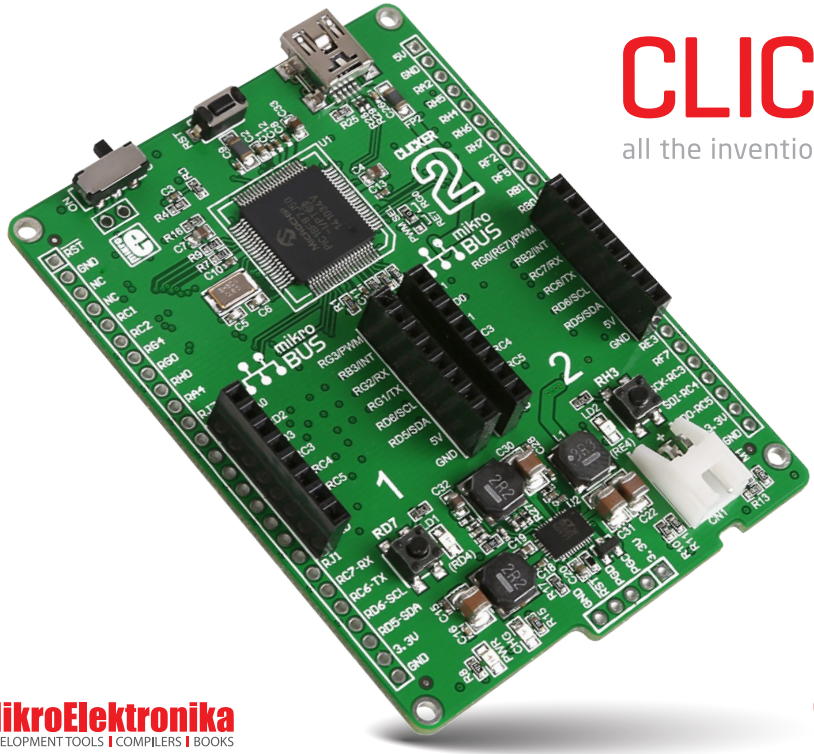
CLICKER 2 PIC18FJ

all the inventions waiting to happen...



A compact starter kit with your favorite microcontroller and two mikroBUS™ sockets

MikroElektronika
DEVELOPMENT TOOLS | COMPILERS | BOOKS

USB | mikro BUS | PIC

TO OUR VALUED CUSTOMERS

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

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

Nebojsa Matic
General Manager

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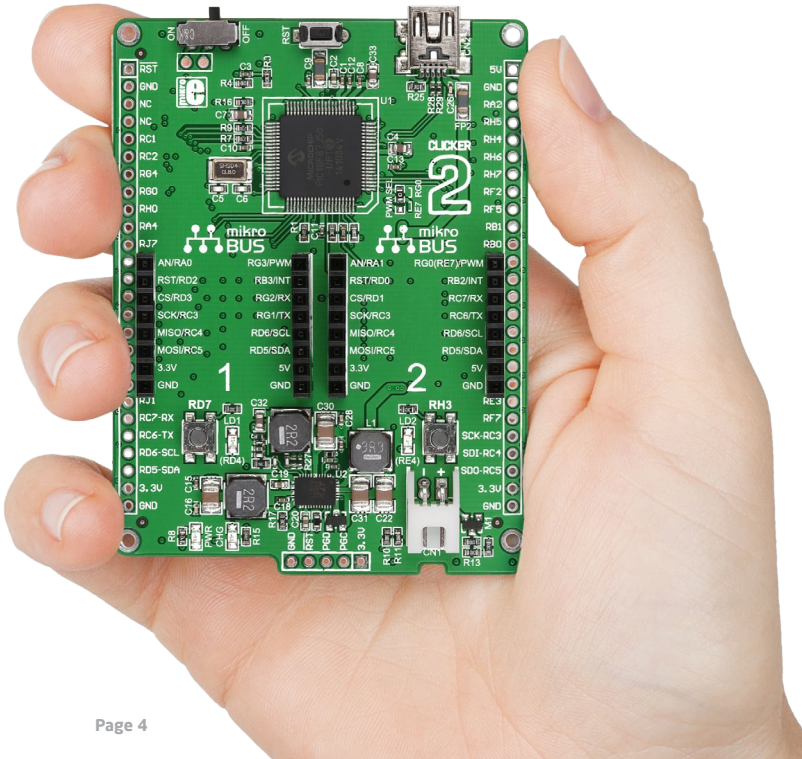
Table of contents

Introduction to clicker 2 for PIC18FJ 4
Key features 5
1. Power supply 7
2. PIC18F87J50 microcontroller 9
Key microcontroller features 9
3. Programming the microcontroller 10
3.1 Programming with mikroBootloader 11
step 1 – Connecting clicker 2 for PIC18FJ 11
step 2 – Browsing for .HEX file 12
step 3 – Selecting .HEX file 12
step 4 – Uploading .HEX file 13
step 5 – Finish upload 14
3.2 Programming with mikroProg™ programmer 15
mikroProg Suite™ for PIC® software 16
4. Buttons and LEDs 18
5. Power management and battery charger 20
6. Oscillators 21
7. USB connection 23
8. Pads 25
9. Pinout 26
9.1 mikroBUS™ pinout 27
10. click boards™ are plug and play! 28
11. Dimensions 30

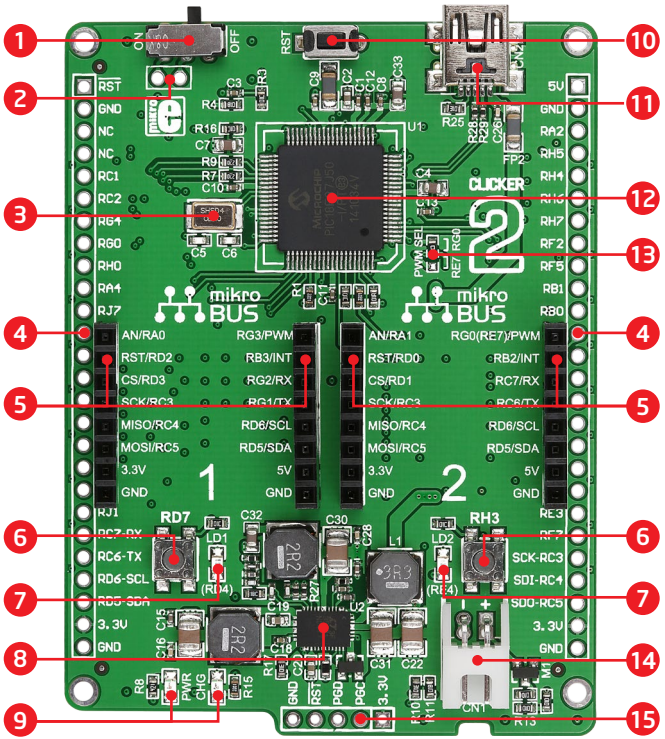
Introduction to clicker 2 for PIC18FJ

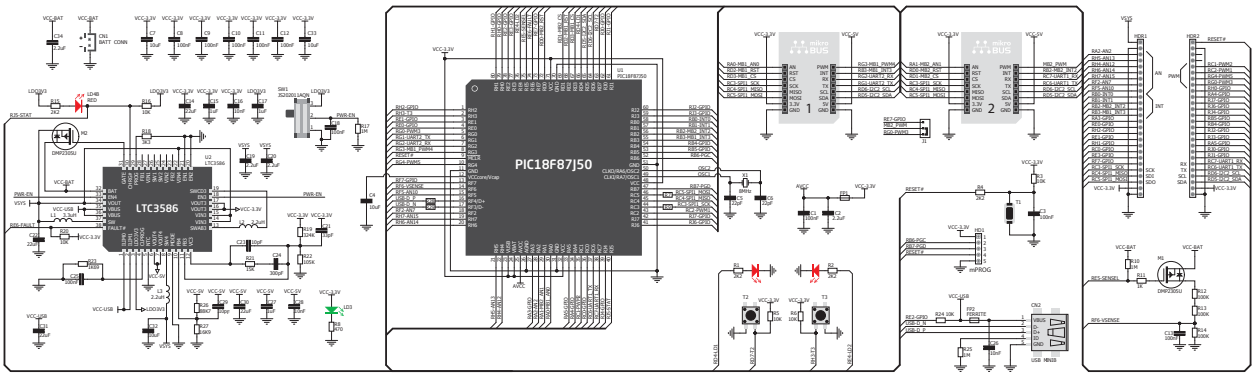
clicker 2 for PIC18FJ is a compact dev. kit with two mikroBUS™ sockets for click board connectivity. You can use it to quickly build your own gadgets with unique functionalities and features. It carries the **PIC18F87J50**, a 8-bit microcontroller, two indication LEDs, two general purpose buttons, a reset button, an on/off switch, a li-polymer battery connector, a USB Mini-B connector and two mikroBUS™ sockets. A mikroProg connector and a 2x26 pinout for interfacing with external electronics are also provided. The mikroBUS™ connector consists of two 1x8 female headers with **SPI**, **I²C**, **UART**, **RST**, **PWM**, **Analog** and **Interrupt** lines as well as **3.3V**, **5V** and **GND** power lines. **clicker 2 for PIC18FJ** board can be powered over a USB cable.



Key features

1. ON/OFF switch
2. Pads for connecting external ON/OFF switch
3. 8 MHz crystal oscillator
4. two 1x26 connection pads
5. mikroBUS™ sockets 1 and 2
6. Pushbuttons
7. Additional LEDs
8. LTC3586 USB power manager IC
9. Power and Charge indication LEDs
10. RESET button
11. USB mini-B connector
12. PIC18F87J50
13. PWM selection jumper
14. Li-Polymer battery connector
15. mikroProg™ programmer connector





clicker 2 for PIC18FJ schematic

1. Power supply

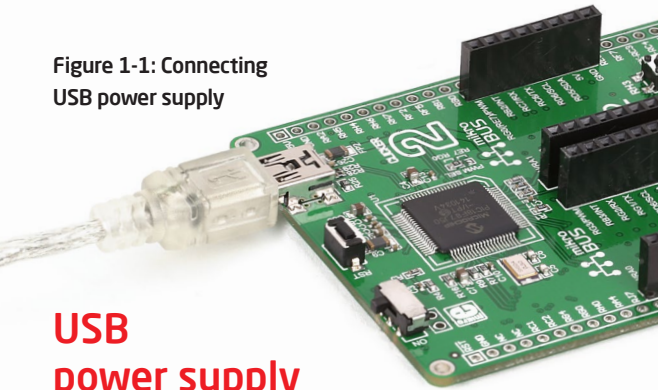


Figure 1-1: Connecting USB power supply

USB power supply

You can supply power to the board with a **Mini-B USB** cable provided in the package. On-board voltage regulators provide the appropriate voltage levels to each component on the board. **Power LED (GREEN)** will indicate the presence of power supply.

Battery power supply

You can also power the board using a **Li-Polymer** battery, via on-board battery connector. On-board battery charger circuit enables you to charge the battery over USB connection. **LED diode (RED)** will indicate when battery is charging. Charging current is ~300mA and charging voltage is 4.2V DC.

Figure 1-2: Connecting Li-Polymer battery

NOTE | *Some click boards need more current than the USB connection can supply. For 3.3V clicks, the upper limit is 750 mA; for 5V clicks, it's 500 mA. In those cases you would need to use the battery as the power supply, or the vsys pin on the side of the board.*

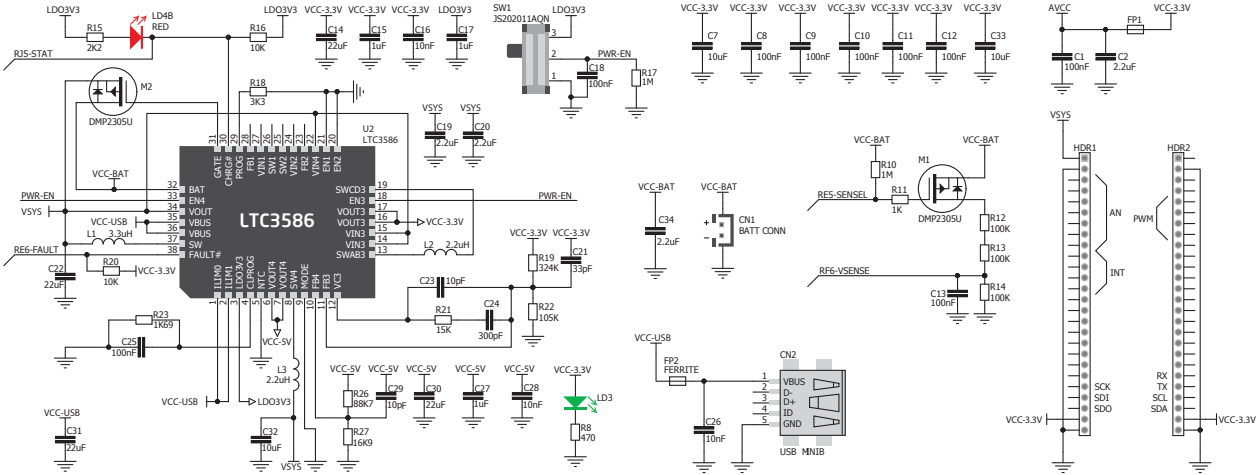
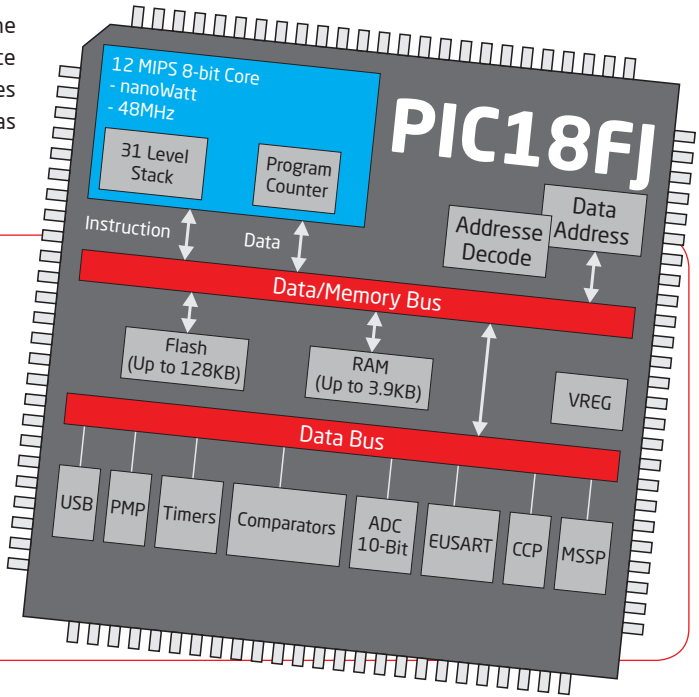


Figure 1-3: Power supply schematic

2. PIC18F87J50 microcontroller

The clicker 2 for PIC18FJ development tool comes with the **PIC18F87J50** device. This 8-bit low power high performance microcontroller is rich with on-chip peripherals and features 128 KB of program memory and 3094 bytes of RAM. It has integrated full speed USB 2.0. support.



Key microcontroller features

- Up to 12 MIPS operation
- 8-bit architecture
- 128 KB of program memory
- 3,904 bytes of RAM
- 65 I/O pins
- Internal oscillator 8 MHz, 32 Khz
- 2-UART, 2-SPI, 2-I²C, USB 2.0, DAC, ADC etc.

3. Programming the microcontroller

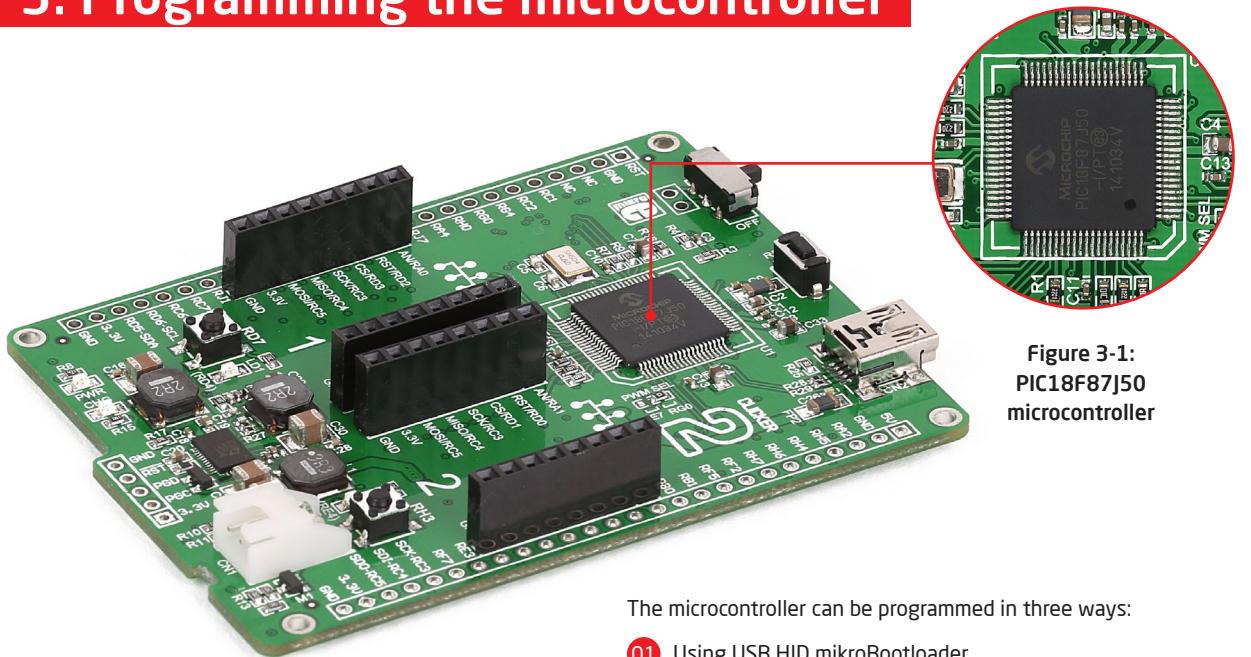


Figure 3-1: PIC18F87J50 microcontroller

The microcontroller can be programmed in three ways:

01 Using USB HID mikroBootloader,

02 Using external mikroProg™ for PIC18FJ programmer

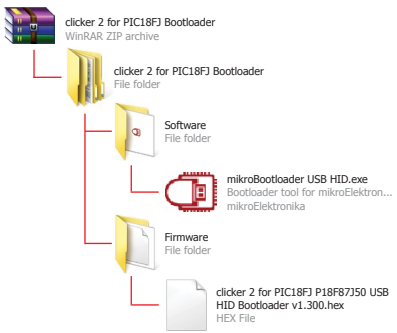
03 Using external ICD2/3® programmer

3.1 Programming with mikroBootloader

You can program the microcontroller with a bootloader which is preprogrammed by default. To transfer .hex file from a PC to MCU you need bootloader software (**mikroBootloader USB HID**) which can be downloaded from:

http://www.mikroe.com/downloads/get/2156/clicker_2_pic18fj_bootloader.zip

After the mikroBootloader software is downloaded, unzip it to desired location and start it.



step 1 – Connecting clicker 2 for PIC18FJ

Figure 3-2: USB HID mikroBootloader window

01 To start, connect the USB cable, or if already connected press the **Reset** button on your clicker 2 for PIC18FJ. Click the **Connect** button within 5s to enter the bootloader mode, otherwise existing microcontroller program will execute.

step 2 - Browsing for .HEX file

Figure 3-3: Browse for HEX

01 Click the **Browse for HEX** button and from a pop-up window (**Figure 3.4**) choose the .HEX file which will be uploaded to MCU memory.

step 3 - Selecting .HEX file

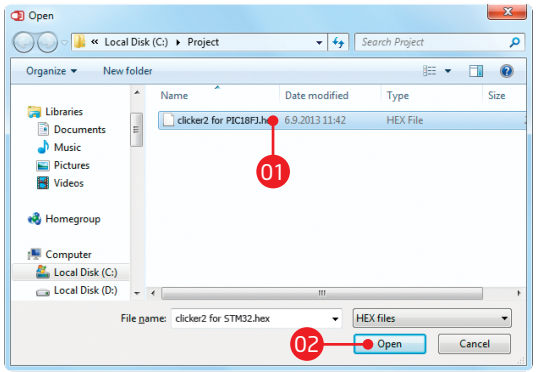


Figure 3-4: Selecting HEX

01 Select .HEX file using open dialog window.

02 Click the **Open** button.

step 4 - Uploading .HEX file

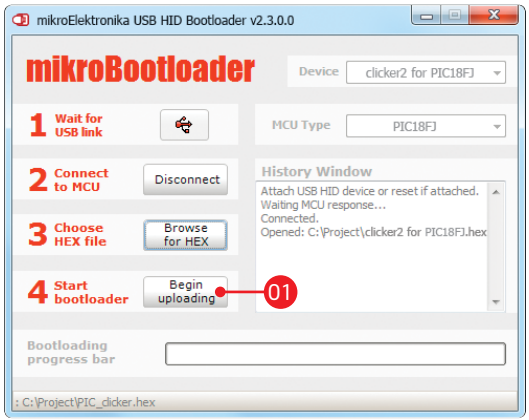


Figure 3-5: Begin uploading

01 To start .HEX file bootloading click the **Begin uploading** button.

Figure 3-6: Progress bar

01 Progress bar enables you to monitor .HEX file uploading.

step 5 - Finish upload

Figure 3-7: Restarting MCU

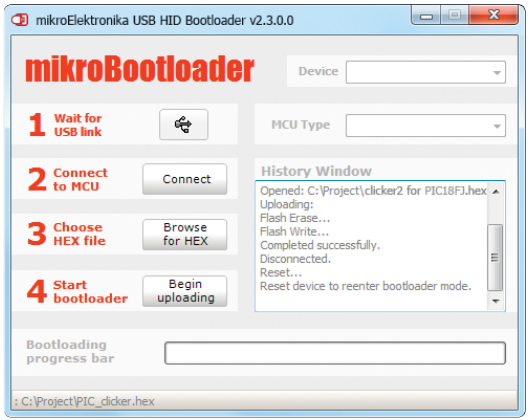


Figure 3-8: mikroBootloader ready for next job

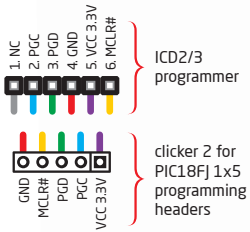
01 Click **OK** button after the uploading process is finished.

02 Press **Reset** button on clicker 2 for PIC18FJ board and wait for 5 seconds. Your program will run automatically.

3.2 Programming with mikroProg™ programmer

The microcontroller can be programmed with external **mikroProg™ for PIC programmer** and **mikroProg Suite™ for PIC® software**. The external programmer is connected to the development system via 1x5 connector **Figure 3-9. mikroProg™** is a fast USB 2.0 programmer with hardware debugger support. It supports PIC10®, dsPIC30/33®, PIC24® and PIC32® devices in a single programmer. It supports over 570 microcontrollers from Microchip®. Outstanding performance, easy operation and elegant design are its key features.

You can also program it with ICD2® or ICD3® if you reroute the wires like shown here.



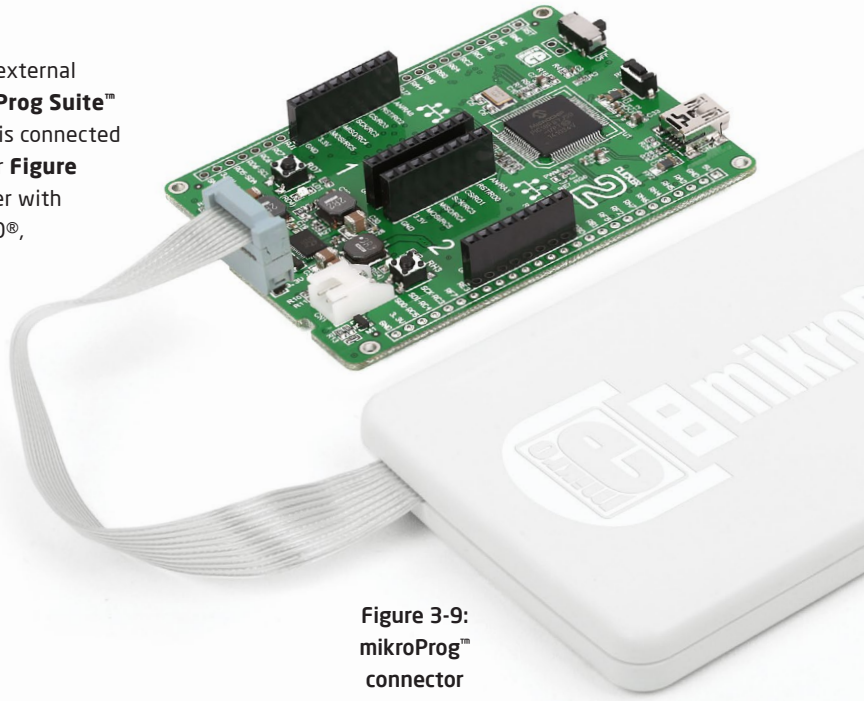


Figure 3-9: mikroProg™ connector

mikroProg Suite™ for PIC® software

mikroProg™ programmer requires special programming software called **mikroProg Suite™ for PIC®**. This software is used for programming of ALL Microchip® microcontroller families, including PIC10®, PIC12®, PIC16®, PIC18®, dsPIC30/33®, PIC24® and PIC32®. Software has intuitive interface and SingleClick™ programming technology. Just by downloading the latest version of **mikroProg Suite™** your programmer is ready to program new devices. **mikroProg Suite™** is updated regularly, at least four times a year, so your programmer will be more and more powerful with each new release.

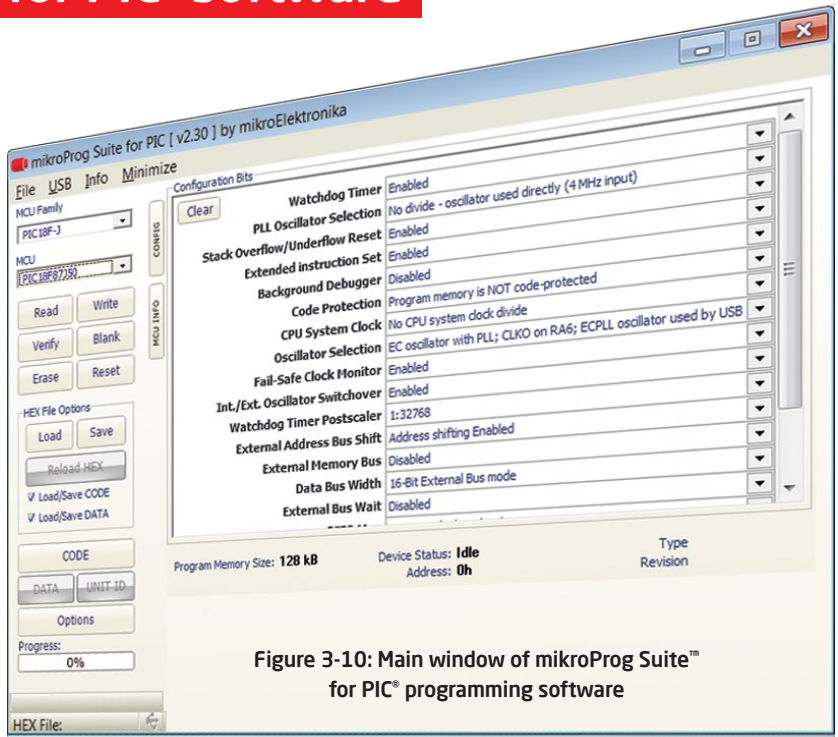


Figure 3-10: Main window of mikroProg Suite™ for PIC® programming software

NOTE | *Before attaching the programming connector, you have to solder the provided 1x5 male header to the programming pads (HD1).*

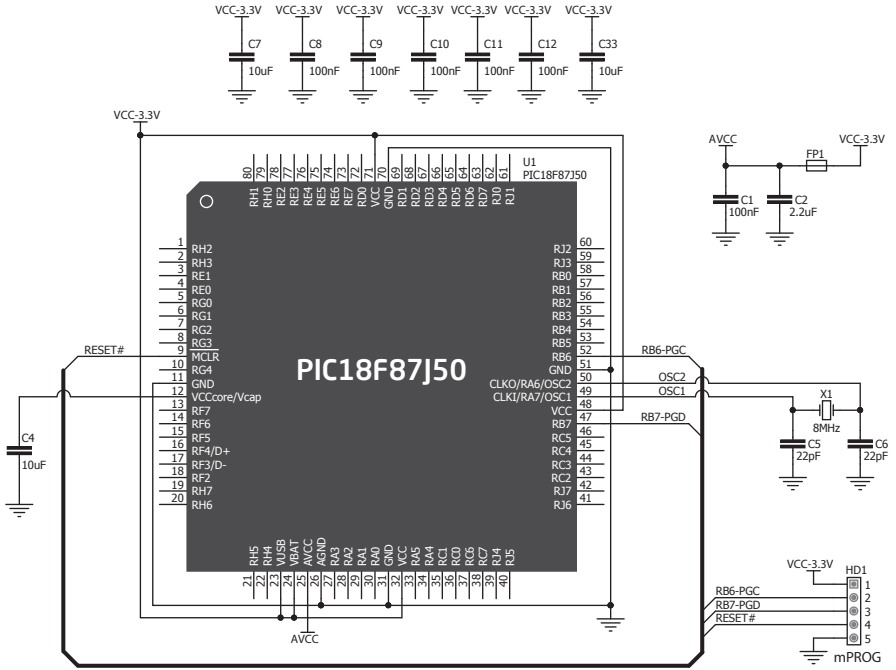


Figure 3-11: mikroProg™ connection schematic

4. Buttons and LEDs

The board also contains a 01 **reset button** and a pair of 02 **buttons** and 03 **LEDs,** as well as an ON/OFF switch. The **Reset button** is used to manually reset the microcontroller–it generates a low voltage level on the microcontroller's reset pin. **LEDs** can be used for visual indication of the logic state on two pins (**RD4** and **RE4**). An active LED indicates that a logic high (1) is present on the pin. Pressing any of the two **buttons** can change the logic state of the microcontroller pins (**RD7** and **RH3**) from logic high (1) to logic low (0). In addition to the onboard ON/OFF switch, two pads (EXT and PSW) allow you to connect your own external switch.

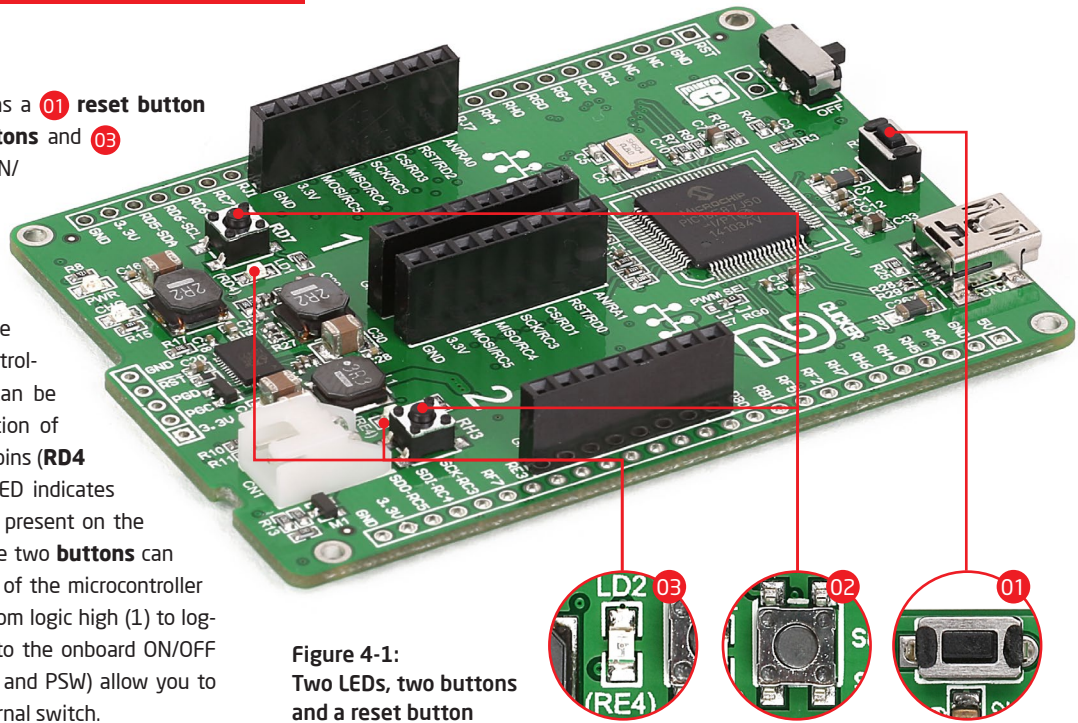


Figure 4-1:
Two LEDs, two buttons and a reset button

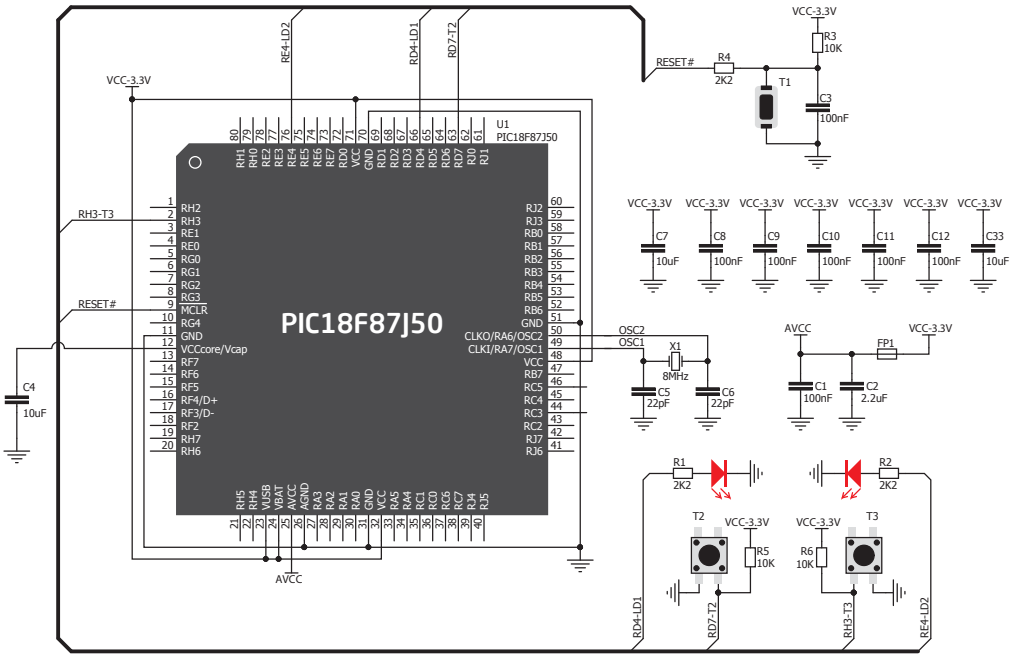
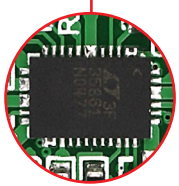


Figure 4-2: Other modules connection schematic

5. Power management and battery charger

clicker 2 for PIC18FJ features **LTC®3586-2**, a highly integrated power management and battery charger IC that includes a current limited switching PowerPath manager. LTC®3586 also **enables battery charging over a USB connection**.



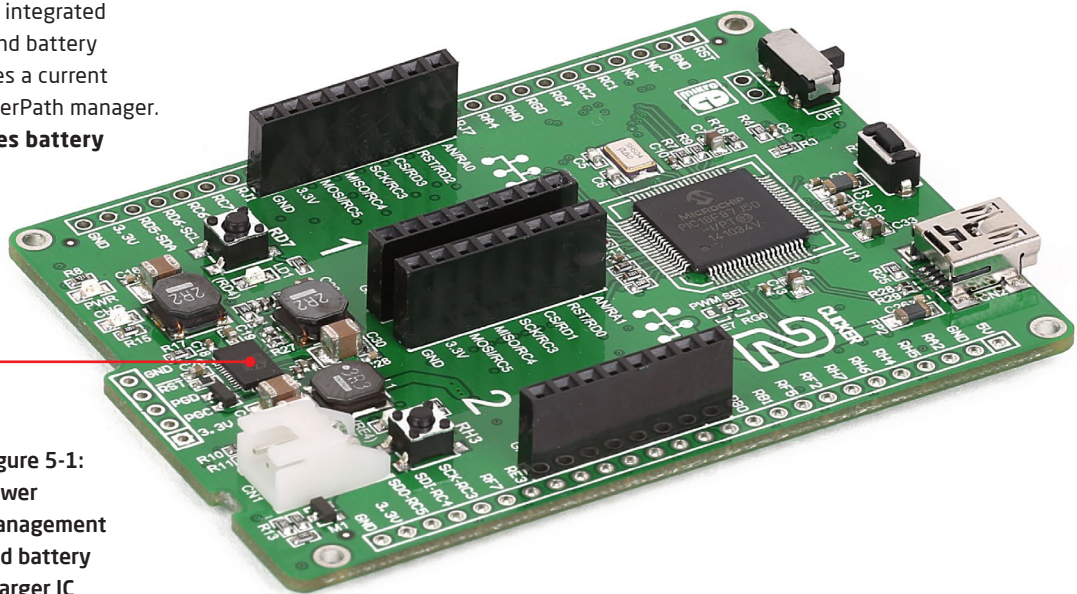


Figure 5-1: power management and battery charger IC

6. Oscillators

Board is equipped with **8MHz crystal oscillator (X1)** circuit that provides external clock waveform to the microcontroller **CLKO** and **CLKI** pins. This base frequency is suitable for further clock multipliers and ideal for generation of necessary USB clock, which ensures proper operation of bootloader and your custom USB-based applications.

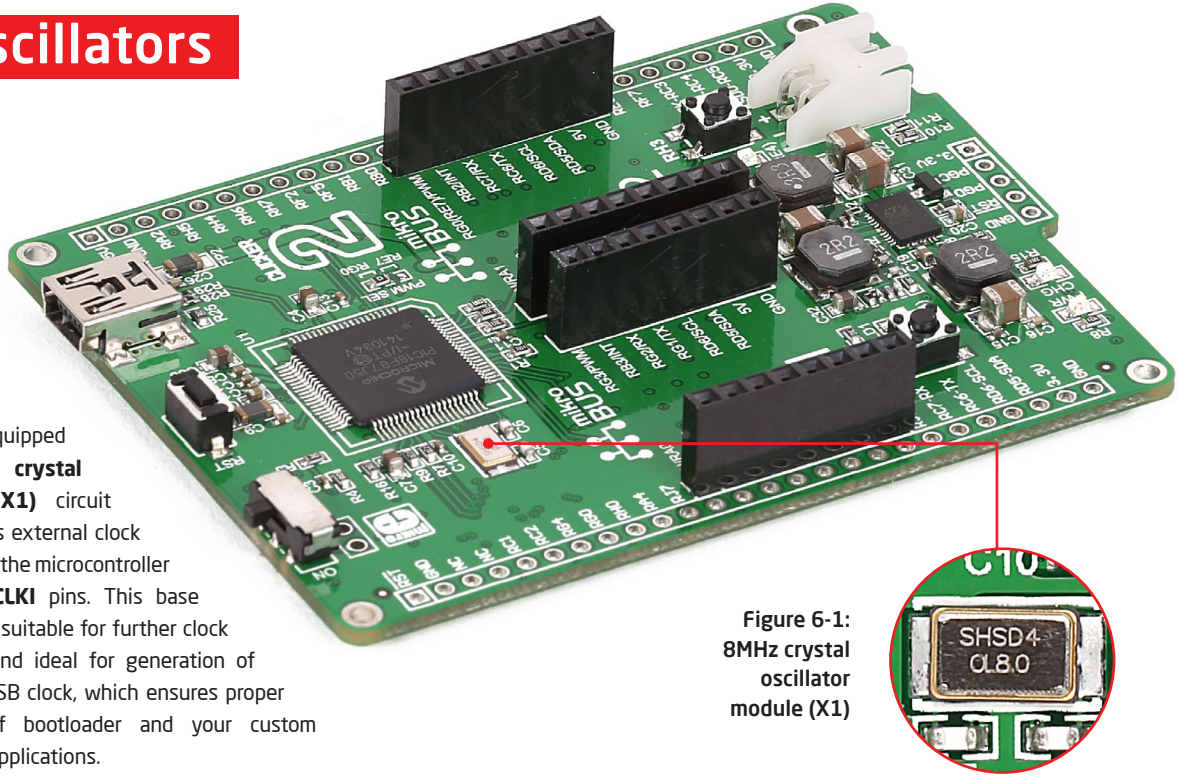


Figure 6-1: 8MHz crystal oscillator module (X1)

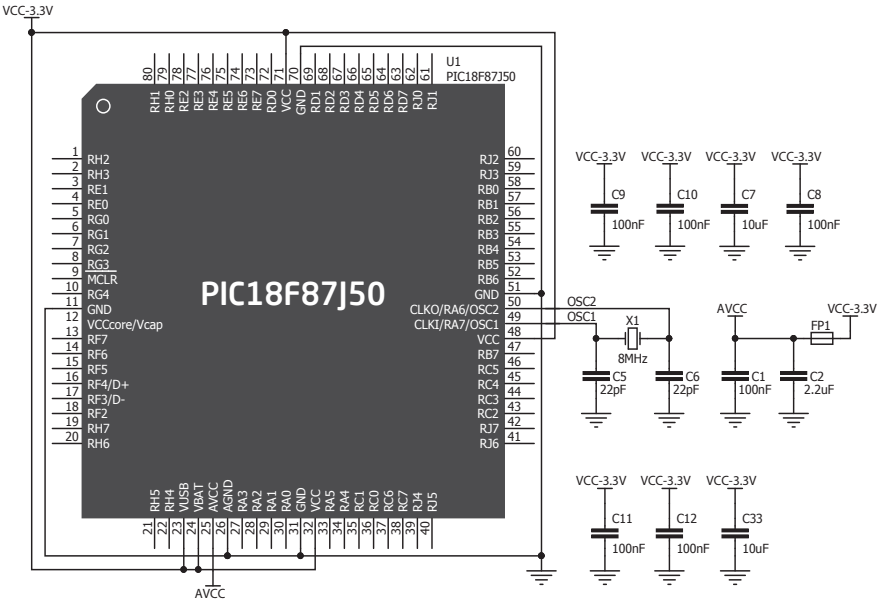


Figure 6-2: Crystal oscillator schematic

NOTE | *The use of crystal in all other schematics is implied even if it is purposely left out, because of the schematics clarity.*

7. USB connection

PIC18F87J50 microcontrollers has an integrated USB module, which enables you to implement USB communication functionality to your clicker 2 board. Connection with target USB host is done over a Mini-B USB connector which is positioned next to the battery connector.

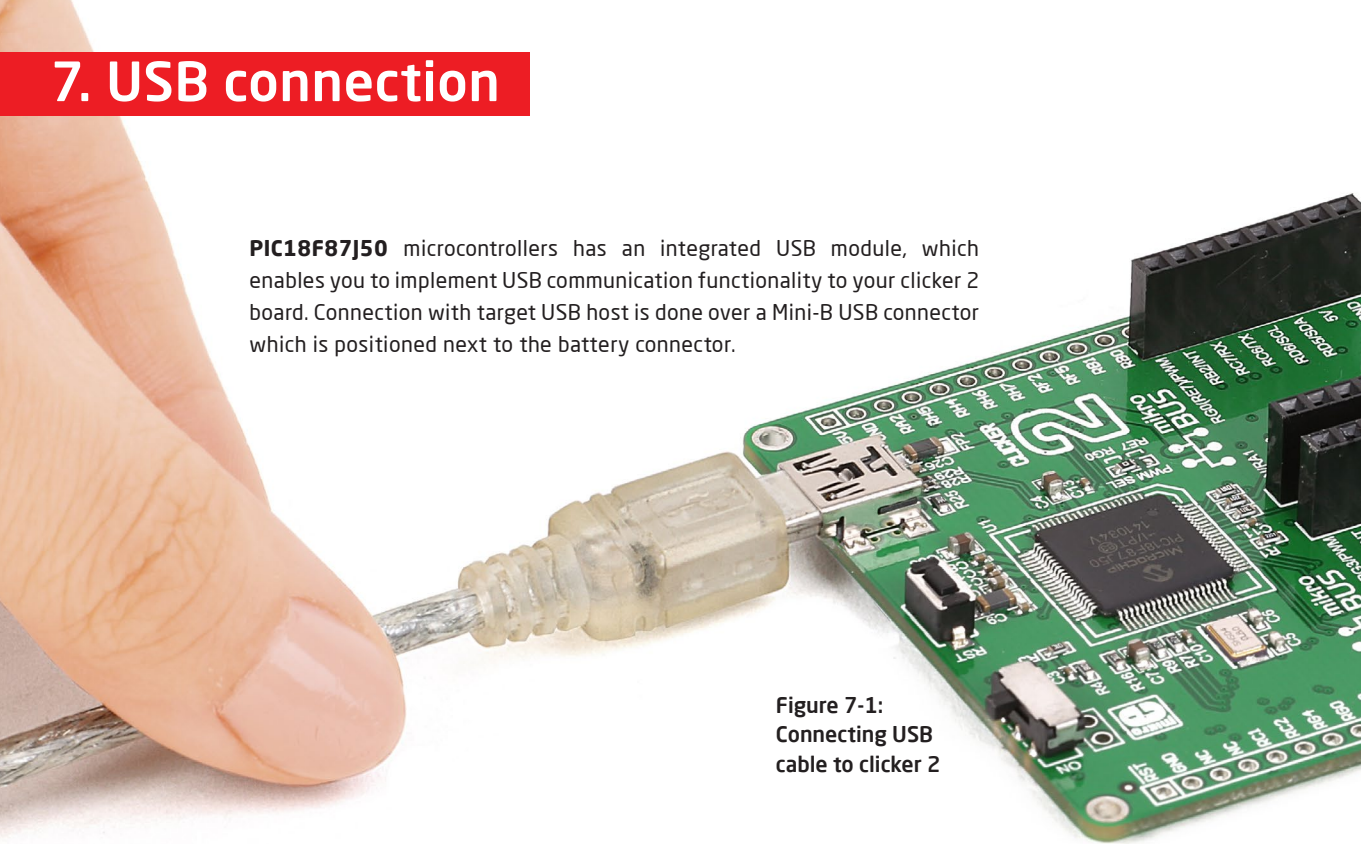


Figure 7-1: Connecting USB cable to clicker 2

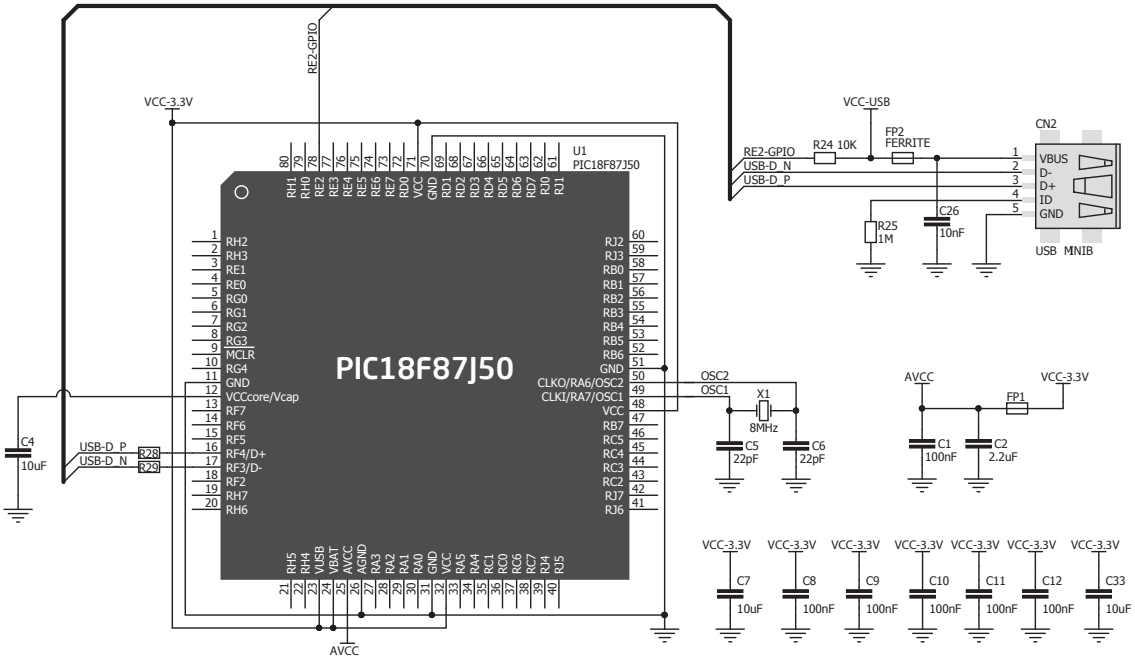
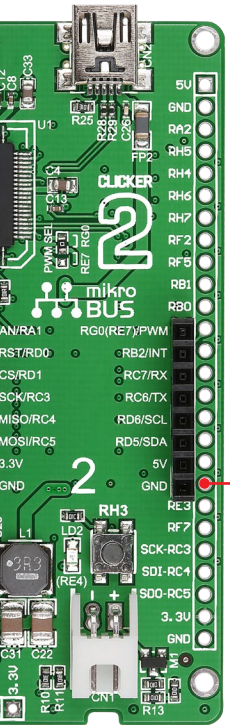
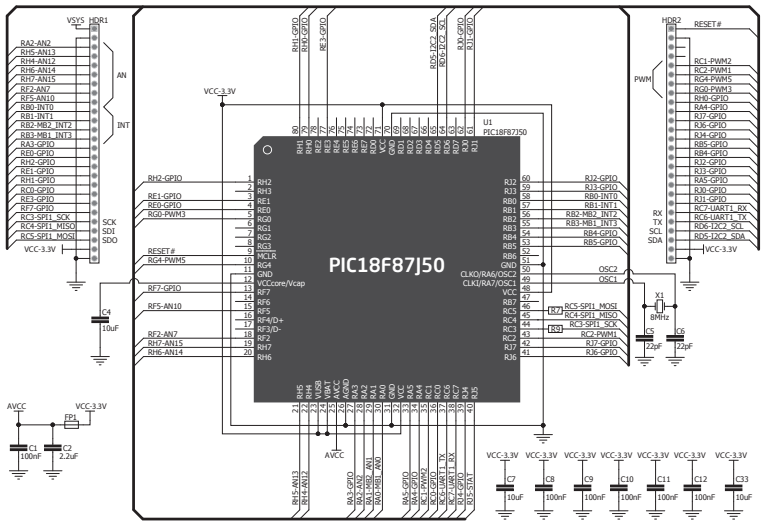


Figure 7-2: USB module connection schematic

8. Pads





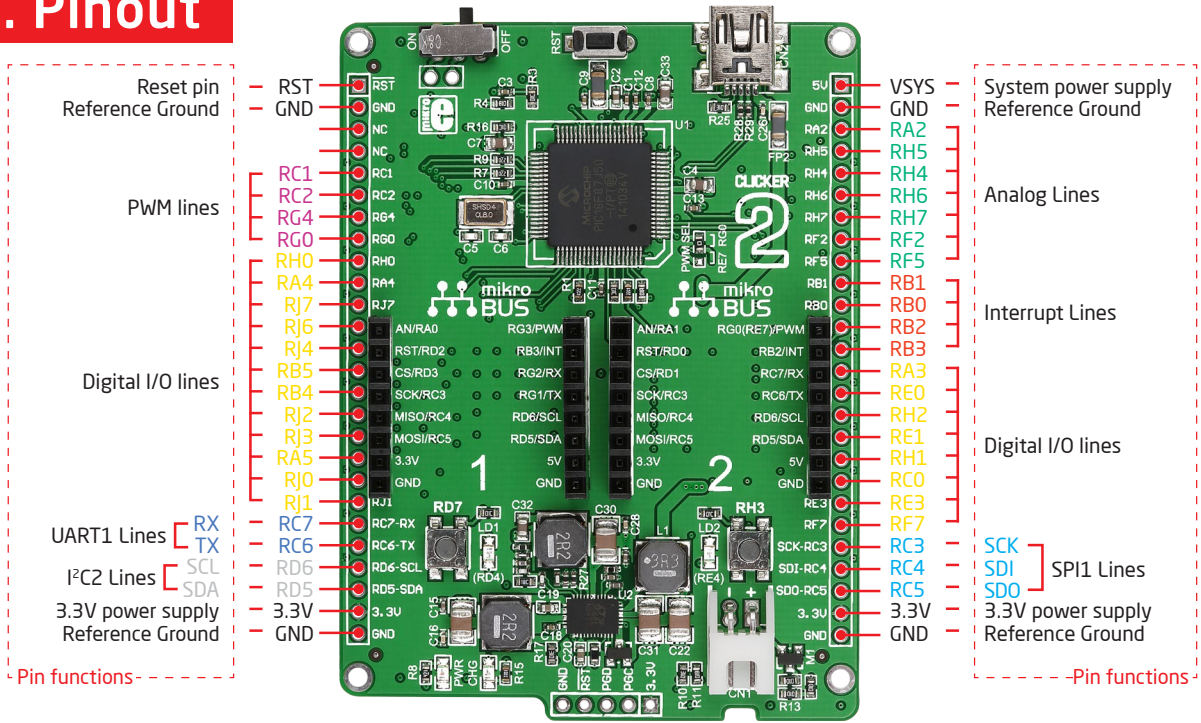
Pads HDR2

Figure 8-1: Connecting pads schematic

Pads HDR1

Most microcontroller pins are available for further connectivity via two 1x26 rows of connection pads on both sides of the clicker 2 for PIC18FJ board. They are designed to match additional shields, such as Battery Boost shield, Gaming, PROTO shield and others.

9. Pinout



Digital lines | Analog Lines | Interrupt Lines | SPI Lines | I2C Lines | UART lines | PWM lines

9.1 mikroBUS™ pinouts

clicker 2 for PIC18FJ employs a solution to optimize the use of available pins and MCU I/Os. The **PWM SEL jumper** (**Figure 9-2**) enables **two modes** of use for the second available PWM line:

1. The default position of the jumper is for applications when you're not using the PWM line on the 1x26 pinout on the right side of the board. This keeps this PWM available through mikroBUS™ 2

2. If you resolder the jumper into the second position, it would turn the PWM line on mikroBUS™ 2 into a GPIO. You would use this in scenarios where you already utilized the PWM through the 1x26 pinout (which would make the PWM pin on mikroBUS™ 2 unusable)

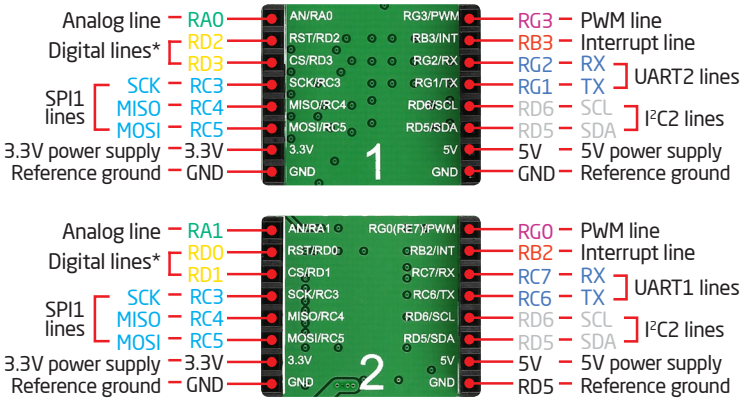


Figure 9-1: mikroBUS™ individual and shared lines

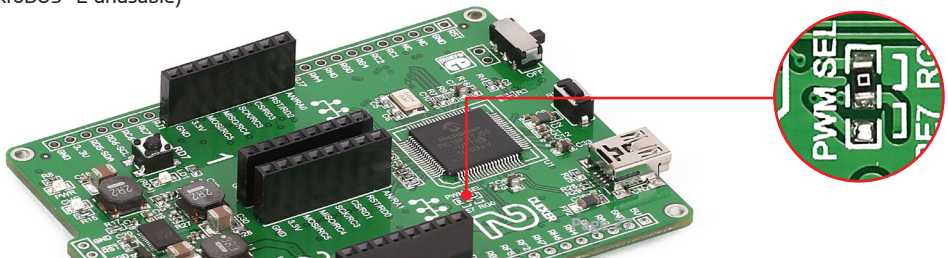


Figure 9-2: PWM SEL jumper

10. click boards™ are plug and play!

Up to now, MikroElektronika has released more than 90 mikroBUS™ compatible **click boards™**. On the average, one click board is released per week. It is our intention to provide you with as many add-on boards as possible, so you will be able to expand your development board with additional functionality. Each board comes with a set of working example code. Please visit the click boards™ webpage for the complete list of currently available boards:

www.mikroe.com/click

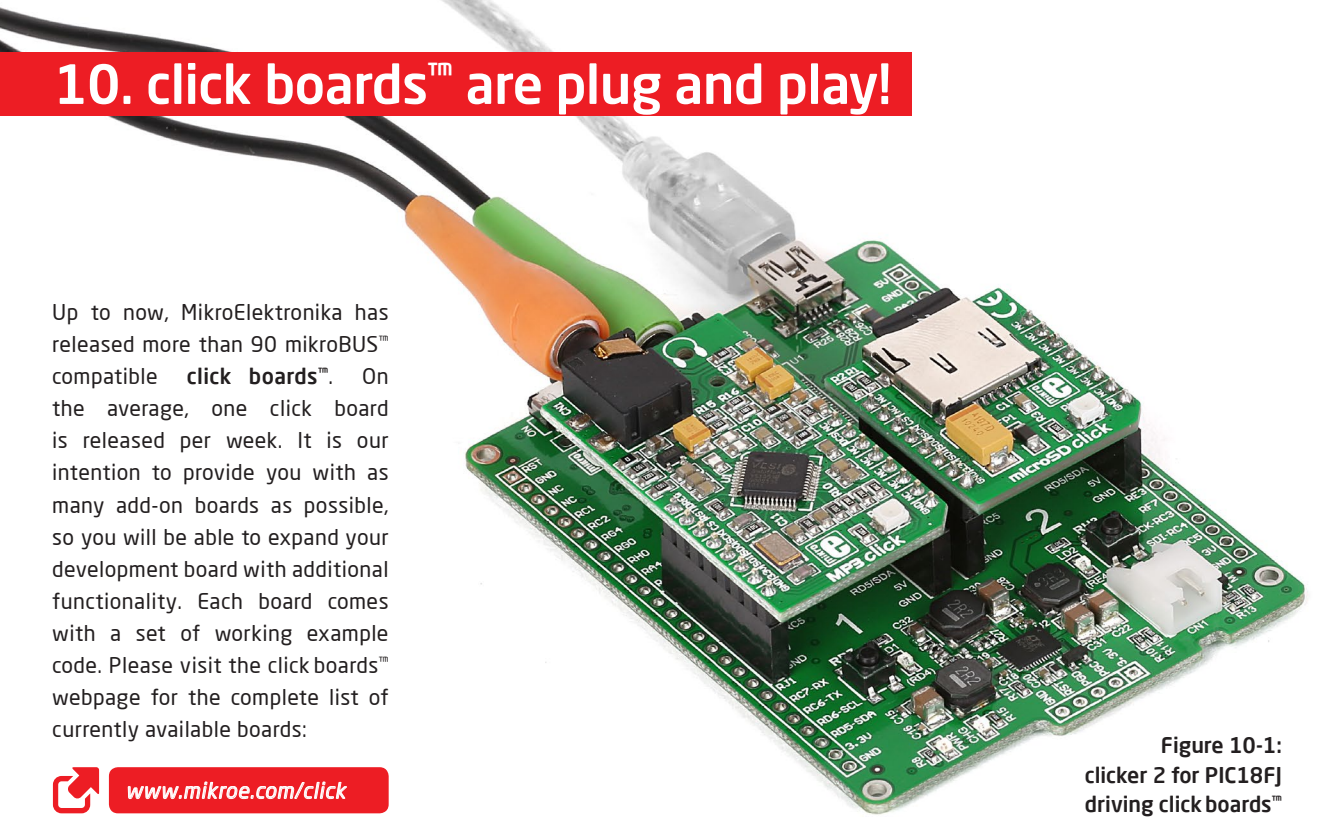
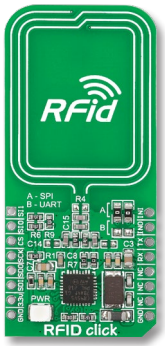
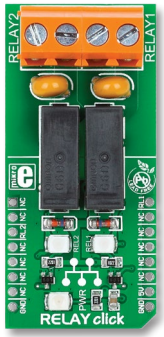


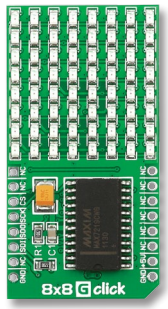
Figure 10-1: clicker 2 for PIC18FJ driving click boards™



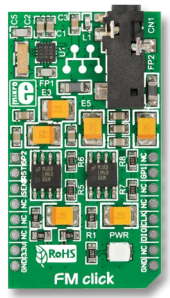
RFid click



Relay click

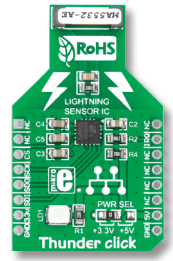


8x8 click

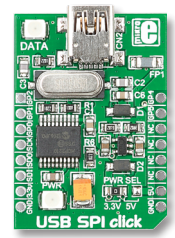


FM click

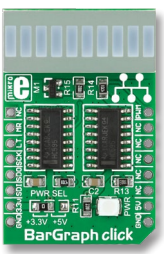
Bluetooth2 click



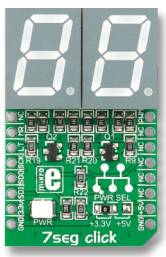
Thunder click



USB SPI click

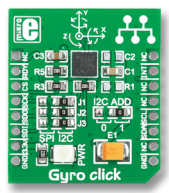


BarGraph click



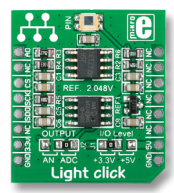
7seg click

THERMO click



Gyro click

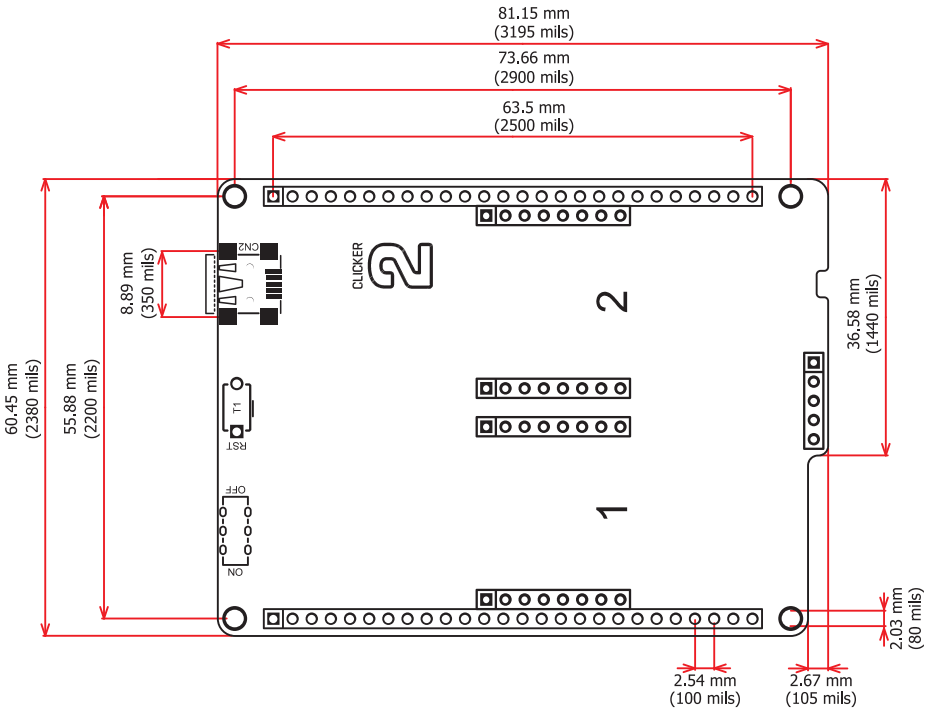
EEPROM click



LightHz click

Pressure click

11. Dimensions



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