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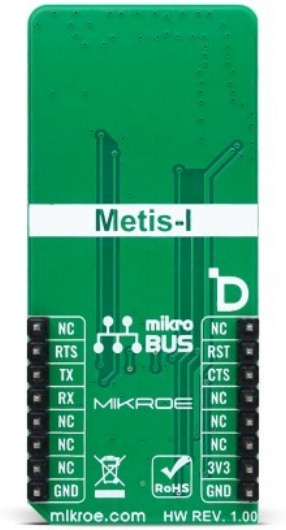
M-BUS RF 2 Click



PID: MIKROE-3303

M-BUS RF 2 Click is a compact add-on board designed for utility metering and various telemetry applications. This board features the Metis-I (2605041183000), an 868MHz radio module from Würth Elektronik. It integrates an MSP430 microcontroller and a CC1101 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 700 meters in clear conditions. The board also offers energy-saving functionalities such as Wake-On-Radio, an output power of +11dBm 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.

M-BUS RF 2 Click is fully compatible with the mikroBUS™ socket and can be used on any host system supporting the mikroBUS™ standard. It comes with the mikroSDK open-source libraries, offering unparalleled flexibility for evaluation and customization. What sets this Click board™ apart is the groundbreaking ClickID feature, enabling your host system to seamlessly and automatically detect and identify this add-on board.

How does it work?

M-BUS RF 2 Click is based on the Metis-I (2605041183000), a radio module from Würth Elektronik, operating at 868MHz frequency. This module integrates an MSP430 microcontroller and a CC1101 RF chip-set, providing a powerful yet low-cost communication solution. The Metis-I module has a range of impressive features. Operating on a frequency band of 868MHz, it is also equipped with a 32768B Flash memory and 1024B RAM. It adheres to the Wireless M-BUS EN13757-4:2013 standard and supports the Open Metering System (OMS), ensuring broad

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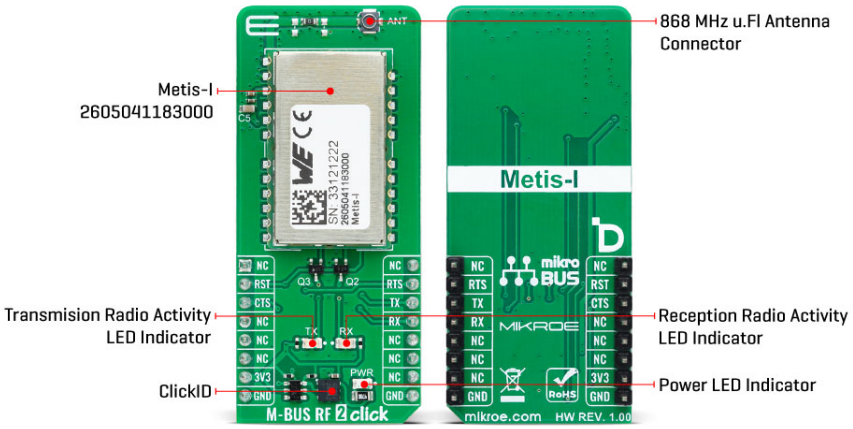
compatibility in utility metering applications. The module can communicate effectively over distances up to 700 meters under clear conditions and is designed with energy efficiency in mind, including a Wake-On-Radio feature that reduces power consumption. Additionally, it has an output power of +11dBm and an RF sensitivity of up to -103dBm for robust wireless transmission.



Communication between the Metis-I 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 also includes a reset (RST) pin for resetting the module. There are two LED indicators for user interaction: an orange TX LED signaling transmission activity and a yellow RX LED indicating reception.

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 Transceievers
Applications	Ideal for wireless communication systems in smart metering, home automation, and industrial control
On-board modules	Metis-I (2605041183000) - radio module from Würth Elektronik
Key Features	868MHz operating frequency, module based on the MSP430 MCU and CC1101 RF chip-set, integrated Flash and RAM, wireless M-BUS EN13757-4:2013 standard, OMS (Open Metering System) supported, range up to 700m line of sight, low-power function (Wake-

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	On-Radio), UART interface with additional 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 2 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikroBUS™				Pin	Notes
	NC	1	AN	PWM	16	NC	
Reset	**RST**	2	RST	INT	15	**RTS**	UART RTS
UART CTS / ID COMM	**CTS**	3	CS	RX	14	**TX**	UART TX
	NC	4	SCK	TX	13	**RX**	UART RX
	NC	5	MISO	SCL	12	NC	
	NC	6	MOSI	SDA	11	NC	
Power Supply	**3.3V**	7	3.3V	5V	10	NC	
Ground	**GND**	8	GND	GND	9	**GND**	Ground

Onboard settings and indicators

Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator
LD2	RX	-	Reception Radio Activity LED Indicator
LD3	TX	-	Transmission Radio Activity LED Indicator

M-BUS RF 2 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-	3.3	-	V
Frequency Range	-	868	-	MHz
Range (Line of Sight)	-	-	700	m
Output Power	-	-	+11	dBm
Sensitivity	-	-	-103	dBm

Software Support

We provide a library for the M-BUS RF 2 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

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Manager(recommended), downloaded from our LibStock™ or found on Mikroe github account.

Library Description

This library contains API for M-BUS RF 2 Click driver.

Key functions

- mbusrf2_set_rst_pin This function is used to set reset pin state.
- mbusrf2_send_command This function is used to send a desired command.
- mbusrf2_send_data This function is used to data in transmitter mode.

Example Description

This example demonstrates the use of M-BUS RF 2 click board 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.MBUSRF2

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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Downloads

M-BUS RF 2 click example on Libstock

M-BUS RF 2 click 2D and 3D files v100

Metis-I datasheet

M-BUS RF 2 click schematic v100

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