

TR-21A

Transceiver Module

Data Sheet

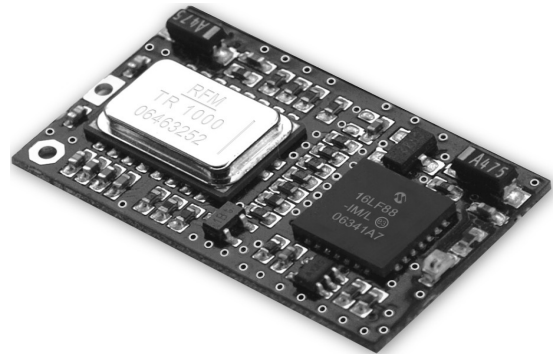
- TR-21A-868
- TR-21A-916



Simple way to smarter wireless solutions

Description:

TR-21A 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 high integrated ready-to-use design requires no external components (excluding antenna). 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 of TR-21A predetermines these modules for use in battery powered applications.



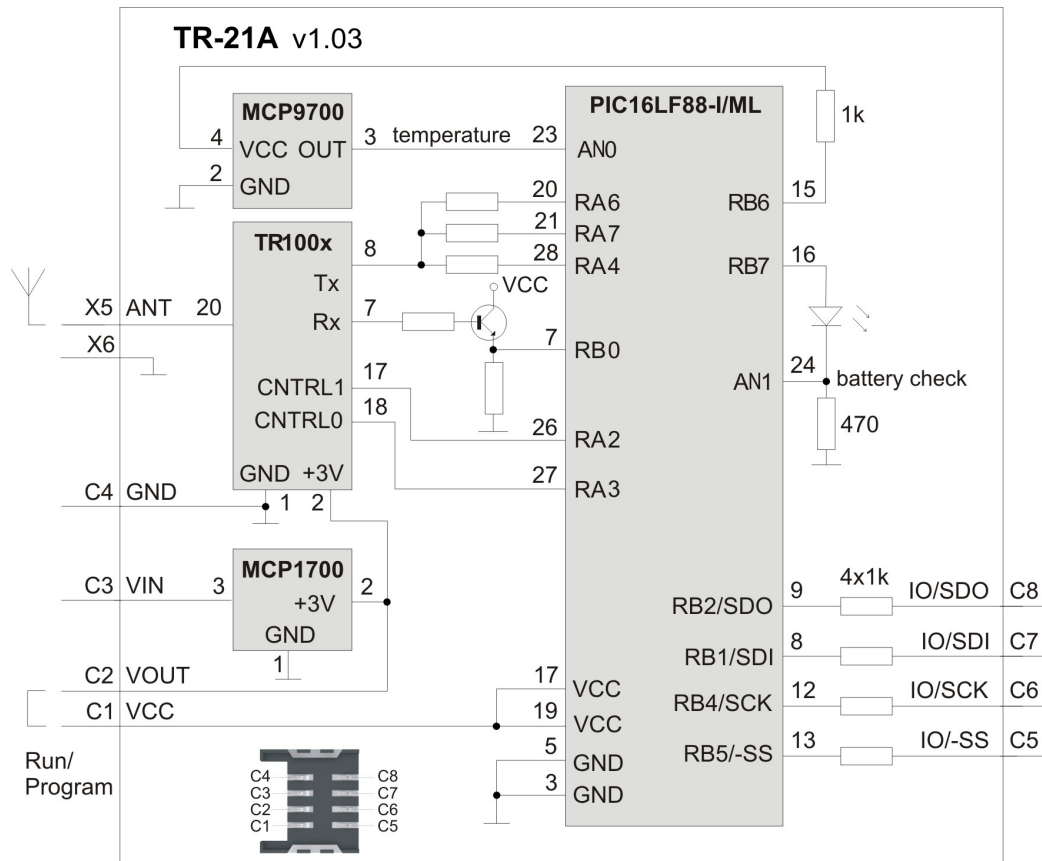
Applications:

- Telemetry
- Home 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 - fast learning curve
- Low cost
- Ultra low power consumption
- SPI Interface supported by OS (in background)
- Battery monitoring
- On-board temperature sensor
- +3 V LDO regulator output
- SIM card format

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

Supply current :

Sleep mode: 5.4 μ A @ 3.0V (v1.03)
 5.5 μ A @ 3.6V (v1.03)
 5.5 μ A @ 3.6V (v1.02)

Run mode¹ : 1.0 mA @ 8 MHz
 570 μ A @ 4 MHz
 290 μ A @ 1 MHz
 170 μ A @ 125 kHz
 17 μ A @ 32 kHz

Rx mode: 4.0 mA @ 8 MHz

Tx mode: 3.3 mA @ 8 MHz, Txpower = 7, transmitting '0'
 13 mA @ 8 MHz, Txpower = 7, transmitting '1'
 3.5 mA @ 8 MHz, Txpower = 1, balanced '0' / '1'
 5.5 mA @ 8 MHz, Txpower = 2, balanced '0' / '1'
 6.8 mA @ 8 MHz, Txpower = 4, balanced '0' / '1'
 8.2 mA @ 8 MHz, Txpower = 6, balanced '0' / '1'
 8.2 mA @ 8 MHz, Txpower = 7, balanced '0' / '1'

Additional supply current when LED on: 2 mA

RF sensitivity: -101 dBm
 RF output power: up to 1.5 dBm, programmable in 7 levels of TXpower
 Frequency range: 868.35 MHz (TR-21A-868)
 916.50 MHz (TR-21A-916)
 RF data modulation: ASK (amplitude-shift-keyed)
 RF data transmission bit rate: 20 kb/s
 RF data transmission bit rate (true speed)²: up to 13 kb/s
 LDO output (VOUT): +3 V, 100 mA max.
 Temperature sensor accuracy: \pm 4 °C max. (not calibrated)
 \pm 0.1 °C min. (calibrated)

Size (L x W x H): 25.0 mm x 14.9 mm x 3.0 mm

Note 1: TR1001 in standby mode, BOR disabled, WDT enabled

Note 2: True speed of RF data transmission strongly depends on transmitted data structure.

Note 3: When the operating temperature is limited to 60°C, the time required to switch from transmit to receive is dramatically less for short transmissions.

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.

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 see datasheets of ICs used:

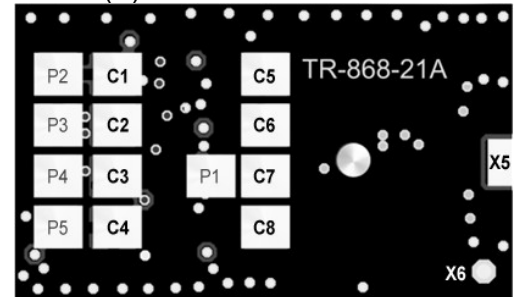
IC	type	manufacturer
MCU	PIC16LF88-I/ML	Microchip
RF	TR1001 (868 MHz) / TR1000 (916 MHz)	RF Monolithics (RFM)
LDO voltage regulator	MCP1700	Microchip
Temperature sensor	MCP9700	Microchip

Pin	Name	Description
C1	VCC	Supply voltage of microcontroller. Connect to VOUT.
C2	VOUT	Output from on-board LDO regulator (+3 V).
C3	VIN	Power supply voltage
C4	GND	Ground
C5	IO/-SS	General I/O pin. Interrupt-on-change pin. SPI Slave select input (SPI enabled)
	RB5 -SS	
C6	IO/SCK	General I/O pin. Interrupt-on-change pin. SPI clock input (SPI enabled)
	RB4 SCK	
C7	IO/SDI	General I/O pin SPI data in (SPI enabled)
	RB1 SDI	
C8	IO/SDO⁴	General I/O pin SPI data out (SPI enabled)
	RB2 SDO	
X5	ANT	Antenna input
X6	GND	Ground (for dipole antenna)
P1–P5		For factory programming only

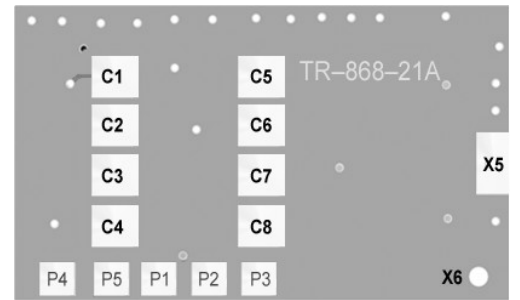
Note 4: This pin is used as output during initial ~250 ms boot-up to recognize programming mode.

Bottom view:

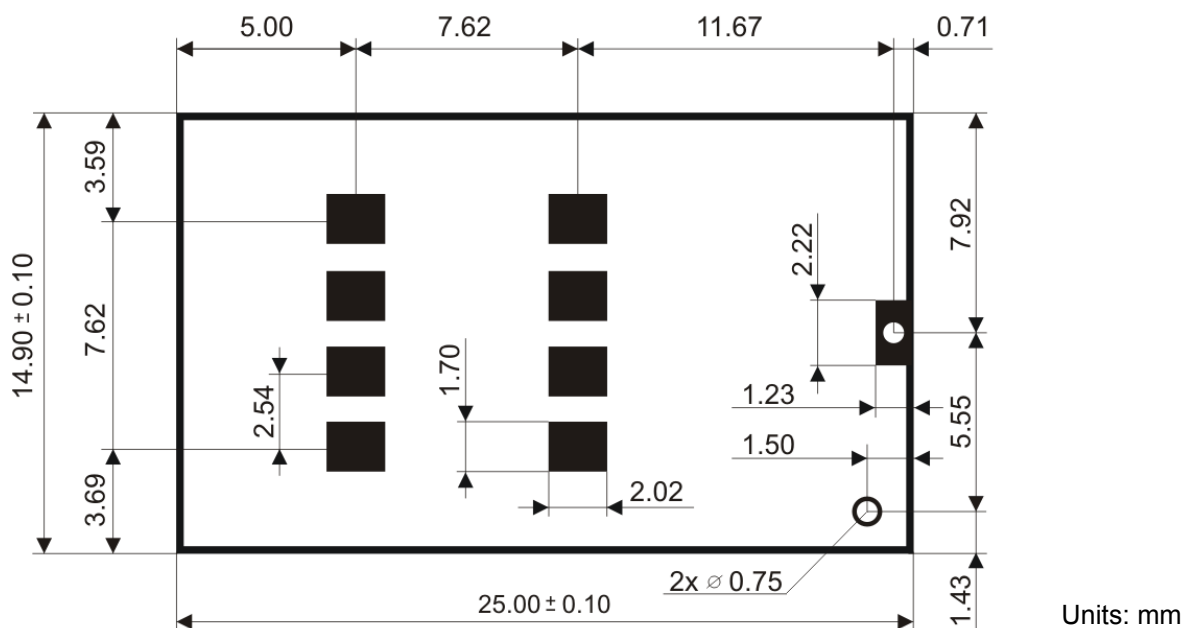
TR-21A(K):



TR-21AKG:



Dimensions:



Recommended SIM connector: KON-SIM-01

Application:

See IQRF OS User's manual, Application examples, www.iqrf.org and www.iq-esupport.com.

Differences in versions v1.02 and v1.03:

	v1.02	v1.03
PCB	green	black
Power consumption in sleep	160 μ A	\sim 5.4 μ A
Temperature sensor circuitry	supplied from pin RB3 	supplied from pin RB6
Temperature measurement	supported with library function	supported with operating system

Ordering codes:

Type	HW version	frequency [MHz]	locality	antenna connector
TR-21A-868	v1.03	868	EU	soldering hole
TR-21AK-868	v1.03	868	EU	for AN-03
TR-21AKG-868	v1.02	868	EU	for AN-03
TR-21A-916	v1.03	916	USA	soldering hole
TR-21AK-916	v1.03	916	USA	for AN-03



K option: with a small connector for the AN-03 antenna ($\frac{1}{4}$ whip)

Datasheet revision history:

- 100506 Note 4 added and information about local restrictions enhanced.
- 100421 Slightly revised, ordering codes updated
- 080920 Detailed supply current parameters
Pictures slightly modified
- 080508 First release

Sales and Service

Corporate office

MICRORISC s.r.o., Delnicka 222, 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 : 2000 certified

*Complies with ETSI directives EN 30279 V.1.2.1:99, ETS 30683:97, ETSI EN 301489-1:00,
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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On-line support: <http://iq-esupport.com>



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