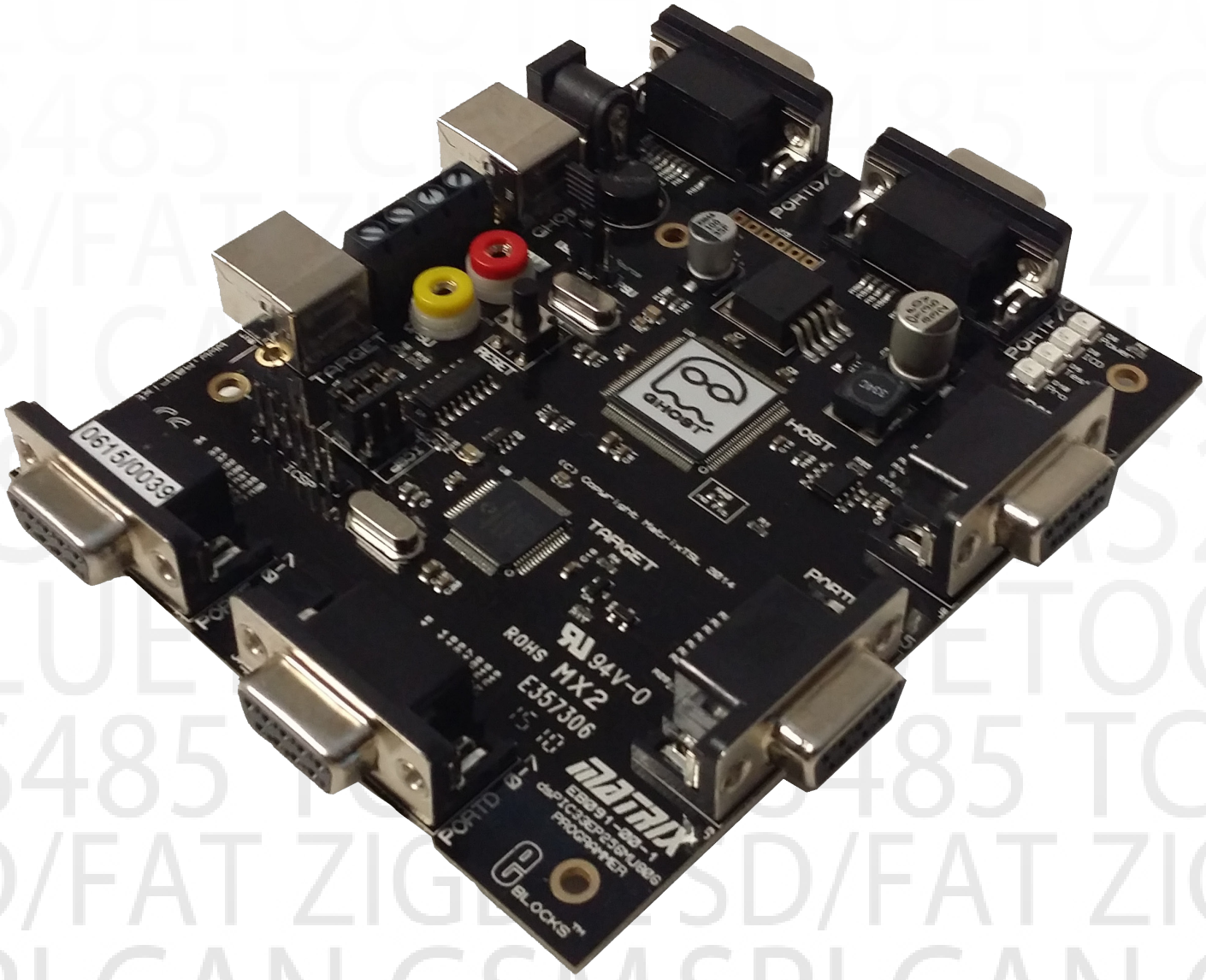
MATRIX

eBLOCKS®

dsPIC Programmer board



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About this document

This document concerns the EB091 E-blocks dsPIC Programmer board.

1. Trademarks and copyright

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

2. Other sources of information

There are various other documents and sources that you may find useful:

- *Getting started with E-blocks.pdf* - This describes the E-block system and how it can be used to develop complete systems for learning electronics and for PICmicro programming
- *PPP help file* - This describes the PPP software and its functionality. PPP software is used for transferring hex code to a PICmicro microcontroller
- *C and Assembly strategies* - Not provided for this product

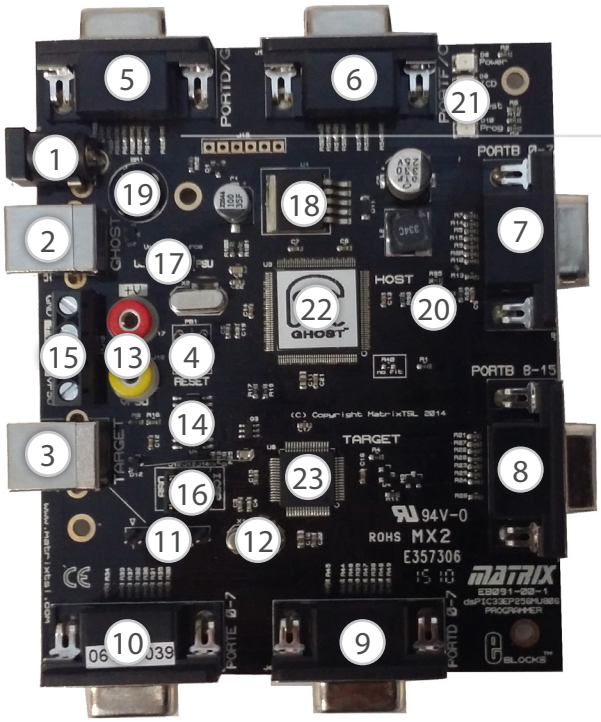
3. Disclaimer

The information provided within this document was correct at the time of going to press. Matrix TSL reserves the right to change specification from time to time. This product is for development purposes only and should not be used for any life-critical application.

4. Technical support

If you have any problems operating this product then please refer to the troubleshoting section of this document first. You will find the latest software updates, FAQs and other information on our website: www.matrixtsl.com

Board layout



1. Power connector - either polarity 5V - 12V
2. Ghost USB connector
3. Target USB connector
4. Reset switch
5. Port D/G I/O
6. Port F/C I/O
7. Port BL I/O
8. Port BH I/O
9. Port DL I/O
10. Port EL I/O
11. PICkit ICSP Header
12. Target crystal oscillator
13. 2mm sockets for supplying power to downstream E-blocks
14. Analogue switch to allow programming and debug pins to be connected / disconnected from circuit
15. Power screw terminals
16. USB/ICSP programming selector
17. USB/PSU power selector
18. 3V3 switch mode voltage regulator
19. Bridge rectifier
20. SRAM storage IC
21. Status LEDs, power, ICD, test, program
22. Ghost microcontroller
23. Target microcontroller

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General information

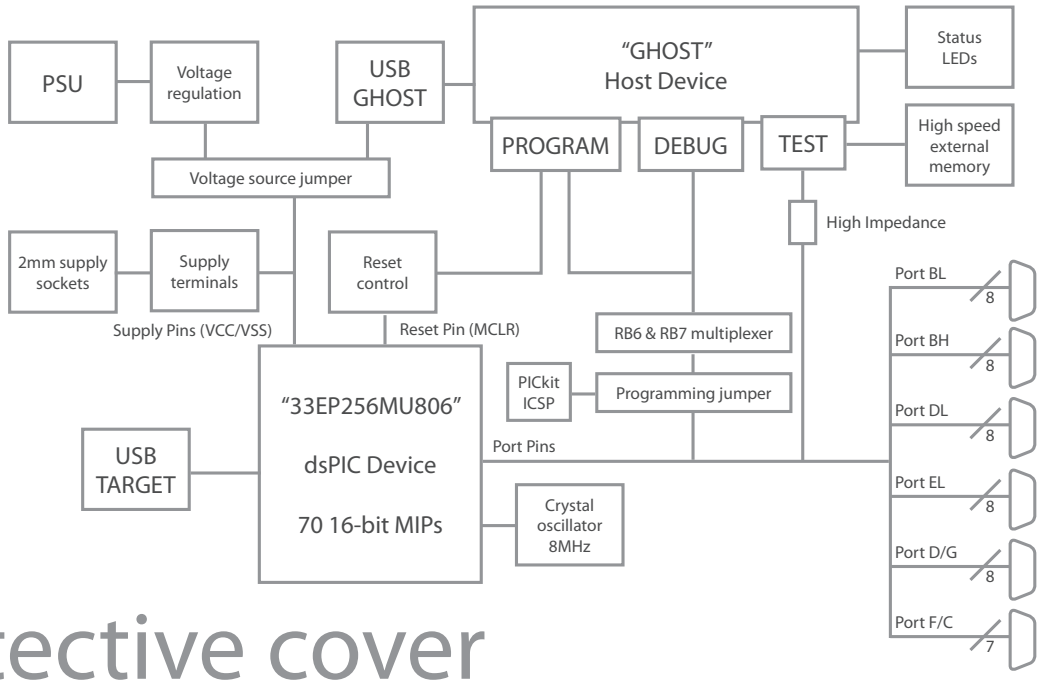
The dsPIC microcontroller E-block connects to your PC via USB to provide you a very simple yet capable way of exploring the dsPIC33EP256MU806 16-bit dsPIC microcontroller. The board provides 'clean' access to all I/O lines on the dsPIC33 device.

When used with Flowcode 6 and greater, the board has additional In-Circuit Debug (ICD) and In-Circuit Test (ICT) facilities which have been captioned Ghost technology.

This board can be used with Assembly, C or Flowcode programming utilities provided by Matrix TSL.

Features:

- E-blocks compatible
- Full suite programming software available
- Ghost technology included
- 6 I/O ports
- Dedicated USB port for dsPIC33 device
- Debug with Flowcode 6
- Test with Flowcode 6
- PICkit 3 ICSP compatible



Protective cover

Most of the boards in the E-blocks range can be fitted with a plastic cover as an optional extra. These covers are there to protect your E-blocks board therefore extending the life of the board. The covers also prevent the removal of external components while still allowing for the adjustment of applicable parts on the board.

12mm M3 spacers, anti-slip M3 nuts and 25mm M3 bolts can be used to attached the cover to the board. These are not included but can be bought separately from our website.

The order code for the EB091 dsPIC programmer board is EB791.

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Circuit description

he dsPIC programmer solution is made up of two parts: A circuit board containing the target microcontroller and the program to be executed 'seamlessly', and the Windows based programming utility 'mLoader'.

1. Power supply

The board is normally operated from a regulated DC supply of 5 -12V or from a USB supply. This allows full operation including programming. The board can be operated solely from the USB cable provided. However care must be taken when connecting additional downstream E-blocks, as there is only limited power that can be taken from a computer's USB port.

The jumper link system, J11, allows the user to decide on the source of the power supply. If using a mains regulated DC power supply the jumper should be positioned to the right hand side of the jumper system labeled 'PSU'. If using USB power place the jumper on the left hand side of the jumper system. LED D6 indicates that power is correctly supplied to the board. Both the Ghost and Target USB ports are capable of supplying power to the board.

Please note that both USB and the PSU cables should be removed from the board BEFORE changing the position of this jumper.

Remember that other E-blocks will have to receive their voltage by placing a connecting wire from the "+V" screw terminal of the programmer to the "+V" screw terminal of each E-Block that requires a voltage.

2. Programming circuit

The programmer board connects to a personal computer via the USB socket. Any USB socket on the PC can be used. The host microcontroller is used to communicate between the USB bus and the programmer circuitry. The host is connected to a network of analogue switches formed by U4. This circuitry routes 0V, VDD, VPP, PGD and PGC to appropriate pins on the slave PICmicro devices as and when necessary.

To use the Microchip PICkit3 ICSP interface instead of the onboard Ghost re-programming, place the 3-way jumper link associated with J12-14 to the right hand side of the 3 x 3 header pins, labeled 'ICSP'. Then simply connect the PICkit into the Multiprogrammer via header J20 ensuring that the orientation of the PICkit matches the markings on the board.

3. I/O ports

The dsPIC33 device pins are connected directly to 6 D-type sockets grouped in ports and providing 47 individual I/O lines. The device also features configurable UART, SPI, PWM and INT peripheral pins allowing you to make the best use of your E-blocks downstream boards.

Each port is also brought out in a no fit SIL connector hidden underneath the D-type socket. This can make it easier to interface and control your own circuitry using the EB091 upstream board.

4. Reset push button

PB1 provides a reset to the target chip by pulling the MCLR pin low. Note that the programming chip will reset the slave PICmicro as part of the send routine so that you do not need to press this switch each time you send your program to the board.

5. Frequency selection

By default the board is fitted with a fixed 8MHz crystal. Flowcode 6 and above will automatically add code to your program to get the chip running at the full speed of 70MIPs provided you select the EB091 as your target instead of selecting the raw chip. For C or Assembly users you will need to add the code to configure the PLL module on-board the chip to achieve full speed operation.

6. 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, synchronized both in hardware and Flowcode 6 software. As well as the standard ICD operation, Flowcode is capable of reading back real time variable values from the target device.

7. In-Circuit test

The Multiprogrammer board has an in-circuit test (ICT) connection between the USB peripheral device and all of the target microcontroller's I/O pins. This allows the Flowcode 6 software to monitor all of the signals on the board in either analogue or digital modes.

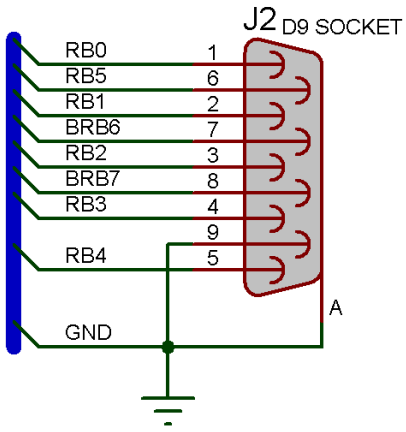
The in circuit test feature can be combined with packet decoding to allow data and control busses to be explored and debugged.

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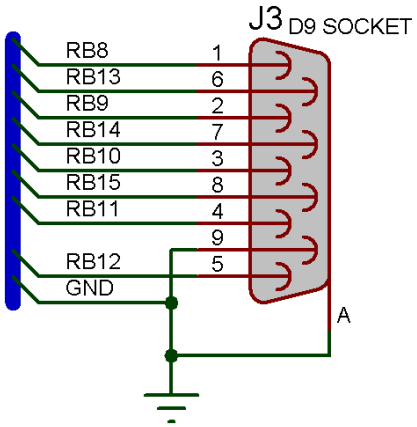
dsPIC33EP256MU806 pin out details

The pins of the target microcontroller have been brought through to the D-type downstream connectors in a logical manner. Please note that most of the 16-bit ports on the target chip are not full ports and as many of the available I/O have been brought out as possible. The specific connections are as follows:

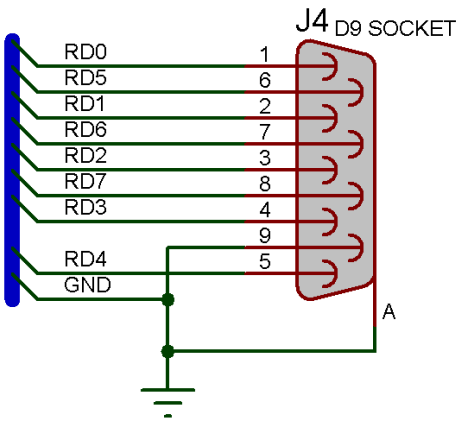
1. Port B 0-7 - PORTBL



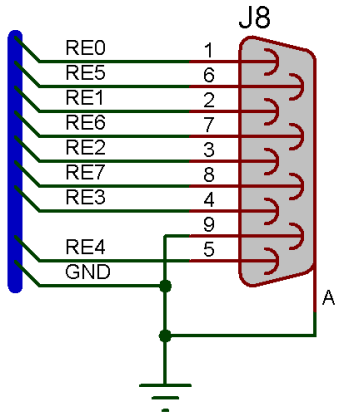
2. Port B 8-15 - PORTBH



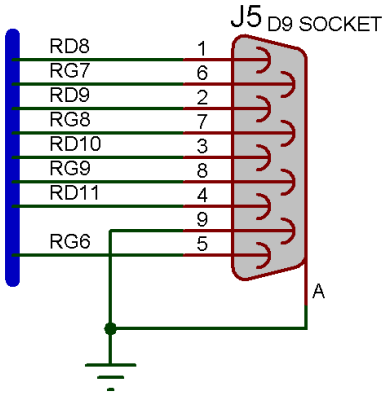
3. Port D 0-7 - PORTDL



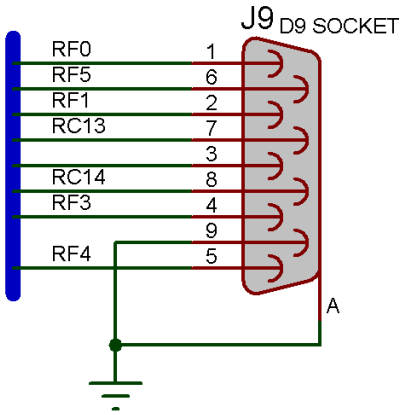
4. Port E 0-7 - PORTEL



5. 5. Port D/G - Port D 8-11 / Port G 6-9

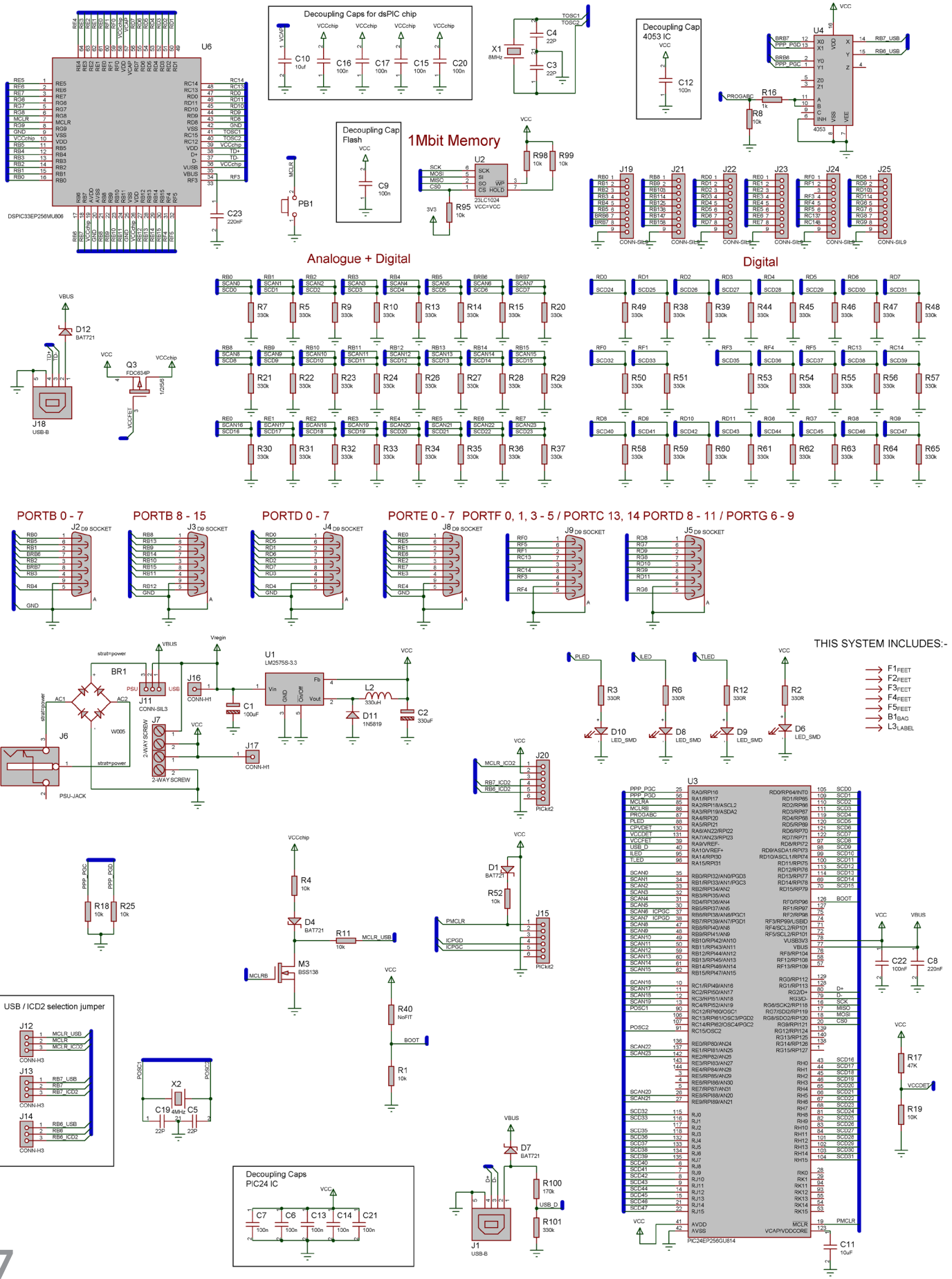


6. PORTF 0, 1, 3 -5 / PORTC 13, 14



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Circuit diagram



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