

# **DK-SW2-01**

**IQRF development kit with relays**

**User's guide**



## Description

DK-SW2-01 is a development kit for debugging of IQRF applications with remotely controlled relays.

## Key features

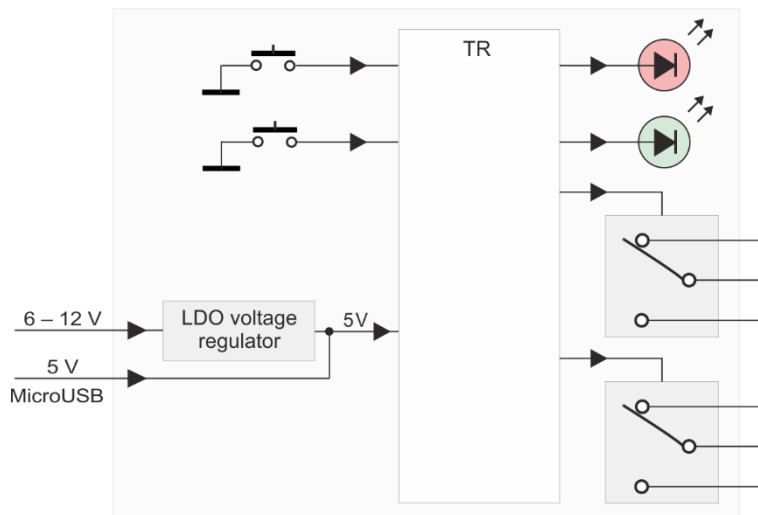
- SIM connector for IQRF transceiver
- 2 relays
- 2 pushbuttons
- 2 LEDs
- Supplied via microUSB or 6 V to 12 V power source
- Screw connectors for relay contacts and power supply



## Applications

- Development of wirelessly switched devices
- Interoperable IQRF Standard

## Block diagram



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**Electrical specifications***Typical values (until otherwise specified)*

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Power supply input	
When supplied via microUSB connector	5.0 V $\pm$ 0.35 V DC, stabilized, 120 mA min.
When supplied via screw connector ( $V_{IN}$ )	6 V to 12 V DC, 120 mA min.
Supply current	
When supplied via microUSB	5 mA (without TR transceiver)
When supplied via screw connector	5 mA (without TR transceiver)
Additional supply current	
With TR transceiver	See TR datasheet
Relay switched	32 mA
LED on	2 mA per LED. Rough value for brief guidance only.
Relay contact rating	0.5 A ,125 V AC or 1 A, 30 V DC, resistive. See the relay datasheet for details.
Operating temperature	0 °C to +70 °C -40 °C to +85 °C (Industrial) available on request
Size	48 mm x 33.5 mm x 13.5 mm
Weight	20 g

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**Absolute maximum ratings**

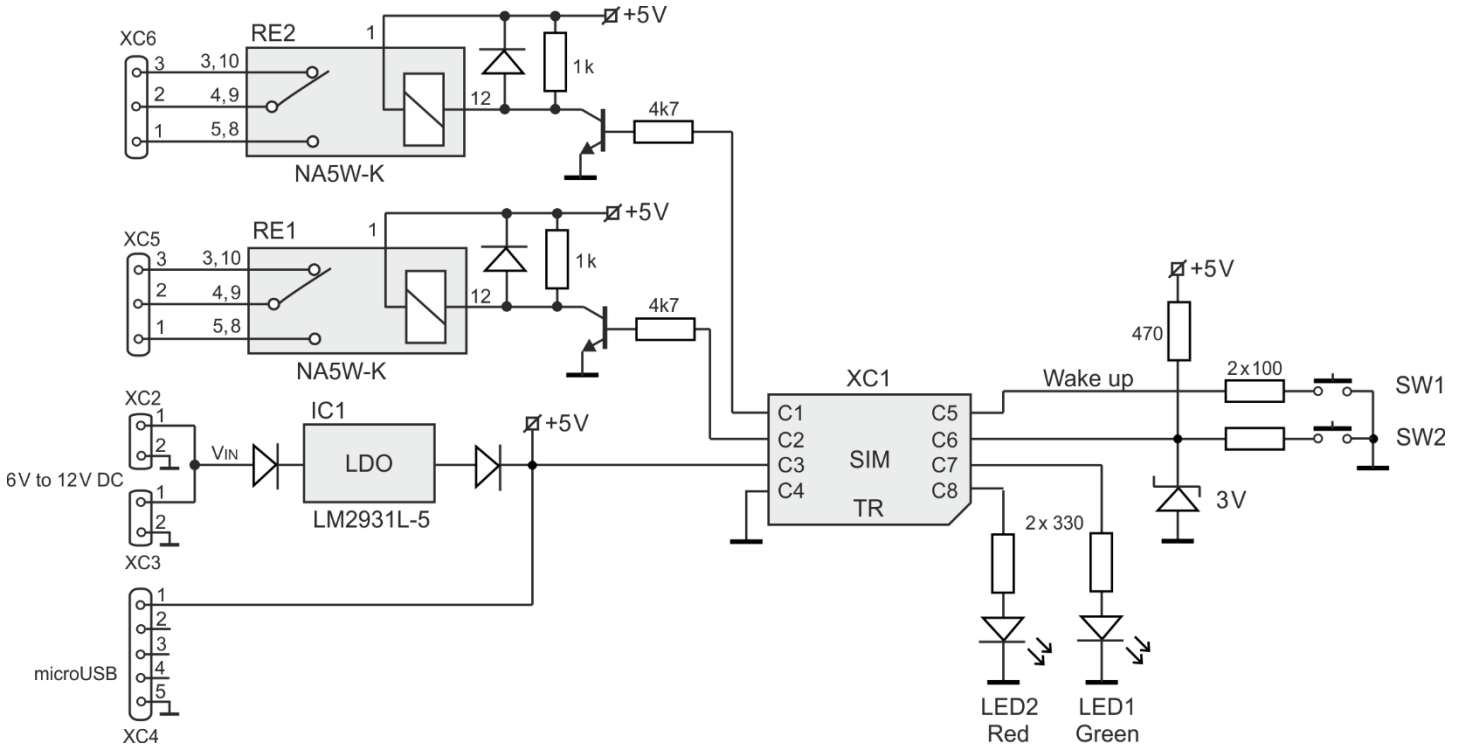
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Stresses above those values may cause permanent damage to the device. Exposure to maximum rating conditions for extended periods may affect device reliability.

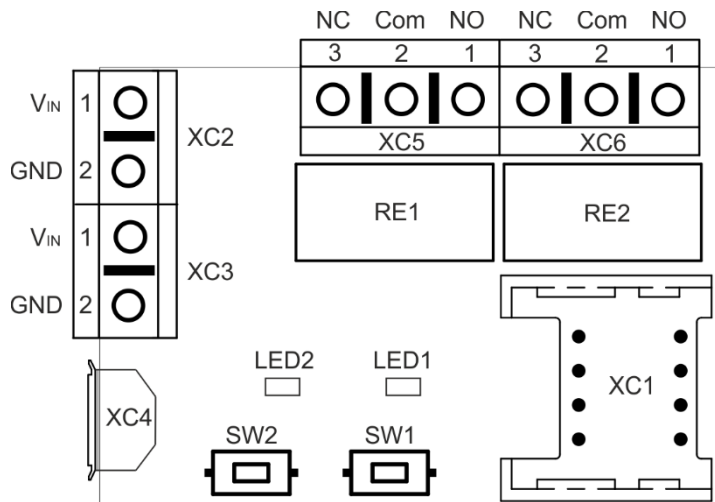
Supply voltage	
When supplied via microUSB connector	5.5 V
When supplied via screw connector ( $V_{IN}$ )	15 V
Storage temperature:	-40 °C to +85 °C

## Hardware

### Simplified schematics



### Board layout



### Key parts

Reference	Part	Note
XC1	KON-SIM-02	SIM connector for TR transceiver
XC2, XC3	Screw connector	Power supply, 2 pins
XC4	MicroUSB	Power supply connector
XC5, XC6	Screw connector	Relay contacts, 3 pins
RE1, RE2	NA5W-K (Fujitsu/Takamisawa)	Relay

## Power supply

DK-SW2-01 must be supplied from an external power source, either from microUSB or alternatively via the screw connector. Only one of these optional sources is allowed to be connected at the same time. The screw connectors XC2 and XC3 are interconnected to each other in parallel to provide better connection possibilities.

## Supported TR transceiver types

DK-SW2-01 is intended for transceivers compatible with SIM connector KON-TR-02 (with plastic SIM holder). Only TRs with internal LDO voltage regulator are allowed. TR-72Dx is recommended.

**Warning:**

Transceivers without LDO like TR-76Dx, TR-75Dx and TR-77Dx must not be used otherwise they may be damaged.

## Relays

Non-latching relays with one coil and dual bifurcated contacts are used. However, both contact pairs are interconnected to each other in parallel. The contacts are accessible via the screw connector. Their functionality fully depends on TR application software.

## LEDs

Red and green LED are connected to TR pins. Their functionality fully depends on TR application software.

## Pushbuttons

Two pushbuttons are connected to TR pins, both active at log. 0 level. To provide log. 1 in inactive state, SW2 has an on-board pull-up resistor and the MCU inside the TR must be configured with internal pull-up on pin C5. It is arranged in IQRF OS by default.

The functionality of both pushbuttons fully depends on TR application software.

## Software

User-specific functionality of DK-SW2-01 fully depends on application software inside the TR transceiver. It can be designed freely according to user's desire, even directly under IQRF OS (without DPA).

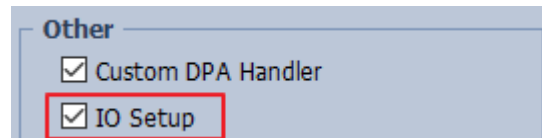
### IQRF Standard

However, the main intention for usage of this kit is development of IQRF interoperable end network devices. In this case, the DPA approach is necessary and *IQRF Standard* must be observed.

Then, this kit should use the DPA plug-in for the Node in STD mode (available in [IQRF Startup package](#)). Factual functionality and conformity with *IQRF Standard* ensures the Custom DPA handler example 1802\_DK-SW2-01 (provided with this kit). It is available within the IQRF Startup package (e.g. at

... \IQRF\_OS402\_7xD\Examples\DPA\CustomDpaHandlerExamples\IQRF\_Standard\1802\_DK-SW2-01.c).

I/O Setup must be selected in TR Configuration before the upload.

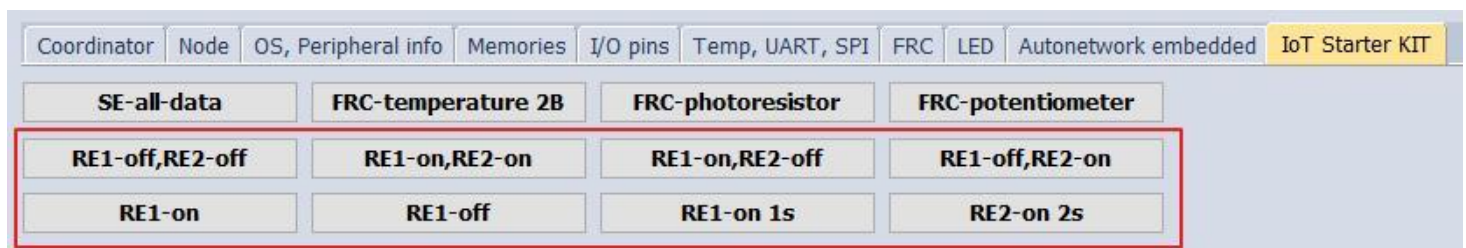


The hardware resources of the kit are utilized as follows:

- Both relays work according to the [IQRF Standard binary output](#).
- During normal operation of bonded Node, LED1 and LED2 indicate the state of the relay RE1 and RE2, respectively.
- SW1 is used for bonding and unbonding the device to/from the IQMESH network in a standard way embedded in DPA:
  - To bond the device: Press SW1 just after power on while the Coordinator is in bonding loop.
  - To unbond the device: Turn the power on while SW1 is pressed and held (not released). Skip the optional RFPGM mode depending on its configuration (typically the pressed button terminates it, see the [IQRF OS User's guide, Appendix RFPGM](#) for details). Keep the button pressed. The green LED is then on. After 2 seconds the green LED goes off. Release the button immediately within 0.5 s. Then unbonding is confirmed by the red LED 1 s flash and consequently by the rapid red LED flashes.
- Such a complicated unbonding procedure is needed to prevent unwanted unbonding caused by accidental button press after the device reset.
- During normal operation, SW1 and SW2 pressed longer than 0.5 s toggles the state of relay RE1 and RE2, respectively.

Such a functionality during normal operation can be extended, modified (or changed almost at all) in Custom DPA handler. But, to keep the interoperability, the *IQRF Standard* must be kept in any case.

In this approach, DK-SW2-01 can be controlled from IQRF IDE by macros primarily intended for UP-IQRF IoT Starter Kit.



### Non-DPA

For non-networking applications under IQRF OS, the DK-SW2-01.c example is provided. It is available within the IQRF Startup package (e.g. at ... \IQRF\_OS402\_7xD\Examples\IQRF\_OS\DK-SW2-01\DK-SW2-01.c). The functionality is described in the header of the source code.

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## *Product information*

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### **Ordering code**

DK-SW2-01                    IQRF development kit with relays. TR transceiver is not included.

### **Hardware revision**

v1.00                            First release.

### **Document history**

180627                         First release.

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# Sales and Service

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## Quality management

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*Complies with directives 2011/65/EU (RoHS) and 2012/19/EU (WEEE).*



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