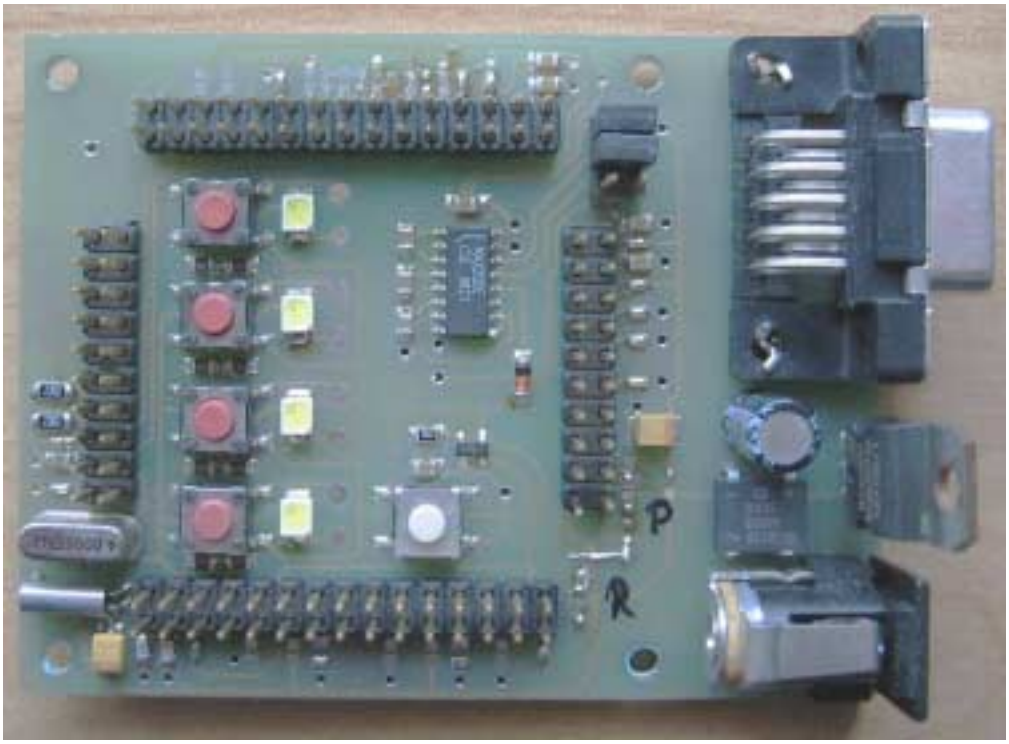
EVB-MB90420
EVB-MB90440
EVB-MB90470
EVB-MB90480
EVB-MB90540/545

EVB-MB90F543

EVB-MB90550
EVB-MB90580
EVB-MB90590/595

Documentation

(DocRev: 0.1 - BoardRev:1.0)



Garantie

Dieses Evaluierungs-Board und alle weiteren Lieferbestandteile,
sowohl Hard- als auch Software,
werden nur für den Laboreinsatz bereitgestellt.
Es wird keine Garantie für Schäden an Geräten und Personen übernommen,
die durch den Einsatz des Evaluierungs-Board entstehen.

Warranty and Disclaimer

This Evaluation-Board and all its deliverables,
hardware as well as software,
are intended and must only be used in an evaluation laboratory environment.
No Guarantee will be overtaken for any demage of any part or person,
that will occurre as a result of this Evaluation-Board.

Contents

1. Overview

1.1. Abstract

The EVB-MB90F543 is a low cost multifunctional evaluation board for different microcontroller series of Fujitsu's 16LX family. 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 Fujitsu's 16LX series:
  MB90420, MB90440, MB90470, MB90480,
  MB90540/545, MB90550, MB90580, MB90590/595
- LQFP-100 package can be used (FPT-100P-M06)
- 9-12V unstabilized external DC power supply
- 5V Regulator on-board
- 4 MHz main crystal, 32.768KHz Sub-clock
- All pins routed to connectors
- All resources available for evaluation
- One UART Interfaces (RS232 Transceiver on board)
- 4 User LEDs + 4 User-Buttons
- Reset Button
- In-Circuit serial Flash programming (asynchronous)

The target board will be delivered with the MB90F543G Flash-ROM microcontroller. This microcontroller contains the 'burn-in'-boot loader for programming the flash.

Note: In order to use this evaluation-board with other Flash-devices than MB90F543, please check jumpers and power-supply !
Mainly this manual will refer to the MB90F543 as it is delivered with, but hints for modifications and jumpersettings will given in each chapter how to support other devices, too

1.3. General Description

The EVB-MB90F543 is designed to support different microcontroller series of Fujitsu's 16LX family in a LQFP-100 package (FPT-100P-M06).

By default the board is supplied with a 4MHz crystal in a socket as the main oscillation clock. Using the internal PLL of the µC, internal clock rates up to 16MHz can be achieved (Please refer to the Datasheet of the microcontroller).

One separate RS232 transceiver is available to connect the on-chip UART to the 9-pin D-Sub connector (J3). The transceivers generates the adequate RS232 levels for the receive (RXD) and transmit (TXD) lines. The RXD and TXD lines may be swapped by jumpers (JP16) for use with crossed or non-crossed cable.
The DTR line or the RTS line of the connector can be configured (JP18) to reset the microcontroller.

All pins of the Microcontrollers are connected to edge connectors and are directly available to the user.

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 five push button switches on the board, one for Reset and four for free programmable user-buttons.

Four user-LEDs are avaible for free use.

The operating mode of the microcontroller can be selected by the jumpers.

2. Installation

2.1. First steps

Carefully remove the board from the shipping carton.
Check first if there are any damages before power on the evaluation board.

Note:
For the power supply an AC or DC input voltage of 9V – 12V is recommended!
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.

The evaluation board is equipped with a Flash-Controller and the device has been programmed with a test program. So after power-on a welcome string is continuously output with 9600 baud on both UART channels.
The in-circuit programming allows the user to program it's own application into the Flash-memory. How to program the Flash memory is described in chapter 4.

2.2. Software

Example-projects can be downloaded from the following locations:

Fujitsu homepage ➔ www.fme.gsdc.de/gsdc.htm

HW-Datentechnik homepage ➔ www.wech-datentechnik.de.vu

3. Power Supply

3.1. General

The on-board voltage regulator allows the user to connect an unregulated DC input voltage between +9V to +12V.
The output voltage of the voltage regulator is adjusted to 5V by the resistors R17 and R18.

Note:
In case of any modifications of the board, care should be taken that the total power consumption will not damage the regulatorJumper

3.2. Capacitors

Depending on the microcontroller series some capacitors have to be assembled:

Jump	Description	MB90420	MB90440	MB90470/480	MB90540/545	MB90550	MB90580	MB90590/595
C15	Power Supply (Pin23)	100nF	100nF	100nF	100nF	100nF	100nF	100nF
C16	A/D-Converter (Pin34)	100nF	100nF		100nF	100nF	100nF	100nF
C17	A/D-Converter (Pin35)	100nF	100nF	100nF	100nF	100nF	100nF	100nF
C18	Stepper-Motor (Pin58)	100nF						100nF
C19	Stepper-Motor (Pin68)	100nF						100nF
C20	Power Supply (Pin84)	100nF	100nF	100nF	100nF	100nF	100nF	100nF

3.3. Important for MB90470 / MB90480series

If the board will be used with Flash-Devices of the MB90470 or MB90480series, then the output voltage has to be reduced to +3V (please check datasheet of microcontroller).
In this case the resistors R17 and R18 have to be changed:

Output Voltage	R17	R18
+5V		
+3V3		
+3V		

Please take care, that in case of an output-voltage other than +5V,
the on-board reset-circuit may not work properly and will cause a reset all the time.
In this case the jumpers J52 and J57 have to be opened.

4. Jumpers

4.1. Overview

Jump	Description	MB90420	MB90440	MB90470 MB90480	MB90540 MB90545	MB90550	MB90580	MB90590	MB90595
JP1	Reset by UART								
JP2	Swap serial cable	12,34	12,34	12,34	12,34	12,34	12,34	12,34	12,34
J11	Power Supply	Vss	Vss	Vss	Vss	Vss	Vss	Vss	Vss
J14	UART							SOT0	
J16	UART							SIN0	
J17	UART							SIN1	
J18I	UART						SIN0		
J18O	UART		SOT0		SOT0				SOT0
J19	UART					SOT0	SOT0	SOT1	
J20	UART		SIN0		SIN0	SIN0			SIN0
J21	UART		SIN1		SIN1	SIN1			SIN1
J22	UART						SOT1		
J23	Power Supply	Vcc	Vcc	Vcc	Vcc	Vcc	Vcc	Vcc	Vcc
J24	UART		SOT1		SOT1				SOT1
J27	UART			SIN0					
J28	UART			SOT0					
J34	A/D-Converter	AVcc	AVcc		AVcc	AVcc	AVcc	AVcc	AVcc
J35	A/D-Converter	AVR+	AVR+	AVcc	AVR+	AVR+	AVR+	AVR+	AVR+
J36-	A/D-Converter		AVR-		AVR-	AVR-	AVR-	AVR-	AVR-
J36+	A/D-Converter			AVRH					
J37	A/D-Converter	AVss	AVss	AVss	AVss	AVss	AVss	AVss	AVss
J42	Power Supply	Vss	Vss	Vss	Vss	Vss	Vss	Vss	Vss
J47P	Flash-Programming only			P80					
J48P	Flash-Programming only			P81					
J49	Mode-Pin: MD0	(1-2)	(1-2)	(1-2)	(1-2)	(1-2)	(1-2)	(1-2)	(1-2)
J50	Mode-Pin: MD1	(1-2)	(1-2)	(1-2)	(1-2)	(1-2)	(1-2)	(1-2)	(1-2)
J51	Mode-Pin: MD2	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3
J52	Reset-Signal *HST		HST		HST	HST	HST	HST	HST
J53	Stepper Motor Power	DVss						DVss	DVss
J58	Stepper Motor Power	DVcc						DVcc	DVcc
J63	Stepper Motor Power	DVss						DVss	DVss
J68	Stepper Motor Power	DVcc						DVcc	DVcc
J73	Stepper Motor Power	DVss						DVss	DVss
J77	Reset-Signal *RST	RST	RST		RST	RST	RST	RST	
J81	Power Supply	Vss	Vss	Vss	Vss	Vss	Vss	Vss	Vss
J84	Power Supply	Vcc	Vcc	Vcc	Vcc	Vcc	Vcc	Vcc	Vcc
J85	UART	SIN0							
J85P	Flash-Programming only	P00	P00		P00	P00	P00	P00	P00
J86	UART	SOT0							
J86P	Flash-Programming only	P01	P01		P01	P01	P01	P01	P01
J88	UART	SIN1							
J89	UART	SOT1							

4.2. Mode Pins

Ensure that the mode pin settings correspond to the operation-mode of the application.
In general two modes are important:
Single-Chip-Run-mode (default) / Programming-mode (Please see chapter 5)

Jumper	Setting	Logical value	Run-Mode	Pgm-Mode
J49 (MD0)	none	1 (high by pull-up)	None / 1-2	2-3
	1-2	1 (high=Vcc)		
	2-3	0 (low=GND)		
J50 (MD1)	none	1 (high by pull-up)	None / 1-2	None / 1-2
	1-2	1 (high=Vcc)		
	2-3	0 (low=GND)		
J51 (MD2)	none	1 (high by pull-up)	2-3	None / 1-2
	1-2	1 (high=Vcc)		
	2-3	0 (low=GND)		

4.3. Reset

An on-board reset-circuit will assert a reset-signal in case of

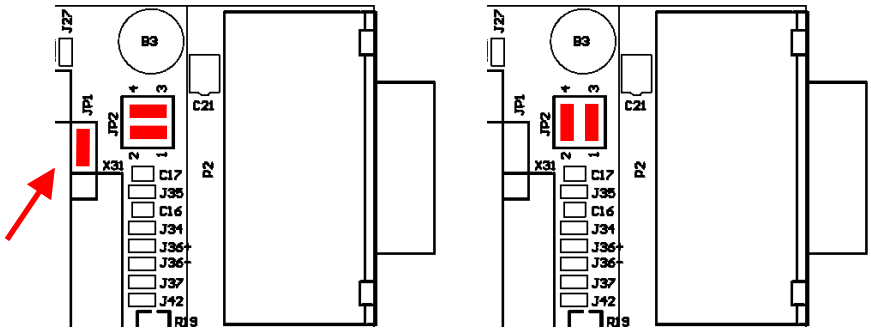
1) Power on
2) Manual Reset if J52 / J77 are set (depending on the Flash device)
3) Reset by UART if JP1 is set

4.4. Uart

One RS232-Transceiver can be switched by jumpers to UART0 or UART1 of the used microcontroller. Please refer to the Jumper-overview (chapter 4.1) for the right setting.

In order to use a 1:1 cable as well as a crossed-cable both RS232-lines can be swaped by JP2.

JP1 can be set in order to generate a reset-signal by the DTR-line



Use 1:1 cable Use crossed cable

Keep in mind, that the burn-in bootloader is dedicated to a fix UART of each microcontroller series. Refer to chapter 5 in order to get more information.

5. Programming the internal Flash

All Flash-devices of Fujitsu's 16LX family series have an internal bootloader for asynchronous Flash-programming via a dedicated UART.

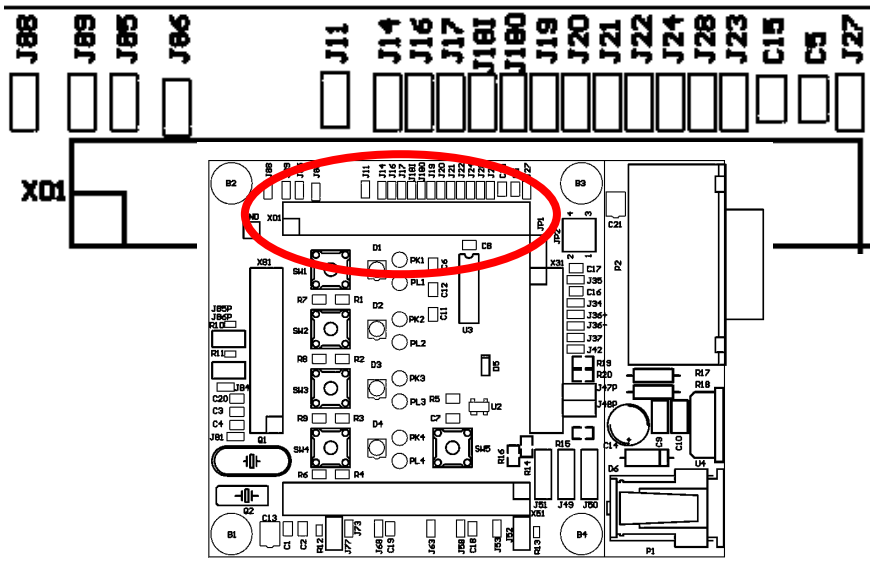
5.1. Asynchronous Mode

In order to program the Flash-ROM asynchronously, a Flash-Memory-Writer Utility must be used. This tool is available for free on the Fujitsu Micros CD-ROM or Web Site (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) Jumper the dedicated bootloader-Uart of the Flash-device to the UART of the board:

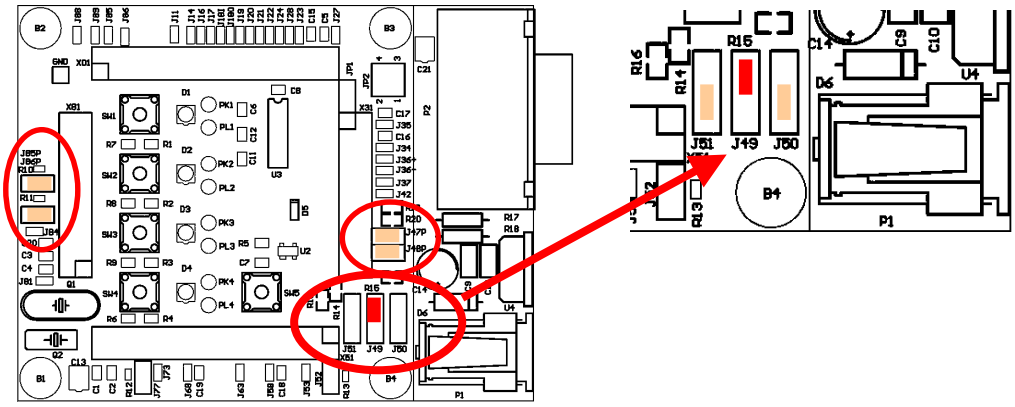
Series	Boot-loader	SIN (RxD)								SOT (TxD)							
		J16	J17	J18I	J20	J21	J85	J27	J88	J14	J18	J19	J22	J24	J28	J86	J89
MB90420	Uart1								x								x
MB90440	Uart1					x								x			
MB90470/480																	
MB90540/545	**Uart1**					**x**								**x**			
MB90550	Uart0				x							x					
MB90580	Uart0			x								x					
MB90590	Uart0	x								x							
MB90595	Uart1					x								x			



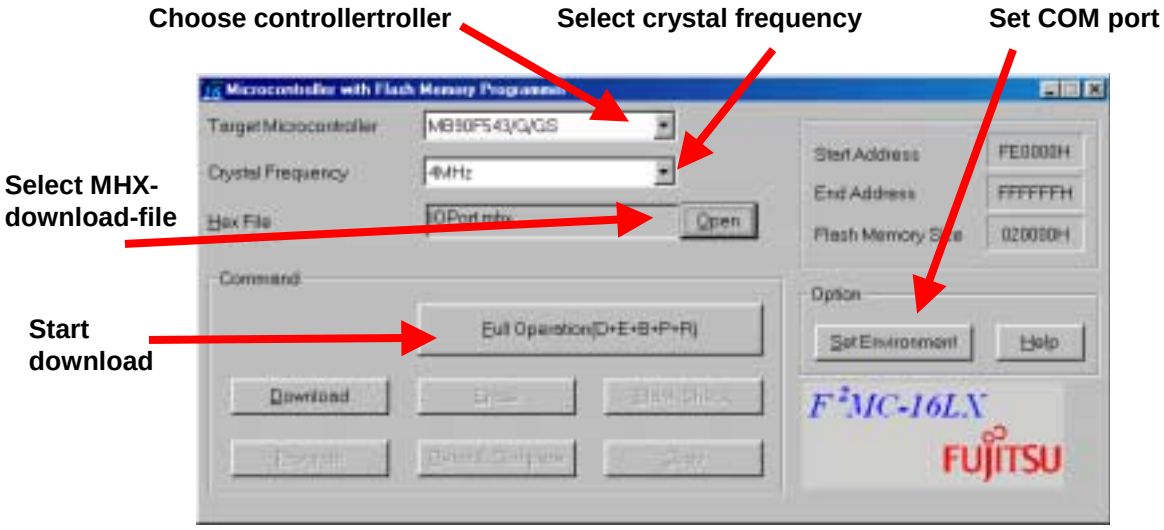
(3) Jumper the Programming-Mode:
For asynchronous programming the mode-pins should be set as follows:
MD2, MD1, MD0 = 1 1 0 ➔ J51: 1-2, J50: 1-2, J49: 2-3

Because of pull-up resistor on the mode-pins,
it should be enough only to jumper MD0 to ground and to leave MD2 and MD1 open.

Further two port-pins have to be set to low-level:
MB90420, MB90540/545, MB90550, MB90580, MB90590/595: P01,P00 = 0 0
MB90470, MB90480 P81,P80 = 0 0
Because of pull-down resistors on that port-pins,
it should be okay to leave these jumpers open.



(4) Connect the Evaluation Board UART to your serial PC communication port.
(5) Power on the board
(6) Start the Flash-Memory-Writer software and follow the instructions

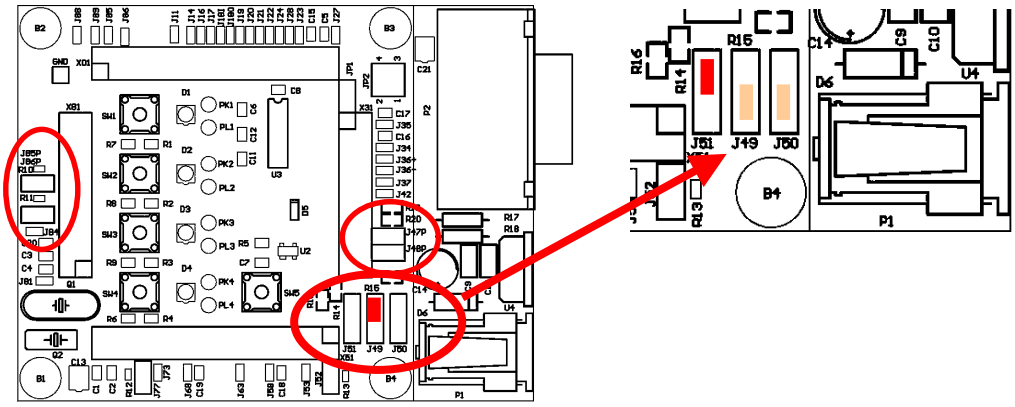


(7) After programming the Flash-ROM, switch off the power supply and set the Run-Mode:

For Single-Chip the mode-pins should be set as follows:
MD2, MD1, MD0 = 0 1 1 ➔ J51: 2-3, J50: 1-2, J49: 1-2

Because of pull-up resistor on the mode-pins,
it should be enough only to jumper MD2 to ground and to leave MD1 and MD0 open.

In case that the two port-pins were set to low-level by jumpers,
open these jumpers to free the port.



(8) Power on the board. The user application is started directly.

6. Connectors

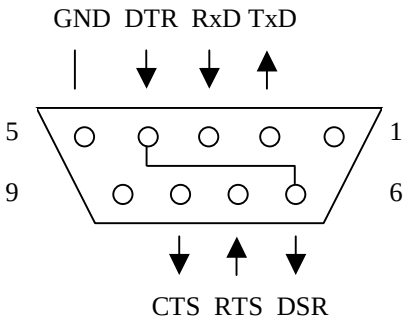
6.1. Edge connector (X01, X31, X51, X81)

All pins of the microcontroller are directly connected to edge connectors:

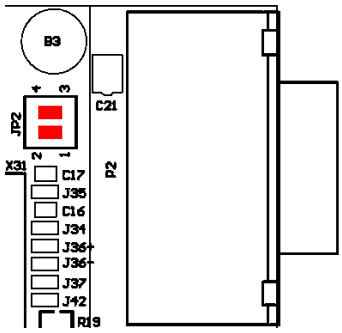
Connector	MCU Pins
X01 (1 – 30)	1 – 30
X31 (1-20)	31 – 50
X51 (1 – 30)	51 – 80
X81 (1-20)	81 – 100

6.2. UART (P2)

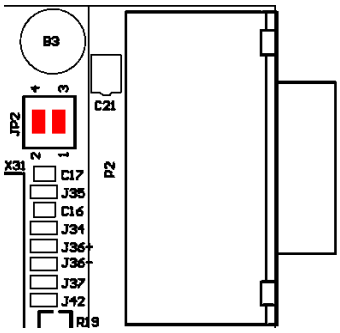
The following diagram shows the connection of the 9-pin D-Sub female connector P2 that is used for the serial interfaces.



TXD is the transmit output.
RXD is the receive input.
Both signals can be swapped by JP2.
The DTR signal can be used to generate a reset.



Use 1:1 cable



Use crossed cable

7. Silk-Plot of the Board

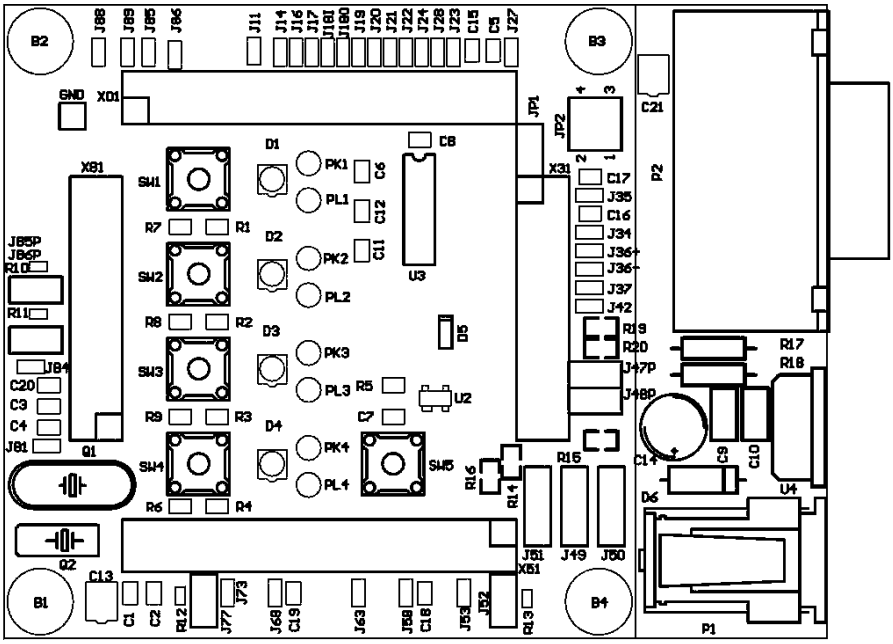


Figure 6.1: Silk-Plot Top

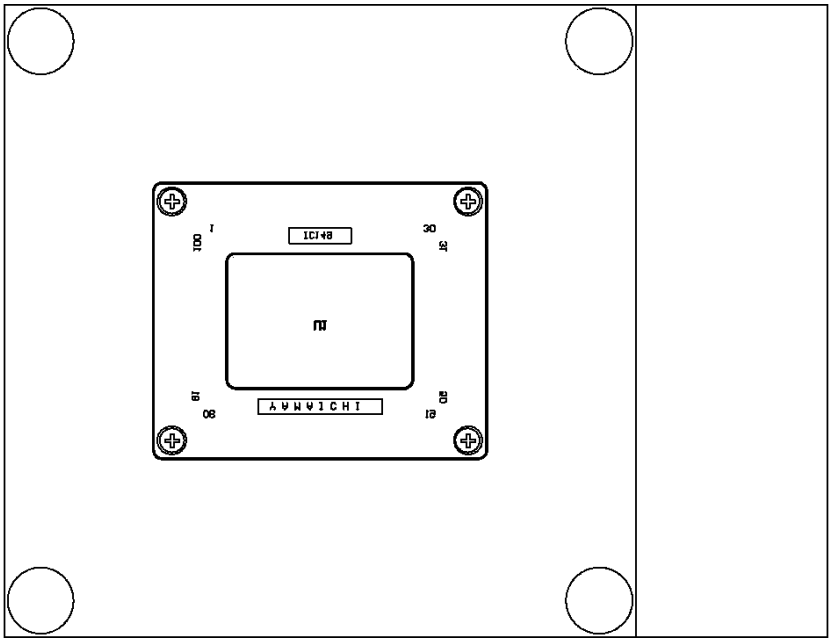


Figure 6.1: Silk-Plot Bottom

8. Revision and Error List

The following bugs have been found with the board and need to be observed when working with this tool:

Date	Revisions – Errors	Board	Doc
28.08.02	First Release	1.0	1.0