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With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



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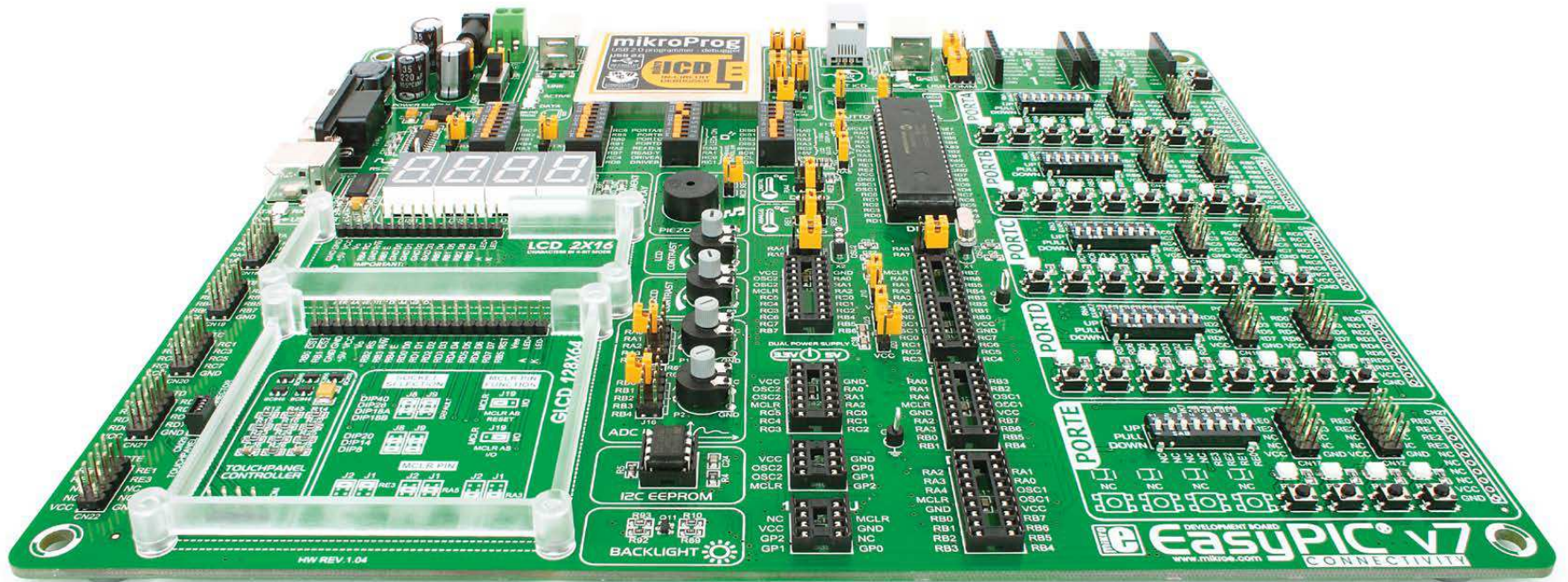
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EasyPIC™ v7

connectivity



350

microcontrollers supported
The ultimate PIC® board



Supports 3.3V and 5V devices
Dual Power Supply



Easy-add extra boards
mikroBUS™ sockets

connectivity



Four connectors for each port
Amazing Connectivity



Fast USB 2.0 programmer and
In-Circuit Debugger

To our valued customers

From the day one, we in MikroElektronika gave ourselves the highest possible goals in pursuit of excellence. That same day, the idea of EasyPIC™ development board was born. And we all grew together with EasyPIC™. In its each and tiniest piece we had put all of our energy, creativity and sense of what's best for an engineer. I've personally assembled hundreds of early EasyPIC™ boards myself with my home soldering iron.

Today, we present you the 7th generation of the board, which brings us some exciting new features. We hope that you will like it as much as we do.

Use it wisely and have fun!



Nebojsa Matic,
Owner and General Manager
of MikroElektronika

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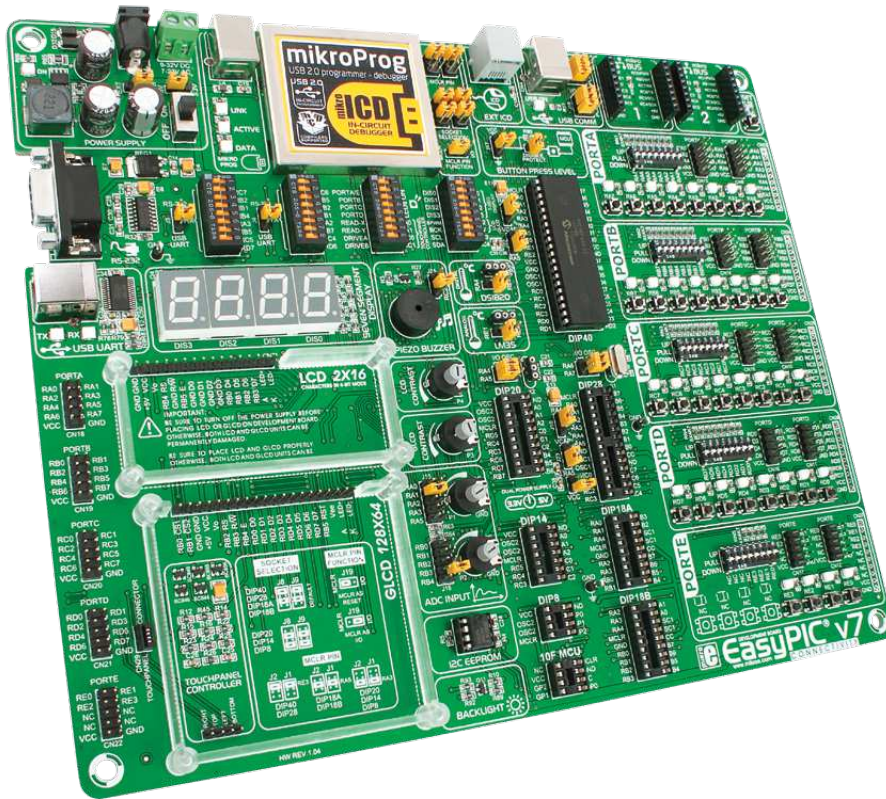
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Introduction

EasyPIC™ is an old friend. It has been with us for six generations. Many of us made our first steps in embedded world with EasyPIC™. Today it has thousands of users: students, hobbyists, enthusiasts and professionals. It's used in many schools and other educational institutions across the globe. We may say that it's the most famous PIC development system in the world. We asked ourselves what we can do to make such a great board even greater. And we made some brilliant changes. We focused all of our creativity and knowledge into making a revolutionary new design, unlike any previous version of the board. We now present you with the new version 7 that brings so much more, and we hope that you will be thrilled with your new board, just as we are.

EasyPIC™ development Team

Four connectors for each port
Amazing connectivity

EasyPIC™ v7 is all about connectivity. Having four different connectors for each port, you can connect accessory boards, sensors and your custom electronics easier than ever before.



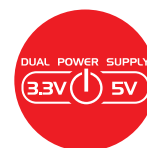
Everything is already here
mikroProg™ on board

Powerful on-board mikroProg™ programmer and In-Circuit debugger can program and debug over 350 microcontrollers. You will need it, whether you are a professional or a beginner.



3.3V and 5V power supply
Dual Power Supply

EasyPIC™ v7 is among few development boards which support both 3.3V and 5V microcontrollers. This feature greatly increases the number of supported MCUs. It's like having two boards instead of one!



For easier connections
mikroBUS™ support

Just plug in your Click™ board, and it's ready to work. We picked up a set of the most useful pins you need for development and made a pinout standard you will enjoy using.



It's good to know

PIC18F45K22 is the new default microcontroller!

Until now, EasyPIC™ development boards were equipped with PIC16® as the default chip. Now we are giving you more power than ever before. **PIC18F45K22** is the new default chip of EasyPIC™ v7! It has **16 MIPS** operation, **32K bytes** of linear program memory, **1536 bytes** of linear data memory, and support for a wide range of power supply from **1.8V to 5V**. It's loaded with great modules: 36 General purpose **I/O pins**, 30 Analog Input pins (**AD**), Digital-To-Analog Converter (**DAC**), support for Capacitive Touch Sensing using Charge Time Measurement Unit (**CTMU**), three **8-bit timers** and four **16-bit timers**. It also has pair of **CCP, Comparators** and **MSSP** modules (which can be either **SPI** or **I²C**).

- More power than ever before
- Great choice for both beginners and professionals
- Rich with modules
- Enough RAM and Flash
- Comes with examples for mikroC, mikroBasic and mikroPascal compilers



System Specification



power supply
7-23V AC or 9-32V DC
or via USB cable (5V DC)



power consumption
~85mA when all peripheral
modules are disconnected



board dimensions
266 x 220mm (10.47 x 8.66 inch)



weight
~445g (0.981 lbs)

Package contains



1 Damage resistant protective box



2 EasyPIC™ v7 board in antistatic bag

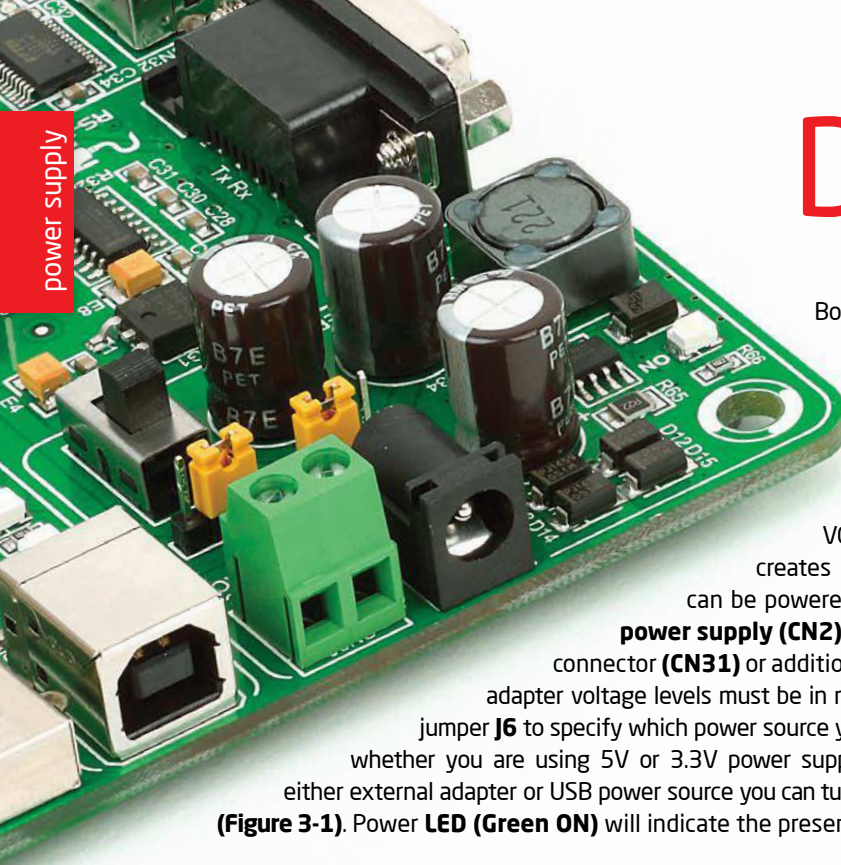


3 USB cable



4 User Manuals and Board schematic

Dual power supply



Board contains switching power supply that creates stable voltage and current levels necessary for powering each part of the board. Power supply section contains two power regulators: **MC34063A**, which generates VCC-5V, and **MC33269DT3.3** which creates VCC-3.3V power supply. The board can be powered in three different ways: with **USB power supply (CN2)**, using external adapters via adapter connector (**CN31**) or additional screw terminals (**CN30**). External adapter voltage levels must be in range of **9-32V DC or 7-23V AC**. Use jumper **J6** to specify which power source you are using and jumper **J5** to specify whether you are using 5V or 3.3V power supply. Upon providing the power using either external adapter or USB power source you can turn on power supply by using **SWITCH 1 (Figure 3-1)**. Power LED (**Green ON**) will indicate the presence of power supply.

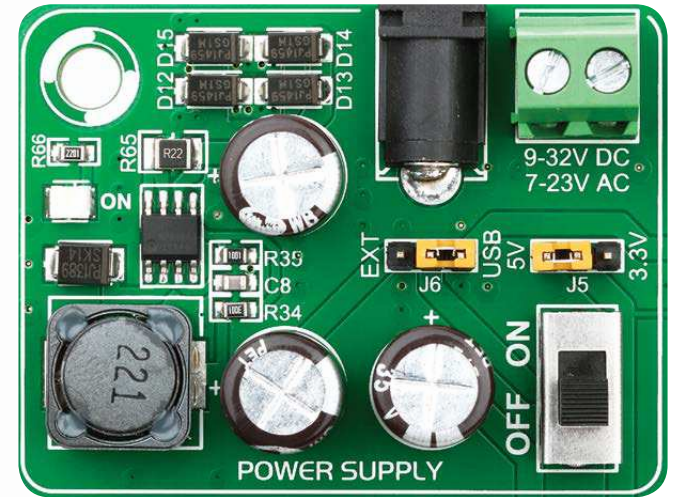


Figure 3-1: Dual power supply unit of EasyPIC™ v7

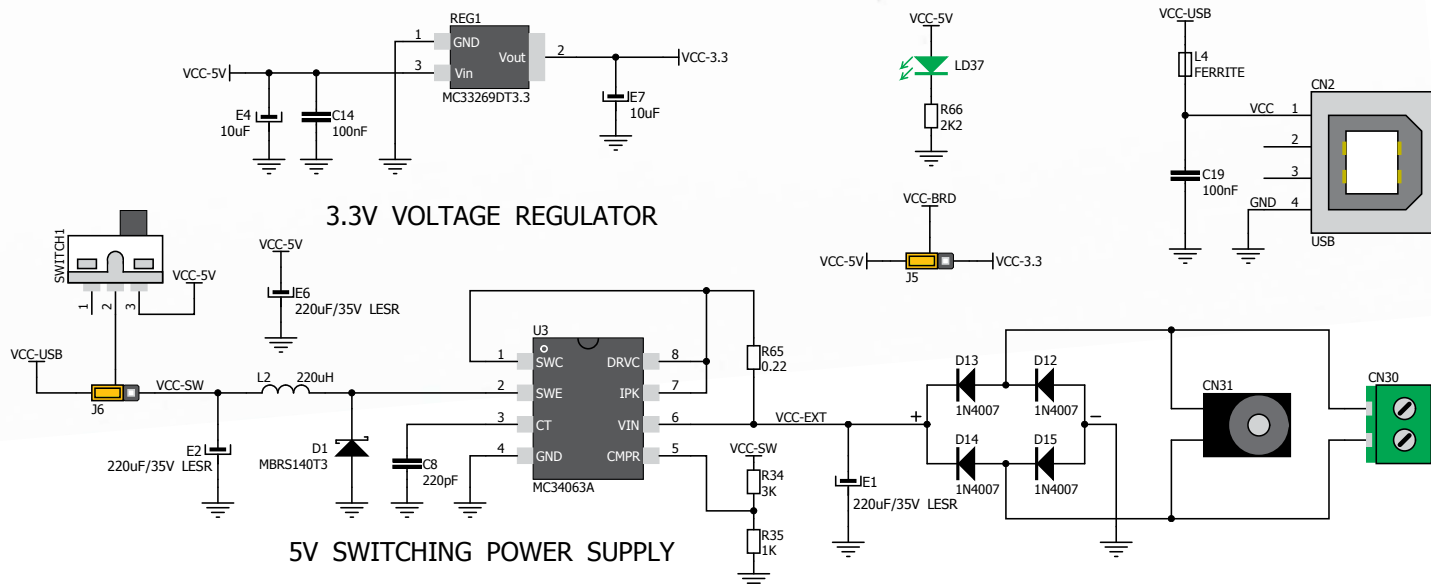


Figure 3-2: Dual power supply unit schematic

DUAL POWER SUPPLY



EasyPIC™ v7 development board supports both 3.3V and 5V power supply on a single board. This feature enables you to use wide range of peripheral boards.

Power supply:

via DC connector or screw terminals (7V to 23V AC or 9V to 32V DC), or via USB cable (5V DC)

Power capacity:

up to 500mA with USB, and up to 600mA with external power supply

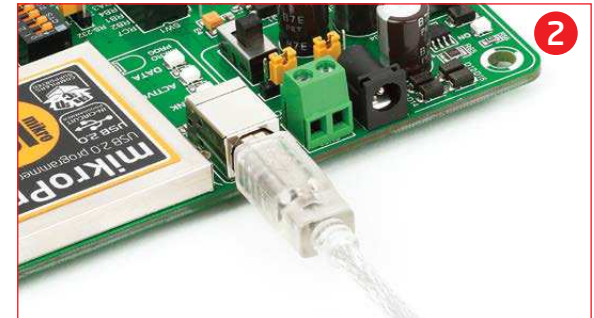
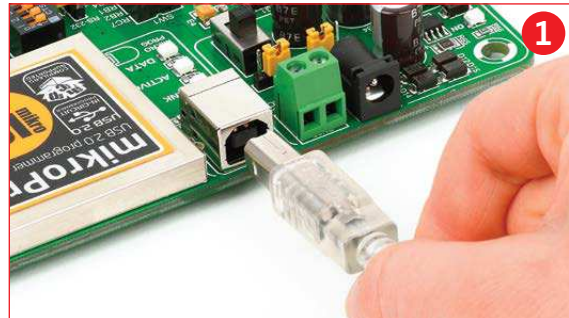
How to power the board?

1. With USB cable

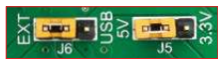


Set J6 jumper to USB position

To power the board with USB cable, place jumper J6 in USB position and place jumper J5 in 5V or 3.3V position. You can then plug in the USB cable as shown on images 1 and 2, and turn the power switch ON.

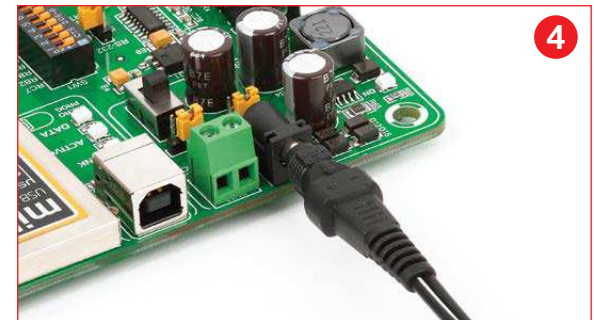


2. Using adapter



Set J6 jumper to EXT position

To power the board via adapter connector, place jumper J6 in EXT position, and place jumper J5 in 5V or 3.3V position. You can then plug in the adapter cable as shown on images 3 and 4, and turn the power switch ON.

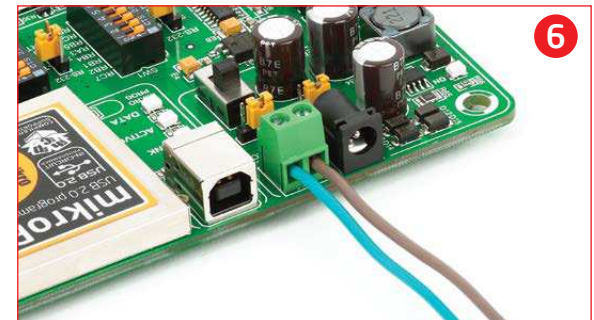
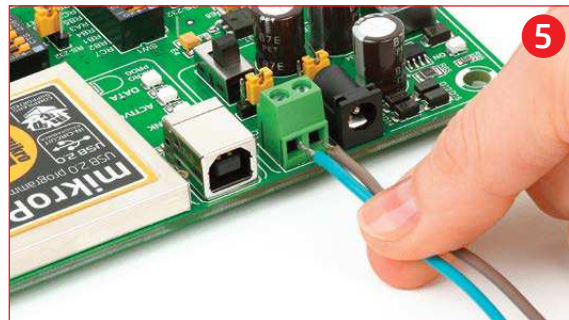


3. With laboratory power supply



Set J6 jumper to EXT position

To power the board using screw terminals, place jumper J6 in EXT position, and place jumper J5 in 5V or 3.3V position. You can then screw-on the cables in the screw terminals as shown on images 5 and 6, and turn the power switch ON.



Supported microcontrollers

The board contains eight DIP sockets: DIP40, DIP28, DIP20, DIP18A, DIP18B, DIP14, DIP8 and support for PIC10F MCUs. With dual power supply and smart on-board mikroProg, board is capable of programming over 350 microcontrollers from PIC10F, PIC12F, PIC16F, PIC16Enh, PIC18F, PIC18FJ and PIC18FK families.

There are two DIP18 sockets for PIC microcontrollers provided on the board - **DIP18A** and **DIP18B**. Which of these sockets you will use depends solely on the pinout of the microcontroller in use. The **EasyPIC™ v7** development system comes with the **PIC18F45K22** microcontroller in a **DIP40** package.

IMPORTANT: When using PIC18F2331 or PIC18F2431 microcontrollers it is necessary to place J20 jumper, in order to route VCC power line to RA5 pin (Figure 4-1)



VCAP jumpers explained

Some PIC16F, PIC18FK and all PIC18FJ microcontrollers have cores that work on 1.8V-2.5V voltage range, and peripherals that work with 3.3V and 5V voltages. Internally, those microcontrollers have power regulators, which adjust the core voltage levels. In order for those devices to have a stable operation of the core, manufacturer recommends that decoupling capacitive filters should be provided, and connected between specific microcontroller pins designated with VCAP and GND. EasyPIC v7 board provides jumpers which are used for this purpose. Here is list of devices that require jumpers placed in VCAP position:

(see figure 4-1)	J22	VCAP position when using PIC16F724/16F727
	J7	VCAP position for PIC18F44J10 and PIC18F45J10
	J10	VCAP for PIC18F24J10, PIC18F25J10, PIC18F2XJ50, PIC18F2XJ11
	J23	VCAP for PIC16F722, PIC16F723, PIC16F726

IMPORTANT: If you do not place VCAP jumper for the MCUs that need it, you might experience some instabilities in program execution.

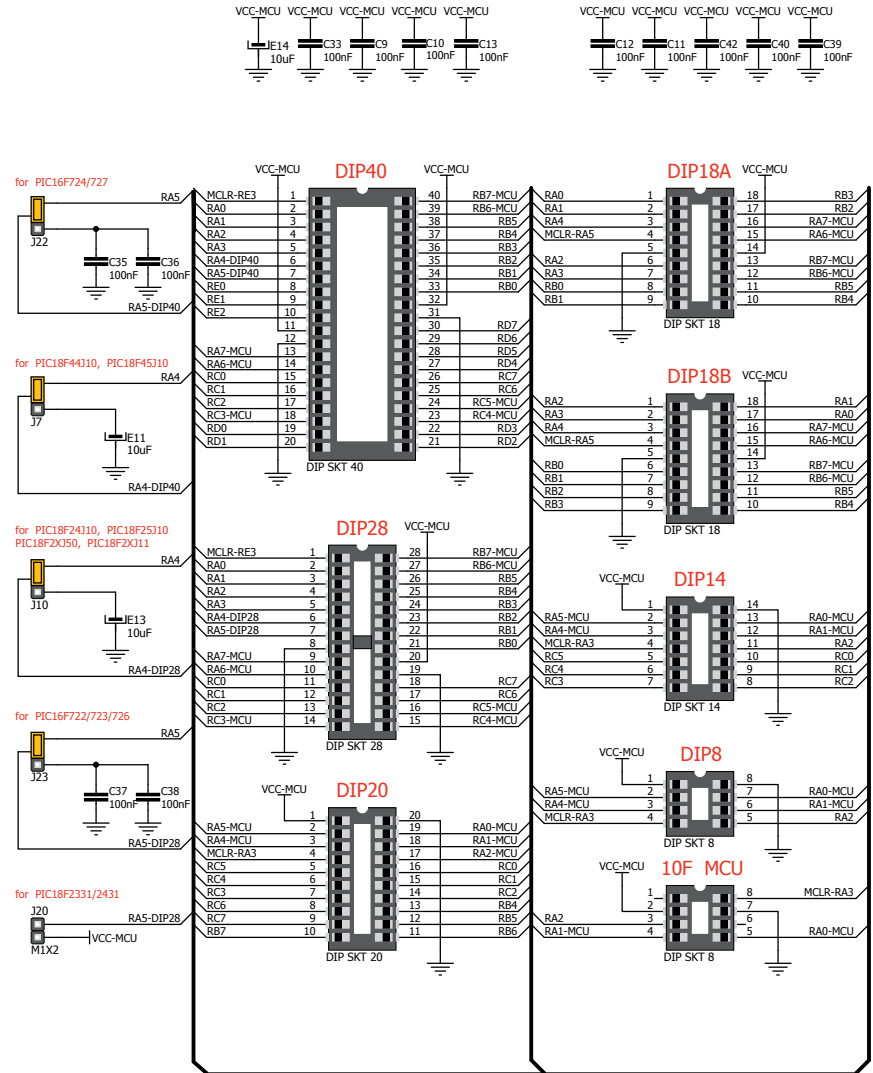


Figure 4-1: Schematic of on-board DIP sockets and VCAP jumpers

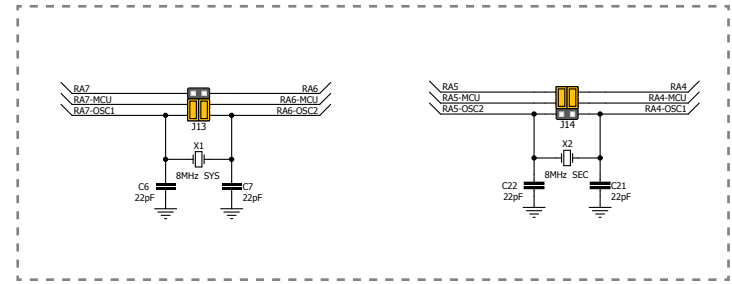


Figure 4-2: crystal oscillators

How to properly place your microcontroller into the DIP socket?

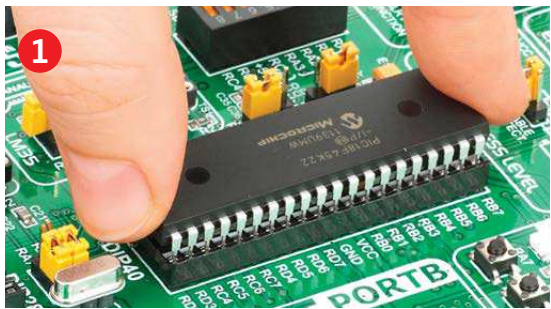


Figure 4-3: Place both ends of microcontroller on the socket so the pins are aligned correctly

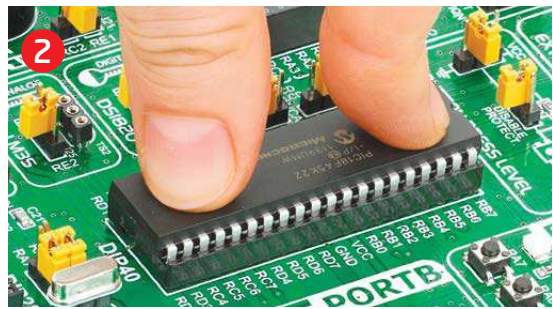


Figure 4-4: with both fingers, evenly distribute the force and press the chip into the socket.

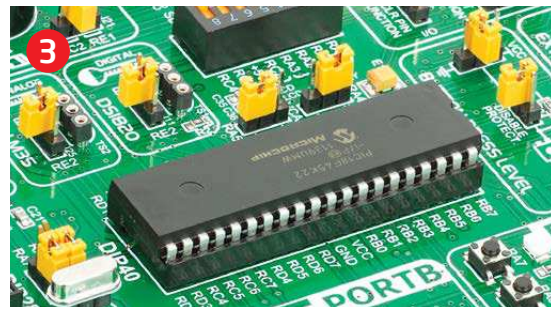


Figure 4-5: Properly placed microcontroller will have equally leveled pins.

Before you plug the microcontroller into the appropriate socket, make sure that the **power supply is turned off**. Images above show how to correctly plug a microcontroller. First make sure that

a half circular cut in the microcontroller DIP packaging matches the cut in the DIP socket. Place both ends of the microcontroller into the socket as shown in **Figure 4-3**. Then put the microcontroller slowly down until

all the pins match the socket as shown in **Figure 4-4**. Check again if everything is placed correctly and press the microcontroller until it is completely plugged into the socket as shown in **Figure 4-5**.

IMPORTANT: *Only one microcontroller may be plugged into the development board at the same time.*

Using crystal oscillators



Figure 4-6: RA6 and RA7 as I/O pins (when using internal oscillator)



Figure 4-7: RA6 and RA7 connected to X1 quartz-crystal

PIC microcontrollers normally use a quartz crystal for the purpose of providing clock frequency. The **EasyPIC™ v7** provides two sockets for quartz-crystal. Microcontrollers in **DIP18A**, **DIP18B**, **DIP28** and **DIP40** packages use socket **X1 (OSC1)** for quartz-crystal.



Figure 4-8: RA4 and RA5 as I/O pins (when using internal oscillator)



Figure 4-9: RA4 and RA5 connected to X2 quartz-crystal

If you want to use microcontrollers in **DIP8**, **DIP14** and **DIP20** packages, it is necessary to put quartz crystal into socket **X2 (OSC2)**. The value of the quartz-crystal depends on the maximum clock frequency allowed and your application. You can always exchange the default 8MHz crystal with another one.

IMPORTANT: *Microcontrollers which are plugged into socket 10F use their own internal oscillator and are not connected to any of the mentioned quartz-crystal sockets.*

On-board programmer

What is mikroProg™?

mikroProg™ is a fast USB 2.0 programmer with mikroICD™ hardware In-Circuit Debugger. Smart engineering allows mikroProg™ to support all PIC10, PIC12, PIC16, PIC18, devices in a single programmer! It supports over 350 microcontrollers from Microchip®. Outstanding performance and easy operation are among its top features.

How do I start?

In order to start using mikroProg™ and program your microcontroller, you just have to follow two simple steps:

1. Install the necessary software

- Install USB drivers
- Install mikroProg Suite™ for PIC® software

2. Power up the board, and you are ready to go.

- Plug in the programmer USB cable
- LINK LED should light up.



Why so many LEDs?



Three LEDs indicate specific programmer operation. **Link** LED lights up when USB link is established with your PC, **Active** LED lights up when programmer is active. **Data** is on when data is being transferred between the programmer and PC software (compiler or mikroProg Suite™ for PIC®).

NOTE: *If you use other than the default PIC18F45K22 MCU, make sure that programmer jumpers are placed in proper positions for your microcontroller socket.*



MCLR pin selection

Before using the programmer, make sure to set MCLR pin jumpers **J1** and **J2**, so that MCLR line is routed to the correct socket for your microcontroller. If you are using the default **PIC18F45K22**, jumpers are supposed to be set for DIP40, as shown below.



DIP40,
DIP28



DIP18A,
DIP18B



DIP20
DIP14
DIP8

Programing lines selection

Jumpers **J8** and **J9** are used to select **PGC** and **PGD** programming lines for your microcontroller. Make sure to place jumpers in the proper position for your socket.



DIP40,
DIP28,
DIP18A,
DIP18B



DIP20,
DIP14,
DIP8

MCLR pin function

Using jumper **J19** you can specify whether **MCLR** pin of your microcontroller is connected to the on-board reset circuit, or acts just as I/O pin.



MCLR
as
MCLR



MCLR
as I/O

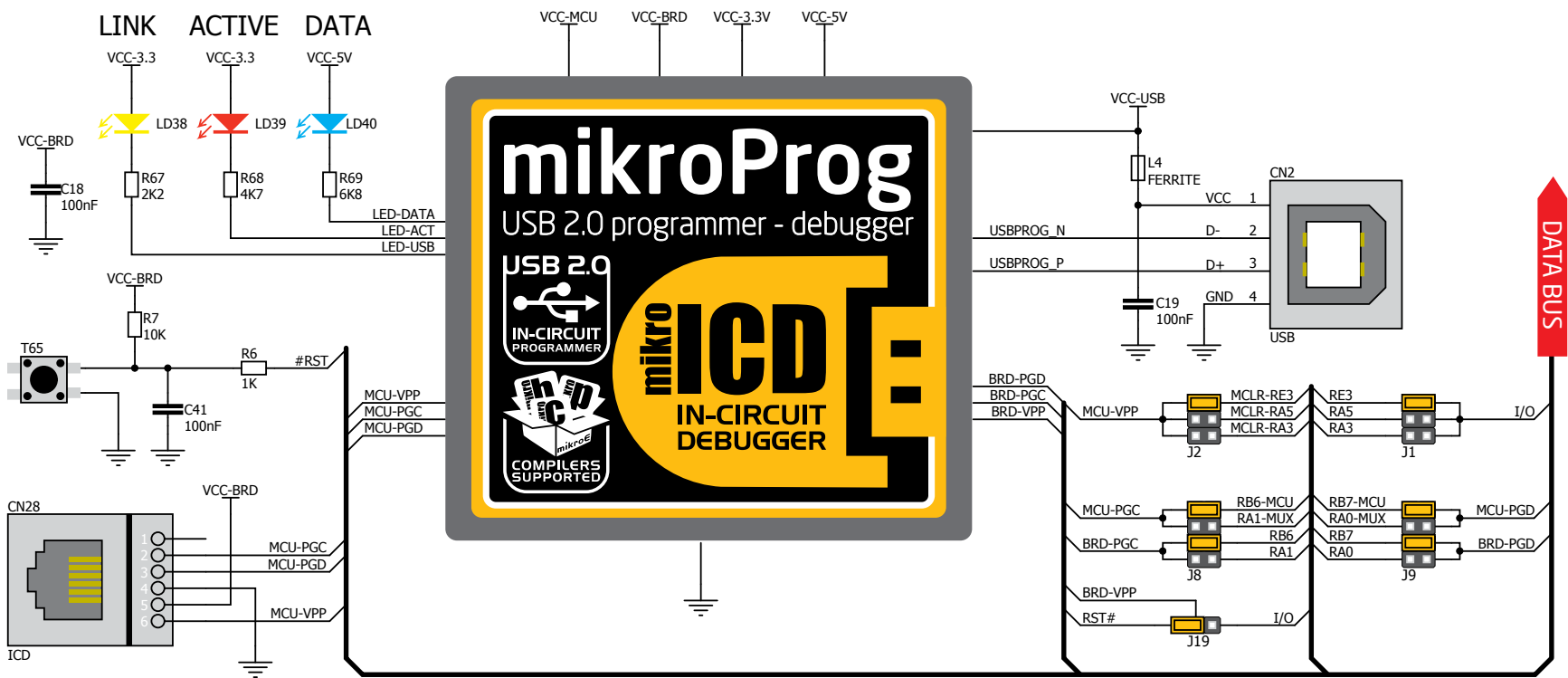
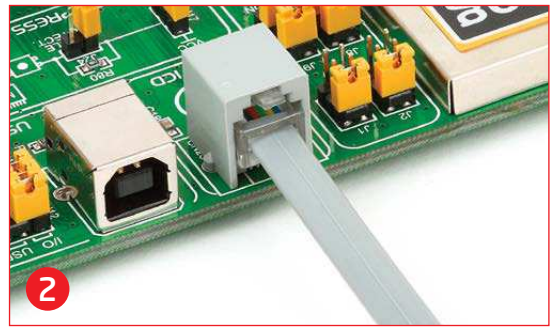
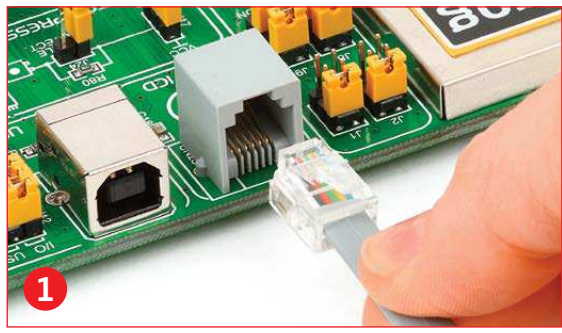


Figure 5-1: mikroProg™ block schematic

Programming with ICD2/ICD3

EasyPIC™ v7 is equipped with RJ-12 connector compatible with Microchip® ICD2® and ICD3® external programmers. You can either use the on-board mikroProg™ programmer or external programming tools as long as you use only one of them in the same time. But you still have to **set the appropriate jumpers**, as described in the previous page. Insert your ICD programmer cable into connector **CN28**, as shown in images **1** and **2**.



Installing programmer drivers

On-board mikroProg™ requires drivers in order to work. Drivers can be found on the link below:



http://www.mikroe.com/downloads/get/1202/mikroprog_for_pic_drivers_v200.zip

When you locate the drivers, please extract files from the ZIP archive. Folder with extracted files contains sub folders with drivers for different operating systems. Depending on which operating system you use, choose adequate folder and open it.



Vista 32bit, Win
2008 32 bit,
Windows 7 32 bit

Vista 64bit, Win
2008 64 bit,
Windows 7 64 bit

Win 98



Win 2000, XP,
2003 32-bit

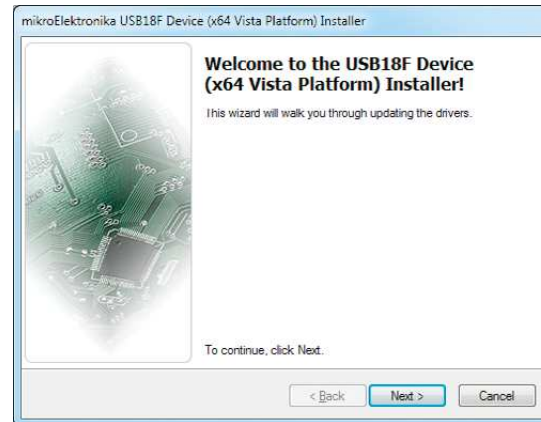
Win XP, 2003
64-bit

installing_usb_drivers.pdf

In the opened folder you should be able to locate the driver setup file. Double click on setup file to begin installation of the programmer drivers.

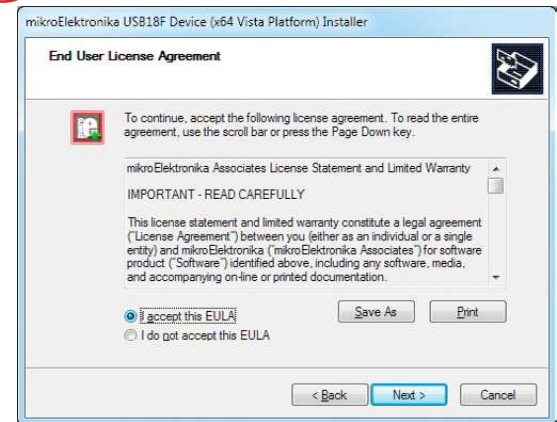


USB18PRG-Vista-x64.EXE



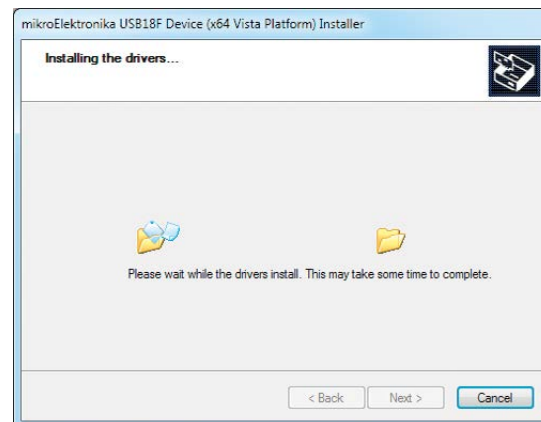
Step 1 - Start Installation

Welcome screen of the installation. Just click on **Next** button to proceed.



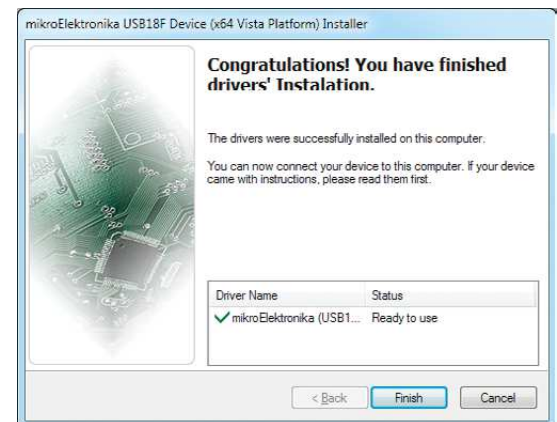
Step 2 - Accept EULA

Carefully read **End User License Agreement**. If you agree with it, click **Next** to proceed.



Step 3 - Installing drivers

Drivers are installed automatically in a matter of seconds.



Step 4 - Finish installation

You will be informed if the drivers are installed correctly. Click on **Finish** button to end installation process.

Programming software

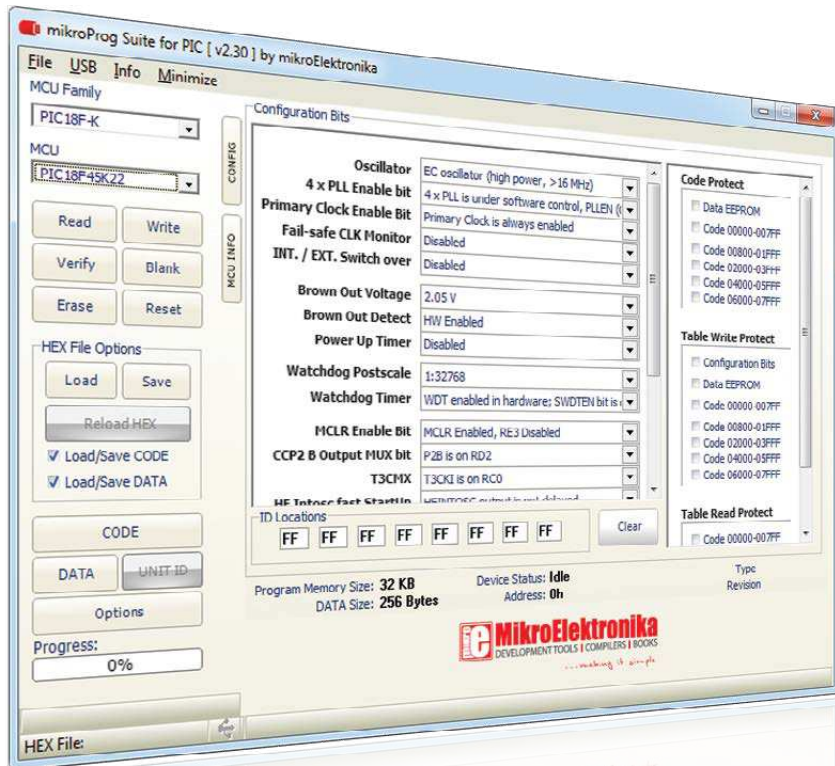
mikroProg Suite™ for PIC®

On-board **mikroProg™** programmer requires special programming software called **mikroProg Suite™ for PIC®**. This software is used for programming all of Microchip® microcontroller families, including PIC10, PIC12, PIC16, PIC18, dsPIC30/33, PIC24 and PIC32. Software has intuitive interface and **SingleClick™** programming technology. To begin, first locate the installation archive on our website:



http://www.mikroe.com/downloads/get/1201/mikroprog_suite_for_pic.zip

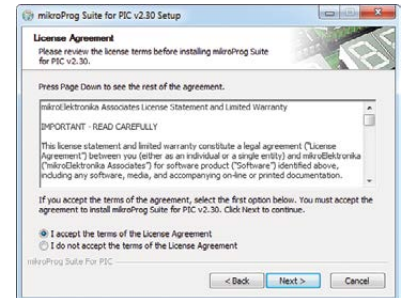
After downloading, extract the package and double click the executable setup file, to start installation.



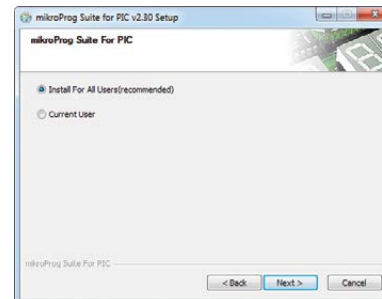
Installation wizard - 6 simple steps



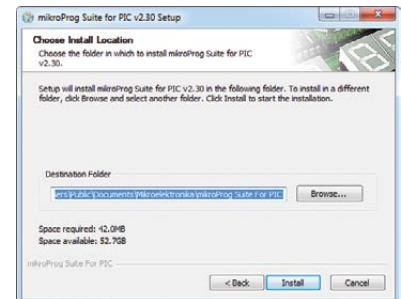
Step 1 - Start Installation



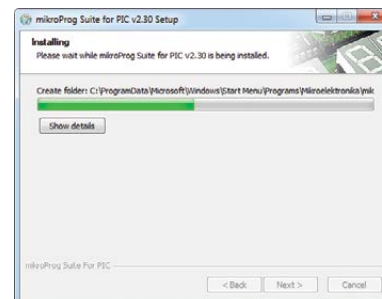
Step 2 - Accept EULA and continue



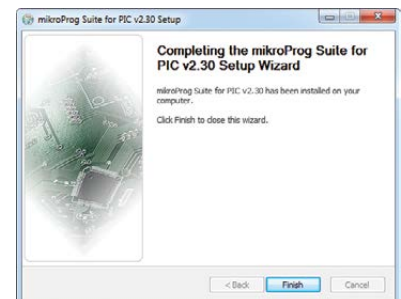
Step 3 - Install for All users or current user



Step 4 - Choose destination folder



Step 5 - Installation in progress



Step 6 - Finish Installation

mikroICD™ - In Circuit Debugger

What is Debugging?

Every developer comes to a point where he has to monitor the code execution in order to find errors in the code, or simply to see if everything is going as planned. This hunt for bugs, or errors in the code is called **debugging**. There are two ways to do this: one is **the software simulation**, which enables you to simulate what is supposed to be happening on the microcontroller as your code lines are executed, and the other, most reliable one, is monitoring the code execution on the MCU itself. And this latter one is called **In-Circuit debugging**. "In-Circuit" means that it is the real deal - code executes right on the target device.

What is mikroICD™?

The on-board **mikroProg™** programmer supports **mikroICD™** - a highly effective tool for a **Real-Time debugging** on hardware level. The mikroICD™ debugger enables you to execute your program on the host PIC microcontroller and view variable values, Special Function Registers (SFR), RAM, CODE and EEPROM memory along with the mikroICD™ code execution on hardware. Whether you are a beginner, or a professional, this powerful tool, with intuitive interface and convenient set of commands will enable you to track down bugs quickly. mikroICD™ is one of the fastest, and most reliable debugging tools on the market.

Supported Compilers

All MikroElektronika compilers, **mikroC™**, **mikroBasic™** and **mikroPascal™** for PIC®, dsPIC® and PIC32® natively support mikroICD™. Specialized mikroICD™ DLL module allows compilers to exploit the full potential of fast hardware debugging. Along with compilers, make sure to install the appropriate **programmer drivers** and **mikroProg Suite™ for PIC®** programming software, as described on **pages 12 and 13**.

How do I use the debugger?

When you build your project for debugging, and program the microcontroller with this HEX file, you can start the debugger using **[F9]** command. Compiler will change layout to debugging view, and a blue line will mark where code execution is currently paused. Use **debugging toolbar** in the **Watch Window** to guide the program execution and stop anytime. Add the desired variables to Watch Window and monitor their values. Complete guide to using mikroICD™ with your compiler is provided within the EasyPIC™ v7 package.



Figure 5-2: mikroICD™ manual explains debugging thoroughly

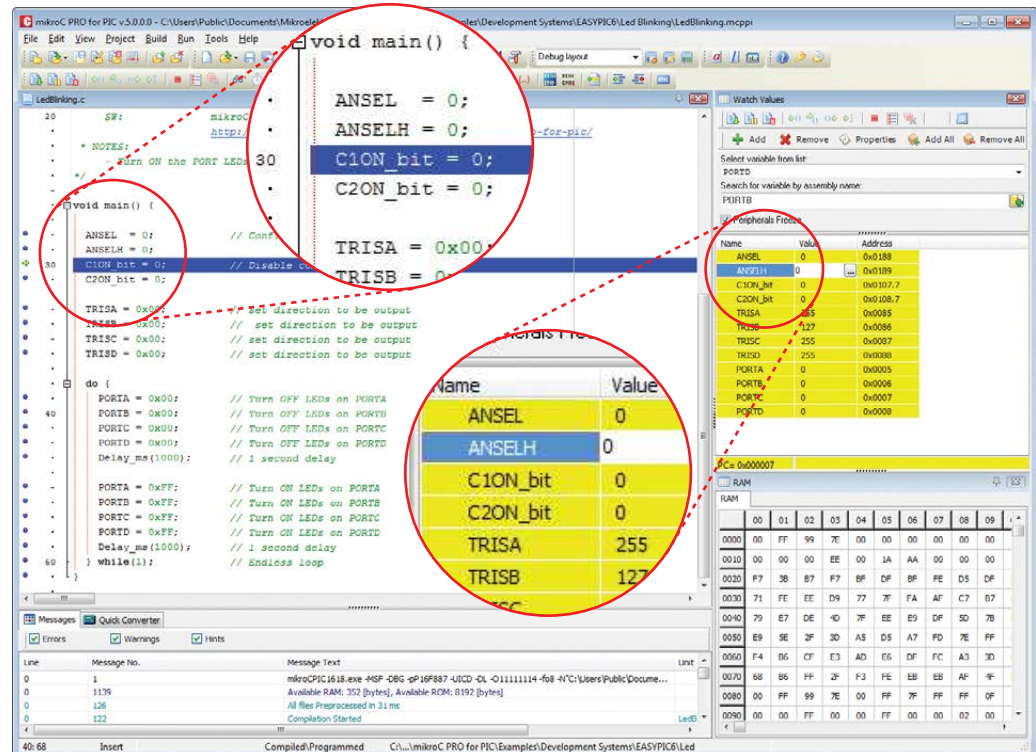
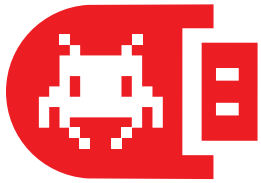


Figure 5-3: mikroC PRO for PIC® compiler in debugging view, with SFR registers in Watch Window



mikroCD™ commands



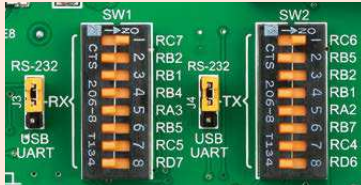
Here is a short overview of which debugging commands are supported in MikroElektronika compilers. You can see what each command does, and what are their shortcuts when you are in debugging mode. It will give you some general picture of what your debugger can do.

Toolbar Icon	Command Name	Shortcut	Description
	Start Debugger	[F9]	Starts Debugger.
	Run/Pause Debugger	[F6]	Run/Pause Debugger.
	Stop Debugger	[Ctrl + F2]	Stops Debugger.
	Step Into	[F7]	Executes the current program line, then halts. If the executed program line calls another routine, the debugger steps into the routine and halts after executing the first instruction within it.
	Step Over	[F8]	Executes the current program line, then halts. If the executed program line calls another routine, the debugger will not step into it. The whole routine will be executed and the debugger halts at the first instruction following the call.
	Step Out	[Ctrl + F8]	Executes all remaining program lines within the subroutine. The debugger halts immediately upon exiting the subroutine.
	Run To Cursor	[F4]	Executes the program until reaching the cursor position.
	Toggle Breakpoint	[F5]	Toggle breakpoints option sets new breakpoints or removes those already set at the current cursor position.
	Show/Hide breakpoints	[Shift+F4]	Shows/Hides window with all breakpoints
	Clears breakpoints	[Shift+Ctrl+F5]	Delete selected breakpoints
	Jump to interrupt	[F2]	Opens window with available interrupts (doesn't work in mikroCD™ mode)

UART via RS-232



Enabling RS-232



In order to enable RS-232 communication, you must set **J3** and **J4** jumpers in the **RS-232** position, and enable desired **RX** and **TX** lines via **SW1** and **SW2** DIP switches. For example, if you want to enable RS-232 connection on UART1 module of the default **PIC18F45K22** chip, you should enable **SW1.1** (RC7) and **SW2.1** (RC6) lines.

The **UART** (universal asynchronous receiver/transmitter) is one of the most common ways of exchanging data between the MCU and peripheral components. It is a serial protocol with separate transmit and receive lines, and can be used for full-duplex communication. Both sides must be initialized with the same baud rate, otherwise the data will not be received correctly.

RS-232 serial communication is performed through a 9-pin SUB-D connector and the microcontroller UART module. In order to enable this communication, it is necessary to establish a connection between **RX** and **TX** lines on SUB-D connector and the same pins on the target microcontroller using DIP switches. Since RS-232 communication voltage levels are different than microcontroller logic levels, it is necessary to use a RS-232 Transceiver circuit, such as **MAX3232** as shown on **Figure 6-1**.

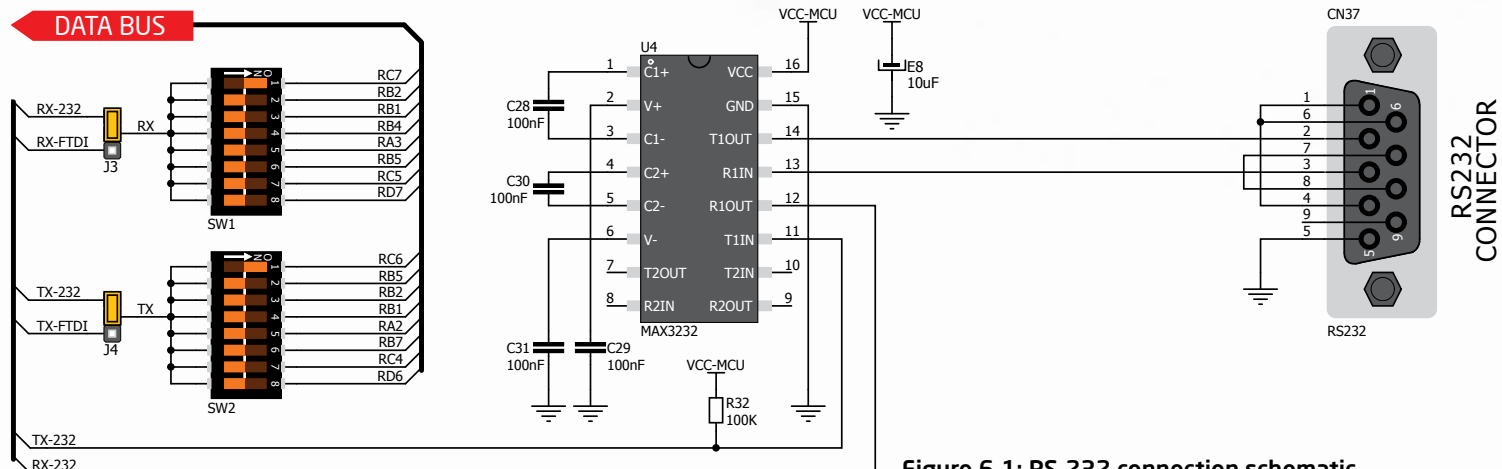
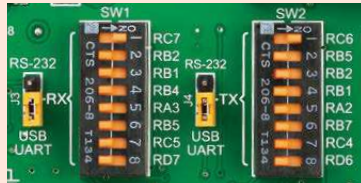


Figure 6-1: RS-232 connection schematic

UART via USB



Enabling USB-UART



In order to enable USB-UART communication, you must set **J3** and **J4** jumpers in the **USB-UART** position, and enable desired **RX** and **TX** lines via **SW1** and **SW2** DIP switches. For example, if you want to enable USB-UART connection on UART1 module of the default **PIC18F45K22** chip, you should enable **SW1.1** (RC7) and **SW2.1** (RC6) lines.

Modern PC computers, laptops and notebooks are no longer equipped with RS-232 connectors and UART controllers. They are nowadays replaced with USB connectors and USB controllers. Still, certain technology enables UART communication to be done over USB connection. Controllers such as **FT232RL** from FTDI® convert UART signals to the appropriate USB standard. In order to use USB-UART module on EasyPIC™ v7, you must first install FTDI drivers on your computer. Drivers can be found on link below:



<http://www.ftdichip.com/Drivers/VCP.htm>

USB-UART communication is being done through a FT232RL controller, USB connector (**CN32**), and microcontroller UART module. To establish this connection, you must put **J3** and **J4** jumpers in the **USB-UART** position, and connect **RX** and **TX** lines to the appropriate pins of the microcontroller. This connection is done using DIP switches **SW1** and **SW2**.

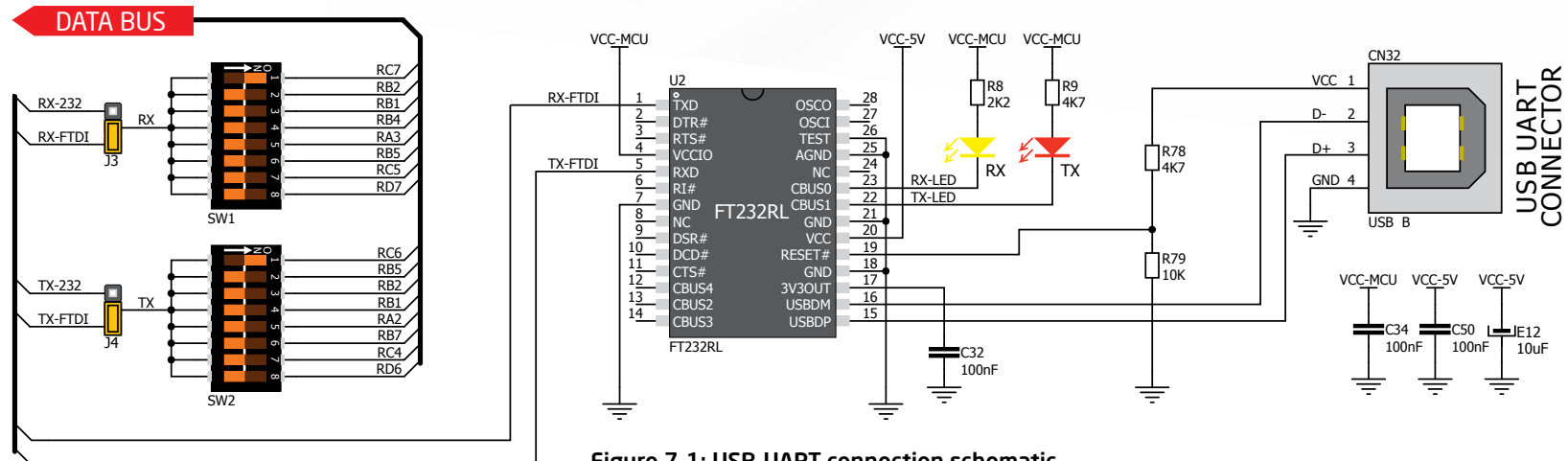


Figure 7-1: USB-UART connection schematic

USB connection

USB is the acronym for **Universal Serial Bus**. This is a very popular industry standard that defines cables, connectors and protocols used for communication and power supply between computers and other devices. EasyPIC™ v7 contains

USB connector (**CN4**) which enables microcontrollers that support USB communication to establish a connection with the target host (eg. PC, Laptop, etc). Selection of communication lines is done using jumpers **J12** or **J18**, depending on

the target microcontroller. When communication lines are routed from the microcontroller to the USB connector using mentioned jumpers, they are cut off from the rest of the board, and cannot be accessed via PORT

headers. Dedicated **USB ON** LED signals the presence of USB connection, when the USB cable is inserted into the USB connector.



Enabling USB connection

Depending on your target microcontroller, USB communication can be enabled on **PORTA** or **PORTC**. For **PIC18(L)F1XK50** you should put **J18** jumpers in the **USB** position (**Figure 8-3**). For **PIC18Fxx(J)50**, **PIC18Fxx(J)53**, **PIC18Fxx(J)55** and **PIC18Fxx58** place **J12** jumpers in the **USB** position (**Figure 8-2**).



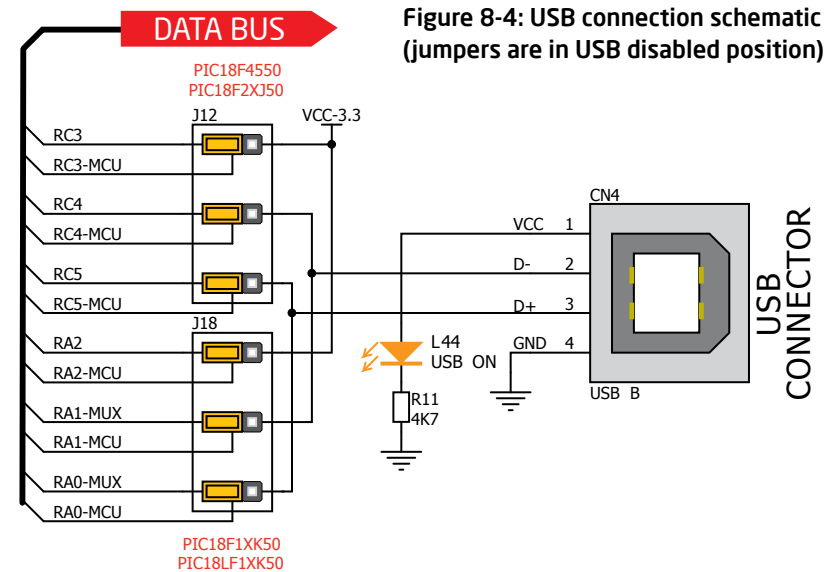
Figure 8-1:
USB function disabled



Figure 8-2:
USB enabled on PORTC



Figure 8-3:
USB enabled on PORTA



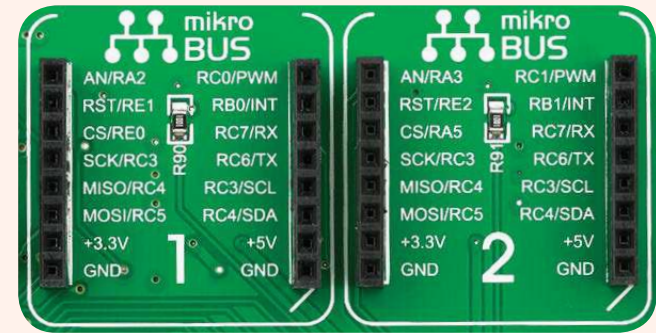
mikroBUS™ sockets

Easier connectivity and simple configuration are imperative in modern electronic devices. Success of the USB standard comes from its simplicity of usage and high and reliable data transfer rates. As we in MikroElektronika see it, Plug-and-Play devices with minimum settings are the future in embedded world too. This is why our engineers have come up with a simple, but brilliant pinout with lines that most of today's accessory boards require, which almost completely eliminates the need of additional hardware settings. We called this new standard the **mikroBUS™**. EasyPIC™ v7 is the first development board in the world to support mikroBUS™ with two on-board sockets. As you can see, there are no additional DIP switches, or jumper selections. Everything is

already routed to the most appropriate pins of the microcontroller sockets.

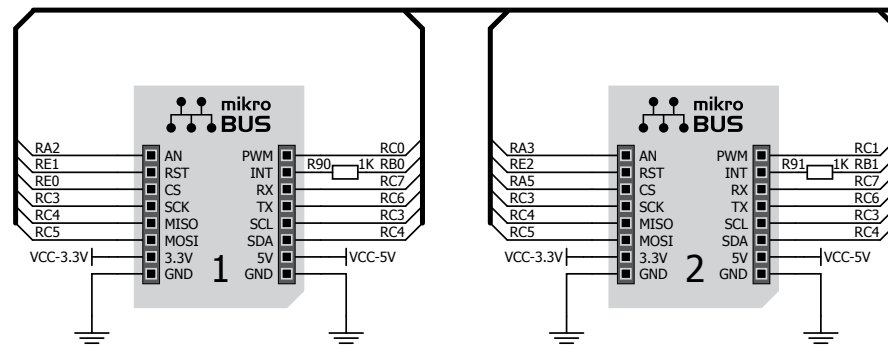
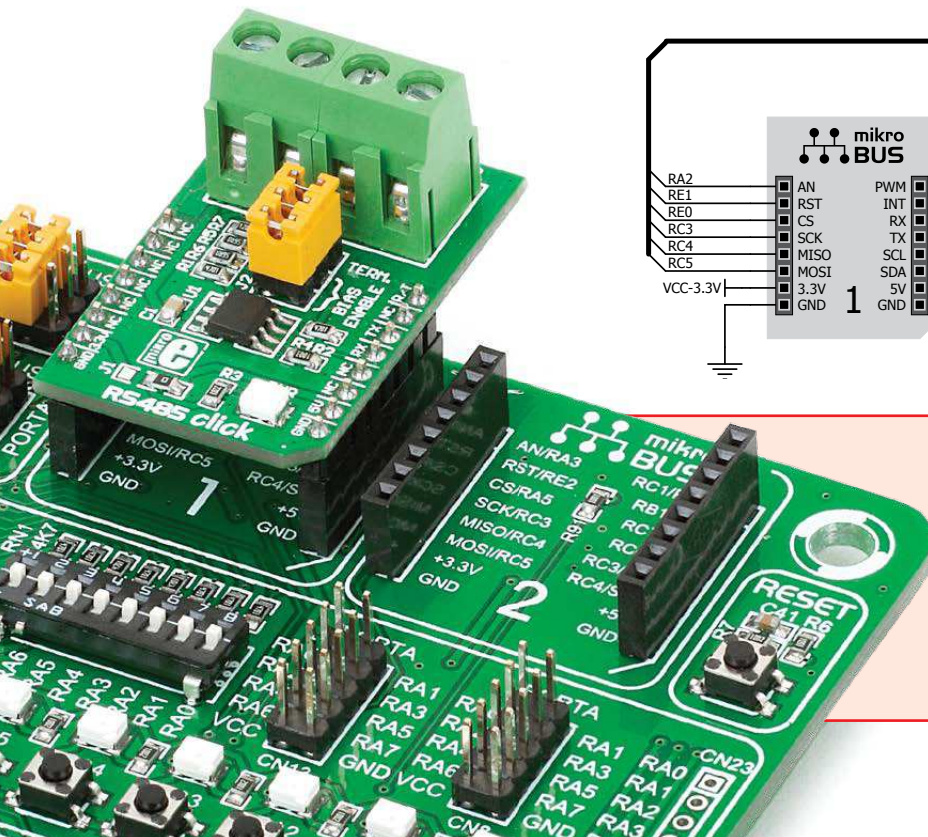
mikroBUS™ host connector

Each mikroBUS™ host connector consists of two 1x8 female headers containing pins that are most likely to be used in the target accessory board. There are three groups of communication pins: **SPI**, **UART** and **I²C** communication. There are also single pins for **PWM**, **Interrupt**, **Analog input**, **Reset** and **Chip Select**. Pinout contains two power groups: **+5V** and **GND** on one header and **+3.3V** and **GND** on the other 1x8 header.



mikroBUS™ pinout explained

- | | |
|-------------------------------------|--------------------------------------|
| AN - Analog pin | PWM - PWM output line |
| RST - Reset pin | INT - Hardware Interrupt line |
| CS - SPI Chip Select line | RX - UART Receive line |
| SCK - SPI Clock line | TX - UART Transmit line |
| MISO - SPI Slave Output line | SCL - I2C Clock line |
| MOSI - SPI Slave Input line | SDA - I2C Data line |
| +3.3V - VCC-3.3V power line | +5V - VCC-5V power line |
| GND - Reference Ground | GND - Reference Ground |



DATA BUS

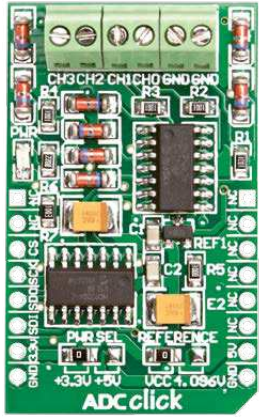
Figure 9-1:
mikroBUS™
connection
schematic

Integrate mikroBUS™ in your design

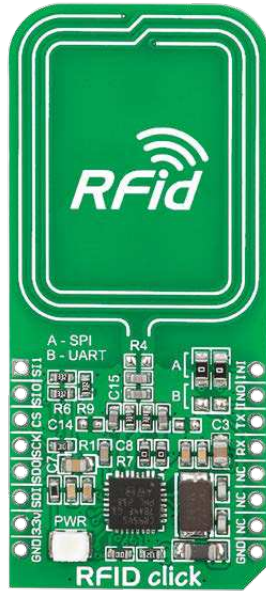
mikroBUS™ is not made to be only a part of our development boards. You can freely place mikroBUS™ host connectors in your final PCB designs, as long as you clearly mark them with mikroBUS™ logo and footprint specifications. For more information, logo artwork and PCB files visit our website:



<http://www.mikroe.com/mikrobus/>



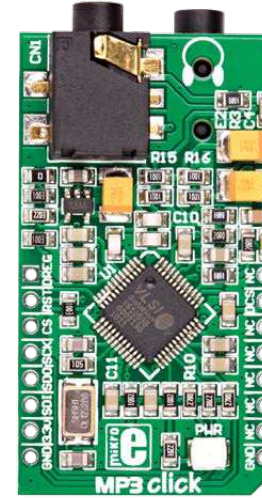
ADC click™



RFID click™



Bluetooth click™



MP3 click™



GSM click™

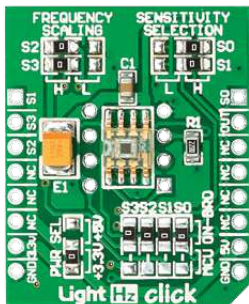
Click Boards™ are plug-n-play!

MikroElektronika portfolio of over 200 accessory boards is now enriched by an additional set of mikroBUS™ compatible **Click Boards™**. Almost each month several new Click boards™ are released. It is our intention to provide the community with as much of these boards as possible, so you will be able to expand your EasyPIC™ v7 with additional functionality with literally zero

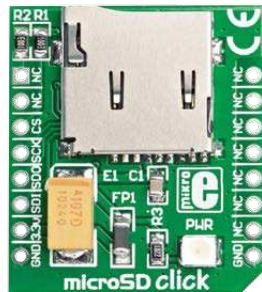
hardware configuration. Just plug and play. Visit the Click boards™ webpage for the complete list of available boards:



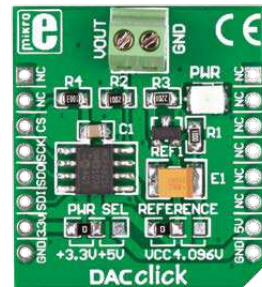
<http://www.mikroe.com/click/>



LightHz click™



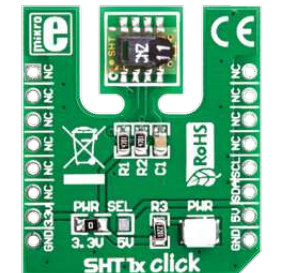
microSD click™



DAC click™



DIGIPOT click™



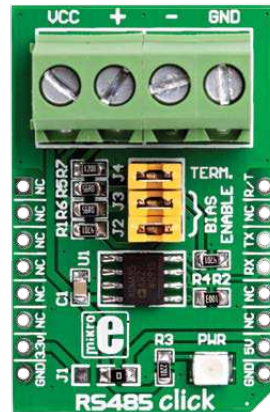
SHT1x click™



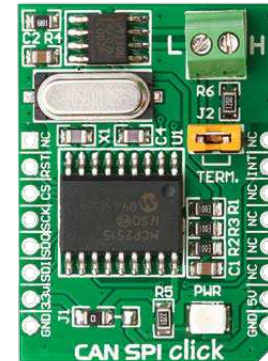
WiFi PLUS click™



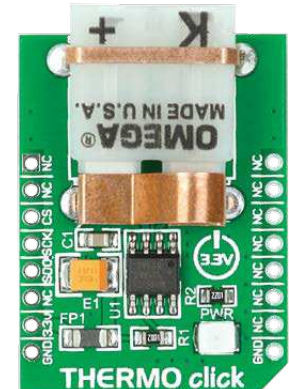
GPS click™



RS485 click™



CAN SPI click™



THERMO click™

The screenshot shows the Libstock website interface. At the top, there's a navigation bar with 'LIBSTOCK A PLACE FOR CODE' and social media icons. Below that, a search bar and navigation links like 'BROWSE CODE', 'SHARE CODE', 'REQUEST CODE', and 'ABOUT LIBSTOCK' are visible. The main content area is titled 'Code Examples' and features a login section on the left. The central part shows a list of categories and a specific example for 'GSM click - Example'. The example details include a 5-star rating, author 'MikroElektronika Team', version '1.0.0.0', and a description of a program using a GSM module for SMS and calls. A download button for '648.97KB' is also present.

Input/Output Group

One of the most distinctive features of EasyPIC™ v7 are its Input/Output PORT groups. They add so much to the connectivity potential of the board.

Everything is grouped together

PORT **headers**, PORT **buttons** and PORT **LEDs** are next to each other, and grouped together. It makes development easier, and the entire EasyPIC™ v7 cleaner and well organized. We have also provided an **additional PORT headers** on the left side of the board, so you can access any pin you want from both sides of the board. Some PORT pins are directly connected to the microcontroller, and some that are connected to other on-board modules are enabled via jumpers (for example USB jumpers, **J12** and **J18**).

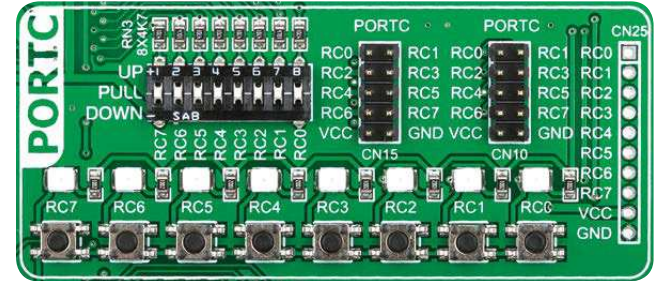
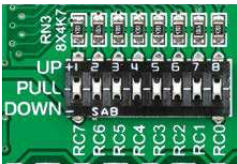


Figure 10-1: I/O group contains PORT headers, tri-state pull up/down DIP switch, buttons and LEDs all in one place

Tri-state pull-up/down DIP switches

Tri-state DIP switches, like **SW7** on **Figure 10-2**, are used to enable 4K7 pull-up or pull-down resistor on any desired port pin. Each of these switches has three states:



1. **middle position** disables both pull-up and pull-down feature from the PORT pin
2. **up position** connects the resistor in pull-up state to the selected pin
3. **down position** connects the resistor in pull-down state to the selected PORT pin.

Figure 10-2: Tri-state DIP switch on PORTC

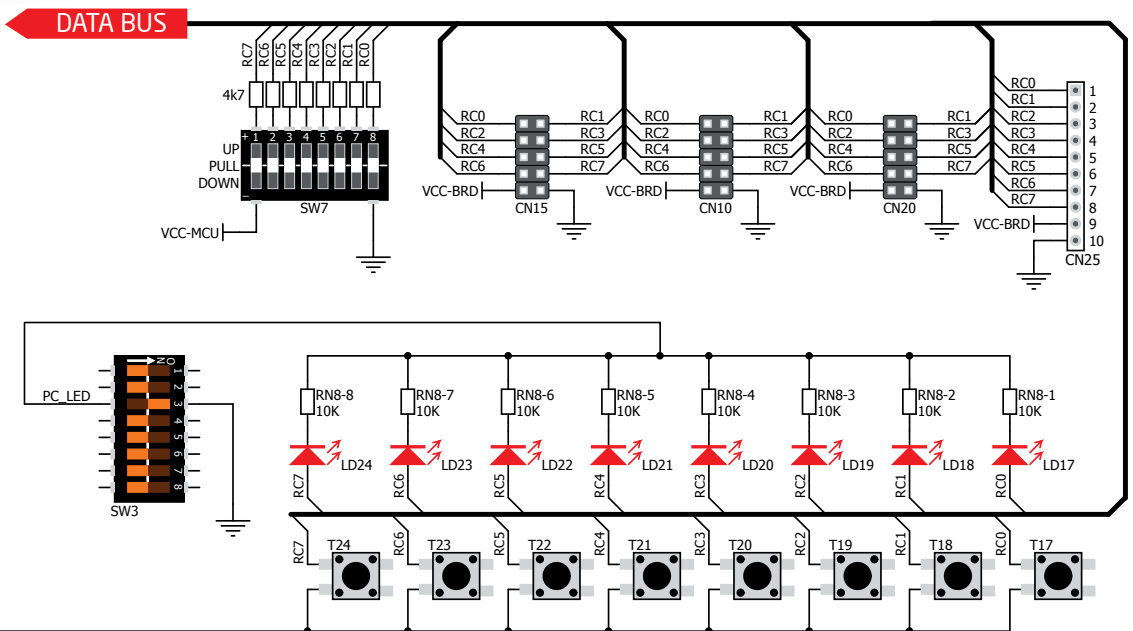
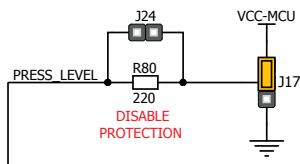
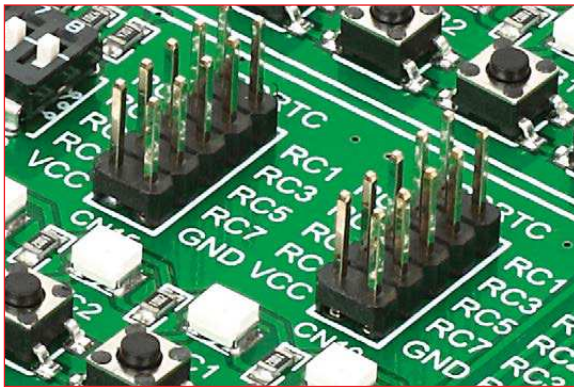


Figure 10-3: Schematic of the single I/O group connected to microcontroller PORTC



Headers

With enhanced connectivity as one of the key features of EasyPIC v7, we have provided **four connection headers for each PORT**. I/O PORT group contains two male IDC10 headers (like **CN10** and **CN15** on **Figure 10-3**). These headers are all compatible with over 70 MikroElektronika accessory boards, and enable simple connection. There is **one more IDC10 header** available on the left side of the board, next to the section with displays.

NOTE: Because of its orientation, header on the left side of the board is not meant for placing accessory boards directly. Instead, use wire jumpers or other ways to establish connection and utilize these pins.

I/O PORT group also contains 1x10 connection pad (like **CN25** on **Figure 10-3**) which can be used for connecting MikroElektronika PROTO boards, or custom user boards.

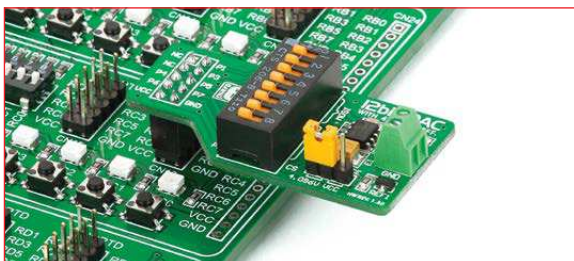
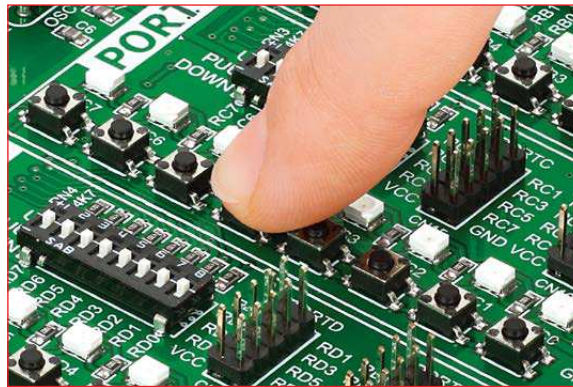


Figure 10-4: IDC10 male headers enable easy connection with MikroElektronika accessory boards



Buttons

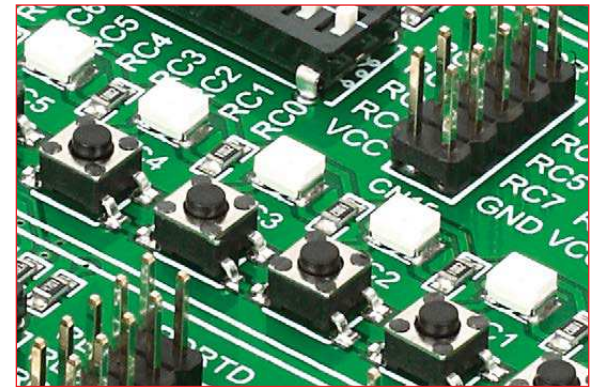


Figure 10-5: Button press level jumper (J17)

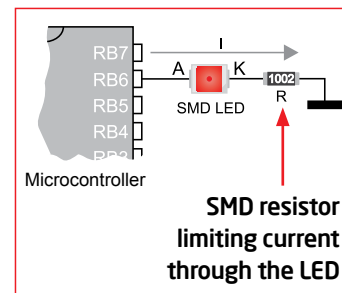
The logic state of all microcontroller digital inputs may be changed using **push buttons**. Jumper **J17** is available for selecting which logic state will be applied to corresponding MCU pin when button is pressed in any I/O port group. If you, for example, place **J17** in **VCC** position, then pressing of any push button in PORT I/O group will apply logic one to the appropriate microcontroller pin. The same goes for **GND**. If the jumper is taken out, then neither of two logic states will be applied to the appropriate microcontroller pin. You can disable pin protection 220ohm resistors by placing jumper **J24**, which will connect your push buttons directly to VCC or GND. Be aware that doing so you may accidentally damage MCU in case of wrong usage.

Reset Button

In the far upper right section of the board, there is a **RESET button**, which can be used to manually reset the microcontroller. This button is directly connected to the **MCLR pin**.



LEDs



LED (Light-Emitting Diode) is a highly efficient electronic light source. When connecting LEDs, it is necessary to place a current limiting resistor in series so that LEDs are provided with the

current value specified by the manufacturer. The current varies from 0.2mA to 20mA, depending on the type of the LED and the manufacturer. The EasyPIC™ v7 board uses low-current LEDs with typical current consumption of 0.2mA or 0.3mA, depending of VCC voltage selection. Board contains 36 LEDs which can be used for visual indication of the logic state on PORT pins. An active LED indicates that a logic high (1) is present on the pin. In order to enable PORT LEDs, it is necessary to enable the corresponding DIP switches on **SW3** (**Figure 10-6**).

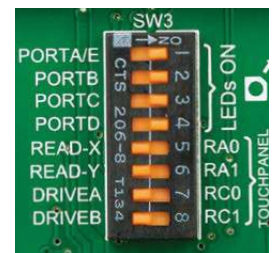


Figure 10-6: SW3.1 through SW3.4 switches are used to enable PORT LEDs

LCD 2x16 characters

Liquid Crystal Displays or **LCDs** are cheap and popular way of representing information to the end user of some electronic device. Character LCDs can be used to represent standard and custom characters in the predefined number of fields. EasyPIC™ v7 provides the connector and the necessary interface for supporting **2x16 character LCDs** in 4-bit mode. This type of display has two rows consisted of 16 character fields. Each field is a 7x5 pixel matrix. Communication with the display module is done through **CN7** display connector. Board is fitted with uniquely designed plastic display distancer, which allows the LCD module to perfectly and firmly fit into place.

IMPORTANT: *Make sure to turn off the power supply before placing LCD onto the board. Otherwise your display can be permanently damaged.*



Figure 11-1: On-board LCD 2x16 display connector

Connector pinout explained

GND and VCC - Display power supply lines

V0 - LCD contrast level from potentiometer P4

RS - Register Select Signal line

E - Display Enable line

R/W - Determines whether display is in Read or Write mode. It's always connected to GND, leaving the display in Write mode all the time.

D0-D3 - Display is supported in 4-bit data mode, so lower half of the data byte interface is connected to GND.

D4-D7 - Upper half of the data byte

LED+ - Connection with the back-light LED anode

LED- - Connection with the back-light LED cathode

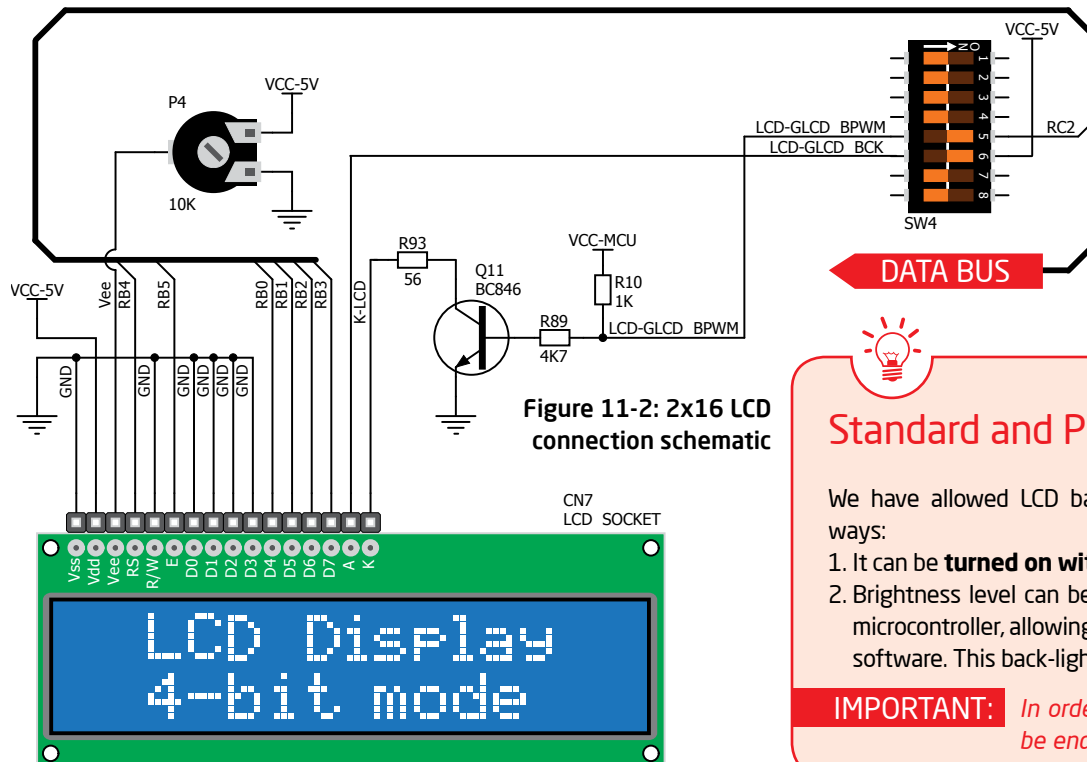


Figure 11-2: 2x16 LCD connection schematic



Standard and PWM-driven back-light

We have allowed LCD back-light to be enabled in two different ways:

1. It can be **turned on with full brightness** using **SW4.6** switch.
2. Brightness level can be determined **with PWM signal** from the microcontroller, allowing you to write custom back-light controlling software. This back-light mode is enabled with **SW4.5** switch.

IMPORTANT: *In order to use PWM back-light both **SW4.5** and **SW4.6** switches must be enabled at the same time.*



GLCD 128x64

Graphical Liquid Crystal Displays, or **GLCDs** are used to display monochromatic graphical content, such as text, images, human-machine interfaces and other content. EasyPIC™ v7 provides the connector and necessary interface for supporting GLCD with resolution of 128x64 pixels, driven by the KS108 or compatible display controller. Communication with the display module is done through **CN6** display connector. Board is fitted with uniquely designed plastic display distancer, which allows the GLCD module to perfectly and firmly fit into place.

Display connector is routed to PORTB (control lines) and PORTD (data lines) of the microcontroller sockets. Since the same ports are used by 2x16 character LCD display, you cannot use both displays simultaneously. You can control the display contrast using dedicated potentiometer **P3**. Full brightness display back light can be enabled with **SW4.6** switch, and PWM-driven back light with **SW4.5** switch.

