

TECHNICAL INFORMATION MANUAL

Revision 4 – 20 June 2018

Quark

R1230CB

OEM UHF Multiregional Ultra Compact Reader

R1230CBEBV

Quark Reader Evaluation Board



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Scope of Manual

The goal of this manual is to provide the basic information to work with the Quark R1230CB family.

Change Document Record

| Date | Revision | Changes | Pages |
|-------------|----------|--|---------|
| 18 May 2010 | 00 | Preliminary release | - |
| 18 Jan 2011 | 01 | Added information about the R1230CBDK Development KIT | 8 |
| | | Added <i>Installation Notice</i> paragraph | 9 |
| | | Added <i>QUARK R1230CBEVB</i> chapter | 19 ÷ 23 |
| | | Added <i>Quark R1230ADAT</i> chapter | -- |
| 20 Sep 2012 | 02 | Added <i>REGULATORY COMPLIANCE</i> chapter | 24 ÷ 27 |
| | | Modified R1230CBDK Development KIT | 8 |
| | | Modified <i>Ordering Options</i> paragraph | 8 |
| | | Modified <i>Firmware upgrade via R1230CBEVB board</i> paragraph | 17 |
| | | Added note 5 on VCP drivers in the <i>Technical Specifications Table</i> | 19 |
| 12 Dec 2016 | 03 | Added warning concerning the correct set up of the RF regulation | 10 |
| | | Modified <i>REGULATORY COMPLIANCE</i> chapter | 24 ÷ 27 |
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| | | Modified <i>Reader</i> paragraph | 6 |
| | | Modified <i>Ordering Options</i> paragraph | 8 |
| | | Modified <i>Regulatory Compliance</i> chapter | 24÷27 |
| | | Modified <i>Tab. 2.1: Quark R1230CB Technical Specifications</i> | 10 |
| | | Removed information about R1230ADAT (obsolete product) | - |

Reference Document

- [RD1] Independent Testing Laboratory – CMC Centro Misura Compatibilità s.r.l. – Report Federal Communication Commission (FCC) – R1230CB Quark Low Power OEM UHF Compact RFID Reader. Test report n. R16152001 13 October 2016.
- [RD2] EPCglobal: EPC Radio-Frequency Identity Protocols Class-1 Generation-2 UHF RFID Protocol for Communications at 860 MHz – 960 MHz, Version 1.1.0 (December 17, 2005).

CAEN RFID srl

Via Vetraia, 11 55049 Viareggio (LU) - ITALY
 Tel. +39.0584.388.398 Fax +39.0584.388.959
info@caenrfid.com
www.caenrfid.com

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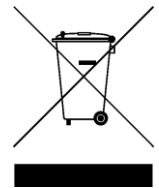
Federal Communications Commission (FCC) Notice

This device was tested and found to comply with the limits set forth in Part 15 of the FCC Rules. Operation is subject to the following conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received including interference that may cause undesired operation. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This device generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with the instruction manual, the product may cause harmful interference to radio communications. Operation of this product in a residential area is likely to cause harmful interference, in which case, the user is required to correct the interference at their own expense. The authority to operate this product is conditioned by the requirements that no modifications be made to the equipment unless the changes or modifications are expressly approved by CAEN RFID.

Disposal of the product

Do not dispose the product in municipal or household waste. Please check your local regulations for disposal/recycle of electronic products.



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1 INTRODUCTION

Product Description

Reader

The Quark (Model R1230CB), an embedded reader of the easy2read[®] product line, is a multiregional ultra-compact reader for low-power, high performance RAIN RFID applications.

With programmable output power in 15 steps from 9dBm to 23dBm, the reader can detect tags at more than 1 mt of distance (depending on antenna and tag dimensions).

Due to its low power consumption, the module is specifically designed to be easily integrated in battery powered devices as well as powered directly by a standard USB port.

The radio frequency core of the module permits to achieve fast reading and to be used in dense reader and dense tag environments for top-class rated performances.

The compactness of the device and the board-to-board connector allow to embed the R1230 inside the new small form factor industrial handhelds, smartphone accessories, small USB dongles and other compact form factor devices.

The R1230 complies with and can operate in both European and US regulatory environments and due to its multiregional capabilities, it is ideal for integration in devices requiring compliance to different geographical regions.

The Mod. R1230CBEVB evaluation board allows to manage the Quark R1230CB Reader directly via USB.



Fig. 1.1: Quark R1230CB OEM UHF Multiregional compact reader

Evaluation Board

The R1230CBEVB evaluation board allows to manage the R1230CB Quark reader directly via USB interface. This board is particularly suited for Quark reader evaluation and SW development purposes.

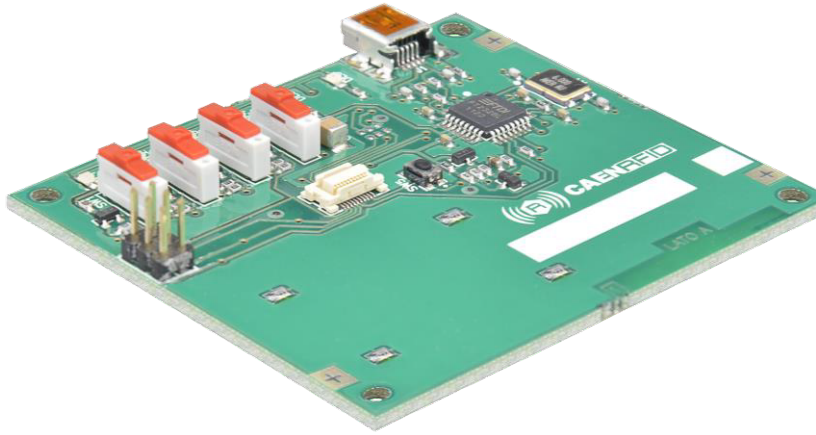


Fig. 1.2: Quark R1230CBEVB - Quark Reader Evaluation Board

Development Kit

A development kit with evaluation board, antenna and tags is available:



Fig. 1.3: R1230CBDK - Development kit with evaluation board, antenna and tags

The kit includes:

- n. 1 [R1230CBEVB Reader evaluation board plus USB cable](#)
- n.1 Circular Polarized Quadrifilar Antenna ASMA ([ETSI](#) or [FCC](#))
- n. 1 [Set of Labels](#)
- n. 1 [A927Z Temperature Logger Tag](#)
- n. 1 [RT0005 Temperature Logger Tag](#)
- n. 1 USB cable

The R1230CB Quark reader and its development kit are a complete set up for a quick implementation of RFID solutions.

Ordering Options

| | Code | Description |
|-----------------|--------------|---|
| Reader | WR1230CXBAAA | R1230CB - Quark Low Power OEM UHF Compact RFID Reader |
| Development kit | WR1230CBDKEU | Quark - Dev Kit with evaluation board, ETSI antennas and tags (reader not included) |
| | WR1230CBDKUS | Quark - Dev Kit with evaluation board, FCC antennas and tags (reader not included) |
| Accessories | WR1230CBEVBX | R1230CBEVB - Quark Reader Evaluation Board |
| | WANT020XASMA | ANT020/SMA - Quad - Circular polarized quadrifilar antenna (ETSI) - SMA |
| | WANT021XASMA | ANT021/SMA - Quad - Circular polarized quadrifilar antenna (FCC) - SMA |

Installation Notice

The correct way to connect the Quark R1230CB module to the evaluation board is shown in the following picture:

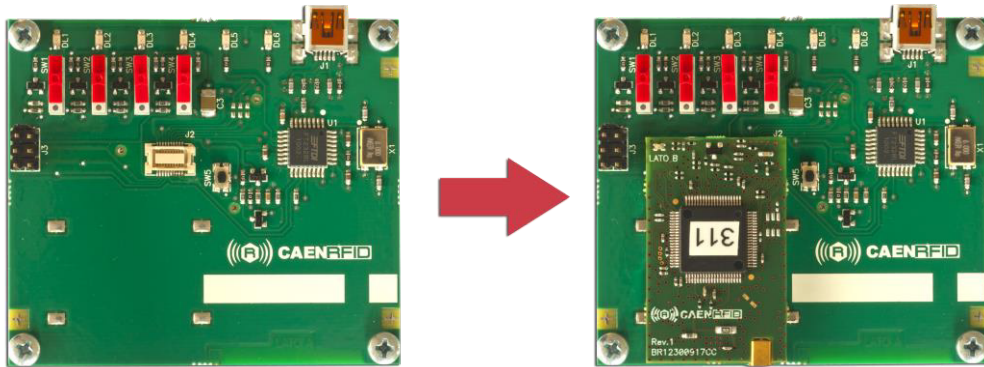


Fig. 1.4: Connection of the R1230CBEVB to the Quark R1230CB module

2 QUARK R1230CB

Technical Specifications Table

| | |
|---------------------------------|---|
| Frequency Band | 865.600÷867.600 MHz (ETSI EN 302 208 v3.1.1) 902÷928 MHz (FCC part 15.247) |
| Output Power Level | Programmable in 15 levels (1dB step) from 9dBm to 23dBm (from 8mW to 200mW) conducted |
| Output Power Accuracy | +/- 1dB |
| Antenna VSWR Requirement | 2:1 or better for optimum performances |
| Antenna Connector | Nr. 1 MMCX type |
| Frequency Tolerance | ±10 ppm over the entire temperature range |
| Number of Channels | 4 channels (compliant to ETSI EN 302 208 v3.1.1) 50 hopping channels (compliant to FCC part 15.247). All subsets of 902-928 MHz band are supported via FW upgrade |
| Standard Compliance | EPC C1G2 [RD2] / ISO18000-63 |
| Digital I/O | 4 I/O lines 3.3V out @ 3mA; 3.3V input level |
| Connectivity | UART Serial Port: Baudrate: 115200 Databits: 8 Stopbits: 1 Parity: none Flow control: none 3.3 V I/O voltage level |
| DC Power | 2.5VDC ÷ 5.5VDC |
| Power Consumption | - 1.6W @ RF out = 23dBm - 1.3W @ RF out = 17dBm - 0.25W in idle mode |
| Dimensions | (W)25 x (L)40 x (H)6 mm ³ (1.0 x 1.6 x 0.2 inch ³) |
| Operating Temperature | -10 °C to +55 °C |
| Weight | 8 g |

Tab. 2.1: Quark R1230CB Technical Specifications



Warning: The RF settings must match the country/region of operating to comply with local laws and regulations. It is not allowed the use in different countries/regions from the one in which the device has been sold.

External Connections

The location of the connectors is shown in Fig. 2.1. Their mechanical specifications are listed below:

Antenna Port: RF Coax Connector Huber+Suhner type 82MMCX-S50-0-2/111_K (to be used with Huber+Suhner type 11MMCX-50-1-1/111_O).

Supply and I/O connector: Molex P.N. 53748-0208 (mates with Molex 52991-0208 to be used on the host board).

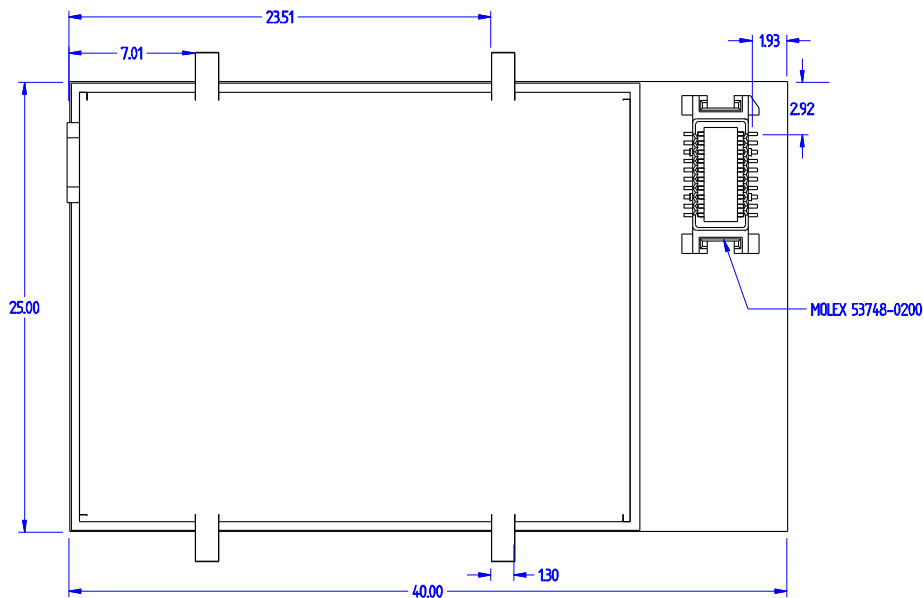


Fig. 2.1: Quark R1230CB technical drawings: top view

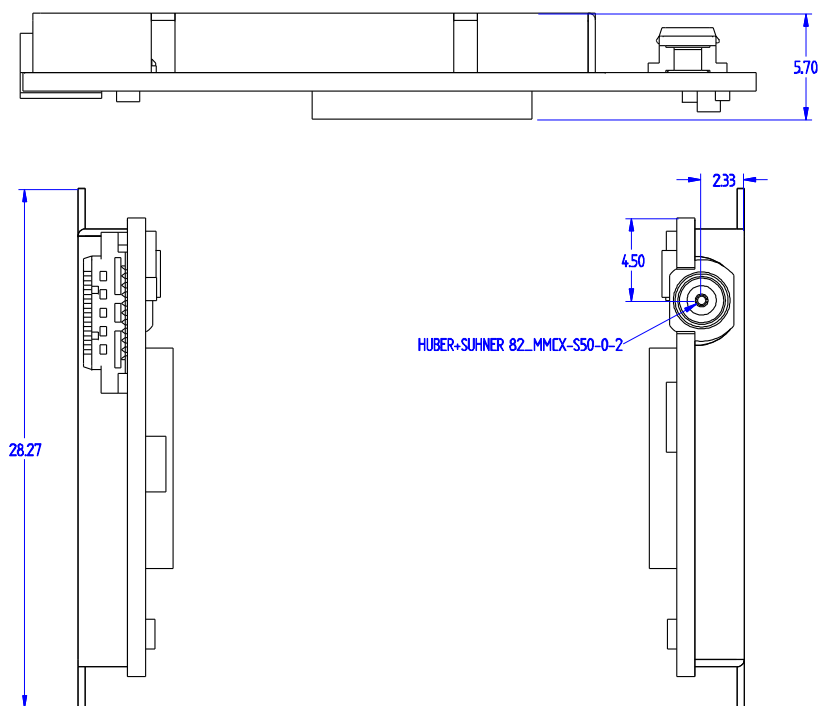


Fig. 2.2: Quark R1230CB technical drawings: lateral views

Supply and I/O connector pinout is shown in the following table¹:

| Pin # | Signal | Description |
|-------|---------|---|
| 1 | GND | Ground |
| 2 | TCK | TCK JTAG signal (debug purpose only) |
| 3 | GND | Ground |
| 4 | /RST | Reset (active low) |
| 5 | TXD | UART TX to host |
| 6 | TMS | TMS JTAG signal (debug purpose only) |
| 7 | RXD | UART RX from host |
| 8 | TDI | TDI JTAG signal (debug purpose only) |
| 9 | 5V_OUT | 5Vdc auxiliary output voltage |
| 10 | TDO | TDO JTAG signal (debug purpose only) |
| 11 | BSL_SEL | Bootloader interface selection ² |
| 12 | TST | TST JTAG signal (also for BSL operation) |
| 13 | VDD_M | 3.3Vdc auxiliary output voltage |
| 14 | GPIO0 | General Purpose IO #0 |
| 15 | VDD_M | 3.3Vdc auxiliary output voltage |
| 16 | GPIO1 | General Purpose IO #1 |
| 17 | VIN | Input supply voltage |
| 18 | GPIO2 | General Purpose IO #2 |
| 19 | VIN | Input supply voltage |
| 20 | GPIO3 | General Purpose IO #3 |

Tab. 2.2: Quark R1230CB connector pinout

The GPIO0-GPIO3 pins are 4 general purpose bidirectional pins, their default direction (or after a Reset) is input.

The RXD/TXD pins are used to communicate with the Quark reader via UART port; to establish a link with the device you must configure your COM port as follows:

Baud rate: 115200
 Parity: None
 Data bits: 8
 Stop bits: 1
 Flow Control: none

JTAG pins, unless otherwise noted, are for internal debug purpose only and shall not be connected by the user.

/RST, BSL_SEL and TST pins shall be properly driven to start the bootloader of R1230CB embedded microcontroller in case the user wants to upgrade the firmware image of the reader. In normal operation BSL_SEL and TST shall be at low level or left unconnected.

See § BLS operation (pag. 16) for the description of bootloader operation.

VDD_M and 5V_OUT are two auxiliary supply sources with 20mA maximum current capability to be used as supply voltages of external components.

¹ Debug purpose and unused pins should not be connected.

² If BSL_SEL is at high level, the UART interface is connected to the serial port dedicated to microcontroller Boot Start Loader operation required for flashing the firmware inside the MCU memory. This pin shall be at low level or left unconnected in normal operation.

R1230CB supply and I/O connector electrical characteristics³

| Pin name | Pin No. | Parameter | Min | Type | Max | Unit |
|------------------|-------------------|-------------------------------|------|------|------|------|
| GND | 1,3 | | | | | |
| TCK | 2 | VIL | -0.3 | | 0.75 | V |
| | | VIH | 1.5 | | 3.6 | V |
| | | Input current | | | 10 | μA |
| /RESET | 4 | VIL | -0.3 | | 0.6 | V |
| | | VIH | 1.65 | | 3.6 | V |
| | | Internal pull-up resistance | | 47 | | kΩ |
| | | Pulse width | 10 | | | μs |
| TXD | 5 | VOL | 0 | | 0.55 | V |
| | | VOH | 2.5 | | 3.5 | V |
| | | Output current | | | 3.0 | mA |
| TMS | 6 | VIL | -0.3 | | 0.75 | V |
| | | VIH | 1.5 | | 3.6 | V |
| | | Input current | | | 10 | μA |
| RXD | 7 | VIL | -0.3 | | 0.75 | V |
| | | VIH | 1.5 | | 3.6 | V |
| | | Input current | | | 10 | μA |
| TDI | 8 | VIL | -0.3 | | 0.75 | V |
| | | VIH | 1.5 | | 3.6 | V |
| | | Input current | | | 10 | μA |
| 5V_OUT | 9 | Output DC voltage | 4.75 | 5.00 | 5.25 | V |
| | | Output current | | | 20 | mA |
| TDO | 10 | VOL | 0 | | 0.55 | V |
| | | VOH | 2.5 | | 3.5 | V |
| | | Output current | | | 3.0 | μA |
| BSL_SEL | 11 | VIL | -0.3 | | 1.0 | V |
| | | VIH | 2.2 | | 3.6 | V |
| | | Internal pull-down resistance | | 10 | | kΩ |
| TST | 12 | VIL | -0.3 | | 0.75 | V |
| | | VIH | 1.5 | | 3.6 | V |
| | | Internal pull-down resistance | 45 | | | kΩ |
| VDD_M | 13,15 | Output DC voltage | 3.1 | 3.3 | 3.5 | V |
| | | Output current | | | 20 | mA |
| GPIO[0:3] | 14, 16, 18, 20 | VOL | 0 | | 0.55 | V |
| | | VOH | 2.5 | | 3.5 | V |
| | | Output current | | | 3.0 | mA |
| | | VIL | -0.3 | | 0.75 | V |
| | | VIH | 1.5 | | 3.6 | V |
| VIN ⁴ | 17,19 | Input supply voltage | 2.5 | | 5.5 | V |
| | | Supply current @ Vin = 2.5V | | 0.68 | | A |
| | | Supply current @ Vin = 3.7V | | 0.42 | | A |
| | | Supply current @ Vin = 5.0V | | 0.30 | | A |

Tab. 2.3: Quark R1230CB supply and I/O connector electrical characteristics

³ Exceeding maximum values reported in the table may cause permanent damage to the model.

⁴ External 100uF bypass capacitor between Vin and GND is recommended for proper operation.

Power supply connection

In the following schematic suggested R1230CB power supply connection is shown.

An external 100uF bypass capacitor between Vin and GND is recommended for proper operation.

The use of fuse F1 (or an equivalent solid state current limiter) is recommended since R1230CB doesn't provide internal current limitation protection.

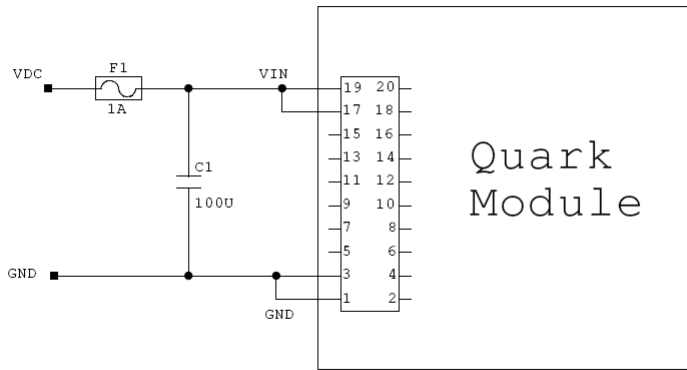


Fig. 2.3: Quark R1230CB power supply connection

General purpose I/O connections

The GPIO0-GPIO3 pins are 4 general-purpose bidirectional pins. Their default direction after a power on reset or a general reset is set to input.

GPIO, when configured as Outputs, can be used to drive indicators as LEDs or buzzers or to send trigger signal to others equipments.

GPIO, when configured as Inputs, can accept control signals from other equipments or trigger signals from sensors (i.e. photocells).

In the following schematic an example of application of GPIO is shown.

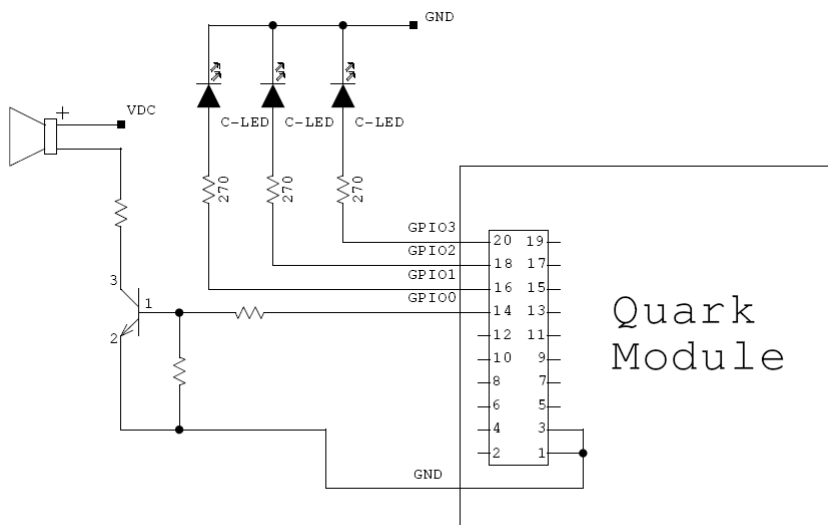


Fig. 2.4: Quark R1230CB GPIO connection example

External reset

R1230CB manual reset can be performed by forcing at low level /RESET pin for 10µs at least. /RESET pin is pulled-up by an internal resistor.

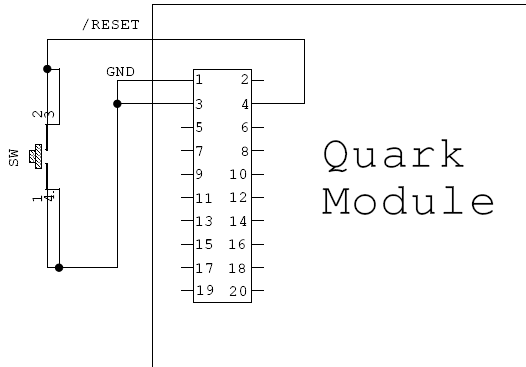


Fig. 2.5: Quark R1230CB external reset

UART connection

The RXD/TXD pins are used to communicate with the R1230CB board via UART port. Since Quark RX/TX are TTL level signals, in order to connect it with a PC, a TTL/RS232 translator shall be used (please refer to the diagram below).

To establish a link with the device host COM port shall be configured as follows:

- Baud rate: 115200
- Parity: None
- Data bits: 8
- Stop bits: 1
- Flow Control: none

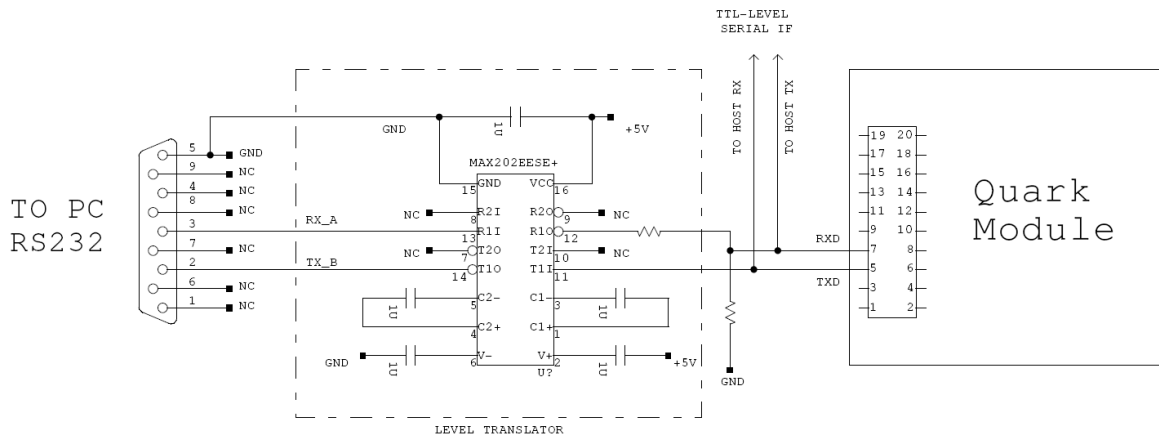


Fig. 2.6: Quark R1230CB RS232 connection

Antenna port specifications

In the following table the pinout of R1230CB antenna is shown.

| Pin # | Function | Direction | Description |
|-------|----------|-----------|-------------|
| INNER | RF OUT | OUT | RF output |
| OUTER | GND | - | Ground |

Tab. 2.4: RF port pinout

| Parameter | Min | Typ. | Max | Unit |
|---|-----|------|-----|------|
| RF output power | 8 | | 200 | mW |
| | 9 | | 23 | dBm |
| Output power vs. power setting accuracy | | | ± 1 | dB |
| RF port impedance | | 50 | | Ω |
| Recommended antenna VSWR | | | 2:1 | - |

Tab. 2.5: RF port electrical characteristics

Reader – Tag Link Profiles

Quark reader supports different modulation and return link profiles according to EPC Class1 Gen2 protocol.

In the following table are reported all profiles that have been tested for the compliance with ETSI and FCC regulations.

| Link profile # | Regulation | Modulation | Return Link |
|----------------|------------|------------------|--------------------------|
| 0 | ETSI - FCC | DSB-ASK; f=40kHz | FMO; f = 40kHz |
| 1 | ETSI - FCC | DSB-ASK; f=40kHz | Miller (M=4); f = 256kHz |

Tab. 2.6: Quark R1230CB reader to tag link profiles

Firmware Upgrade

Quark reader firmware upgrade is based on Boot Start Loader (BSL) of the embedded microcontroller inside the module.

An upgrade software has been developed to be used with Quark evaluation board (mod. R1230CBEVB).

BSL operation

In order to start the BSL of Quark internal microcontroller /RST, TST and BSL_SEL signal shall be driven as in the picture below:

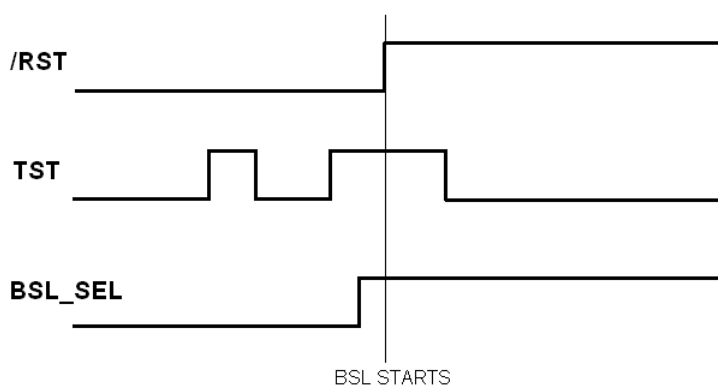


Fig. 2.7: BSL sequence

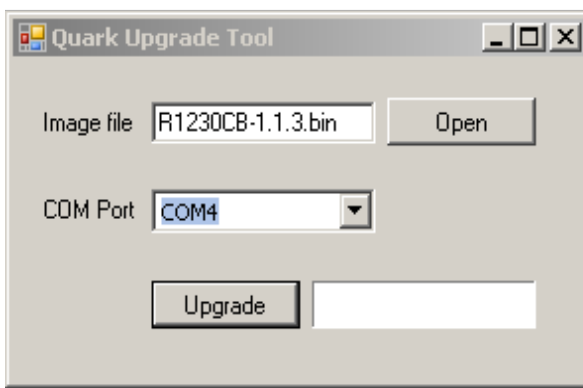
The BSL program execution starts when TST pin has received a minimum of two positive transitions and if TST is high while /RST rises from low to high. BSL_SEL shall be at high level before BSL starts. Pulses length and distance between edges of all signals shall be 10ms at least.

Firmware upgrade via R1230CBEVB board

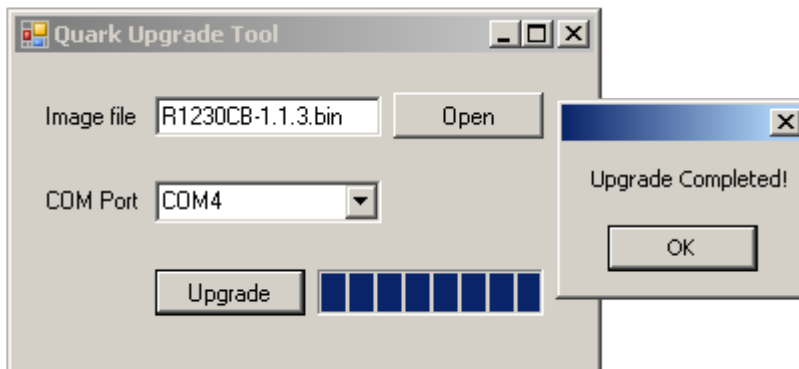
Quark firmware upgrade can be managed via USB by using the evaluation board (mod.R1230CBEVB) and the SW upgrade program. The Quark Upgrade Tool is available for free at [Quark R1230CB page](#) of the CAEN RFID Web Site.

In order to upgrade the firmware follow the steps below:

- Connect to the USB port the evaluation board with the Quark reader installed
- Verify the virtual COM port associated to the board
- Open the FW upgrade program
- Select the COM port
- Select the image file by clicking on "Open" button
- Click on "Upgrade" button



- Wait for the upgrade to be completed



- Disconnect the USB cable from the evaluation board
- Connect again the USB cable in order to restore normal reader operation.

PCB Pad Layout

In the picture below the recommended PCB pad layout to be implemented on the user host board is shown. The 4 square pads shall be used to solder R1230CB shield and shall be connected to ground. In addition is shown the position and the layout required for Molex 52991-0208 connector, which mates with R1230CB supply and I/O connector, and which shall be soldered on the host board.

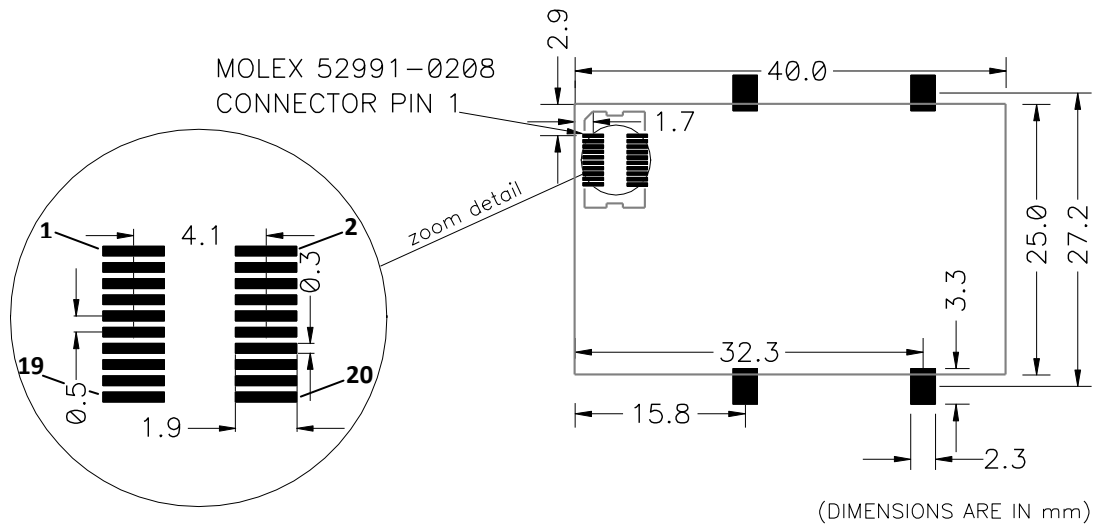


Fig. 2.8: PCB pad layout

3 QUARK R1230CBEVB

Technical Specifications Table

| | |
|------------------------------|---|
| Switch | SW1= RESET SW2...SW5=GPIO |
| USB Port | USB Type A plug connector Bus powered USB 2.0 device Must be connected to Hight-power Port (500 mA @ VBUS) It appears as USB serial port Virtual Com Port (VCP) ⁵ drivers for Windows XP/Vista/Seven (7), Windows CE 4.2, Linux 2.40 and greater Baudrate: 115200 Databits: 8 Stopbits: 1 Parity: none Flow control: none |
| User Interface | Red LED: Power Yellow LED: USB communication activity Green LED: GPIO[0..3]. |
| Dimensions | (W)70.9 x (L)62.5 x (H)11.6 mm ³ (2.8 x 2.5 x 0.5 inch ³) |
| Electrical Power | DC Voltage 5V +/-5% Max 400 mA ⁶ |
| Operating Temperature | -10 °C to +55 °C |

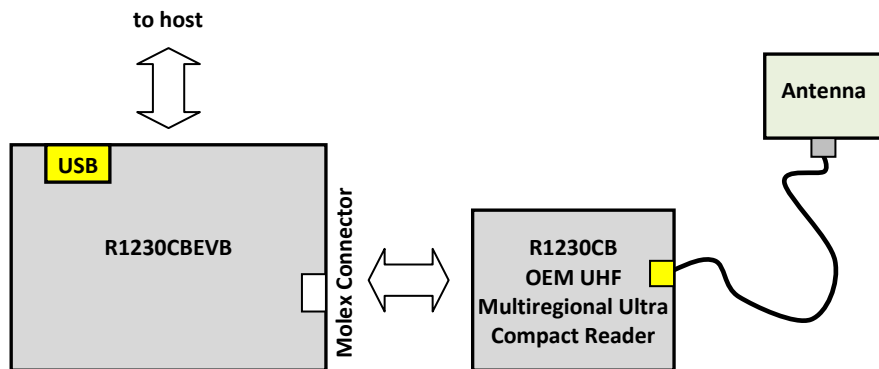
Tab. 3.1: Quark R1230CBEVB - Technical Specifications

⁵ You can download VCP drivers for Windows based systems from the CAEN RFID Web Site at [Quark R1230CB page](#) or from <http://www.ftdichip.com/Drivers/VCP.htm> for different operating systems (or for the most updated version).

⁶ With Quark reader operating.

Connection diagram

The following block diagram shows how to connect the Mod. R1230CB with the PC host via the Mod. R1230CBEVB evaluation board.



Technical drawings

The location of the connectors is shown in Fig. 3.1. Their mechanical specifications are listed below:

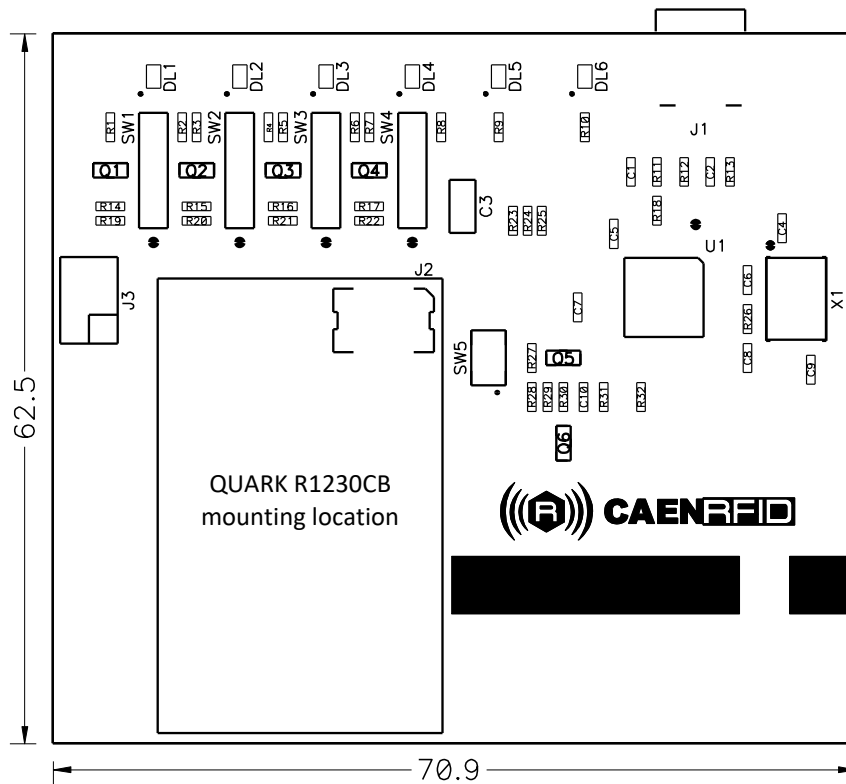


Fig. 3.1: Quark R1230CBEBV technical drawing

Electrical scheme

The electrical scheme of the Quark R1230CBEVB is shown in Fig. 3.2.

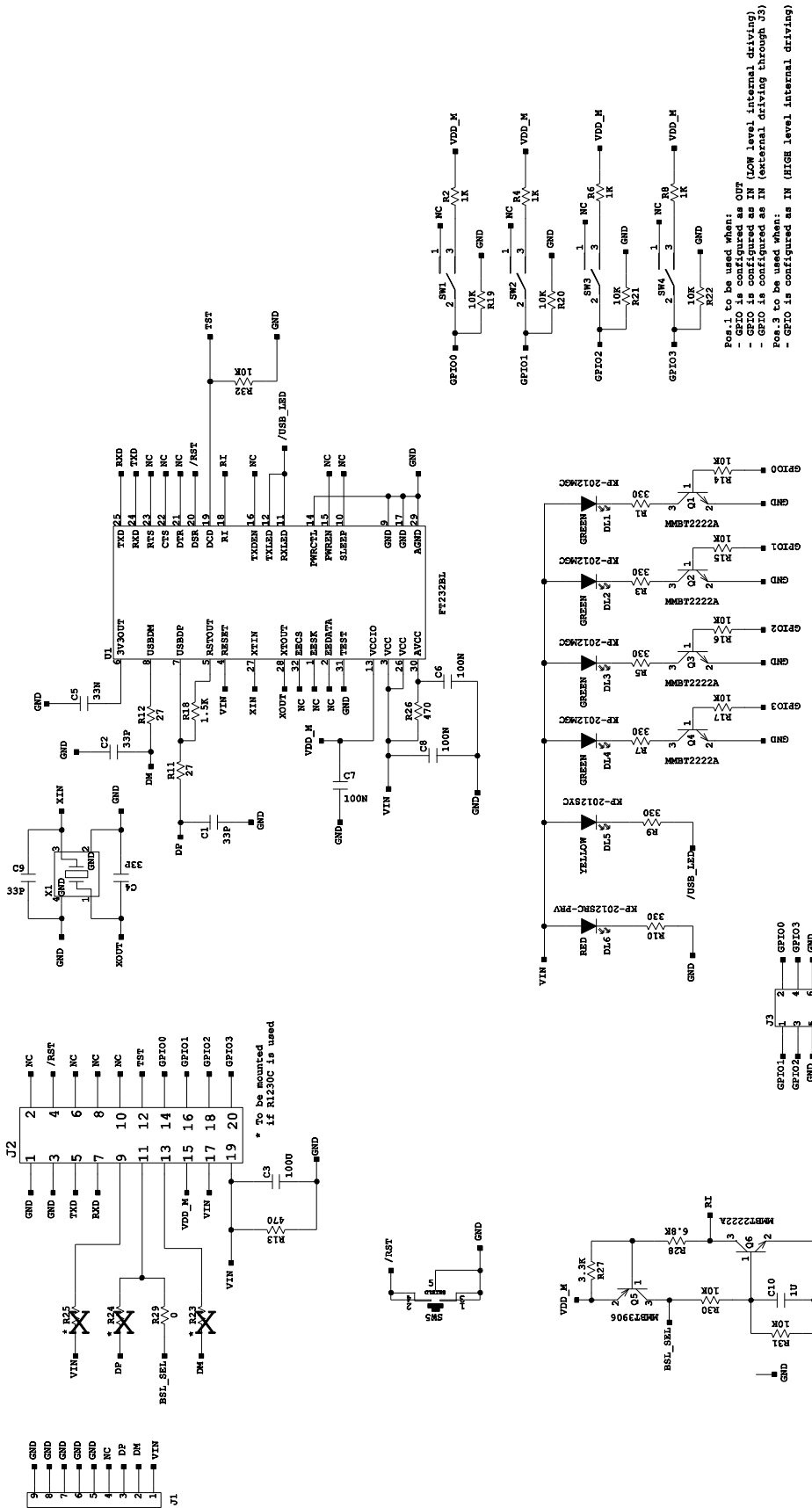


Fig. 3.2: Quark R1230CBEVB electrical scheme

External Connections

GPIO connector pinout is shown in the following table:

| Pin # | Signal |
|-------|--------|
| 1 | GPIO 1 |
| 2 | GPIO 0 |
| 3 | GPIO 2 |
| 4 | GPIO 3 |
| 5 | GND |
| 6 | GND |

Tab. 3.2: Quark R1230CBEVB connector pinout

4 REGULATORY COMPLIANCE

FCC Compliance

This equipment has been tested and found to comply with Part 15 of the FCC Rules.

NOTE:

- a. Any changes or modification not approved by CAEN RFID could void the user's authority to operate the equipment.
- b. The QUARK R1230CB Module, which is rated at 200 mW output, is approved for operation with the following antennas:
 - 1. CAENRFID antenna Mod. WANTENNAX012 (Linear polarized antenna 1.3dBi gain 902 - 928 MHz).
 - 2. CAENRFID antenna Mod. WANT021XMMCX (QUAD Circular Polarized Quadrifilar Antenna; 0.7dBi gain).

Use of other than the approved antennas with this unit may result in harmful interference with other users, and cause the unit to fail to meet regulatory requirements.

- c. This transmitter module is authorized to be used in other devices only by OEM integrators under the following conditions:
 - 1. The RFID Module antenna shall have a separation distance of at least 20 cm from all persons
 - 2. The transmitter module must not be co-located with any other antenna or transmitter
- d. In case that the two conditions above are met, further transmitter testing will not be necessary. However, the OEM integrator is still responsible for testing the end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.). In the event that these conditions can not be met (for certain configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In such case the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

- e. If the FCC ID is not visible when the module is installed inside another device, the OEM integrator shall apply a label in a visible area on his product with the following statement:

Contains Transmitter Module FCC ID: UVECAENRFID016

or

Contains FCC ID: UVECAENRFID016

- f. The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module or change RF related parameters in the user manual of the end product.

Reference document: Test report n. R16152001 **[RD1]**.

See § **Quark FCC Grant** page 27 for the Quark R1230CB FCC Compliance Certificate.

CE Compliance

Reference standard:

ETSI EN 301 489-1 V. 1.9.2:2011

EN 55032:2012

CEI EN 55024:2013

ETSI EN 302 208 V3.1.1:2017

CEI EN 60950-1:2007 +/A11:2010 +/A1:2012 +/A12:2012

CEI EN 50364:2011

EN 50581:2012

See § **Quark CE Declaration of Conformity** page 26 for the Quark R1230CB CE Compliance Certificate.

RoHS EU Directive

The Quark R1230CB Reader is compliant with the EU Directive 2011/65/EU on the Restriction of the Use of certain Hazardous Substances in Electrical and Electronic Equipment (RoHS2).

Quark R1230CB

CE DECLARATION OF CONFORMITY

We

CAEN RFID Srl
Via Vetraia, 11
55049 Viareggio (LU)
Italy
Tel.: +39.0584.388.398 Fax: +39.0584.388.959
Mail: info@caenrfid.com
Web site: www.caenrfid.com

herewith declare under our own responsibility that the product:

Code: WR1230CXBAAA
Description: R1230CB - Quark Low Power OEM UHF Compact RFID Reader

corresponds in the submitted version to the following standards:

ETSI EN 301 489-1 V. 1.9.2:2011
EN 55032:2012
CEI EN 55024:2013
ETSI EN 302 208 V3.1.1:2017
CEI EN 60950-1:2007 +/A11:2010 +/A1:2012 +/A12:2012
CEI EN 50364:2011
EN 50581:2012

and declare under our sole responsibility that the specified product meets the principle requirements and other applicable regulations of directives 2014/53/EU (RED) and 2011/65/EU (RoHS2)

Date: 08/01/2018


CAEN RFID Srl
Via Vetraia, 11
55049 VIAREGGIO - ITALY
VAT IT 02032050466

Adriano Bigongiari (Chief Executive Officer)



On the basis of this declaration, these products will bear the following mark:

Quark R1230CB

FCC GRANT

TCB

GRANT OF EQUIPMENT AUTHORIZATION

TCB

Certification
Issued Under the Authority of the
Federal Communications Commission
By:

EMCCert Dr. Rasek GmbH
Stoernhofer Berg 15
91364 Unterleinleiter,
Germany

Date of Grant: 11/11/2016
Application Dated: 11/11/2016

CAEN RFID srl
via Vetrata, 11 - 55049 Viareggio (LU) - ITALY
Viareggio, 55049
Italy

Attention: Adriano Bigongliari , CEO

NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for the equipment identified hereon for use under the Commission's Rules and Regulations listed below.

FCC IDENTIFIER: UVECAENRFID010
Name of Grantee: CAEN RFID srl
Equipment Class: Part 15 Spread Spectrum Transmitter
Notes: Low power OEM UHF Compact RFID Reader
Modular Type: Single Modular

| <u>Grant Notes</u> | <u>FCC Rule Parts</u> | <u>Frequency Range (MHZ)</u> | <u>Output Watts</u> | <u>Frequency Tolerance</u> | <u>Emission Designator</u> |
|--------------------|-----------------------|------------------------------|---------------------|----------------------------|----------------------------|
| | 15C | 902.75 - 927.25 | 0.19 | | |

Power output listed is peak conducted. This module is approved for battery powered devices, only. The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter except in accordance with FCC accepted multi-transmitter procedures. End-users and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.

