

EasyARM 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

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General information

The *EasyARM v6* development system provides a development environment for programming and experimenting with ARM microcontrollers from NXP®. Numerous modules, such as 128x64 graphic LCD display, 2x16 alphanumeric LCD display, piezo buzzer, CAN, etc. are provided on the board and allow you to easily simulate the operation of your target device.



Full-featured development system for ARM microcontroller based devices



UART communication via USB connector



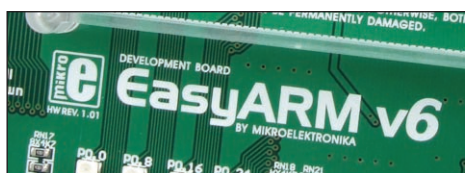
CAN communication module



Integrated EEPROM module



Graphic LCD display with backlight



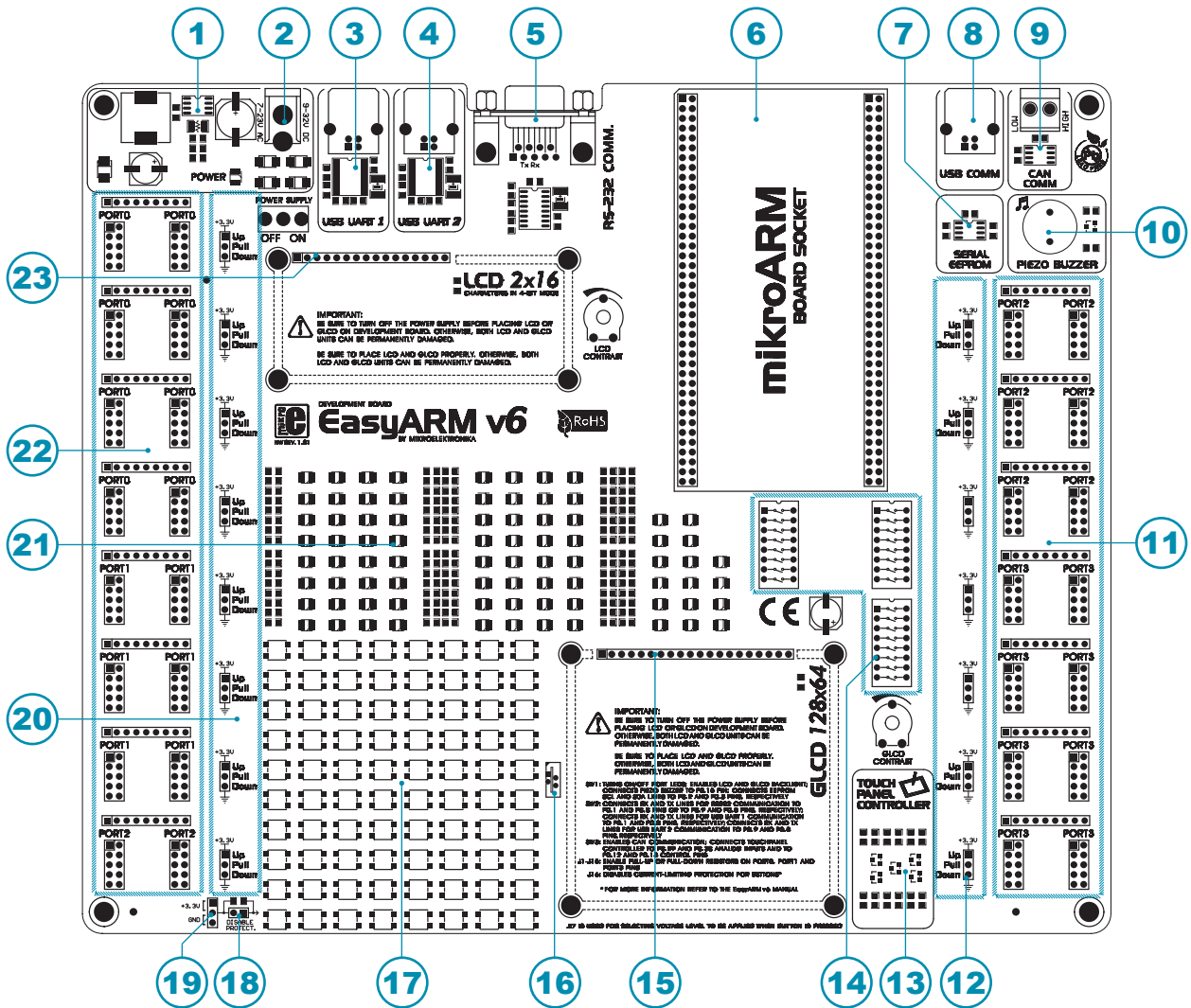
Package includes:

Development system:	EasyARM v6
CD:	product CD with relevant software
Cables:	USB cable
Documentation:	manual and electrical schematic for EasyARM v6



System specification:

Power supply:	over AC/DC connector (7-23V AC or 9-32V DC) or a USB cable (5V DC)
Power consumption:	50mA when all on-board modules are off
Dimensions:	26,5 x 22cm (10,4 x 8,6inch)
Weight:	~420g (0.92lbs)



Key features

- | | |
|--|---|
| <ol style="list-style-type: none"> 1. Power supply module 2. AC/DC connector 3. USB UART1 module 4. USB UART2 module 5. RS-232 module 6. mikroARM board socket 7. Serial EEPROM 8. USB connector 9. CAN module 10. Piezo buzzer 11. I/O ports 12. Jumpers used to select pull-up/pull-down resistors | <ol style="list-style-type: none"> 13. Touch panel controller 14. DIP switches 15. GLCD display connector 16. Touch panel connector 17. Push buttons 18. Jumper used to shorten protective resistor 19. Jumpers used to select push buttons' logic state 20. Jumpers used to select pull-up/pull-down resistors 21. LEDs 22. I/O ports 23. LCD display connector |
|--|---|

1. Connecting EasyARM v6 to power supply module

In order to enable the development system to be turned on, it is necessary to provide the power supply voltage over an AC/DC connector CN37, Figure 1. When the development system is powered, it is necessary to set switch marked POWER SUPPLY to the ON position. The power supply voltage provided via the CN37 AC/DC connector may be in a range between 7 and 23V AC or 9 and 32V DC.

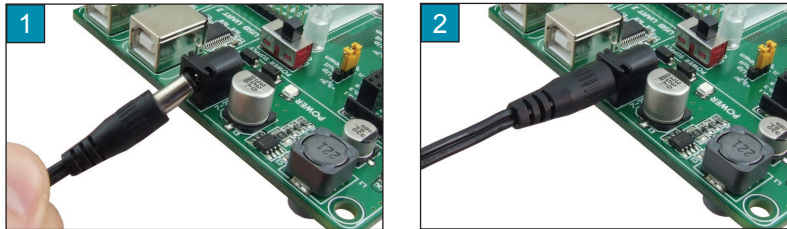


Figure 1-1: Powering the development system

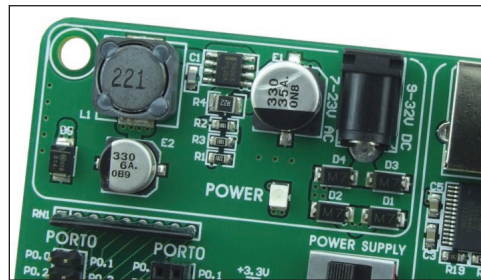


Figure 1-2: Power supply module

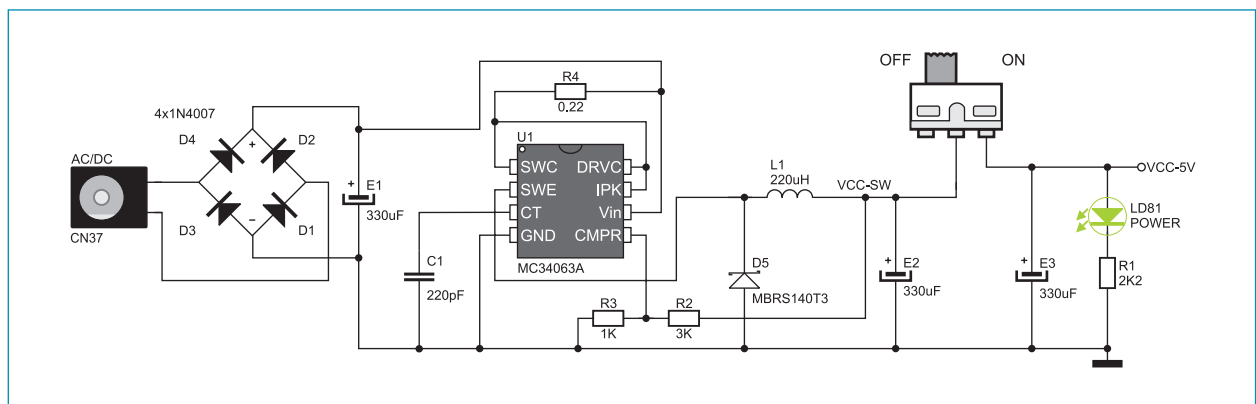


Figure 1-3: Power supply module connection schematic

2. Connecting EasyARM v6 to a PC

The *EasyARM v6* development system comes with the mikroBoard for ARM provided with a USB connector. This connector enables the development system to be connected to a PC. It is also possible to provide the system with the 5V power supply voltage from the PC via this connector. The mikroBoard for ARM may be used as a stand-alone device. When connecting the mikroBoard for ARM card to the development system, it is necessary to remove jumper marked STANDALONE. For more information on the mikroBoard for ARM, refer to the relevant manual.

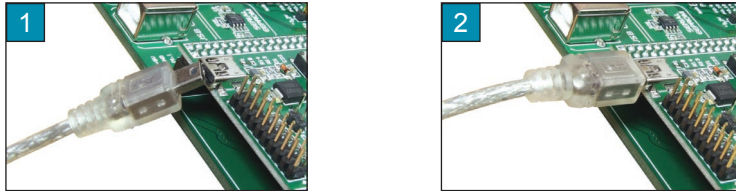


Figure 2-1: Connecting the development system to a PC

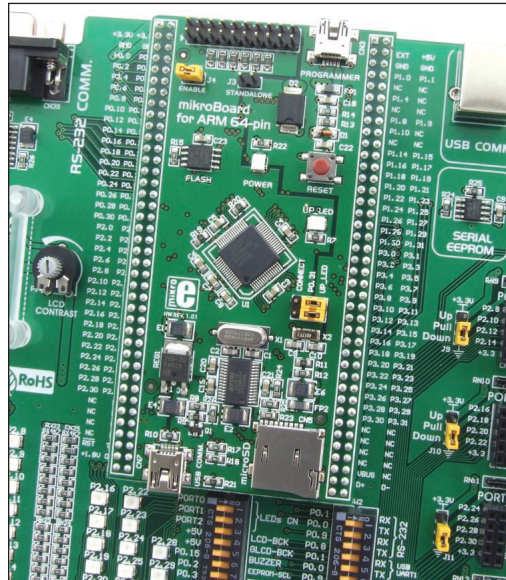


Figure 2-2: mikroBoard for ARM

In addition to the mikroBoard for ARM, the development system can also be connected to a PC via USB UART 1 or USB UART2 module supplied on the development system or via a USB connector used for USB communication. It's also possible to connect development system via RS-232 port.

3. USB UART1 i USB UART2 modules

USB UART modules enables the *EasyARM v6* 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 P0.1(RX) and P0.0(TX) pins for USB UART1 or P0.9(RX) and P0.8(TX) for USB UART2.

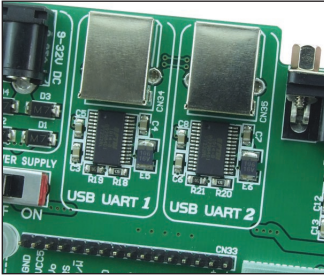


Figure 3-1: USB UART modules

In order to establish connection between the USB UART1 module and the microcontroller, it is necessary to set switches 5 and 6 on the DIP switch SW2 to the ON position. To connect the USB UART2 module and the microcontroller, it is necessary to set switches 7 and 8 on the DIP switch SW2 to the ON position.

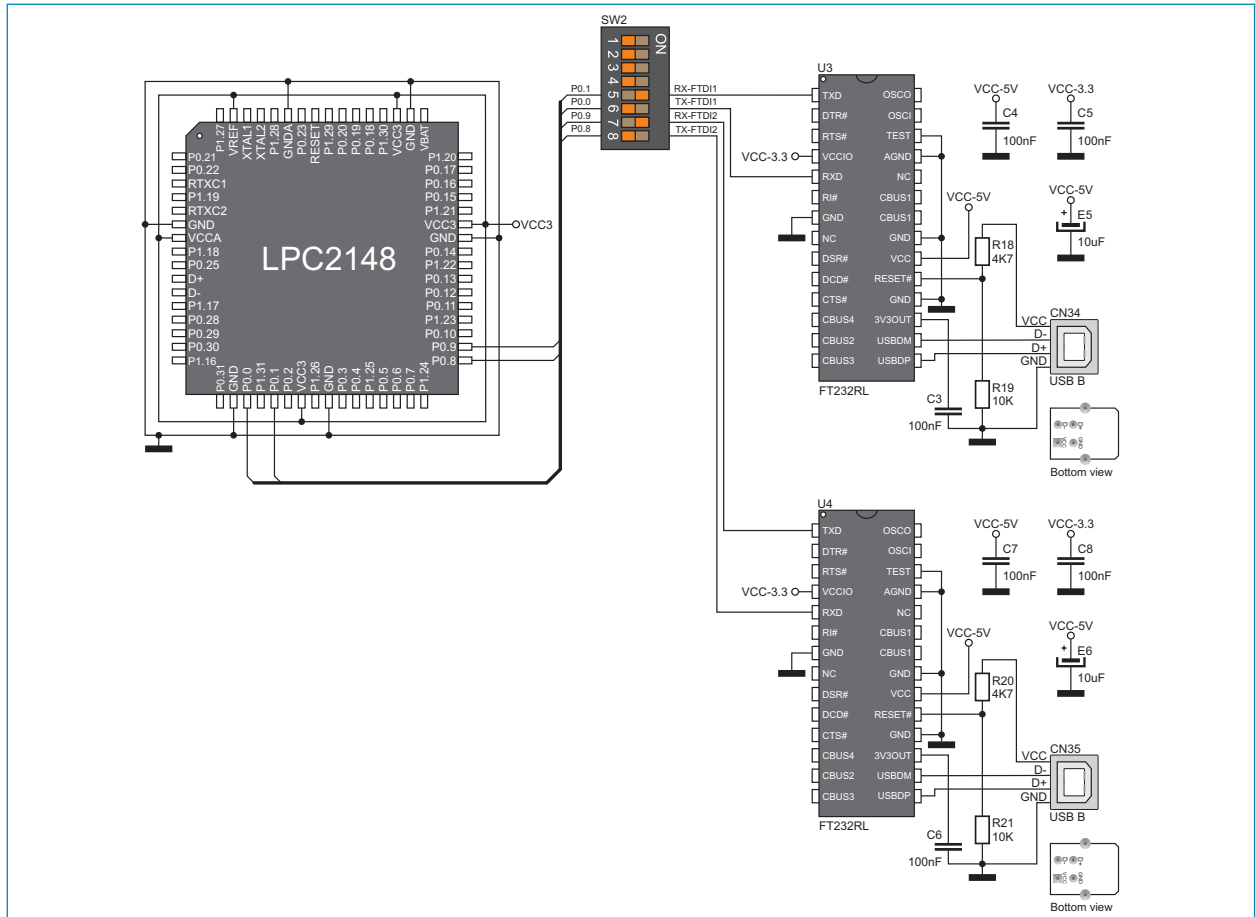


Figure 3-2: USB UART module connection schematic

4. RS-232 module

The RS-232 module enables the development system to communicate with external devices whose operation is in compliance with the RS-232 standard. In order to establish connection between the RS-232 module and the microcontroller, it is necessary to set switches 1 and 2 (optionally 3 and 4) on the DIP switch SW2 to the ON position.

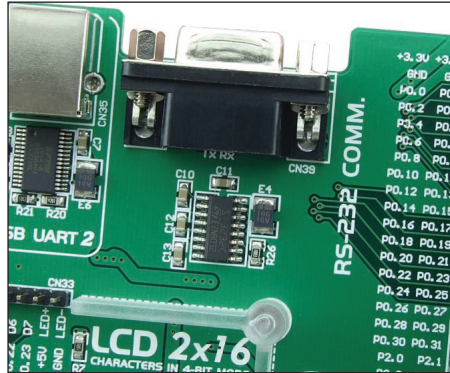


Figure 4-1: RS-232 module

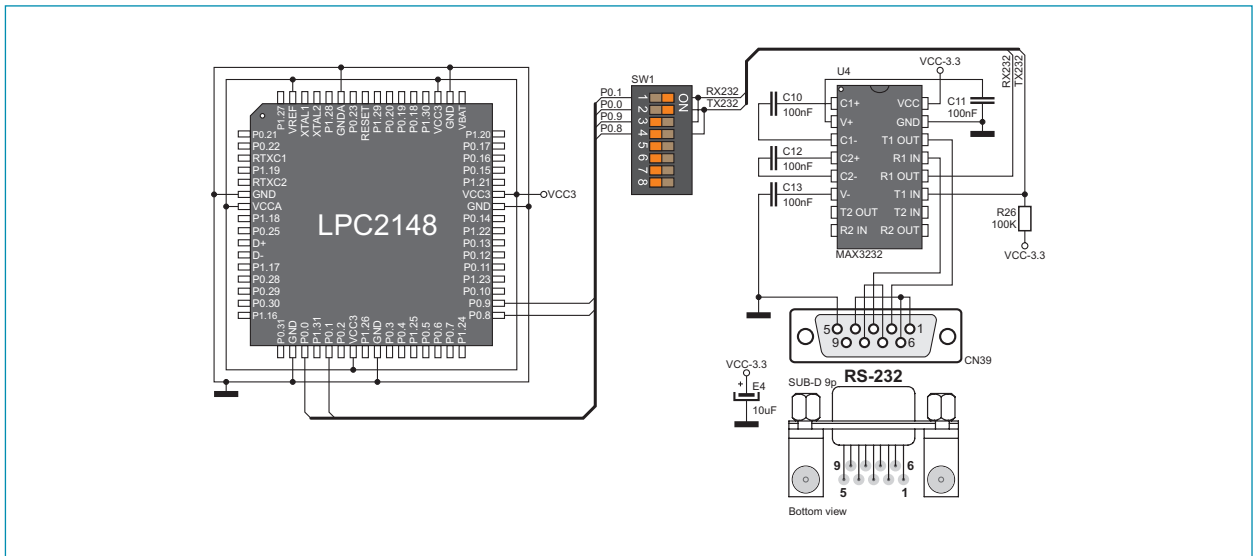


Figure 4-2: RS-232 module connection schematic

5. Piezo buzzer

Due to a built-in piezo buzzer, the *EasyARM v6* development system is capable of emitting audio signals. In order to enable the piezo buzzer to operate properly it is necessary to generate a voltage signal of specific frequency. Remember, when writing the code for voltage signal generation, that the piezo buzzer's resonant frequency is 3.8kHz. Other frequencies in the range between 20Hz and 20kHz can also be used, but the best performance is provided with frequencies ranging between 2kHz and 4kHz. To establish connection between the piezo buzzer and the microcontroller, it is necessary to set switch 6 on the DIP switch SW1 to the ON position.

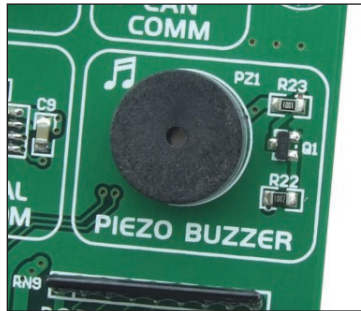


Figure 5-1: Piezo buzzer

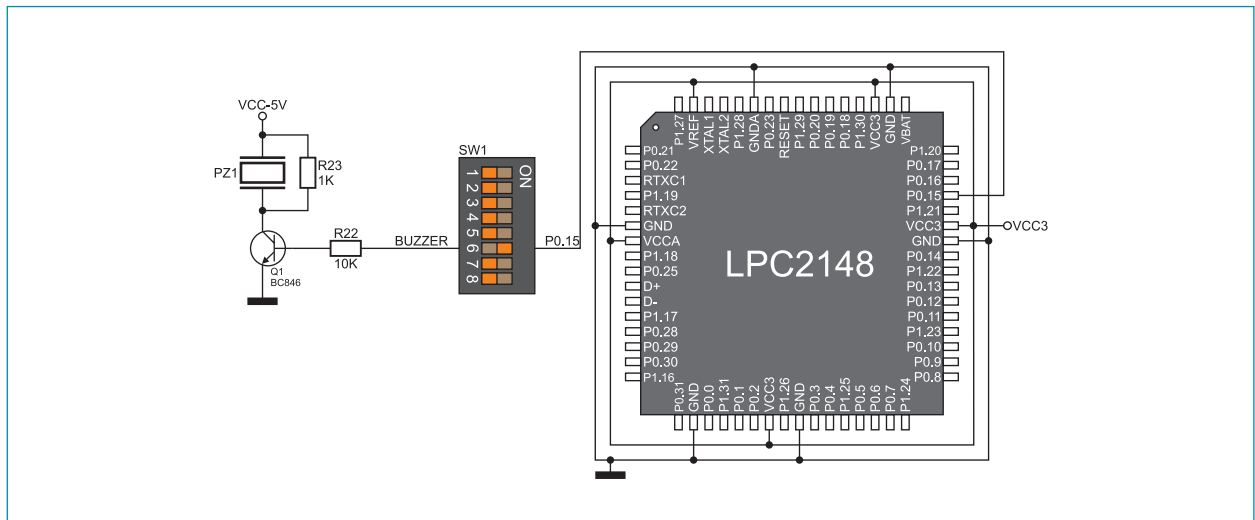


Figure 5-2: Piezo buzzer connection schematic

6.0. CAN module

CAN (Controller Area Network) is a communication standard primarily intended for use in automotive industry. It enables the microcontroller to communicate to a device installed in cars without using a host PC. In addition, this communication is widely used in industrial automation. The *EasyARM v6* development system features CAN module used for communication with CAN devices. To establish connection between this module and the microcontroller, it is necessary to set switches 1 and 2 (optionally 3 and 4) on the DIP switch SW3 to the ON position.

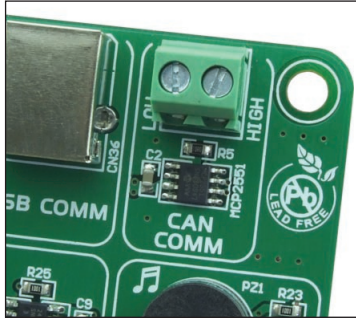


Figure 6-1: CAN module

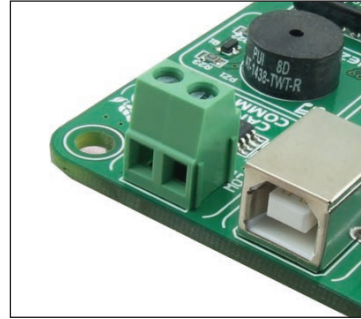


Figure 6-2: CAN module connector

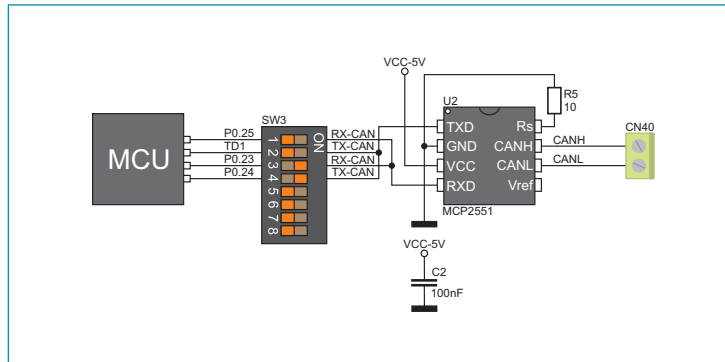


Figure 6-3: CAN module connection schematic

7. EEPROM module

EEPROM module enables the microcontroller to use additional 1Kbit EEPROM memory via I2C serial connection. To establish connection between this module and the microcontroller, it is necessary to set switches 7 and 8 on the DIP switch SW1 to the ON position.



Figure 7-1: EEPROM module

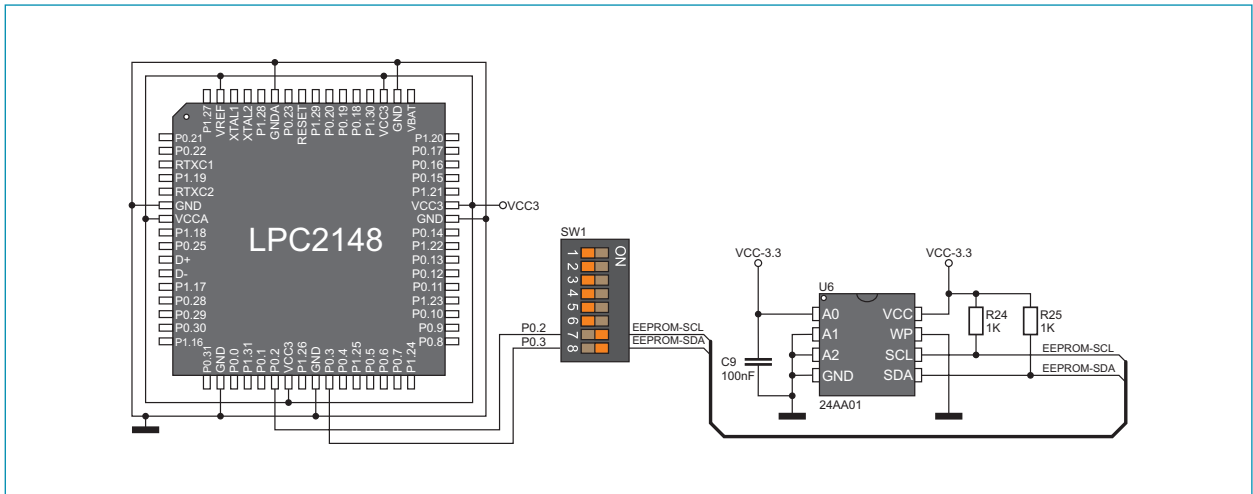


Figure 7-2: EEPROM module connection schematic

8. USB communication

The *EasyARM v6* development system can communicate with external devices via the USB connector used for USB communication. The USB connector is directly connected to the microcontroller pins used for USB communication.

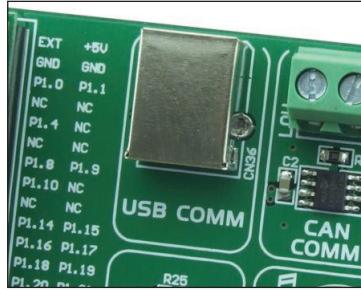


Figure 8-1: USB connector of B type

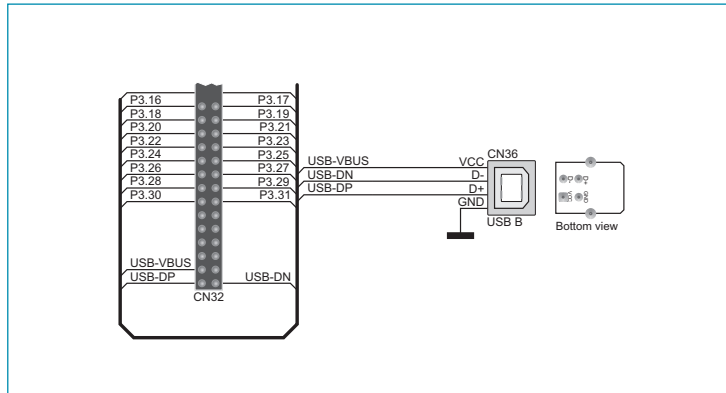


Figure 8-2: USB connector connection schematic

9. LEDs

There are 80 LEDs on the *EasyARM v6* development system used to 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 LEDs to illuminate, it is necessary to select the appropriate port (PORT0, PORT1 or PORT2) by using DIP switch SW1. Port PORT3 is not connected to LEDs.

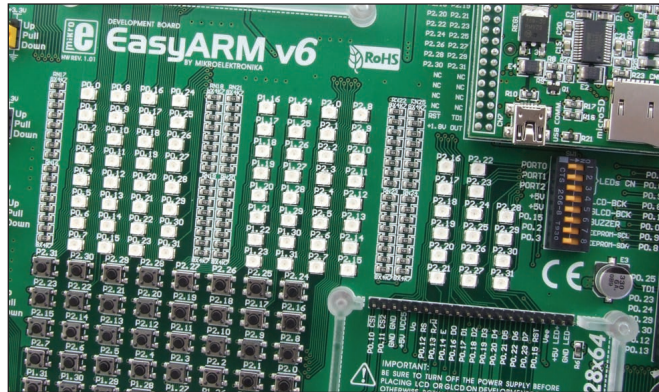


Figure 9-1: LEDs

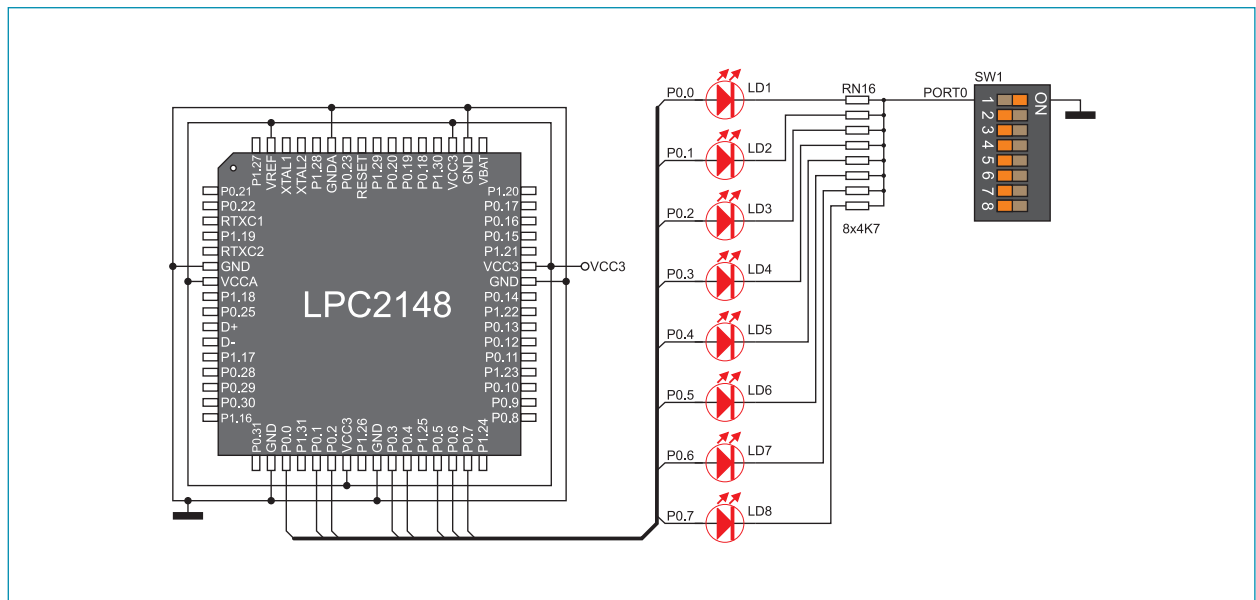
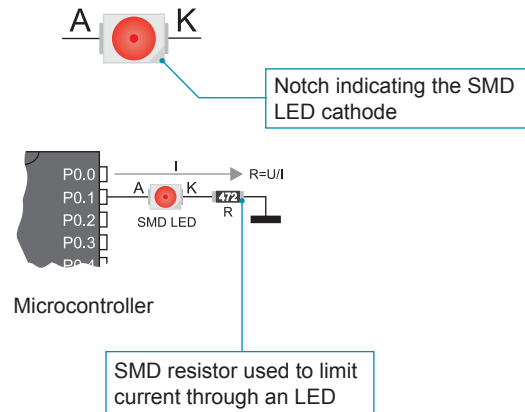


Figure 9-2: LED and port PORT0 connection schematic

10. Push buttons

The logic level of all microcontroller input pins may be changed by using push buttons. Jumper J17 is used to determine the logic level to be supplied on the appropriate microcontroller pin by pressing a push button. The function of the protective resistor is to limit the maximum current, thus preventing the development system and peripheral modules from being damaged in case a short circuit occurs. If needed, advanced users may shorten this resistor by using jumper J16.

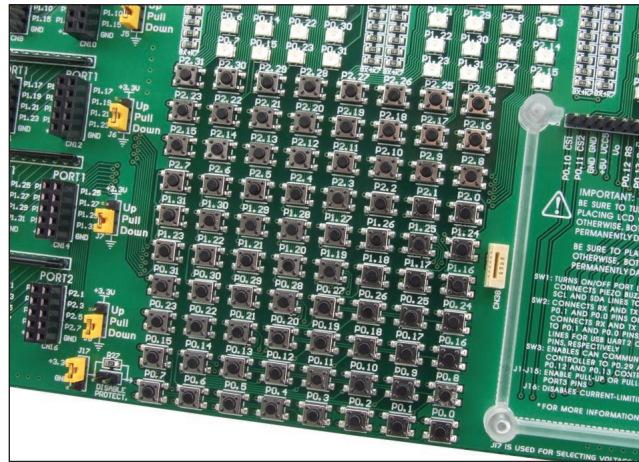


Figure 10-1: Push buttons

By pressing any push button when jumper J17 is in the VCC-3.3 position, a logic one (3.3V) will be applied to the appropriate microcontroller pin, as shown in Figure 2.

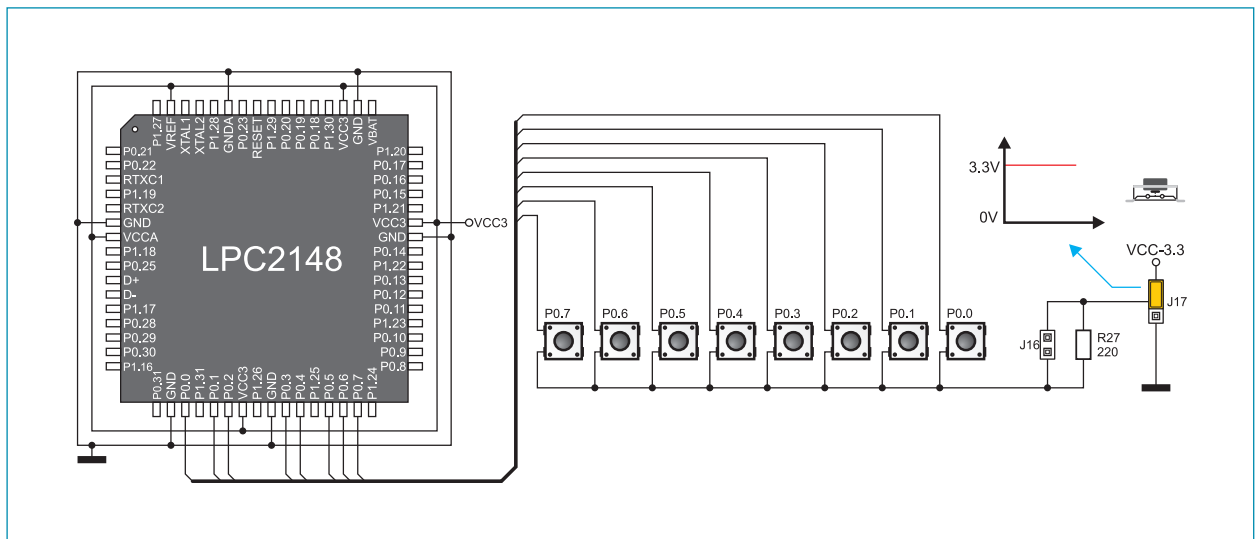


Figure 10-2: Push buttons and port PORT0 connection schematic

11.0. 2x16 LCD display

The *EasyARM v6* development system features an on-board connector for the alphanumeric 2x16 LCD display. This connector is linked to the microcontroller via port PORT0. Potentiometer P1 is used to adjust display contrast. The LCD-BCK switch on the DIP switch SW1 is used to turn the display backlight on/off.

Communication between this LCD and the microcontroller is performed in a 4-bit mode. Alphanumeric digits are displayed in two lines each containing up to 16 characters of 7x5 pixels.



Figure 11-1: Connector for alphanumeric LCD display



Figure 11-2: Alphanumeric 2x16 LCD display

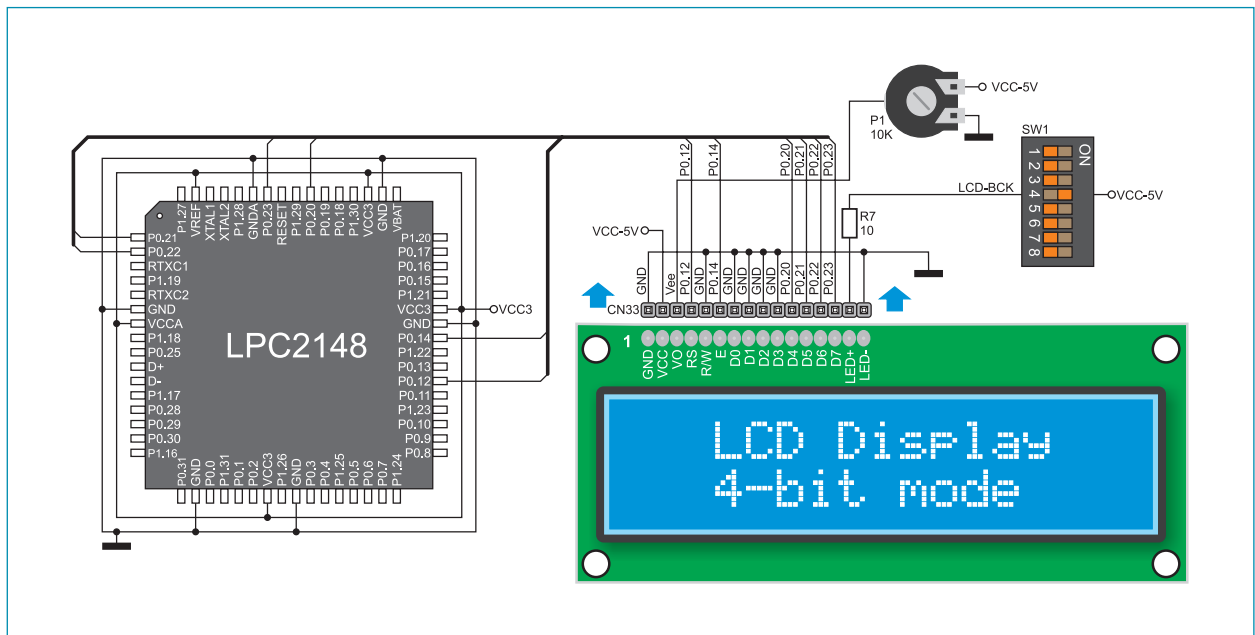


Figure 11-3: 2x16 LCD display connection schematic

12.0. 128x64 graphic LCD display

128x64 graphic LCD (GLCD) is connected to the microcontroller via port PORT0. It has a screen resolution of 128x64 pixels, which allows diagrams, tables and other graphic contents to be displayed. Potentiometer P2 is used for the GLCD contrast adjustment. Switch 5 (GLCD-BCK) on the DIP switch SW1 is used to turn the display backlight on/off.

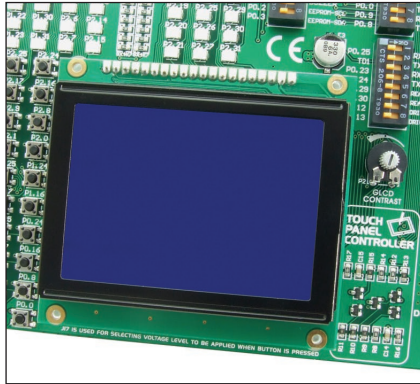


Figure 12-1: GLCD display

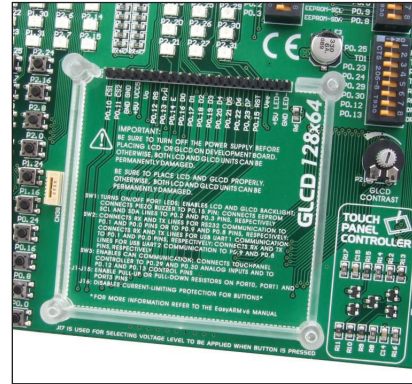


Figure 12-2: GLCD connector

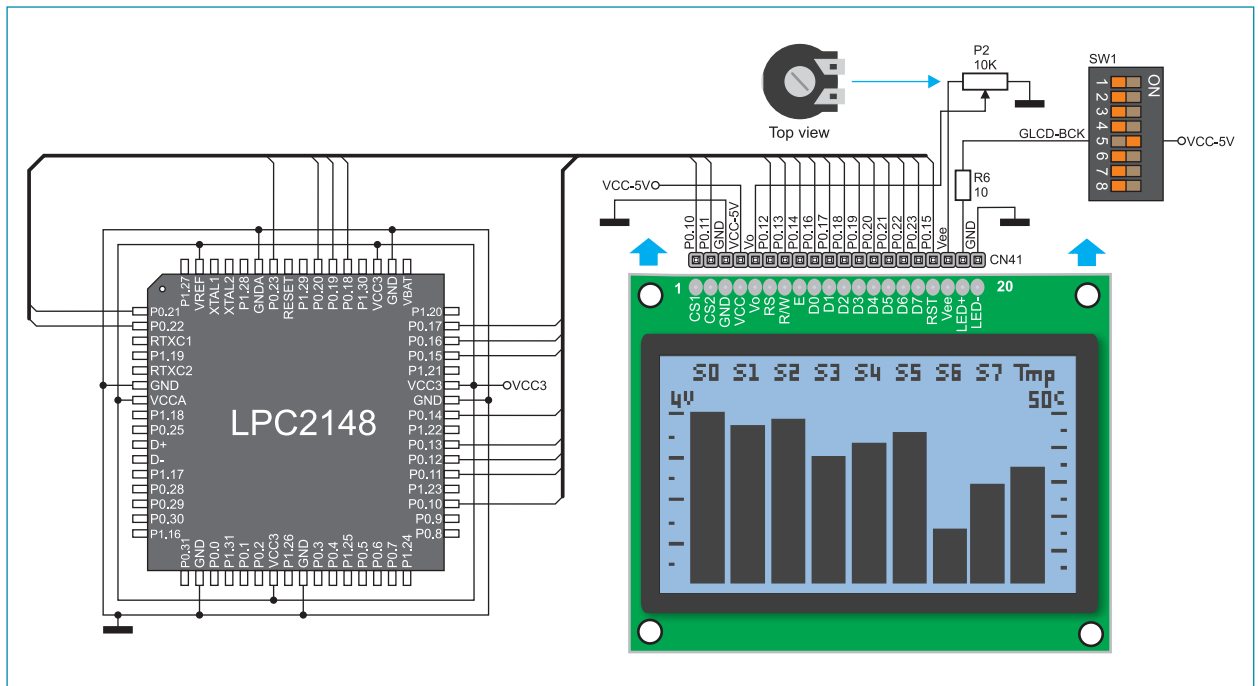


Figure 12-3: GLCD display connection schematic

13.0. Touch panel

A touch panel is a thin, self-adhesive, transparent, touch-sensitive panel. It is placed over a GLCD display. Its main function is to register pressure at some specific display point and to forward its coordinates in the form of analog voltage to the microcontroller. Switches 5, 6, 7 and 8 on the DIP switch SW3 are used to connect the microcontroller and touch panel.

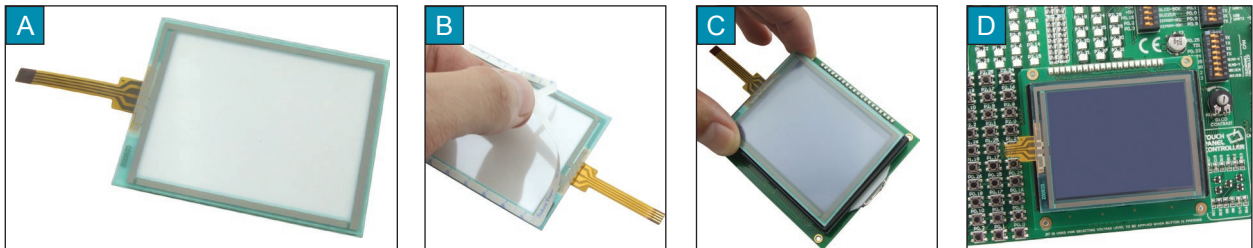


Figure 13-1: Placing touch panel over a GLCD

Figure 1 shows how to place a touch panel over a GLCD display. Make sure that the flat cable is to the left of the GLCD, as shown in Figure 1D.

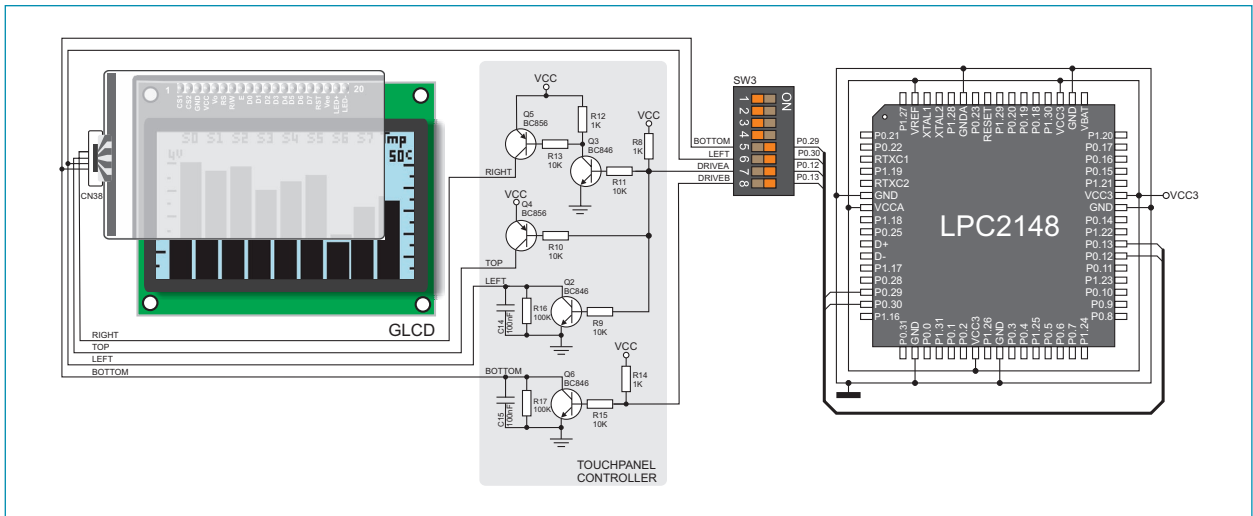


Figure 13-2: Touch panel connection schematic

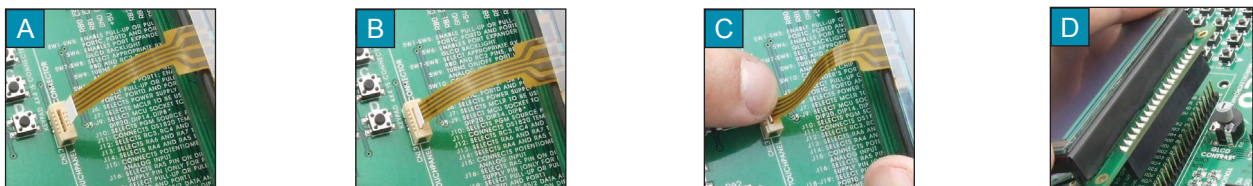


Figure 13-3: Connecting touch panel

Figure 3 shows in detail how to connect a touch panel to the microcontroller. Bring the end of the flat cable close to the CN38 connector (Figure A). Plug the cable into the connector (Figure B) and press it easily so as to fully fit the connector (Figure C). Now, a GLCD can be plugged into the appropriate connector (Figure D).

NOTE: LEDs and pull-up/pull-down resistors on port PORT0 should be off when the touch panel is in use.

14.0. Input/output ports

Along the left and right sides of the development system, there are fifteen 10-pin connectors linked to the microcontroller I/O ports. Due to jumpers J1-J15, pull-up or pull-down resistors can be connected to I/O ports.

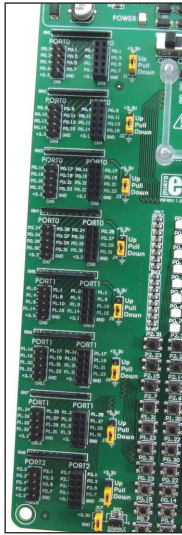


Figure 14-1: I/O ports

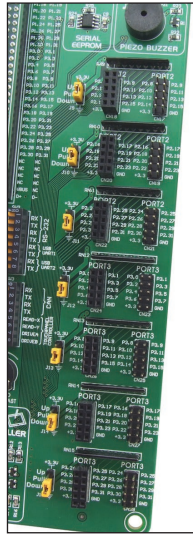


Figure 14-2: I/O ports

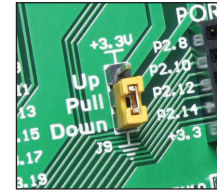


Figure 14-3: J9 in pull-down position

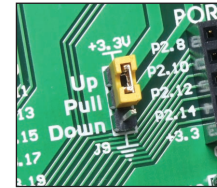


Figure 14-4: J9 in pull-up position

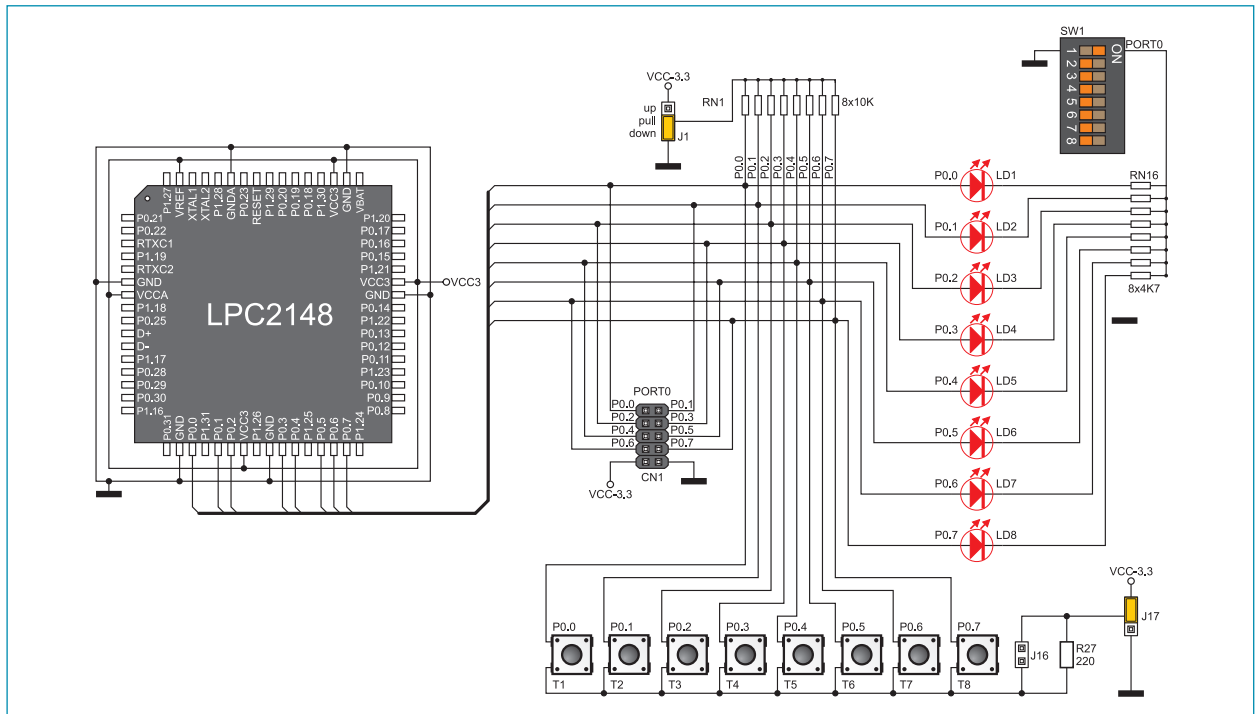


Figure 14-5: Port PORT0 connection schematic

Pull-up/pull-down resistors enable you to feed all microcontroller's input pins the logic level on when they are in idle state. This level depends on the position of the pull-up/pull-down jumper. The P0.0 pin with the relevant jumper J2 and P0.0 push button with jumper J17 are used here for the purpose of explaining the performance of pull-up/pull-down resistors. The principle of their operation is the same for all other microcontroller pins.

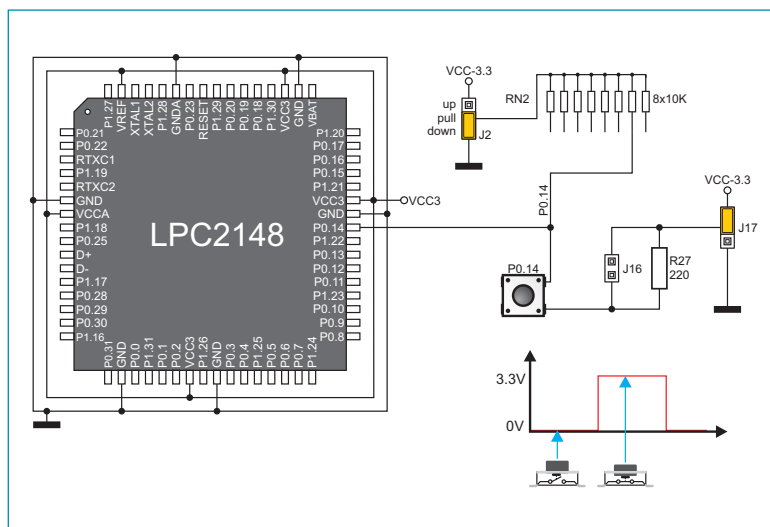


Figure 14-6: Jumper J2 in pull-down and jumper J17 in pull-up position

In order to enable the PORT0 port pins to be connected to pull-down resistors, it is necessary to place jumper J1 in the *Down* position first. This enables any PORT0 port pin to be supplied with a logic zero (0V) in idle state over jumper J2 and 8x10k resistor network.

As a result, every time you press the P0.0 push button, the P0.0 pin will be fed with a logic one (VCC-3.3 voltage), provided that jumper J17 is placed in the VCC-3.3 position.

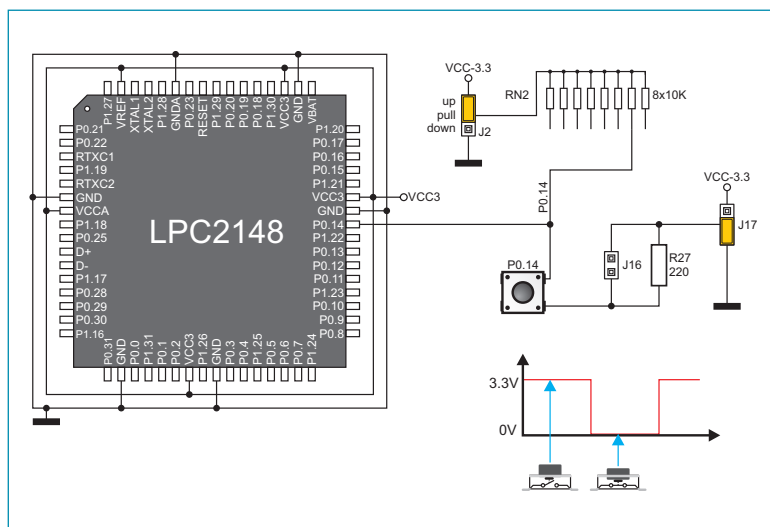


Figure 14-7: Jumper J2 in pull-up and jumper J17 in pull-down position

In order to enable port PORT0 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 J2 in the *Up* position and jumper J17 in the GND position. This enables any port PORT0 input pin, when it is in idle state, to be driven high (3.3V) over the 10k resistor.

As a result, every time you press the P0.0 push button, the P0.0 pin will be fed with a logic zero (0V)

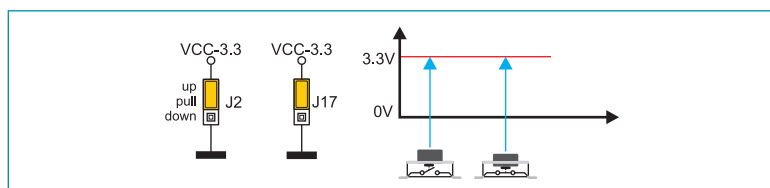
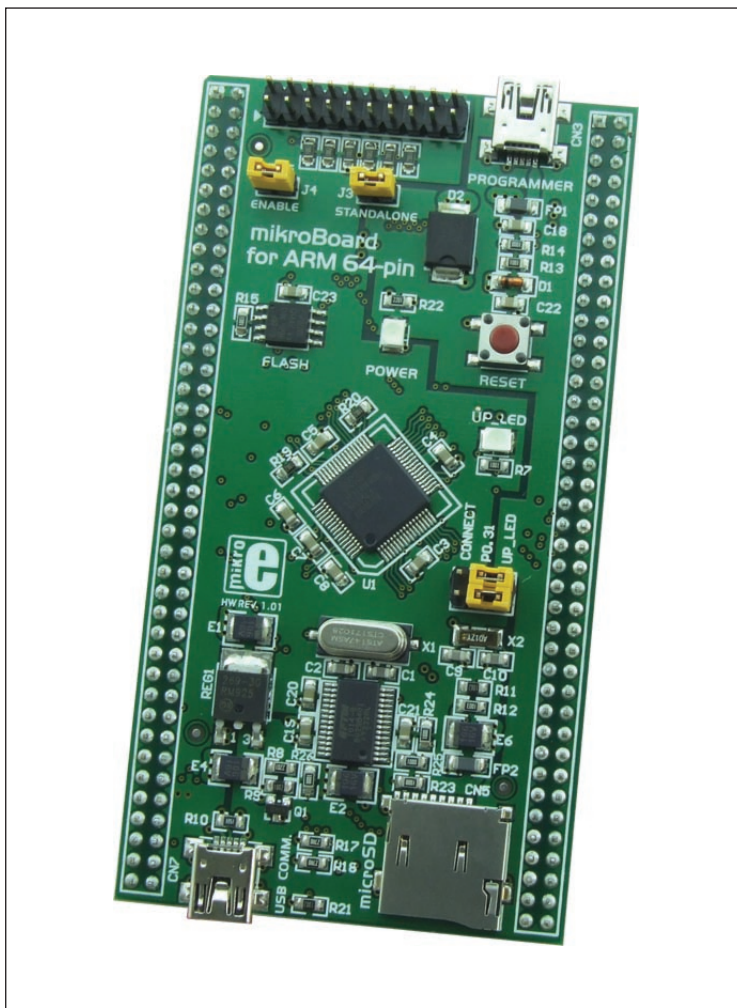
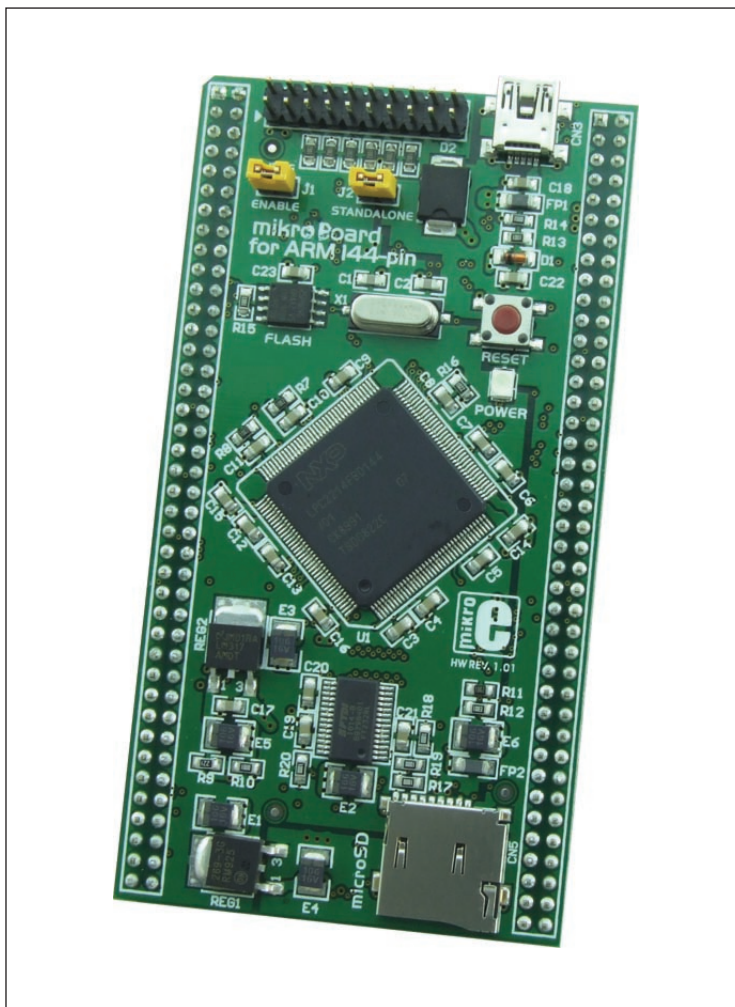


Figure 14-8: Jumpers J2 and J17 in the same positions

In case that jumpers J2 and J17 are in the same positions, pressure on any button will not cause input pins to change their logic state.



mikroBoard for ARM 64-pin



mikroBoard for ARM 144-pin

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