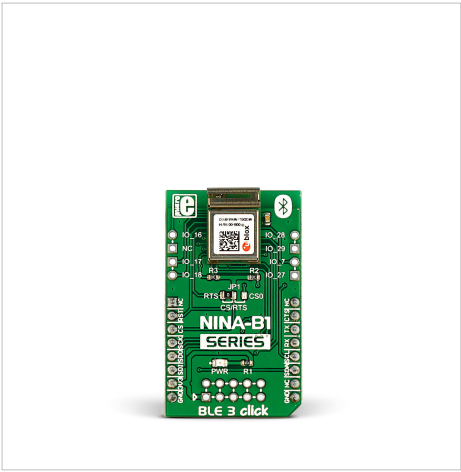


# BLE 3 click

BLE 3 click is a quick and simple solution if you want to add Bluetooth Low Energy to your project. It features the NINA-B1 Bluetooth 4.2 module, from u-blox. This click also comes with an integrated antenna mounted on the PCB.

## BLE 3 click



BLE 3 click	
<b>IC/Module</b>	u-blox NINA-B1 <sup>[1]</sup>
<b>Interface</b>	UART, SPI, I2C
<b>Power supply</b>	3.3V
<b>Product page</b>	<a href="http://www.mikroe.com/click/ble-3">www.mikroe.com/click/ble-3</a> <sup>[2]</sup>
<b>Schematic</b>	BLE 3 click schematic <sup>[3]</sup>

## Features and usage notes

Also known as Bluetooth Low Energy, BLE is intended for small smart devices like home automation sensor and fitness applications that need to have really low power consumption and long battery life. The BLE 3 click communicates with the target board MCU through the UART, SPI and I2C interface, with the addition of 7 GPIO pins. It uses **3.3V** power supply only.

The NINA-B1 module has different power saving modes to conserve battery life – standby mode and power off mode. The module usually spends most of the time in power off mode (it is the primary mode) and wakes up to send small packages of data, and then powers off again. The following events can be used to bring the module out of standby-mode:

- External wake-up event
- RTC event
- Analog or digital sensor event (programmable voltage level or edge detection)

During standby mode, the module is clocked at 32 kHz reference clock, which is generated by an internal 32 kHz oscillator.


The module is fully Bluetooth qualified and provides global modular approval. The ADC can sample up to 200 kHz using different inputs as sample triggers and it supports 8/10/12 bit resolution. Any of the 8 analog inputs can be

used both as single-ended inputs and as differential pairs for measuring the voltage across them. The ADC supports full 0 V to VCC input range.

The NINA-B112 modules have an integrated antenna mounted on the PCB (10.0 x 14.0 mm). The RF signal pin is not connected to any signal path. You can configure NINA-B1 modules through U-Blox S-Center toolbox software using AT commands. The s-center evaluation software is available free of charge and can be downloaded from the U-Blox website.

### Pinout diagram

This table shows how the pinout on BLE 3 click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin					Pin	Notes	
Not connected	NC	1	AN		PWM	16	NC	Not connected
Active-high Reset pin	RST	2	RST		INT	15	RTS	UART request to send
UART clear to send	CS/CTS	3	CS		RX	14	TX	
	SPI0 SCLK	4	SCK		TX	13	RX	
	SPI0 MISO	5	MISO		SCL	12	SCL	
	SPI0 MOSI	6	MOSI		SDA	11	SDA	
	+3.3V	7	+3.3V		+5V	10	NC	Click operates at 3.3V only
	GND	8	GND		GND	9	GND	

The board also has an additional pinout with 7 GPIOs:

Name	I/O	Description
IO_7	I/O	GPIO intended for use with a push-button switch.
IO_16	I/O	Analog function enabled GPIO
IO_17	I/O	Analog function enabled GPIO
IO_18	I/O	Analog function enabled GPIO
IO_27	I/O	Analog function enabled GPIO
IO_28	I/O	NFC pin 1
IO_29	I/O	NFC pin 2

### Programming

The demo code available on Libstock sets up the BLE 3 click to broadcast the state of pins on a desired port. A smartphone and BLE 3 can communicate when a connection is established, and the smartphone can change the state of the pins over bluetooth low energy.

### Code example

The code snippet sets up the BLE 3 click in data mode, and sends the state of the pins of a port over BLE. Also, when BLE 3 receives a value from the smartphone, it will send the value over UART to the MCU, the MCU then sets that value as the value of the pins of a desired port.

```
#include <stdint.h>
#include <stdbool.h>

sbit BLE3_RTS_MCU at GPIOD_IDR.B13;
sbit BLE3_CTS_MCU at GPIOD_ODR.B10;
sbit BLE3_RST      at GPIOC_ODR.B2;

uint16_t porte_read = 0;

void main()
{
    GPIO_Digital_Input( &GPIOD_BASE, _GPIO_PINMASK_10 );
    GPIO_Digital_Output( &GPIOD_BASE, _GPIO_PINMASK_13 );
    GPIO_Digital_Output ( &GPIOC_BASE, _GPIO_PINMASK_2 );
    GPIO_Digital_Output(&GPIOE_BASE, _GPIO_PINMASK_ALL); // Set PORTE
as digital output

    UART3_Init_Advanced( 115200, _UART_8_BIT_DATA,          // Initialize
UART
                        _UART_NOPARITY,
                        _UART_ONE_STOPBIT,
                        &_GPIO_MODULE_USART3_PD89);

    delay_ms(500);

    BLE3_RTS_MCU = 0;          // set RTS to 0
    BLE3_RST = 1;             // pull reset pin high
    delay_ms(2000);

    Uart3_Write_Text("AT+UBTLN="); // set the device name to "mikroE"
    Uart3_Write_Text("\mikroE\");
    Uart3_Write_Text("\r");

    delay_ms(2000);

    Uart3_Write_Text("ATO1\r"); // set BLE 3 into data mode, all
bytes sent from UART will be sent over BLE
    delay_ms(1000);           // all bytes received from BLE will
be sent to UART

    RXNEIE_USART3_CR1_bit = 1; // setup UART interrupt
    NVIC_IntEnable( IVT_INT_USART3 );
    EnableInterrupts();

    while(1)
```

```
    {
        GPIOE_ODR = porte_read << 8;
        Uart3_Write(porte_read);           // send the updated value of
the PORT over BLE
        delay_ms(1000);
        porte_read++;
    }
}

// if smartphone/tablet writes to BLE 3, update the port with the value
sent from the smartphone/tablet

void LO_RX_ISR() iv IVT_INT_USART3 ics ICS_AUTO
{
    if( RXNE_USART3_SR_bit )
    {
        porte_read = USART3_DR;
    }
}
```

Code examples for BLE 3 click, written for MikroElektronika hardware and compilers are available on Libstock <sup>[4]</sup>.

## Resources

- Data sheet <sup>[1]</sup>
- URL Demo code / Library <sup>[4]</sup>
- BLE Tutorial <sup>[5]</sup>
- mikroBUS™ standard specifications <sup>[6]</sup>

## References

- [1] <https://www.u-blox.com/en/product/nina-b1>
- [2] <http://www.mikroe.com/click/ble-3>
- [3] [http://cdn-docs.mikroe.com/images/5/52/BLE\\_3\\_click\\_schematic\\_v101.pdf](http://cdn-docs.mikroe.com/images/5/52/BLE_3_click_schematic_v101.pdf)
- [4] <http://libstock.mikroe.com/projects/view/1946/ble-3-click>
- [5] <http://learn.mikroe.com/bluetooth-low-energy-part-1-introduction-ble/>
- [6] <http://www.mikroe.com/mikrobus/>

# Article Sources and Contributors

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