

LV32MX v6™

User manual

All MikroElektronika's development systems represent irreplaceable tools for programming and developing microcontroller-based devices. Carefully chosen components and the use of machines of the last generation for mounting and testing thereof are the best guarantee of high reliability of our devices. Due to simple design, a large number of add-on modules and ready to use examples, all our users, regardless of their experience, have the possibility to develop their project in a fast and efficient way.

Development System

 **MikroElektronika**

SOFTWARE AND HARDWARE SOLUTIONS FOR EMBEDDED WORLD ...making it simple

TO OUR VALUED CUSTOMERS

I want to express my thanks to you for being interested in our products and for having confidence in mikroElektronika.

The primary aim of our company is to design and produce high quality electronic products and to constantly improve the performance thereof in order to better suit your needs.



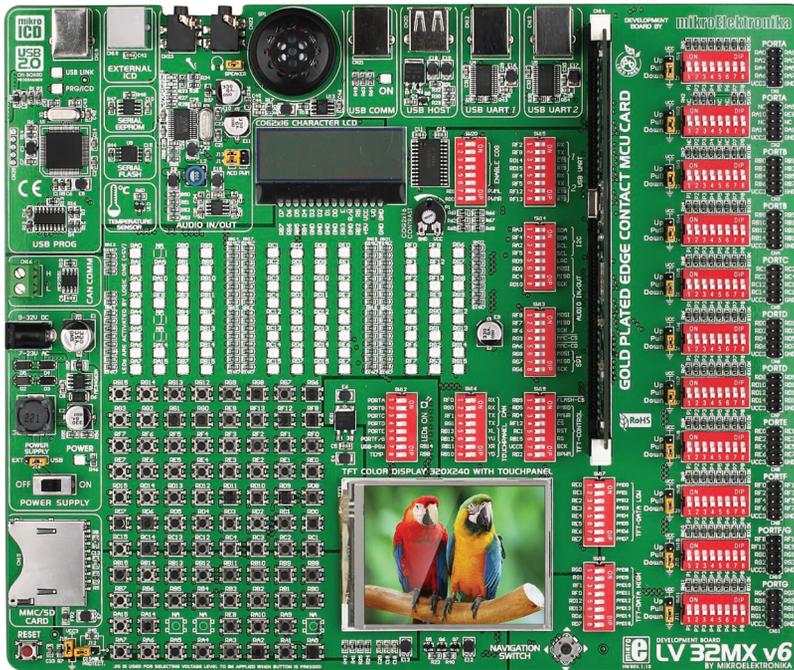
Nebojsa Matic
General Manager

TABLE OF CONTENTS

Introduction to LV32MX v6 Development System	4
Key Features	5
1.0. Connecting the System to a PC	6
2.0. Supported Microcontrollers	7
3.0. On-board PIC32Flash Programmer	9
4.0. ICD Connector	10
5.0. 3.3V Voltage Regulator	10
6.0. Power Supply	11
7.0. USB Communication Connector	12
8.0. USB HOST Connector	12
9.0. USB UART Module	13
10.0. CAN Communication Module	14
11.0. MMC/SD Connector	15
12.0. Temperature Sensor	16
13.0. Joystick	17
14.0. FLASH Module	18
15.0. EEPROM Module	18
16.0. Audio Module	19
17.0. On-board 2x16 LCD	21
18.0. TFT Display	22
19.0. LEDs	23
20.0. Push Buttons	24
21.0. I/O Ports	25

Introduction to LV32MX v6 Development System

The LV32MX v6™ development system provides a development environment for experimenting with PIC32™ microcontrollers from Microchip®. The system includes an on-board programmer PIC32Flash™ which serves as an interface between the microcontroller and a PC. You are simply expected to write a program, generate a .hex file and program your microcontroller using the *mikroPROG Suite for PIC™* program. Numerous modules, such as TFT display with a resolution of 320x240, on-board 2x16 LCD, serial EEPROM module etc, are provided on the board and allow you to easily simulate the operation of the target device.



LV32MX
MultiMedia
BOARD

Full-featured development system for PIC32MX microcontroller based devices

USB 2.0
IN-CIRCUIT
PROGRAMMER

On-board USB 2.0 programmer

TFT
320X240
Display

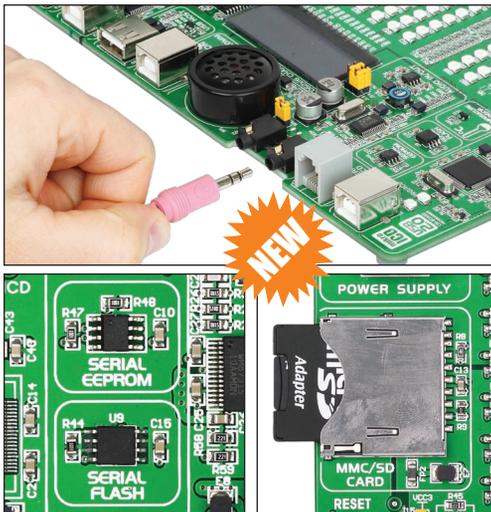
TFT display provides a palette of 262.000 colours and an integrated touch panel

MMC/SD
MEMORY CARD

A possibility of reading MMC/SD memory cards

JOYSTICK

Navigation joystick used for easier orientation and navigation through the user menu



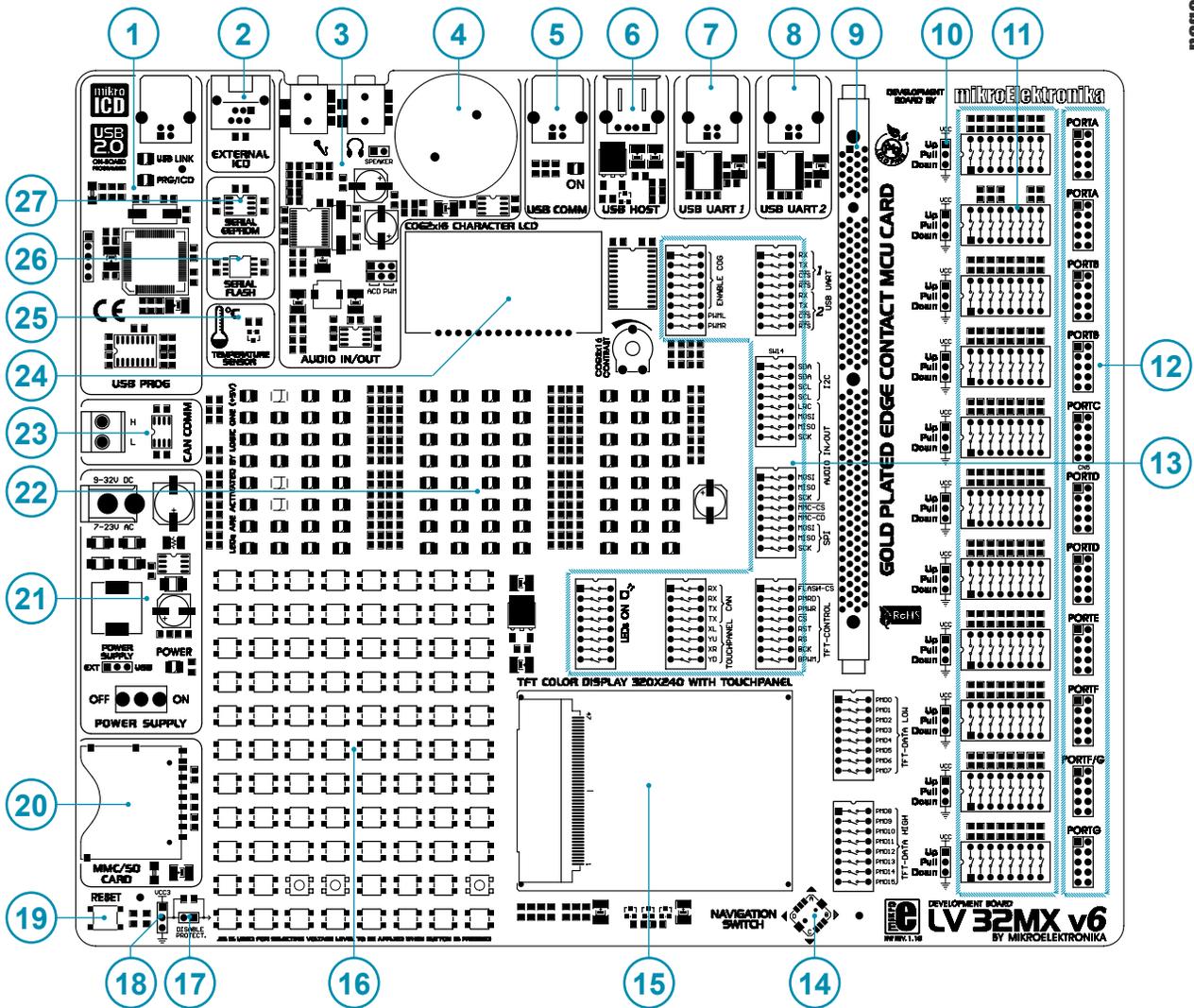
The PIC32FLASH™ program for programming provides a complete list of all supported microcontrollers. The latest version of this program with updated list of supported microcontrollers can be downloaded from our website at www.mikroe.com

Package contains:

Development system: LV32MX v6
 CD: product CD with relevant software
 Cables: USB cable
 Documentation: Manual for LV32MX v6, quick guide for installing USB drivers and electrical schematic of the system

System specification:

Power supply: over an AC/DC connector (7-23V AC or 9-32V DC); or over a USB cable for programming (5V DC)
 Power consumption: ~40mA in idle state when all on-board modules are off
 Dimension: 26,5 x 22cm (10,4 x 8,6inch)
 Weight: 440g (0.97lbs)



Key Features

- 1. On-board programmer PIC32Flash
- 2. Connector for external programmer ICD2® or ICD3®
- 3. Audio module
- 4. Speaker
- 5. USB communication connector
- 6. USB HOST connector
- 7. USB UART 1 module
- 8. USB UART 2 module
- 9. DIMM 168P socket for MCU cards
- 10. Jumper for pull-up/pull-down resistor selection
- 11. DIP switches enable pull-up/pull-down resistors
- 12. I/O port connectors
- 13. DIP switches turn on/off on-board modules
- 14. Navigation joystick

- 15. TFT display with integrated touch panel
- 16. Push buttons simulate microcontroller input pins
- 17. Jumper for shortening the protective resistor
- 18. Jumper for selecting push buttons' logic state
- 19. Reset button
- 20. MMC/SD card connector
- 21. Power supply voltage regulator
- 22. 85 LEDs indicate pins' logic state
- 23. CAN communication module
- 24. On-board 2x16 LCD
- 25. Temperature sensor
- 26. FLASH module
- 27. EEPROM module

1.0. Connecting the System to a PC

Step 1: Install mikroProg Suite for PIC

Follow the instructions provided in the relevant manual and install the *mikroProg Suite for PIC* program and the USB driver from the product CD. They are essential for the proper operation of the on-board programmer.

Step 2: Connect development system

Use the USB cable to connect the development system to a PC. One end of the USB cable, with a USB connector of B type, should be connected to the development system, as shown in Figure 1-2, whereas the other end of the cable with a USB connector of A type should be connected to a PC. When establishing a connection, make sure that jumper J16 is placed in the USB position as shown in Figure 1-1.

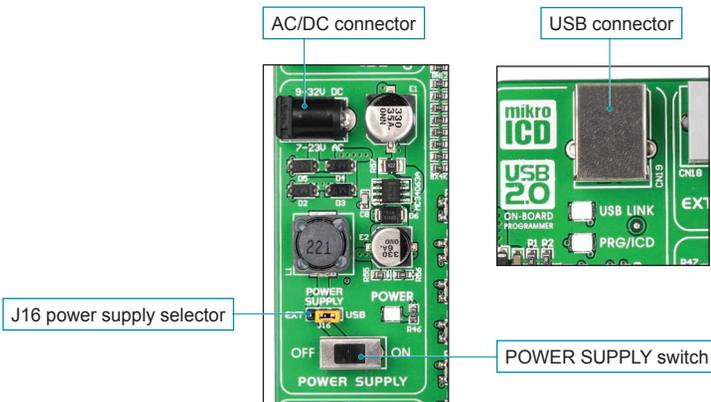


Figure 1-1: Power supply

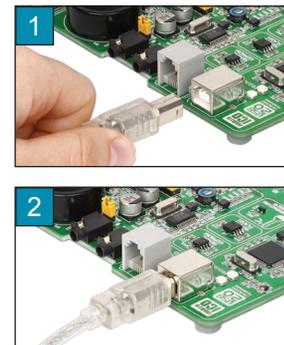


Figure 1-2: Connecting USB cable

Step 3: Load .hex file

Turn on your development system by setting the POWER SUPPLY switch to ON position. Two LEDs marked as POWER and USB LINK will be automatically turned on indicating that your development system is ready to use. Use the on-board programmer *PIC32Flash* and the *mikroProg Suite for PIC* program to dump a code into the microcontroller and employ the system to test and develop your projects.

NOTE: If some additional modules are used, it is necessary to place them properly on the development system while it is turned off. Otherwise, either can be permanently damaged. Refer to figure below for the proper placing of the additional modules.

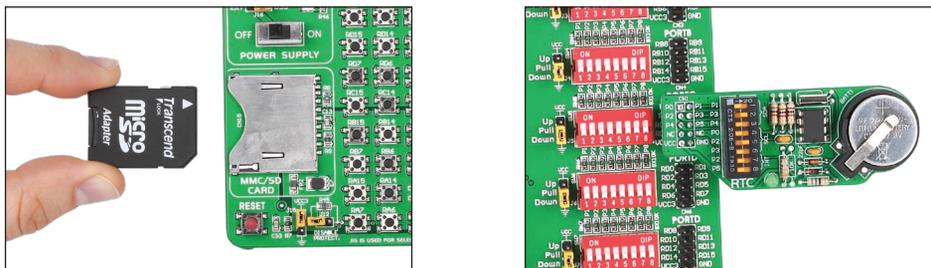


Figure 1-3: Placing additional modules on the board

2.0. Supported Microcontrollers

The LV32MX v6 development system provides a DIMM-168P connector to place an MCU card into. This development system comes with an MCU card with the PIC32MX460F512L in 100-pin TQFP package soldered on it, Figure 2-3. Besides, the MCU card alone provides an oscillator as well as 102 soldering pads connected to microcontroller pins. Each pad is marked the same as the pin it is connected to. Soldering pads also make connection between the MCU card and target device's modules easy.

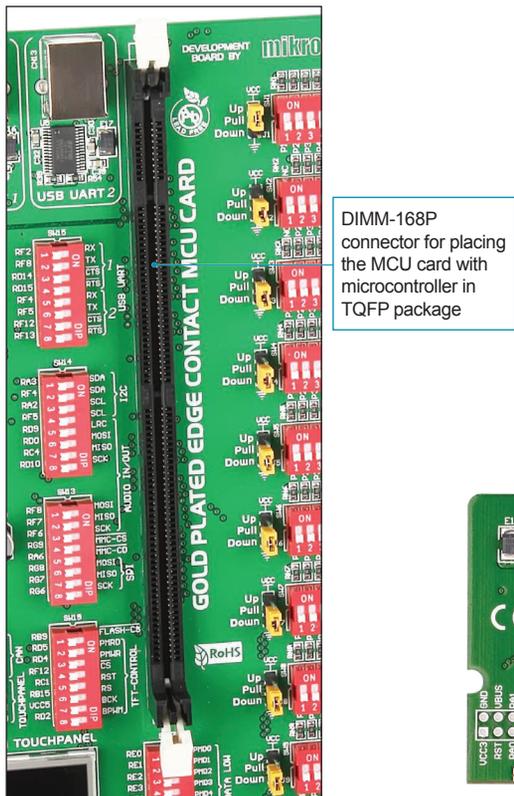


Figure 2-1: DIMM-168P connector

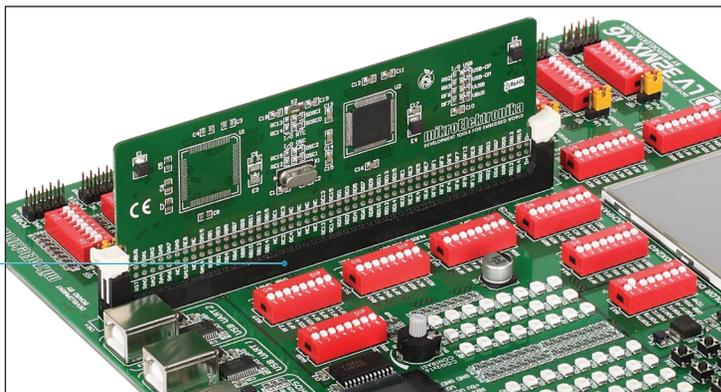


Figure 2-2: DIMM-168P connector with the MCU card inserted

DIMM-168P connector for placing the MCU card with microcontroller in TQFP package

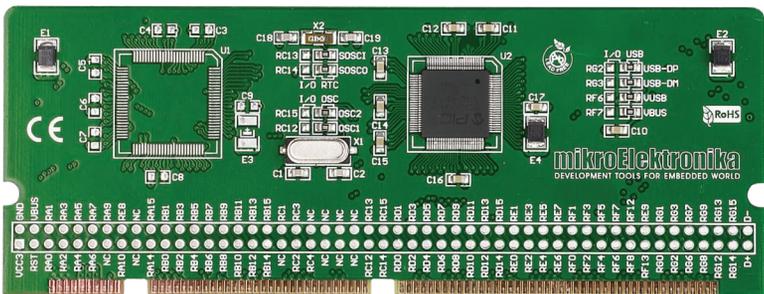


Figure 2-3: MCU card with a 100-pin microcontroller in TQFP package soldered on it

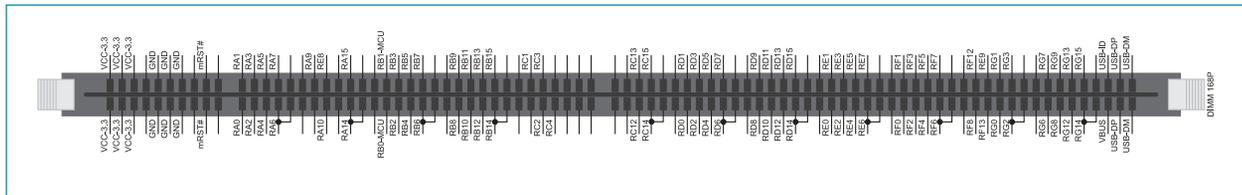
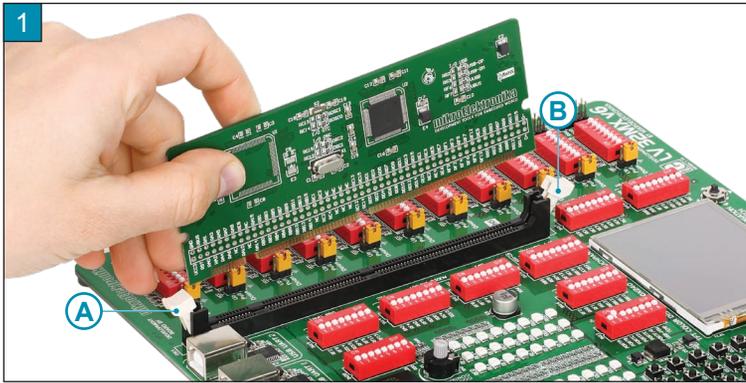
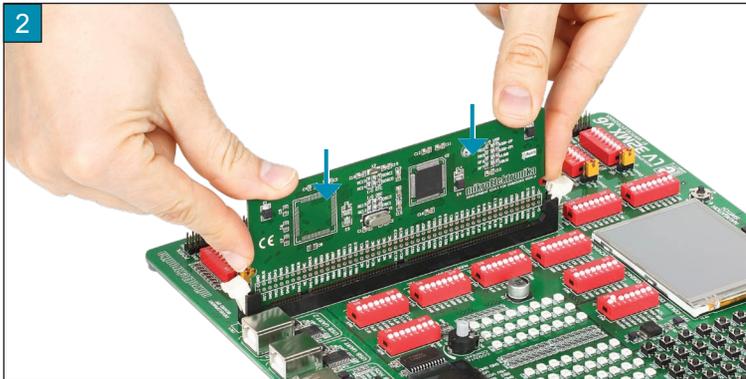


Figure 2-4: Schematic of the DIMM-168P connector's pinout

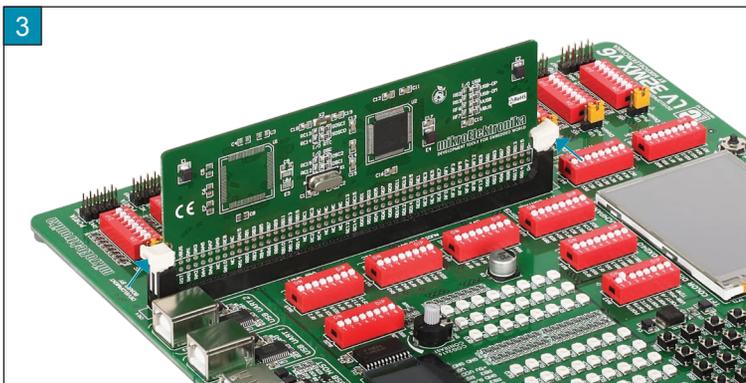
The MCU card should be placed into the DIMM-168P connector in the following way:



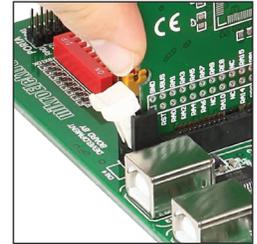
Open extraction levers A and B



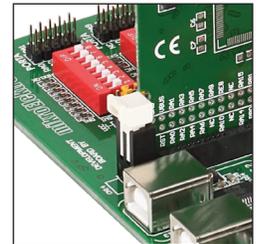
Insert the MCU card into the DIMM-168P connector



Push the MCU card down gently into the DIMM-168P connector and lift extraction levers slowly at the same time



Extraction levers for fixing the MCU card in 'open' position



Extraction levers for fixing the MCU card in 'closed' position

3.0. On-board PIC32Flash Programmer

A programmer is a necessary tool when working with microcontrollers. It is used to load a hex code into the microcontroller and serves as an interface between the microcontroller and the PC. The LV32MX v6 has an on-board PIC32Flash programmer. The mikroProg Suite for PIC program is used for loading a .hex file into the microcontroller. Figure 3-3 shows connection between the compiler, MikroProg Suite for PIC program and the microcontroller.

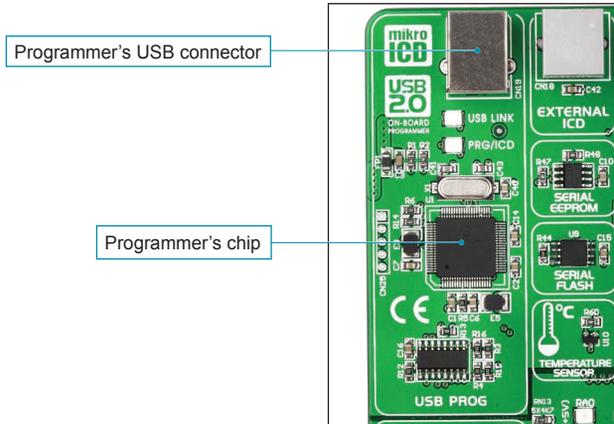


Figure 3-1: On-board programmer



Figure 3-2: USB connector's front side

```

LedBlinking.c
• void main() {
•
• ANSEL = 0; // Co
• ANSELH = 0;
30 C1ON_bit = 0; // Di
• C2ON_bit = 0;
•
• TRISA = 0x00; // se
• TRISB = 0x00; // s
• TRISC = 0x00; // se
• TRISD = 0x00; // se
•
• do {
• PORTA = 0x00; // Tu
• PORTB = 0x00; // Tu
40 PORTC = 0x00; // Tu
• PORTD = 0x00; // Tu
• Delay_ms(1000); // 1
•
• }
    
```

Compiling program

1110001001	Bin.
0110100011	
0111	2FC23AA7
1011	F43E0021A
Hex.	DA67F0541

2 Loading hex code



3

Write a code, generate a .hex file, and employ the on-board PIC32Flash programmer to load the code into the microcontroller.

- 1 Write a program and generate a .hex file;
- 2 Use the PIC32FLASH program to select desired microcontroller to be programmed and load the .hex file;
- 3 Click the Write button to dump the code into the microcontroller.

On the left side of the PIC32FLASH program's main window, there are a number of options for setting the operation of the microcontroller to be used. A number of options which enable the programming process are provided on the right side of the window. Positioned in the bottom right corner of the window, the Progress bar enables you to monitor the programming progress.

Figure 3-3: Programming process

4.0. ICD Connector

In addition to the on-board *PIC32Flash* programmer, one of the external programmers ICD2 or ICD3 from Microchip can be used for programming microcontrollers. Connection between the external programmer and development system is established by means of the ICD connector.

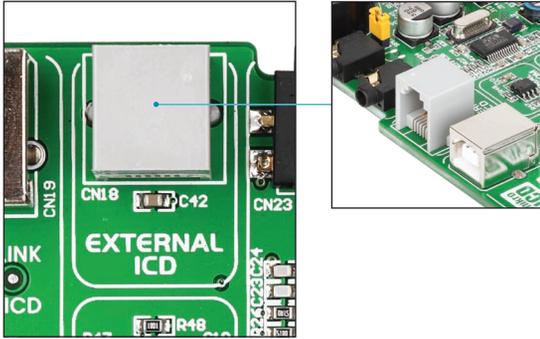


Figure 4-1: ICD connector

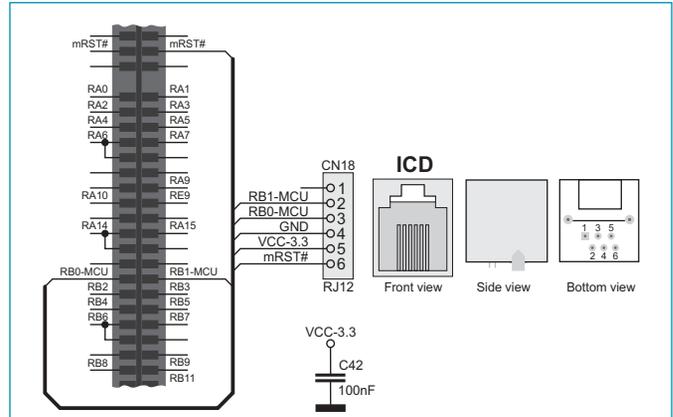


Figure 4-2: ICD connector and microcontroller connection schematic

For the .hex file to be loaded into the microcontroller, it is necessary to provide an adequate program. The MPLAB program from Microchip is the right one. You can use this program to write a code and load it afterwards into the microcontroller. By means of the *Programmer* option, contained in the MPLAB window, you can select a programmer to be used for loading the code into the microcontroller.

5.0. 3.3V Voltage Regulator

The LV32MX v6 development system is provided with a voltage regulator whose purpose is to reduce the power supply voltage of the development system from 5V to 3.3V. The 3.3V power supply voltage is then used for powering the microcontroller and other on-board modules. The MC33269DT-3.3 circuit provided on the development system is used as a voltage regulator capable of providing 800mA current.

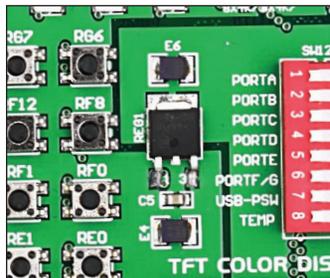


Figure 5-1: Voltage regulator

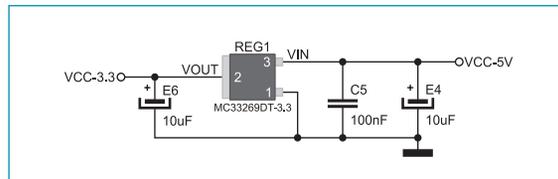


Figure 5-2: Voltage regulator connection schematic

6.0. Power supply

The LV32MX v6 development system may use one of two power supply sources:

1. +5V PC power supply through the USB programming cable; and
2. External power supply source connected to an AC/DC connector provided on the development board.

The MC34063A voltage regulator and Gretz rectifier are used to enable external power supply voltage to be either AC (in the range of 7V to 23V) or DC (in the range of 9V to 32V). Jumper J16 is used as a selector of the power supply source. To take advantage of the USB power supply, jumper J16 should be placed in the USB position. When using the external power supply, jumper J16 should be placed in the EXT position. The development system is turned on/off by switching the position of the POWER SUPPLY switch.

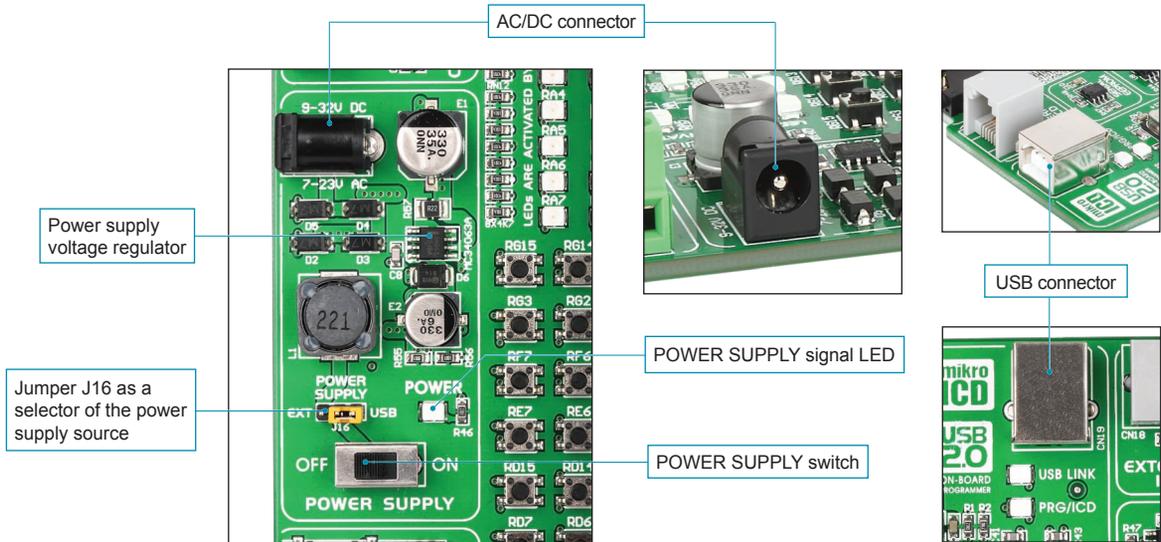


Figure 6-1: Power supply

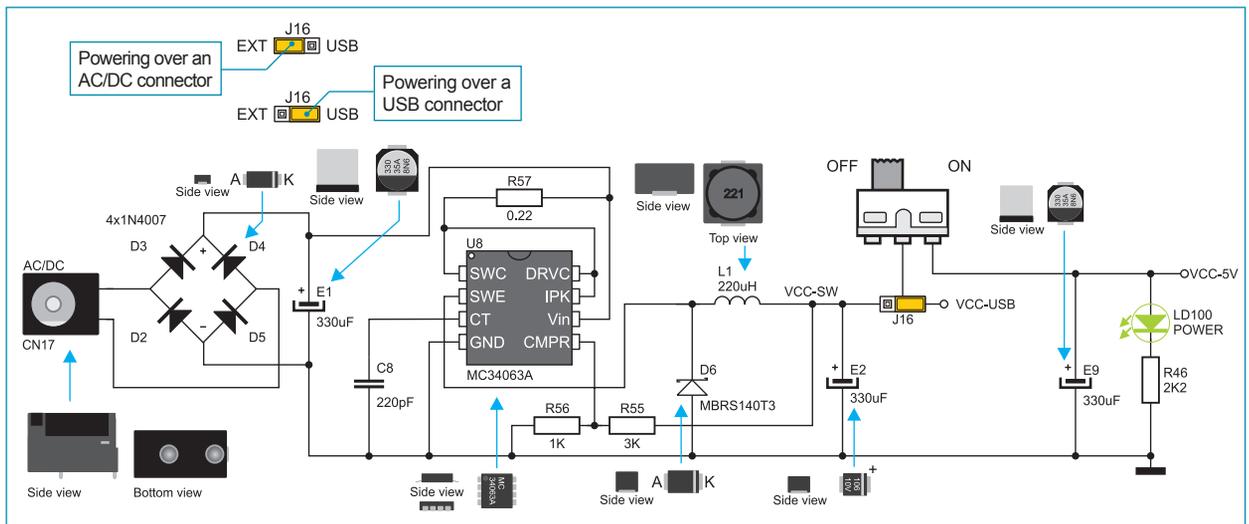


Figure 6-2: Power supply source connection schematic

9.0. USB UART Modules

USB UART modules enable the development system to be connected to a PC via a USB connector. In addition to PC, the development system can also be easily connected to other devices that use USB communication. USB UART modules are connected to the microcontroller supplied on the development system via DIP switch SW15. In order to establish connection between USB UART 1 module and MCU turn ON switches 1-4 on DIP switch SW15. For USB UART 2 turn ON switches 5-8 on DIP switch SW15.

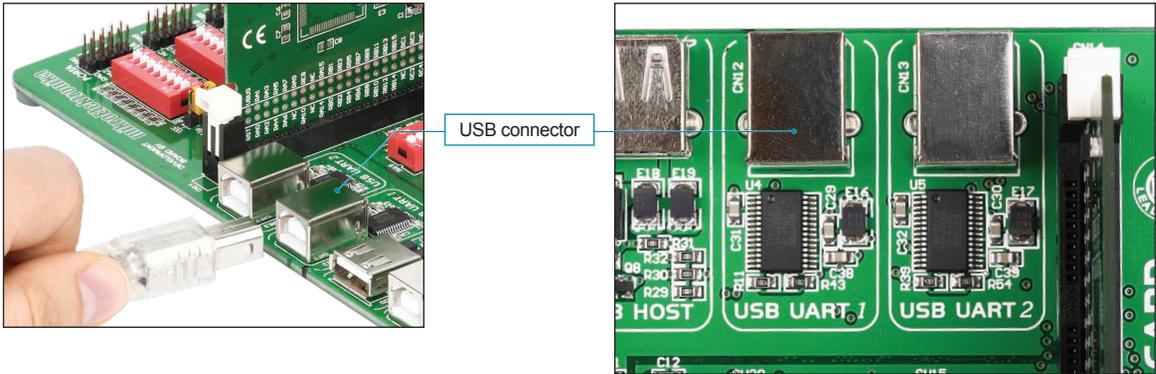


Figure 9-1: USB UART modules

Port RS-232A is connected to the microcontroller via RF2, RF8, RD14 and RD15 pins

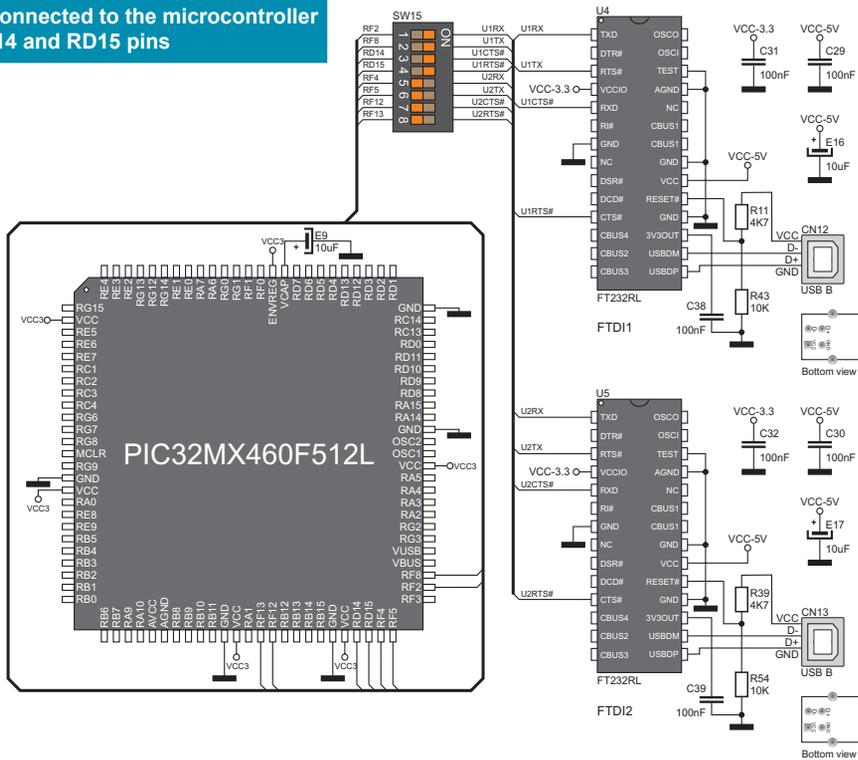


Figure 9-2: USB UART modules and microcontroller connection schematic

page 10.0. CAN Communication Module

CAN (Controller Area Network) is a communication standard primarily intended for use in automotive industry. It enables the microcontroller to communicate to a car device without using a host PC. In addition, such communication is widely used in industrial automation. The LV32MX v6 uses the MCP2551 circuit for CAN communication. This circuit provides an interface between the microcontroller and some peripheral device. To enable connection between the microcontroller and MCP2551, it is necessary to set switches 1 and 3 on the DIP switch SW16 to ON position. For the same purpose can be used switches 2 and 4 on the DIP switch SW16. Which of these switches is to be used depends solely on the arrangement of the microcontroller pins connected to CAN communication lines. The RX line is connected to the microcontroller via RF0 and RG0 microcontroller pins, whereas the TX line is connected to the microcontroller via RF1 and RG1 microcontroller pins.



Figure 10-1: CAN module

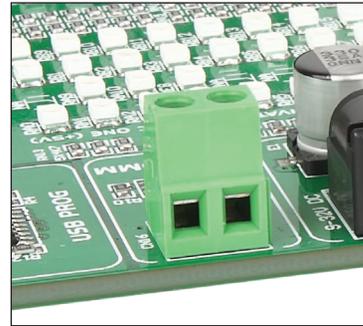


Figure 10-2: CAN module connector

CAN communication is enabled via DIP switch SW16

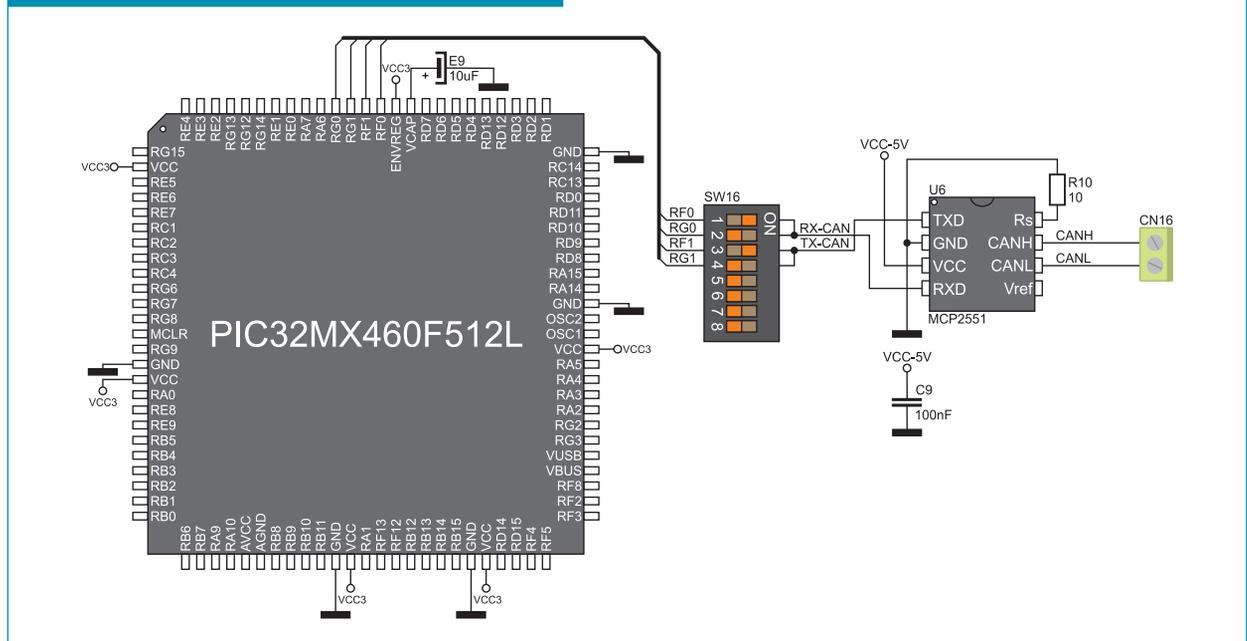


Figure 10-3: Microcontroller and MCP2551 connection schematic

12.0. Temperature Sensor

A temperature measurement is one of the most commonly performed measurements. The LV32MX v6 is capable of measuring temperature due to the MCP9700A circuit. The temperature range of this circuit goes from -40°C to $+125^{\circ}\text{C}$, with accuracy of $\pm 2^{\circ}\text{C}$. The MCP9700A circuit converts temperature into an analog voltage signal which is then transferred to the RB8 microcontroller pin. The value of this voltage is temperature dependable and is converted into a digital number by means of the A/D converter provided within the microcontroller.

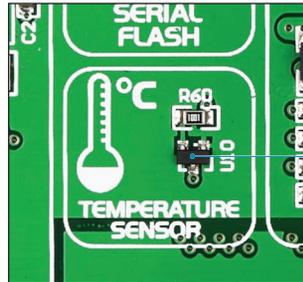


Figure 12-1: Temperature sensor

The RB8 microcontroller pin is fed with a signal sent by the MCP9700A circuit

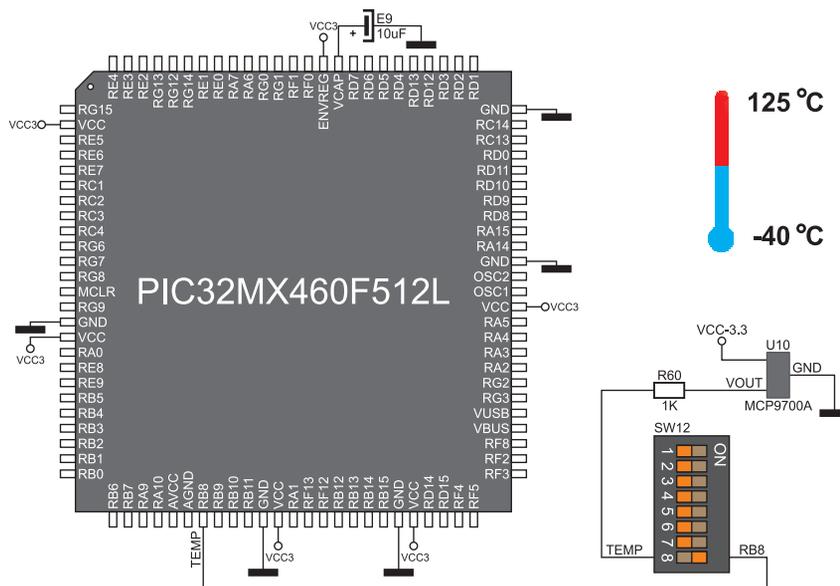


Figure 12-2: MCP9700A and microcontroller connection schematic

13.0. Joystick

A joystick is a movable stick that can be moved in several directions. Every movement can be registered by the microcontroller. The LV32MX v6 provides a joystick which can be moved in four directions and serves as a push button. Its function is determined in the program written by the user and loaded into the microcontroller. However, the joystick can be assigned various functions. In this case, it is typically used for navigation through the user menu.



In addition to navigation function, the joystick can serve as a push button

Figure 13-1: Joystick

Joystick has a navigation function

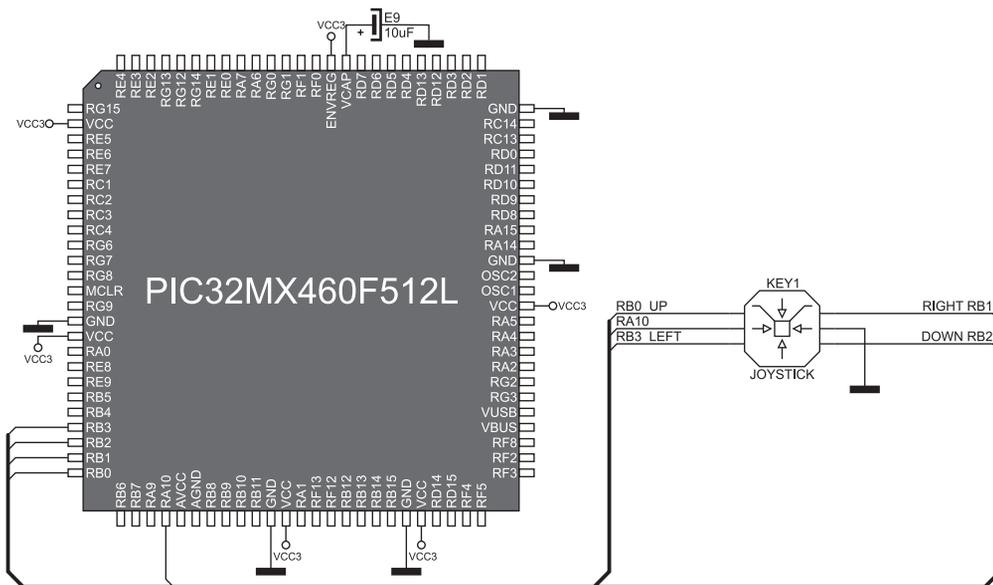


Figure 13-2: Joystick and microcontroller connection schematic

14.0. FLASH Module

Since multimedia applications are getting increasingly demanding, it is necessary to provide additional memory space to be used for storing programs by the microcontroller. The M25P80 circuit enables the microcontroller to use additional 8Mbit flash memory. In order to connect this memory to the microcontroller, it is necessary to set switches 6, 7 and 8 on the DIP switch SW13 as well as switch 1 on the DIP switch SW19 to ON position.

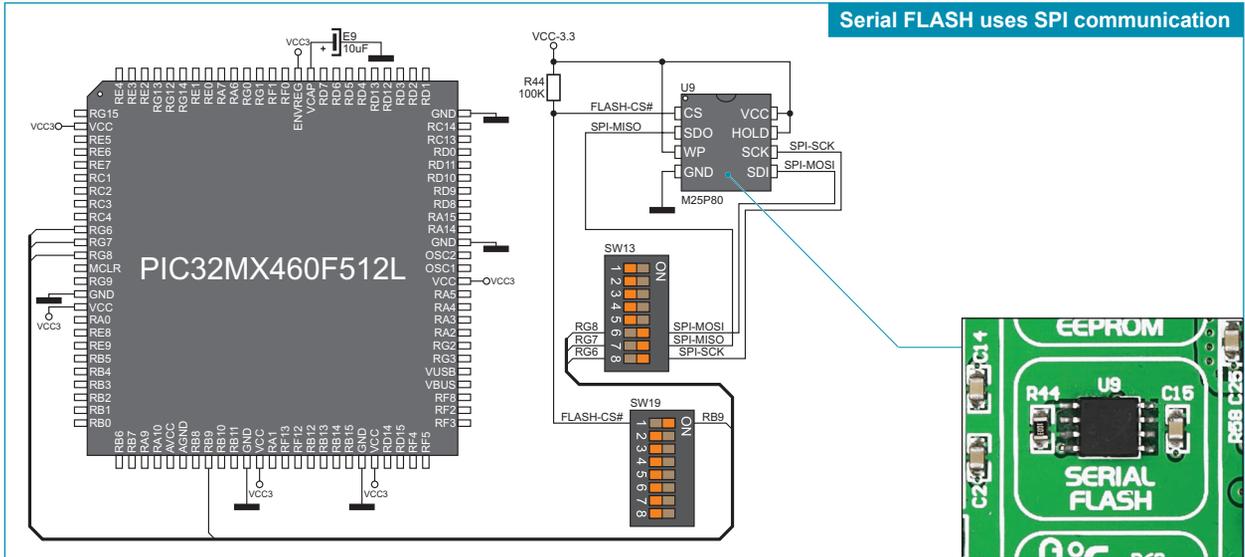


Figure 14-1: Flash memory and microcontroller connection schematic

15.0. EEPROM Module

EEPROM (Electrically Erasable Programmable Read-Only Memory) is a built-in memory module used to store data that must be saved when power goes off. The 24AA01 circuit is capable of storing up to 1Kbit data and uses serial I²C communication to exchange data with the microcontroller via its pins RA3 and RA2 or RF4 and RF5.

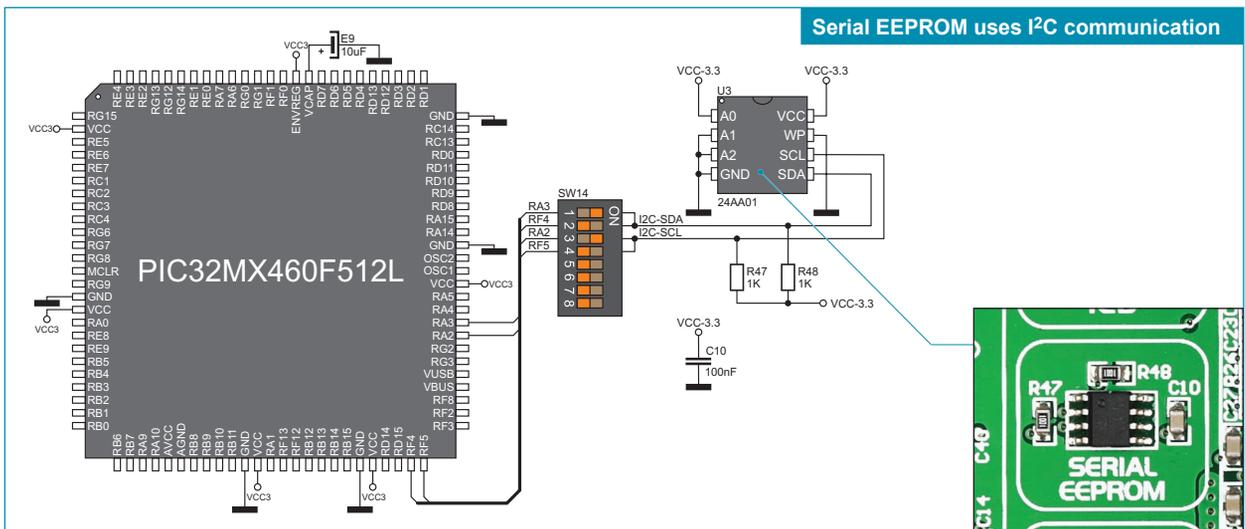


Figure 15-1: Serial EEPROM and microcontroller connection schematic

16.0. Audio Module

Due to the on-board audio module, the LV32MX v6 development system can be connected both to a microphone and headphones.

A microphone can be interfaced to the system via a 3.5mm connector CN23 and the WM8731SEDS circuit. This circuit is a stereo CODEC with an integrated headphones driver. Its function is to convert an analog signal from interfaced microphone to a digital value, then to transfer it to a microcontroller or as a sidetone to headphones output. A sidetone volume control can be programmed by a software so an additional potentiometer is not necessary. In case the microphone signal is transferred to headphones as a sidetone, it is necessary to set jumpers J13 and J14 to ACD position, as shown in Figure 16-3. It causes the WM8731SEDS headphones output to be connected to the 3.5mm headphones connector CN22. The WM8731SEDS output signal is transferred to the connector CN22 via LHPO and RHPO lines. Figure 16-5 (page 20) illustrates connection between jumpers, LHPO and RHPO lines and the CN22 connector.

The LV32MX v6 development system is also able to generate an audio signal using WM8731SEDS or MCP6022 circuit. The WM8731SEDS is used to convert digital data from the microcontroller to audio signal to be transferred to headphones. Communication between this circuit and the microcontroller is performed via SPI serial interface. The MCP6022 circuit is used for filtering PWM signal generated by the microcontroller. The headphones may be connected to the system using a 3.5mm connector CN22. The function of jumpers J13 and J14 is to select a signal to be transferred to the 3.5mm connector. When jumpers J13 and J14 are set to PWM position, as shown in Figure 16-4, the CN22 connector is fed with a signal from the MCP6022 circuit. When jumpers J13 and J14 are set to ACD position, refer to Figure 16-3, the CN22 connector is fed with an audio signal from the WM8731SEDS circuit via LHPO and RHPO lines.

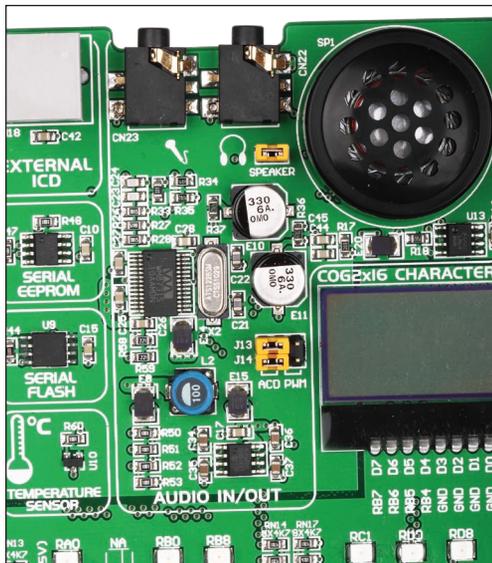


Figure 16-1: Audio module



Figure 16-2: 3.5mm connectors CN22 and CN23



Figure 16-3: Jumpers J13 and J14 in ACD position

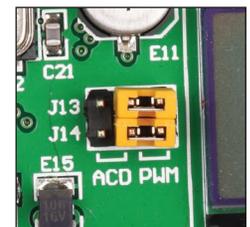


Figure 16-4: Jumpers J13 and J14 in PWM position

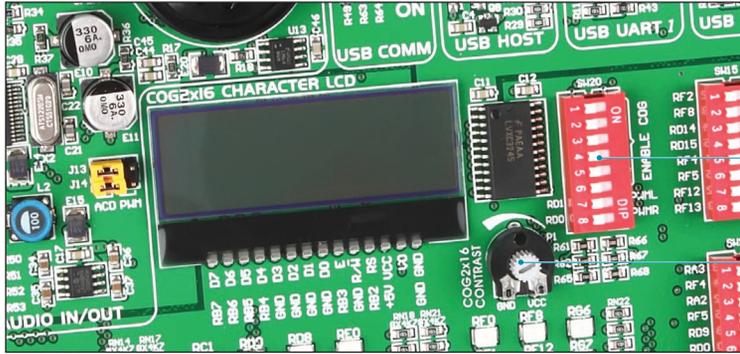


Figure 16-5: Enabling on-board speaker

Prior to headphones you can use on-board speaker which is connected to left stereo channel. In order to use this speaker it is necessary to place jumper marked with SPEAKER, Figure 16-5.

17.0. On-board 2x16 LCD

The on-board 2x16 LCD is connected to the microcontroller via the 74LVCC3245 transceiver. For this display to be used, it is necessary to set switches 1-6 on the DIP switch SW20 to ON position, thus connecting the display pins to the microcontroller port PORTB. Potentiometer P1 is used to adjust the display contrast.



DIP switch SW20 is used to turn the on-board 2x16 LCD on

Contrast adjustment potentiometer P1

Figure 17-1: On-board 2x16 LCD

On-board 2x16 LCD is turned on via DIP switch SW20

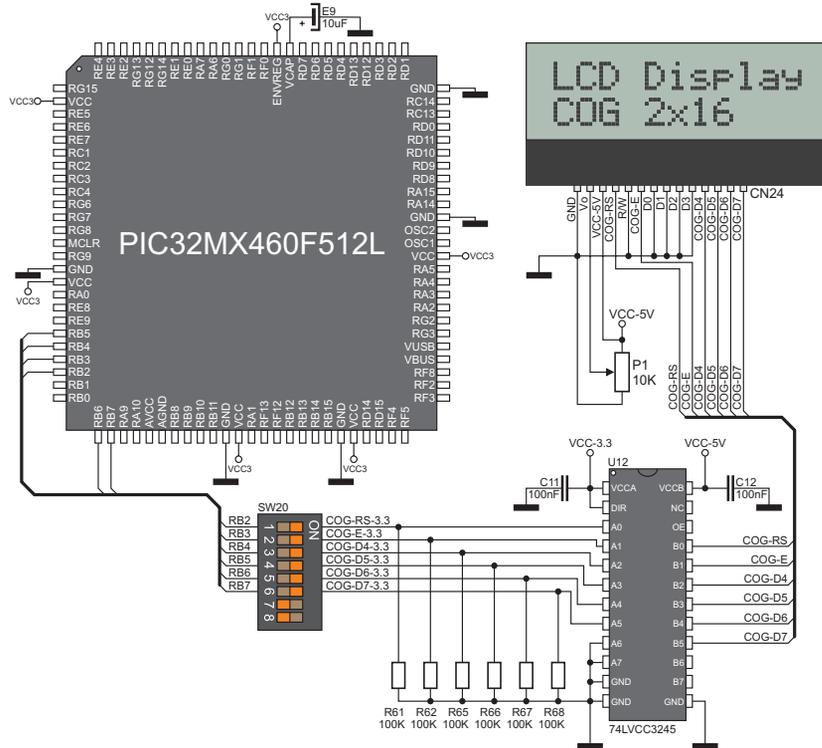


Figure 17-2: On-board 2x16 LCD connection schematic

18.0. TFT Display

The LV32MX v6 features a TFT display in a resolution of 320x240 covered with a touch panel. It is capable of displaying 262.000 colours. The TFT display and touch panel together form a functional unit called a touch screen. The TFT display can be used for displaying pictures, videos and other graphic contents. Owing to the touch screen, it is possible to create interactive applications, such as virtual keyboard, when writing programs for the microcontroller. For the TFT display to be connected to the microcontroller, it is necessary to set all switches on the DIP switches SW17 and SW18, switches 2-8 on the DIP switch SW19 as well as switches 5-8 on the DIP switch SW16 to ON position.



Figure 18-1: TFT display with touch panel

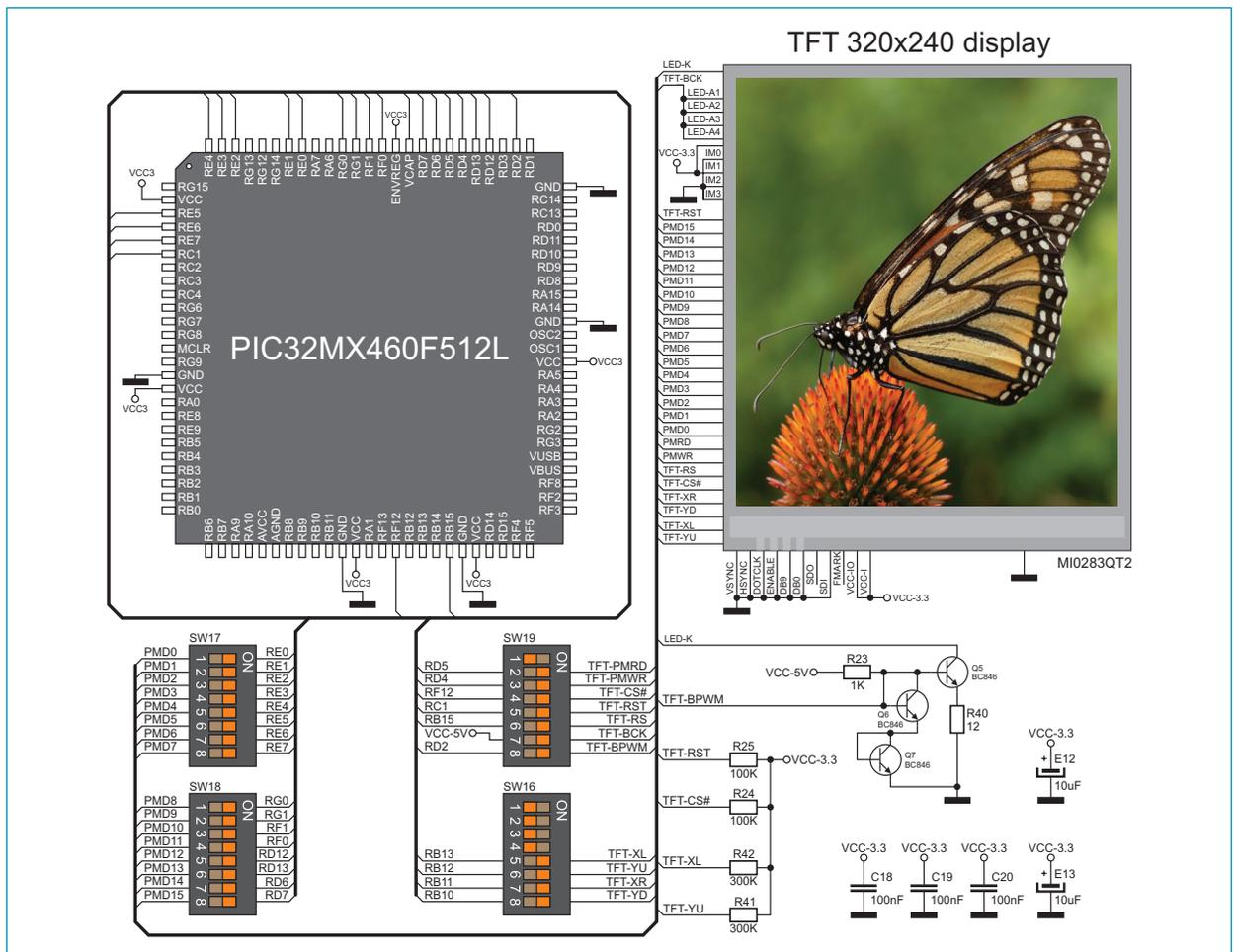


Figure 18-2: TFT display and microcontroller connection schematic

19.0. LEDs

LED (Light-Emitting Diode) is a highly efficient electronic light source. When connecting LEDs, it is necessary to use a current limiting resistor. A common LED voltage is approximately 2.5V, while the current varies from 1 to 20mA depending on the type of LED. The LV32MX v6 uses LEDs with current $I=1\text{mA}$.

There are 85 LEDs on the LV32MX v6 development system which visually indicate the state of each microcontroller I/O pin. An active LED indicates that a logic one (1) is present on the pin. In order to enable the pin state to be shown, it is necessary to select appropriate port (PORTA, PORTB, PORTC, PORTD, PORTE, PORTF, PORTF/G or PORTG) using DIP switch SW12.

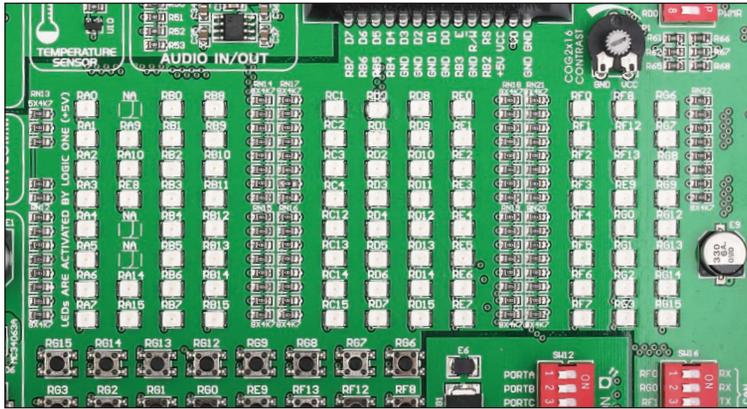


Figure 19-1: LEDs

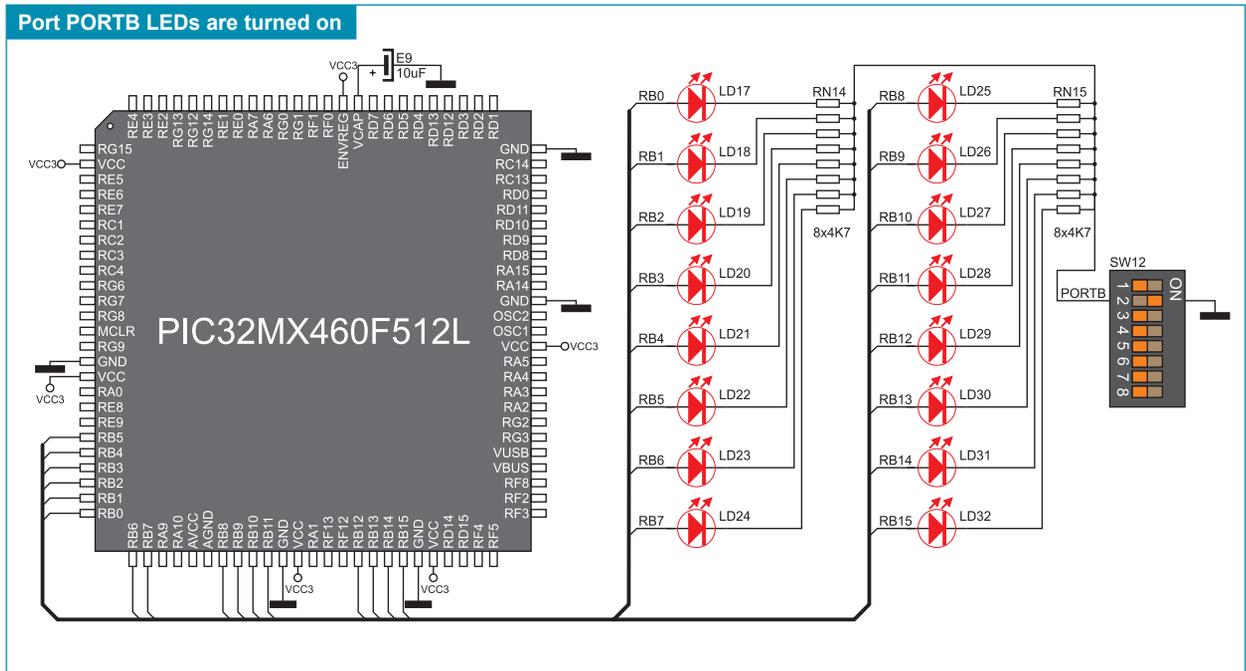
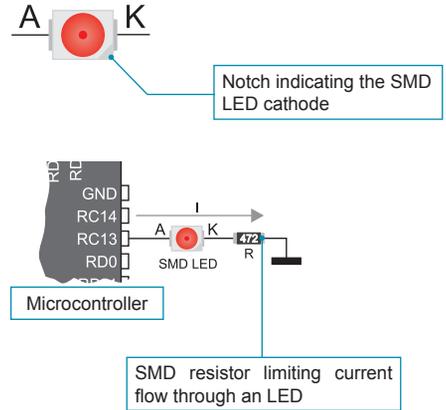


Figure 19-2: LEDs and port PORTB connection schematic

21.0. Input/Output Ports

Along the right side of the development system, there are twelve 10-pin connectors connected to the microcontroller's I/O ports. Pins RB0, RB1 and mRST# are used for programming and therefore are not directly connected to the appropriate 10-pin connectors, but via the programmer's multiplexer. DIP switches SW1-SW11 enable each connector pin to be connected to one pull-up/pull-down resistor. Whether pins of some port are to be connected to a pull-up or a pull-down resistor depends on the position of jumpers J1-J11.

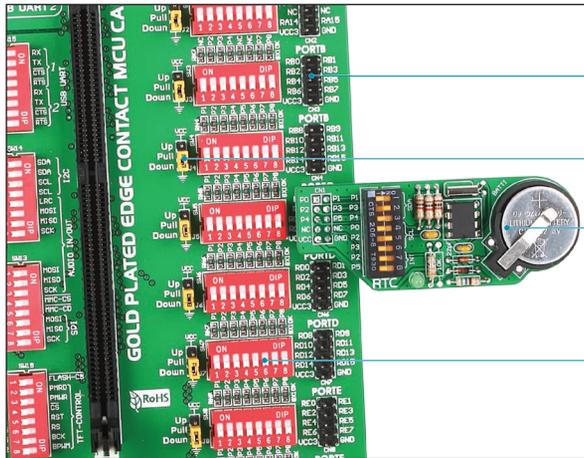


Figure 21-1: I/O ports

- PORTB 2x5 male connector
- Jumper for pull-up/pull-down resistor selection
- Additional module connected to PORTC
- DIP switch to turn on pull-up/pull-down resistors for each port pin

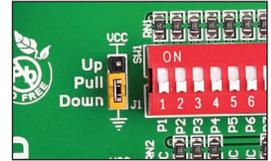


Figure 21-2: J9 in pull-down position

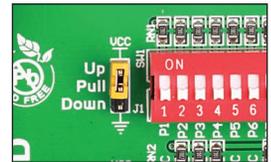


Figure 21-3: J9 in pull-up position

Port PORTB pins are connected to pull-down resistors

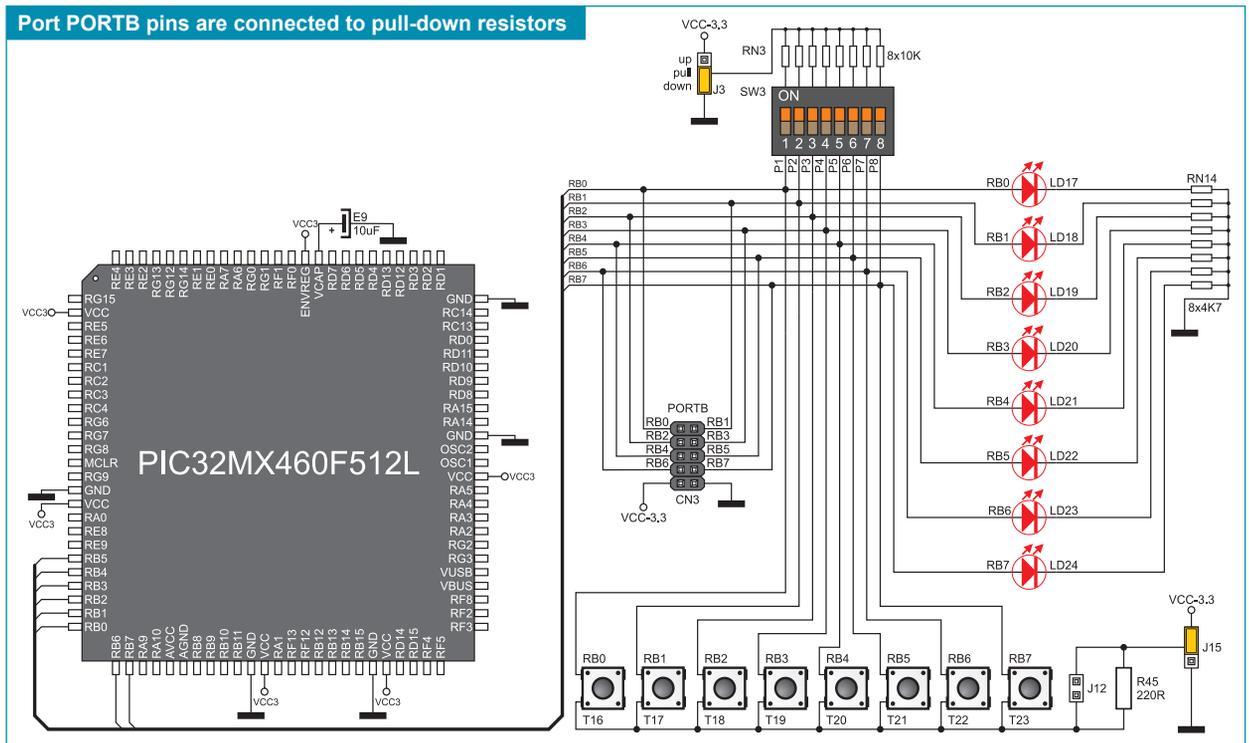


Figure 21-4: Port PORTB connection schematic

Pull-up/pull-down resistors enable you to set the logic level on all microcontroller's input pins when they are in idle state. Such level depends on the position of the pull-up/pull-down jumper. The RD8 pin with the relevant DIP switch SW7, jumper J7 and RD8 push button with jumper J15 are used here for the purpose of explaining the performance of pull-up/pull-down resistors. The principle of their operation is the same as for all other microcontroller pins.

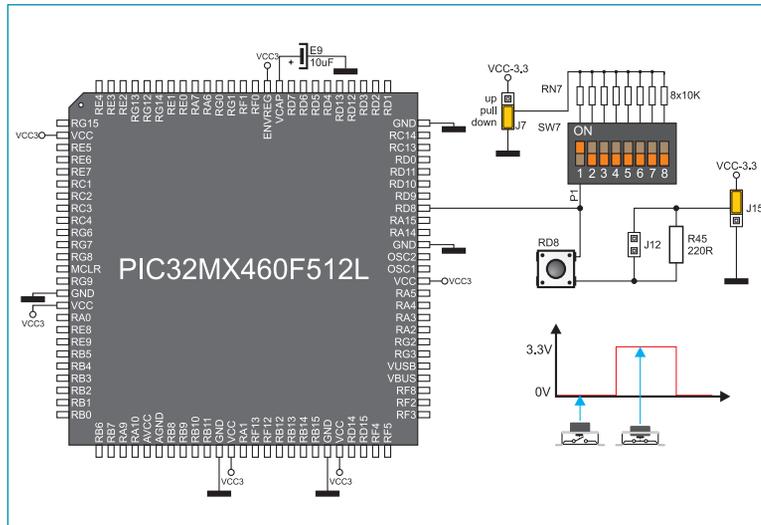


Figure 21-5: Jumper J7 in pull-down position and jumper J15 in pull-up position

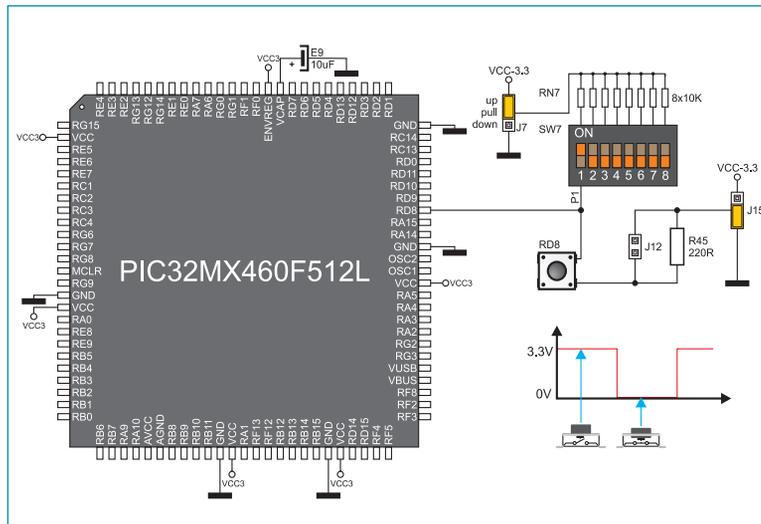


Figure 21-6: Jumper J7 in pull-up position and jumper J15 in pull-down position

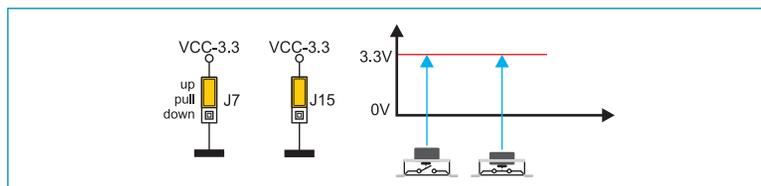


Figure 21-7: Jumpers J7 and J15 in the same position

In order to enable the PORTD port pins to be connected to pull-down resistors, it is necessary to place jumper J7 in the *Down* position first. This enables any PORTD port pin to be supplied with a logic zero (0V) in idle state over jumper J7 and 8x10k resistor network. To provide the RD8 pin with such signal, it is necessary to set switch P1 on the DIP switch SW7 to ON position.

As a result, every time you press the RD8 push button, a logic one (3.3V) will appear on the RD8 pin, provided that jumper J15 is placed in the VCC-3.3 position.

In order to enable port PORTD pins to be connected to pull-up resistors and the port input pins to be supplied with a logic zero (0), it is necessary to place jumper J7 in the *Up* position and jumper J15 in the GND position. This enables any port PORTD input pin to be driven high (3.3V) in idle state over the 10k resistor.

As a result, every time you press the RD8 push button, a logic zero (0V) will appear on the RD8 pin, provided that the P1 switch is set to the ON position.

In case that jumpers J7 and J15 have the same logic state, pressure on any button will not cause input pins to change their logic state.

DISCLAIMER

All the products owned by MikroElektronika are protected by copyright law and international copyright treaty. Therefore, this manual is to be treated as any other copyright material. No part of this manual, including product and software described herein, may be reproduced, stored in a retrieval system, translated or transmitted in any form or by any means, without the prior written permission of MikroElektronika. The manual PDF edition can be printed for private or local use, but not for distribution. Any modification of this manual is prohibited.

MikroElektronika provides this manual 'as is' without warranty of any kind, either expressed or implied, including, but not limited to, the implied warranties or conditions of merchantability or fitness for a particular purpose.

MikroElektronika shall assume no responsibility or liability for any errors, omissions and inaccuracies that may appear in this manual. In no event shall MikroElektronika, its directors, officers, employees or distributors be liable for any indirect, specific, incidental or consequential damages (including damages for loss of business profits and business information, business interruption or any other pecuniary loss) arising out of the use of this manual or product, even if MikroElektronika has been advised of the possibility of such damages. MikroElektronika reserves the right to change information contained in this manual at any time without prior notice, if necessary.

HIGH RISK ACTIVITIES

The products of MikroElektronika are not fault – tolerant nor designed, manufactured or intended for use or resale as on – line control equipment in hazardous environments requiring fail – safe performance, such as in the operation of nuclear facilities, aircraft navigation or communication systems, air traffic control, direct life support machines or weapons systems in which the failure of Software could lead directly to death, personal injury or severe physical or environmental damage ('High Risk Activities'). MikroElektronika and its suppliers specifically disclaim any expressed or implied warranty of fitness for High Risk Activities.

TRADEMARKS

The Mikroelektronika name and logo, the Mikroelektronika logo, mikroC, mikroC PRO, mikroBasic, mikro-Basic PRO, mikroPascal, mikroPascal PRO, AVRflash, PICflash, dsPICprog, 18FJprog, PSOCprog, AVR-prog, 8051prog, ARMflash, EasyPIC5, EasyPIC6, BigPIC5, BigPIC6, dsPIC PRO4, Easy8051B, EasyARM, EasyAVR5, EasyAVR6, BigAVR2, EasydsPIC4A, EasyPSoC4, EasyVR Stamp LV18FJ, LV24-33A, LV32MX, PIC32MX4 MultiMedia Board, PICPLC16, PICPLC8 PICPLC4, SmartGSM/GPRS, UNI-DS are trademarks of Mikroelektronika. All other trademarks mentioned herein are property of their respective companies.

All other product and corporate names appearing in this manual may or may not be registered trademarks or copyrights of their respective companies, and are only used for identification or explanation and to the owners' benefit, with no intent to infringe.



MikroElektronika
SOFTWARE AND HARDWARE SOLUTIONS FOR EMBEDDED WORLD ...making it simple

If you want to learn more about our products, please visit our website at www.mikroe.com

If you are experiencing some problems with any of our products or just need additional information, please place your ticket at www.mikroe.com/en/support

If you have any questions, comments or business proposals, do not hesitate to contact us at office@mikroe.com