



## BLE 8 CLICK

PID: MIKROE-3674

Weight: 18 g

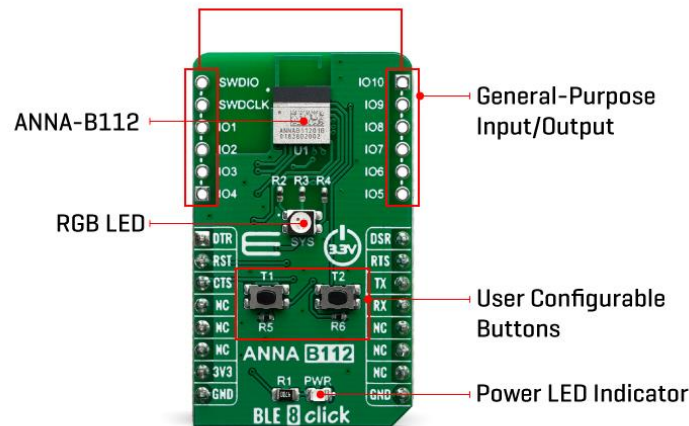
**BLE 8 Click** is fully embedded stand-alone Bluetooth 5.0 Energy connectivity module, equipped with the ANNA-B112, an ultra-small, high-performing, standalone Bluetooth low energy module for easy integration of Bluetooth low energy connectivity (BLE) into various electronic devices. This module combines a high-performance Arm® Cortex®-M4 CPU microprocessor with FPU, and state-of-the-art power performance. Reliable and easy to use, BLE 8 click is a perfect solution for development of various IoT applications, smart home applications, BLE enabled toys, advanced robotics, and other similar applications.

WiFi BLE click is supported by a mikroSDK compliant library, which includes functions that simplify software development. This Click board™ comes as a fully tested product, ready to be used on a system equipped with the mikroBUS™ socket.

BLE 8 click is a Click board™ which provides Bluetooth Low Energy connectivity for any embedded application. It features the ANNA-B112, an integrated wireless connectivity solution. The ANNA-B112 module itself is based on the nRF52832 chip, a flexible, efficient Bluetooth 5 and Bluetooth mesh multiprotocol SoC. Armed with such a powerful processor, the ANNA-B112 can achieve data rates of up to 2 Mbps and up to 5 dBm maximum radiated output power using internal antenna, ensuring a reliable connection and good signal coverage. BLE 8 click is ideal for small smart devices like home automation sensor and fitness applications that need to require really low power consumption and long battery life.

## HOW DOES IT WORK?

BLE 8 click is equipped with the ANNA-B112, Stand-alone Bluetooth 5 low energy module by u-blox, which is based on the nRF52832 chip. The nRF52832 is the mid-range member of the nRF52 Series SoC family. It meets the challenges of a broad range of applications that need Bluetooth 5 feature sets, protocol concurrency and a rich and varied set of peripherals and features. In addition, it offers generous memory availability for both Flash and RAM. It is operated by a set of AT commands, over the UART interface, which makes the BLE 8 click very easy to use.



By integrating most of the critical components on the chip, the ANNA-B112 allows the module to overcome any imperfections of external discrete components, allowing signal transmission power of up to 5dBm, and -92 dBm sensitivity for the receiver, using the on-chip antenna.

The ANNA-B112 module is built around an ARM® Cortex™-M4 CPU with floating point unit running at 64 MHz. It has NFC-A Tag for use in simplified pairing and payment solutions, as well as numerous digital peripherals and interfaces such as PDM and I2S for digital microphones and audio. It is also fully multiprotocol capable with full protocol concurrency. It has protocol support for Bluetooth 5, Bluetooth mesh, ANT and 2.4 GHz proprietary stacks.

Besides the mikroBUS™ socket, BLE 8 click also features two optional 6-pin header mounts, with marked pin labels. All of these pins can be externally connected and used for various purposes. SWDCLK and SWDIO pins are reserved for the SWD interface, which the ANNA-B112 series modules uses for flashing and debugging. The rest of the external pins, labeled as IO1-IO10 are general purpose IO type and can be programmed according to the users needs.

The onboard buttons T1 and T2, as well as the RGB LED LD2 (labeled SYS), are also user programmable and can be used for various purposes for basic user interaction without any external components required besides the BLE 8 click.


This Click Board™ is designed to be operated only with 3.3V logic level. A proper logic voltage level conversion should be performed before the Click board™ is used with MCUs with logic levels of 5V.

## SPECIFICATIONS

<b>Type</b>	BT/BLE
<b>Applications</b>	Medical equipment and fitness applications, IoT devices, home automation, smart energy, etc.
<b>On-board modules</b>	ANNA-B112, Stand-alone Bluetooth 5 low energy module by u-blox
<b>Key Features</b>	ARM® Cortex™-M4 CPU, integrated antenna, support for Bluetooth 5, Bluetooth mesh, ANT and 2.4 GHz proprietary stacks, onboard tactile switches and RGB LED
<b>Interface</b>	GPIO,UART
<b>Click board size</b>	M (42.9 x 25.4 mm)
<b>Input Voltage</b>	3.3V

## PINOUT DIAGRAM

This table shows how the pinout on BLE 8 click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin					Pin	Notes
Data terminal ready	<b>DTR</b>	1	AN	PWM	16	<b>DSR</b>	Data set ready
Reset	<b>RST</b>	2	RST	INT	15	<b>RTS</b>	UART request to send
UART clear to send	<b>CTS</b>	3	CS	RX	14	<b>TX</b>	UART Transmit
	NC	4	SCK	TX	13	<b>RX</b>	UART Receive
	NC	5	MISO	SCL	12	NC	
	NC	6	MOSI	SDA	11	NC	
Power Supply	<b>3.3V</b>	7	3.3V	5V	10	NC	
Ground	<b>GND</b>	8	GND	GND	9	<b>GND</b>	Ground

## ONBOARD SETTINGS AND INDICATORS

Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator
LD2	SYS	-	User programmable RGB LED Indicator

T1,T2	-	-	User programmable tacticle switches
J1,J2	-	-	External GPIO and SWD interface connections

## SOFTWARE SUPPORT

We provide a library for the BLE 8 click on our LibStock page, as well as a demo application (example), developed using MikroElektronika compilers. The demo can run on all the main MikroElektronika development boards.

### Library Description

This library allows user to perform a full control of the ANNA-B112 module. With this library user can send a commands to the module to perform the desired module configurations, connection with the other device, data transferring, and also can check the response from the module. User also can check the all necessary information about module. This library consists of the some predefined commands witch can be helpful to user to configure the module. For more details check full documentation.

Key functions:

- `void ble8_uartDriverInit( T_BLE8_P gpioObj, T_BLE8_P uartObj )`- This function initializes UART driver.
- `void ble8_response_handler_set( void ( *handler )( uint8_t* ) )`- This function sets handler on the function which should be performed, for example function for the results logging.
- `void ble8_uart_isr( void )`- This function reads response bytes from the module and sets flag after each received byte.
- `void ble8_send( uint8_t *tx_data, uint8_t term_char )`- This function allows user to transmit data and send commands to the module.

### Examples description

The application is composed of three sections :

- System Initialization - Initializes peripherals and pins.
- Application Initialization - Initializes UART serial interface, UART interrupt, and executes a module reset. Allows user to enter command mode.
- Application Task - (code snippet) - This function has two segments. First segment allows user to enter a commands, module configuration, data which will be transmitted, also to check all module and connection status by using the serial terminal. Press 'Enter' when you want to send the entered command (data). Press 'Backspace' to delete the wrong entered character before you send the command. Press 'Up-Down' or 'Left-Right' to see and enter a 3 last sent commands. Press 'Esc' and then 'r' or 'R' to execute a module reset. Press 'Esc' and then 't' or 'T' to enter command mode. Second segment allows user to check and get response from the ANNA-B112 module when

response was ready. Note : The all possible commands, module configuration and specification can be found in the related documents: [1] ANNA-B112 System Integration Manual, document number UBX-18009821 [2] u-blox Short Range AT Commands Manual, document number UBX-14044127 [3] ANNA-B112 Getting Started Guide, document number UBX-18020387 [4] ANNA-B112 Declaration of Conformity, document number UBX-18058993.

```
void applicationTask()
{
    rx_data = UART_Rdy_Ptr();

    if (rx_data != _RX_NOT_READY)
    {
        rx_data = UART_Rd_Ptr();

        checkRX();
    }

    if (start_timer == 1)
    {
        timer_cnt++;
    }

    logRsp();

    Delay_us( 1 );
}
```

#### Additional Functions :

- `_strcpy` - Allows user to copy content of one string to another string, starting from the first place.
- `_strncmp` - Allows user to compare a content of two strings.
- `prevCmd` - Checks which character (Up, Down, Left, Right, Esc) was entered by the user.
- `checkPrevCmd` - Determines which of 3 previous commands will be entered again.
- `addCmdLine` - Adds new command line for entering new data/command.
- `enterLocalAddr` - Allows user to enter a 12 digits of target local address in hex format from the serial terminal.

- cmdCmp - Checks did user enter one of the predefined commands, that are defined for this demo example.
- checkRX - Allows user to enter a desired characters and to send the commands from the serial terminal.
- getRsp - Catches the response bytes and sets flag when the response was ready.
- logRsp - Allows user to see and check the response on the serial terminal.
- interrupt - Calls a uart isr function when new byte was received from the module.

The full application code, and ready to use projects can be found on our LibStock page. Other mikroE Libraries used in the example:

- UART

### **Additional notes and informations**

Depending on the development board you are using, you may need USB UART click, USB UART 2 click or RS232 click to connect to your PC, for development systems with no UART to USB interface available on the board. The terminal available in all MikroElektronika compilers, or any other terminal application of your choice, can be used to read the message.

## **MIKROSDK**

This Click board™ is supported with mikroSDK - MikroElektronika Software Development Kit. To ensure proper operation of mikroSDK compliant Click board™ demo applications, mikroSDK should be downloaded from the LibStock and installed for the compiler you are using.

For more information about mikroSDK, visit the official page.

## **RESOURCES**

mikroBUS™ Standard specification

LibStock: mikroSDK

Click board catalog

## DOWNLOAD

BLE 8 click example on Libstock

BLE 8 click 2D and 3D files

ANNA-B112 datasheet

BLE 8 click schematic

