

DK-RC-03

IQRF development kit for RC-03

User's Guide

- DK-RC-03-868
- DK-RC-03-916



Simple way to smarter wireless solutions

Description

DK-RC-03 is a development kit for wireless network applications, especially for wireless control from more end devices based on remote controllers RC-03. Additionally, USB gateway offers PC connectivity.

It is a generic equipment, i.e. the hardware is fixed and the user can realize specific functionality by software for internal TR modules.

For final applications individual standard modular IQRF devices (RC-03, GW-USB-03, DK-31BA, ...) are available.



Applications

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

Key features

- IQRF gateway GW-USB-03 with USB connectivity and programmable TR module
- 4 programmable bidirectional remote controllers RC-03
- Wirelessly controlled kit DK-31BA with two relays
- Bidirectional communication – high security in comparison to unidirectional systems
- High performance
- Sleep mode with ultra low power consumption
- Accumulators and internal chargers
- Charged via microUSB connector

Hardware

For HW description and electric specification refer to GW-USB-03, RC-03 and DK-31BA User's guides.

For final applications individual standard modular IQRF devices (RC-03, GW-USB-03 and DK-31BA) are available. Standard RC-03 and GW-USB-03 (not delivered as a part of this development kit) are equipped with the TR-31B modules (the non-A version). Thus, after soldering the PCB antenna programming is enabled via RF only.

Software

DK-RC-03 is delivered with demo programs:

- Relay control (non-networking)
- Relay control (networking)
- Voting system (networking)

Relay control demo application (non-networking)

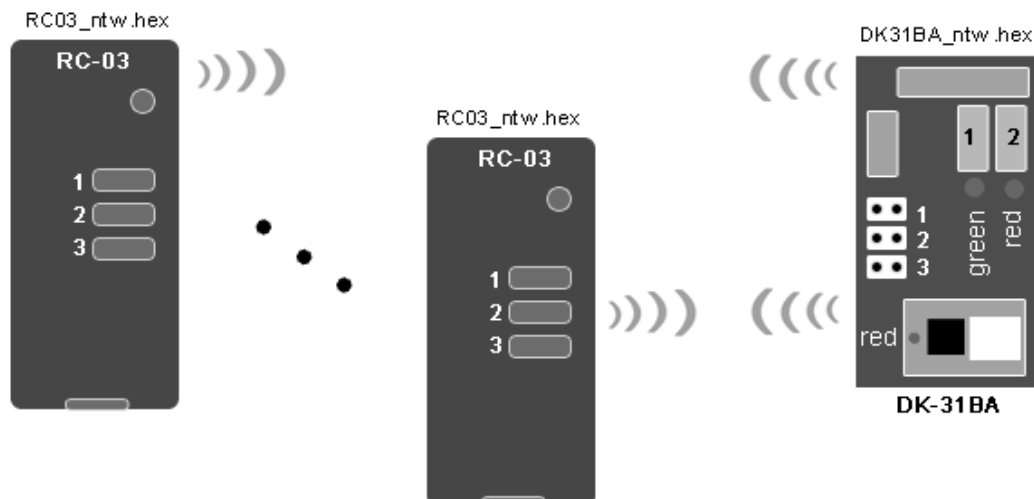
Demo program controlling relays on the DK-31BA kit from the RC-03 remote controller. Refer to RC-03 User's guide for description.



Relay control demo application (networking)

This demo illustrates bidirectional networking communication between the RC-03 controllers and the DK-31BA relay kit, all equipped with TR-31BA modules. The `RC03_ntw.c` program is intended for the controller and the `DK31BA_ntw.c` for the relay kit. Use IQRF IDE development environment and CK-USB-02 or other IQRF programmer to upload the code (`RC03_ntw.hex` and `DK31BA_ntw.hex`) to the TR modules.

The relay kit works as a network Coordinator and controllers work as Nodes. The Nodes have to be bonded to the Coordinator to enable network communication. Coordinator assigns a unique address to a Node during bonding. To enable bonding, the controller as well as the Node must be set in the bonding mode.



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In idle state the controller stays in Sleep mode allowing wake-up by any pushbutton. After wake-up the accumulator voltage is checked and LED flashing indicates pressing the button and accumulator condition. Then respective command is sent to DK-31BA and the controller waits a determinate period for acknowledge from the Coordinator. Received acknowledge is indicated by another LED flash. Then the controller gets to sleep again.

An unbonded controller does not respond to short press of a button. The controller is set to bonding mode by holding any button for more than 2 s and stays in bonding mode for ~10 s. To be bonded, the controller must be unbonded before.

To unbond a Node, press buttons 1 and 3 simultaneously for 5 s. Successfull unbonding is indicated by LED.

Commands

- Button S1 toggle relay RE1
- Button S2 toggle relay RE2
- Button S3 switch off both RE1 and RE2 relays
- Button S1 and S3 for more than 5 s unbond
- Any button for more than 2 s enter the bonding mode (if not bonded only)

LED indication

- LED on the case
 - Microcontroller reset 3 x flash
 - Button S1, S2 or S3 1 x flash (accumulator O.K.), 3 x flash (accumulator exhausted)
 - Acknowledge 1 x long flash
 - Bonding mode LED continuously on for 10 s
 - Successful bonding 3 x flash
 - Unbonding 1 x flash for 1 s
- Red LED on TR module 1 x flash – accumulator checking

DK-31BA

This kit switches the relays according commands received via RF packets. Successfull receiving is indicated by LED and the command is returned back to the sender.

The kit is set to bonding mode if the CFG1 jumper is inserted during power on. Bonding procedure is active for ~10 s. All bonds are cleared if the CFG1 and CFG2 jumpers are inserted during power on.

Jumper functions (checked during power on)

- CFG1 enter bonding mode
- CFG1 and CFG2 unbond all Nodes

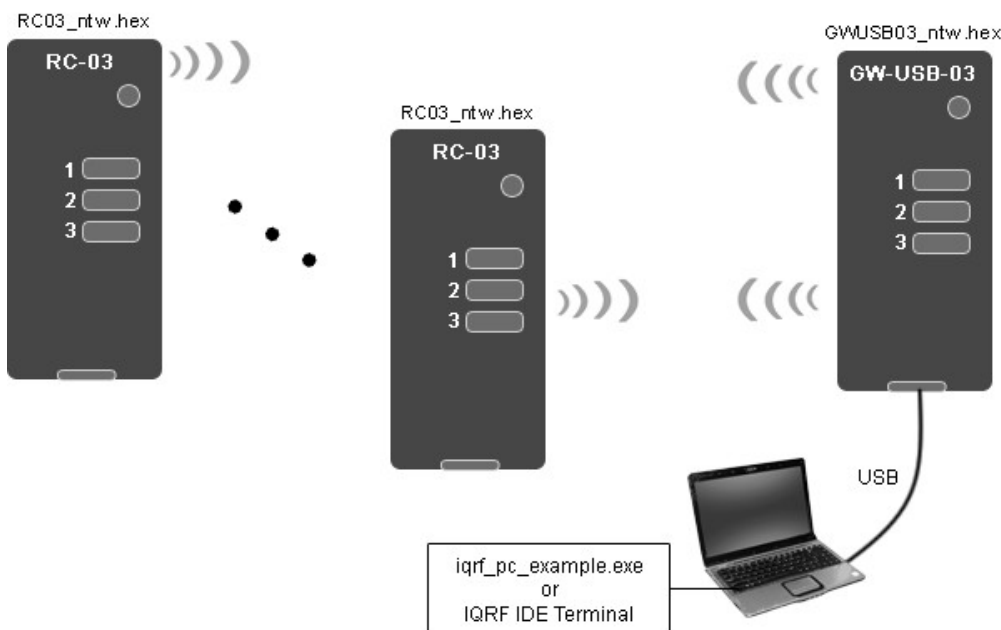
LED indication

- Main board
 - Relay 1 on green LED on
 - Relay 2 on red LED on
- TR module
 - RF packet received red LED 1 x flash
 - Bonding mode green LED on for 10 s
 - Successful bonding green LED 3 x flash
 - Unbonding all Nodes green and red LED 1 x flash for 1 s
 - Microcontroller reset green LED 3 x flash

Voting system (networking)

This demo illustrates bidirectional networking communication between the RC-03 controllers and the GW-USB-03 gateway, all equipped with TR-31BA modules. The `RC03_ntw.c` program is intended for the controller and the `GWUSB03_ntw.c` for the relay kit. Use IQRF IDE development environment and CK-USB-02 or other IQRF programmer to upload the code (`RC03_ntw.hex` and `GWUSB03_ntw.hex`) to the TR modules in RC-03s.

The GW works as a network Coordinator and controllers work as Nodes. The Nodes have to be bonded to the Coordinator to enable network communication. Coordinator assigns a unique address to a Node during bonding. To enable bonding, the controller as well as the Node must be set in the bonding mode. The GW is connected to PC via USB to control the RF network and monitor results.



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The controllers use the same program as in the Relay control demo application (networking) above. The operation is also the same just with one exception:

Commands

- Button S1, S2 or S3 send identification about the button pressed

GW

The GW receives RF packets and forwards them to PC via USB. Valid packet reception is acknowledged back to the sender. The GW is set to the bonding mode using the PC demo program. Bonding takes ~10 s. PC demo program also allows to clear all bonded Nodes – see below.

GW application can be uploaded into internal TR module by the IQRF IDE PC program.

Caution: PC demo program and IQRF IDE must not run simultaneously.

PC demo example

The PC demo `iqrif_pc_example.exe` is available including source codes for the C++ Builder 2007, USB library and USB driver. If IQRF IDE is installed on the PC there is no need to install the driver again. Refer to the IQRF application note AN003 – IQRF development tools installation.

The program allows to bond a new controller, clear all bonded controllers and monitor messages received from controllers. The following information is displayed:

- Identification of the controller (address)
- Identification of the button pressed
- Condition of accumulator in given controller

Control buttons:

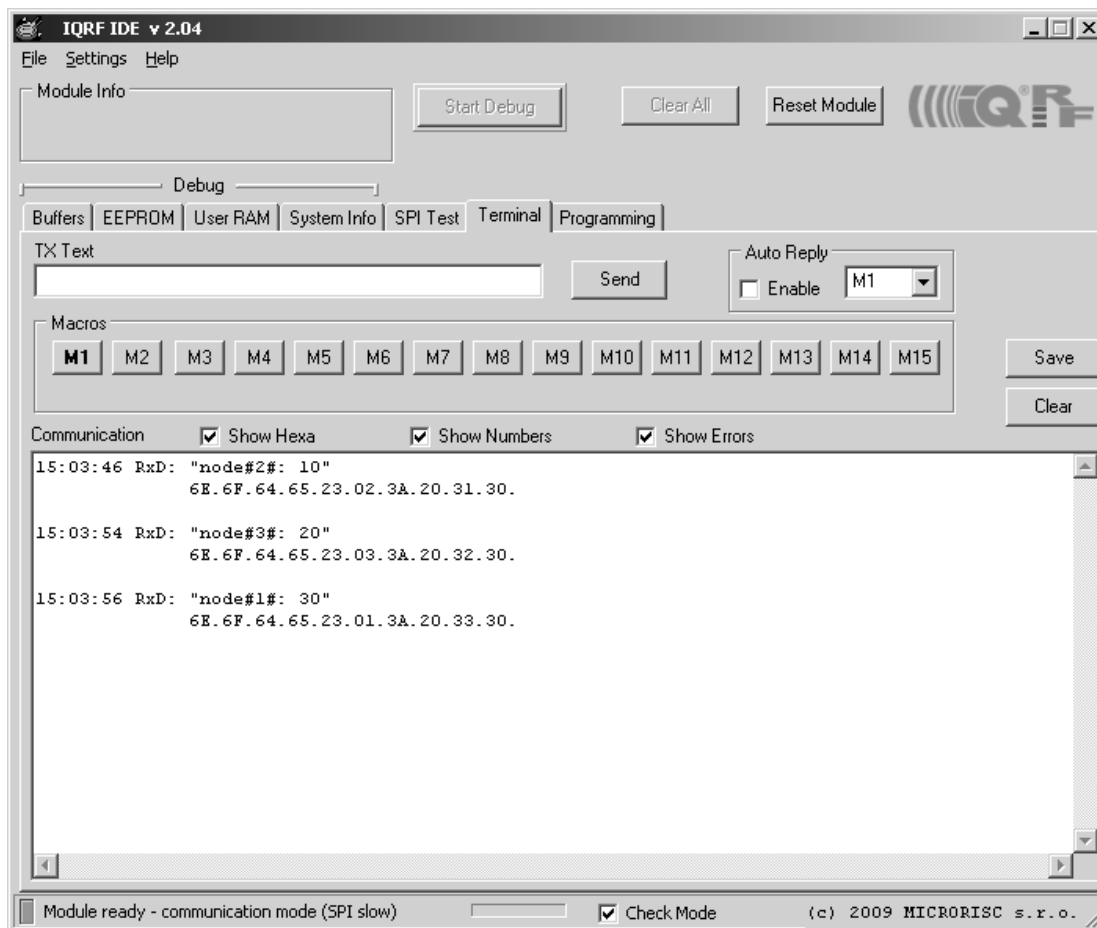
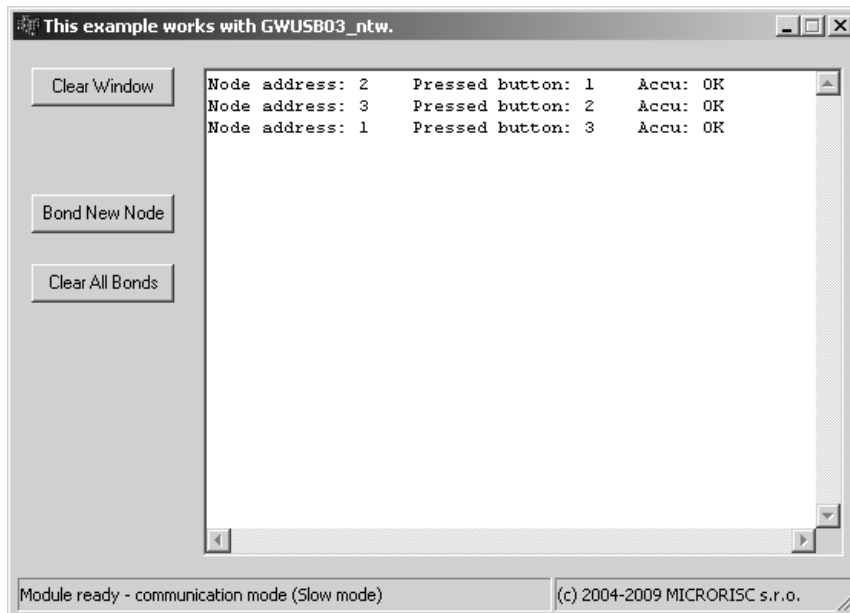
- | | |
|-------------------|-----------------------------------------------------------------------------------|
| • Clear Window | clears the message window |
| • Bond New Node | sets the GW in bonding mode for 10 s and displays the state in the message window |
| • Clear All Bonds | clears all bonded controllers to the GW |

The GW can also work with IQRF IDE, the Terminal tab which enables complete service like the demo program. In this case IDE v2.04 or higher is recommended and the *Show Numbers* checkbox should be active. See IQRF IDE help for details.

Commands sent from the IQRF IDE Terminal:

- "b" Bond new node
- "c" Clear all bonds

Screenshots below illustrate receiving the same messages using the demo program and IQRF IDE.



Pack list

- GW-USB-03 with TR-31BA-868 or TR-31BA-916 and `GWUSB03_ntw.hex` demo programmed, inserted in SIM connector, soldered accumulator, in Sleep mode
- RC-03 with TR-31BA-868 or TR-31BA-916 and `RC03_simple.hex` demo programmed, inserted in SIM connector, soldered accumulator, in Sleep mode
- DK-31BA with TR-31BA-868 or TR-31BA-916 and `DK31BA_simple.hex` demo programmed, inserted in SIM connector, 4 jumpers
- MI-TY-A6-microUSB power supply adapter
- CAB-USBABMICRO-200 micro USB cable
- Printed Brief User's manual

Ordering codes

- DK-RC-03-868 Developemnt kit for RC-03, 868 MHz
- DK-RC-03-916 Developemnt kit for RC-03, 916 MHz

Document history

- 100114 First release

Sales and Service

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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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