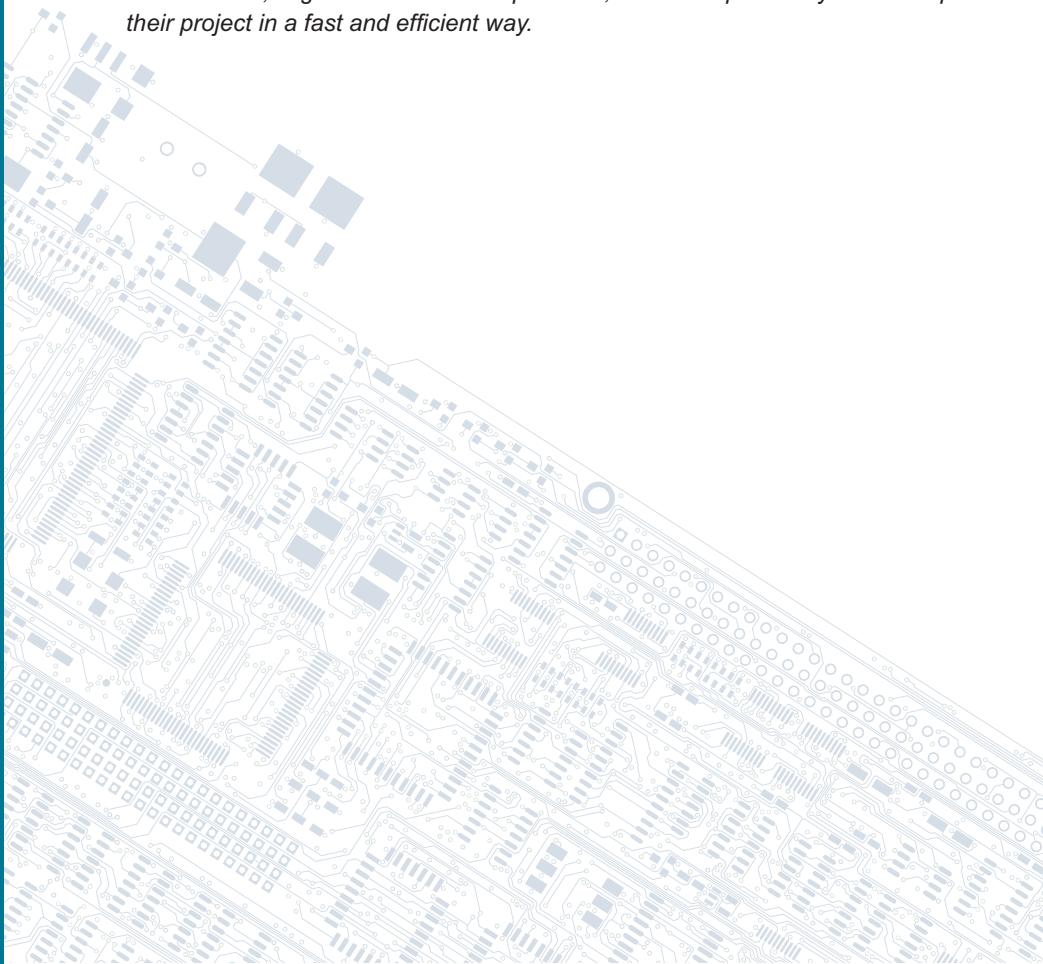


UNI-DS3™

User manual

Development System

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.



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.



Nebojša Matić
General Manager

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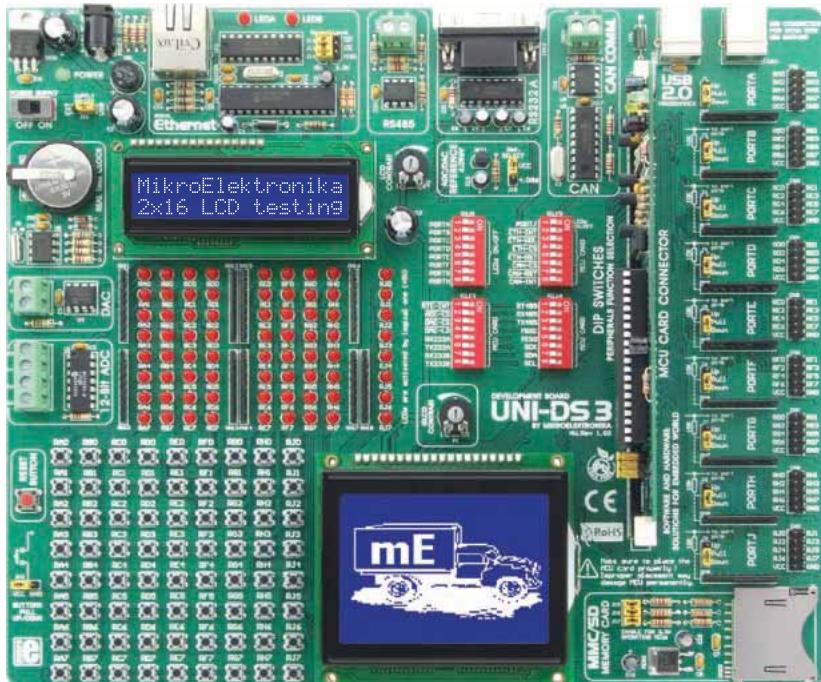
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Introduction to UNI-DS3 Development System

The **UNI-DS3™** development system provides a universal development environment for programming and experimenting with microcontrollers. Thanks to the universal DIMM-168P socket, it is possible to place MCU cards with different microcontrollers on this development system. Every MCU card is also provided with appropriate programmer used for loading a hex code into the microcontroller. The **UNI-DS3** development system may come with an MCU card with PIC®, dsPIC®, AVR®, 8051, ARM® or PSoC® microcontroller. Numerous on-board modules, such as RS232, CAN, ADC, DAC, LCD display, GLCD display etc. allow you to easily experiment with your microcontroller.



Universal development system for microcontroller based devices



On-board USB 2.0 programmer



Digital-to-analog converter



Alphanumeric 2x16 LCD display



Graphic LCD display with backlight



Every MCU card is provided with appropriate programmer. To load a hex code from a PC to the microcontroller it is also necessary to have appropriate program for it installed on the PC. MCU cards with PIC microcontrollers use the *PICflash* program, MCU cards with AVR microcontrollers use the *AVRflash* program etc.

Package contains:

Development system: UNI-DS3

CD: product CD with relevant software

Cables: USB cable

Documentation: UNI-DS3 manual, quick guide for installing USB drivers and electrical schematic of the system

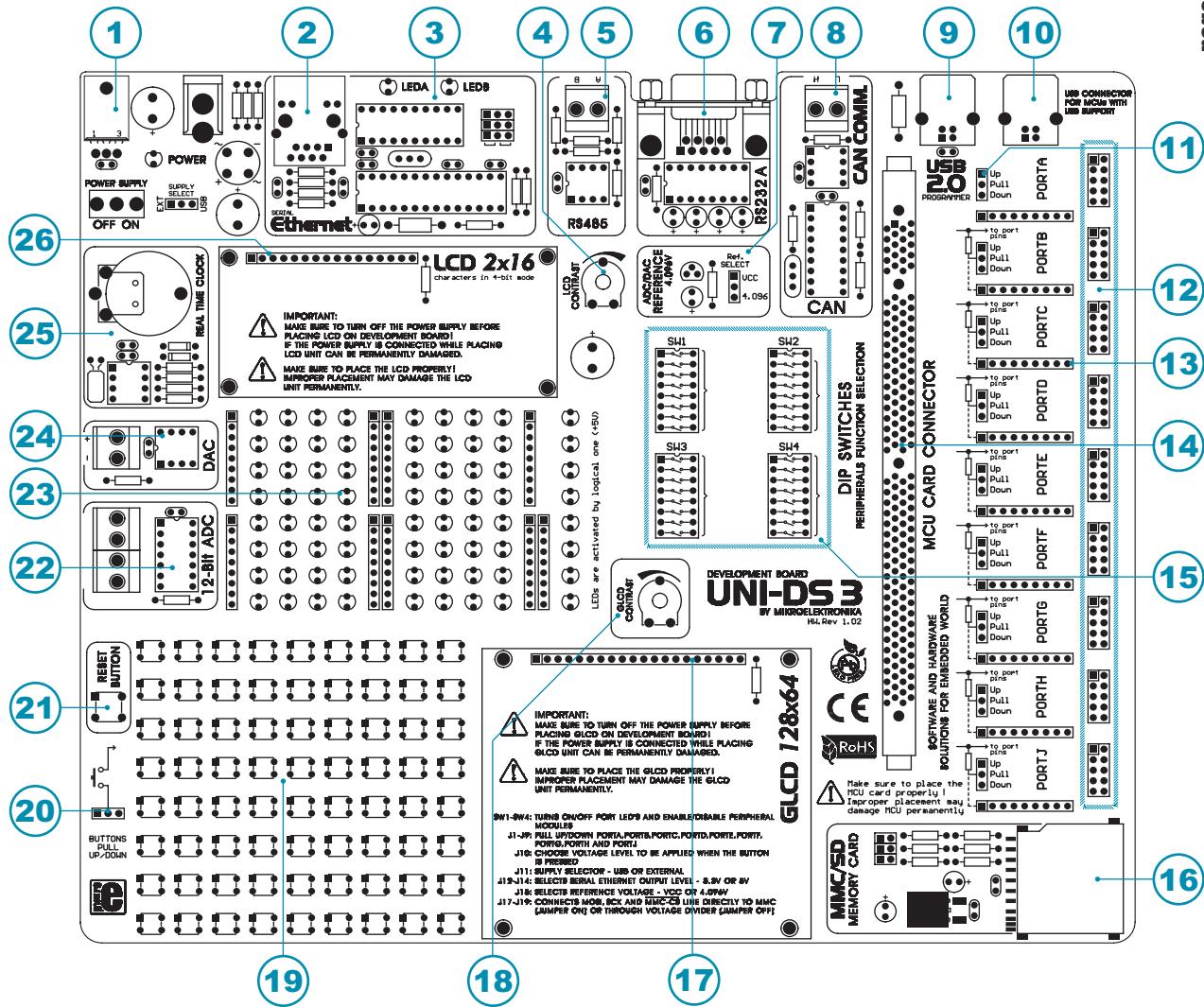
System specification:

Power supply: over a AC/DC connector (8-16V AC/DC); or over a USB cable for programming (5V DC)

Power consumption: ~20mA when all on-board modules are off

Dimension: 25 x 21cm (9,8 x 8,2inch)

Weight: ~400g (0.88lbs)



Key Features

- Power supply voltage regulator
- Ethernet connector
- Ethernet module
- Alphanumeric display contrast adjustment
- Connector for RS485 communication
- Connector for RS232 communication
- 4.096V voltage reference source
- Connector for CAN communication
- MCU programmer USB connector
- Connector for USB communication
- Jumper for pull-up/pull-down resistor selection
- I/O port connectors
- Pull-up/pull-down resistors
- Socket for placing MCU card
- DIP switches
- MMC/SD card slot
- Graphic LCD display connector
- Graphic LCD display contrast adjustment
- Push buttons simulate microcontroller input pins
- Jumper for selecting push buttons' logic state
- Reset button
- Analog-to-digital converter
- 72 LEDs indicate pins' logic state
- Digital-to-analog converter
- Real-time clock
- Alphanumeric LCD display connector

1.0. Connecting the System to a PC

Step 1:

Prior to connecting the development system to a PC, it is necessary to install the appropriate USB driver essential for the proper operation of the programmer. In addition to the USB driver, it is also necessary to install the appropriate program for loading a .hex code into the microcontroller. Instructions for installing USB drivers are provided in the relevant manual accompanying the development system (Quick guide for installing USB drivers).

Step 2:

MCU card with the microcontroller must be placed into the DIMM-168P socket prior to connecting the development system to a PC.

Step 3:

Use the USB cable to connect the *UNI-DS3* 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 the PC. When establishing a connection, make sure that jumper J11 is placed in the USB position as shown in Figure 1-1.

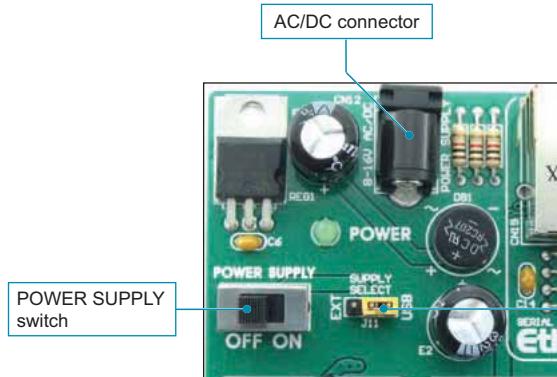


Figure 1-1: Power supply



Figure 1-2: Connecting USB cable

Step 4:

Turn on your development system by setting the POWER SUPPLY switch to the ON position. An LED diode marked as *POWER* will be automatically turned on indicating that your development system is ready to use.

NOTE: If some additional modules are used, such as LCD, GLCD etc, 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.

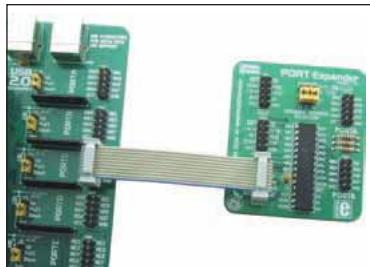
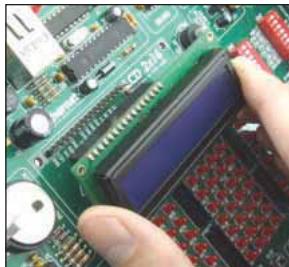
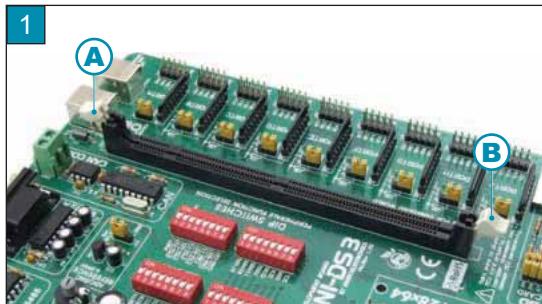


Figure 1-3: Placing additional modules on the development system

2.0. Placing MCU Card

The *UNI-DS3* development system provides a DIMM-168P socket to place an MCU card into. All MCU cards are placed in the same manner. It is shown in figures below how to place the *UNI-DS3* card with a PIC microcontroller in TQFP80 package. Any card intended to be used on the *UNI-DS3* development system may be placed instead of this one.



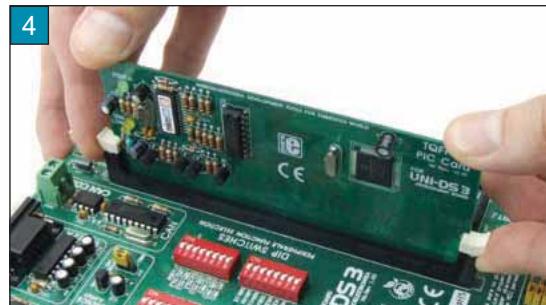
Open extraction levers A and B



Place the MCU card into the DIMM-168P socket



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



Close the extraction levers when the MCU card is properly placed into the socket

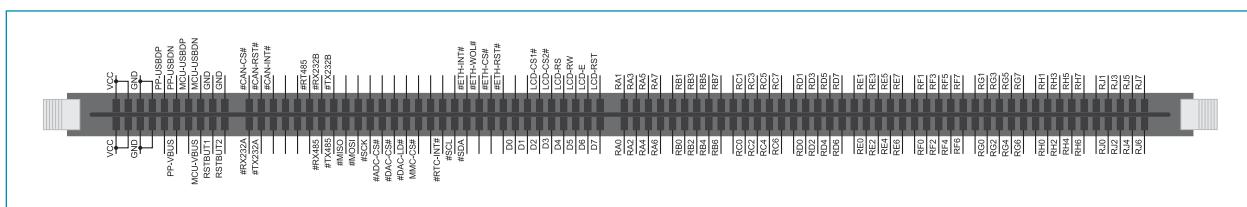


Figure 2-1: Schematic of the DIMM-168P socket's pinout

The *UNI-DS3* development system may be delivered with MCU cards with one of the following microcontroller families: PIC, dsPIC, AVR, 8051, ARM and PSoC. Detailed descriptions of MCU cards are provided at the end of this manual.



Extraction lever used to fix MCU card in the 'open' position



Extraction lever used to fix MCU card in the 'closed' position

3.0. Power Supply

The UNI-DS3 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 LM7805 voltage regulator and Gretz rectifier are used to enable external power supply voltage to be either AC (in the range of 8V to 16V) or DC (in the range of 8V to 16V). Jumper J11 is used as a selector for a power supply source. To make advantage of the USB power supply, jumper J11 should be placed in the USB position. When using external power supply, jumper J11 should be placed in the EXT position. The development system is turned on/off by switching the position of the POWER SUPPLY switch.

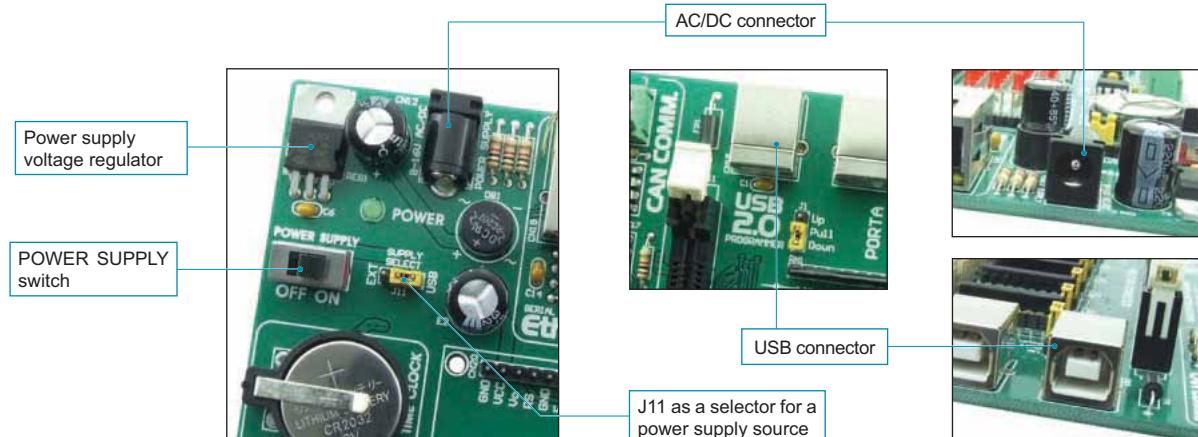


Figure 3-1: Power supply

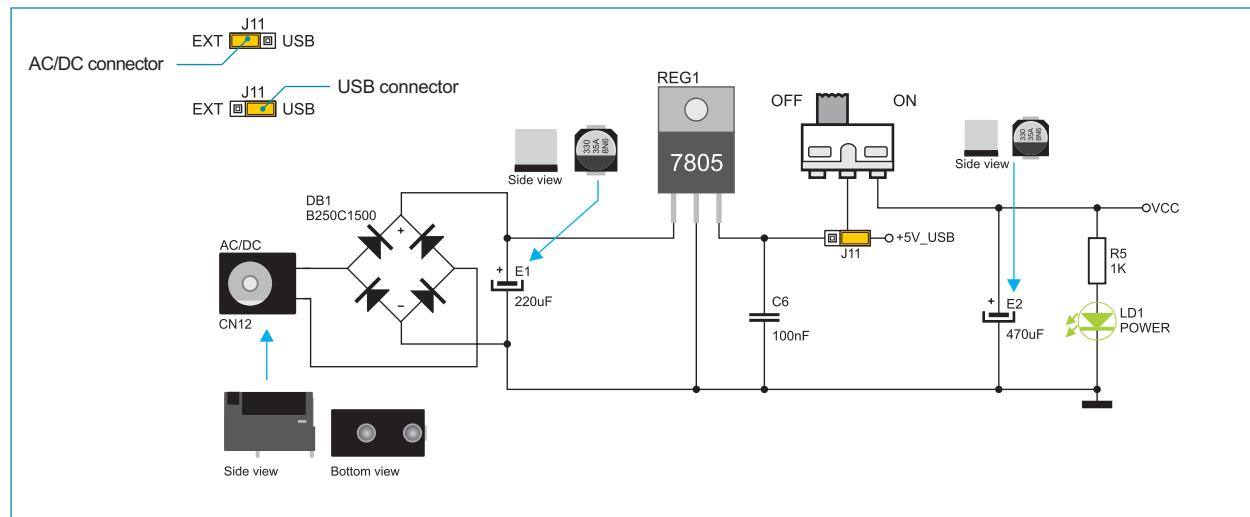


Figure 3-2: Power supply source schematic

4.0. MCU Programmer USB Connector

The USB connector (CN15) provided on the *UNI-DS3* development system is connected to the on-board programmer on the MCU card. Every MCU card is supplied with a built-in programmer matching the relevant microcontroller. For example, the MCU card with a PIC microcontroller is supplied with the built-in *PICflash* programmer with *mikroICD* support. To load a .hex code from a PC into the microcontroller it is necessary to install the program providing an interface between the PC and built-in programmer. For the MCU card with a PIC microcontroller, it is the *PICflash* program to be installed. In case an MCU card with some other type of the microcontroller is used then it is necessary to install the appropriate program depending on the microcontroller in use.

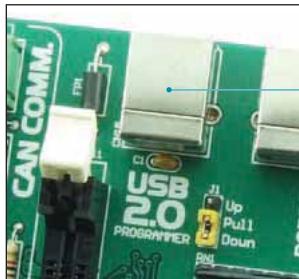


Figure 4-1: USB connector for MCU programmer

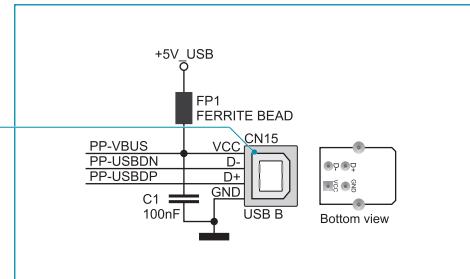


Figure 4-2: USB connector CN15 schematic

5.0. USB Communication Module

The USB connector CN21 enables connection between the MCU card, provided with the microcontroller with the USB communication module, and external device. The MCU card is connected to the USB connector CN21 through MCU-USBDN and MCU-USBDP communication lines. The MCU-VBUS line is used to detect external USB device connected to the development system.

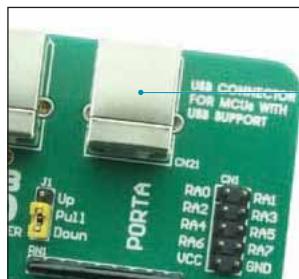


Figure 5-1: USB connector for USB communication

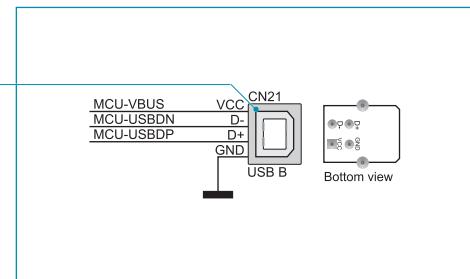


Figure 5-2: USB connector CN21 schematic

6.0. 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 MCP2551 circuit is used for communication between the CAN controller (MCP2510) and the target device. The MCP2510 circuit is a stand-alone CAN controller which communicates to the microcontroller using SPI communication. To enable connection between the microcontroller and MCP2510, it is necessary to set switches 6, 7 and 8 on the DIP switch SW2 as well as switches 4, 5 and 6 on the DIP switch SW4 to the ON position.



Figure 6-1: CAN module



Figure 6-2: CAN module connector

CAN communication is enabled via DIP switches SW2 and SW4

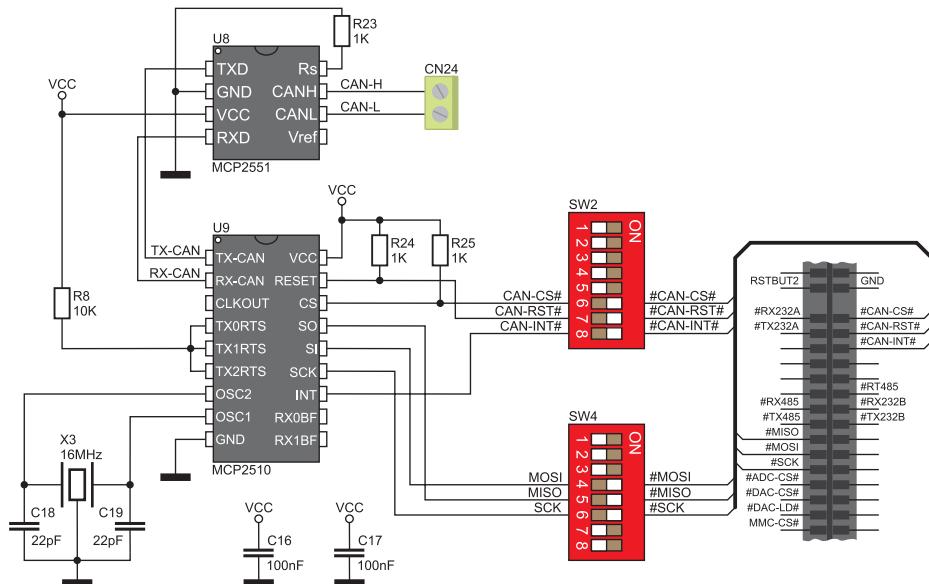


Figure 6-3: CAN communication module connection schematic

7.0. RS232 Communication Module

USART (*Universal Synchronous/Asynchronous Receiver/Transmitter*) is one of the most common ways of exchanging data between the PC and peripheral units. The RS232 serial communication is performed through a 9-pin SUB-D connector and the microcontroller USART module. The *UNI-DS3* provides one RS232A port. Use switches marked as RX232A and TX232A as well as RX232B and TX232B on the DIP switch SW3 to enable port RS232A. The microcontroller pins used in such communication are marked as follows: RX - receive data line and TX - transmit data line. Data rate goes up to 115 kbps.

In order to enable the microcontroller's USART module to receive input signals which meet the RS232 standard, it is necessary to adjust voltage levels using an IC circuit such as MAX232.



Figure 7-1: RS232 module connector

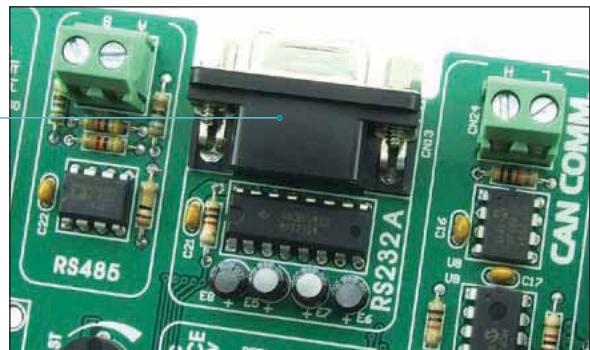


Figure 7-2: RS232 module

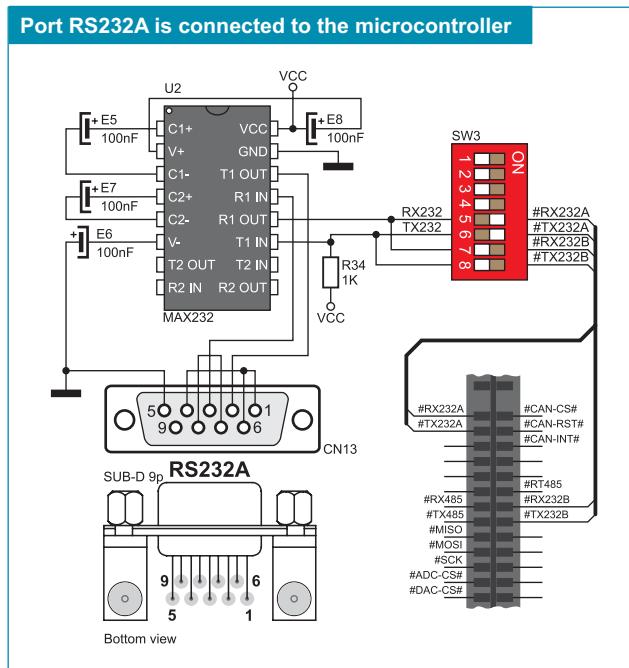


Figure 7-3: RS232 module and microcontroller connection schematic

As mentioned above, the *UNI-DS3* development system is a universal tool which makes it suitable for use with different microcontrollers. The position of pins used for RS232 communication is not the same for all microcontrollers. In order to enable different microcontrollers to make advantage of RS232 communication it is necessary to select appropriate microcontroller pins to be used for such communication. DIP switch SW3 is used as a communication line selector.

The method of connecting the RS232 communication module depends on the MCU card placed into the DIMM-168P socket. All MCU cards are described at the end of this manual and it is clearly stated which pins are used for RS232 communication with microcontrollers. For example, for the 8051 MCU card, switches 5 (RX232A) and 6 (TX232A) on the DIP switch SW3 are used. For the ATmega128 MCU card, switches 5, 6, 7 and 8 on the DIP switch SW3 may be used. Which of these four pins are to be used here depends on which pins on the ATmega128 microcontroller you want to use for RS232 communication. In case pins RE0 and RE1 are used, switches 5 (RX232A) and 6 (TX232A) on the DIP switch SW3 should be set to the ON position. In case pins RD2 and RD3 are used, switches 7 (RX232B) and 8 (TX232B) on the DIP switch SW3 should be set to the ON position.

8.0. RS485 Communication Module

RS485 communication is a communication standard primarily intended for use in industrial applications. The main features of this communication standard is the ability to exchange data between distant points (up to 1200 m) and high tolerance to accompanying noise. The UNI-DS3 development system features a connector used for connecting devices which use RS485 communication. The LTC485 circuit acts as a transciever between an external device and the microcontroller. To enable connection between the microcontroller and the RS485 communication module, it is necessary to set switches 1, 2 and 3 on the DIP switch SW4 to the ON position.



Figure 8-1: RS485 module

Connector for RS485 communication

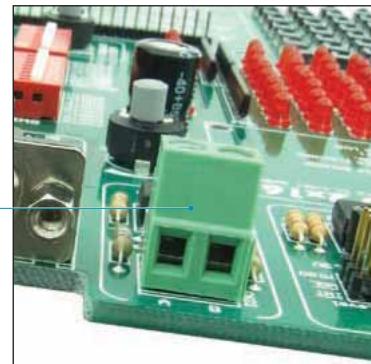


Figure 8-2: RS485 module connector

RS485 communication is enabled via DIP switch SW4

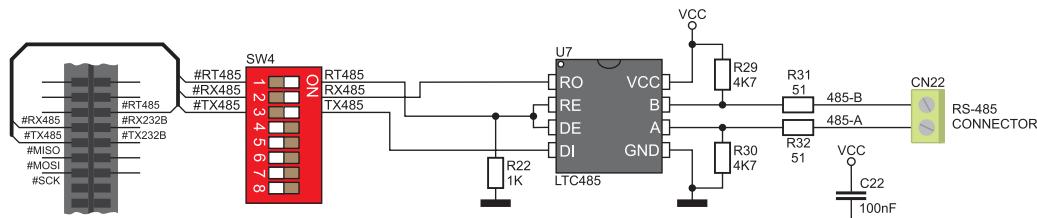


Figure 8-3: RS485 module connection schematic

9.0. MMC/SD Connector

The MMC/SD connector is used to enable memory cards to be interfaced with the microcontroller. To enable communication between memory card and microcontroller, it is necessary to adjust their voltage levels. Memory card is powered by the 3.3V power supply voltage (VCC3) generated by the REG2 voltage regulator, whereas the microcontroller's power supply voltage is 5V (VCC). In case the MCU card is powered with 5V power supply voltage, it is necessary to remove jumpers J17, J18 and J19. As a result, resistors start acting as a voltage dividers. In this case, such divider is used to lower the microcontroller's power supply voltage from 5V to 3.3V. To enable communication between microcontroller and memory card, switches 4, 5 and 6 on the DIP switch SW4 should be set to the ON position.

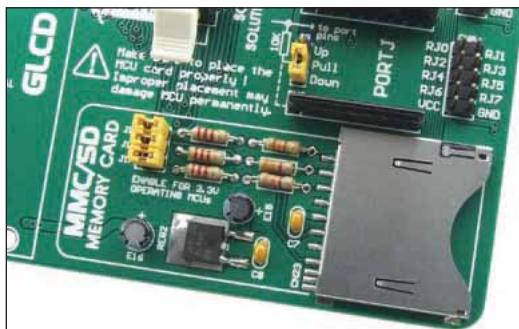


Figure 9-1: MMC/SD connector

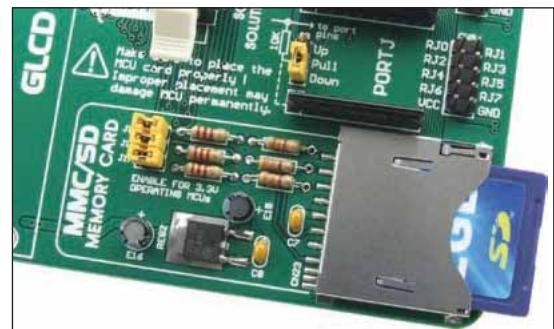


Figure 9-2: MMC/SD memory card

To use MCU cards requiring 5V power supply voltage it is necessary to remove jumpers J17, J18 and J19

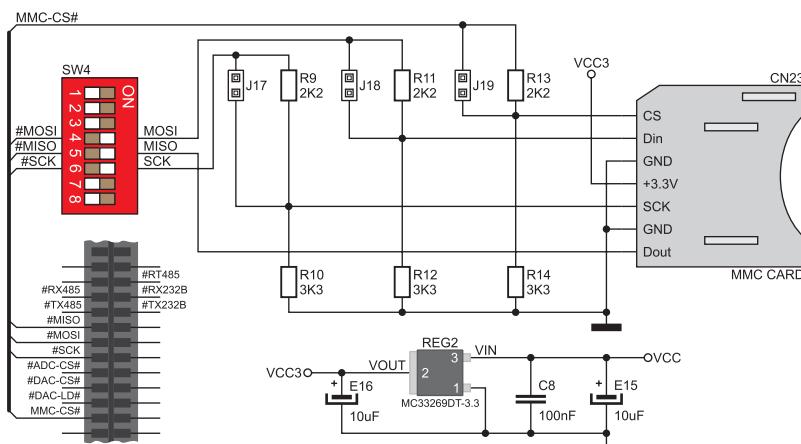


Figure 9-3: MMC/SD connector connection schematic

10.0. Real-Time Clock (RTC)

A real-time clock is widely used in alarm devices, industrial controllers, consumer devices etc. Thanks to the PCF8583 circuit, the *UNI-DS3* development system is capable of keeping the real time. The main features of the real-time clock are as follows:

- clock with calendar
- I²C serial interface
- universal counter used as an alarm
- ability to change the time format (12/24h)

The real-time clock provided on the *UNI-DS3* development system is used to generate an interrupt at pre-set time. In order to establish connection between the microcontroller and real-time clock it is necessary to set switch 1 on the DIP switch SW3, as well as switches 7 and 8 on the DIP switch SW4 to the ON position.

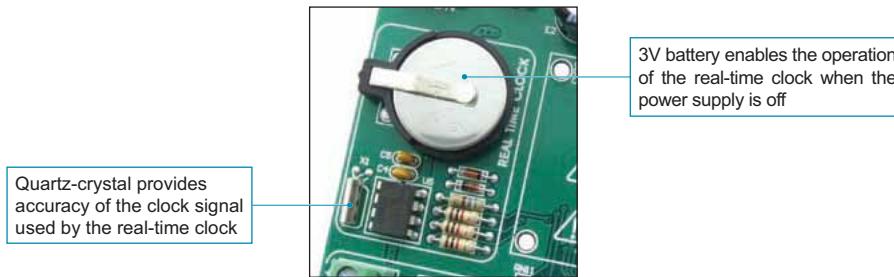


Figure 10-1: Real-time clock

Real-time clock is connected to the microcontroller via DIP switches SW3 and SW4

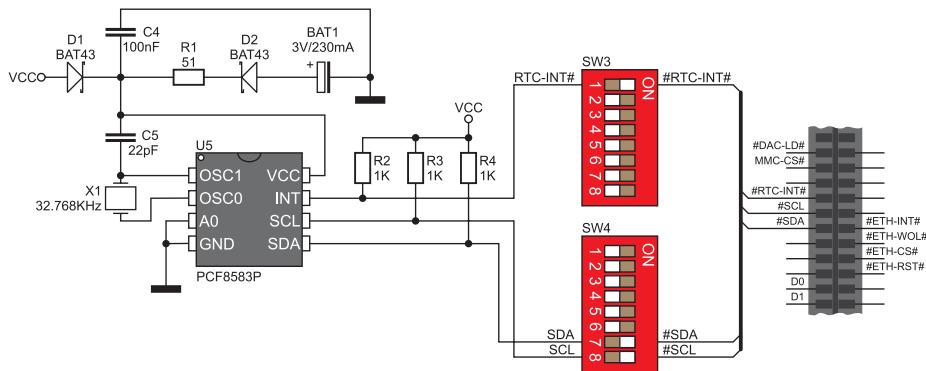


Figure 10-2: Real-time clock and microcontroller connection schematic

11.0. Digital-to-Analog Converter (DAC)

A digital-to-analog converter is a module used to convert a digital code into an analog voltage signal. The *UNI-DS3* development system is equipped with the MCP4921 circuit which acts as a 12-bit digital-to-analog converter. This circuit provides a high accuracy of conversion as well as a high-quality signal despite noises occurring when it is used in industrial applications. It communicates with the microcontroller via SPI serial communication. In order to establish connection between these two circuits, it is necessary to set switches 3 and 4 on the DIP switch SW3 to the ON position. It is also necessary to enable serial communication by setting switches 4 and 6 on the DIP switch SW4 to the ON position.

The function of jumper J15 is to determine voltage reference to be used in digital-to-analog conversion. By setting jumper to the 4.096 position, the MCP4921 circuit will be powered with the 4.096V voltage. By setting jumper J15 to the VCC position, the MCP4921 circuit will be powered with the 5V power supply voltage.

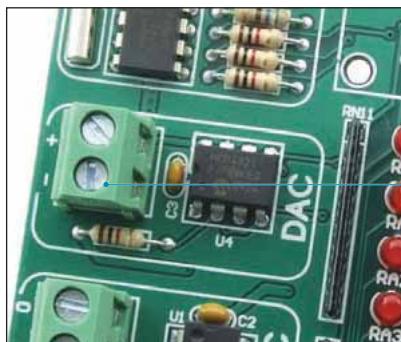


Figure 11-1: DAC module

Connector for digital-to-analog converter

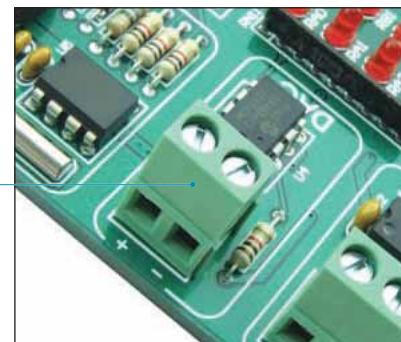


Figure 11-2: DAC connector

Digital-to-analog converter is connected to the microcontroller via DIP switches SW3 and SW4

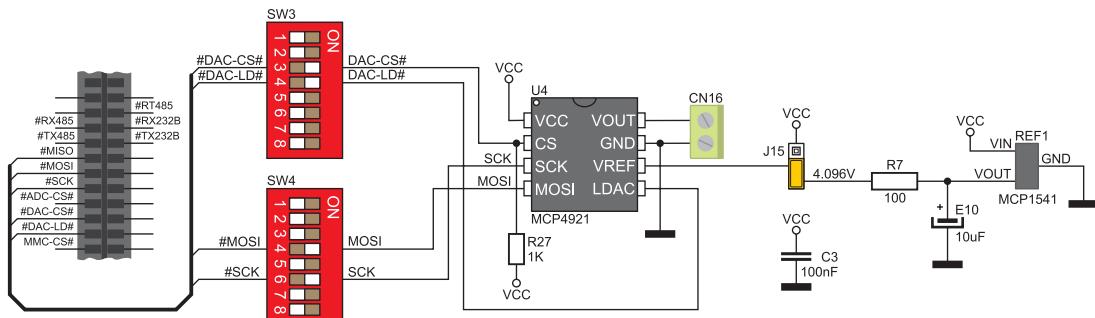


Figure 11-3: DAC module connection schematic

12.0. A/D Converter Test Inputs

An A/D converter is used for converting an analog signal into the appropriate digital value. A/D converter is linear, which means that converted number is linearly dependent on the input voltage value. The MCP3204 circuit is used as an A/D converter on the UNI-DS3 development system. Voltage to be converted is brought to the A/D converter input pins which converts it into a 12-bit number. The result of conversion is transferred to the microcontroller by means of serial communication. To make this transmission possible, it is necessary to set switch 2 on the DIP switch SW3 as well as switches 4, 5 and 6 on the DIP switch SW4 to the ON position.

A voltage reference supplied on the Vref pin of the MCP3204 circuit is used to determine maximum input analog signal, whereas jumper J15 is used to determine this voltage reference. When jumper J15 is in the 4.096 position, the 4.096V voltage is used as a voltage reference. Otherwise, when jumper J15 is in the VCC position, then the 5V power supply voltage is used as a voltage reference.

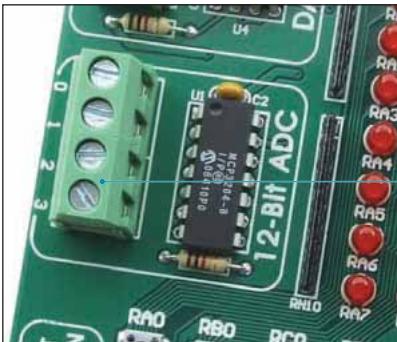


Figure 12-1: ADC module

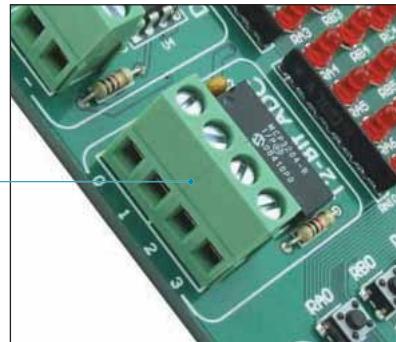


Figure 12-2: ADC connector

A/D converter is connected to the microcontroller via DIP switches SW3 and SW4

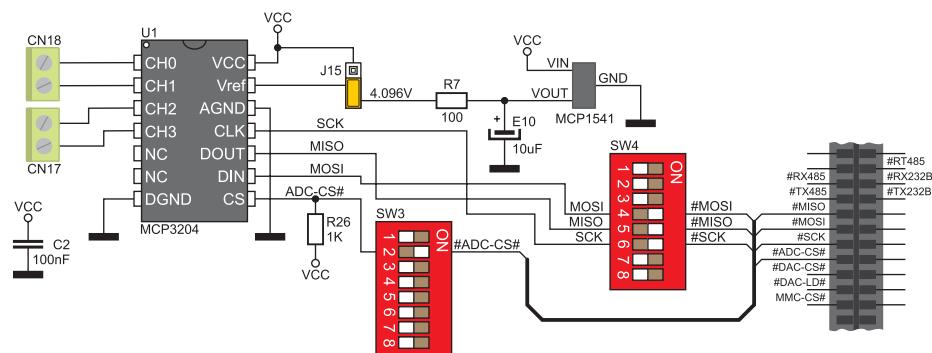


Figure 12-3: ADC module connection schematic

13.0. Ethernet Module

The UNI-DS3 development system is provided with an ethernet module. Its function is to provide an interface between the microcontroller and LAN (local area network). A stand-alone controller ENC28J60 enables ethernet communication on the development system. This circuit is used to transfer data from LAN to the microcontroller using serial communication. The 3.3V voltage is required for the operation of this circuit. To enable data to be transferred to the microcontroller powered with the 5V power supply voltage, it is necessary to adjust these voltage levels by means of the 74HCT245 transceiver. Jumpers J12, J13 and J14 are used for selecting voltage levels. In case that MCU card with the microcontroller requiring the 5V power supply for its operation is used, it is necessary to set jumpers J12, J13 and J14 to the 5V position. In case the microcontroller requiring the 3.3V power supply for its operation is used, it is necessary to set jumpers J12, J13 and J14 to the 3.3V position. To enable connection between the ethernet module and the microcontroller, switches 2, 3, 4 and 5 on the DIP switch SW2, as well as switches 4, 5 and 6 on the DIP switch SW4 must be set to the ON position.



Figure 13-1: Ethernet module

Ethernet module connector

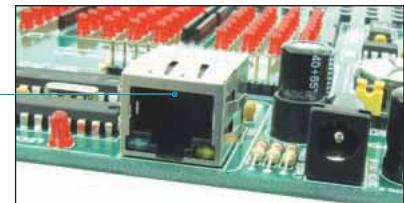


Figure 13-2: Ethernet connector

Ethernet module is connected to the microcontroller via DIP switches SW2 and SW4

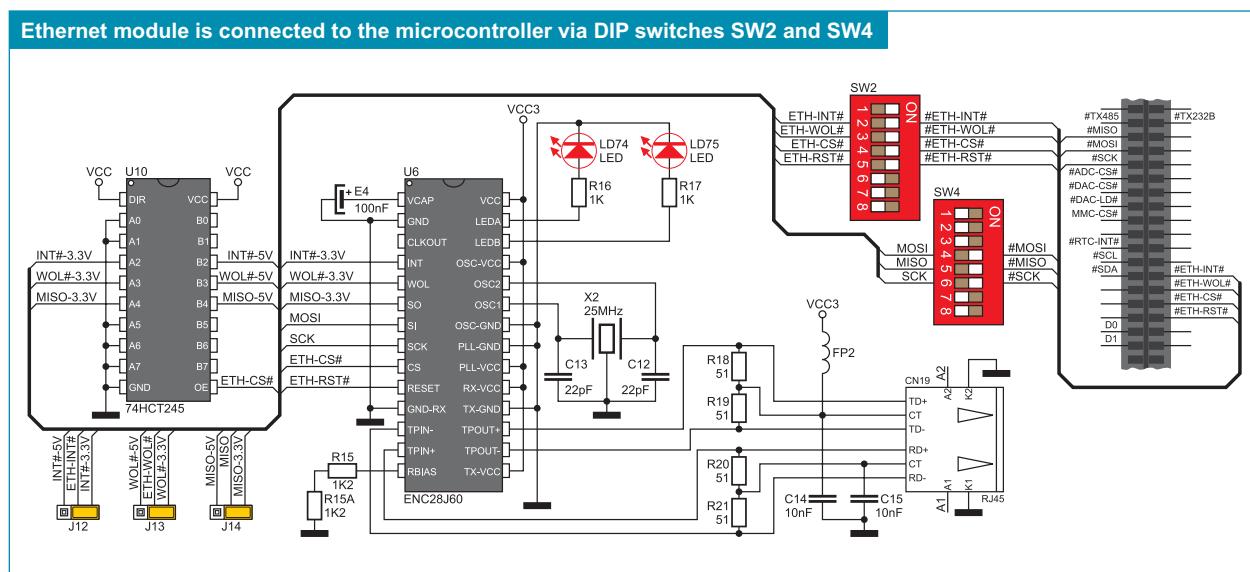


Figure 13-3: Ethernet module connection schematic

14.0. 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 diode voltage is approximately 2.5V, while the current varies from 1 to 20mA depending on the type of LED. The UNI-DS3 uses LEDs with current $I=1\text{mA}$.

There are 72 LEDs on the *UNI-DS3* 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, PORTG, PORTH or PORTJ) using the DIP switch SW1 and switch 1 on the DIP switch SW2.

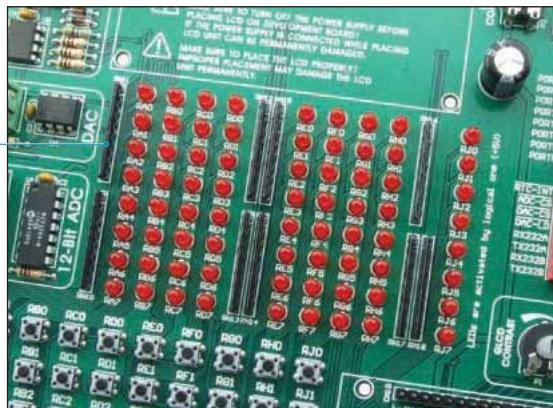


Figure 14-1: LEDs

LEDs on ports PORTB and PORTC are turned on

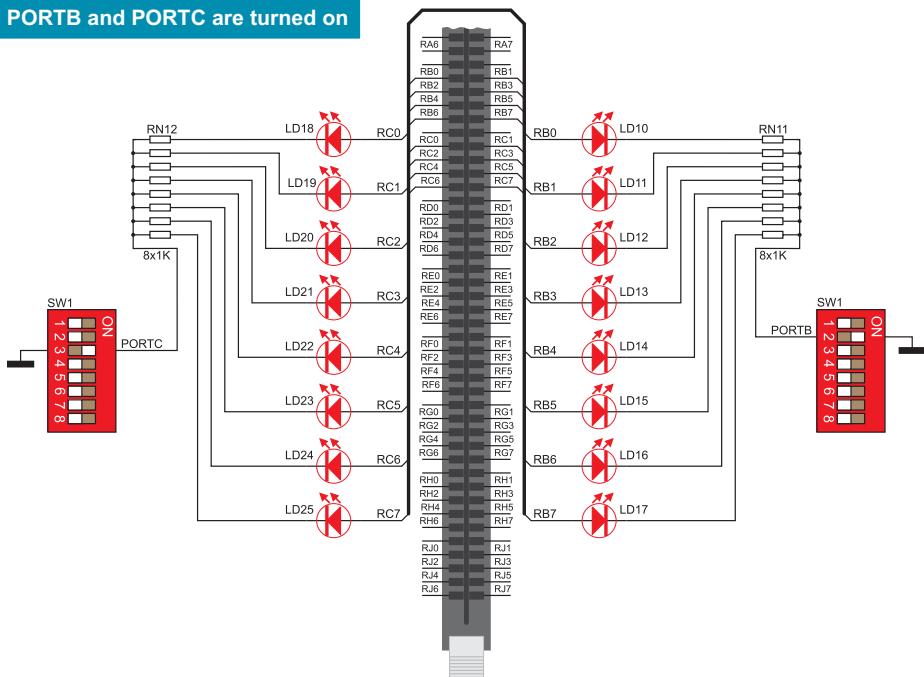


Figure 14-2: LEDs and ports PORTB and PORTC connection schematic

15.0. Push buttons

The logic state of all microcontroller input pins may be changed by means of push buttons. Jumper J10 is used to determine the logic state to be applied to the desired microcontroller pin by pressing appropriate push button. Right next to the push buttons, there is a RESET button which is used to provide the MCLR pin with the microcontroller reset signal over the programmer provided on the MCU card.

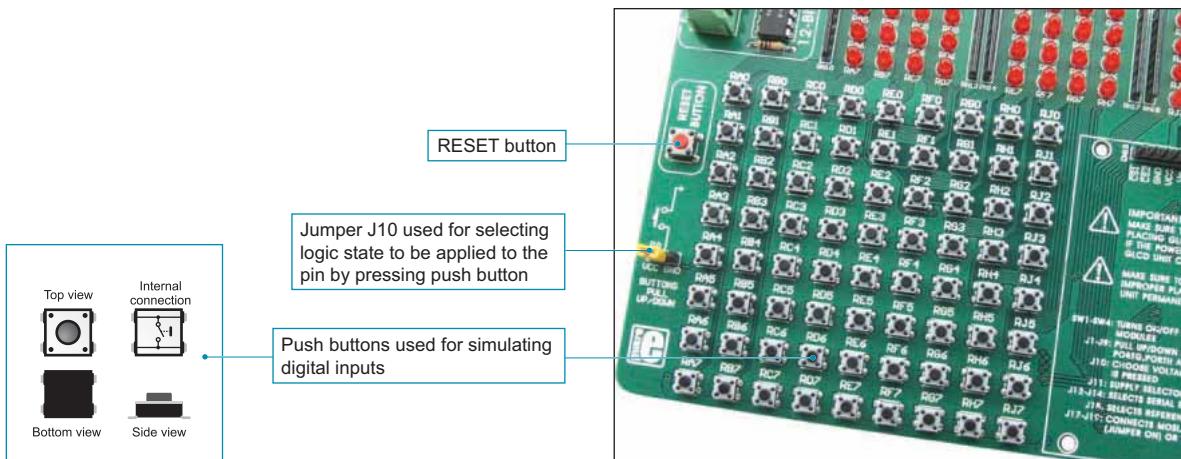


Figure 15-1: Push buttons

In Figure 15-2, jumper J10 is in the VCC position. In this case, by pressing any push button, a logic one (5V) will be applied to the appropriate microcontroller pin.

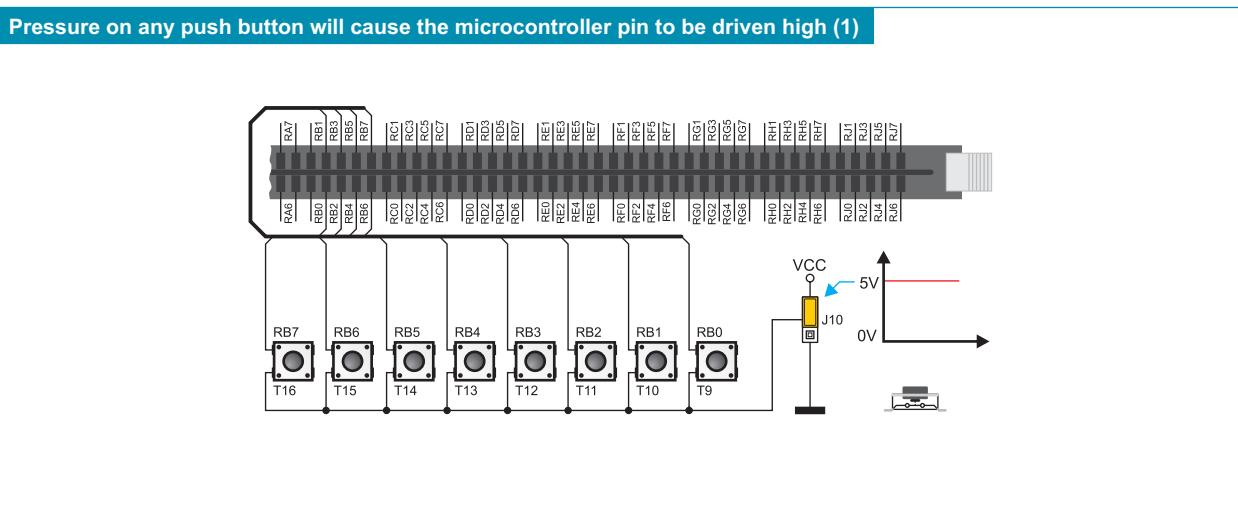


Figure 15-2: Push-buttons and port PORTB connection schematic

16.0. 2x16 LCD Display

The UNI-DS3 development system provides an on-board connector for the alphanumeric 2x16 LCD display. This connector is linked to the microcontroller via pins D0, D1, D4, D5, D6 and D7 on the MCU card. Potentiometer P2 is used for display contrast adjustment. The display backlight is automatically turned on by turning the development system on.

Communication between the LCD display 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 16-1: Alphanumeric LCD display connector



Figure 16-2: Alphanumeric 2x16 LCD display

LCD display backlight is automatically turned on along with the development system

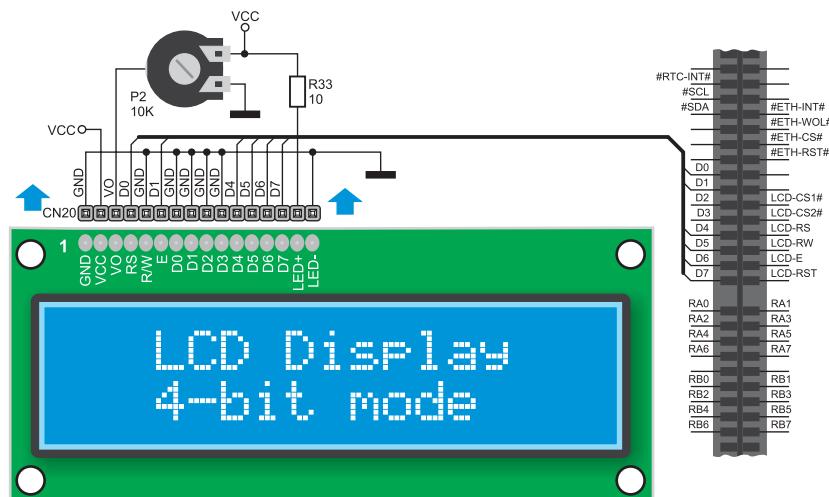


Figure 16-3: Alphanumeric 2x16 LCD display connection schematic

17.0. 128x64 Graphic LCD Display

128x64 graphic LCD display (GLCD) is connected to the microcontroller via the following pins on the MCU card: LCD-CS1#, LCD-CS2#, LCD-RS, LCD-RW, LCD-E, LCD-RST and D0-D7. It has a screen resolution of 128x64 pixels, which allows diagrams, tables and other graphic content to be displayed. Potentiometer P1 is used for the GLCD display contrast adjustment. The display backlight is automatically turned on by turning the *UNI-DS3* development system on.



Figure 17-1: GLCD display



Figure 17-2: GLCD connector

GLCD display backlight is automatically turned on along with the development system

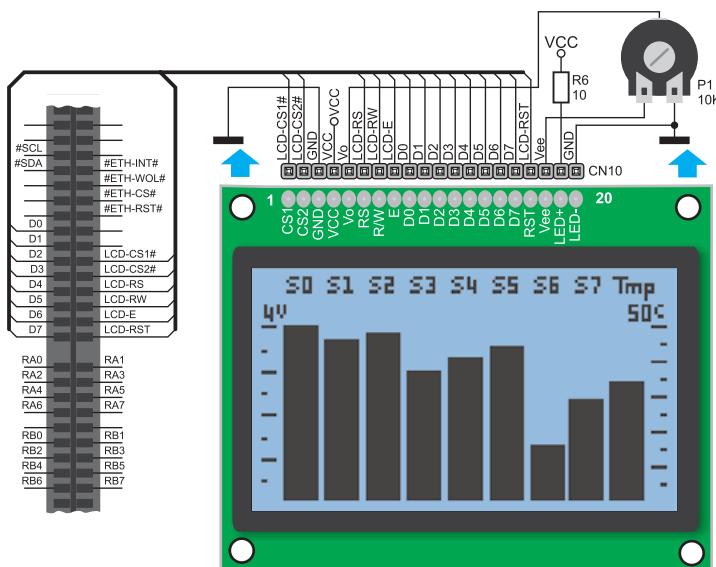


Figure 17-3: GLCD display connection schematic

18.0. Input/Output Ports

Along the right side of the development system, there are nine 10-pin connectors which are connected to the microcontroller's I/O ports. Microcontroller pins used for programming are not directly connected to the appropriate 10-pin connectors, but via a multiplexer. The multiplexer is provided on the MCU card and is connected to the programmer. Microcontroller pins can be connected to pull-up/pull-down resistors by means of jumpers J1-J9. All pull-up/pull-down resistors together form a resistor network which can be removed and replaced with another one. If pull-up/pull-down resistors are not used, it is necessary to remove them or jumpers (J0-J9).

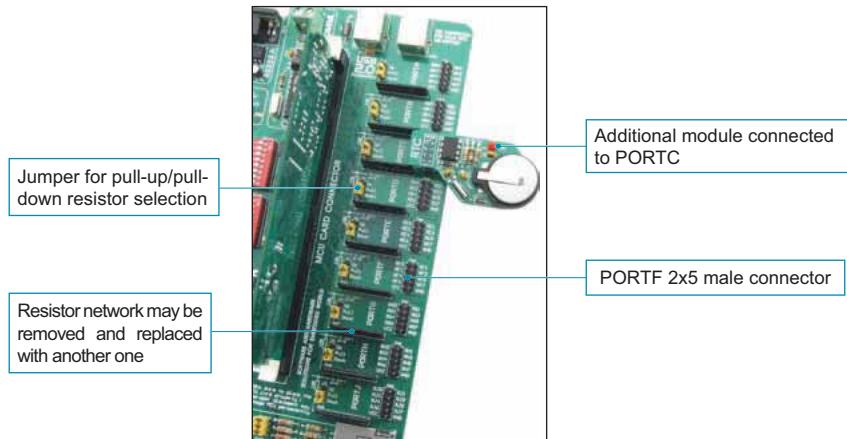


Figure 18-1: I/O ports



Figure 18-2: J3 in pull-down position



Figure 18-3: J3 in pull-up position

Port PORTB pins are connected to pull-down resistors

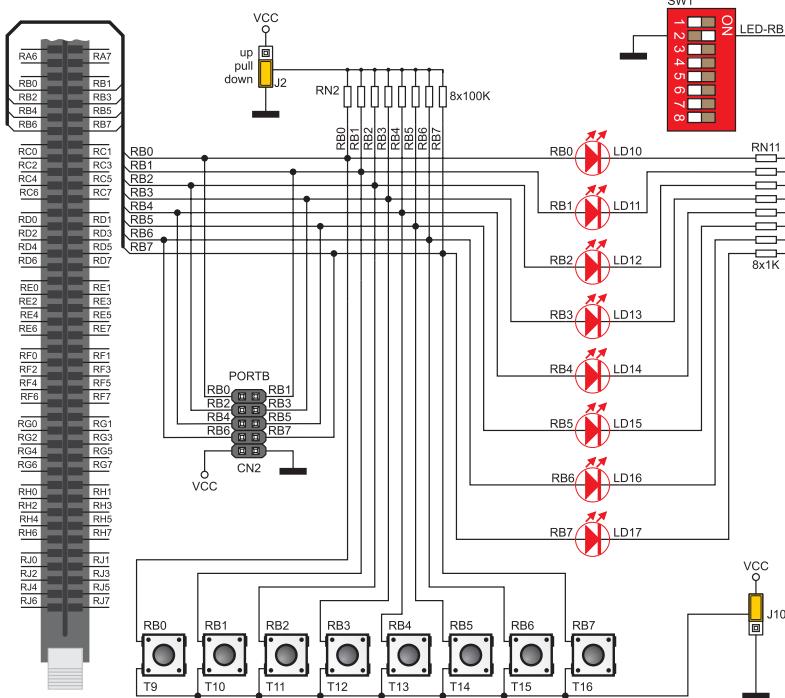


Figure 18-4: Port PORTB connection schematic

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 RB1 microcontroller pin with jumper J2 and the RB1 push button with jumper J10 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.

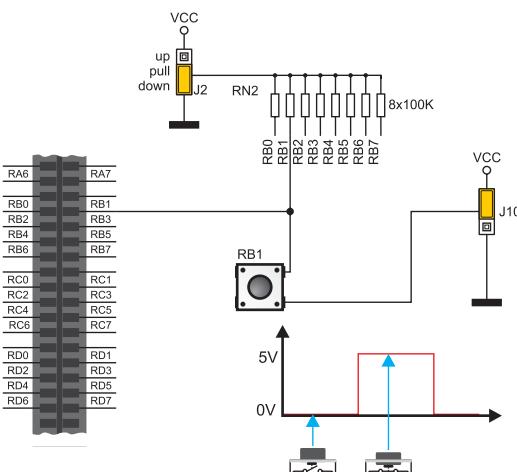


Figure 18-5: Jumper J2 in pull-down and jumper J10 in pull-up position

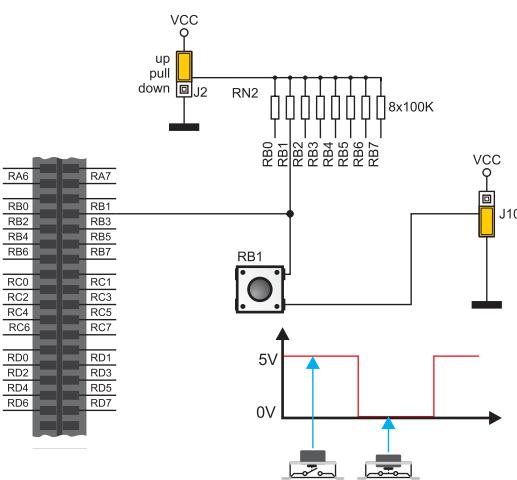


Figure 18-6: Jumper J2 in pull-up and jumper J10 in pull-down position

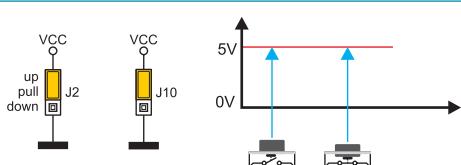


Figure 18-7: Jumpers J2 and J10 in the same position

In order to enable connection between the PORTB port and pull-down resistors, it is necessary to place jumper J2 in the *Down* position first. In this way any PORTB port pin can be supplied with a logic zero (0V) in idle state over jumper J2 and 8x100K resistor network. As a result, every time you press the RB1 push button, a logic one (VCC voltage) will appear on the RB1 pin, provided that jumper J10 is placed in the VCC position.

In order to enable port PORTB 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 J10 in the GND position. This enables any port PORTB input pin to be driven high (5V) in idle state over the 100K resistor. As a result, every time you press the RB1 push button, a logic zero (0V) will appear on the RB1 pin.

In case that jumpers J2 and J10 have the same logic state, pressure on any button will not cause input pins to change their logic state.

19.0. MCU Card with 8051 Microcontroller

The MCU card is provided with a socket for 8051 microcontrollers in DIP40 package. The AT89S8253 microcontroller normally delivered with the 8051 MCU card is placed into the DIP40 socket. In addition to this microcontroller, there are also other microcontrollers in DIP40 package such as AT89S51, AT89S52, AT89S53 and AT89S8252 that can be used here.

There is an on-board programmer *8051prog* provided on the MCU card. To enable the proper operation of this programmer, it is necessary to install the appropriate USB driver. Place the MCU card into the DIMM-168p socket first and then follow the instructions provided in the relevant manual and install driver for the *8051prog* programmer from the product CD. To enable a .hex code to be loaded into an 8051 microcontroller, it is necessary to install the *8051flash* program providing an interface between the microcontroller and a PC.



Figure 19-1: MCU card with an 8051 microcontroller

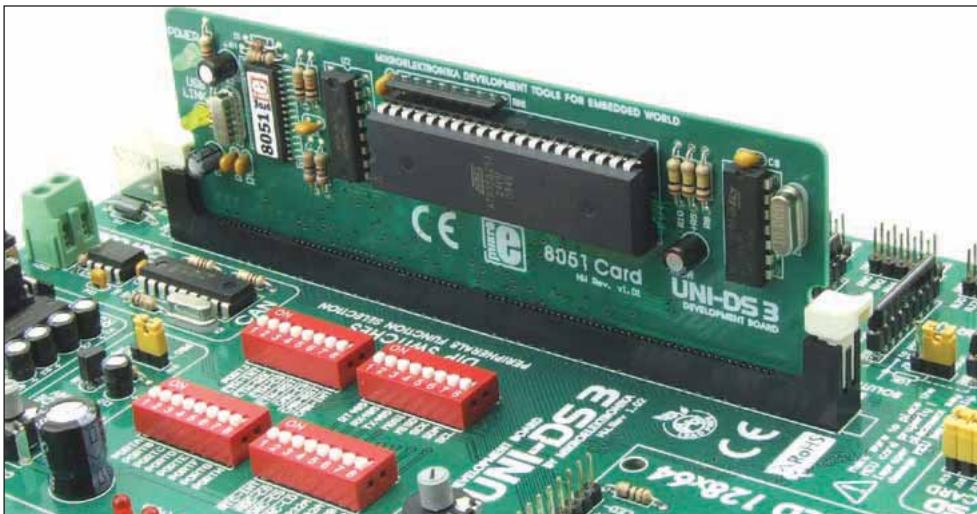


Figure 19-2: 8051 MCU card placed in the DIMM-168p socket

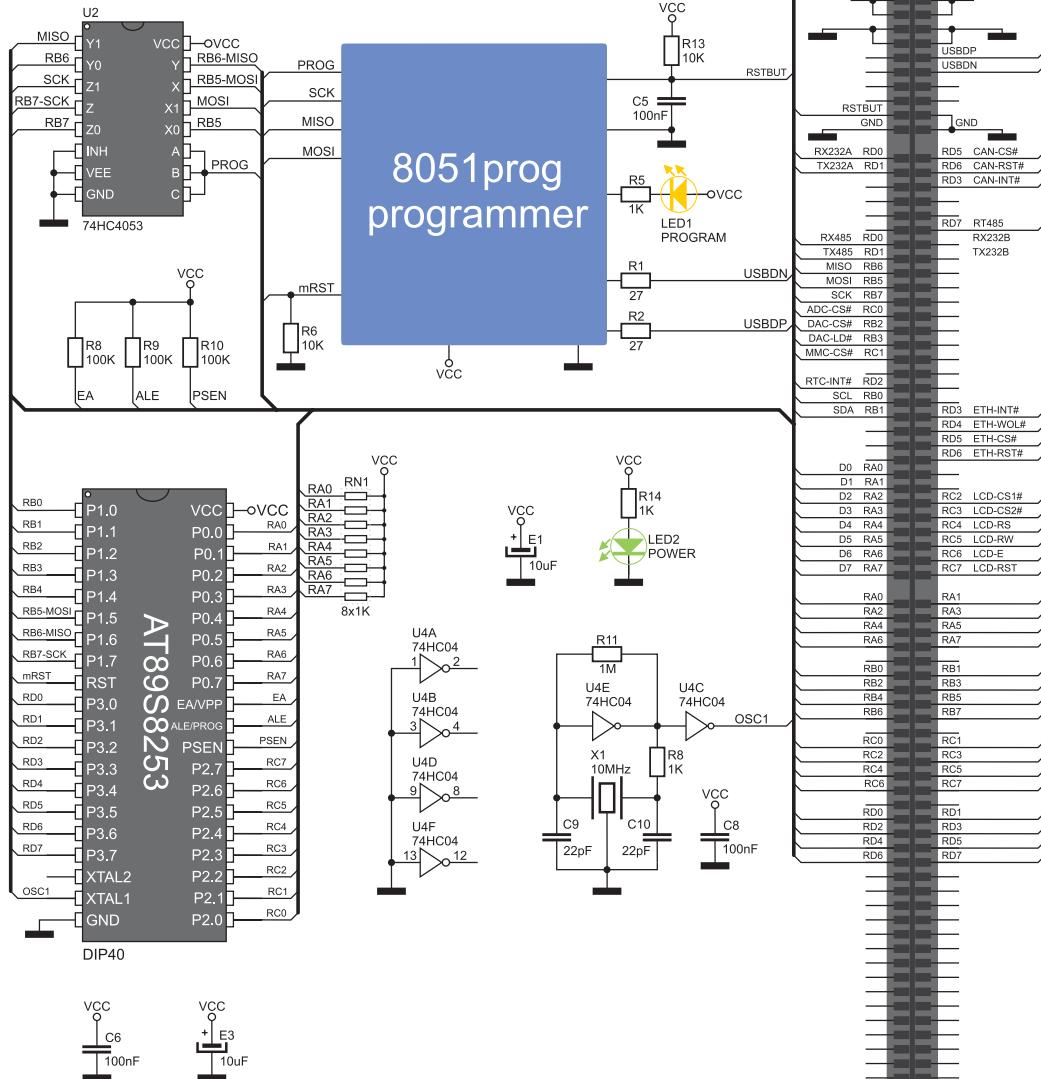


Figure 19-3: MCU card with the DIMM-168p socket connection schematic

20.0. MCU Card with AVR Microcontroller

The MCU card is provided with the ATmega128 microcontroller in 64-pin TQFP package. In addition to this microcontroller, there is also a built-in programmer AVRprog as well as the CN2 connector provided on the MCU card. Such connector is intended for connecting the external JTAG programmer. To enable the AVRprog programmer to operate properly, it is necessary to install the appropriate USB driver. Place the MCU card into the DIMM-168p socket first and then follow the instructions provided in the relevant manual and install driver for the AVRprog programmer from the product CD. To enable a .hex code to be loaded into an AVR microcontroller, it is necessary to install the AVRflash program providing an interface between the microcontroller and a PC. The external JTAG programmer is connected to the microcontroller on the MCU card by means of the 2x5 male connector CN2. When this programmer is used, the MCU card doesn't necessarily have to be placed into the DIMM-168p socket on the development system. In this case, the MCU card is powered by the external JTAG programmer.



Figure 20-1: MCU card with an AVR microcontroller

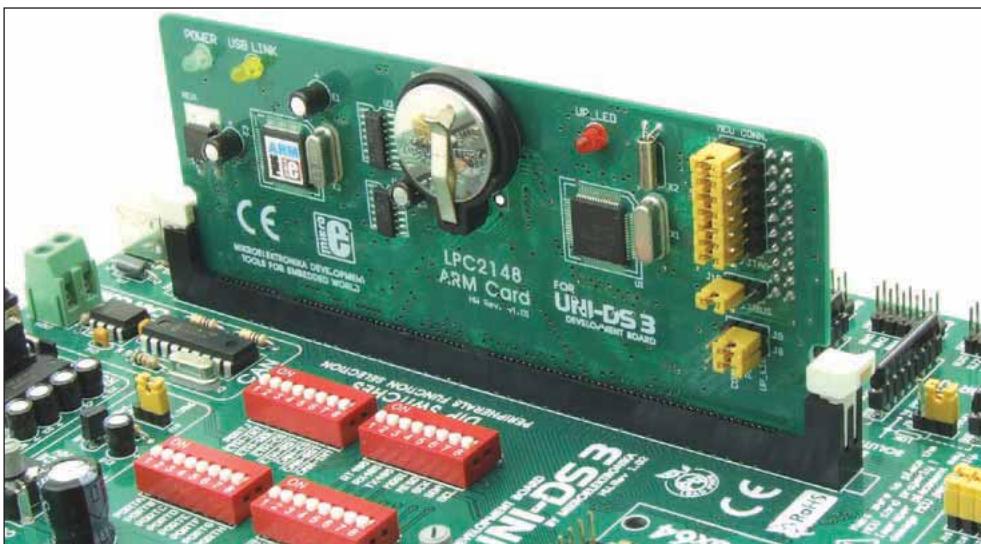


Figure 20-2: AVR MCU card placed into the DIMM-168p socket

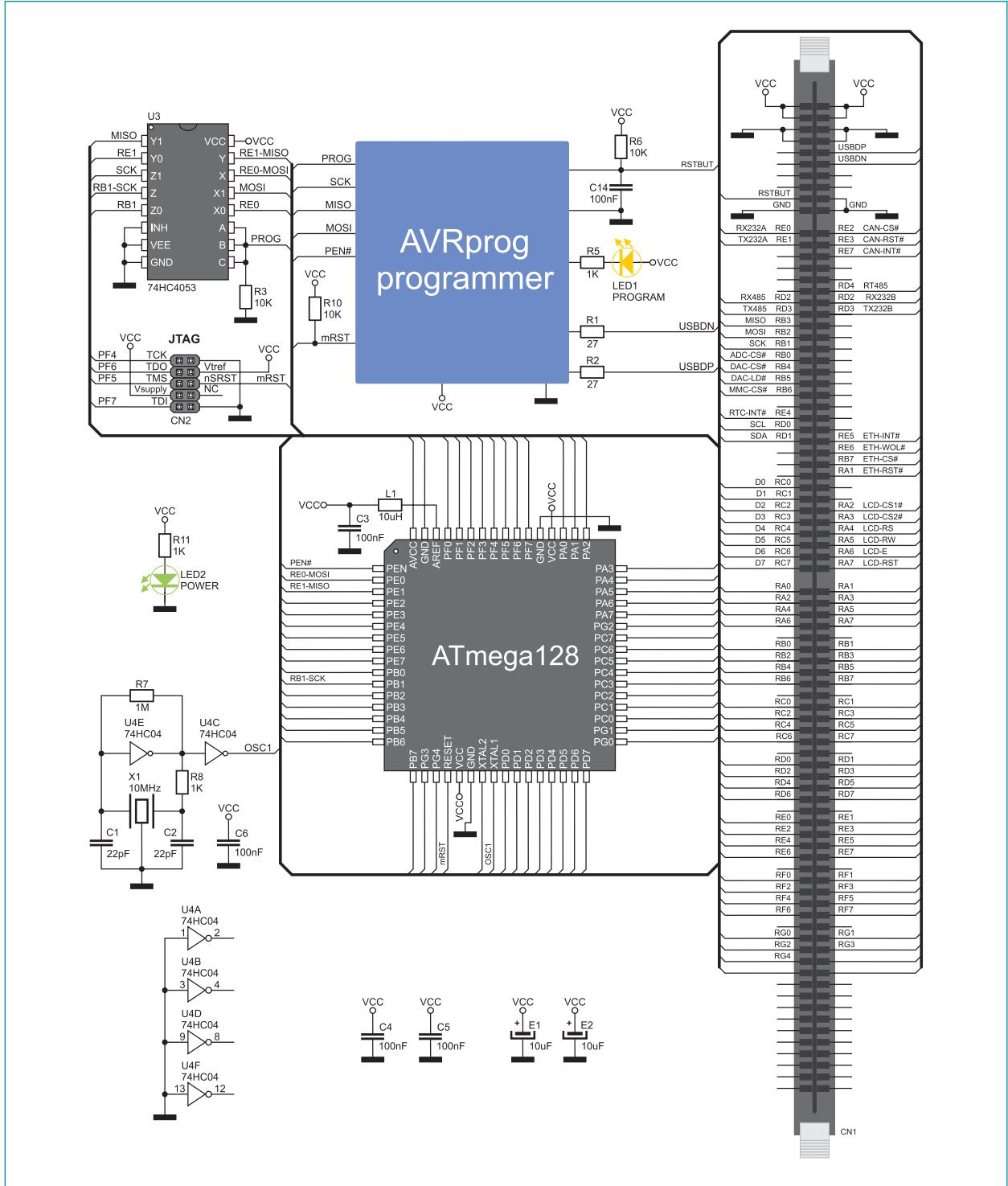


Figure 20-3: MCU card with the DIMM-168p socket connection schematic

21.0. MCU Card with dsPIC Microcontroller

The MCU card is provided with the dsPIC6014A microcontroller in 80-pin TQFP package. In addition to this microcontroller, there is also a built-in programmer *dsPICprog* provided on the MCU card. To enable the *dsPICprog* programmer to operate properly, it is necessary to install the appropriate USB driver. Place the MCU card into the DIMM-168p socket first and then follow the instructions provided in the relevant manual and install driver for the *dsPICprog* programmer from the product CD. To enable a .hex code to be loaded into a dsPIC microcontroller, it is necessary to install the *dsPICflash* program. The *dsPICprog* programmer has a hardware mikroLCD support which enables real-time debugging. As a result, it is possible to monitor variables and state of all registers within the microcontroller during programming.



Figure 21-1: MCU card with a dsPIC the microcontroller



Figure 21-2: dsPIC MCU card placed into the DIMM-168p socket

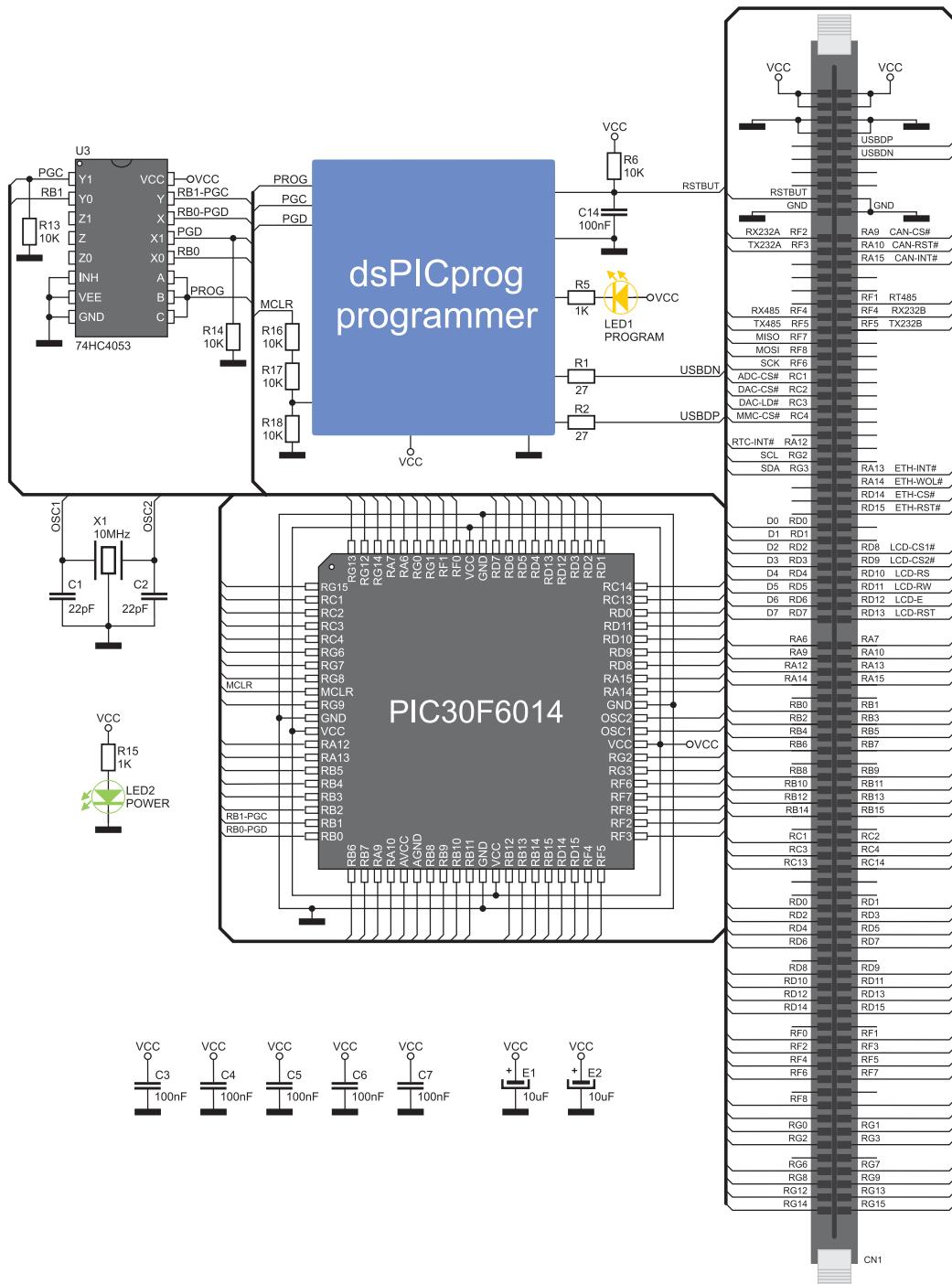


Figure 21-3: MCU card with the DIMM-168p socket connection schematic

22.0. MCU Card with PIC Microcontroller in DIP40 Package

The MCU card is provided with a socket for PIC microcontrollers in DIP40 package. The PIC18F4520 microcontroller normally delivered with the PIC MCU card is placed into the DIP40 socket. In addition to this microcontroller, there are also other microcontrollers in DIP40 package such as PIC16F877A, PIC18F4550 etc. that can be used here. There is a built-in programmer *PICflash* with mikroICD support provided on the MCU card. To enable the proper operation of this programmer, it is necessary to install the appropriate USB driver. Place the MCU card into the DIMM-168p socket first and then follow the instructions provided in the relevant manual and install driver for the *PICflash* programmer from the product CD. To enable a .hex code to be loaded into a PIC microcontroller, it is necessary to install the *PICflash* program providing an interface between the microcontroller and a PC. The built-in *PICflash* programmer has a hardware mikroICD support which enables real-time debugging. As a result, it is possible to monitor variables and state of all registers within the microcontroller during programming.

A USB communication between the microcontroller and an external USB device is enabled by means of jumpers J1, J2 and J3. In case the USB communication is not used, it is necessary to set jumpers J1, J2 and J3 to the upper position.



Figure 22-1: MCU card with a PIC microcontroller

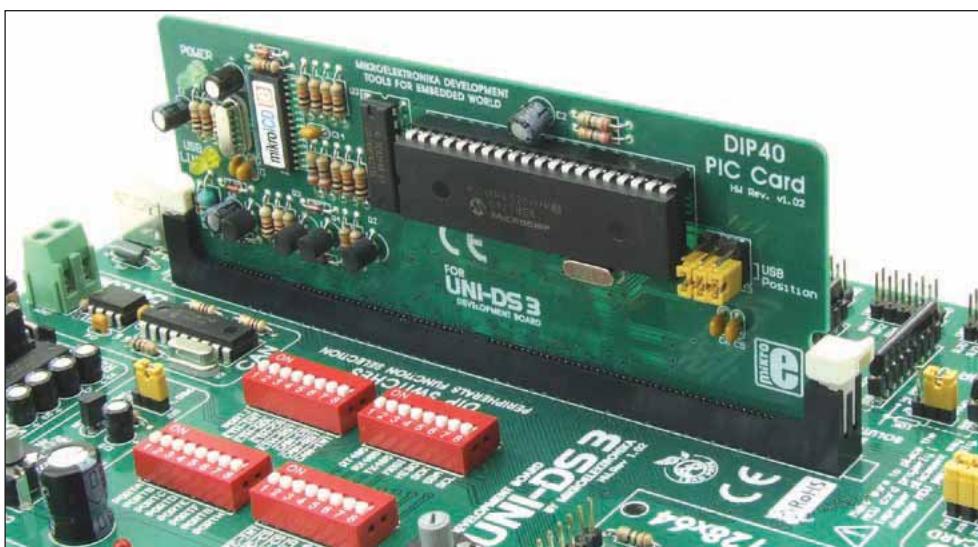


Figure 22-2: PIC MCU card placed into the DIMM-168p socket

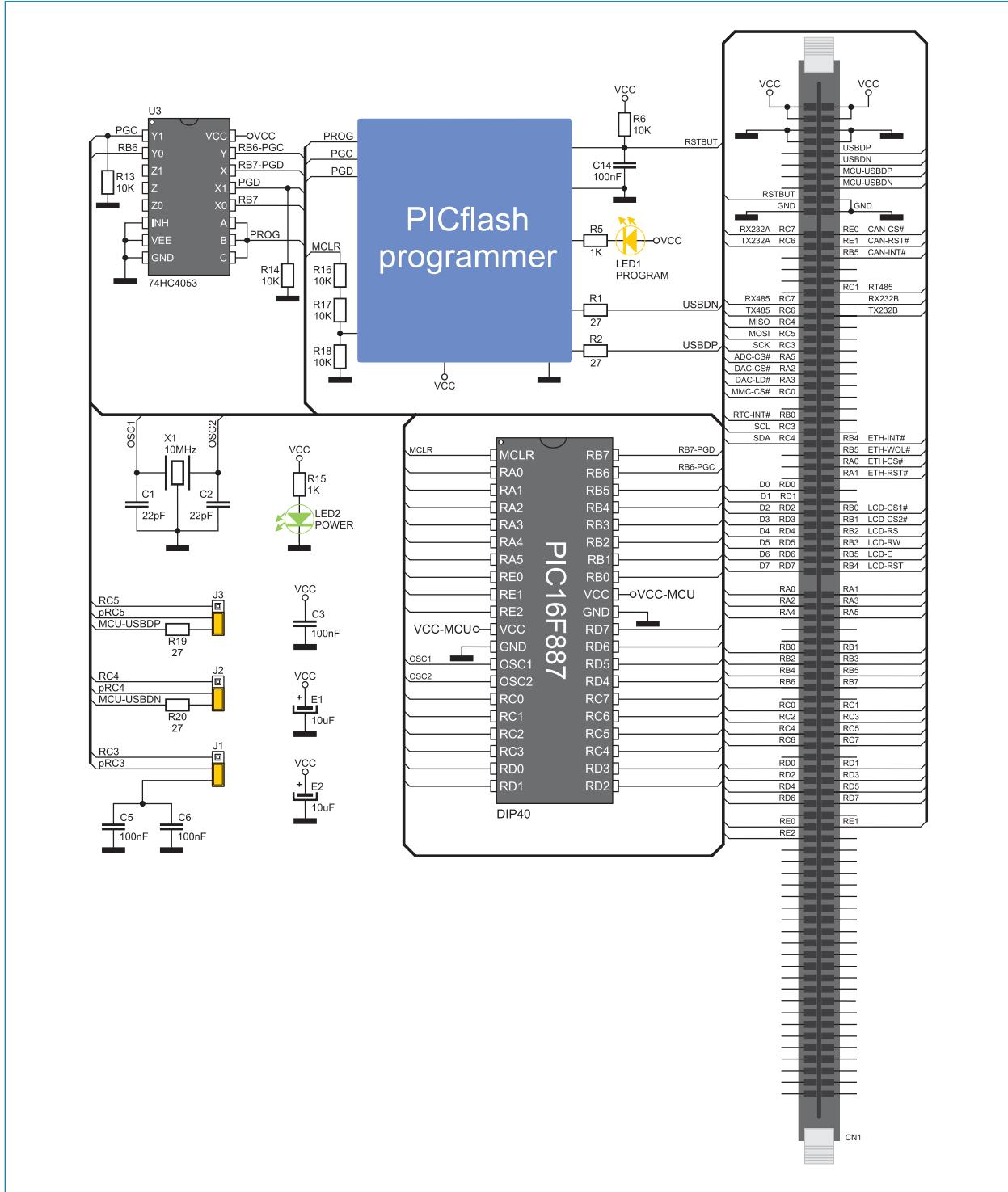


Figure 22-3: MCU card with the DIMM-168p socket connection schematic

23.0. MCU Card with PIC Microcontroller in TQFP80 Package

The MCU card is provided with the PIC18F8520 microcontroller in 80-pin TQFP package. In addition to this microcontroller, there is also a built-in programmer *PICflash* with mikroICD support provided on the MCU card. To enable the *PICflash* programmer to operate properly, it is necessary to install the appropriate USB driver. Place the MCU card into the DIMM-168p socket first and then follow the instructions provided in the relevant manual and install driver for the *PICflash* programmer from the product CD. To enable a .hex code to be loaded into a PIC microcontroller, it is necessary to install the *PICflash* program. The *PICflash* programmer has a hardware mikroICD support which enables real-time debugging. As a result, it is possible to monitor variables and state of all registers within the microcontroller during programming.



Figure 23-1: MCU card with a PIC microcontroller

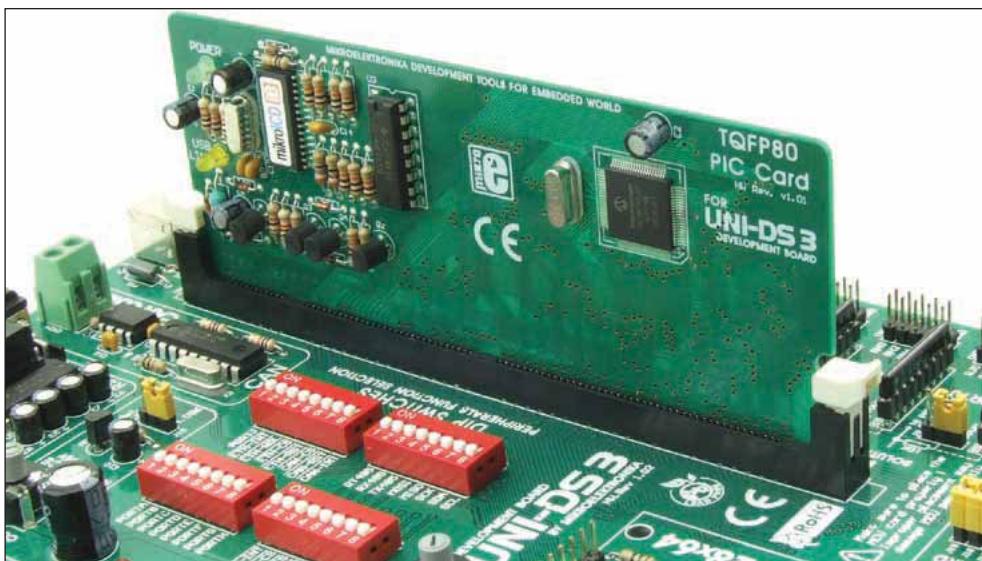


Figure 23-2: PIC MCU card placed into the DIMM-168p socket

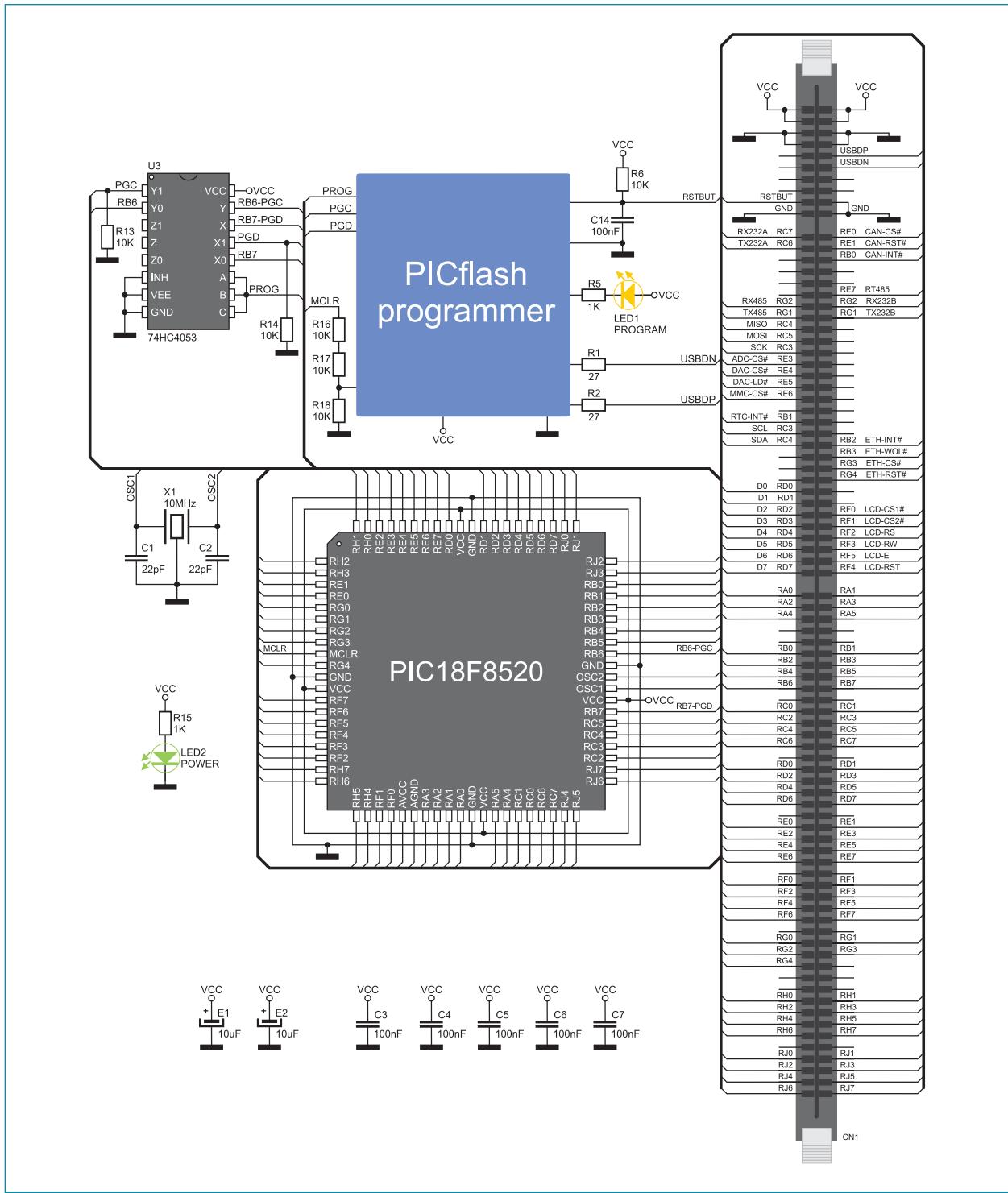


Figure 23-3: MCU card with the DIMM-168p socket connection schematic

24.0. MCU Card with PSoC Microcontroller

The MCU card is provided with the CY8C27643 microcontroller in 48-pin SSOP package. In addition to this microcontroller, there is also a built-in programmer *PSoCprog* provided on the MCU card. To enable the *PSoCprog* programmer to operate properly, it is necessary to install the appropriate USB driver. Place the MCU card into the DIMM-168p socket first and then follow the instructions provided in the relevant manual and install driver for the *PSoCprog* programmer from the product CD. To enable a .hex code to be loaded into a PSoC microcontroller, it is necessary to install the *PSoCflash* program providing an interface between the microcontroller and a PC.



Figure 24-1: MCU card with a PSoC microcontroller

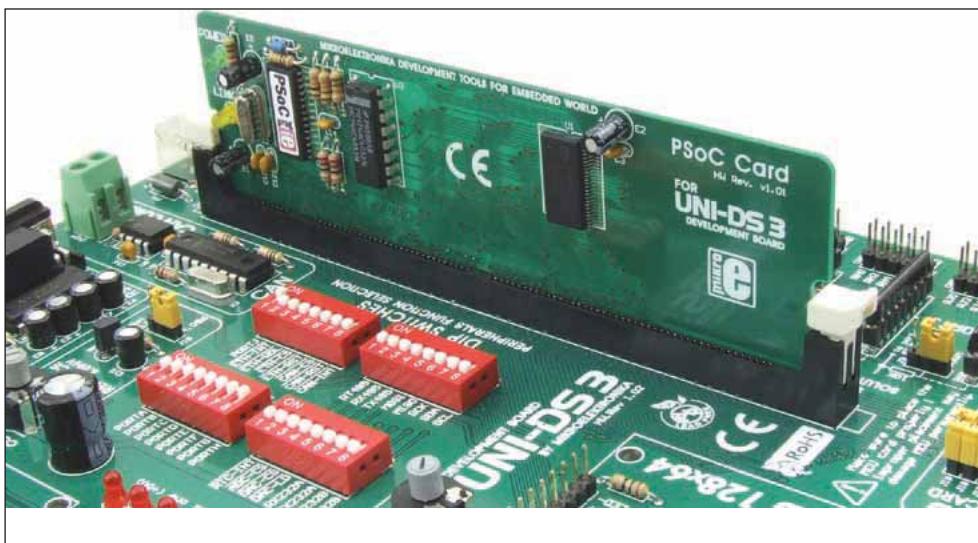


Figure 24-2: PSoC MCU card placed into the DIMM-168p socket

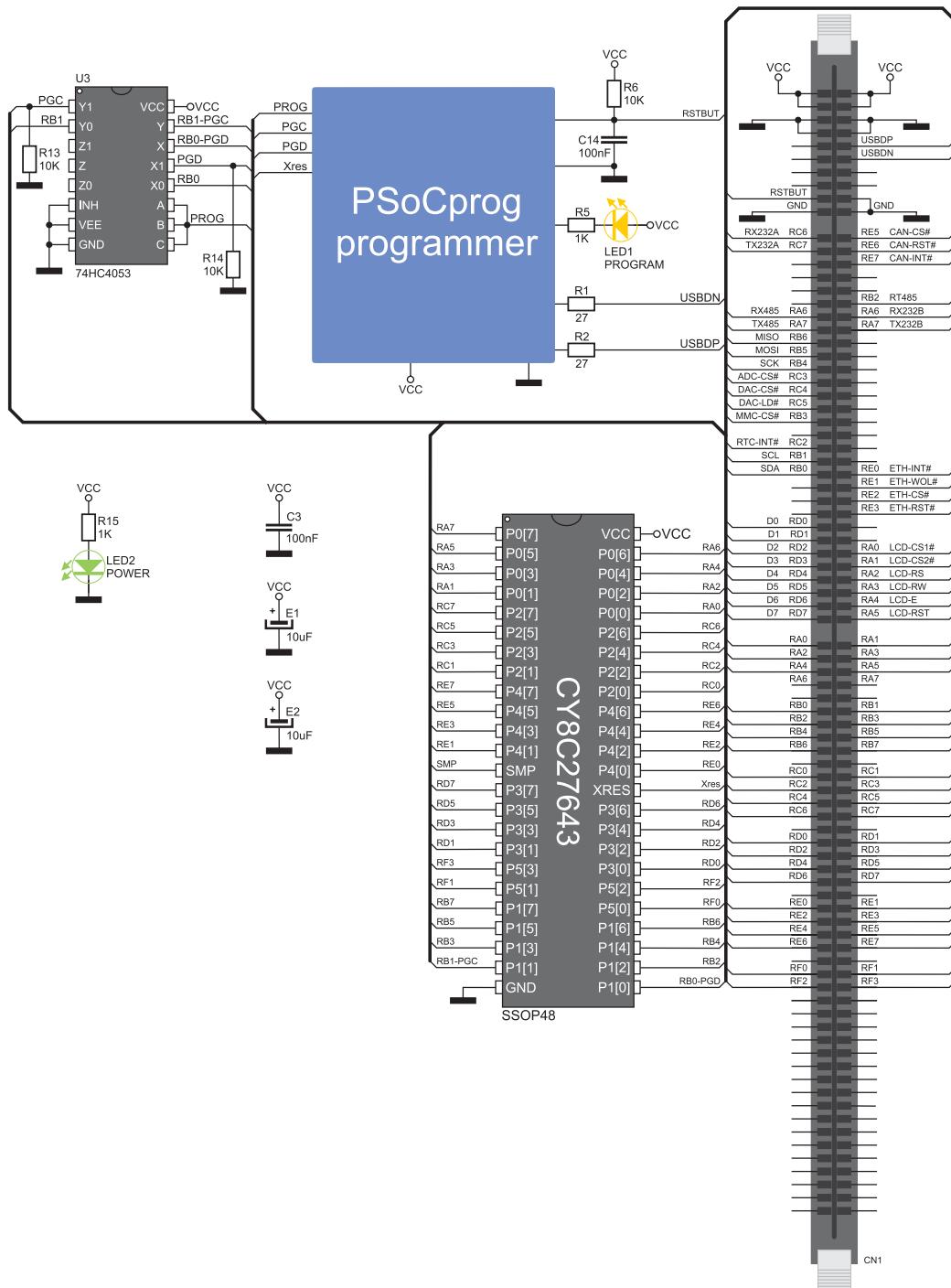


Figure 24-3: MCU card with the DIMM-168p socket connection schematic

25.0. MCU Card with ARM Microcontroller

The MCU card is provided with the LPC2148 microcontroller in LQFP64 package. In addition to this microcontroller, the MCU card is also supplied with a battery used to power the microcontroller when the power supply is off. The LPC2148 microcontroller requires 3.3V generated by the REG1 voltage regulator. In addition to the built-in programmer *ARMprog*, the microcontroller can be programmed by means of the external JTAG programmer as well. To enable the *ARMprog* programmer to operate properly, it is necessary to install the appropriate USB driver. Place the MCU card into the DIMM-168p socket first and then follow the instructions provided in the relevant manual and install driver for the *ARMprog* programmer from the product CD. To enable a .hex code to be loaded into an ARM microcontroller, it is necessary to install the *ARMflash* program providing an interface between the microcontroller and a PC.

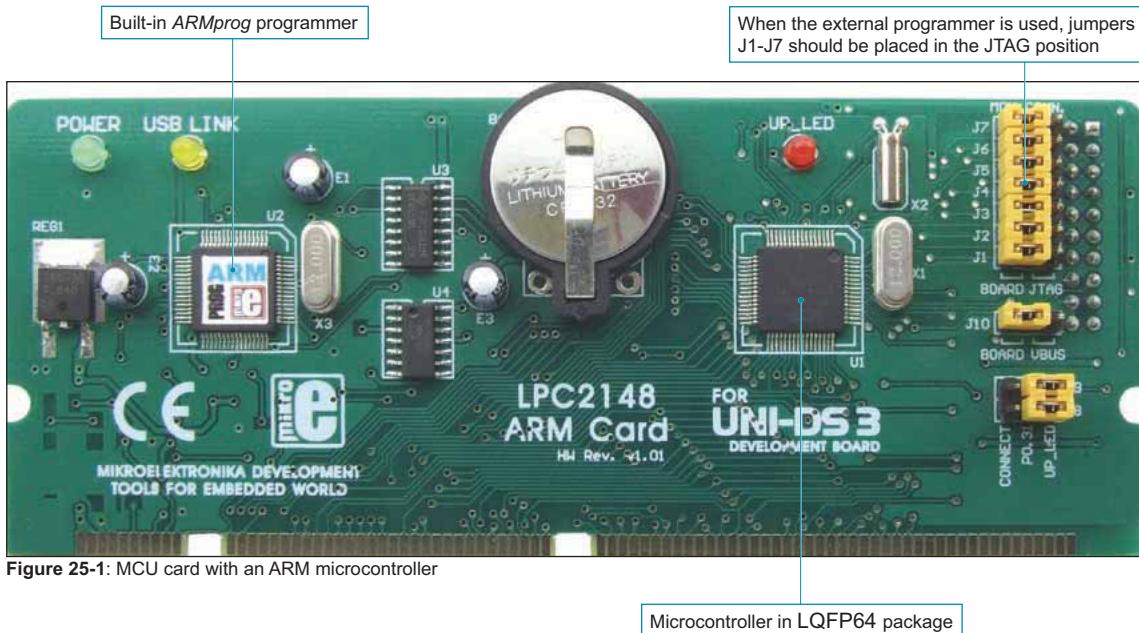


Figure 25-1: MCU card with an ARM microcontroller

The male CN2 connector is used to connect the external JTAG programmer. In case the external programmer is used, it is necessary to place jumpers J1-J7 in the JTAG position.

In case the USB communication is used via the CN21 connector provided on the development system, jumper J10 should be placed in the VBUS position, thus connecting the MCU-0.23 microcontroller pin to the MCU-VBUS pin on the DIMM-168p socket. In case the USB communication is not used, jumper J10 should be placed in the BOARD position. In this case the MCU-0.23 microcontroller pin gets connected to the P0.23 pin on the DIMM-168p socket.

The function of the LED diode marked as UP_LED is to detect and signal external USB device connected to the microcontroller via the CN21 connector for USB communication. To enable the UP_LED diode to perform its signal function, it is necessary to place jumpers J8 and J9 in the UP_LED position. When jumpers J8 and J9 are placed in the CONNECT position, the powering of the external USB device is controlled from within the software.

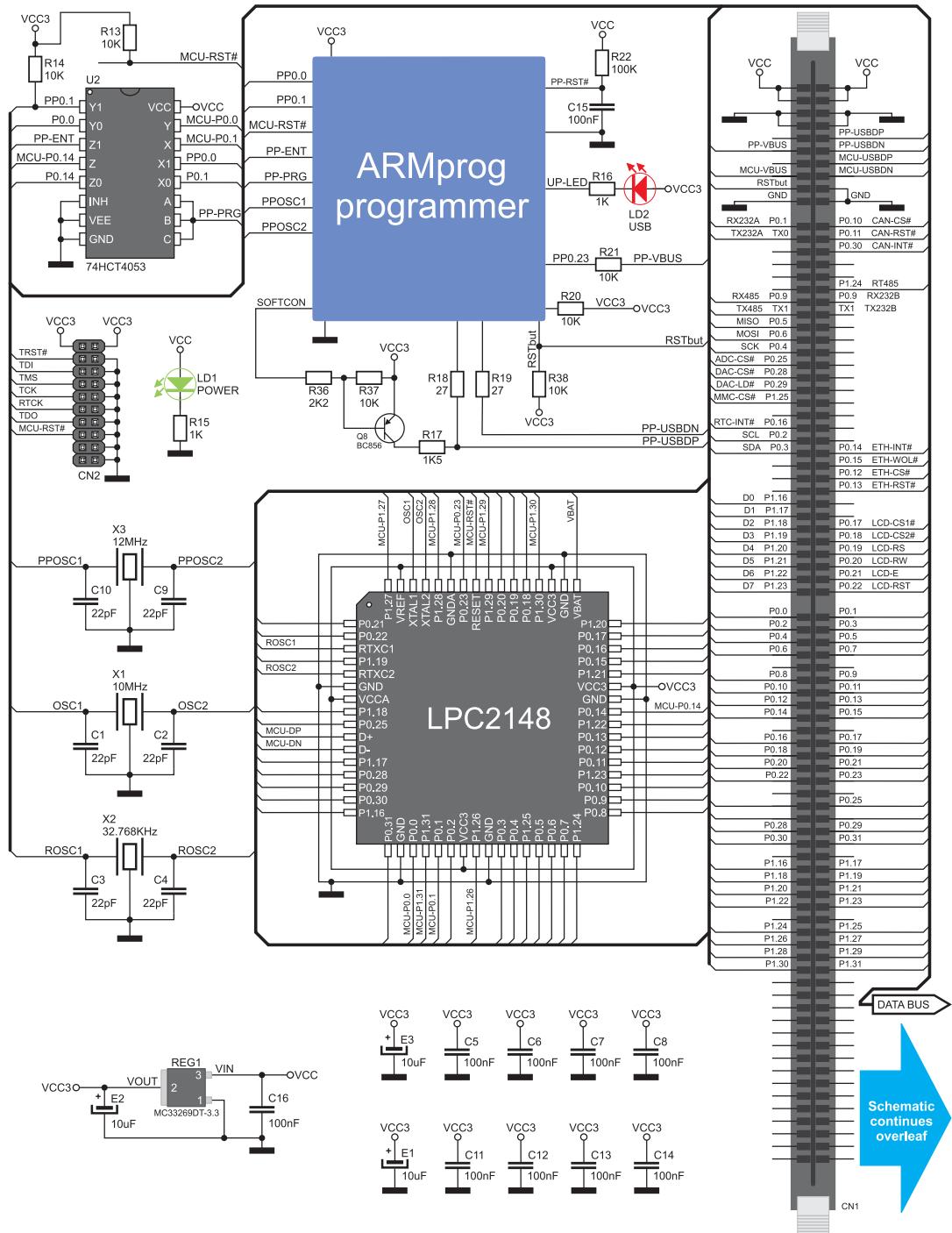


Figure 25-2: MCU card with the DIMM-168p socket connection schematic

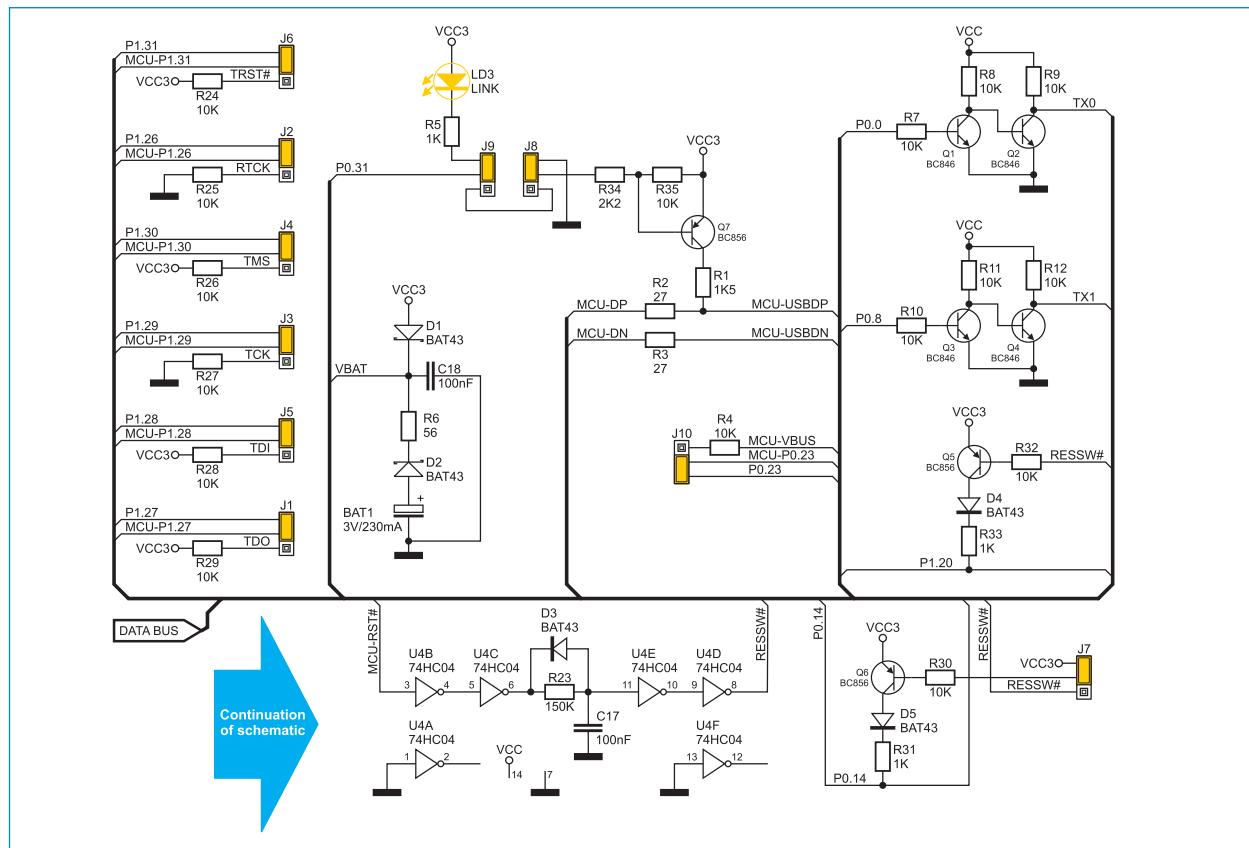


Figure 25-3: MCU card with the DIMM-168p socket connection schematic

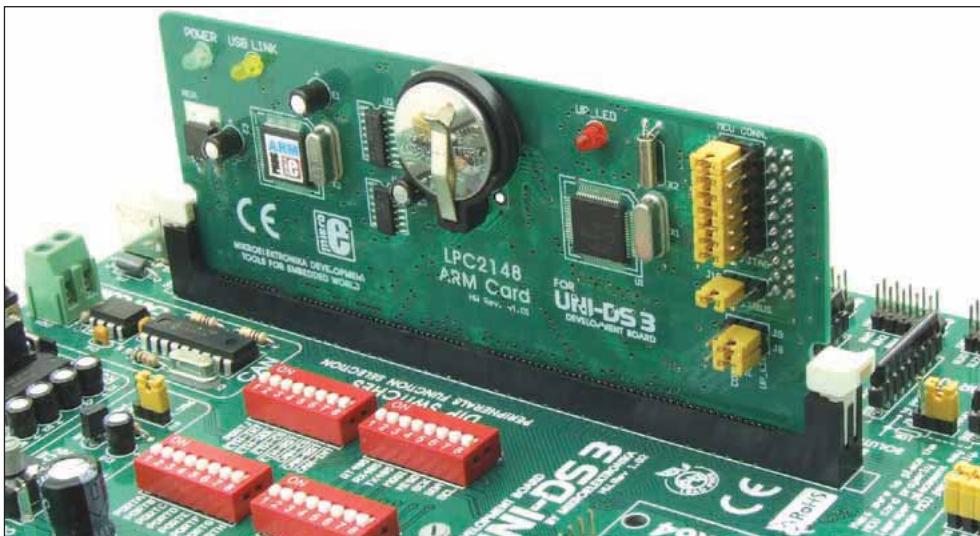


Figure 25-4: ARM MCU card placed into the DIMM-168p socket

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