

TR-72D-WMB

Transceiver Module for Wireless M-Bus

Data Sheet



Description

TR-72D-WMB is a family of IQRF transceivers intended for Wireless M-Bus. It operates in the 868 MHz license free ISM (Industry, Scientific and Medical) frequency band. Its highly integrated ready-to-use design requires no external components. Extra low power consumption predetermines these modules for battery powered applications.



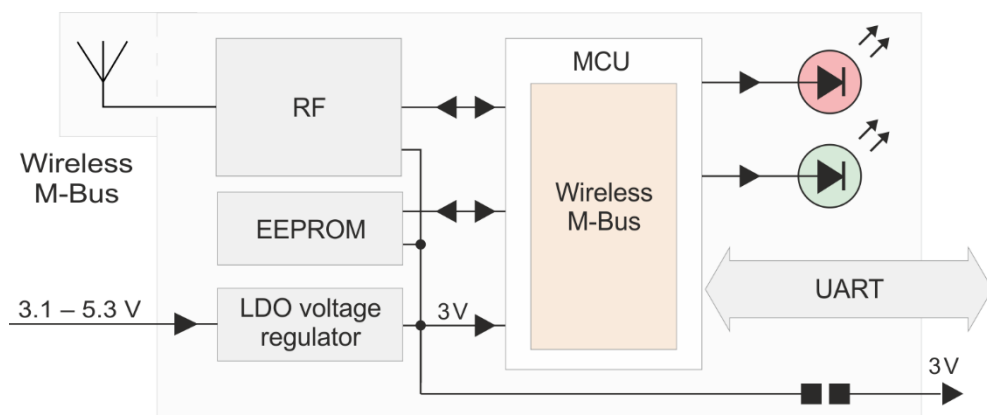
Key features

- Embedded Wireless M-Bus protocol, without operating system
- Wireless M-Bus EN 13757-4:2005 modes S1, T1, S2 and T2
- UART ↔ Wireless M-Bus converter
- UART pins: RX and TX
- FSK modulation
- RF band 868 MHz
- RF output power 12.5 mW
- Extra low power consumption
- +3 V LDO regulator output
- 2 LEDs
- Antenna options: on-board antenna or U.FL connector
- SIM card format
- Shielding can

Applications

- Wireless M-Bus
- Telemetry
- Automated meter reading (AMR)
- Heat, electricity, gas and water meters

Block diagram



Information contained in this publication regarding device applications and the like is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications.

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Electrical specifications

Typical values *unless otherwise stated*

Parameters specified in this datasheet are typical values. They are at power supply $V_{OUT} = 3\text{ V}$ only. V_{OUT} voltage different from 3 V can impact on RF range and other parameters.

Supply voltage (V_{CC})	3.1 V to 5.3 V
LDO output (V_{OUT})	+3 V \pm 60 mV ($V_{CC} > 3.1\text{ V}$), 100 mA max.
Operating temperature ¹	-40 °C to +85 °C
Supply current	
Sleep mode	1 μ A (Pin C8 must be at logic high level))
Run mode	6.2 mA
Additional LED supply current	About 2 mA per LED. Rough value for brief guidance only.
RX mode	10 mA (RF IC in RX mode, MCU in sleep mode)
TX mode	8 mA – 22 mA (according to RF output power)
Nominal frequency	868.30 and 868.95 MHz
RF data modulation	FSK (Frequency shift keying)
RF data transmission bit rate	32.768 kb/s (mode S) or 100 kb/s (mode T)
RFIC RF sensitivity	104.3 dBm (mode T), 104.5 dBm (mode S)
RFIC RF output power	Up to 9.1 dBm (mode T), 11.3 dBm (mode S), programmable in 8 steps
RF range (TR-72DA-WMB) ²	Up to 320 m (mode T), 365 m (mode S)
UART interface	Bit rate 19200 Bd, Data bits: 8, Parity: none, Stop bit: 1, Flow control: none
Input voltage on C5 and C8 pins	0 V to V_{OUT}
Size (L x W x H)	25.0 mm x 14.9 mm x 2.0 mm (TR-72Dx-WMB) 31.8 mm x 14.9 mm x 2.0 mm (TR-72Dax-WMB)

Note 1: RF range may change with lower temperature. Frost, condensation or humidity over 85% may disable transceiver functionality. Transceiver suitability should be tested in final application before volume use.

Note 2: RF range strongly depends on transceiver orientation and surroundings.

Caution: Electrostatic sensitive device. Observe appropriate precautions for handling.

Absolute maximum ratings

Stresses above listed maximum values may cause permanent damage to the device and affect device reliability. Functional operation at these or any other conditions beyond those specified is not supported.

Supply voltage (V_{CC})	5.5 V
Voltage on C5 and C8 pins vs. GND	-0.3 V to ($V_{OUT} + 0.3\text{ V}$)
Storage temperature	-40 °C to +85 °C
Ambient temperature under bias	-40 °C to +85 °C

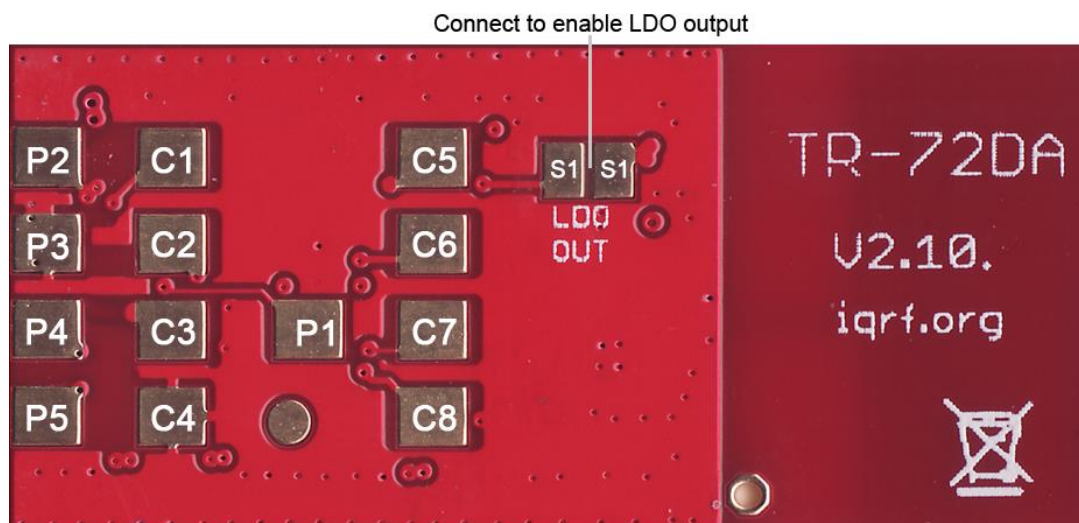
The diagram shows a PIC16LF1938-I/ML microcontroller interfaced with several components:

- SPIRIT1 Module:** Connected to the microcontroller via a bidirectional I2C interface. The SPIRIT1 module is powered by a +3V supply and has a GND connection. Its antenna is connected to X5 and X6.
- MCP1700 Voltage Regulator:** A low-dropout (LDO) regulator that takes VIN (C3) as input and provides a +3V output (LDO out) to the microcontroller's VCC pin (17). It has a GND connection and a feedback pin (VOUT, C2) connected to a 2 x 200 ohm resistor network.
- 24AA256 EEPROM:** Connected to the microcontroller's I2C interface. The SDA pin (RA3, 2) is connected to the microcontroller's RA3 pin (2) and the EEPROM's SDA pin (1). The SCI pin (RB6, 7) is connected to the microcontroller's RB6 pin (24) and the EEPROM's SCI pin (2). The WP pin (4) is connected to the microcontroller's RA6 pin (7) and the EEPROM's WP pin (3). The GND pin (7) is connected to the microcontroller's GND pin (5) and the EEPROM's GND pin (8). The VCC pin (1) is connected to the microcontroller's VCC pin (17) and the EEPROM's VCC pin (1).
- LEDs:** A green LED (LEDG) is connected to the microcontroller's RB7 pin (25) and a red LED (LEDR) is connected to the microcontroller's RA2 pin (1). Both LEDs have current-limiting resistors.
- Power and Grounding:** The microcontroller is powered by a +3V supply (S2) connected to its MCLR pin (26). It has multiple GND connections (pins 5, 16, 17, 10, 27, 25, 1) and a VCC connection (pin 17).
- Other Connections:** The microcontroller's RX/RC7 pin (15) is connected to the RX pin (C8) of the SPIRIT1 module. The TX/RC6 pin (14) is connected to the TX pin (C5) of the SPIRIT1 module. The RC5 pin (13) is connected to the RC4 pin (12) and the RC3 pin (11). The RA5 pin (4) is connected to the RB4 pin (22) and the TX/RC6 pin (14).

IC	Type	Manufacturer	Note
MCU	PIC16LF1938-I/MV	Microchip	
RF IC	SPIRIT1	STMicroelectronics	
RF balun	BALF-SPI-01D3	STMicroelectronics	
LDO voltage regulator	MCP1700T-3002E/TT	Microchip	
EEPROM	24AA256-I/CS16K	Microchip	256 Kb

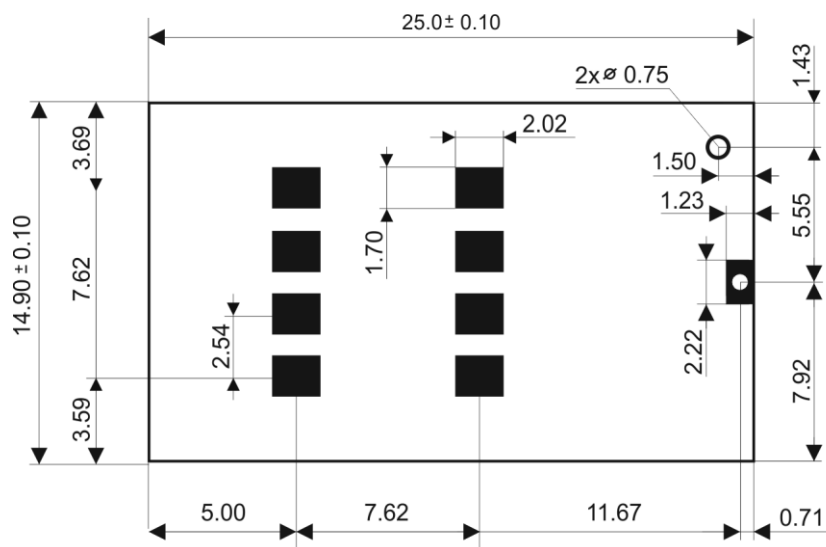
Page 4

Pin	Name	Description
C1		Do not use, leave unconnected
C2	VOUT	On-board +3 V LDO output (if S1 pads interconnected)
C3	VIN	Power supply voltage
C4	GND	Ground
C5	TX	UART TX
C6		Do not use, leave unconnected
C7		Do not use, leave unconnected
C8	RX	UART RX. Must be in log. H in idle state.
X5	ANT	Antenna input (TR-72D-WMB only)
X6	GND	Ground (TR-72D-WMB only)
P1–P5		For manufacturer only
S1		LDO output enable. Interconnect to enable (default disabled).

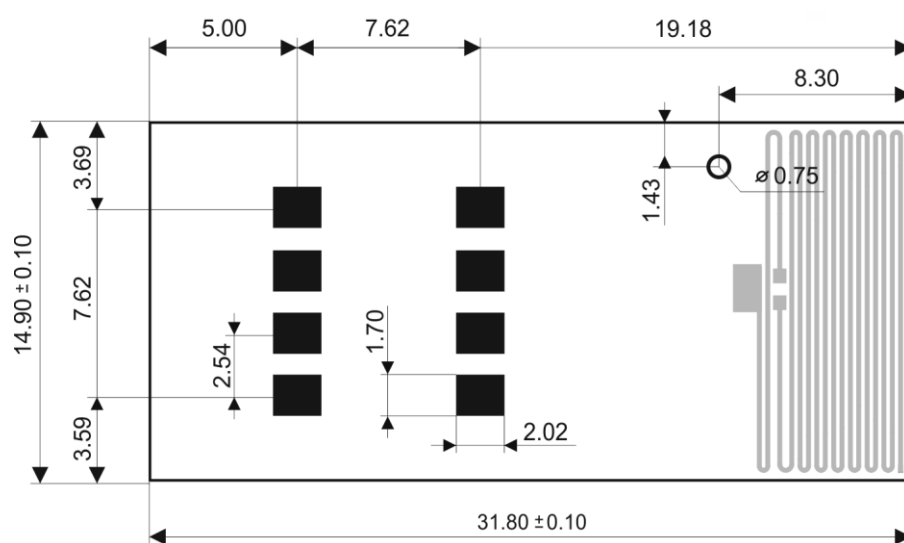


Bottom view

Dimensions



TR-72D(C)-WMB



TR-72DA-WMB

Top view, Units: mm

Recommended SIM connector: KON-SIM-01.

Firmware

TR transceiver

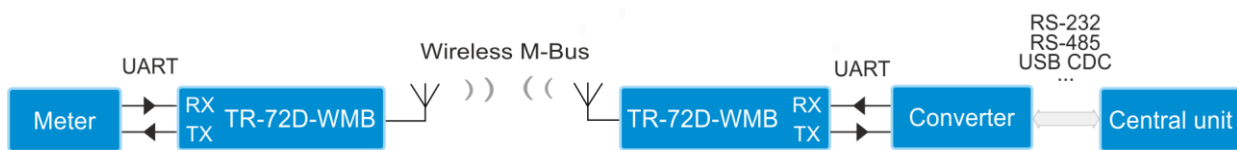
Firmware of the MCU inside the TR transceiver can be upgraded at the user through the PC utility (see below) by the FW possibly released by the factory.

Application

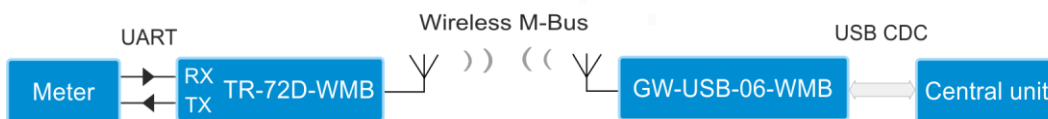
Refer to *Wireless M-Bus Implementation in TR-7xD-WMB User's guide*.

Typical usage

Meter and MUC



Compact implementation using the GW-USB-06-WMB device



Sniffer

The wM-Bus Sniffer allows to monitor wM-Bus communication.



PC software

To configure parameters and control wM-Bus devices in all Meter, MUC and Sniffer modes from PC, the `wMBUS-Utility_XXXXXX.exe` utility is provided. It is also intended for device configuration, wM-Bus communication testing and upgrade of FW inside the TR transceiver.

Product information

Ordering codes

TR - 7 2 D A - WMB

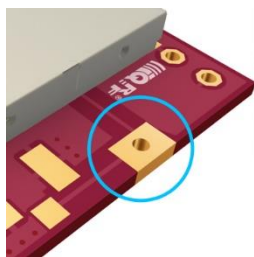
Antenna options:

nil - Soldering pad-hole (no antenna, no antenna connector)

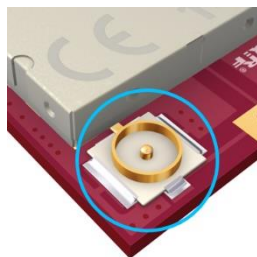
A - On-board PCB antenna

C - U.FL connector (mini coax)

Type	Antenna option
TR-72D-WMB	Soldering pad-hole
TR-72DC-WMB	U.FL connector
TR-72DA-WMB	On-board PCB antenna



TR-72D-WMB



TR-72DC-WMB



TR-72DA-WMB

Document history

- 151209 First release.

Sales and Service

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EN 300220-1 V2.4.1:2012, EN 300220-2 V2.4.1:2012 and VO-R/10/05.2014-3.

Complies with directives 2011/65/EU (RoHS) and 2012/19/EU (WEEE).



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