SHD-SE-01

IQRF Multifunctional Sensor

Hardware v1.03

Demo SW v1.01

User's Guide

Smarter wireless. Simply.

Description

SHD-SE-01 is an IQRF multifunctional wireless sensor providing temperature, illumination and acceleration measurement, real-time clock and EEPROM memory.

Low power design allows battery lifetime for several years.

The sensor can be adapted for user-specific functionality by application software for microcontroller in internal transceiver module with built in operating system.

For development of application SW the DS-SHD-SE-01 development set is available.

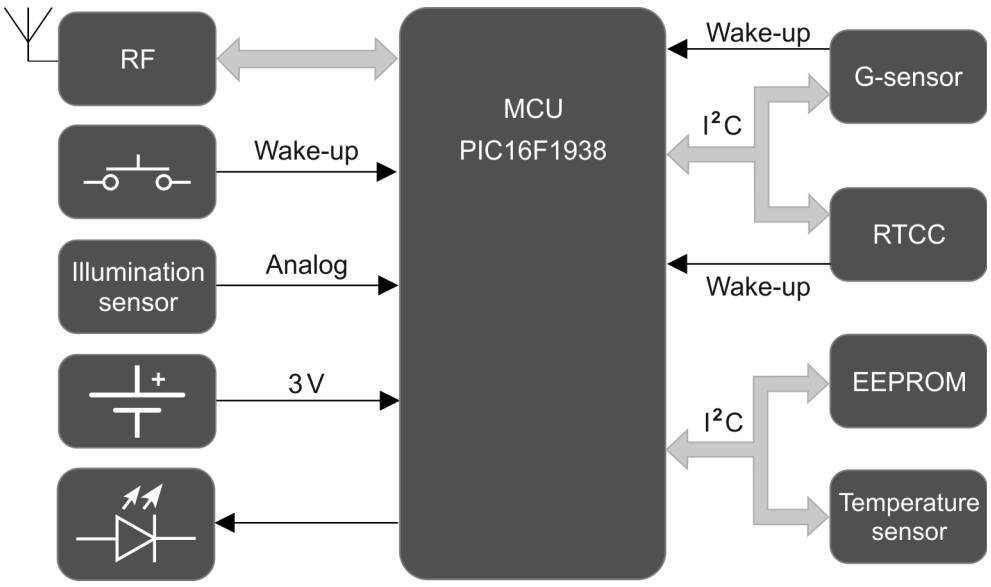
Key features

- Integrated smart RF transceiver with antenna
- Selectable RF band 868 / 916 MHz, multiple channel
- Built-in MCU with operating system, TR-54D compatible
- 3-axis accelerometer (G-sensor)
- Temperature sensor
- Light sensor
- RTCC (real time clock/calendar)
- Serial EEPROM
- Tactile switch
- LED indication
- Ultra low power consumption
- Integrated primary battery, lifetime for several years
- Programmable application in internal TR module

Applications

- Remote control and monitoring
- Data logging
- Motion detection
- Lightning and illumination control
- Remote sensor for IQRF network
- Access control
- Building automation

Block diagram



Information contained in this publication regarding device applications and the like is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications.

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Electrical *specifications*

Typical values unless otherwise stated

Parameters specified in this datasheet are typical values fo power supply 3 V only.

Battery	$LiMnO_2$ CP502441, 3 V, 1200 mAh (primary cell)
Operating temperature	-30 °C to +60 °C
Supply current	
Sleep mode	
All functionality disabled	380 nA
Additional supply current	
MCU watchdog enabled	800 nA
RTCC running, powered from V_{BAT}	0.8 µA
Run mode	1 mA (MCU running, RF IC disabled)
Additional supply current	
RF IC enabled	0.6mA
RTCC, Light and G-sensors powered	1 mA
G-sensor running	0.3 mA
Temp. sensor and EEPROM powered	10 µA (shutdown)
Temp. sensor or EEPROM active	Refer to datasheets of respective ICs
LED on	2 mA
Rx mode	STD mode: 13 mA LP mode: 330 µA (depends on interferences) XLP mode: 25 µA (depends on interferences)
Tx mode	14 mA – 24 mA (according to RF output power)
Nominal frequency	868.35 MHz or 916.50 MHz (software selectable)
Channels	See IQRF OS User's guide, Appendix 2, Channel maps
RF data modulation	FSK (frequency-shift keying)
RF data transmission bit rate	19.2 kb/s
RF sensitivity	-104 dBm (868 MHz), -102 dBm (916 MHz)
RF output power	Programmable in 8 levels (0 – 7), -2.5 dBm/level

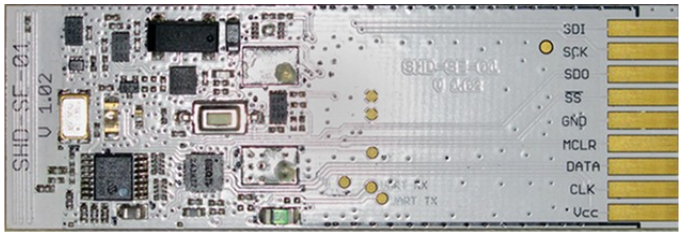
level	0	1	2	3	4	5	6	7
[dBm]	-12.5	-10	-7.5	-5	-2.5	0	2.5	5

RF range	Up to 380 m (strongly depends on device orientation and surroundings)
Temperature sensor accuracy	0.5°C (max) from 0°C to +60°C 1.0°C (max) from –20°C to 0°C
3D Accelerometer range	± 2 g / ± 8 g dynamically selectable full-scale
EEPROM	16 Kb, serial interface I2C, 1 000 000 erase / write cycles typ.
Size (L x W x H)	77 mm x 27 mm x 8 mm
Weight	18 g
Storage temperature	0 °C to +30 °C

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.

Hardware

SHD-SE-01 is a generic equipment, i.e. the hardware is fixed and specific functionality (communication with individual peripherals, their control and readout) can be achived by application software for internal MCU only.



SHD-SE-01 board, without battery

Power supply

SHD-SE-01 is supplied from built-in primary non-removable battery and protected by 100 mA resettable fuse. Energy consumption should be minimized by software techniques in application program. Properly designed application software allows battery lifetime of several years. SHD-SE-01 device is permanently powered on, delivered in sleep mode.

MCU

Complete functionality of the device is controlled by application program in MCU dedicated to TR module and equipped by IQRF OS operation system. Refer to the documentation of development set DS-SHD-SE-01. Application SW should be uploaded wirelessly.

Sleep mode

For minimizing of current consumption, it is possible to switch off individual functions and peripherals. Thus, to achieve long battery lifetime, individual parts should be disabled in application program as much as possible and activated just in short periods when necessary.

G-sensor

An ultra compact low-power three axis linear accelerometer (motion sensor).

RTCC

Real Time Clock Calendar with programmable alarm output.

Serial EEPROM

16 kb EEPROM memory. Data remains stored after power off. Overwriting is not unlimited, number of erase/write cycles is 1 000 000 typically.

Temperature sensor

Temperature is measured by precise optional digital on-board sensor.

Light sensor

Illumination is measured by the phototransistor.

Pushbutton

Functionality of the pushbutton is fully under application software control.

LED

Functionality of the LED is fully under application software control.

IQRF transceiver module

The RF circuitry is compatible with IQRF smart transceiver TR-54DA. The only exception is implementing one LED only (instead of two, the green LED is not used).

Antenna

SHD-SE-01 includes built-in PCB antenna.

Case

The plastic case can not be disassembled.

Software

SHD-SE-01 is delivered with Demo software illustrating functionality of all on-board parts.

The device stays completely in sleep mode except of sending an RF packet with data acquired from all sensors and peripherals (except of RTCC which is disabled due to power saving) whenever the button is shortly pressed. (The Demo software is the same as for the DS-SHD-SE-01 development set but without periodic sending of packets in 64 s periods.)

This data can be received by another IQRF TR module, forwarded to PC to be displayed on the screen etc. No networking is applied in this demo SW.

Application program should be uploaded in MCU via wireless RFPGM programming.

Refer to the documentation and source codes of development set DS-SHD-SE-01 for packet format and other details.

Response to the pushbutton and LED indication

- Short press (< 5 s, LED is on): RF packet sent
- Long press (> 5 s, LED is flashing): RFPGM mode. It can be cancelled by the pushbutton pressed for ~1 s or automatically after ~1 min.

Product information

Pack list

- SHD-SE-01 IQRF multifunctional sensor, Demo SW uploaded, in sleep mode
- Battery Inside the case, non-removable

Ordering codes

- SHD-SE-01 IQRF multifunctional sensor
- DS-SHD-SE-01 Development set for IQRF multifunctional sensor SHD-SE-01

Product history

- HW v1.03 First release

Document history

- 130708 First release

Sales and Service

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