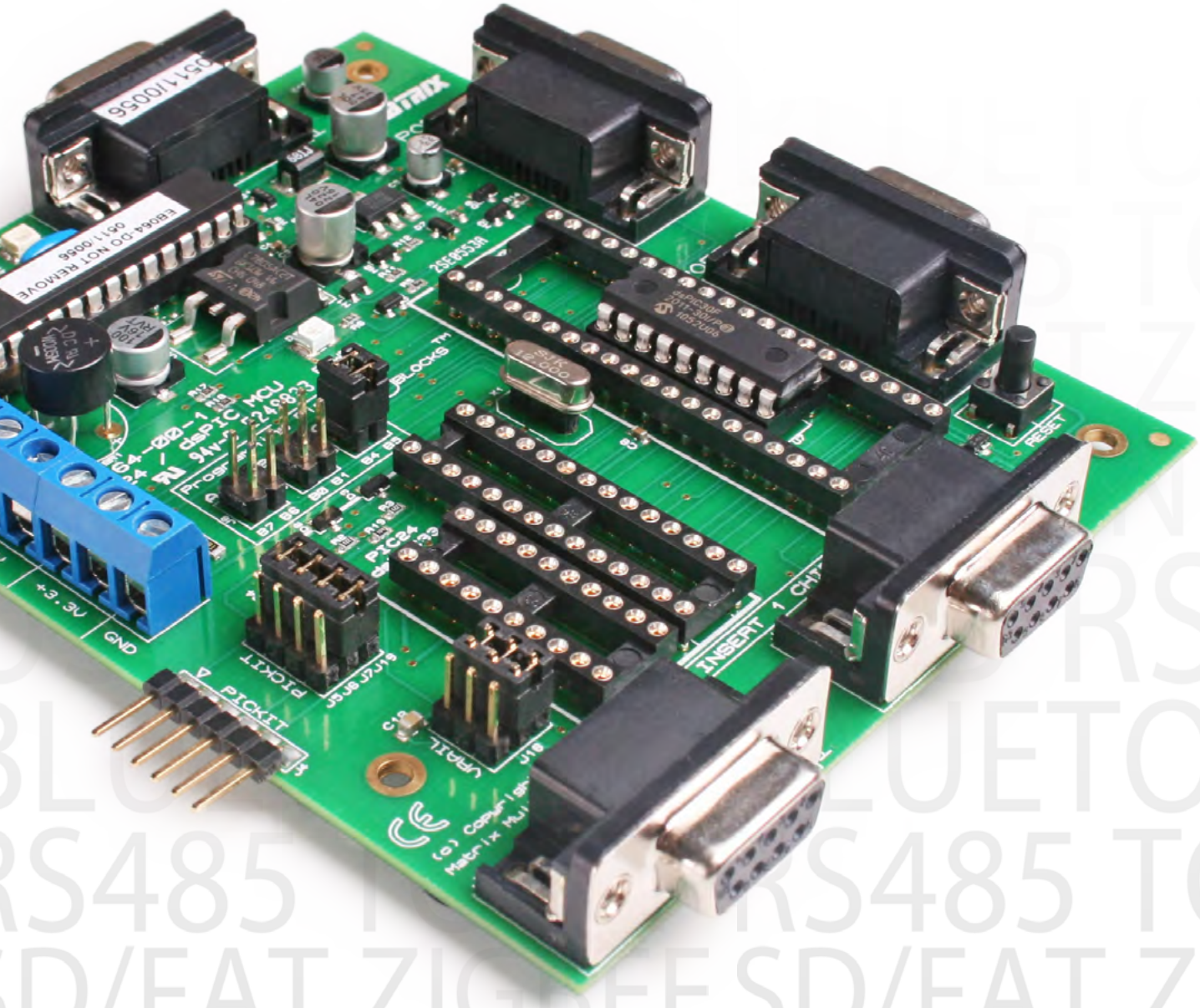
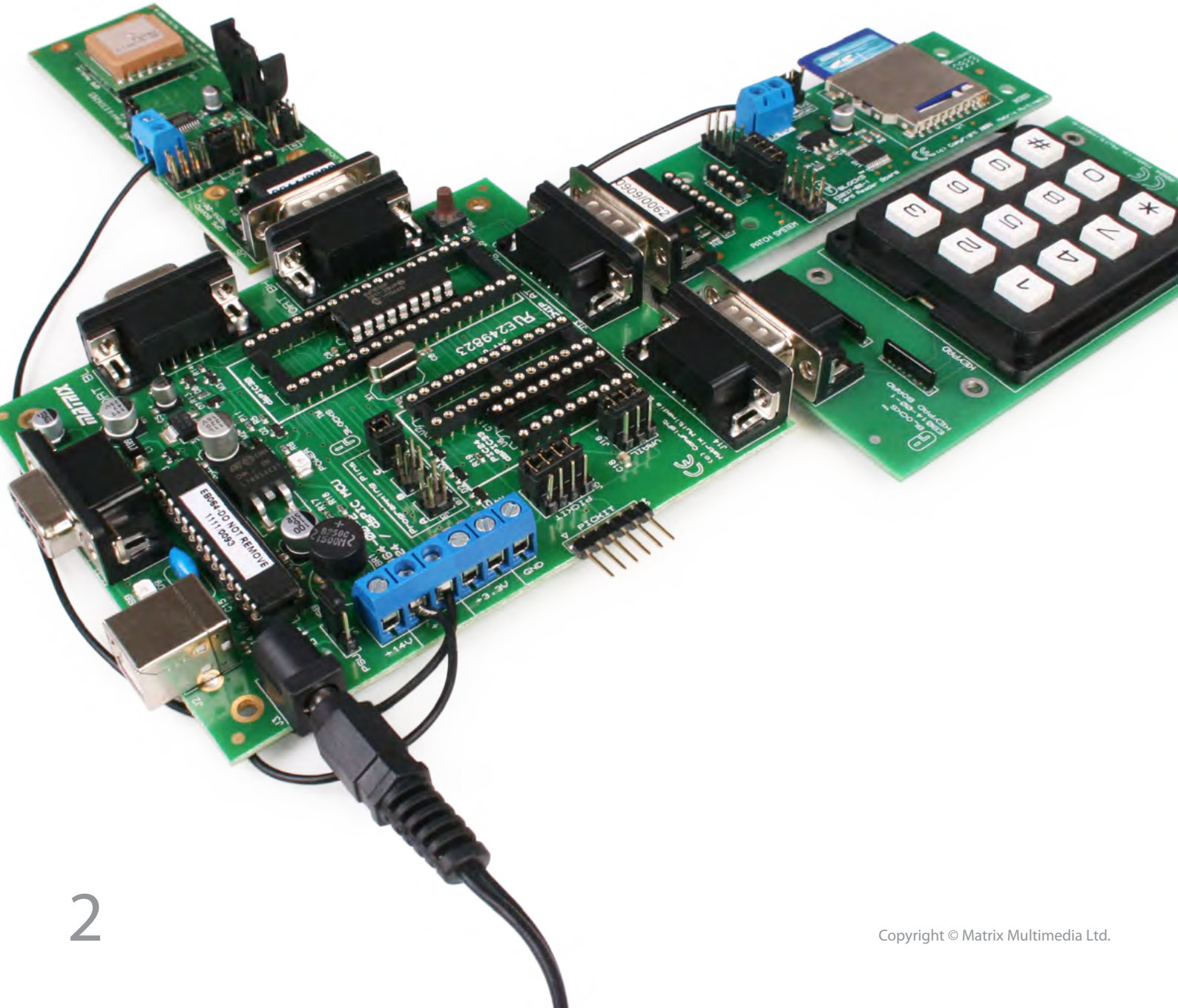
MATRIX

eBLOCKS®

dsPIC / PIC24 board



Contents



About this document

This document concerns the EB064 E-blocks dsPIC/PIC24 board.

1. Trademarks and copyright

PIC and PICmicro are registered trademarks of Arizona Microchip Inc. E-blocks is a trademark of Matrix Multimedia Ltd.

2. Disclaimer

The information provided within this document is correct at the time of going to press. Matrix Multimedia reserves the right to change specifications from time to time.

3. Testing this product

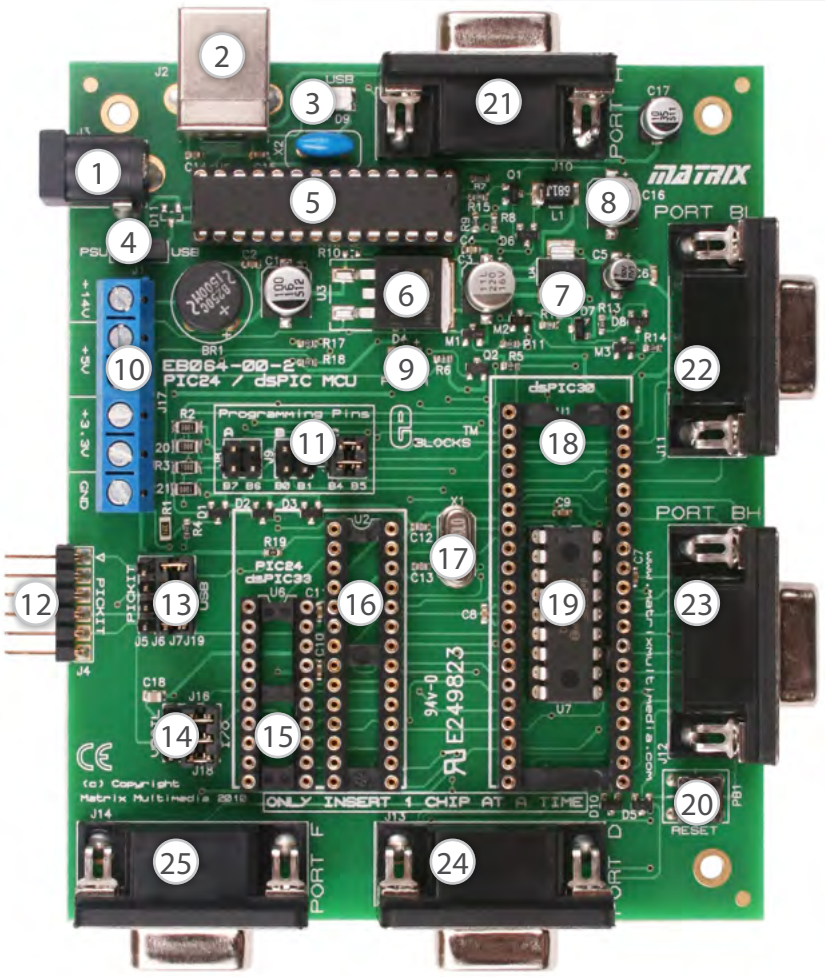
It is advisable to test the product upon receiving it to ensure it works correctly. Matrix provides test procedures for all E-blocks, which can be found in the Support section of the website.

4. Product support

If you require support for this product then please visit the Matrix website, which contains many learning resources for the E-blocks series. On our website you will find:

- How to get started with E-blocks - if you are new to E-blocks and wish to learn how to use them from the beginning there are resources available to help.
- Relevant software and hardware that allow you to use your E-blocks product better.
- Example files and programs.
- Ways to get technical support for your product, either via the forums or by contacting us directly.

Board layout



1. PSU input socket
2. USB socket
3. USB LED
4. PSU / USB power source selection jumper
5. USB PPP microcontroller
6. 5V regulator
7. 3.3V regulator
8. 5V to 12.5V charge pump circuitry
9. Power LED
10. Output power terminals
11. Programming pins selection jumper
12. PICkit header
13. PICkit / PP selection jumper
14. I/O pin assignment jumper
15. 20 pin PIC24 / dsPIC33 socket
16. 28 pin PIC24 / dsPIC33 socket
17. Crystal oscillator
18. 40 pin dsPIC30 socket
19. 18 pin dsPIC30 socket
20. Reset push button
21. Port A downstream socket
22. Port B low downstream socket
23. Port B high downstream socket
24. Port D downstream socket
25. Port F downstream socket

General information

The dsPIC and PIC24 microcontroller programmer connects to your PC via USB to provide you with one of the world's lowest cost and most flexible 16-bit PIC microcontroller programmers. This board can be used with Assembly, C or Flowcode and comes complete with a programming utility provided by Matrix Multimedia. The board will program a range of PIC24, dsPIC30 and dsPIC33 microcontroller devices using the flexible programming software provides. The board also provides 'clean' access to all I/O lines on the relevant PICmicro MCU devices. When used with Flowcode for PIC24 and dsPIC microcontrollers V4.2 and greater, the board has additional In-Circuit Debug facilities.

Please note: dsPIC30 devices have an operating voltage of 5V whereas PIC24 and dsPIC33 devices have an operating voltage of 3.3V. Care should be taken to ensure that the voltage levels presented on I/O pins are within the specification of the chip. More details on the chips I/O tolerances can be found in the microcontroller device datasheet. You should also be aware that the chip sockets are voltage specific so the 40 and 18 pin sockets are for dsPIC30 devices only and the 28 and 20 pin sockets are for PIC24 and dsPIC devices only.

1. Features

- E-blocks compatible
- PIC24 / dsPIC30 / dsPIC33 compatible
- 5V and 3.3V supply terminals
- Powered from USB or 8-14V external supply
- Onboard 5V to 12.5V programming voltage generation
- In-Circuit Debugging (ICD) using Flowcode
- Socketed crystal oscillator
- PICkit interface

2. Supported devices

PIC24 DEVICES

24F08KA101, 24F16KA101, 24F08KA102, 24F16KA102, 24FJ16GA002, 24FJ32GA002, 24FJ32GA102, 24FJ32GB002, 24FJ48GA002, 24FJ64GA002, 24FJ64GA102, 24FJ64GB002, 24HJ12GP202, 24HJ32GP202, 24HJ32GP302, 24HJ64GP202, 24HJ64GP502, 24HJ128GP202

dsPIC30 DEVICES

30F2011, 30F3012, 30F3014, 30F4013

dsPIC33 DEVICES

33FJ12MC201, 33FJ12GP202, 33FJ12MC202, 33FJ32GP202, 33FJ32GP302, 33FJ32MC202, 33FJ32MC302, 33FJ64GP202, 33FJ64GP802, 33FJ64MC202, 33FJ64MC802, 33FJ128GP202, 33FJ128GP802, 33FJ128MC202, 33FJ128MC802

Circuit description

1. Chip compatibility

The design of this product enables you to use this device with many standard PIC24, dsPIC30 and dsPIC33 microcontroller devices. This is achieved by identifying the microcontroller, then by selecting the corresponding jumper settings on the EB064 dsPIC and PIC24.

Please note that the I/O pin assignment jumper is only applicable for the PIC24 and dsPIC33 range of devices. Also note that powering a device using an incorrect pin assignment setting could potentially damage certain I/O of your microcontroller device or cause it not to run as expected.

2. Power supply

The multiprogrammer board comes complete with the circuitry for a charge pump to allow the 5V dsPIC30 devices to be programmed in high voltage mode from a single 5V supply. The allows you to run and reprogram the microcontroller situated on the board using either the USB supply or an external power supply. External power supply voltage should be between 8V and 14V. There is a bridge rectifier fitted to the board so the polarity of the power supply makes no difference to the board. If an external power supply is being used then the supply voltage is also available on the +14V screw terminal. If the USB supply is being used then +14V screw terminal is left disconnected. The recommended power supply for the EB064 is the Matrix power supply unit (PSU)

3. Oscillator configuration

The multiprogrammer board features an onboard removable crystal allowing you to drive the microcontrollers at varying speeds. Most of the PIC24 and dsPIC devices contain onboard phase locked loop (PLL) hardware that can be used to multiply or divide the microcontroller program clock frequency. To work directly with the crystal speed and miss out the PLL the HS oscillator configuration setting can be used for crystal values over 10MHz. Alternatively crystals under 10MHz will need to use the XT oscillator configuration setting. Some devices also require that you write values to registers at the start of

Microcontroller	Socket	Programming pins selection jumper	I/O pins assignment jumper
30F2011	18 pin	C position	N/A
30F3012	18 pin	C position	N/A
24F08KA101	20 pin	B position	I/O position
24F16KA101	20 pin	B position	I/O position
33FJ12MC201	20 pin	B position	Vrail position
24F08KA102	28 pin	B position	I/O position
24F16KA102	28 pin	B position	I/O position
24FJ16GA002	28 pin	B position	Vrail position
24FJ32GA002	28 pin	B position	Vrail position
24FJ32GA102	28 pin	B position	Vrail position
24FJ32GB002	28 pin	B position	Vrail position
24FJ48GA002	28 pin	B position	Vrail position
24FJ64GA002	28 pin	B position	Vrail position
24FJ64GA102	28 pin	B position	Vrail position
24FJ64GB002	28 pin	B position	Vrail position
24HJ12GP202	28 pin	B position	Vrail position
24HJ32GP202	28 pin	B position	Vrail position
24HJ32GP302	28 pin	B position	Vrail position
24HJ64GP202	28 pin	B position	Vrail position
24HJ64GP502	28 pin	B position	Vrail position
24HJ128GP202	28 pin	B position	Vrail position
33FJ12GP202	28 pin	B position	Vrail position
33FJ12MC202	28 pin	B position	Vrail position
33FJ32GP202	28 pin	B position	Vrail position
33FJ32GP302	28 pin	B position	Vrail position
33FJ32MC202	28 pin	B position	Vrail position
33FJ32MC302	28 pin	B position	Vrail position
33FJ64GP202	28 pin	B position	Vrail position
33FJ64GP802	28 pin	B position	Vrail position
33FJ64MC202	28 pin	B position	Vrail position
33FJ64MC802	28 pin	B position	Vrail position
33FJ128GP202	28 pin	B position	Vrail position
33FJ128GP802	28 pin	B position	Vrail position
33FJ128MC202	28 pin	B position	Vrail position
33FJ128MC802	28 pin	B position	Vrail position
30F3014	40 pin	A position	N/A
30F4013	40 pin	A position	N/A

your program before things like the PLL oscillator will start up. For help on setting up your oscillator please refer to the datasheet for the microcontroller device you are using.

4. 5V and 3.3V operation

This board is fully compatible with downstream boards operating off 3.3V or 5V.

When a dsPIC30 device is being used then downstream boards should be placed into 5V mode and the +5V screw terminal should be used to wire a +V signal to the board.

When a PIC24 or a dsPIC33 device is being used then downstream boards should be placed into 3.3V mode where available and the +3.3V screw terminal should be used to wire a +V signal to the board.

Downstream boards requiring a larger supply voltage such as the graphical LCD E-block will have to be powered from the +14V screw terminal output and an external power supply of that voltage should be used to drive the multiprogrammer.

5. PICkit connection

The board comes complete with a PICkit header allowing you to reprogram your PIC24 and dsPIC devices using a PICkit rather than using the PPP software. You must ensure that the 4-way jumper is in the correct position to allow either the PPP or the PICkit programming to link to the microcontroller correctly. You will also need to ensure that the programming pins jumper is correct for the specific microcontroller you are using.

6. I/O connections

Not all pins are available on each port so we have arranged the I/O onto the ports in a way that allows for the maximum amount of flexibility whilst keeping everything as straightforward as possible.

7. In-circuit debugging

The multiprogrammer board has an in-circuit debugging (ICD) connection between the USB peripheral device and the target microcontroller. This allows the Flowcode software to start, stop, step and inspect an active program, synchronised both in hardware and Flowcode software. As well as the standard ICD operation, Flowcode is capable of reading back real time variable values from the target device.

	Bit0	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7
PORTA	RA0	RA1	RC13	RC14	RA4	RA11	RA6	RA7
PORTBL	RB0	RB1	RB2	RB3	RB4	RB5	RB6	RB7
PORTBH	RB8	RB9	RB10	RB11	RB12	RB13	RB14	RB15
PORTD	RD0	RD1	RD2	RD3	RD8	RD9	-	-
PORTF	RF0	RF1	RF2	RF3	RF4	RF5	RF6	-

General information

The test file can be downloaded from:
www.matrixmultimedia.com

1. Installing mLoader

If you are using Flowcode with the EB064, then mLoader is installed automatically as part of the installation, you should therefore skip to the installing drivers section. mLoader can also be downloaded from the support section of our website as a standalone program. If installed as part of Flowcode the default install location is:

C:/Program Files/ Flowcode(PIC16)/v5/Tools/mLoader

2. Installing drivers

The drivers for the EB064 can be found as a download in the support section of the Matrix website.

IMPORTANT: Always install the drivers before plugging in your hardware.

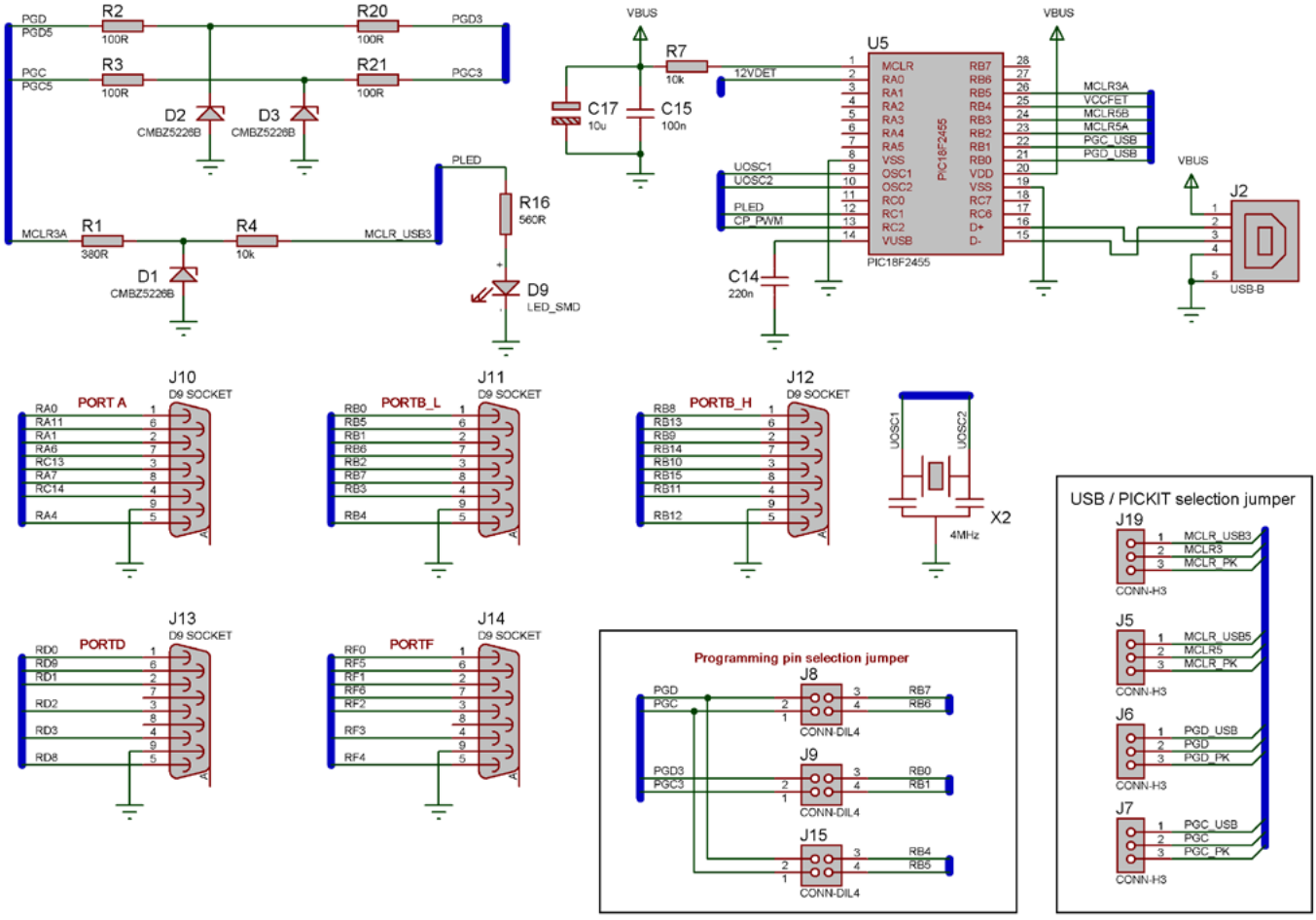
The zip file downloaded from the Matrix website (extract the contents first) will contain three applications you can run which will install the appropriate driver depending on the type of operating system/chipset you running.

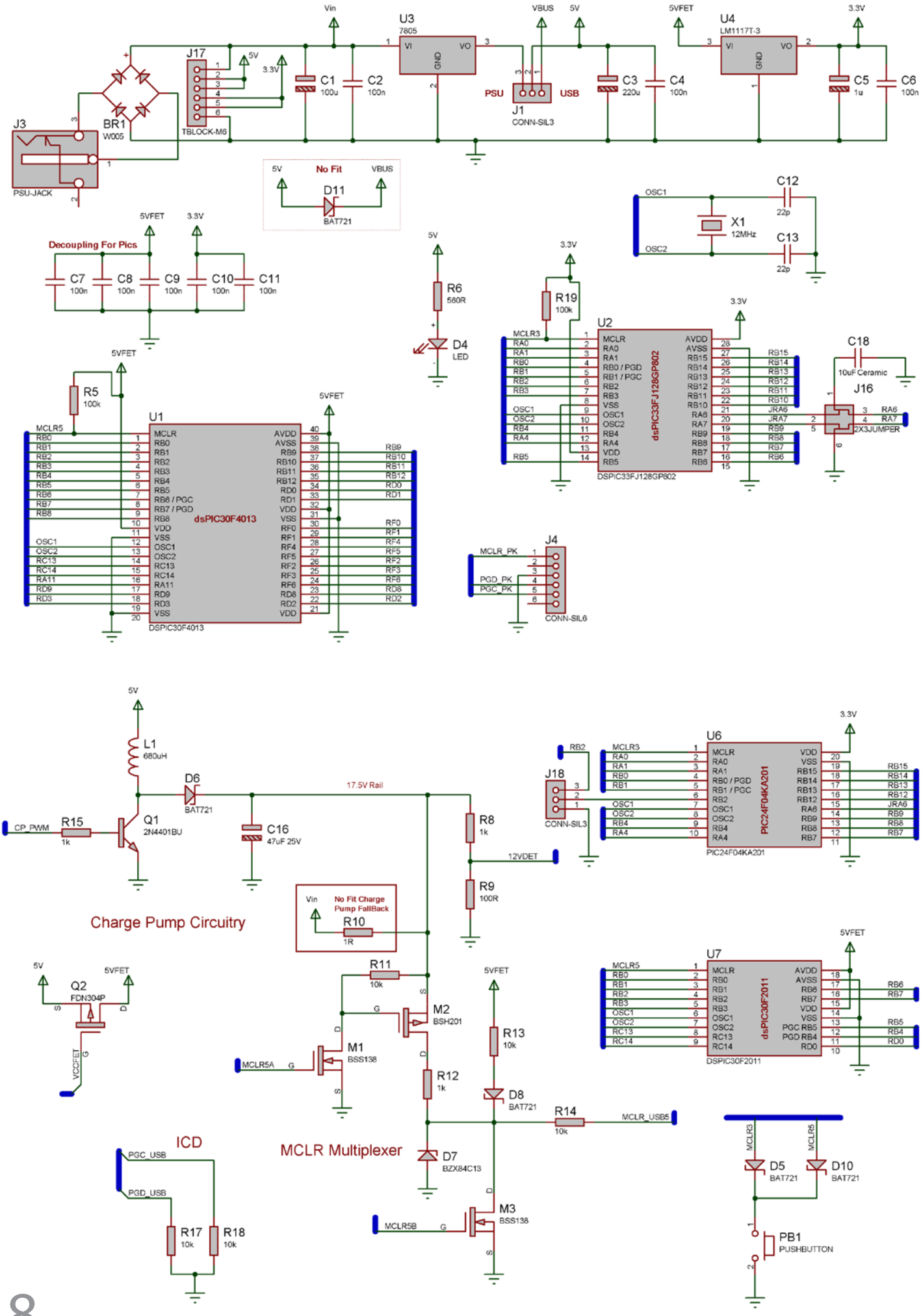
dpinst_amd64.exe - *used for more 64bit computers (AMD or Intel chipsets)*

dpinst_ia64.exe - *used for 64bit computers with Itanium chipsets*
dpinst_x86.exe - *used for 32bit computer (any chipset)*

Follow the installation procedure and if Windows throws up a warning up a warning screen about the driver being digitally signed, click "Install anyway". After the driver has been installed you can plug in the EB006 board and after a few moments it should be detected and recognised by the system, after this the board is ready to be used.

Circuit diagram





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