

# **RC-04**

**IQRF Programmable remote controller**

## **User's Guide**



## Description

RC-04 is a universal user programmable IQRF remote controller with bidirectional communication.

It is a generic equipment, i.e. the hardware is fixed and the user can realize specific functionality by software for internal microcontroller. This can be uploaded by the user via RF (which is the only way how to upload the code into the device).



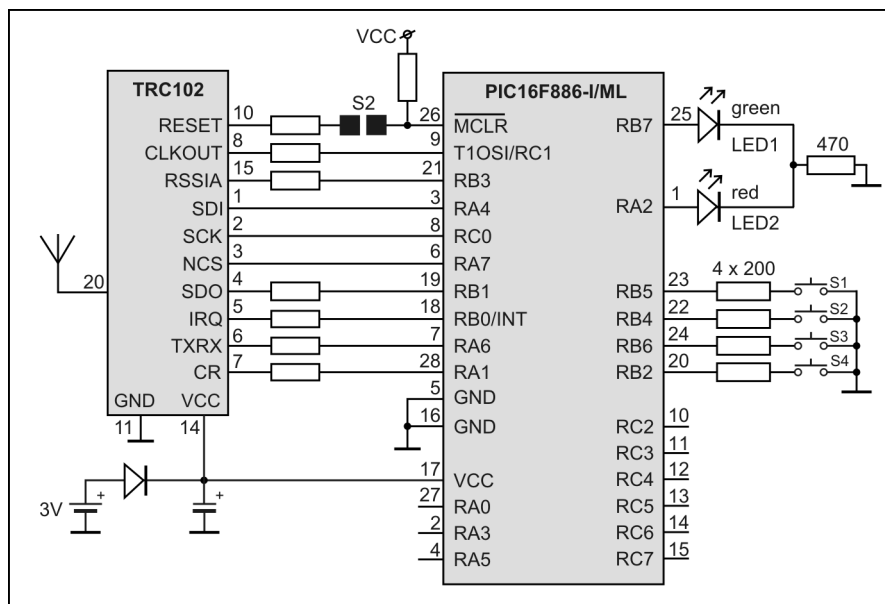
## Applications

- Portable controller
- Automation
- Voting systems
- Wide usage facilities

## Key features

- Built-in IQRF transceiver module
- Programmable via RF only
- Architecture based on TR-52B
- On-board PCB antenna
- 4 pushbuttons, 2 LEDs
- Bidirectional communication – high security in comparison to unidirectional systems
- High performance
- Sleep mode with ultra low power consumption
- Coin battery
- Low cost

## Simplified schematics



---

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


---

RF transceiver	built-in, based on the TR-52B architecture
RF IC	MRF49XA (Microchip)
Microcontroller	PIC16F886 (Microchip)
Antenna	PCB shortened ¼ wave whip
Frequency band	868 MHz or 916 MHz, multiple channels (SW selectable)
RF output power	up to 3.5 mW, programmable in 7 steps
Battery	Lithium 3V, 210 mAh coin cell CR2032
Supply current	<i>depends on application SW (see TR-52B datasheet for details)</i>
Sleep mode	0.8 µA (all peripherals shut down)
Additional watchdog supply current	2 µA typ., 4 µA max. (watchdog enabled)
Run mode	1 mA @ 8 MHz (RF circuitry in standby mode)
Additional supply current	0.6 mA (RF circuitry on) 2 mA (one or two LEDs on)
Rx mode	
STD mode	13 mA
LP mode	3.5 mA (depends on interferences)
XLP mode	600 µA max. (depends on interferences)
Tx mode	14 mA – 24 mA (according to RF output power)
Temperature range	0 °C to +70 °C
Dimensions	58 mm x 42 mm x 14 mm
Weight:	29 g (with the battery and the charm chain)

---

**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)	3.5 V
Storage temperature	-40 °C to +85 °C

---

**Hardware**

RC-04 is a generic equipment, i.e. the hardware is fixed and the user can implement specific functionality by software for integrated transceiver only.

**Power supply**

RC-04 is supplied from the coin non-rechargeable battery.

**Sleep mode**

It is possible to switch off all functions and peripherals to minimize current. For Sleep mode control refer to demo software included. The power can not be switched off at all (unless removing the battery), the Sleep mode is used instead of this.

**Tip:** User SW should allow wake-up the controller after pushbutton(s) press. See demo SW included.

**Pushbuttons and LEDs**

Functionality of all four pushbuttons and both LEDs is fully under user software control.

**RF transceiver**

Integrated IQRF wireless transceiver based on the TR-5xB architecture. User SW uploading is possible via IQRF wireless upload only (without opening the case).

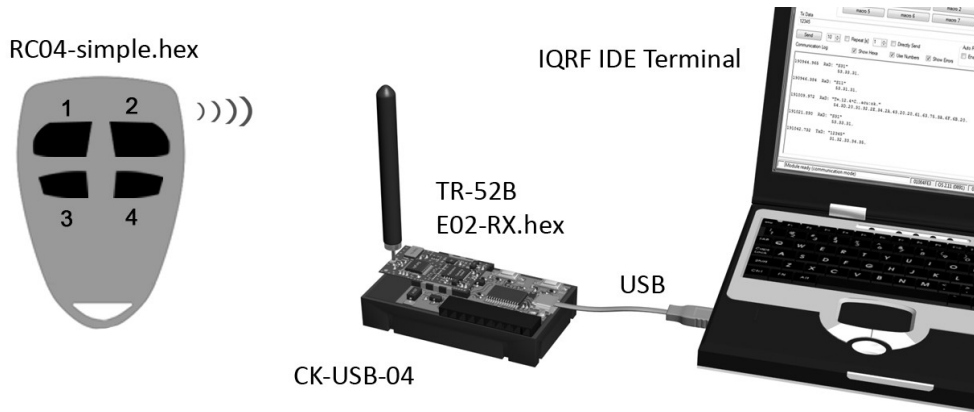
**Antenna**

Built-in PCB antenna on the RC-04 board.

## Software

### Demo application

This demo illustrates unidirectional non-networking communication between the RC-04 controller and the CK-USB-04 kit equipped with the TR-52B module connected to PC with the IQRF IDE Terminal running. The `RC04_simple.c` program is intended for the controller and the `E02-RX` (one of basic IQRF examples) for the TR module in the CK kit. Both are available on IQRF CD and IQRF website. To upload the `RC04_simple.hex` to the RC-04 via RF – see Application note AN009 – IQRF wireless upload. Switching to RF PGM mode after reset is enabled by default.



In idle state the controller stays in Sleep mode allowing wake-up by any pushbutton. After wake-up the battery voltage is checked and LEDs flashing indicates pressing the button and accumulator condition. Then respective command is sent to CK-USB-04 and the controller gets to sleep again.

#### Buttons

Buttons	Function
• S1	text sent: "S1x"      x=0 if battery O.K. otherwise x=1
• S2	text sent: "S2x"      "-"
• S3	text sent: "S3x"      "-"
• S4	text sent: "S4x"      "-"
• S3 + S4 for more than 5 s	enter RF PGM mode
• S2 for more than 0.7 s	leave RF PGM mode

#### LED indication

- button S1 to S4      1 x flash green (battery O.K.) / red (battery exhausted).
- RF PGM indication      See the Application note AN009 – IQRF wireless upload.

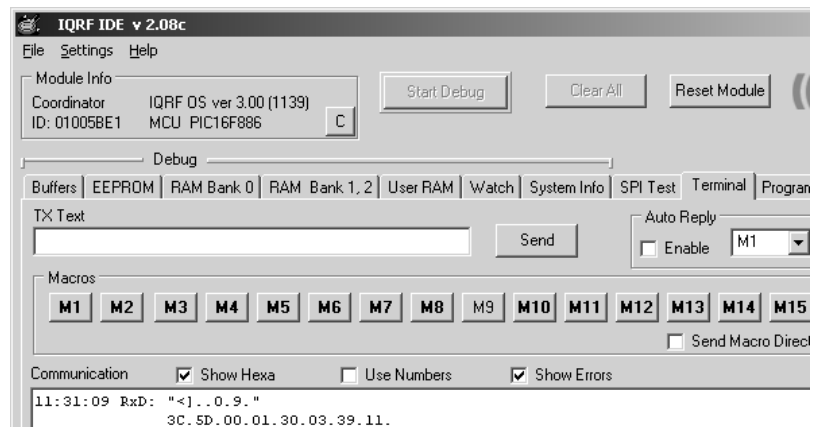
**Caution:** Select the proper version of Demo according to IQRF OS version (2.11 or 3.xx) implemented in RC-04.

To distinguish OS version, catch Module Info which is always sent by this Demo application just before switching to RF PGM mode in IQRF IDE Terminal. Show hexa checkbox should be checked. OS version is in buffer `moduleINFO[4]`. See the picture above and IQRF OS User's guide.

#### Example:

```
moduleINFO[0-7]:
  [0] [1] [2] [3] [4] [5] [6] [7]
  3C 5D 00 01 30 03 39 11

moduleINFO[4] = 30 means OS v3.00
moduleINFO[4] = 2B means OS v2.11
```



---

**Caution!**

The **only** way how to upload user application into the RC-04 is RF PGM (wireless programming, ICWP). Demo application `RC04_simple.c` invokes the `enableRFPGM` function first. It ensures that after every reset (due to reconnecting the battery) the device is switched to RF PGM mode and can possibly be reprogrammed. This feature can be removed (by `disableRFPGM`), but it should not be done unless there is another reliable way how to invoke back the RF PGM mode using `runRFPGM` after pressing a pushbutton. See the demo application, refer to AN009 Application note for details. **If being omitted the device can not be reprogrammed any more.** Recovery is possible by the manufacturer only.

**Tip:** Always use `enableRFPGM` during development.

---

**Product information****Pack list**

- RC-04 remote controller with charm chain, battery inserted, the `RC04_simple` demo uploaded, in Sleep mode

**Recommended options**

- CK-USB-04 Programmer / development kit for wireless upload (RF PGM)
- TR-52BA Additional TR module for the CK-USB-04 for wireless upload (RF PGM)
- CAB-USBABMICRO-100 USB cable to connect CK-USB-04 to PC
- GW-USB-04 Complete comfortable RF PGM programmer (alternative to all above)

**Ordering code**

- RC-04 RC-04 Remote controller

**Document history**

- 160519 Chapter *Key features* slightly clarified.
- 110926 Slightly updated. Caution added.
- 110303 Updated for IQRF OS v3.00 (and CK-USB-04).
- 100629 First release.

---

# Sales and Service

---

## Corporate office

MICRORISC s.r.o., Prumyslova 1275, 506 01 Jicin, Czech Republic, EU  
Tel: +420 493 538 125, [www.microrisc.com](http://www.microrisc.com)

## Partners and distribution

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

---

## Quality management

*ISO 9001 : 2009 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)*



## Trademarks

*The IQRF name and logo are registered trademarks of MICRORISC s.r.o.  
PIC, SPI, Microchip, RFM 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: <http://iq-esupport.com>**

---



Smarter wireless. Simply.