

# **TR-52B**

## **Transceiver Module**

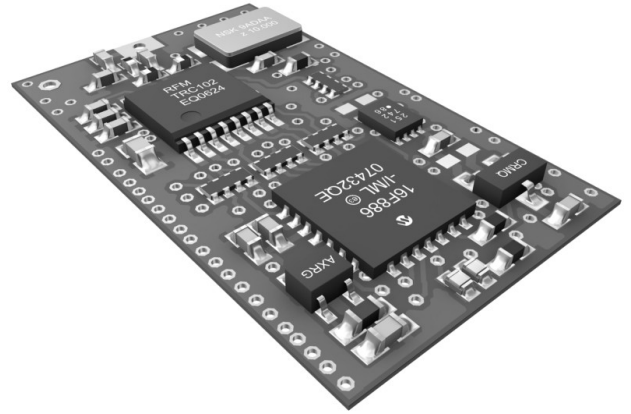
### **Data Sheet**



Simple way to smarter wireless solutions

## Description

TR-52B is a family of IQRF transceiver modules operating in the 868 MHz and 916 MHz license free ISM (Industry, Scientific and Medical) frequency band. Its highly integrated ready-to-use design requires no external components. The microcontroller with built-in operating system, excellent development support, integrated LDO regulator, temperature sensor and serial EEPROM dramatically reduce time of application development. Ultra low power consumption predetermines these modules for use in battery powered applications.



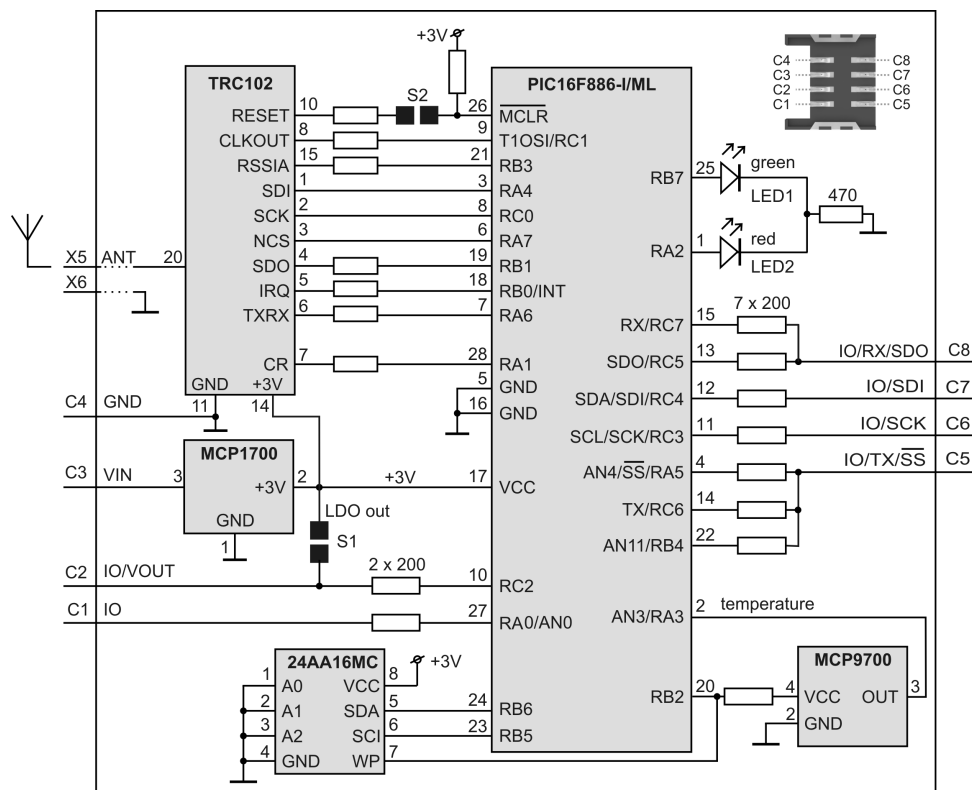
## Applications

- Telemetry
- Building automation
- Wireless control & regulation
- Access control
- Remote data acquisition
- Communication links
- RF connectivity in many other areas

## Key features

- Complete solution with operating system, easy to use
- Extended RF power, FSK modulation, multiple channel
- MCU with extended Flash memory, additional serial EEPROM
- Ultra low power consumption, low cost
- SPI interface supported by OS on background
- On-board temperature sensor and battery monitoring
- +3 V LDO regulator output
- 2 LEDs
- Up to 6 I/Os, up to 2 analog inputs (A/D)
- SIM card format
- Coaxial antenna connector (optional)
- On-board antenna (optional)

## Simplified schematics



**Electrical specifications**
*(typical values unless otherwise stated, for brief guidance only)*

Supply voltage (VCC)	3.0 V to 5.3 V
Operating temperature	0 °C to +70 °C -40 °C to +85 °C (Industrial) available on request
Supply current	
Sleep mode	2 µA
Additional watchdog supply current	2 µA typ., 4 µA max. (watchdog enabled)
Run mode <sup>1</sup>	1 mA @ 8 MHz 170 µA @ 125 kHz 17 µA @ 31 kHz
Additional supply current	0.6 mA (TRC102 on) 2 mA (one or two LEDs on)
Rx mode	13 mA (STD mode) 5 mA (LP mode <sup>4</sup> ) 1 mA max. (XLP mode <sup>4</sup> )
Tx mode	14 mA – 24 mA (according to RF output power)
RF sensitivity <sup>2</sup>	-110 dBm @ 868 MHz, 1.2 kb/s - 99 dBm @ 868 MHz, 19.2 kb/s -109 dBm @ 916 MHz, 1.2 kb/s -102 dBm @ 916 MHz, 19.2 kb/s
RF output power	up to 5 dBm, programmable in 8 steps (7-0), -3dBm/step
RF range (TR-52BA) <sup>3</sup>	up to 700 m @ 1.2 kb/s up to 500 m @ 19.2 kb/s
Nominal frequency	868.35 MHz or 916.50 MHz (software selectable)
RF data modulation	FSK (frequency-shift-keyed)
RF data transmission bit rate	up to 86.2 kb/s – preliminary
LDO output (VOUT)	+3 V, 100 mA max.
A/D converter	10 b, 2 inputs (multiplexed S&H, successive approximation)
Input A/D impedance	10 kΩ max.
Temperature sensor accuracy	±2 °C typ., ±4 °C max. (not calibrated) ±0.1 °C min. (calibrated)
Size (L x W x H)	25.0 mm x 14.9 mm x 3.0 mm 41.8 mm x 14.9 mm x 3.0 mm (TR-52BA)

**Note 1:** TRC102 in standby mode.

**Note 2:** RF sensitivity depends on frequency band and bit rate.

**Note 3:** RF range strongly depends on module orientation and surroundings.

**Note 4:** Depends on interferences.

**Absolute maximum ratings**

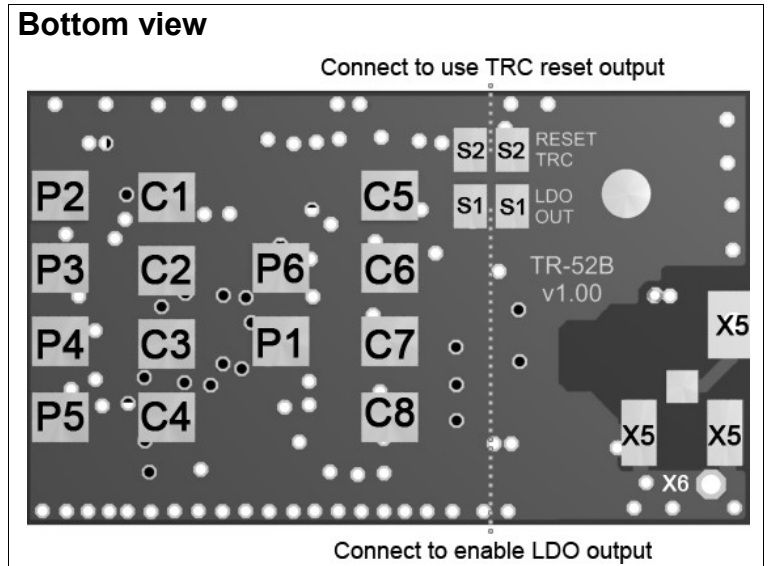
Stresses above those values may cause permanent damage to the device. Exposure to maximum rating conditions for extended periods may affect device reliability.

Supply voltage (VCC)	5.5 V
Storage temperature	-50 °C to +100 °C
Ambient temperature under bias	-40 °C to +85 °C

For more information refer to datasheets of ICs used:

IC	type	manufacturer
<b>MCU</b>	PIC16F886-I/ML	Microchip
<b>RF</b>	TRC102	RF Monolithics (RFM)
<b>LDO voltage regulator</b>	MCP1700	Microchip
<b>Temperature sensor</b>	MCP9700	Microchip

Pin	Name	Description
C1	<b>IO/AN</b> RA0 AN0	General I/O pin Analog A/D input
C2	<b>IO/AN/VOUT</b> RA1 VOUT	General I/O pin (S1 disconnected) On-board +3 V LDO output (S1 connected)
C3	<b>VIN</b>	Power supply voltage
C4	<b>GND</b>	Ground
C5	<b>IO/AN/TX/-SS</b> RA5, RB4, RC6 AN4, AN11 TX -SS	General I/O pin, wake-up on change on RB4 Analog A/D input UART Tx SPI Slave select input (SPI enabled)
C6	<b>IO/SCK/SCL</b> RC3 SCK SCL	General I/O pin SPI clock input (SPI enabled) I <sup>2</sup> C clock
C7	<b>IO/SDI/SDA</b> RC4 SDI SDA	General I/O pin SPI data in (SPI enabled) I <sup>2</sup> C data
C8	<b>IO/RX/SDO</b> RC5, RC7 RX SDO	General I/O pin UART Rx SPI data out (SPI enabled)
X5	<b>ANT</b>	Antenna input
X6	<b>GND</b>	Ground (for dipole antenna)
P1–P6		For factory programming only
S1		LDO output enable. Connect to enable (default disabled).
S2		TRC reset output enable. Connect to reset the MCU from the TRC (default disabled).

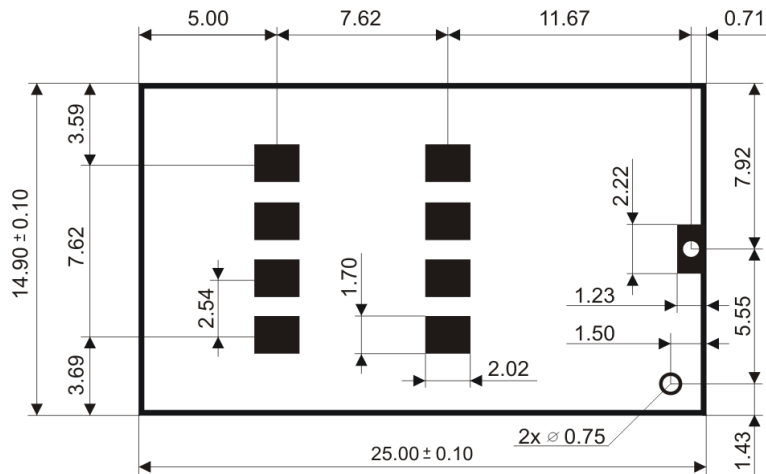


## Application

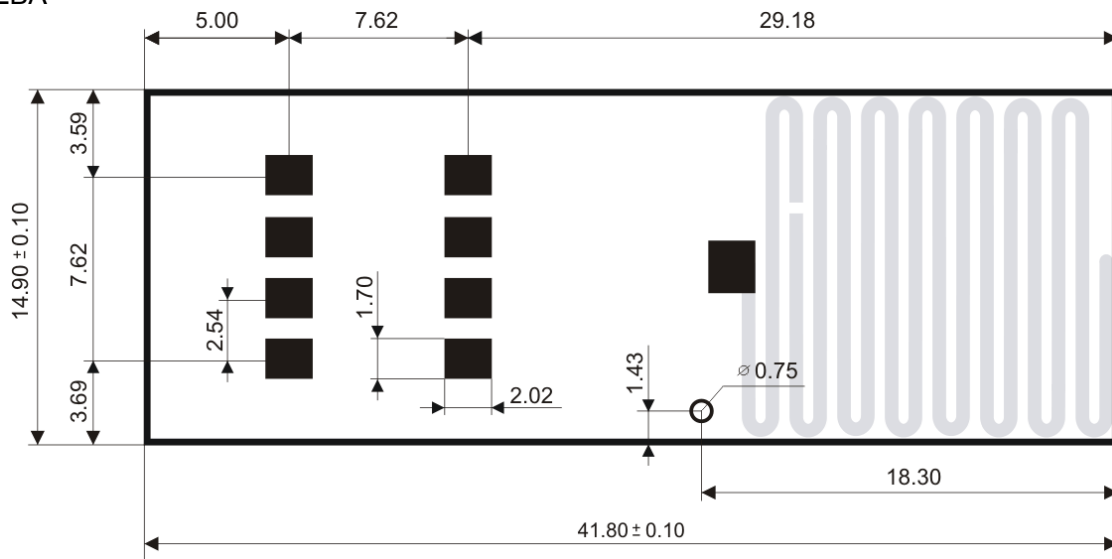
See IQRF OS User's guide, IQRF OS Reference guide, Application examples, [www.iqrf.org](http://www.iqrf.org) and [www.iq-esupport.com](http://www.iq-esupport.com).

## Dimensions

TR-52B, TR-52BK, TR-52BC



TR-52BA

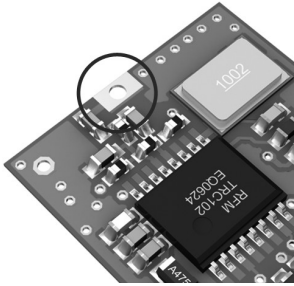


Units: mm

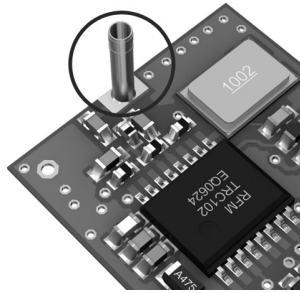
Recommended SIM connector: KON-SIM-01

## Ordering codes

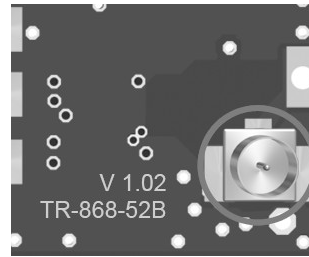
Type	frequency [MHz]	antenna connector
<b>TR-52B</b>	868 / 916	soldering hole
<b>TR-52BK</b>	868 / 916	for AN-868-03 (¼ whip)
<b>TR-52BC</b>	868 / 916	KON-U.FL-R-SMT (mini coax)
<b>TR-52BA</b>	868 / 916	built-in PCB antenna



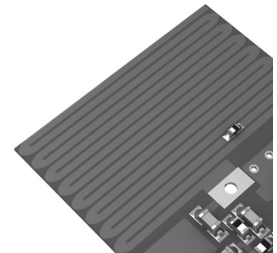
TR-52B



TR-52BK



TR-52BC



TR-52BA

## Document history

- 100209 First release
- 090612 Preliminary

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# Sales and Service

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*ISO 9001 : 2000 certified*

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ETSI EN 300220-1:00, ETSI EN 300390-2V.1.1.1:00*

*Complies with FCC directives FCC CFR, Title 47, Part 15, Section 15.209, FCC CFR, Title 47, Part 15, Section 15.249*

*Complies with Directive 2002/95/EC (RoHS)*



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