

# 

A compact starter kit with your favorite microcontroller and a socket for click<sup>™</sup> add-on boards. New ideas are just a click away.





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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

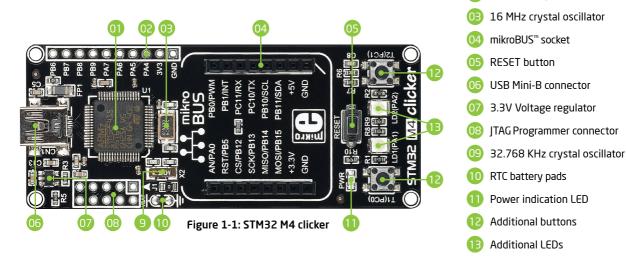
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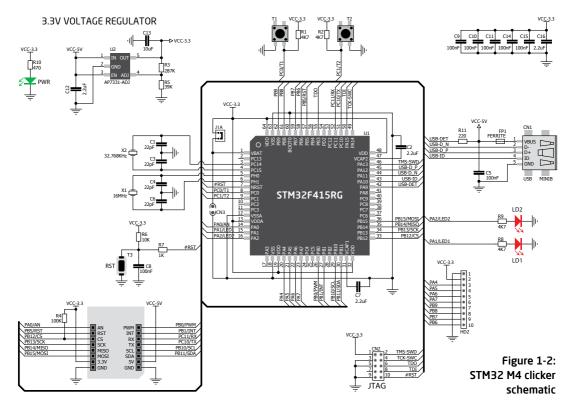
# 1. What is STM32 M4 clicker?



**STM32 M4 clicker** is an amazingly compact starter development kit which brings the innovative mikroBUS<sup>TM</sup> socket to your favorite microcontroller. It features **STM32F415RG**, a 32-bit ARM® Cortex®-M4 microcontroller, two indication LEDs, two general purpose buttons, a reset button, a USB Mini-B connector and a single mikroBUS<sup>TM</sup> socket. A JTAG connector and pads for interfacing with external electronics are provided as well. The mikroBUS<sup>TM</sup> 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. **STM32 M4 clicker** board can be powered over a USB cable.

64-pin STM32F415RG MCU

Connection pads



# 2. Power supply

Figure 2-1: Connecting USB power supply through CN1 connector

When the board is powered up the power indication LED will be automatically turned on. The USB connection can provide up to 500mA of current which is more than enough for the operation of all on-board and additional modules.

### **3.3V VOLTAGE REGULATOR**

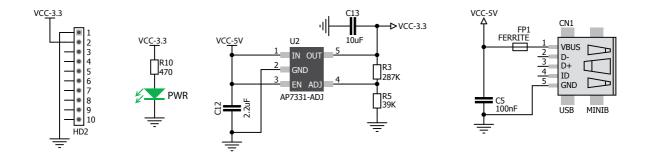


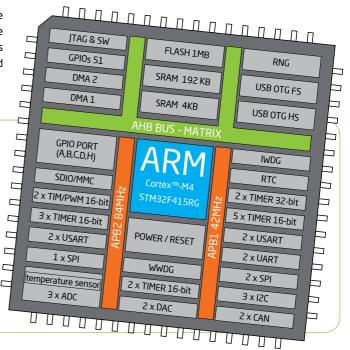
Figure 2-2: Power supply schematic

# 3. STM32F415RG microcontroller

The STM32 M4 clicker development tool comes with the **STM32F415RG** microcontroller. This 32-bit high performance microcontroller is rich with on-chip peripherals and features 1024KB of Flash and 192KB of SRAM. It has integrated full speed USB 2.0. support.

### **Key microcontroller features**

- Up to 168 MHz operation
- 32-bit ARM® Cortex®-M4 architecture
- 1024KB of Flash memory
- 192KB SRAM
- 64 pin LQFP
- 3x 16 ch, 12-bit ADC
- USB 2.0, UART, RTC, SPI, I<sup>2</sup>C, etc.



### 4. Programming the microcontroller

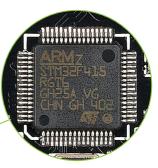


Figure 4-1: STM32F415RG microcontroller

The microcontroller can be programmed in two ways:



Using USB HID mikroBootloader,

Using external mikroProg<sup>™</sup> for STM32 programmer.

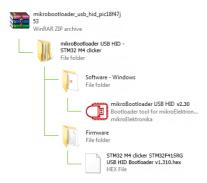
# Programming with mikroBootloader

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:



www.mikroe.com/downloads/get/2144/ mikrobootloader usb hid STM32F415RG.zip

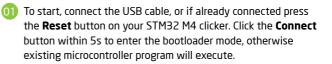
After the mikroBootloader software is downloaded, unzip it to desired location and start it.



### step 1 - Connecting STM32 M4 clicker



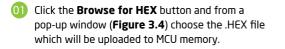
#### Figure 4-2: USB HID mikroBootloader window



### step 2 - Browsing for .HEX file

🗊 mikroElektronika (	JSB HID Bootloader v	2.3.0.0		X
mikroBo	otioader	Device	STM32 M4 Clicker	•
1 Wait for USB link	4	МСИ Туре	STM	•
2 Connect to MCU	Disconnect	History Window Attach USB HID dev Waiting MCU respon	ice or reset if attached.	*
3 Choose HEX file	Browse for HEX	Connected.		
4 Start bootloader	Begin uploading			Ŧ
Bootloading progress bar				
: No files opened.				

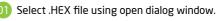
#### Figure 4-3: Browse for HEX



### step 3 - Selecting .HEX file

1 Open	al Disk (C	:) • Project	<b>- 4</b> €	earch Project	 /
Organize 👻 Nev	v folder			83 •	- I 0
	^	Name	Date modified	Туре	Size
Libraries Documents		PIC_clicker.hex	.2013 11:42	HEX File	
Music	_				
Pictures					
📑 Videos					
🤞 Homegroup					
👰 Computer					
🚢 Local Disk (C:)					
👝 Local Disk (D:)	+ +				
	File <u>n</u> am	PIC_clicker.hex	- HE	X files	•
				Open	Cancel
			02	,	

#### Figure 4-4: Selecting HEX

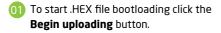


Click the **Open** button.

### step 4 - Uploading .HEX file

🗊 mikroElektronika (	JSB HID Bootloader	v2.3.0.0		X
mikroBo	otloade	Device	STM32 M4 Clicker	Ŧ
<b>1</b> Wait for USB link	4	МСИ Туре	STM	Ŧ
2 Connect to MCU	Disconnect	History Wind Attach USB HID o Waiting MCU resp	levice or reset if attached.	*
3 Choose HEX file	Browse for HEX	Connected.	ect\PIC_dicker.hex	
4 Start bootloader	Begin uploading	-01		Ŧ
Bootloading progress bar				
C:\Project\PIC_dicker.	hex			

Figure 4-5: Begin uploading



D mikroElektronika USB HID Bootloader	/2.3.0.0	
mikroBootloader	Device	STM32 M4 Clicker 👻
1 Wait for 😪	МСИ Туре	STM 👻
2 Connect Disconnect	History Window Attach USB HID device Waiting MCU response	e or reset if attached.
3 Choose Browse Tor HEX	Connected. Opened: C:\Project\PIC_dicker.hex Uploading: Flash Erase	
4 Start Stop uploading	Flash Write	-
Bootloading progress bar		
: F: \LED Blinking \LedBlinking.hex	01	

#### Figure 4-6: Progress bar

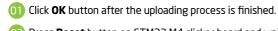


01 Progress bar enables you to monitor .HEX file uploading.

### step 5 - Finish upload

① mikroElektroni	ika USB HID Bootloader v2.3.0.0	x
mikroB	Bootloader Device	-
1 Wait for USB link	Success	Ŧ
2 Connect to MCU	Restarting MCU	*
3 Choose HEX file	Uploading program completed successfully.	
4 Start bootload		•
Bootloading progress bar		
: C:\Project\PIC_clic	ker.hex	

Figure 4-7: Restarting MCU



02 Press **Reset** button on STM32 M4 clicker board and wait for 5 seconds. Your program will run automatically.

mikroBo	otioade	Device	Ŧ
1 Wait for USB link	4	МСИ Туре	Ŧ
2 Connect to MCU	Connect	History Window Opened: C:\Project\PIC_dicker.hex Uploading:	*
3 Choose HEX file	Browse for HEX	Upioading: Flash Erase Flash Write Completed successfully. Disconnected	
4 Start bootloader	Begin uploading	Reset Reset device to reenter bootloader mode.	4 III
Bootloading progress bar			

#### Figure 4-8: mikroBootloader ready for next job

# Programming with mikroProg<sup>™</sup> programmer

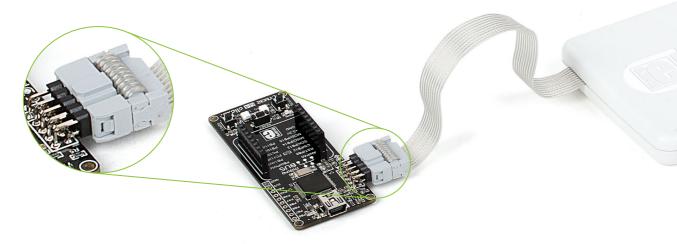


Figure 4-9: mikroProg<sup>™</sup> connector

The microcontroller can be programmed with external **mikroProg**<sup>™</sup> for STM32 programmer and **mikroProg Suite<sup>™</sup> for ARM**<sup>\*</sup> software. The external programmer is connected to the development system via 2x5 JTAG connector soldered on the CN2 connector pads, **Figure 4-9. mikroProg**<sup>™</sup> is a fast USB 2.0 programmer with hardware debugger support. It supports STM32 M3 and M4 devices from STMicroelectronics. Outstanding performance, easy operation and elegant design are its key features.

# mikroProg Suite<sup>™</sup> for ARM<sup>®</sup> software

On-board mikroProg<sup>™</sup> programmer requires special programming software called mikroProg Suite<sup>™</sup> for ARM<sup>®</sup>. This software is used for programming of all supported microcontroller families with ARM<sup>®</sup> Cortex<sup>™</sup>-M3 and Cortex<sup>™</sup>-M4 cores. The software has an intuitive interface and SingleClick<sup>™</sup> programming technology. To begin, first locate the installation archive on the link bellow:



http://www.mikroe.com/downloads/get/1809/mikroprog\_suite\_for\_arm.zip

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

### Quick guide



- Click the **Detect MCU** button in order to recognize the device ID.
- Click the **Read** button to read the entire microcontroller memory. You can click the **Save** button to save it to the target HEX file.
- 03

If you want to write the HEX file into the microcontroller, first make sure to load the target HEX file using the **Load** button. Then click the **Write** button to begin programming.

Click the **Erase** button to clear the microcontroller memory.

🐠 mikroProg	×			
<u>F</u> ile <u>A</u> bout	<u>H</u> istory			
De	vice			
Detec	t MCU			
Read	Write			
Verify	Blank			
Erase	Reset			
HEX File				
Load Save				
Reload				
CODE				
Options				
Progress:				
0%				

Figure 4-10: mikroProg Suite™

for ARM® window

# Programming with ST-LINK V2 programmer

In order to adjust the ST-LINK<sup>™</sup> V2 programmer to be connected to the development system, it is necessary to provide the appropriate adapter such as the **mikroProg to ST-LINK V2 adapter**. 2x5 male headers should be first soldered on the CN2 connector pads. Then you should plug the adapter into the ST-LINK V2 programmer (2x10 header), and plug an IDC10 flat cable in headers, **Figure 4-12**. The microcontroller can also be programmed with the ST-LINK V2 programmer and mikroProg Suite<sup>™</sup> for ARM\* software, Figure 5-1. This programmer connects with mikromedia board via mikroProg to ST-LINK V2 adapter (Figure 4-11).



Figure 4-11: mikroProg<sup>™</sup> to ST-LINK<sup>™</sup> V2 adaper Figure 4-12: Connecting ST-LINK™ V2 programmer

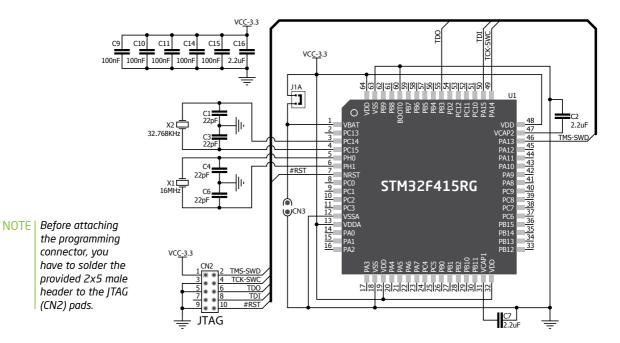
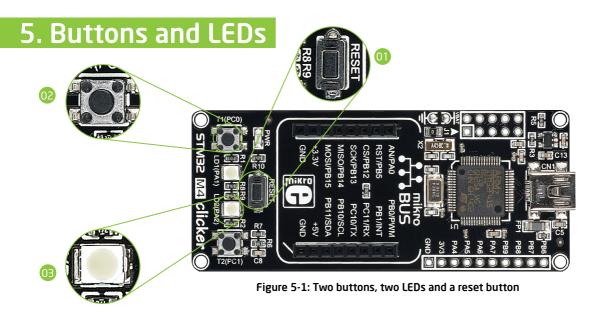


Figure 4-13: mikroProg<sup>™</sup> connection schematic



The board also contains a (1) **reset button** and a pair of (12) **buttons** and (13) **LEDs**. Each of these additional peripherals are located in the bottom area of the board. **Reset button** is used to manually reset the microcontroller. Pressing the reset button will generate a low voltage level on microcontroller's reset pin. **LEDs** can be used for visual indication of the logic state on two pins (**RAO** and **RA1**). An active LED indicates that a logic high (1) is present on the pin. Pressing any of these **buttons** can change the logic state of the microcontroller pins (**RD2** and **RD3**) from logic high (1) to logic low (0).

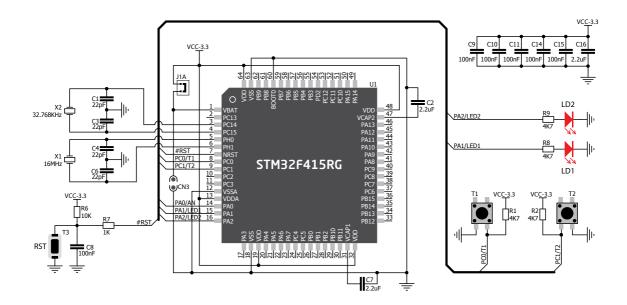
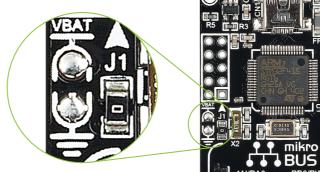


Figure 5-2: Other modules connection schematic

# 6. RTC battery



STM32 M4 clicker features RTC battery pads for powering microntroller's internal RTC module. Battery is used as an alternative source of power, so the RTC module can keep track of time while primary source of power is OFF or unavailable. In order to use this option it is necessary to connect (solder) external battery (type **CR2032**; voltage range from **1.65 to 3.6 V**) and unsolder jumper **J1**, **Figure 6-1**. Make sure that orientation of the battery is correct (plus on **VBAT** and minus on **GND** pad), otherwise it won't work properly. Figure 6-1: battery pads and jumper |1



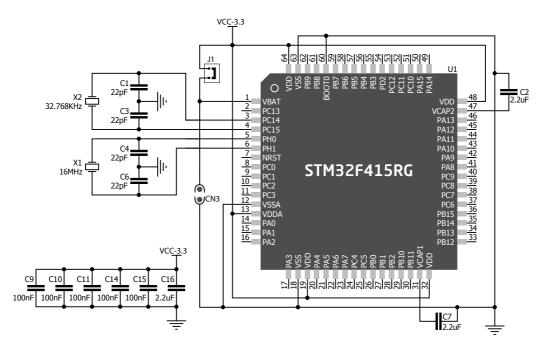


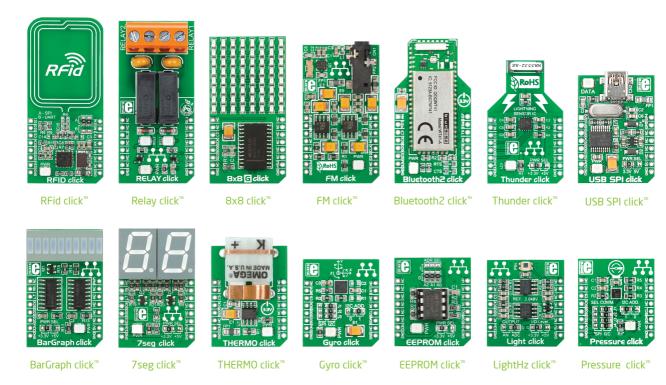
Figure 6-2: RTC battery schematic

# 7. click boards are plug and play!

Up to now, MikroElektronika has released more than 90 mikroBUS<sup>™</sup> compatible **click<sup>™</sup> 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<sup>™</sup> boards webpage for the complete list of currently available boards:

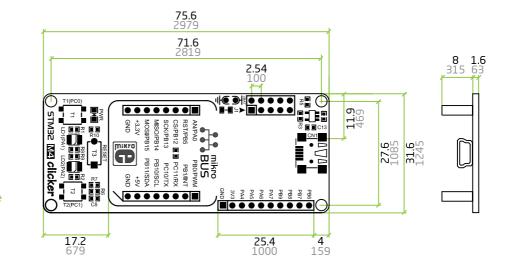
www.mikroe.com/click

Figure 7-1: STM32 M4 clicker driving a GSM click board



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# 8. Dimensions



#### Legend mm mils

Mounting hole size

ø2 mm

ø79 mils

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