

# **TR-XXX-32B**

## **Transceiver Module**

### **Data Sheet**

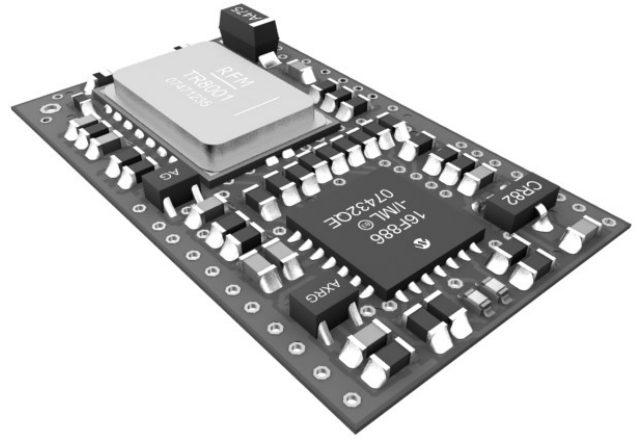
- TR-868-32B
- TR-916-32B



Simple way to smarter wireless solutions

## Description

TR-xxx-32B is a family of IQRF transceiver modules operating in the 868 MHz or 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 and temperature sensor dramatically reduce time of application development. Ultra low power consumption predetermines these modules for use in battery powered applications.



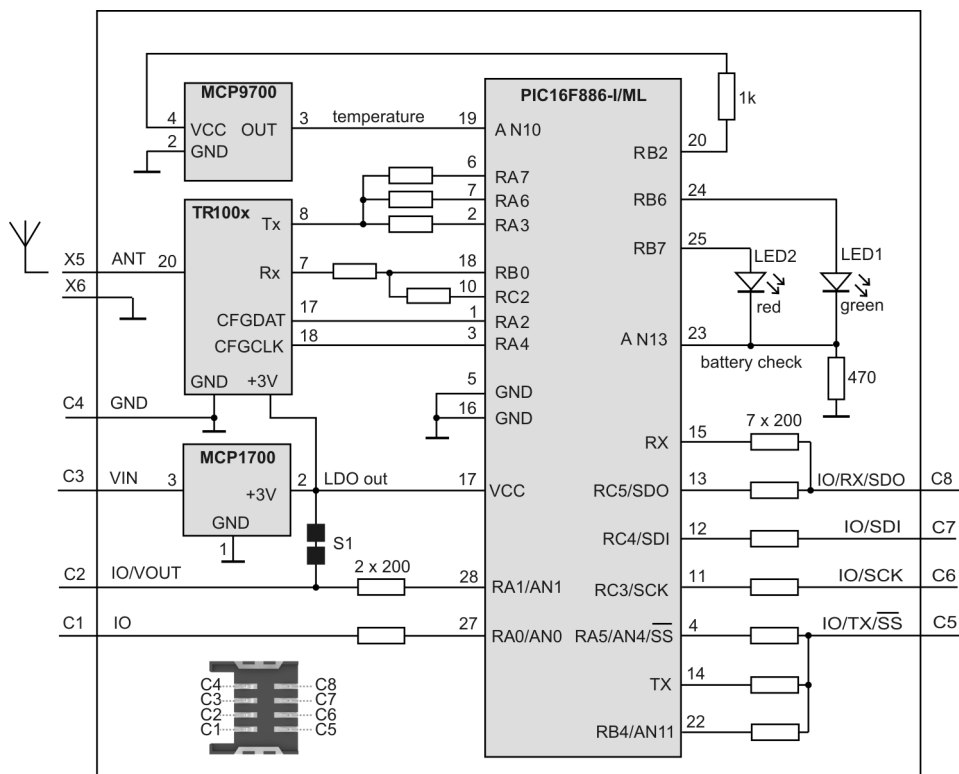
## Applications

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

## Key features

- Complete solution with operating system, easy to use
- Extended RF power
- MCU with extended Flash memory
- 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
- Dual LED
- 5/6 I/Os, 3 analog inputs (A/D)
- SIM card format
- Coaxial antenna connector (optional)

## Simplified schematics



**Electrical specifications**
*(typical values unless otherwise stated)*

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
<b>Supply current</b>	
Sleep mode	2.5 µA @ 3.0V 2.6 µA @ 3.6V
Run mode <sup>1</sup>	0.9 mA @ 8 MHz 0.5 mA @ 4 MHz 0.25 mA @ 1 MHz 170 µA @ 125 kHz 30 µA @ 31 kHz
Rx mode	5.0 mA @ 8 MHz
Tx mode	4.0 mA @ 8 MHz, Txpower = 7, transmitting '0' 29 mA @ 8 MHz, Txpower = 7, transmitting '1' 6 mA @ 8 MHz, Txpower = 1, balanced '0' / '1' 9 mA @ 8 MHz, Txpower = 2, balanced '0' / '1' 13 mA @ 8 MHz, Txpower = 4, balanced '0' / '1' 16.5 mA @ 8 MHz, Txpower = 6, balanced '0' / '1' 18 mA @ 8 MHz, Txpower = 7, balanced '0' / '1'
Additional supply current when LED(s) on	2 mA
RF sensitivity	-104 dBm
RF output power	up to 10 dBm, programmable in 7 levels of Txpower
Frequency range	868.35 MHz (TR-868-32B) 916.50 MHz (TR-916-32B)
RF data modulation	ASK (amplitude-shift-keyed)
RF data transmission bit rate	20 kb/s
RF data transmission bit rate (true speed) <sup>3</sup>	up to 13 kb/s
LDO output (VOUT)	+3 V, 100 mA max.
A/D converter	10 b, 3 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-xxx-32BA)

**Note 1:** TR800x in standby mode, BOR disabled, WDT disabled.

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

**Note 3:** True speed of RF data transmission strongly depends on transmitted data structure.

**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.

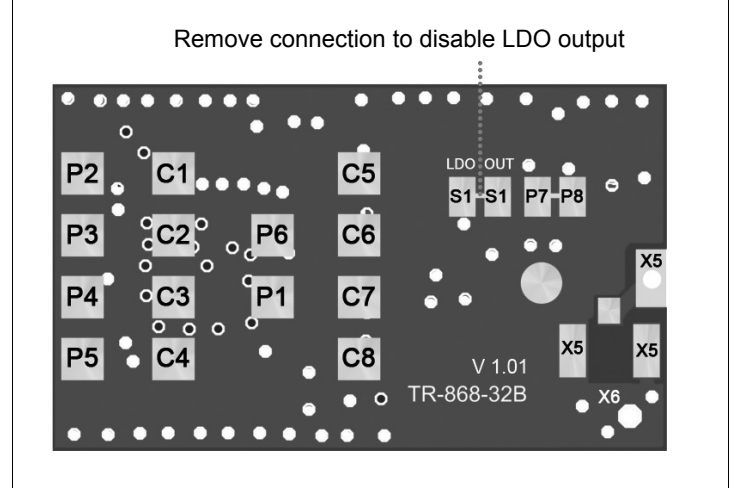
Supply voltage (VCC)	5.5 V
Storage temperature	-50 °C to +100 °C
Ambient temperature under bias	-40 °C to +85 °C

For more information refer to datasheets of ICs used:

IC	type	manufacturer
<b>MCU</b>	PIC16F886-I/ML	Microchip
<b>RF</b>	TR8001 (868 MHz) / TR8000 (916 MHz)	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	General I/O pin
	AN0	Analog A/D input
C2	<b>IO/AN/VOUT</b>	
	RA1	General I/O pin (S1 disconnected)
	AN1	Analog A/D input (S1 disconnected)
	VOUT	On-board +3 V LDO output (S1 connected – default)
C3	<b>VIN</b>	Power supply voltage
C4	<b>GND</b>	Ground
C5	<b>IO/AN/TX/-SS</b>	
	RA5	General I/O pin
	AN4, AN11	Analog A/D input
	TX	UART TX
	-SS	SPI Slave select input (SPI enabled)
	RB4	General I/O pin, Interrupt on change
C6	<b>IO/SCK</b>	
	RC3	General I/O pin
	SCK	SPI clock input (SPI enabled)
C7	<b>IO/SDI</b>	
	RC4	General I/O pin
	SDI	SPI data in (SPI enabled)
C8	<b>IO/RX/SDO</b>	
	RC5	General I/O pin
	RX	UART RX
	SDO	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

### Bottom view

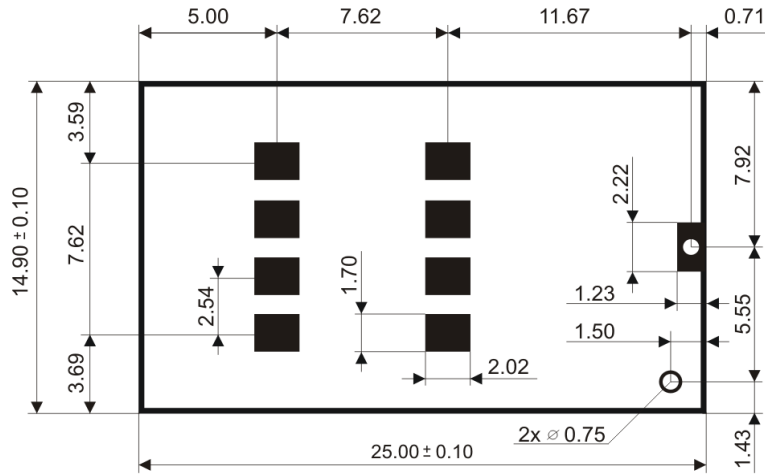


## Application

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

## Dimensions

TR-xxx-32B, TR-xxx-32BK, TR-xxx-32BC

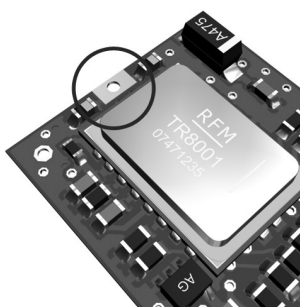


Units: mm

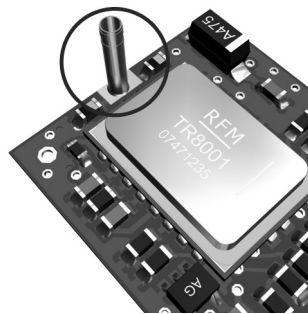
Recommended SIM connector: KON-SIM-01

## Ordering codes

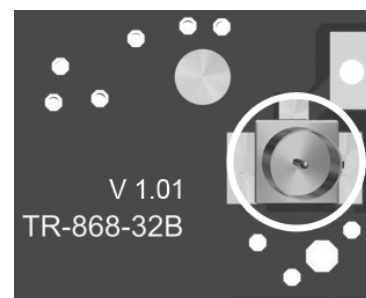
Type	frequency [MHz]	locality	antenna connector
TR-868-32B	868	EU	–
TR-868-32BK	868	EU	for AN-868-03 (¼ whip)
TR-868-32BC	868	EU	KON-U.FL-R-SMT (coax)
TR-916-32B	916	USA	–
TR-916-32BK	916	USA	for AN-916-03 (¼ whip)
TR-916-32BC	916	USA	KON-U.FL-R-SMT (coax)



TR-xxx-32B



TR-xxx-32BK



TR-xxx-32BC

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# Sales and Service

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## Partners and distribution

Please visit [www.iqrf.org/partners](http://www.iqrf.org/partners)

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