Fujitsu Microelectronics Europe
User Guide

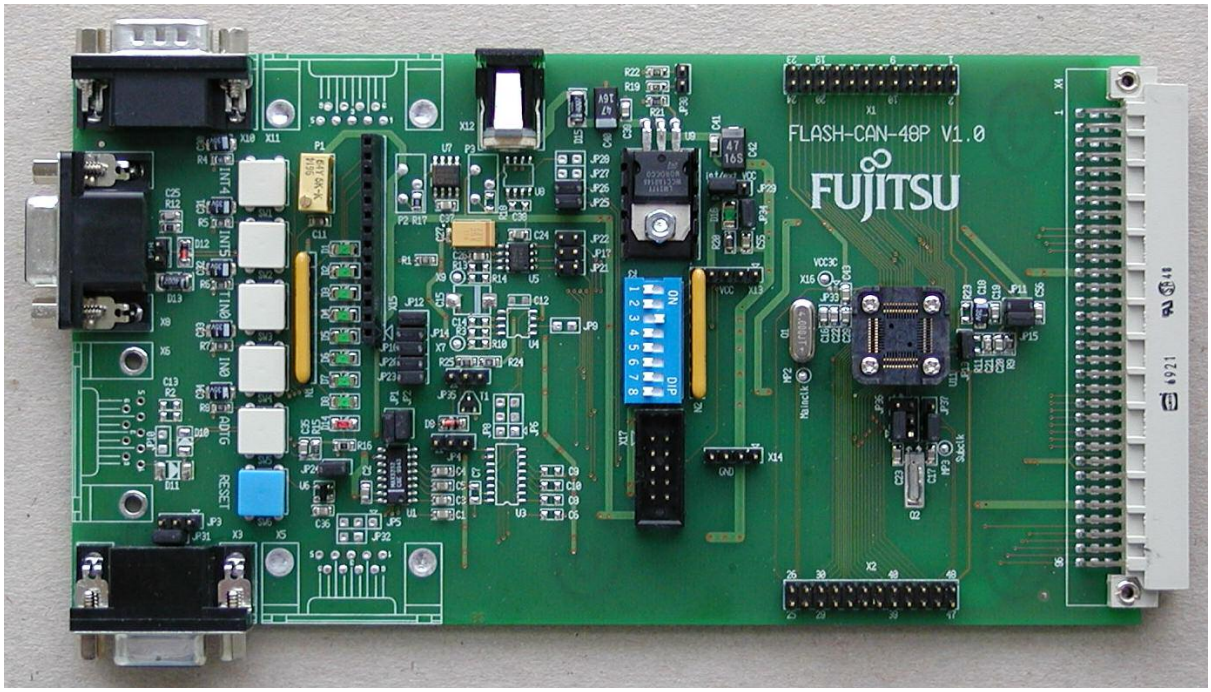
FMEMCU-UG-900002-12

F²MC-16LX FAMILY

EVALUATION BOARD

FLASH-CAN-48P

USER GUIDE



FUJITSU

Revision History

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25.10.2002	V1.1 chapter 7: Related Products updated
07/02/2003	V1.2 Disclaimer corrected

This document contains 26 pages.

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0 Contents

REVISION HISTORY **2**

WARRANTY AND DISCLAIMER **3**

0 CONTENTS **4**

1 OVERVIEW **5**

1.1 Abstract 5

1.2 Features 5

1.3 General Description 6

2 INSTALLATION **7**

3 JUMPERS AND SWITCHES **8**

3.1 Jumper Overview 8

3.2 Operating-Mode (S2) 10

3.3 Power Supply Voltage (JP: 29, 34) 11

3.4 Analogue Power Supply Voltage (JP: 11, 13, 15) 12

3.5 Subclock (JP: 36,37) 13

3.6 UART”A” (JP: 1, 2, 31) 13

3.7 LIN”A” (JP: 17, 18, 21, 22) 14

3.8 CAN“A” (JP: 25, 26) 14

3.9 Reset-Generation (JP: 3, 4, 24, 35) 15

3.10 Buttons INT4, INT5, TIN0, IN0, ADTG, Reset (JP: 12, 14, 16, 20, 23, 24) 16

4 PROGRAMMING THE INTERNAL FLASH **17**

4.1 Asynchronous Mode 17

4.2 Synchronous Mode 19

5 CONNECTORS **20**

5.1 Power connector (X12) 20

5.2 Edge connector (X1, X2) 20

5.3 UART”A” (X3) 20

5.4 LIN”A” Interface (X8) 21

5.5 CAN”A” Interface connector (X10) 21

5.6 USER-LEDs & LC-Display (optional) 21

5.7 VG96 connector (X4) 22

6 SILK-PLOT OF THE BOARD **24**

7 RELATED PRODUCTS **25**

8 INFORMATION IN THE WWW **26**

1 Overview

1.1 Abstract

The FLASH-CAN-48P is a low cost multifunctional evaluation board for 16-Bit Fujitsu Flash microcontrollers in a FPT-48P-M26 package.

It can be used stand alone for software development and testing or as a simple target board to work with the emulator system.

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

1.2 Features

- Supports 16-Bit microcontroller in FPT-48P-M26 package (7x7x1.5mm, 0.5 mm pitch)
  - MB90385series: MB90V495, MB90F387/S
  - MB90455series: MB90V495, MB90F455/S, MB90F456/S, MB90F457/S
- 9-12V unregulated external DC power supply usable
- 5V internal power supply, Power-LED
- In-Circuit serial Flash programming
- All resources available for evaluation
- All pins routed to connectors
- 4 MHz main-crystal, 32kHz subclock-crystal (selectable by jumpers)
- One UART Interface
- One LIN-Transceiver
- One High-Speed CAN Transceiver
- 8 User LEDs, optional: alphanumeric standard LC-Display connectable instead of LEDs
- Reset-Button, Reset-LED
- 5 User-buttons configurable for INT4, INT5, TIN0, IN0 and ADTG
- 64pin VG connector (same pin-out as Flash-CAN-64P-M09-V2)

The target board will be delivered with the MB90F387 microcontroller.

This microcontroller contains a 'burn-in'-boot loader for programming the flash.

This board must only be used for test applications
in an evaluation laboratory environment.

1.3 General Description

The FLASH-CAN-48P is designed to support 16Bit microcontrollers with 48-pin LQFP package like MB90385series and MB90455series.

It can be used as a stand alone evaluation board or as a target board for emulator debugger.

The evaluation board supports following package: FPT-48P-M26 (7x7x1.5mm, 0.5mm pitch)

The board is supplied with a socketed 4MHz crystal as the main oscillation clock. Using the internal PLL of the µC, internal clock rates up to 16MHz can be achieved.

Additionally a 32kHz crystal is mounted for use as a subclock, if this is supported by the device type.

UART1 can be used for RS232- (JP1, JP2, X3) or LIN- (JP21, JP22, X8) communication.

One separate RS232 transceiver is available to connect the on-chip UART to the 9-pin D-Sub connector (X3). The transceiver generate the adequate RS232 levels for the receive (RXD) and transmit (TXD) lines. The DTR line or the CTS line of the connector can be selected with jumpers (JP3, JP4) to generate a system reset. The RTS signal can be shortcut to CTS using the jumper JP31.

In-circuit-programming (asynchronous) can be done via UART1 (UART"A", X3) using the Burn-In Bootloader of the microcontroller.

Additionally one TLE6259 single-wire LIN-transceiver is included to drive the bus line in LIN-systems for automotive and industrial applications.

If the board provides a socket for the microcontroller than it can be used as an emulator target board. In this case the microcontroller must be removed from the socket and the corresponding probe cable has to be used:

Probe Cable: **MB2132-466**

Header Socket: ***NQ048sd + HQ048sd***

All pins of the microcontroller are connected to the edge connectors X1 and X2 and are directly available to the user. Furthermore, the most important signals are available on the VG64 connector (X4).

The on-board voltage regulator allows the user to connect an unregulated DC input voltage between +9V to +12V. In case of any modifications of the board, care should be taken that the total power consumption will not damage the regulator.

There are six push button switches on the board, used for Reset, External Interrupts INT4 and INT5, Trigger for Reload-Timer0 (TIN0), Input-Capture (IN0) and Trigger for the A/D-converter (ADTG).

Eight user-LEDs are connected via a 1k resistor network to Port P30-P33 / P54-P57. If these LEDs are not required, the resistor network can be removed to disconnect the LEDs and to free the port. Take care of Port P30 and P31, which needs the 1k Resistor while serial in-circuit programming!

The operating mode of the microcontroller can be selected by the Dip-switch S2.

2 Installation

Remove carefully the board from the shipping carton.

Check first if there are any damages before power on the evaluation board.

For the power supply a DC input voltage of 9V – 12V is recommended. The positive voltage (+) must be connected to the shield, and ground (GND) must be connected to the centre of the connector X12!

After power-on, the green 'Power'-LED (D16) should be on. If the LED does not light, than switch off the power supply and check the default jumper settings.

By default, the evaluation board is equipped with a MB90F387 and the device has been programmed with a test program. So after power-on a running light at the eight 'User'-LEDs can be seen. Furthermore, a welcome string is continuously output with 9600 baud on UART channel (UART"A"). Please use a 1:1 cable for the PC-connection.

The burn-in bootloader allows the user to program it's own application into the Flash-memory. How to program the Flash memory is described in chapter 4.

If the board is used as an emulator target board, than switch off the power supply and remove the microcontroller from the socket. Now the probe cable can be mounted into the socket. Take care of pin 1 marking onto the socket and fix the probe cable with screws.

Do not use other probe cable than for LQFP-48 package only!

Connect the probe cable to the emulation pod. Check all DIP-switch-settings of the evaluation board and the emulation pod.

For the power on sequence the emulator system must be switched on first, afterwards switch on the evaluation board. Please look at the corresponding user manual for the emulator how to set up the emulator system. After the power on the 'Reset'-LED of the emulator must be off and the 'Vcc'-LED must be on.

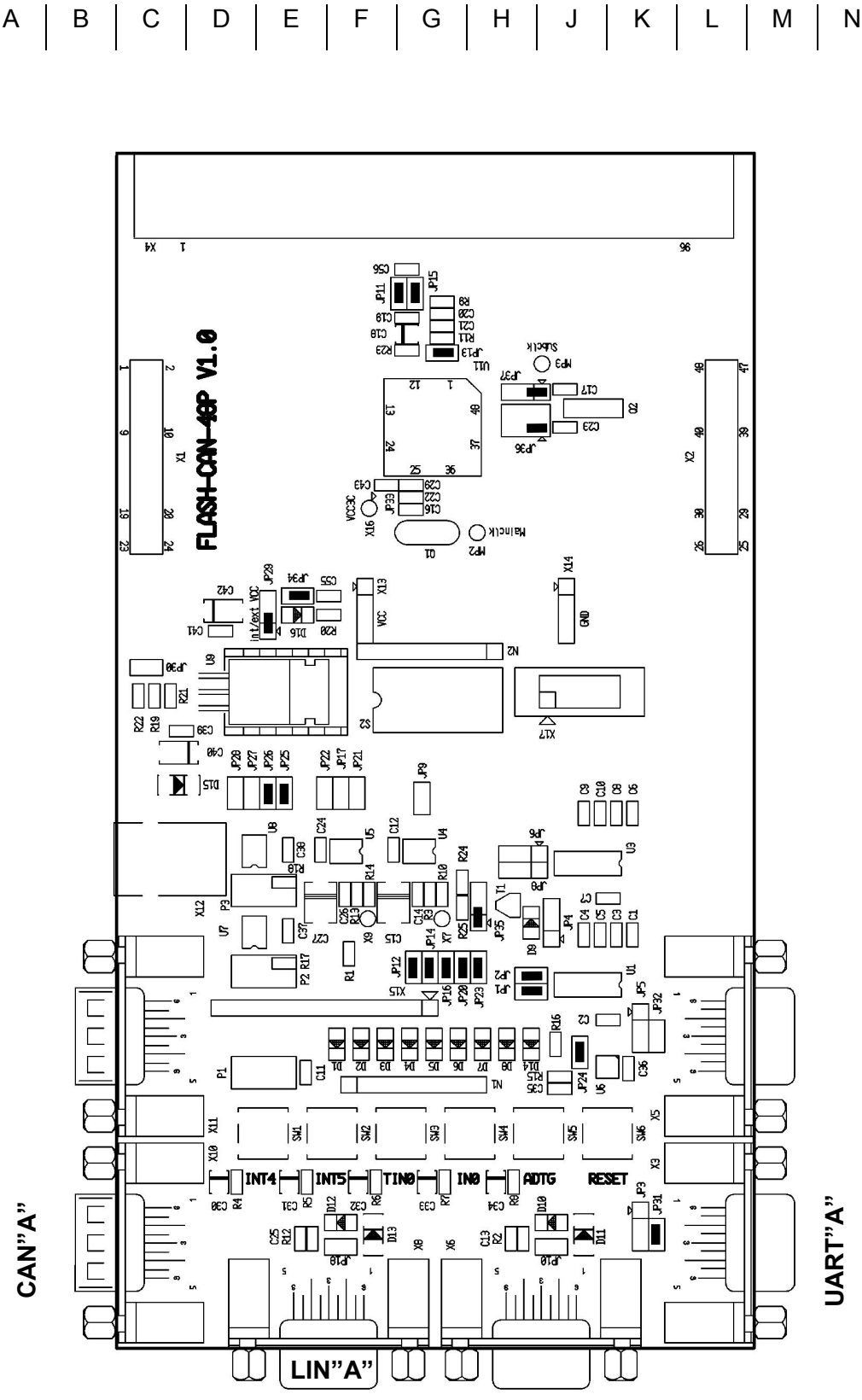
If the 'Reset'-LED is still lighting, check the DIP-switch-settings of the emulator system and the power supply of the evaluation board.

3 Jumpers and Switches

This chapter describes all jumpers and switches which can be modified on the evaluation board. The default setting is shown with a grey shaded area. All jumpers and switches are named directly on the board, so it is very easy to set the jumpers according to the features.

3.1 Jumper Overview

Jumper	Description / Function	Type	Default	Coordinates
JP1	UART A (TXD)	Jumper 2 pol	closed	HJ 21
JP2	UART A (RXD)	Jumper 2 pol	closed	HJ 21
JP3	DTR/RTS	Jumper 3 pol	open	K 26
JP4	RESET UART A	Jumper 3 pol	open	J 20
JP11	AVcc	Jumper 2 pol	closed	G 5/6
JP12	SW INT4	Jumper 2 pol	closed	G 21
JP13	AVcc=AVRH	Jumper 2 pol	closed	G 7
JP14	SW INT5	Jumper 2 pol	closed	G 21
JP15	AVss	Jumper 2 pol	closed	G 5/6
JP16	SW TIN0	Jumper 2 pol	closed	GH 21
JP17	LIN A enable	Jumper 2 pol	open	F 17
JP18	Master-Mode	Jumper 2 pol	open	F 27
JP20	SW IN0	Jumper 2 pol	closed	H 21
JP21	LIN A (RXD)	Jumper 2 pol	open	F 17
JP22	LIN A (TXD)	Jumper 2 pol	open	F 17
JP23	SW ADTG	Jumper 2 pol	closed	H 21
JP24	RESET	Jumper 2 pol	closed	J 23
JP25	CAN A (TXD)	Jumper 2 pol	closed	E 17
JP26	CAN A (RXD)	Jumper 2 pol	closed	E 17
JP29	int/ext VCC	Jumper 3 pol	1-2	E 13
JP30	5V/3V3	Jumper 2 pol	open	C 14
JP31	RTS-CTS	Jumper 2 pol	closed	K 27
JP33	C-Pin	sold-Jumper	open	F 10
JP34	MCU_VCC	Jumper 2pol	closed	E 12
JP35	Reset inverter	Jumper 3 pol	1-2	H 19
JP36	X0A select	Jumper 3 pol	1-4	H 9
JP37	X1A select	Jumper 3 pol	1-2	H 8


A B C D E F G H J K L M N
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
FLASH-CAN-48P V1.0
CAN"A"
UART"A"
LIN"A"
INT4
INT5
TIN0
IN0
ADTG
RESET

3.2 Operating-Mode (S2)

The DIP-switch S2 is used to set the operating mode of the µC.

Ensure that the mode pin settings correspond to the operation-mode of the application.

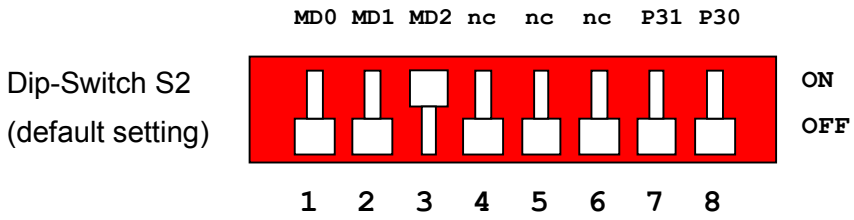
For more detailed information please check the Hardware-Manual of the microcontroller.

DIP switch	Setting	Logical value
S2/1 (MD0)	ON (closed)	0 (low)
	OFF (open)	1 (high)
S2/2 (MD1)	ON (closed)	0 (low)
	OFF (open)	1 (high)
S2/3 (MD2)	ON (closed)	0 (low)
	OFF (open)	1 (high)
S2/4	not connected (OFF)	
S2/5	not connected (OFF)	
S2/6	not connected (OFF)	
S2/7 (P31)	ON (closed)	1 (high)
	OFF (open)	0 (low)*[1]
S2/8 (P30)	ON (closed)	1 (high)
	OFF (open)	0 (low) *[1]

Default: MD0, 1, 2 = 1 1 0 P30, P31 = 0 0

By default, the Single Chip Run-Mode is selected.

Note: *[1] Take care that the low-level is reached by the resistor-network N1 and the LEDs D1/D2. In case that N1 is removed in order to free the Port, then P30 and P31 have to be connected manually to GND in case of asynchronous programming (see chapter 4).



3.3 Power Supply Voltage (JP: 29, 34)

Vcc and GND (Vss) are both connected to the edge-connector (X4) in order to supply additional circuitry. In this case take care of not to exceed the maximum ratings of the on board voltage regulator LM317T.

JP29 Power Supply selection

JP30 Power Supply voltage selection: +5V or +3.3V

JP34 This Jumper is used to connect the Vcc supply voltage to the µC.
Connecting an Ampere-meter instead of the jumper allows measuring of the power-supply-current of the microcontroller (Icc).

Jumper	Setting	Description
JP29 (Vcc)	1 - 2	On-board voltage regulation
	2 - 3	not supported
JP30 (3V3)	ON (closed)	voltage regulation adjusted to +3.3V
	OFF (open)	voltage regulation adjusted to +5V
JP34 (MCUVcc)	ON (closed)	Power supply Vcc is connected to µC
	OFF (open)	Disconnected from Power supply Vcc

Default: JP29 = 1-2, JP30 = OFF, JP34 = ON,

By default, the on-board Voltage +5V regulation is used and the microcontroller is powered.

3.4 Analogue Power Supply Voltage (JP: 11, 13, 15)

The power supply as well as the positive reference voltage for the A/D-converter can be provided internally or externally.

JP11, JP15 connect power supply voltages (AVcc and AVss)

JP13 connect reference voltages (AVRH to AVcc)

Jumper	Setting	Description
JP11 (AVcc)	ON (closed)	AVcc is connected to Vcc
	OFF (open)	AVcc is disconnected from Vcc
JP13 (AVRH)	ON (closed)	AVRH is connected to AVcc
	OFF (open)	AVRH defined by resistor divider*1
JP15 (AVss)	ON (closed)	AVss is connected to GND
	OFF (open)	AVss is disconnected from GND

*1By default the resistor-divider R11 and R23 is not mounted on the board

Default: JP11, JP13, JP15 are closed

By default, the A/D-converter supply and reverence voltage is +5V.

Note:

If JP11 and J15 are open, the user has to supply an adequate analogue voltage supply (AVcc and AVss) to the A/D-converter.

If JP13 is open, the resistors R11 and R23 define AVRH. By default, the resistor divider (R11 and R23) is not mounted on the board.

3.5 Subclock (JP: 36,37)

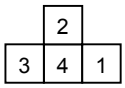
Some devices like e.g. MB90F387 support a 32kHz subclock (X0A, X1A), other devices like MB90FxxxS do not support a subclock but will offer additional port-pins (P35, P36) instead.

Please check the related datasheet.

JP36: defines usage of Pin 46 (X0A/P35)

JP37: defines usage of Pin 47 (X1A/P36)

Pin-out JP36:



Jumper	Setting	Description
JP36 (X0A/P35)	1-4	Pin 46 is connected to the 32kHz Subclock (X0A)
	2-4	Pin 46 is used as P35 and is connected to X4-A28
	3-4	Pin 46 is connected to GND (in case that subclock-device is used, but no 32kHz crystal is connected)
JP37 (X1A/P36)	1-2	Pin 47 is connected to the 32kHz Subclock (X1A)
	2-3	Pin 47 is used as P36 and is connected to X4-C29

Default: JP36: 1-4, JP37: 1-2

By default, the 32kHz-subclock-crystal is connected to the microcontroller.

3.6 UART"A" (JP: 1, 2, 31)

One RS232-transceiver is available and can be connected to UART1.

JP1, JP2 connects UART1 to the RS232-transceiver (U1, X3)

JP31 Some Flash-programming-Tools needs a connection between CTS and RTS

Jumper	Setting	Description
JP1 (UART"A"TxD)	ON (closed)	SOT1 is connected to RS232-Transceiver
	OFF (open)	SOT1 is disconnected from RS232-Transceiver
JP2 (UART"A"RxD)	ON (closed)	SIN1 is connected to RS232-Transceiver
	OFF (open)	SIN1 is disconnected from RS232-Transceiver
JP31 (RTS-CTS)	ON (closed)	RTS and CTS is shortcut on X3
	OFF (open)	RTS and CTS is not shortcut on X3

Default: JP1=ON, JP2=ON, JP31 = ON

By default, UART1 of MB90F387 is used as UART"A".

Note: RS232- and LIN-transceiver can not be used at the same time. Take care that the jumpers JP21 and JP22 are open if JP1 and JP2 are closed.

3.7 LIN"A" (JP: 17, 18, 21, 22)

One LIN-transceiver is available and can be used with UART1.

JP17 enable LIN-Transceiver

JP18 LIN Master-mode

JP21, JP22 connects UART1 to the LIN-transceiver (U5, X8)

Jumper	Setting	Description
JP17 (LIN enable)	open	LIN-transceiver is disabled
	closed	LIN-transceiver is enabled
JP18 (LIN Master)	open	LIN Slave-mode
	closed	LIN Master-mode
JP21 (LIN"A"RXD)	open	SIN1 is disconnected from LIN-Transceiver
	closed	SIN1 is connected to LIN-Transceiver
JP22 (LIN"A"TXD)	open	SOT1 is disconnected from LIN-Transceiver
	closed	SOT1 is connected to LIN-Transceiver

Default: JP17, JP18, JP21, JP22 = open

By default, UART1 of MB90F387 is not used as LIN-interface.

Note: RS232- and LIN-transceiver can not be used at the same time. Take care that the jumpers JP1 and JP2 are open if JP21 and JP22 are closed.

3.8 CAN"A" (JP: 25, 26)

One high-speed CAN-transceiver is available on the FLASH-CAN-48P evaluation board.

JP25, JP26 connects the CAN-Port to the CAN-transceiver (U7, X10).
If the CAN interface is not used, the jumpers should be left open.

Jumper	Setting	Description
JP25 (TX0)	Open	TX is disconnected from CAN-Transceiver (U7, X10)
	Closed	TX is connected to CAN-Transceiver (U7, X10)
JP26 (RX0)	Open	RX is disconnected from CAN-Transceiver (U7, X10)
	Closed	RX is connected to CAN-Transceiver (U7, X10)

Default: JP25, JP26 = Closed

By default, the CAN transceiver is connected to the microcontroller

3.9 Reset-Generation (JP: 3, 4, 24, 35)

Additional to the internal Power-On-Reset the microcontroller can be reset by an external Reset-circuit (Voltage-Monitor) and by the UART, too.

JP3 As well the DTR-line as the RTS-Line of UART"A" can be used to generate a system-reset.

JP4 This jumper selects whether the DTR/RTS line from UART"A" or UART"B" will generate a system-reset.

JP24 open this jumper if no external Reset shall be generated.
In this case, only the internal reset is active (e.g.: power-on)

JP35 The polarity of the DTR/RTS line can be invert by this jumper.
Remove the jumper in order to disable the reset logic.

Jumper	Setting	Description
JP3 (DTR / RTS "A")	1-2	DTR of UART"A" is selected
	2-3	RTS of UART"A" is selected
JP4 (UART"A"/"B")	1-2	UART"A" is used to generate Reset
	2-3	not applicable on FLASH-CAN-48P
JP24 (Main Reset)	closed	external Reset generation is active
	open	no external Reset generation
JP35 (Polarity)	1-2	No polarity inversion for the DTR/RTS signal
	2-3	Polarity inversion for the DTR/RTS signal

Default: JP24 = closed (JP3, JP4 and JP35 are not set)

By default, the external Reset generation is active. The Reset by UART is disabled.

Note:

While a reset signal is asserted the red Reset-LED D14 is lit.

During normal operation, this LED should be off!

If JP35 (Polarity) is set, than JP4 and JP5 have to be set, too.

If the reset LED is steadily on, check the power supply input voltage and the settings for the reset-generation by UART.

3.10 Buttons INT4, INT5, TIN0, IN0, ADTG, Reset (JP: 12, 14, 16, 20, 23, 24)

JP12, JP14: Two push buttons can be used to trigger the external interrupts INT4 and INT5

JP16: One button can be used as trigger-input for the Reload-Timer0 (TIN0)

JP20: One Button can be used for input at Input-Capture0 (IN0)

JP23: One Button can be used as trigger for the A/D-converter (ADTG)

JP24: One Button can be used for manually reset

Jumper	Setting	Description
JP12 (INT4)	Closed	INT4 is connected to Push-button “INT4”
	Open	no connection to INT4
JP14 (INT5)	Closed	INT5 is connected to Push-button “INT5”
	Open	no connection to INT5
JP16 (TIN0)	Closed	TIN0 is connected to Push-button “TIN0”
	Open	no connection to TIN0
JP20 (IN0)	Closed	IN0 is connected to Push-button “IN0”
	Open	no connection to IN0
JP23 (ADTG)	Closed	ADTG is connected to Push-button “ADTG”
	Open	no connection to ADTG
JP24 (Reset)	Closed	Push-button “Reset” is active
	Open	no external Reset generation

Default: JP12, JP14, JP16, JP20, JP23, JP24 = Closed

By default, INT4, INT5, TIN0, IN0 and ADTG of the microcontroller are connected to the Push buttons and the external Reset-generation is active.

4 Programming the internal Flash

All Flash devices have an internal bootloader for asynchronous- as well as synchronous-Flash-programming:

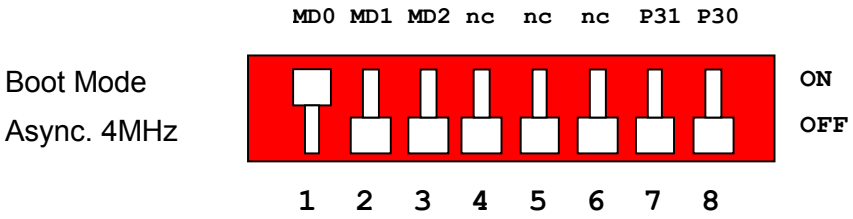
- asynchronous-serial Flash-programming via UART1 (UART"A", X3)
- synchronous-serial Flash-programming via Serial I/O (SCI1, X17)

4.1 Asynchronous Mode

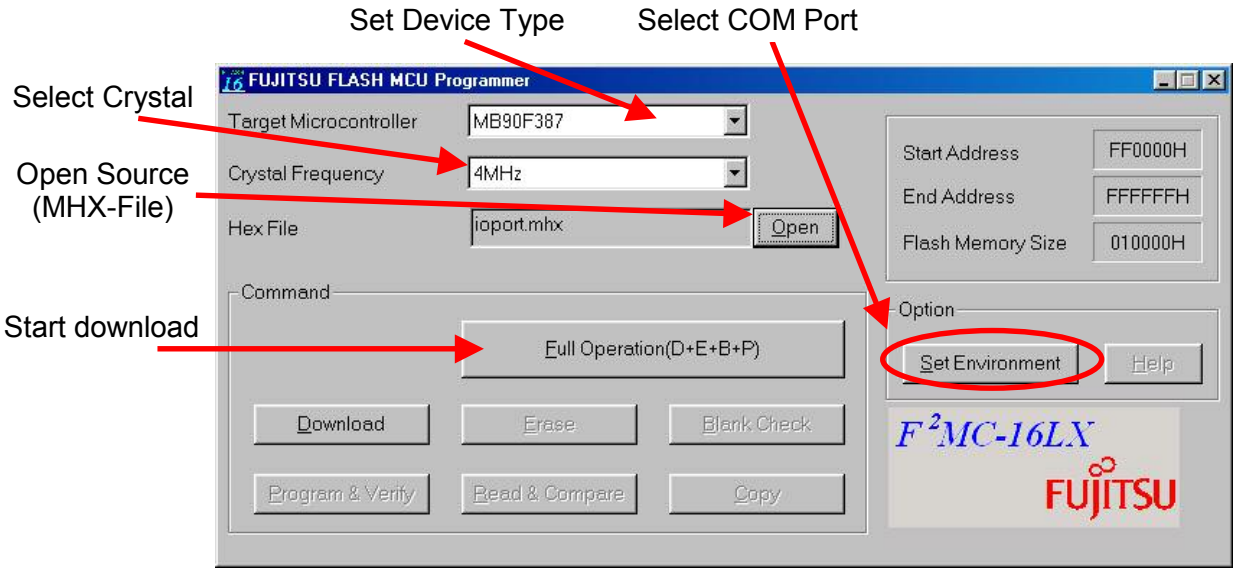
In order to program the Flash-ROM asynchronously via UART1, the tool "Fujitsu Flash MCU Programmer for FMC16LX" can be used. This tool is available free on the Fujitsu Micros CD-ROM or Web Site (http://www.fme.gsdc.de/gsdc.htm: select ▸ Software ▸ Utilities)

The following procedure must be followed to enable Flash Programming:

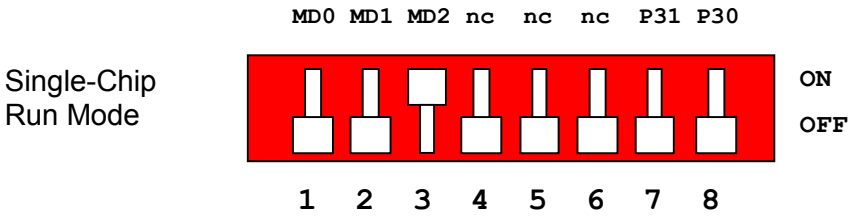
1. Power off the board
2. Connect the Evaluation Board UART"A" to your serial PC communication port.
   Please use a 1:1 cable for the PC-connection.
3. Check the Jumper-settings according to the UART as described in chapter 3.6
4. Configure the chip mode:
   Depending on the external crystal two modes can be selected by DIP-switch S2:



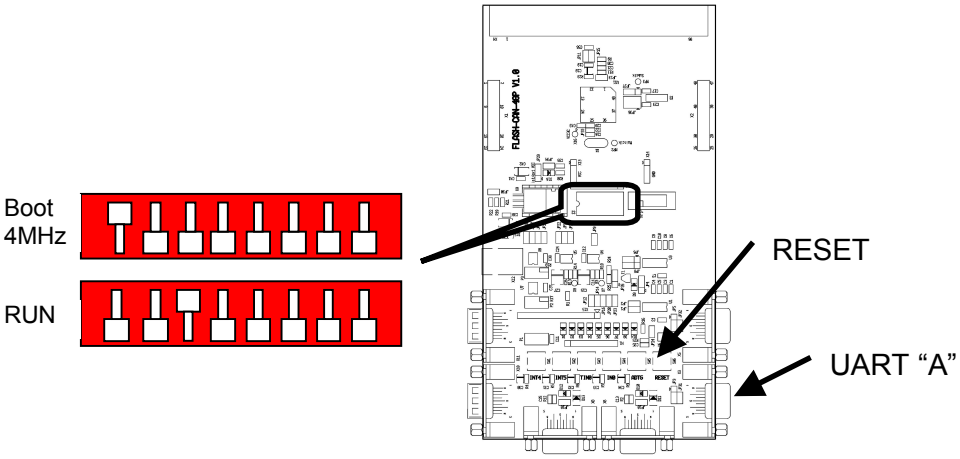
5. Power on the board
6. Check that the Reset LED is off. Otherwise change the DTR polarity (JP35) and check the power supply voltage.
7. Start the tool "Fujitsu Flash MCU Programmer for FMC16LX" software and follow the instructions:



8. After programming the Flash-ROM, switch off the power supply and set back the mode according to the usage of the application, e.g.:



9. Power on the board. The user application is started directly.



4.2 Synchronous Mode

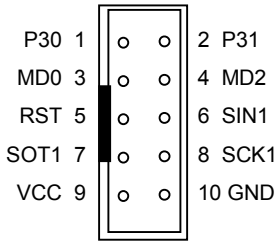
In order to program the Flash-ROM synchronously via Serial-I/O (SCI1) special software has to be used, e.g. Fujitsu 'FlashKit' Tool. This tool is not available free.

Please contact our Web Site in order to get more information about the FlashKit-Tool:

http://www.fme.gsdc.de/gsdc.htm: select ▸ Tools ▸ Programme ▸ MCU FlashKit

A dedicated Flash programming socket (X17) is provided on the FLASH-CAN-48P board for direct connection to the Fujitsu 'FlashKit'.

X17: Flash programming socket

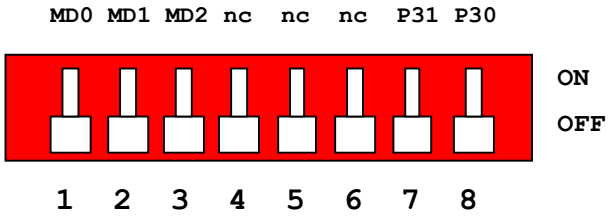


Note:

Open Jumper JP1 and JP2 in order to disconnect UART1 from the RS232-Transceiver !

In case that the FlashKit-Tool is used, all Mode-settings will be done automatically by the FlashKit. This means that all DIP-switch S2 has to be set to the "OFF" position.

When using the FlashKit-Tool…

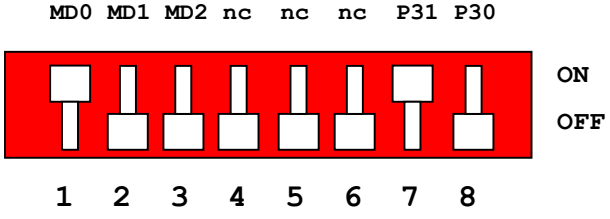


Please refer to the manual of the FlashKit for more information how to program a Flash-device by the synchronous-serial mode.

Note:

In case that another Programming-Tool is used and the Mode-settings have to be done manually then use the following configuration of DIP-switch S2 in order to select the synchronous-serial Flash-programming mode:

synchronous Boot-Mode

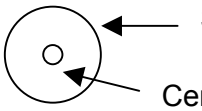


5 Connectors

5.1 Power connector (X12)

The following figure shows the power connection jack X12. This connector is used to connect an external unregulated DC power supply voltage (9V-12V DC) to the evaluation board.

Connector X12:



Shield is connected to positive voltage supply

Centre is connected to ground (GND)

It is recommended to use 9V to keep the power dissipation to a minimum. Otherwise, an additional heat sink for the linear voltage regulator might be necessary.

5.2 Edge connector (X1, X2)

All pins of the microcontroller are directly connected to X1 and X2, both are 2 x 12 Pin headers, as follows:

Connector	MCU Pins
X1 (1 – 24)	1 – 24
X2 (25 – 48)	25 – 48

The odd pin numbers are located on the one side and the even pin numbers are located on the other side of the connector.

On the PCB, the corresponding pin numbers of the µC are written next to the connector pins.

5.3 UART"A" connector (X3)

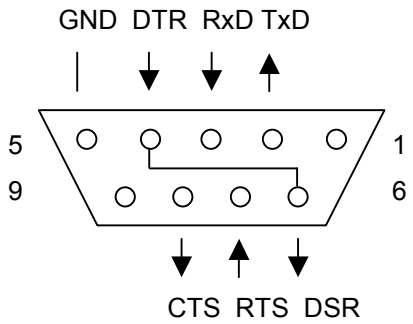
One 9-pin D-Sub female connector is used for the serial interface UART"B".

TXD is the transmit output, RXD is the receive input.

The DTR or RTS signal can be used to generate a reset.

Please use 1:1 cable for PC-connection.

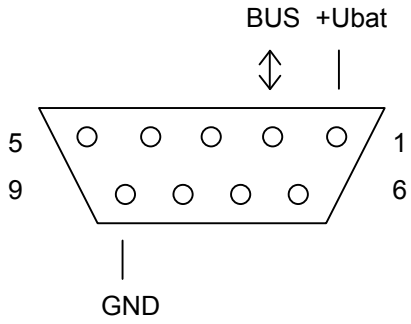
Connector X3:



5.4 LIN"A" Interface connector (X8)

One 9-pin D-Sub female connector is used for the LIN-communication.

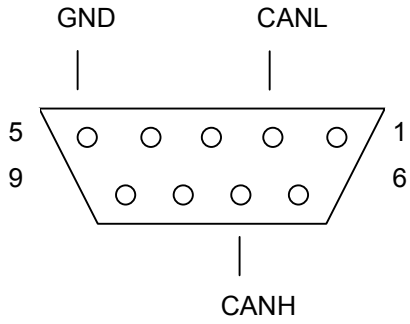
Connector X8:



5.5 CAN"A" Interface connector (X10)

One 9-pin D-Sub male connector is used for the CAN interface.

Connector X10:

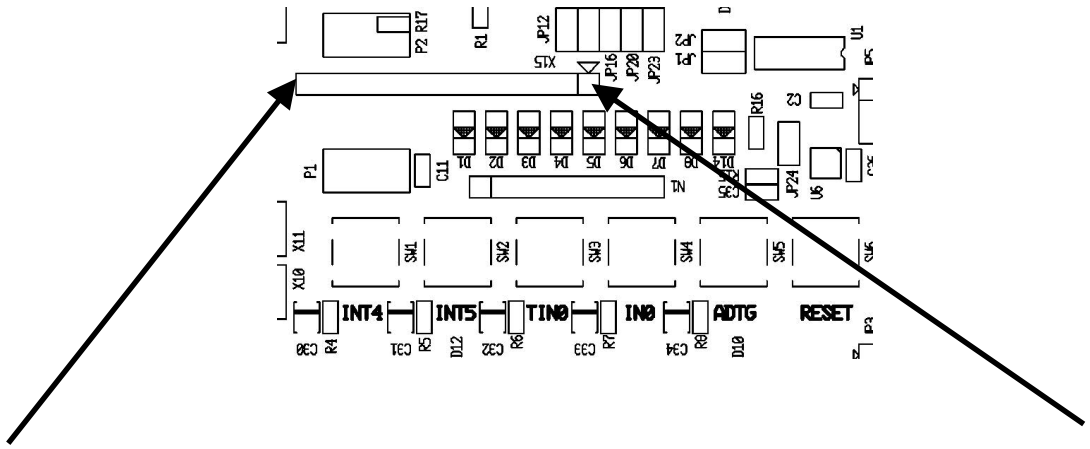


5.6 USER-LEDs & LC-Display (optional)

Eight LEDs are reserved for user-application. In order to disconnect the LEDs from the related microcontroller port, the resistor network N1 can be removed. Take care that, in case of asynchronous programming, the low-level of P30 and P31 is reached by the resistor-network N1 and the LEDs D1/D2. If N1 is removed in order to free the Port, then P30 and P31 have to be connected manually to GND. See chapter 4 for more details.

Instead of the user-LEDs one alphanumeric LC-Display (optional) can be connected.

The following control-signals are reserved:



	14	13	12	11	10	9	8	7	6	5	4	3	2	1
LCD	D6	D5	D4	D3	-	-	-	-	E	R/W	RS	V0	VCC	GND
LED	D8	D7	D6	D5				D4	D3	D2	D1			
MCU	10	9	8	7				45	44	43	42			
Port	P57	P56	P55	P54				P33	P32	P31	P30			

5.7 VG96 connector (X4)

The signal-layout of connector X4 is near the same as used with the Evaluation-Board Flash-CAN-64P-M09-V2 that will be used together with the MB90495series.

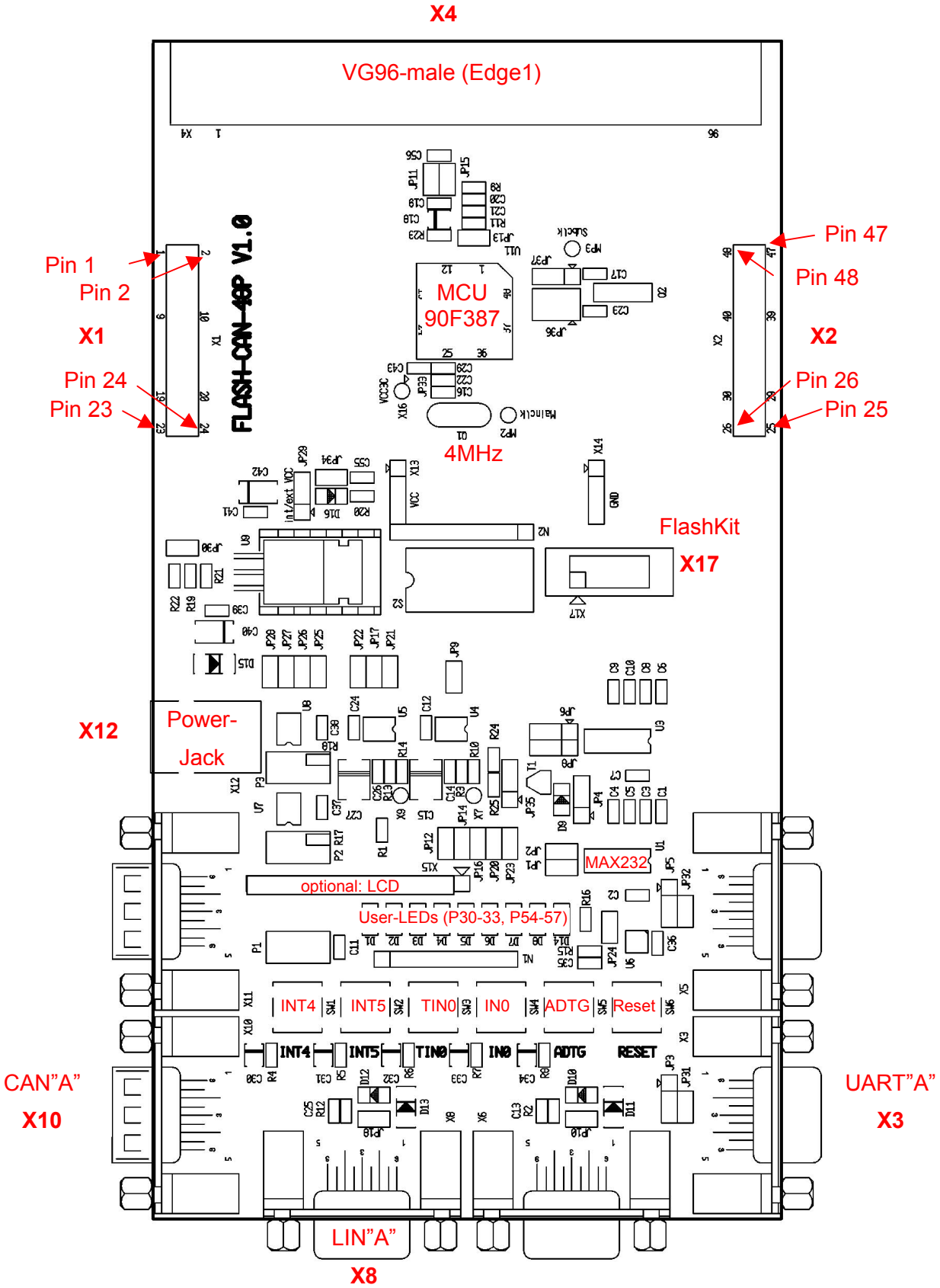
Connector X4	FLASH-CAN-48P MB90385/MB90455 series		FLASH-CAN-64P MB90495 series	
A1	-	-	1	P61/INT1
C1	-	-	2	P62/INT2
A2	3	P50/AN0	3	P50/AN0
C2	4	P51/AN1	4	P51/AN1
A3	5	P52/AN3	5	P52/AN3
C3	6	P53/AN3	6	P53/AN3
A4	7	P54/AN4	7	P54/AN4
C4	8	P55/AN5	8	P55/AN5
A5	9	P56/AN6	9	P56/AN6
C5	10	P57/AN7	10	P57/AN7
A6	-	-	11	AVcc
C6	-	-	12	AVR
A7	-	-	13	AVss
C7	-	-	14	P60/INT0
A8	-	-	15	X0A
C8	-	-	16	X1A
A9	-	-	17	P63/INT3
C9	-	-	18	MD0
A10	23	RSTX	19	RSTX
C10	-	-	20	MD1
A11	-	-	21	MD2
C11	-	-	22	X0
A12	-	-	23	X1
C12	25	Vss	24	Vss
A13	-	-	25	P00/AD00
C13	-	-	26	P01/AD01
A14	-	-	27	P02/AD02
C14	-	-	28	P03/AD03
A15	-	-	29	P04/AD04
C15	-	-	30	P05/AD05
A16	-	-	31	P06/AD06
C16	-	-	32	P07/AD07

Connector X4	FLASH-CAN-48P MB90385/MB90455 series		FLASH-CAN-64P MB90495 series	
A17	29	P10/IN0	33	P10/IN0/AD08
C17	30	P11/IN1	34	P11/IN1/AD09
A18	31	P12/IN2	35	P12/IN2/AD10
C18	32	P13/IN3	36	P13/IN3/AD11
A19	33	P14/PPG0	37	P14/PPG0/AD12
C19	34	P15/PPG1	38	P15/PPG1/AD13
A20	35	P16/PPG2	39	P16/PPG2/AD14
C20	36	P17/PPG3	40	P17/PPG3/AD15
A21	12	P20/TIN0/	41	P20/TIN0/A16
C21	13	P21/TOUT0	42	P21/TOUT0/A17
A22	14	P22/TIN1	43	P22/TIN1/A18
C22	15	P23/TOUT1	44	P23/TOUT1/A19
A23	16	P24/INT4	45	P24/INT4/A20
C23	17	P25/INT5	46	P25/INT5/A21
A24	18	P26/INT6	47	P26/INT6/A22
C24	19	P27/INT7	48	P27/INT7/A23
A25	25	Vss	49	Vss
C25	42	P30	50	P30/SOT0/ALE
A26	43	P31	51	P31/SCK0/RDX
C26	44	P32	52	P32/SIN0/WRLX
A27	45	P33	53	P33/WRHX
C27	-	-	54	P34/HRQ
A28	(46)	(P35) *2	55	P35/HAKX
C28	24	Vcc	56	Vcc
A29	-	-	57	C
C29	(47)	(P36) *2	58	P36/FRCK/RDY
A30	11	P37/ADTG	59	P37/ADTG/CLK
C30	37	P40/SIN1	60	P40/SIN1
A31	38	P41/SCK1	61	P41/SCK1
C31	39	P42/SOT1	62	P42/SOT1
A32	40	P43/(TX)*1	63	P43/TX
C32	41	P44/(RX)*1	64	P44/RX

*1 only MB90385series

*2 only MB90F38xS /MB90F45xS

6 Silk-Plot of the Board



7 Related Products

FLASH-CAN-48P-M26	Evaluation board for MB90385 and MB90455 series with socket and MB90F387
FLASH-CAN-48P-90F387	Evaluation board for MB90385 and MB90455 series with soldered microcontroller MB90F387 (without socket)
MB2141A/B	Emulator debugger main unit
MB2145-507	Emulation adapter for MB90385 and MB90455 series
MB2132-466	Emulator probe cable for package (FPT-48P-M26)
MB90V495G	Evaluation chip for MB90385 and MB90455 series
MB90F387	Flash-Microcontroller with CAN and with Subclock
MB90F387S	Flash-Microcontroller with CAN but without Subclock
MB90F45x	Flash-Microcontroller without CAN but with Subclock
MB90F45xS	Flash-Microcontroller without CAN and without Subclock
NQPACK48SD	Socket for package FPT-48P-M26 (Tokyo Eletech Corp. www.tetc.co.jp/e_tet.htm)
HQPACK48SD	Header for NQPACK48SD

8 Information in the WWW

Information about FUJITSU MICROELECTRONICS Products
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Memory products: Flash, SDRAM and FRAM

http://www.fme.fujitsu.com/products/memory/index1.html

Linear Products: Power Management, A/D and D/A Converters

http://www.fme.fujitsu.com/products/linear/start.html

Media Products: SAW filters, acoustic resonators and VCOs

http://www.fme.fujitsu.com/products/media/index1.html

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