ST25RU3993-EVAL

Data brief

ST25RU3993 RAIN® (UHF) RFID reader IC evaluation board

Product status link
ST25RU3993-EVAL

Features

Based on the ST25RU3993 RAIN® (UHF) RFID reader IC

- ISO/IEC 18000-63:2015 / Gen2V2
- ISO/IEC 18000-62:2012

Two SW-controlled power amplifier (PA) options

- External PA: 29 dBm max TX power
- Internal PA: 18 dBm max TX power
- Configurable TX power level
- Power detector to monitor TX power
- Carrier cancellation circuitry enabling pre- and re-tuning
- Automatic / manual carrier cancellation
- Differential RX input
- Maximum sensitivity: -80 dBm
- Maximum tag read rate: 700 tags/s (with 16-bit tag EPC length)
- External reference: 20 MHz TCXO, clipped sine wave
- External reference option: 20 MHz crystal
- Frequency: 840 to 960 MHz
- Adaptive / manual anti-collision slot handling
- Continuous modulated RF output mode
- Continuous wave RF output mode
- Two antenna connectors: SMB (F)
- Automatic / manual antenna port switching
- Reflected power measurement
- Carrier sense (LBT)
- Transponder RSSI display
- Direct command support
- Transponder EPC read / write
- Application start based on transponder reads
- Generic custom transponder command tool
- Store / recall reader configuration
- Configurable register map

Host interface and supply

- USB / UART bridge
- USB receptacle: Micro, B-type
- Main supply: 5 V USB (3.0)

MCU

- STM32L476RGT6 (Arm® 32-bit Cortex®-M4)
- 64 MHz
- 128-Kbyte RAM

- 1-Mbyte Flash memory
- SPI mode 1 (4 MHz)
- Firmware programmable through USB / UART
- SWD debug interface

LED Indicators

- Power amplifier selection
- Carrier cancellation tuning activity
- Carrier cancellation tuning OK
- OSC OK (20 MHz external reference)
- PLL OK
- RF ON
- No tag response
- Tag CRC error
- Tag found
- Active antenna port
- Power amplifier option
- BT OK (not installed)

Test points

- In-circuit RF power levels and signals
- RFID communication TX and RX
- UART and SPI signal lines
- UART_LOG for debug purposes
- Control voltage of internal VCO
- RF power detector output voltage
- 20 MHz reference signal
- External PA BIAS voltage
- LDO output voltages
- LDOs: 0 Ω resistor for current consumption measurement
- Main supply: jumper for current consumption measurement

Buttons

- MCU reset
- MCU boot mode
- BT module reset button (optional)

Buzzer (optional)

Wireless interface (optional)

- BT4.0 - SPP profile
- JTAG interface: for BT module programming
- BT module boot mode jumper (optional)

1 Description

The ST25RU3993-EVAL board is a RAIN® RFID (UHF) reader system based on the ST25RU3993 integrated reader IC. The objective of the ST25RU3993-EVAL board is to provide engineers, students and technically interested people with a comprehensive RAIN RFID reader system, which allows evaluation of the properties and the feature set of the ST25RU3993. For this purpose the architecture of the ST25RU3993-EVAL board combines a high RF power, long-range reader and a low RF power, short-range RAIN RFID reader. In addition the ST25RU3993-EVAL board has been fitted with numerous easy to access test points and measurement possibilities.

The ST25RU3993-EVAL is controlled by a graphical user interface (GUI) running on a host PC through a USB/UART bridge (it requires a driver installation). The GUI can be found on www.st.com.

The ST25RU3993-EVAL is powered through a USB3.0 port to correctly operate the high RF power long-range configuration of the reader. If a USB3.0 port is not available, a USB2.0 Y-cable or an external power supply can be used to enable the long-range capabilities of the reader. If neither is available only the low RF power short-range reader configuration is available.

The ST25RU3993-EVAL provides two SMB (male) antenna connectors, which can be controlled via the GUI. To enable scanning for RAIN RFID transponders the user must connect the provided kit antenna or a suitable 50 Ω UHF antenna for the targeted frequency range.

The ST25RU3993-EVAL board supports frequency channels ranging from 840 to 960 MHz and Arm®-based devices.

Note: Arm is a registered trademark of Arm Limited (or its subsidiaries) in the US and/or elsewhere.

2 Kit contents

The kit contains:

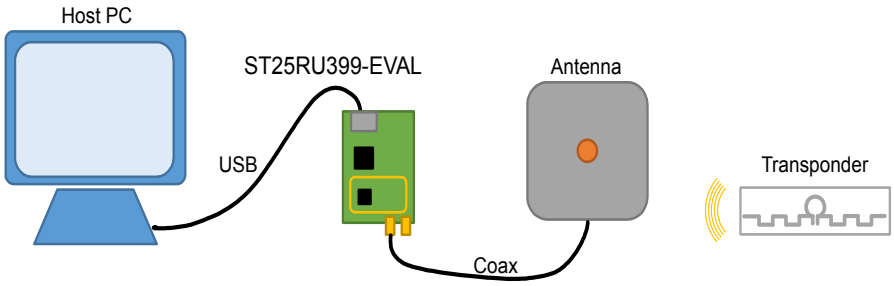
- an evaluation RAIN reader PCB
- an UHF near field antenna
- an SMA (male) / SMB (female) antenna cable
- sample tags
- the FCC note.

3 Standard setup

Figure 1. Standard setup shows the typical reader setup:

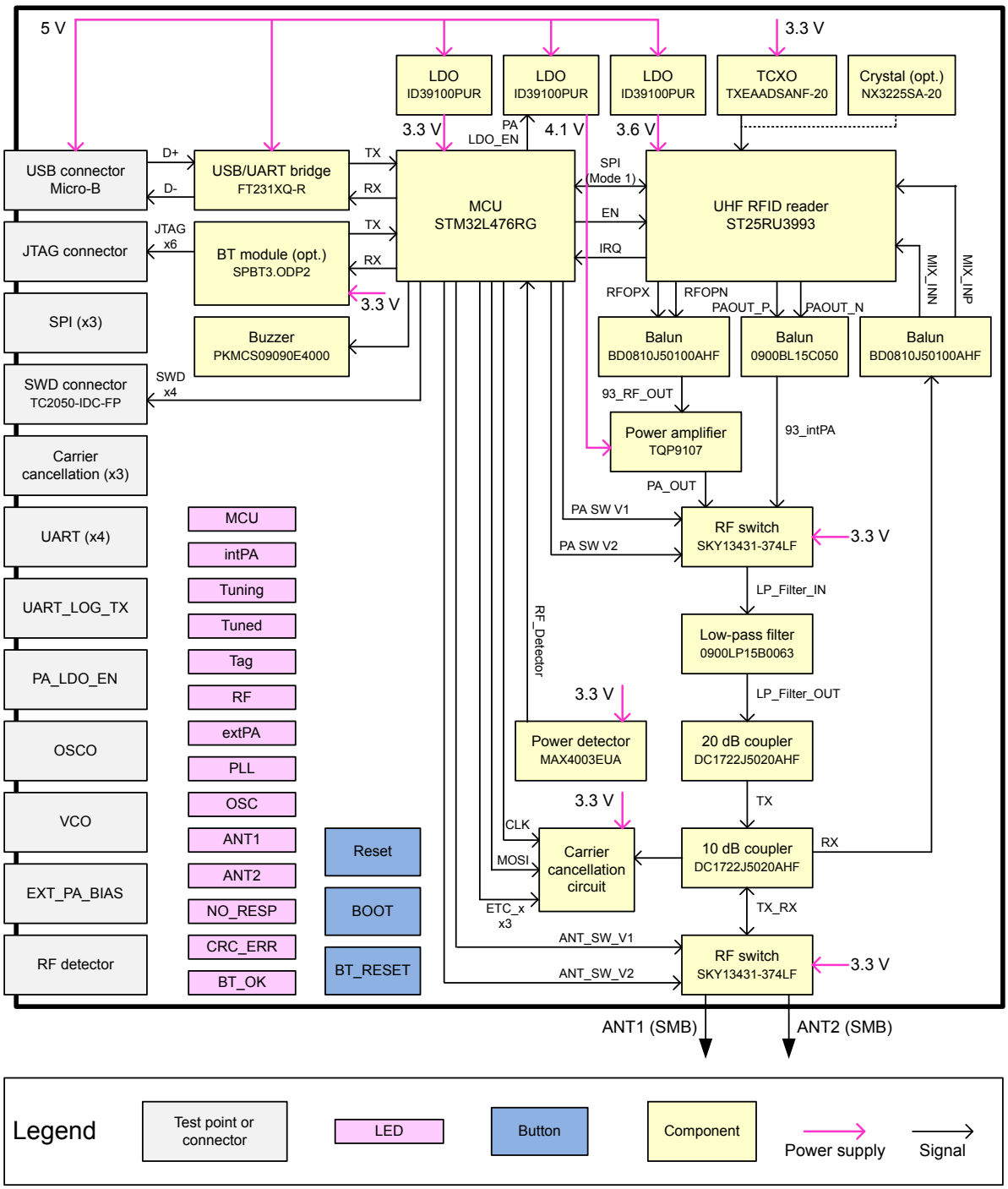
- the host PC running the GUI is connected to the ST25RU3993-EVAL board via a Micro-USB cable
- the antenna is connected to the active antenna port by means of a coaxial cable
- the transponder is within the range of the antenna.

Figure 1. Standard setup



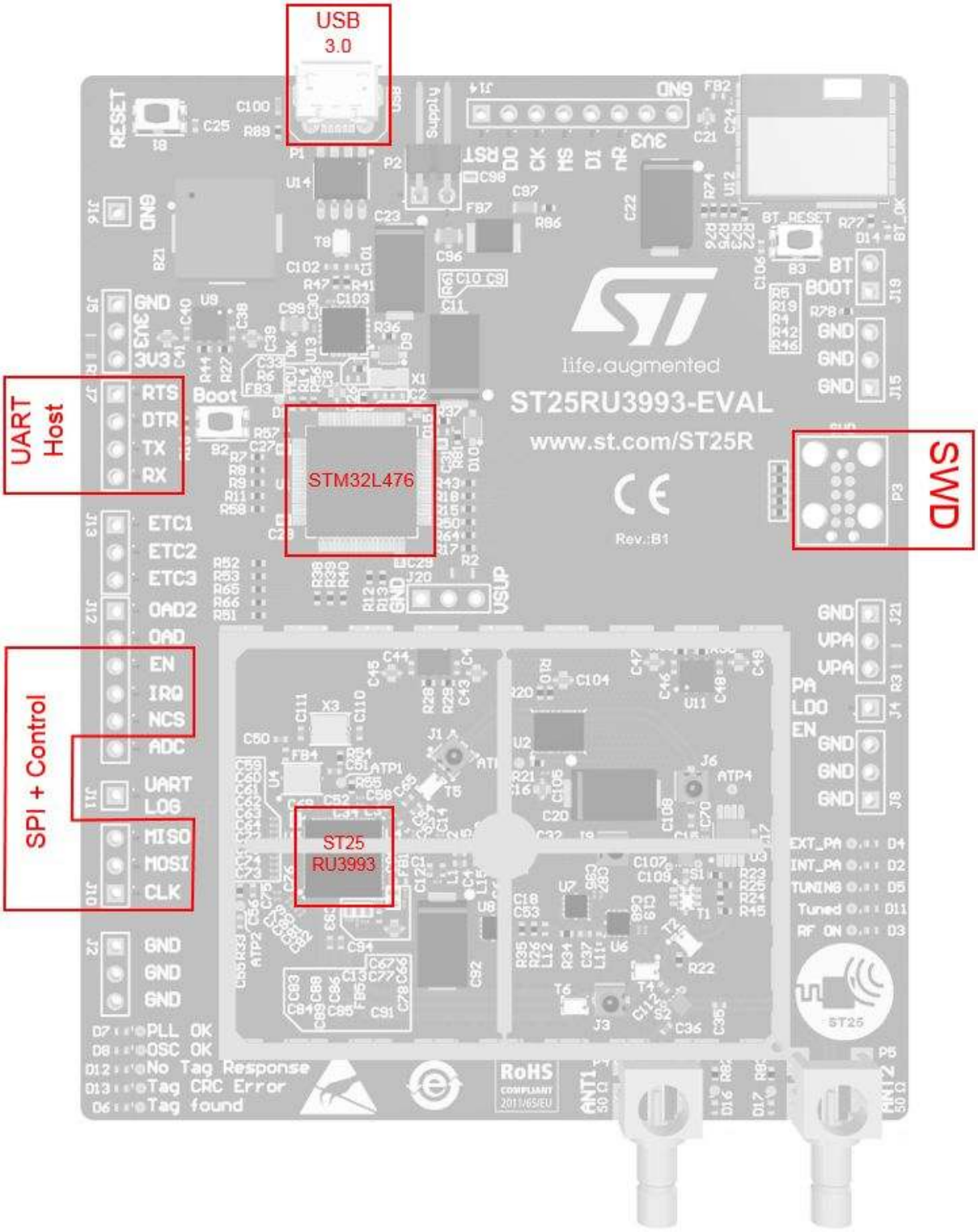
4 ST25RU3993-EVAL block diagram

Figure 2. Functional block diagram



5 Main digital interfaces

Figure 3. **Main digital interfaces and devices on the board**



Revision history

Table 1. Document revision history

Date	Revision	Changes
27-Mar-2017	1	Initial release.
04-Oct-2018	2	Updated: • Features
01-Apr-2019	3	Updated Features, Section 1 Description, Figure 2. Functional block diagram and Figure 3. Main digital interfaces and devices on the board, and added Section 2 Kit contents.
15-Oct-2019	4	Updated Features.

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