TR-76D-WMB

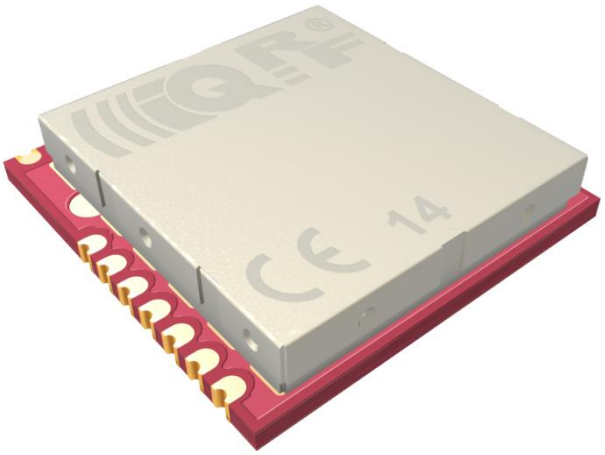
Transceiver Module for Wireless M-Bus

Data Sheet

Smarter wireless. Simply.

Description

TR-76D-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 transceivers for battery powered applications.



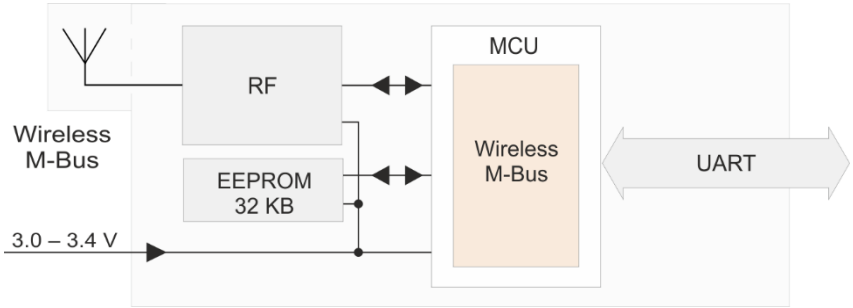
Key features

- 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
- RF band 868 MHz
- FSK modulation
- RF output power 12.5 mW
- Serial EEPROM 256 Kb
- Antenna options: on-board antenna or soldering antenna pad-hole
- Stamp-hole pads, SMT mounting, compatible with SIM card connector without metallic holder (KON-SIM-02)
- Shielding can
- Extra low power consumption

Applications

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

Block diagram



Electrical specifications

***Typical values** unless otherwise stated*

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

Supply voltage (V_{CC})	3.0 V min., 3.4 V max., stabilized
Operating temperature [1]	-40 °C to +85 °C
Supply current	
Sleep mode	< 1 µA (Pin Q5 must be at logic high level)
Run mode	6.2 mA
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-76DA-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 Q4 and Q5 pins	0 V to V_{CC}
Size (L x W x H)	15.2 mm x 14.9 mm x 3.3 mm (TR-76D-WMB) 23.3 mm x 14.9 mm x 3.3 mm (TR-76DA-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.

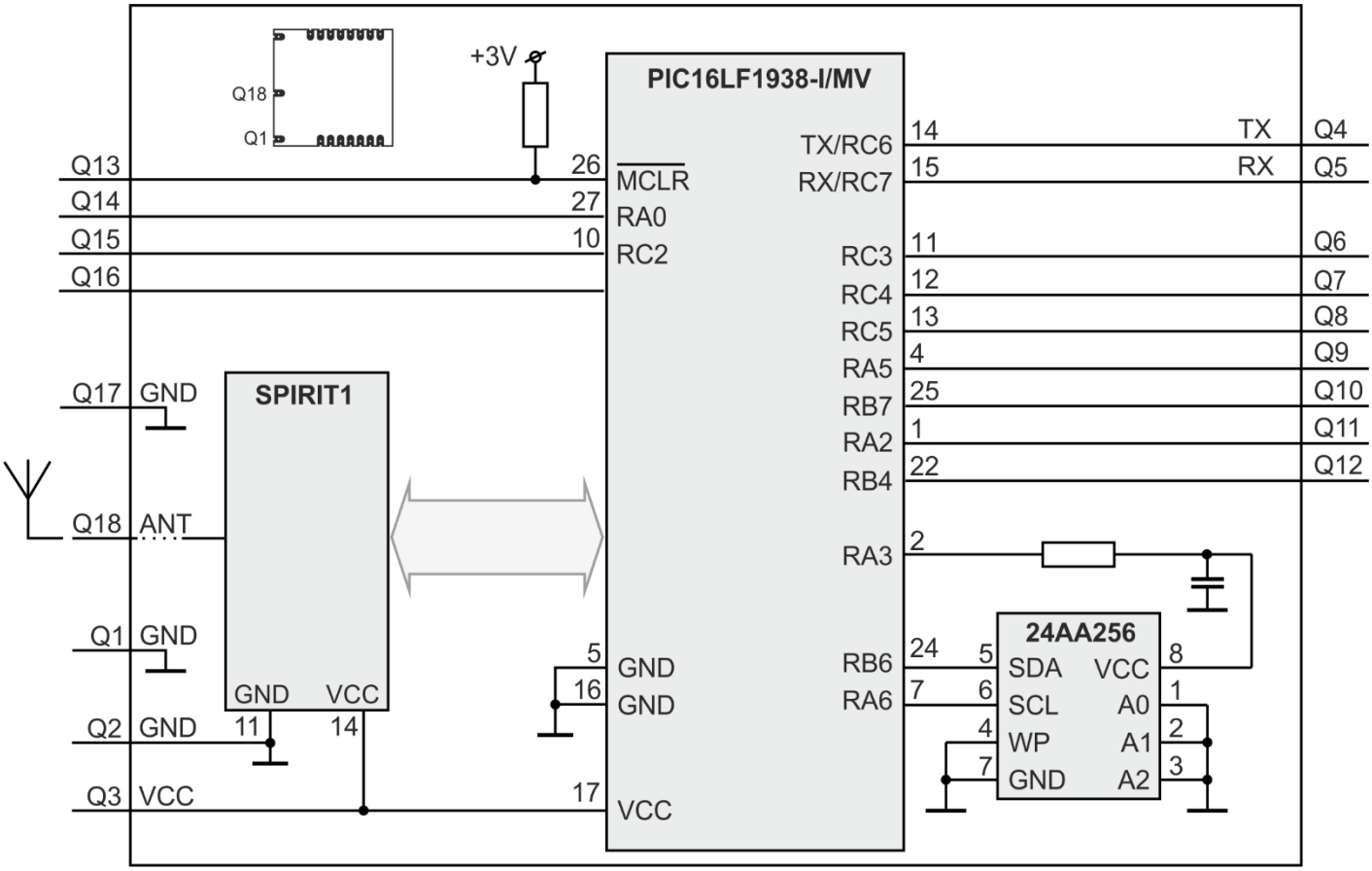
***Caution:** Electrostatic sensitive device. Observe appropriate precautions for handling.*

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})	4.0 V
Voltage on Q4 and Q5 pins vs. GND	-0.3 V to (V_{CC} + 0.3 V)
Storage temperature	-40 °C to +85 °C
Ambient temperature under bias	-40 °C to +85 °C

Simplified schematic



Basic components

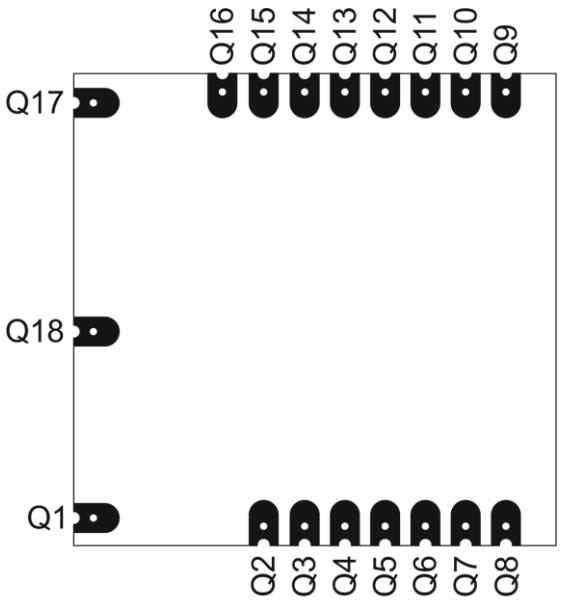
IC	Type	Manufacturer	Note
MCU	PIC16LF1938–I/MV	Microchip	
RF IC	SPIRIT1	STMicroelectronics	
RF balun	BALF-SPI-01D3	STMicroelectronics	
EEPROM	24AA256-I/CS16K	Microchip	256 Kb

For more information refer to datasheets of ICs used.

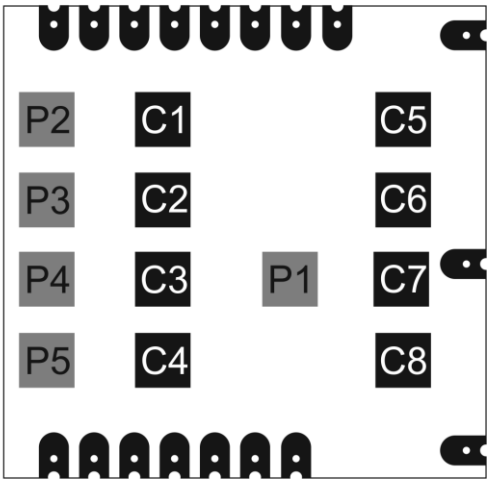
Pin	*Name*	*Description*
Q1 [1]	GND	Ground
Q2, C4	**GND**	Ground
Q3, C3	**V_{CC}**	Power supply voltage
Q4	**TX**	UART TX
Q5	**RX**	UART RX
Q6, C6	*n.u.*	Do not use, leave unconnected
Q7, C7	*n.u.*	Do not use, leave unconnected
Q8, C8	*n.u.*	Do not use, leave unconnected
Q9, C5	*n.u.*	Do not use, leave unconnected
Q10 to Q16	*n.u.*	Do not use, leave unconnected
Q17 [1]	GND	Ground
Q18 [1]	ANT	Antenna input
P1 to P5	*n.u.*	For manufacturer only Do not use, leave unconnected

Note 1: For TR-76D-WMB only. Not implemented for TR-76DA-WMB.

Top view

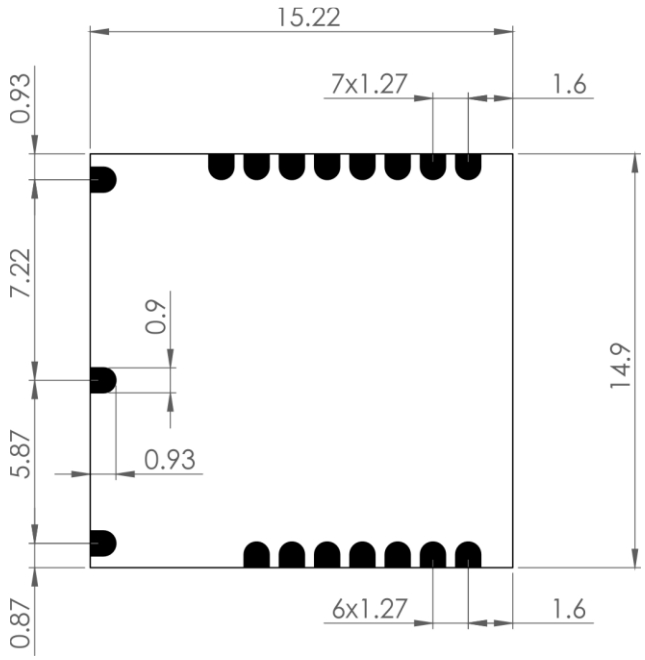


Bottom view

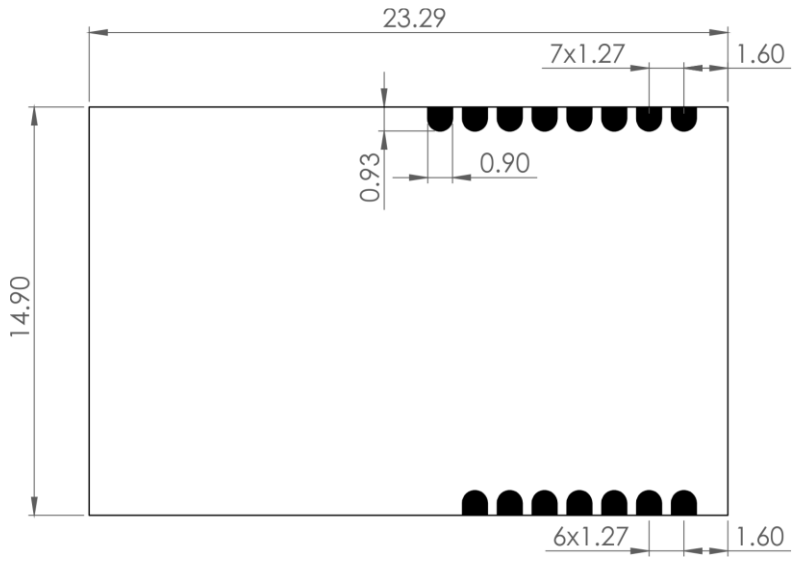


Mechanical drawings

TR-76D-WMB



TR-76DA-WMB



Top view. Units: mm.

Application

Users have to ensure observing local provisions and restrictions relating to the use of short range devices by software, e.g. the CEPT ERC/REC 70-03 Recommendation and subsequent amendments in EU.

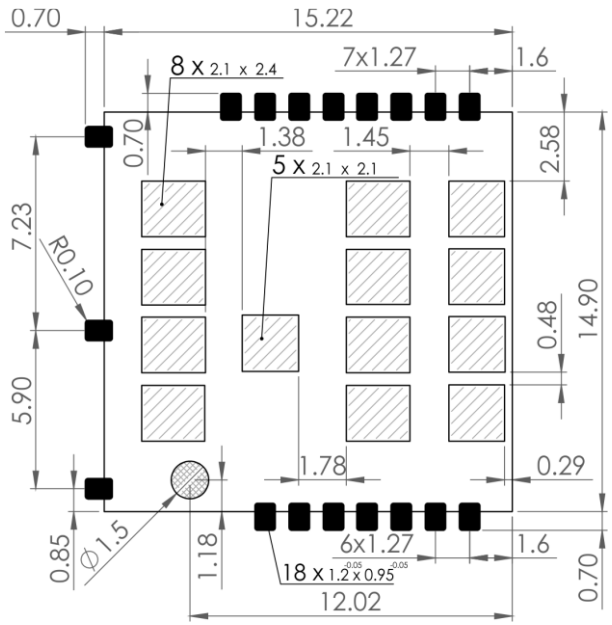
Assembly

For proper mounting of surface mount TR-76Dx-WMB modules and avoiding damage during solder reflow assembly the IPC/JEDEC J-STD-020C standard must be observed. The parts must be baked dry according to IPC/JEDEC J-STD-033C,MSL 4 before reflow soldering. For reflow profile and details refer to the *AN010 Application note – SMT mounting of IQRF TR modules*.

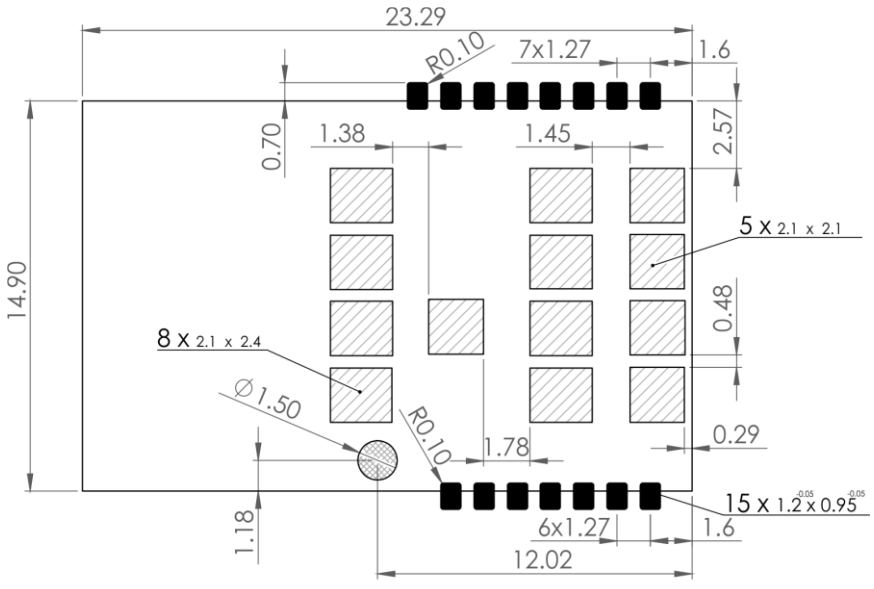
Caution: *TR-76Dx-WMB must not be plugged in a SIM connector with metallic holder.*

Recommended PCB layout:

TR-76D-WMB:



TR-76DA-WMB:



Top view. Units: mm.

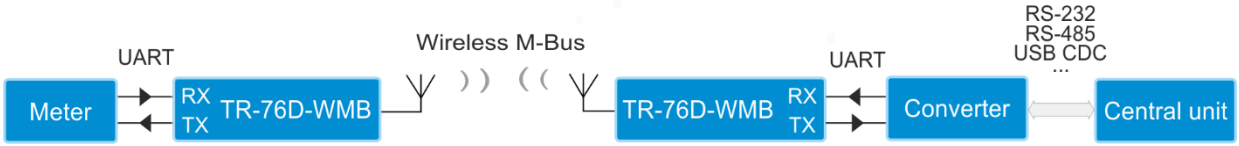
Firmware

Firmware of the MCU inside the TR-76Dx-WMB transceiver can be upgraded at the user through the PC utility (see below) by the FW possibly released by the factory.

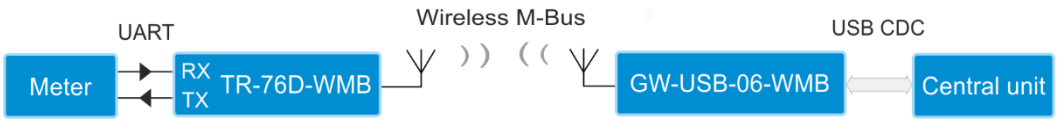
Typical usage

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

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 utility

To configure parameters and control wM-Bus devices in all Meter, MUC and Sniffer modes from PC, the `WMBUS-Utility_xxxxxx.exe` software utility is provided. It is also intended for device configuration, wM-Bus communication testing and upgrade of FW inside the TR-76Dx-WMB transceiver.

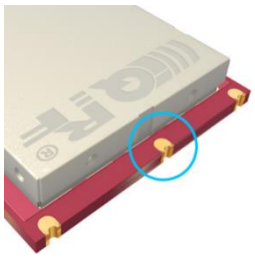
Product information

Ordering codes

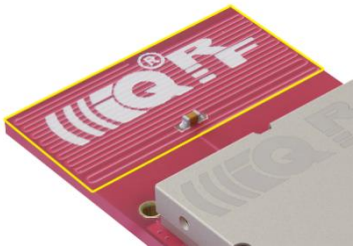
TR-76D A - WMB

- Wireless M-Bus transceiver
- Antenna options
  - ***nil*** **-** soldering pad-hole (no antenna, no U.FL connector)
  - **A** **-** PCB antenna
- Transceiver series

Type	Antenna option
TR-76D-WMB	Soldering pad-hole
TR-76DA-WMB	PCB antenna



TR-76D-WMB



TR-76DA-WMB

Document history

- 161124 First release.

Sales and Service

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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

Legal

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

On-line support: support@iqrf.org

Smarter wireless. Simply.