmc.pdf)
- Starterkit SK-91467B-144PMC
  (ug-910049-*xx*-SK-91467B-144PMC.pdf)
- Starterkit SK-91467C-144PMC
  (ug-910047-*xx*-SK-91467C-144PMC.pdf)
- Starterkit SK-91467R-176PMC
  (ug-910053-*xx*-SK-91467R-176PMC.pdf)
- Starterkit SK-91460P-176PMC
  (ug-910071-*xx*-SK-91460P-176PMC.pdf)
- Starterkit SK-91460S-176PMC
  (ug-910075-*xx*-SK-91460S-176PMC.pdf)
- Starterkit SK-91460T-144PMC
  (ug-910073-*xx*-SK-91460T-144PMC.pdf)

Application Notes about:

- GALEP-4 Programmer
  (mcu-an-300004-e-v*xx*-galep4.pdf)
- GALEP-5 Programmer
  (mcu-an-300022-e-v*xx*-galep5.pdf)
- MB91F467D Flash Programming Times
  (mcu-an-300017-e-v*xx*-mb91f467d_flash_erase_prog_times.pdf)
- MB91460 Flash Write/Erase via CPU
  (mcu-an-300034-e-v*xx*_mb91460_flash_write_erase_via_cpu.pdf)

Revision History

Document Revision History

Document Title: FR Family MB91460 Series, Flash Programming Document Number: 002-05153			
Revision	**Issue Date**	**Origin of Change**	**Description of Change**
**	01/30/2006	NOFL	Initial release
	09/11/2006		Added SK-91464A-100PMC, SK-91465K-120PMT, SK-91469G-256BGA, GALEP-4 programmer
	01/14/2008		Added SK-91463N-64PMC, SK-91465X-100PMC, SK-91467B-144PMC, SK-91467C-144PMC, SK-91467R-100PMC
	11/05/2008		Added new devices to table 1, 6+8, added GALEP-5, added SK91460S-176PMC, SK-91460T-144PMC, SK-91460P-176PMC
*A	01/12/2016	NOFL	Migrated Spansion document from MCU-AN-300012-E-V13 to Cypress format