

# CLICKER 2

PIC32MX

a fast click™ board two-seater

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

# 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.

A stylized, handwritten signature in white ink, consisting of several overlapping loops and a long horizontal stroke extending to the right.

Nebojsa Matic  
General Manager

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# Introduction to clicker 2 for PIC32MX

Clicker 2 for PIC32MX 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 PIC32MX460F512L, a 32-bit MIPS M4K core PIC32 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™ socket. 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, I<sup>2</sup>C, UART, RST, PWM, Analog and Interrupt lines as well as 3.3V, 5V and GND power lines. Clicker 2 for PIC32MX board can be powered over a USB cable.



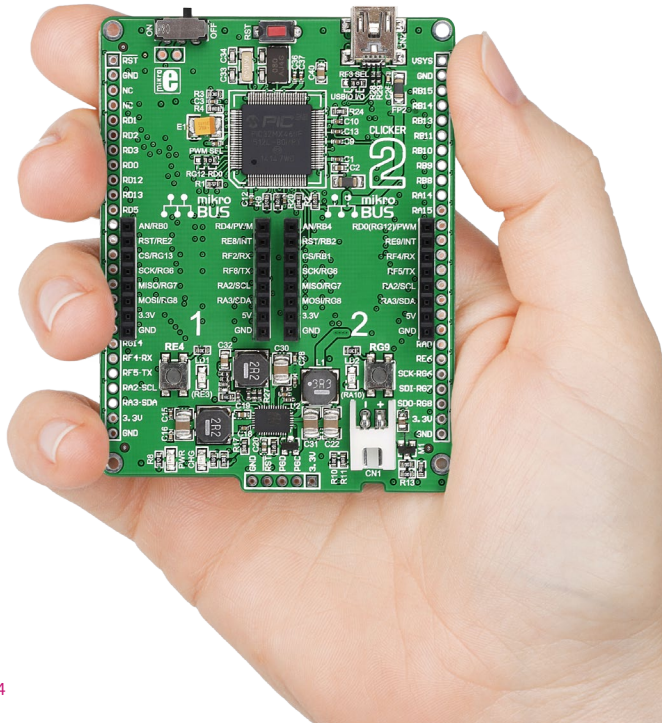
power supply  
via USB cable  
(5V DC)



board dimensions  
60.4 x 81 mm  
(2.4 x 3.2 inch)

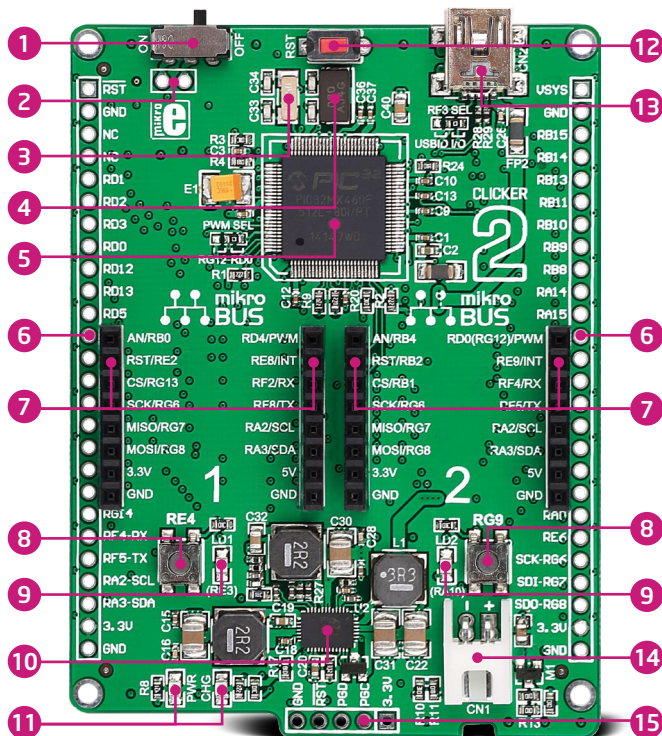


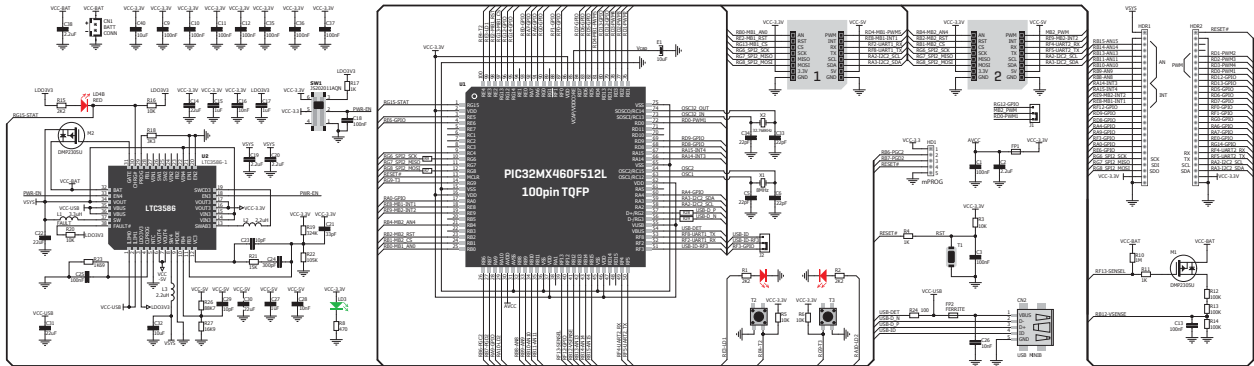
weight  
26 g (0.057 lbs)



# Key features

- 1 ON/OFF switch
- 2 Pads for connecting external ON/OFF switch
- 3 32.768 KHz crystal oscillator
- 4 8 MHz crystal oscillator
- 5 PIC32MX460F512L
- 6 2x26 connection pads
- 7 mikroBUS™ sockets 1 and 2
- 8 Pushbuttons
- 9 Additional LEDs
- 10 LTC3586-1 USB power manager IC
- 11 Power and Charge indication LEDs
- 12 RESET button
- 13 USB mini-B connector
- 14 Li-Polymer battery connector
- 15 Programmer connector

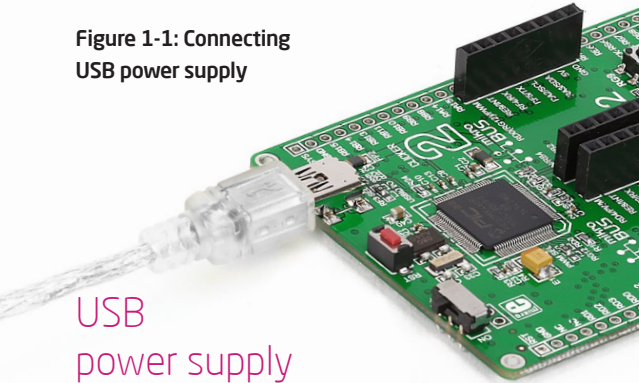




clicker 2 for PIC32MX schematic

# 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.

**NOTE** | *click™ boards that use a 3.3V power supply can draw up to 750 mA of current, which is more current than a USB can supply (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.*

## 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



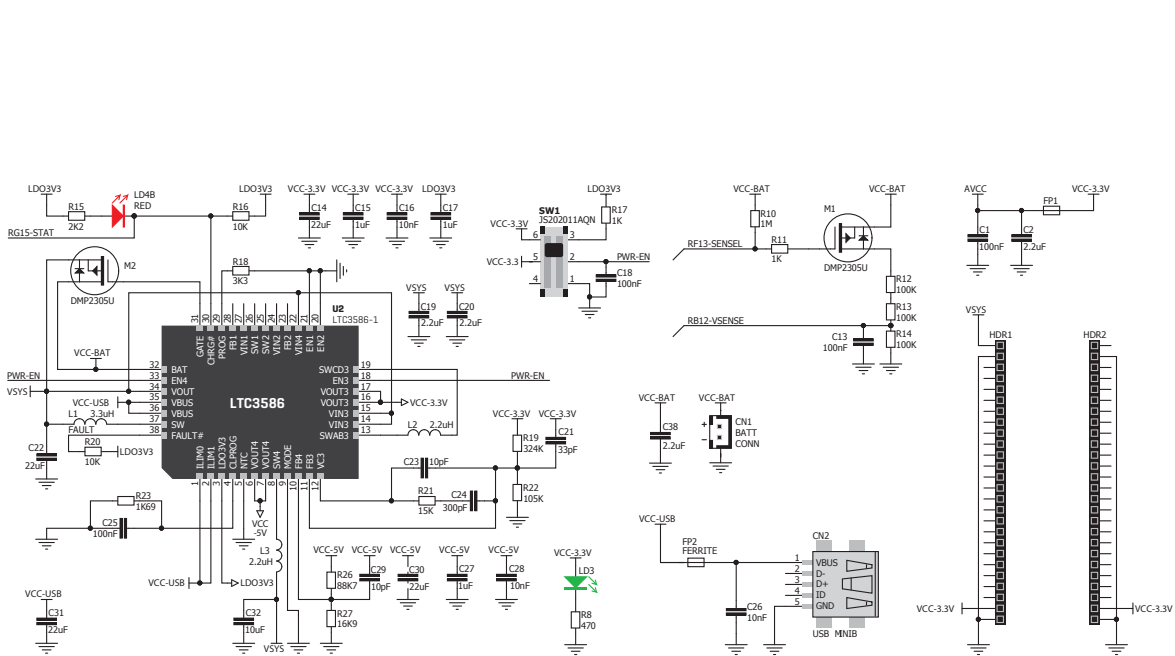


Figure 1-3: Power supply schematic

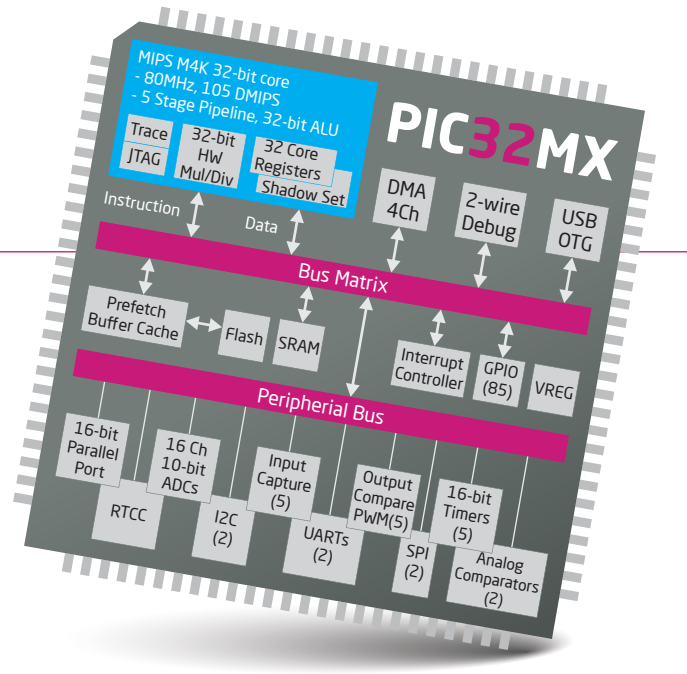


## 2. PIC32MX460F512L microcontroller

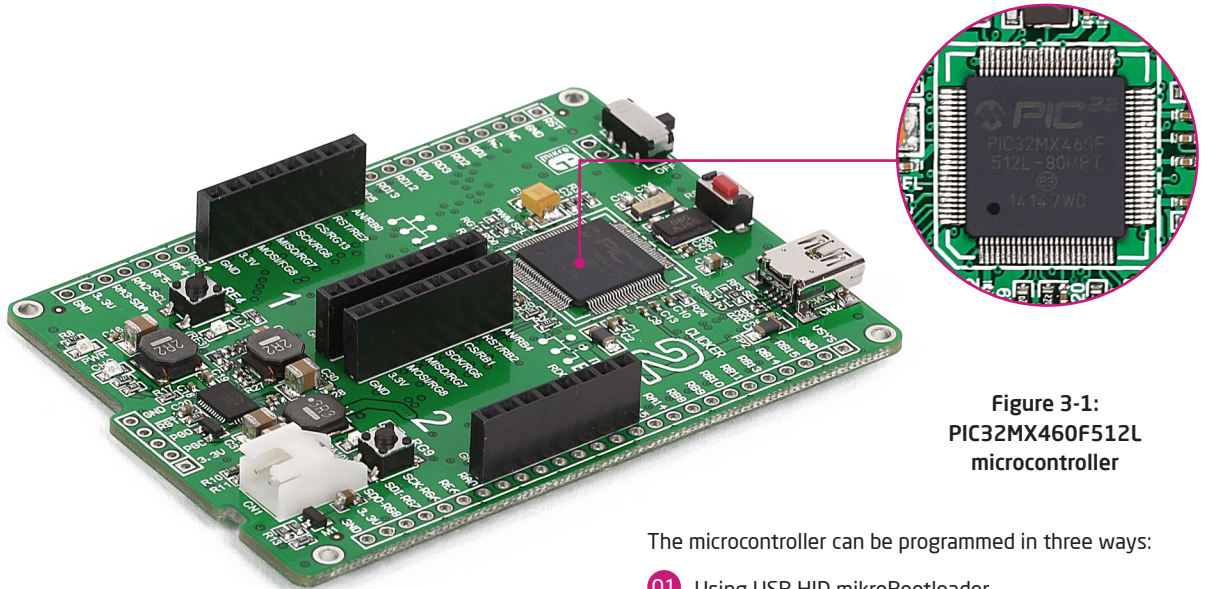
The PIC32MX clicker development tool comes with the **PIC32MX460F512L** microcontroller. This 32-bit MIPS M4K Core high performance microcontroller is rich with on-chip peripherals and features 512KB of Flash and 32KB RAM. It has integrated full speed USB 2.0. support.

### Key microcontroller features

- 105 DMIPS/ 80MHz, 32-bit MIPS M4K Core;
- 512K Flash (plus 12K boot Flash);
- 32K RAM (can execute from RAM);
- 85 I/O pins;
- SPI, I<sup>2</sup>C, A/D, UART;
- 16-bit, 32-bit Digital Timers;
- Internal Oscillator 8MHz, 32kHz;
- RTCC; etc.



# 3. Programming the microcontroller



**Figure 3-1:**  
**PIC32MX460F512L**  
**microcontroller**

The microcontroller can be programmed in three ways:

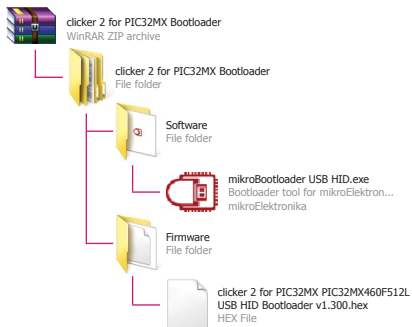
- 01** Using USB HID mikroBootloader,
- 02** Using external mikroProg™ for PIC32MX programmer
- 03** Using external ICD2/3® programmer

# 3.1 Programming with mikroBootloader

You can program the microcontroller with 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:

➔ [www.mikroe.com/downloads/get/2210/clicker\\_2\\_pic32mx\\_bootloader\\_v100.zip](http://www.mikroe.com/downloads/get/2210/clicker_2_pic32mx_bootloader_v100.zip)

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



## step 1 – Connecting PIC32MX clicker



Figure 3-2: USB HID mikroBootloader window

**01** To start, connect the USB cable, or if already connected press the **Reset** button on your PIC32MX clicker. 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

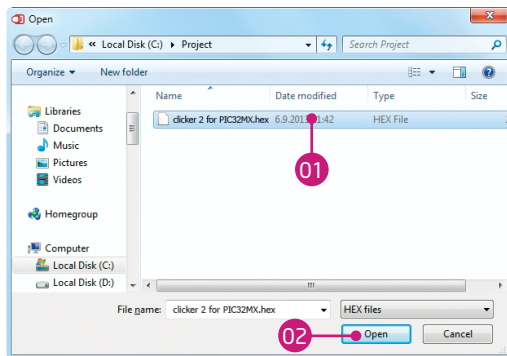


Figure 3-4: Selecting HEX

- 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

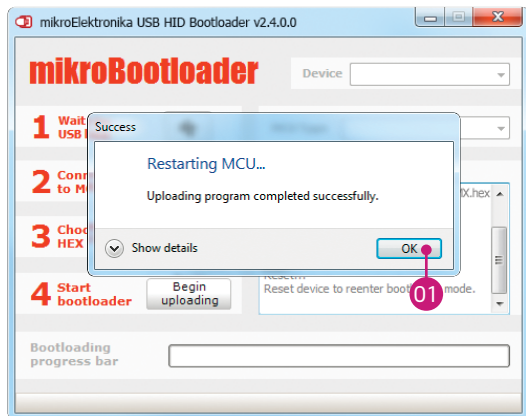


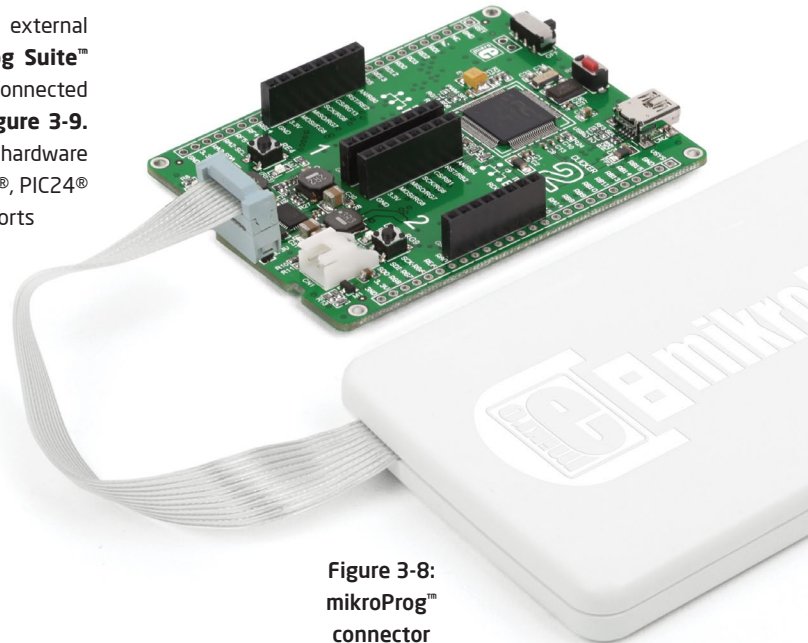
Figure 3-7: Restarting MCU

- 01 Click **OK** button after the uploading process is finished.
- 02 Press **Reset** button on PIC32MX clicker board and wait for 5 seconds. Your program will run automatically.

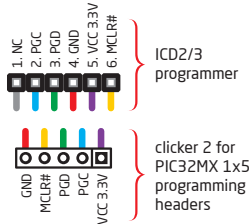


## 3.2 Programming with mikroProg™ programmer

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 3-8:**  
mikroProg™  
connector

# mikroProg Suite™ for PIC® Software



The **mikroProg™** programmer requires special programming software called **mikroProg Suite™ for PIC®**. It can be used for programming all Microchip® microcontroller families, including PIC10®, PIC12®, PIC16®, PIC18®, dsPIC30/33®, PIC24® and PIC32®. The software has intuitive interface and SingleClick™ programming technology. Just download the latest version of **mikroProg Suite™** and 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.

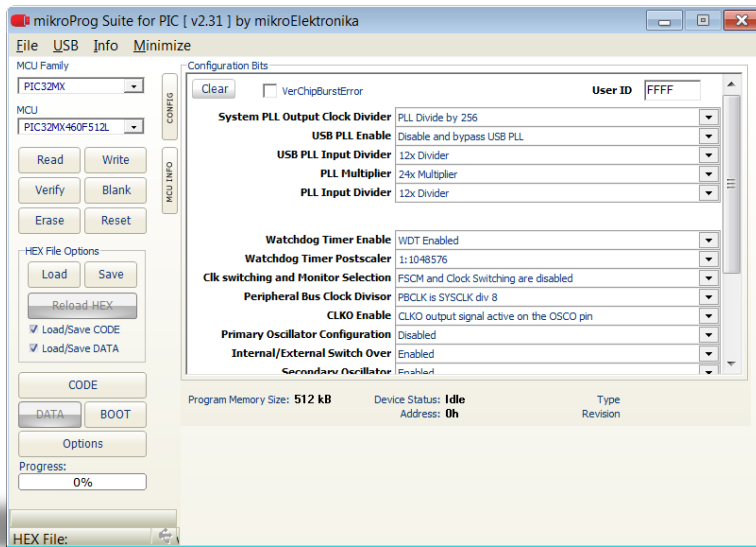


Figure 3-9: Main window of mikroProg Suite™ for PIC® programming software



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

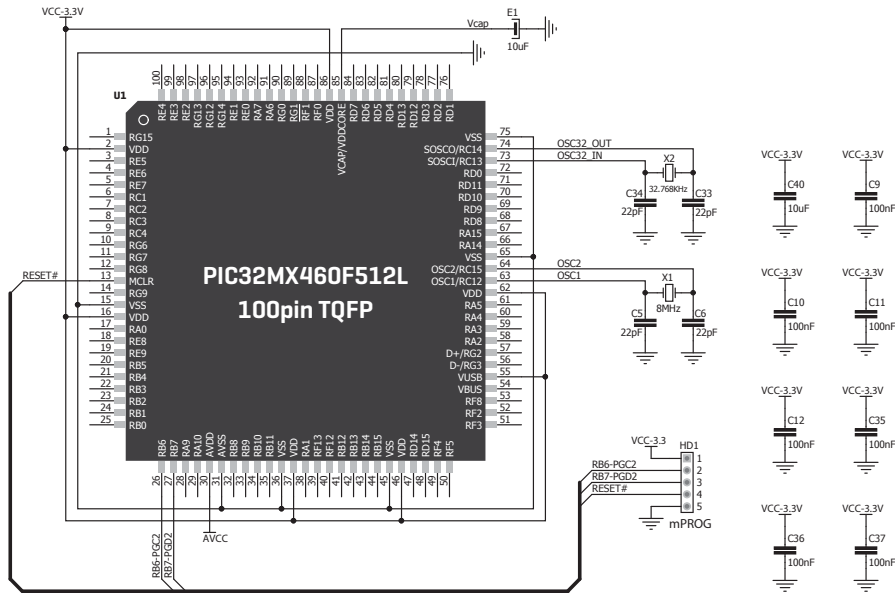
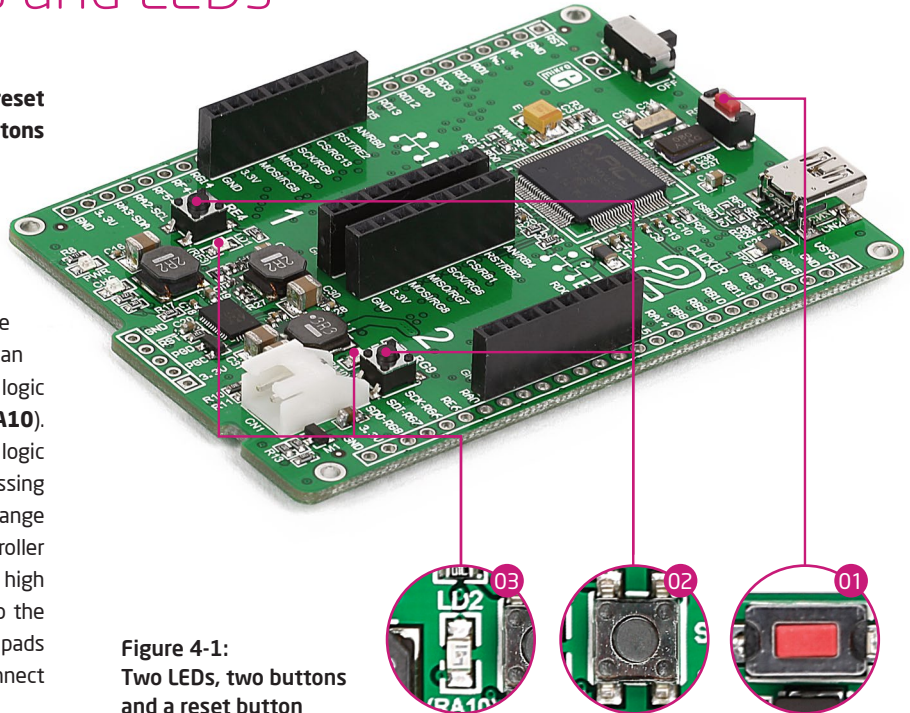


Figure 3-10: mikroProg™ connection schematic

# 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 by generating a low voltage level on the microcontroller's reset pin. **LEDs** can be used for visual indication of the logic state on two pins (**RE3**) and (**RA10**). 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 (**RE4** and **RG9**) 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



# 5. Power management and battery charger

Clicker 2 for PIC18FJ features

**LTC®3586-1**, 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**.

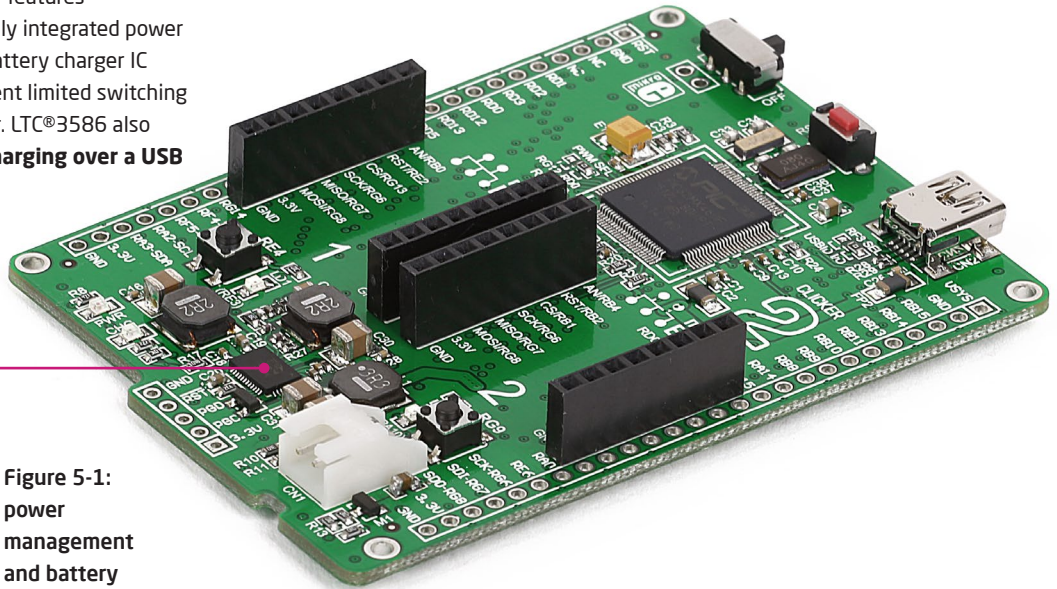
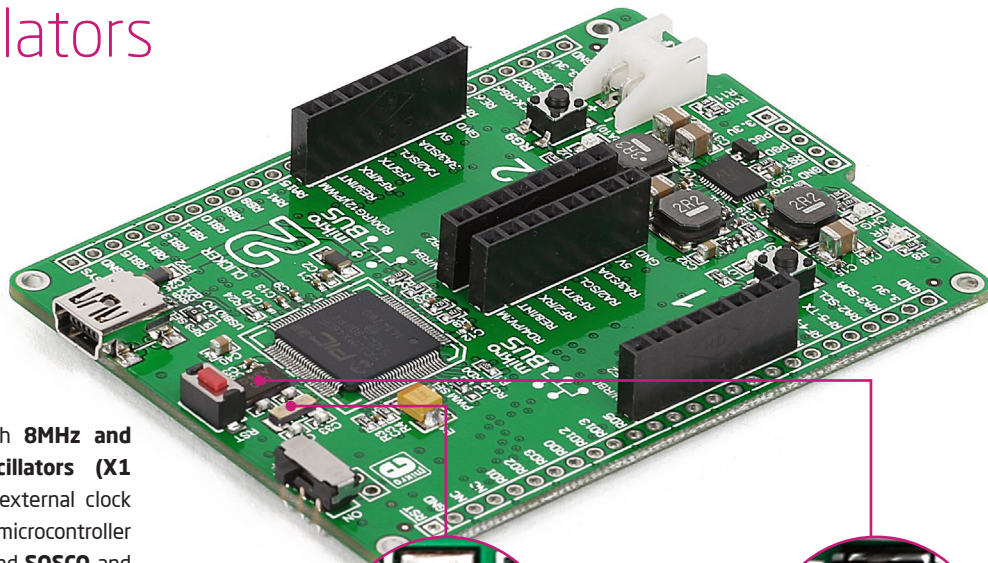


Figure 5-1:  
power  
management  
and battery  
charger IC

## 6. Oscillators



Board is equipped with **8MHz** and **32.7kHz crystal oscillators (X1 and X2)** that provide external clock waveforms to the microcontroller **OSC2** and **OSC1** (X1) and **SOSCO** and **SOSCI** (X2) 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:  
32.768kHz  
crystal  
oscillator  
module (X2)

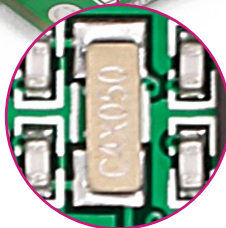
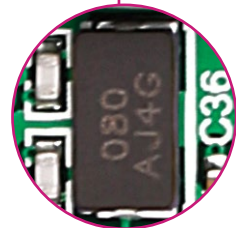
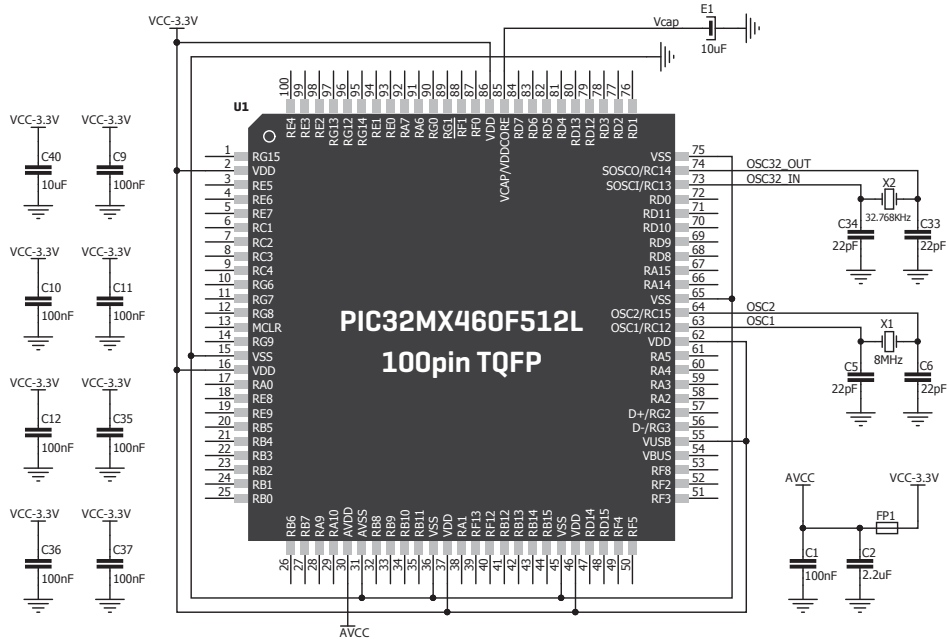


Figure 6-2:  
8MHz  
crystal  
oscillator  
module (X1)



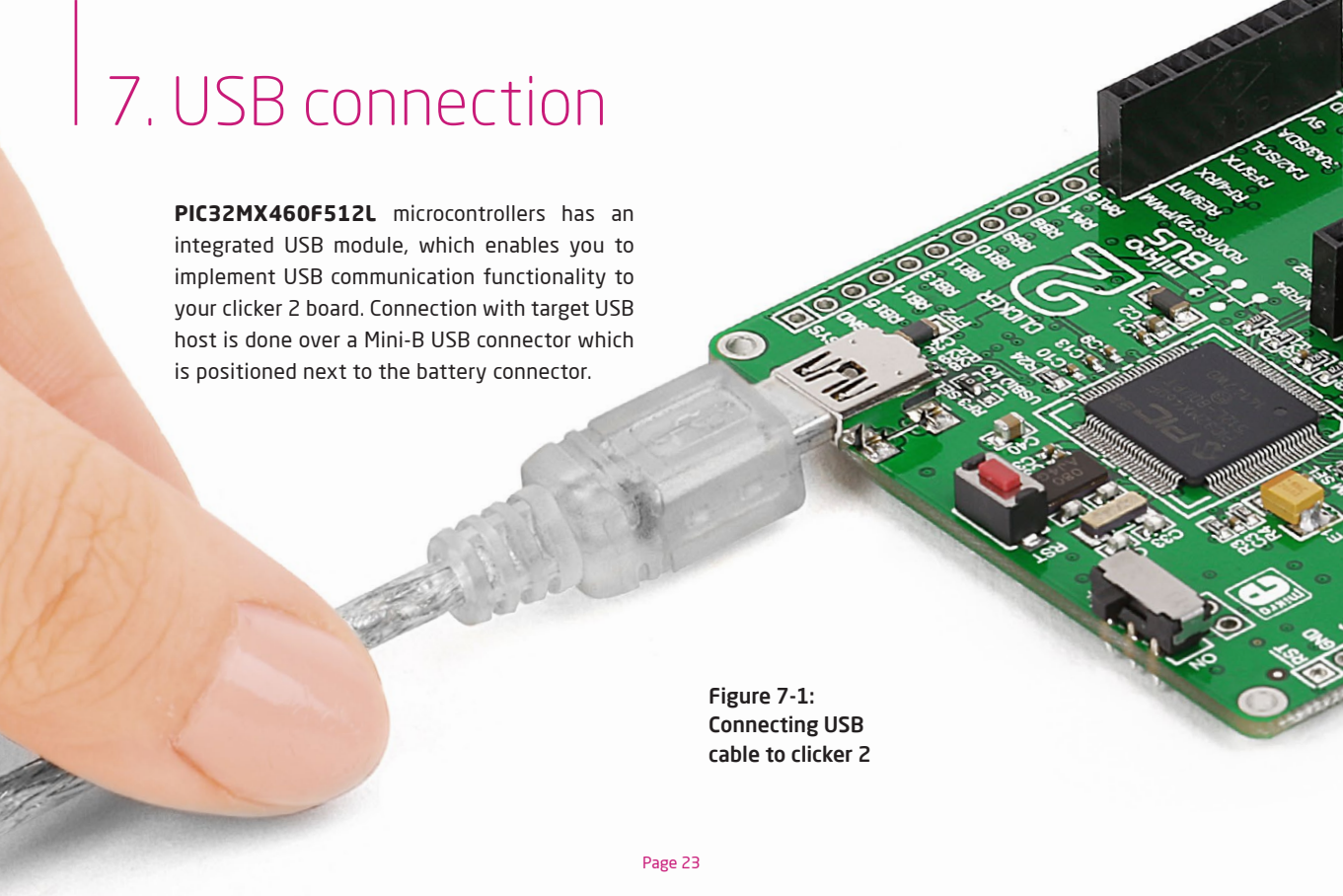


**NOTE** | The use of crystal in all other schematics is implied even if it is purposely left out, because of the schematics clarity.

**Figure 6-3:**  
Crystal oscillator schematic

## 7. USB connection

**PIC32MX460F512L** 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

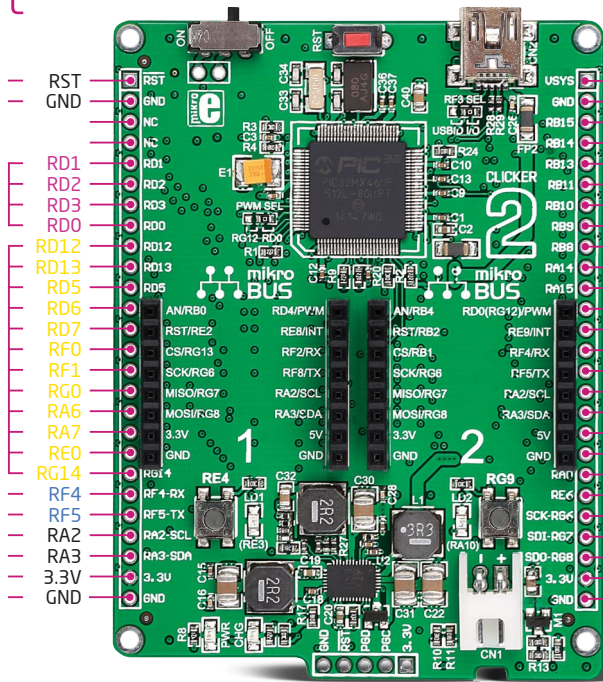






# 9. Pinout

- Reset pin
- Reference Ground
- PWM lines
- Digital I/O lines
- UART1 Lines
- I<sup>2</sup>C Lines
- 3.3V power supply
- Reference Ground



- System power supply
- Reference Ground
- Analog Lines
- Interrupt Lines
- Digital I/O lines
- SPI Lines
- 3.3V power supply
- Reference Ground

■ Digital lines  
 ■ Analog Lines  
 ■ Interrupt Lines  
 ■ SPI Lines  
 ■ I<sup>2</sup>C Lines  
 ■ UART lines  
 ■ PWM lines

# 9.1 PWM jumper selection

Clicker 2 for PIC32MX 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)

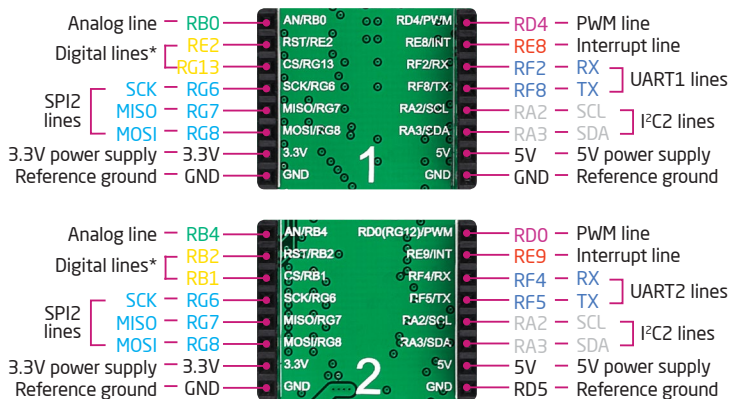


Figure 9-1: mikroBUS™ individual and shared lines

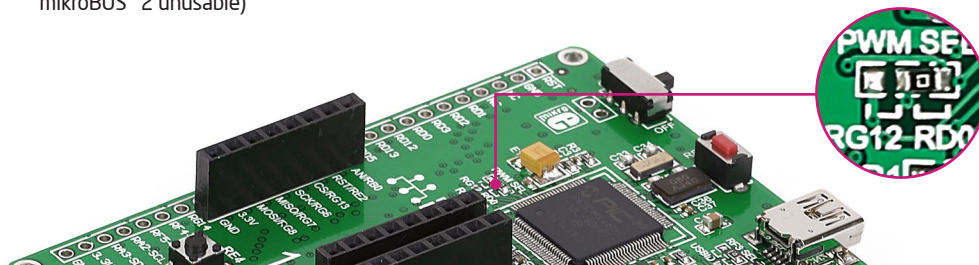
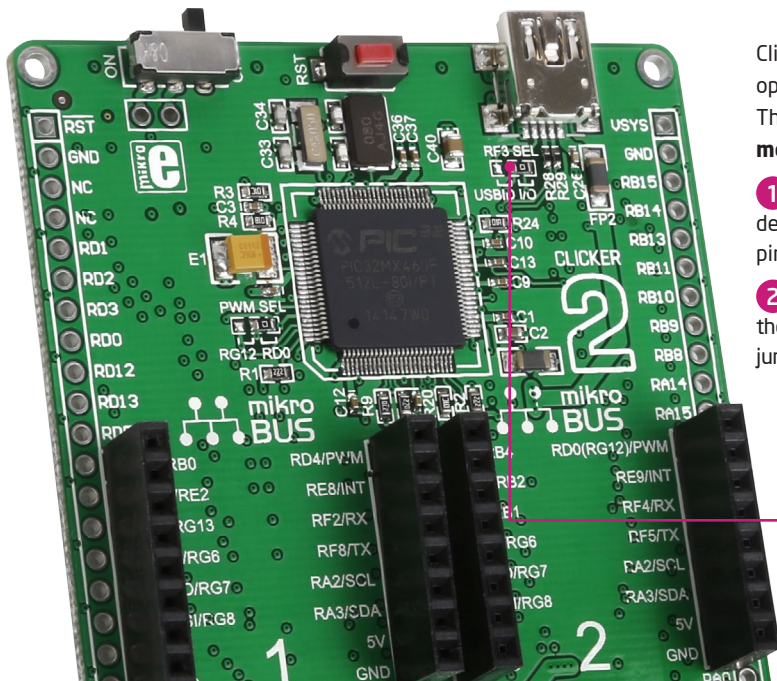


Figure 9-2: PWM SEL jumper

## 9.2 RF3/USBID Jumper selection



Clicker 2 for PIC32MX 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 To use RF3 as a GPIO, keep the jumper in the default position (connected to the corresponding pin on the 1x26 connection pad, see page 26)
- 2 To connect the RF3 MCU pin to USB-ID (one of the four pins on the USB port), resolder the RF3 SEL jumper (zero-ohm resistor) to the other position.

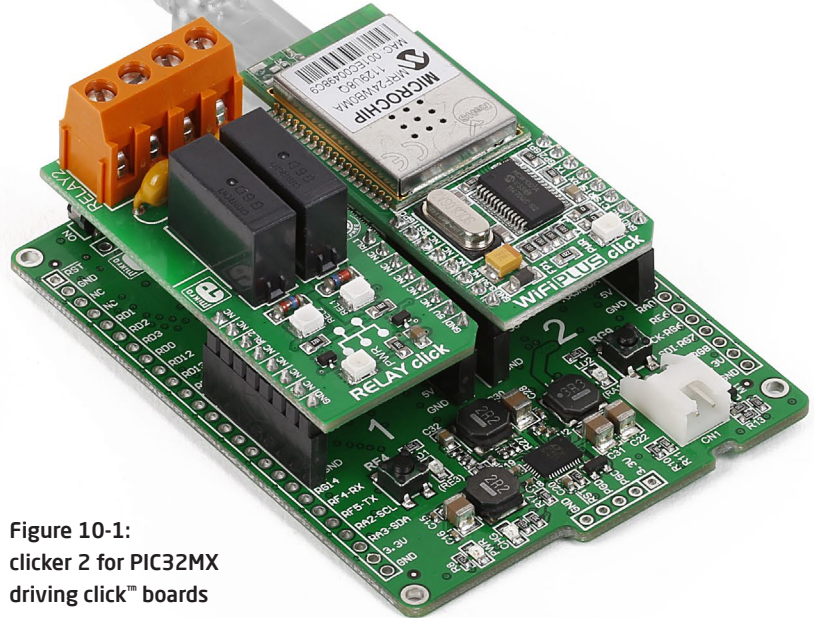


Figure 9-3:  
RF3/USBID jumper

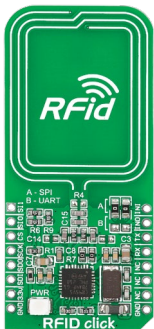
# 10. click™ boards are plug and play!

Up to now, MikroElektronika has released more than a 100 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:

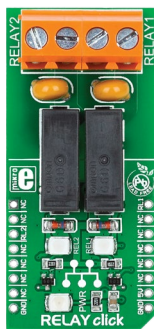
[www.mikroe.com/click](http://www.mikroe.com/click)



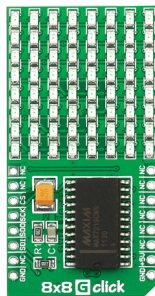
**Figure 10-1:**  
clicker 2 for PIC32MX  
driving click™ boards



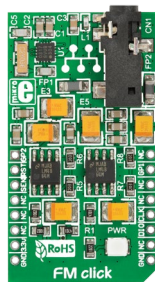
RFID click™



Relay click™



8x8 click™



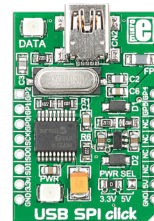
FM click™



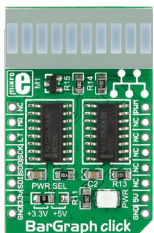
Bluetooth2 click™



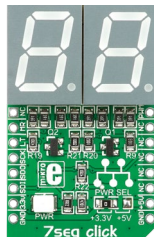
Thunder click™



USB SPI click™



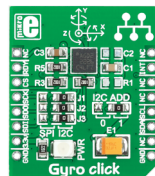
BarGraph click™



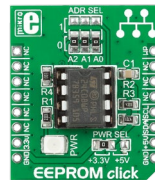
7seg click™



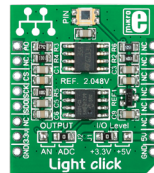
THERMO click™



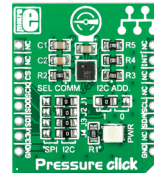
Gyro click™



EEPROM click™

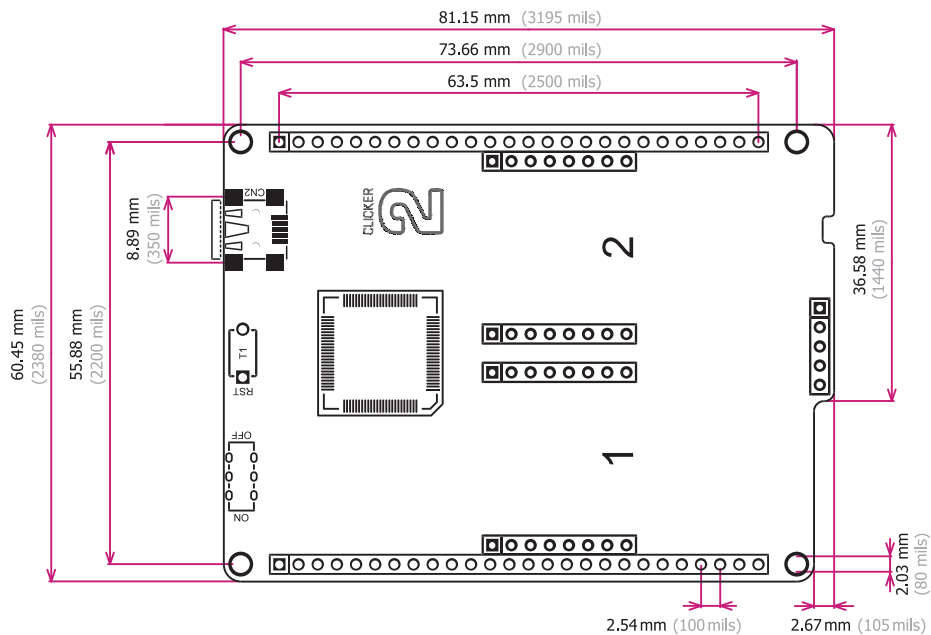


Light click™



Pressure click™

# 11. Dimensions



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If you have any questions, comments or business proposals, do not hesitate to contact us at **[office@mikroe.com](mailto:office@mikroe.com)**

Clicker 2 for PIC32MX manual  
ver 1.02



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