

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.



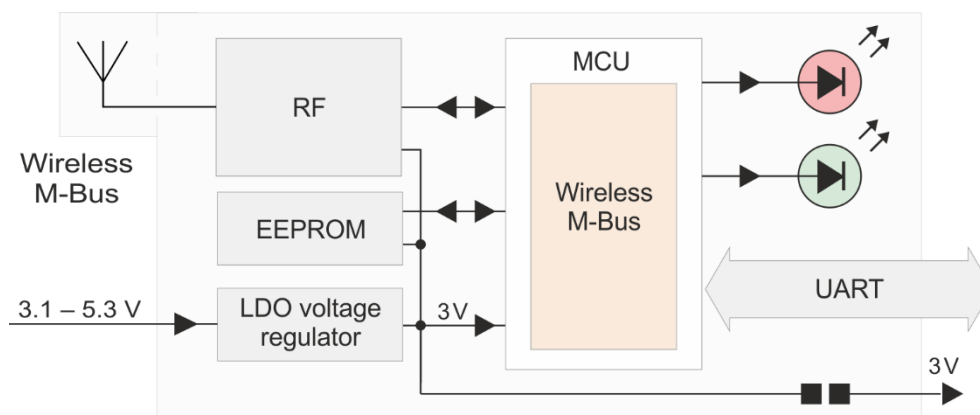
Key features

- 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in this publication regarding device applications and the like is provided only for your convenience and may be superseded by updates.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.

MICRORISC MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND TO STATED CONDITION, QUALITY, PERFORMANCE, MERCHANTABILITY OR FITNESS FOR PURPOSE and disclaims all liability arising from this information and its use. Use of MICRORISC devices in life support and/or safety applications is entirely at the buyer's risk, and the buyer agrees to defend, indemnify and hold harmless MICRORISC from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any MICRORISC intellectual property rights.

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.

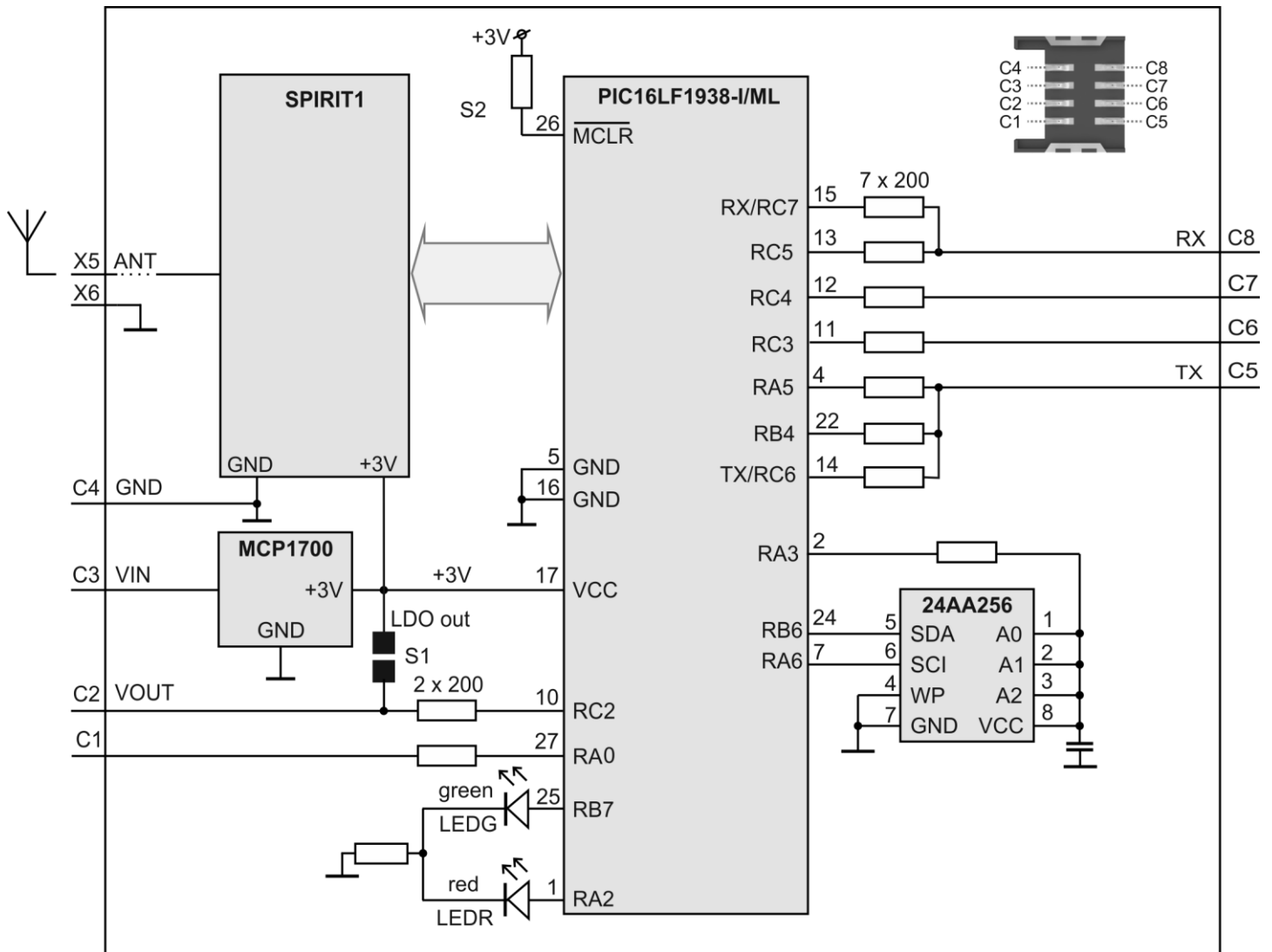
Caution: Electrostatic sensitive device. Observe appropriate precautions for handling.

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 |

Simplified schematic

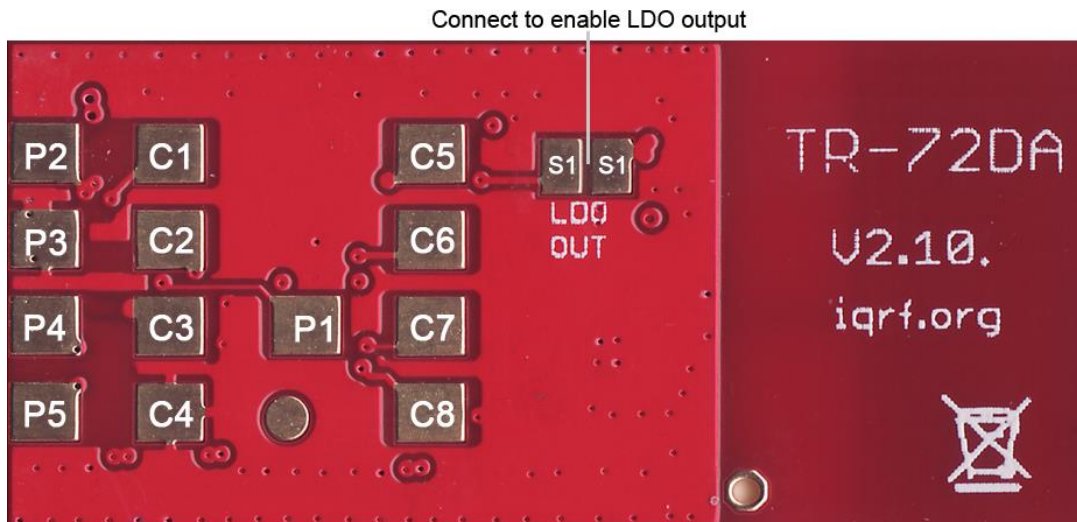


Basic components

| 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 |

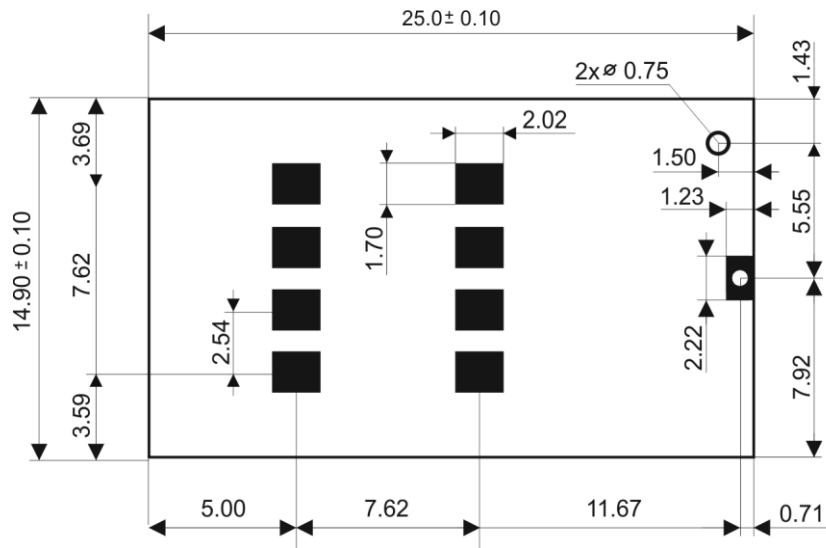
For more information refer to datasheets of ICs used.

| 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). |

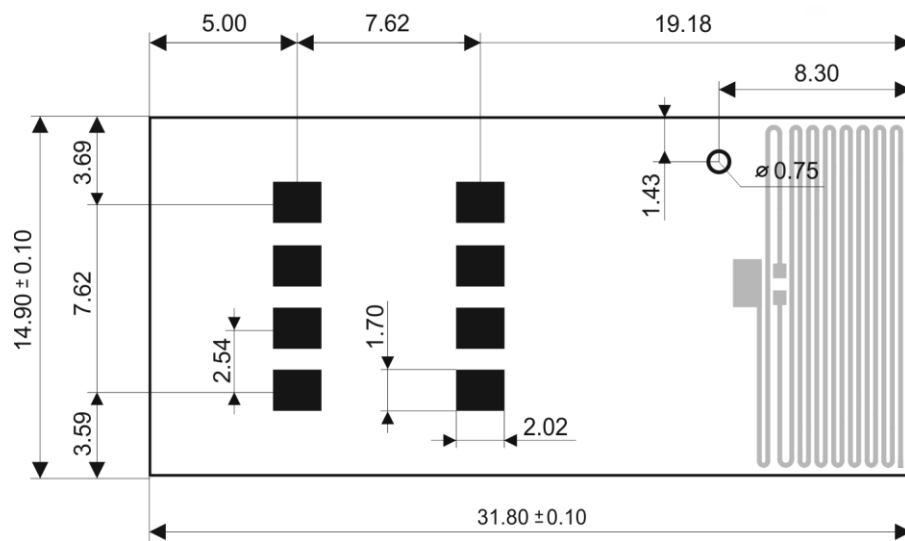


Bottom view

Dimensions



TR-72D(C)-WMB



TR-72DA-WMB

Top view, Units: mm

Recommended SIM connector: KON-SIM-01.

Firmware

TR transceiver

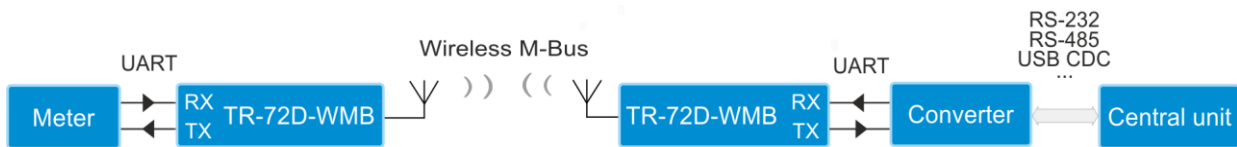
Firmware of the MCU inside the TR transceiver can be upgraded at the user through the PC utility (see below) by the FW possibly released by the factory.

Application

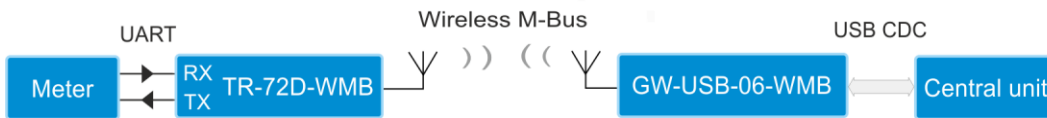
Refer to *Wireless M-Bus Implementation in TR-7xD-WMB User's guide*.

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

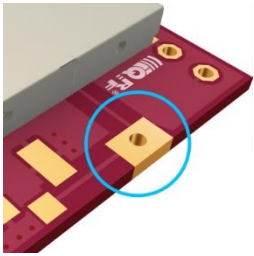
└───┬───┘ Antenna options:

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

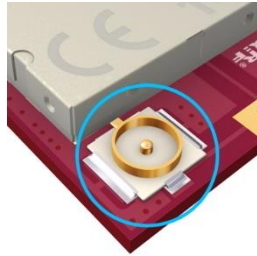
A - On-board PCB antenna

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

Corporate office

MICRORISC s.r.o., Prumyslova 1275, 506 01 Jicin, Czech Republic, EU
Tel: +420 493 538 125, Fax: +420 493 538 126, www.microrisc.com.

Partners and distribution

Please visit www.iqrf.org/partners.

Quality management

ISO 9001 : 2009 certified

Complies with ETSI directives EN 301489-1 V1.9.2:2011, EN 301489-3 V1.6.1:2013,
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).



Trademarks

The IQRF name and logo and MICRORISC name are registered trademarks of MICRORISC s.r.o.
PIC, SPI, Microchip and all other trademarks mentioned herein are property of their respective owners.

Legal

All information contained in this publication is intended through suggestion only and may be superseded by updates without prior notice. No representation or warranty is given and no liability is assumed by MICRORISC s.r.o. with respect to the accuracy or use of such information.

Without written permission it is not allowed to copy or reproduce this information, even partially.

No licenses are conveyed, implicitly or otherwise, under any intellectual property rights.

The IQRF® products utilize several patents (CZ, EU, US)

On-line support: support@iqrf.org



Smarter wireless. Simply.