

# M-BUS RF 3 Click



PID: MIKROE-6084

M-BUS RF 3 Click is a compact add-on board designed for utility metering and various telemetry applications. This board features the Metis-II (2607021183000), an 868MHz radio module from Würth Elektronik. It integrates an MSP430 microcontroller and a CC1125 RF chip-set to ensure efficient data transmission. Key features include a frequency range of 868.3MHz to 869.525MHz, support for the Wireless M-BUS EN13757-4:2013 and Open Metering System (OMS) standards, and communication capabilities up to 1000 meters in line-of-sight conditions. The board also offers energy-saving functionalities such as Wake-On-Radio, an output power of +14dBm output, and AES-128 encryption for secure communication. This Click board™ is ideal for developers looking to implement advanced wireless communication systems in smart metering, home automation, and industrial control.

## How does it work?

M-BUS RF 3 Click is based on the Metis-II (2607021183000), a high-power radio module from Würth Elektronik, operating at 868MHz. This module integrates an MSP430 microcontroller and a CC1125 RF chip-set, offering an efficient and cost-effective communication solution. The Metis-II module adheres to the Wireless M-BUS EN13757-4:2013 standard and supports the Open Metering System (OMS), ensuring wide compatibility in utility metering applications. An increased RF output power of +14dBm and sensitivity up to -106dBm enables reliable wireless communication over distances up to 1000 meters in line-of-sight conditions. Designed with energy efficiency in mind, the module includes low-power functions such as Wake-On-Radio and adjustable RF data rates, making it ideal for long-range, low-power wireless applications. Additionally, it features AES-128 encryption for secure data transmission, ensuring robust communication for metering systems.

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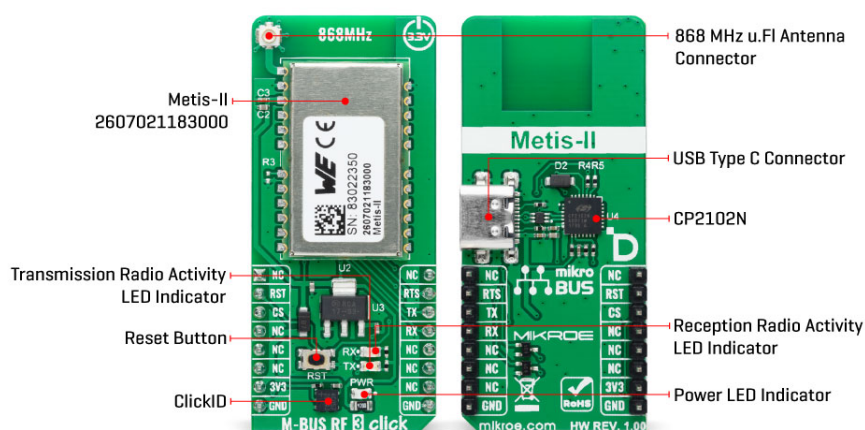
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Communication between the Metis-II and the host MCU is made through a UART interface, using the standard UART RX and TX pins and hardware flow control pins (CTS/RTS). The module communicates at 115200bps by default, allowing efficient data exchange. The board includes a reset pin (RST) and a RESET button for resetting the module, and two LED indicators for user interaction: an orange TX LED signaling transmission activity and a yellow RX LED indicating reception.

In addition to the UART interface, this Click board™ also features a USB Type-C connector, enabling power supply and configuration through a PC. This is made possible by the [CP2102N](#), a highly integrated USB-to-UART bridge, and the [NCP1117](#) LDO regulator, which converts the USB supply to the required 3.3V for the module allowing for standalone operation.

The board is designed to interface with 868MHz antennas, such as the [Rubber 868MHz Antenna](#) offered by MIKROE. It includes a u.FI connector, necessitating an [IPEX-SMA cable](#) adapter, also available from MIKROE, to ensure proper antenna connection.

This Click board™ can be operated only with a 3.3V logic voltage level. The board must perform appropriate logic voltage level conversion before using MCUs with different logic levels. Also, it comes equipped with a library containing functions and an example code that can be used as a reference for further development.

## Specifications

Type	Sub-1 GHz Transceivers
Applications	Ideal for wireless communication systems in smart metering, home automation, and industrial control
On-board modules	Metis-II (2607021183000) - radio module from Würth Elektronik
Key Features	868MHz operating frequency, module based on the MSP430 MCU and CC1125 RF chip-set, integrated Flash and RAM, wireless M-BUS EN13757-4:2013 standard, OMS (Open Metering System) supported, range up to 1000m line of sight, low-power function (Wake-On-Radio), UART interface with additional

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	hardware flow control pins, and more
Interface	UART
Feature	ClickID
Compatibility	mikroBUS™
Click board size	L (57.15 x 25.4 mm)
Input Voltage	3.3V

## Pinout diagram

This table shows how the pinout on M-BUS RF 3 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin					Pin	Notes
	NC	1	AN	PWM	16	NC	
Reset	<b>RST</b>	2	RST	INT	15	<b>RTS</b>	UART RTS
UART CTS / ID COMM	<b>CS</b>	3	CS	RX	14	<b>TX</b>	UART TX
	NC	4	SCK	TX	13	<b>RX</b>	UART RX
	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	TX	-	Transmission Radio Activity LED Indicator
LD3	RX	-	Reception Radio Activity LED Indicator
T1	RST	-	Reset Button

## M-BUS RF 3 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-	3.3	-	V
Frequency Range	-	868	-	MHz
Range (Line of Sight)	-	-	1000	m
Output Power	-	-	+14	dBm
Sensitivity	-	-	-106	dBm

## Software Support

We provide a library for the M-BUS RF 3 Click as well as a demo application (example), developed using MIKROE [compilers](#). The demo can run on all the main MIKROE [development boards](#).

Package can be downloaded/installed directly from NECTO Studio Package Manager

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(recommended), downloaded from our [LibStock™](#) or found on [MIKROE github account](#).

## Library Description

This library contains API for M-BUS RF 3 Click driver.

Key functions

- `mbusrf3_set_rst_pin` This function is used to set reset pin state.
- `mbusrf3_send_command` This function is used to send a desired command.
- `mbusrf3_send_data` This function is used to data in transmitter mode.

## Example Description

This example demonstrates the use of M-BUS RF 3 Click by processing the incoming data and displaying them on the USB UART.

The full application code, and ready to use projects can be installed directly from NECTO Studio Package Manager (recommended), downloaded from our [LibStock™](#) or found on [MIKROE github account](#).

Other MIKROE Libraries used in the example:

- MikroSDK.Board
- MikroSDK.Log
- Click.MBUSRF3

## 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. UART terminal is available in all MIKROE [compilers](#).

## mikroSDK

This Click board™ is supported with [mikroSDK](#) - MIKROE 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™](#)

[mikroSDK](#)

[Click board™ Catalog](#)

[Click boards™](#)

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[ClickID](#)

## Downloads

[M-BUS RF 3 click example on Libstock](#)

[M-BUS RF 3 click 2D and 3D files v100](#)

[Metis-II datasheet](#)

[M-BUS RF 3 click schematic v100](#)

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