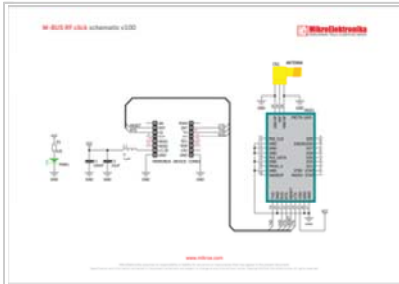


# M-BUS RF click

From MikroElektronika Documentation

**M-BUS RF click** is a mikroBUS™ add-on board with a Telit ME70-169 RF wireless module. The radio operates at the unlicensed ISM frequency band between 169.400 and 169.475 MHz. The device is compliant with EN13757 part 4 2013.

## Features and usage notes



Schematic also available in PDF ([http://cdn-docs.mikroe.com/images/9/93/M-BUS\\_RF\\_click\\_sch](http://cdn-docs.mikroe.com/images/9/93/M-BUS_RF_click_sch))

The module has specified serial data rates of up to 115.2 Kbps and radio data rates of 2.4, 4.8 and 19.2 kbps. For security, the wireless signal has AES and NRZ encryption. Output power is from 125 mW to 631 mV (28dBm). According to the vendor's data sheet, the module has wireless range of up to 20 km (an external antenna is required).

Short for Meter-Bus, this protocol was designed for remote reading of gas or electricity meters in Europe, but it's also suitable for alarm systems, illumination installations, heating control and more.

Devices that communicate with wireless M-Bus modules are classified as either meters or 'other' devices. There is a total of six different M-Bus

modes:

- Mode S 'Stationary
- Mode T 'frequent Transmit
- Mode R2 'frequent Receive
- Mode C 'Compact
- Mode N 'Narrowband VHF
- Mode F 'Frequent receive and transmit

The working of all six modes is explained in detail in the [learn.mikroe.com](http://learn.mikroe.com) article on M-Bus.

Telit also provides a M-Bus ([http://www.telit.com/fileadmin/user\\_upload/products/Downloads/sr-rf/me70-169/Telit\\_Wireless\\_M-bus\\_2013\\_Part4\\_User\\_Guide\\_r13.pdf](http://www.telit.com/fileadmin/user_upload/products/Downloads/sr-rf/me70-169/Telit_Wireless_M-bus_2013_Part4_User_Guide_r13.pdf)) guide which provides an Learn article explaining the MikroElektronika M-BUS library overview of the standard (<http://learn.mikroe.com/wireless-m-bus/>).

M-BUS RF click communicates with the target MCU through the mikroBUS™ UART interface, with additional functionality provided by RESET, RTS, and CTS pins. The board is designed to use a 3.3 power supply only.

## Programming

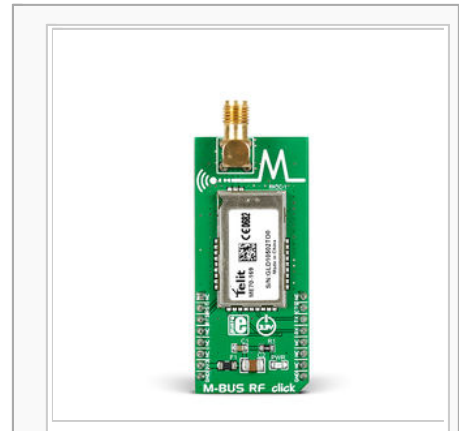
This example sets the M-Bus up for transmitting some data with a length field activated.

```

1 #include <stdint.h>
2 #include <stdbool.h>
3 #include <stddef.h>
4 #include "mbus_hw.h"
5
6 sbit MBUS_RST at GPIOC_ODR.B2;
7 sbit MBUS_RTS at GPIOD_ODR.B13;
8 sbit MBUS_CTS at GPIOD_ODR.B10;
9
10 bool my_receive_flag = false; //Extern for knowing when packet is received from another M-Bus RF click
11
12 void system_setup( void );
13
14 void main()
15 {
16     //Local Declarations
17     transmit_frame_t *transmit_frame;
18
19     // Malloc space for the Transmit Frame
20     MM_Init();
21     transmit_frame = Malloc( sizeof( transmit_frame_t ) );
22     // Setup GPIOs, communication pins, interrupts, e.t.c.
23     system_setup();
24
25
26     //Initialize Configuration Mode
27     UART1_Write_Text( "Entering Config Mode\r\n" );
28     mbus_at_init();
29
30     // Set MBUS Mode
31     UART1_Write_Text( "Setting MBUS Mode\r\n" );
32     check_status( mbus_set_mbus_mode( ROLE_N1_METER ) );
33
34     // Set RX / TX formats
35     check_status( mbus_set_serial_tx_format( LENGTH_TX ) ); // TX Format must have Length.. so that sending / receiving works properly
36

```

M-BUS RF click



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<b>IC/Module</b>	ME 70-169 ( <a href="http://www.lte.com.tr/uploads/pdf/410.pdf">http://www.lte.com.tr/uploads/pdf/410.pdf</a> )
<b>Interface</b>	CTS, TX, RX, RESET, RTS
<b>Power supply</b>	3.3V
<b>Website</b>	<a href="http://www.mikroe.com/click/m-bus-rf">www.mikroe.com/click/m-bus-rf</a> ( <a href="http://www.mikroe.com/click/m-bus-rf">http://www.mikroe.com/click/m-bus-rf</a> )

```

37 //Sending some data...
38 UART1_Write_Text( "\r\n\r\n Sending Frame Of Data...\r\n\r\n" );
39 // Set OP Mode
40 check_status( mbus_op_init() );
41 //Send Frame
42 sprintf( transmit_frame->data_field, "My Name is Engineer and I am %d Years Old.", 22 );
43 transmit_frame->length_field = strlen( transmit_frame->data_field );
44 mbus_send_frame( transmit_frame, 1 );          /**< Using length field for TX format, so not length needed */
45
46 while ( 1 );
47 }
48
49 void system_setup( void )
50 {
51     GPIO_Digital_Output( &GPIOC_BASE, _GPIO_PINMASK_2 );          /**< Reset pin Output */
52
53     UART1_Init_Advanced( 9600, _UART_8_BIT_DATA,                    /**< UART for Terminal */
54                         _UART_NOPARITY,
55                         _UART_ONE_STOPBIT,
56                         &_GPIO_MODULE_USART1_PA9_10 );
57     Delay_ms(300);
58
59     UART3_Init_Advanced( 19200, _UART_8_BIT_DATA,                   /**< UART for MBus */
60                         _UART_NOPARITY,
61                         _UART_ONE_STOPBIT,
62                         &_GPIO_MODULE_USART3_PD89);
63     Delay_ms(300);
64
65     mbus_init();          /**< Initialize MBus HAL Layer */
66     Delay_ms(300);
67
68     RXNEIE_USART3_CR1_bit = 1;
69     NVIC_IntEnable( IWT_INT_USART3 );
70     EnableInterrupts();
71 }
72
73 void LO_RX_ISR() iv IWT_INT_USART3 ics ICS_AUTO
74 {
75     mbus_rx_isr( USART3_DR );
76 }

```

Code examples that demonstrate the usage of TK click with MikroElektronika hardware, written for mikroC for ARM, AVR, dsPIC, FT90x, PIC and PIC32 are available on Libstock (<http://libstock.mikroe.com/projects/view/1902/m-bus-click>).

## Resources

- Vendor's data sheet ([http://www.telit.com/fileadmin/user\\_upload/products/Downloads/sr-rf/me70-169/Telit\\_ME70-169\\_Datasheet.pdf](http://www.telit.com/fileadmin/user_upload/products/Downloads/sr-rf/me70-169/Telit_ME70-169_Datasheet.pdf))
- Vendor's User guide ([http://www.telit.com/fileadmin/user\\_upload/products/Downloads/sr-rf/me70-169/Telit\\_ME70\\_169\\_RF\\_module\\_User\\_Guide\\_r4.pdf](http://www.telit.com/fileadmin/user_upload/products/Downloads/sr-rf/me70-169/Telit_ME70_169_RF_module_User_Guide_r4.pdf))
- M-BUS library hosted on Libstock (<http://libstock.mikroe.com/projects/view/1902/m-bus-click>)
- Learn article explaining the MikroElektronika M-BUS library (<http://learn.mikroe.com/wireless-m-bus/>)
- mikroBUS™ standard specifications (<http://download.mikroe.com/documents/standards/mikrobus/mikrobus-standard-specification-v200.pdf>)