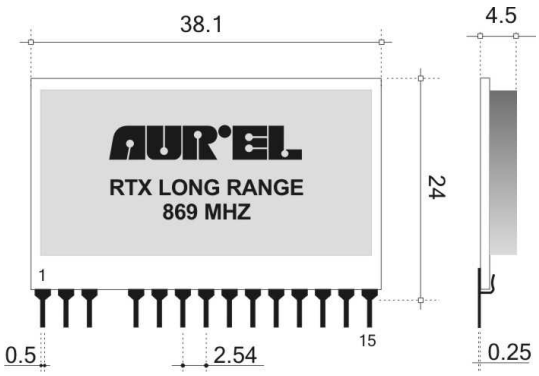




RTX-LONG-RANGE-869MHz radio transceiver half-duplex, offers improved performance, as such as longer RF range up to 3Km, operates in European band 869,4÷869,65MHz free licensed with no government taxes.
The high sensitivity level (-118dBm) joined with its typical ERP (+27dBm) can assure a budget-link around 145dB, improving communication distance of 4-5 times better compared with traditional 10mW LPD devices.
It operates in 2 different modes: DIRECT MODE with modulation and demodulation of proper data protocol or PACKET MODE, selectable via UART through AT commands, same as a radio-modem.
7 channels available, selectable depending on transmission speed. GFSK modulation.
Blocking immunity performance are compliant with Class 1, optimum rejection to the disturbances in the adjacent channels.
In order to assure a battery power supply, the module has been designed for 3,3V supply, perfect for SCADA application and its current consumption is around 600mA at maximum power emission, and 1 uA in stand-by mode.
Thanks to its tiny overall dimensions it can be fitted vertically on application circuit, with dimensions similar to the Aurel standard receivers ( 38,1mm length x 24mm high x 4,5mm ), top layer is protected with metallic shield with the purpose to obtain the European standard approvals.

## Features

- **Double transmission mode: DIRECT AND PACKET**
- **RS-232 signals store and forward operation**
- **No coding or preamble demanded to User in PACKET MODE**
- **AT Commands for internal registers programming**
- **HyperTerminal* compatible**
- **Number of channels: 7 max**
- **Overall dimension (38,1x24X4,5 mm)**
- **UART Data Rate: 2400, 4800, 9600 bps**
- **Max ERP: max 500 mW**
- **High sensibility -118dBm with data-rate 500bps**
- **Fixed Voltage supply 3,3V**
- **Average range: 3 Km**

## Applications

- **Irrigation systems**
- **Instruments and solar panel monitoring**
- **Industrial control**
- **Animal tracking**
- **SCADA**
- **Alarms**
- **AMR**

## Absolute limits

| | |
|---|---|
| Operating temperature | -20 °C ÷ +70 °C |
| Storage temperature | -40 °C ÷ +100 °C |
| Power supply | +4 V |
| Input voltage | -1.0 ÷ Vcc + 0.3V |
| Output voltage | -1.0 ÷ Vcc + 0.3V |

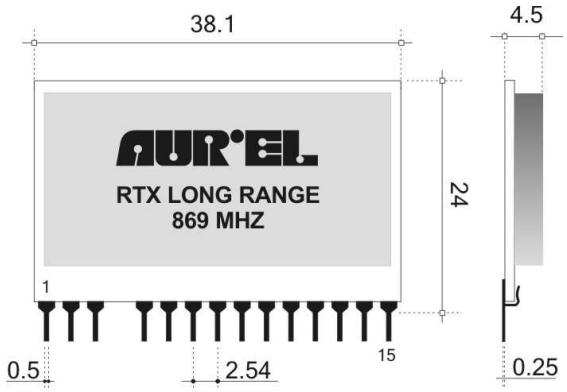
## Technical features

| | Min. | Tip. | Max. | Unità |
|---|---|---|---|---|
| **DC Levels** | | | | |
| Supply voltage pins 1,15. | 2.7 | 3.3 | 3.6 | V |
| Power consumption (rx mode) | | 32 | | mA |
| Power consumption (tx mode @ +27 dBm) | 420 | 500 | 550 | mA |
| Power consumption (stand-by mode) | | 8 | 10 | µA |
| Logic level “1” in input/output | 0.7xVcc | | Vcc | V |
| Logic level “0” in input/output | 0 | | 0.3xVcc | V |
| **RF TX** | | | | |
| Frequency band | | 869,4÷869,65 | | MHz |
| TX Power (direct mode Pin 14=1) | 25 | 27 | 29 | dBm |
| TX Power (direct mode Pin 14=0) | 20 | 21 | 23 | dBm |
| TX Power (packet mode) | 8 | | 29 | dBm |
| Modulation type | | GFSK | | |
| Frequency deviation | | ±3.5 | | KHz |
| Spurious < 1GHz | | | -36 | dBm |
| Spurious > 1GHz | | | -30 | dBm |
| Power on adjacent channel in TX ( see note2) | | | 50 | nW |
| **RF RX** | | | | |
| Sensitivity, direct mode | -115 | -116 | -120 | dBm |
| IF Band | | 12 | | KHz |
| RF Band | | 600 | | KHz |
| Selectivity on adjacent channel (note3) | | 50 | | dB |
| Saturation on adjacent channel (note4) | | ≥87 | | dB |
| Blocking test ±2MHz (note5) | 85 | | 90 | dB |
| Blocking test ±10MHz (note5) | 85 | | 94 | dB |
| **Performance** | | | | |
| Serial Bit Rate [1] | 2400 | 4800 | 9600 | bps |
| Outdoor range | | 3000 | | m |
| Channels | | | 7 | n° |
| Channelization | | 25 | | kHz |
| **Switching times** | | | | |
| PWRDN → RX | TBD | | | ms |
| TX → RX | | 4 | | ms |
| RX → TX | | 3,5 | | ms |
| **Default settings (only packet mode)** | | | | |
| Channel | | (CN3) 869,5 | | MHz |
| Output power (tx) | | 27 | | dBm |
| Serial Data Rate | | 9600 | | Bps |

The technical features can change without forecasting. AUR°EL S.p.A doesn’t assume any responsibility of damage due to the improper use of the device.

Note l : As input serial signal is intended 8 bit ,not parity,1 stop bit .
Note 2: Test achieved with the method described in 7.6 section of the normative ETSI EN 300 220-1 V2.4.1
Note 3: Test achieved with the method described in 8.3 section of the normative ETSI EN 300 220-1 V2.4.1
Note 4: Test achieved with the method described in 8.3.4 section of the normative ETSI EN 300 220-1 V2.4.1
Note 5: Test achieved with the method described in 8.4 section of the normative ETSI EN 300 220-1 V2.4.1

## PIN OUT




**Pin-out**
1)+V_PA_LNA
2)ANTENNA
3)GND
4)NC(No pin)
5)DM/UART
6)ENABLE
7)TX_RX / SP1
8) IN_DATA / SP2
9)OUT-DATA(RX direct mode)
10)GND
11)CN0 / RTS
12)CN1 / CTS
13)CN2 / TX_UART
14)PW_TX / RX_UART
15) +V_RD

**Picture 2:** pin-out of the module

| N° Pin | Name | Description |
|---|---|---|
| 1 | **+V_PA_LNA** | Front end power supply. Use a stable power source at 3,3V/1A. Connect a electrolytic capacitor 220 – 1000 uF near GND PIN |
| 2 | **ANT** | Antenna connection, 50 ohm impedance |
| 3 | **GND** | Connection to ground plane |
| 5 | **DM / UART** | In Digital input for choosing transmission mode.<br>Internally, it's connected to a 22÷47K pull-down resistor.<br>**DM/UART** / **STATE**<br>0 – Direct-mode<br>1 – Packet mode |

<table>
<tr><td>6</td><td>ENABLE</td><td>Starting up Pin.<br>Internally, it’s connected to a 22÷47K pull-down resistor<br><br><table><tr><th>PWRDN</th><th>STATE</th></tr><tr><td>0</td><td>Off</td></tr><tr><td>1</td><td>On</td></tr></table></td></tr>
<tr><td>7</td><td>TX_RX / SP1</td><td>In DIRECT MODE (pin5 = 0), pin 7 = Input for TX/RX switching. Connected as follow:<br><br><table><tr><th>TX/RX</th><th>STATE</th></tr><tr><td>0</td><td>RX</td></tr><tr><td>1</td><td>TX</td></tr><tr><td>X (open)</td><td>RX</td></tr></table><br>In PACKET MODE (pin5 = 1) , SP1 together with SP2 allow the selection of serial port speed UART<br><br>Functionality not available yet: the communication works only at 9600pbs, SP1 e SP2 not working<br><br><table><tr><th>SP1<br>Pin7</th><th>SP2<br>Pin8</th><th>UART Data Rate<br>bps</th></tr><tr><td>0/X</td><td>0/X</td><td>9600</td></tr><tr><td>0/X</td><td>1</td><td>19200</td></tr><tr><td>1</td><td>1</td><td>115200</td></tr><tr><td>1</td><td>1</td><td>Test mode<br>(non available)</td></tr></table>Tab. SP1/SP2</td></tr>
<tr><td>8</td><td>IN_DATA / SP2</td><td>In DIRECT MODE (pin5 = 0), pin 8 = Digital data input for DIRECT MODE transmission<br>Connect at 0 or 1 with data-rate 10÷3000Hz.<br><br>In PACKET MODE (pin5 = 1) , SP1 together with SP2 allows to select serial port speed UART (pin 13,14).<br>For pin 8 settings (SP2) please see above pin 7 SP1 in PACKET</td></tr>
<tr><td>9</td><td>OUT-DATA<br>(RX direct mode)</td><td>Digital data output in DIRECT MODE. This pin is active only in DIRECT MODE.</td></tr>
<tr><td>10</td><td>GND</td><td>Connection to ground plane.</td></tr>
</table>

<table>
<tr>
<td>11<br>12<br>13</td>
<td>CN0 / RTS<br>CN1 / CTS<br>CN2 / TX_UART</td>
<td>In DIRECT MODE (pin5 = 0), pin 11(CN0), pin 12(CN1), pin13(CN2), allows to modify frequency channel selection.<br><br>
<table>
<tr><th colspan="8">DIRECT-MODE pin5 = 0</th></tr>
<tr><td>RF Channel</td><td>CN1</td><td>CN2</td><td>CN3</td><td>CN4</td><td>CN5</td><td>CN6</td><td>CN7</td></tr>
<tr><td>Frequency (MHz)</td><td>869,45</td><td>869,475</td><td>869,5</td><td>869,525</td><td>869,550</td><td>869,575</td><td>869,6</td></tr>
<tr><td>PIN11_CN0</td><td>0 / X</td><td>1</td><td>0 / X</td><td>1</td><td>0 / X</td><td>1</td><td>0 / X</td></tr>
<tr><td>PN12_CN1</td><td>0 / X</td><td>0 / X</td><td>1</td><td>1</td><td>0 / X</td><td>0 / X</td><td>1</td></tr>
<tr><td>PIN13_CN2</td><td>0 / X</td><td>0 / X</td><td>0 / X</td><td>0 / X</td><td>1</td><td>1</td><td>1</td></tr>
</table>
0 = GND, 1 = +Vcc, X = open<br>
Note: Pins 11,12,13,14, when left open are internally connected to GND with 22K resistance.<br><br>
In PACKET MODE (pin5=1), pin 11(RTS), pin12(CTS), pin13(TX_UART), pin14 (RX_UART), allow the connection to a serial port for data Exchange and the programming of some registers through AT commands<br><br>
<table>
<tr><th>PIN</th><th>Description</th></tr>
<tr><td>PIN11_RTS</td><td>TBD</td></tr>
<tr><td>PN12_CTS</td><td>TBD</td></tr>
<tr><td>PIN13_RX_UART</td><td>Serial data output in TTL RS-232 logic with 1 start bit (0V), 8 data bit and1 stop bit (3V). The line must be driven at high logic level (3V)</td></tr>
</table>
</td>
</tr>
<tr>
<td>14</td>
<td>PW_TX /<br>RX_UART</td>
<td>In direct mode (pin 5 = 0), the pin 14 allows to change the RF power transmission of approximately 6 dBm. This setting is useful when connected to external antenna and gain of 6-8dB.<br>
This setting allows you to return to the power limits shown in Table 5 by the normative<br>
EN 300 220-1 paragraph 7.2.3<br><br>
<table>
<tr><th>PW_TX (pin14)</th><th>STATO</th></tr>
<tr><td>1</td><td>RF output Power, max Power(+27dBm)</td></tr>
<tr><td>0/X</td><td>RF output Power (+21dBm)</td></tr>
</table>
In packet mode (pin5 = 1), pin 11 (RTS), pin12 (CTS), pin13 (TX_UART), pin14 (RX_UART), allow connection to a serial port for data exchange and the programming of some internal registers using AT commands.<br><br>
<table>
<tr><th>PIN</th><th>Description</th></tr>
<tr><td>PIN14_RX_UART</td><td>Serial data output in TTL RS-232 logic with start bit 1 (0V), 8 data bits and 1 stop bit (3V). The line must be driven to a high logic level (3V).</td></tr>
</table>
</td>
</tr>
<tr>
<td>15</td>
<td>+V_RD</td>
<td>Radio digital circuit power supply. Use a stable power source at 3,3V/100mA. Connect a electrolytic capacitor 10-100uF near GND PIN. In Aurel demoBoard there is a 100 nF capacitor.</td>
</tr>
</table>

**Tab. 1**: PIN description

## Operating mode

The device's operating modes can be summarized in 5 conditions

1. **Test Mode**
2. **DIRECT MODE**
3. **PACKET MODE**
4. **Power Down Mode**
5. **Command Mode**

### 1. Test Mode

The Test Mode can be reached by short circuiting SP1 and SP2 pins to +V, before of the switching of the device. This condition it is not available yet.

### 2. DIRECT MODE (pin 5 =0)

This mode is used to transfer proprietary data packets via RF, without the module prepares the data for the transmission.
In this way the packet must include a preamble long enough and a coding (example Manchester) in order to balance the average Voltage value. Single data duration must be included in time interval between 20ms and 350us (high+low).

Transmission

Direct mode transmission is activated bringing pin 7 high (TX_RX). Data on pin 8 (IN_DATA) will sent via radio.

Receiving

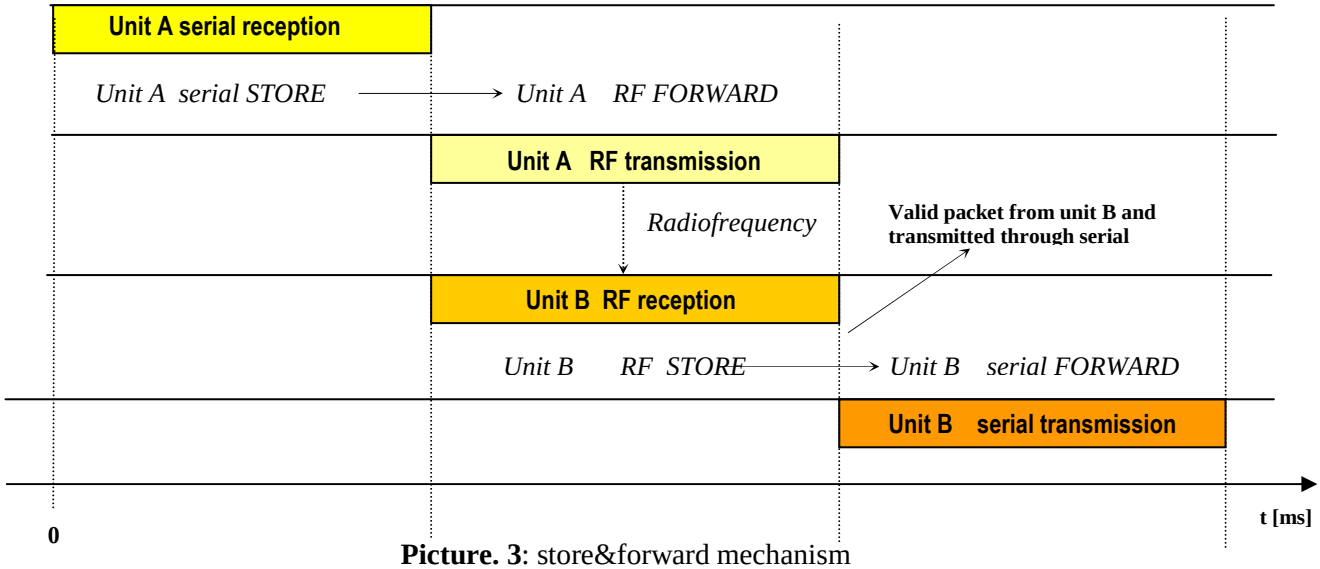
Same as the transmission. It is activated bringing pin 7 low (TX_RX).
Received data will available on pin 9.

### 3. PACKET MODE (pin5 = 1)

When a start bit (low logic level 0V) is present on input line RX_UART (pin14) and consequently at least one data Byte, the device enters in transmission mode.
Store&forward system could be described in sequence:

- Serial reception unit A / Transmission RF unit A
- RF reception unit B / Transmission serial unit B [Picture. 3]

The absence of the data input in Pin 14 is established by an Timeout expiring (equal to the time of 1.5 bytes to the serial data rate used). Then the transceiver will not memorize further data input until the effective RF transmission of the data in the internal buffer is occurred.
The maximum length of the transmitted packet is 63 bytes, after which, the module rejects the received serial byte.
The data are transmitted on RF channel only after the serial Rx is expired.
Likewise the receiver part will analyze the incoming RF packet going on with the serial transmission in case of valid data, deleting in case of wrong data.




**Picture. 3**: store&forward mechanism

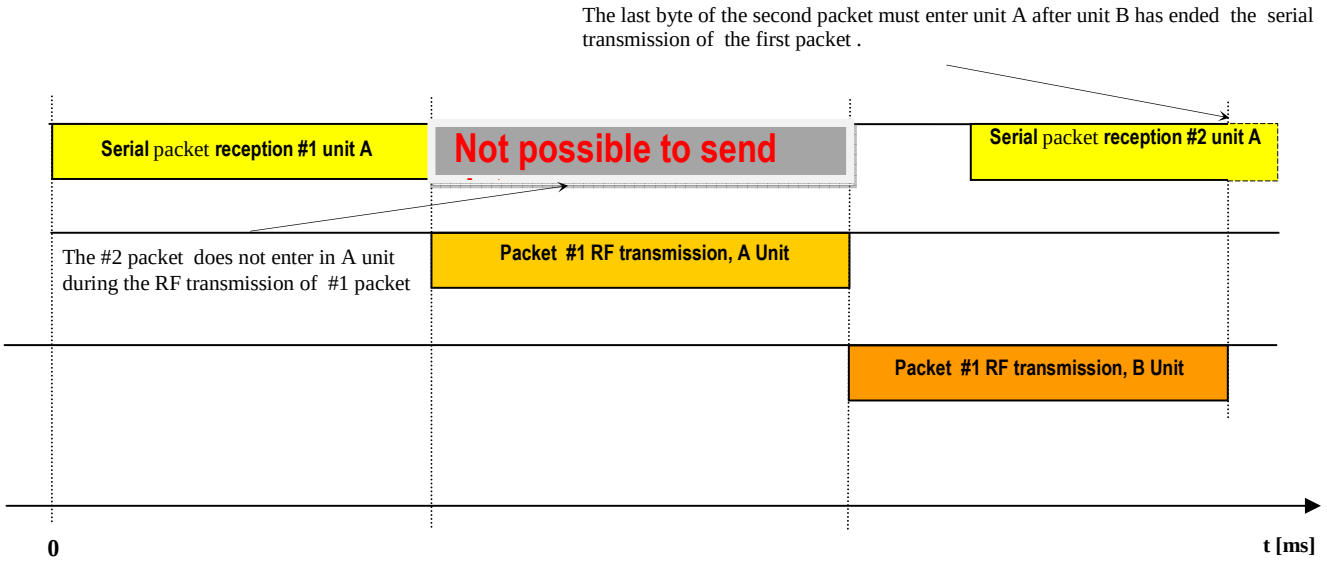
As shown by the Pic. 3 time diagram, the time interval, from the starting moment (instant 0) when the data reaches the module's port, to the moment when it is received by the remote module, depends on the number of Bytes that form the packet and also on the serial speeds used for the reception as well as for the transmission.

**For the correct operation of the device consider that it's not allowed to have contemporary phases inside the same unit.**
**For instance : If A unit is in RF transmission phase, eventual incoming data will not memorized in the buffer.**

Fig. 4 shows the case of the transmission of two packets in a sequence from unit A to unit B: packet #1 enters in unit A and it's transmitted to unit B that forwards it through the serial port. The transmission of the packet #2 must be carried out, keeping in mind that the end of the serial reception of unit A has to take place AFTER the end of the serial transmission of packet #1 by unit B so to avoid the overlapping of the RF reception and of the serial transmission phases in this device: it is therefore necessary to enter a safety interval between the transmissions of the two packets in function of the number of byte of the first packet, of the serial speed of unit B and in function of the time required $T_{RF}\,[ms]$ for the transmission of the packet on the RF which depends upon the number of bytes of the packet and it is given by

$T_{RF}[ms] = K + ???\cdot N_{byte}$

with $K$= TBD @9600bps, $K$=TBD @4800bps, $K$=TBD @2400bps.




**Picture. 4**: Two data packets transmission

## 4. Power Down Mode

By bringing to a low level or left open PIN 6 (ENABLE) device enters into a power saving state, the consumption in fact is limited to less than 5 µA. In this mode, the transceiver can neither receive nor transmit. It is necessary to commutate pin 6 in high level (+3V) to bring it back to the normal operating state.

**NOTE:**
At the first feeding cycle, you should enable the Enable pin high after the power supply is stable, bring it back down to enter the Power-down mode.
This action is required to ensure the reported consumption in a specific phase in the power-down.

## 5. Command Mode (Programmation of the module)

The Command Mode state allows the Owner to configure the operating parameters of the device. The programming is carried out by means of 'AT' type commands sent to the TX_UART (pin 13) at the speed set by means of pins SP1 and SP2 (pin 7 and pin 8). The module's answers shall be given on the RX_UART (pin 14).

To enter in Command Mode from PACKET MODE, it is necessary to send on the TX_UART (pin 13) a sequence of 3 consecutive ASCII characters '+', i.e.: (+++). A module under Command Mode state is unable to the RF reception and transmission
At this purpose, we recommend using the RS232 port or USB port of a PC, physically interfaced to the radio module to get logic levels 0-3V, connect the RX and TX signals leaving disconnected RTS and CTS (non-implemented). Use a program to communicate with the serial port, Hyperteminal, RealTerm or other similar, setting the following parameters:
communication speed established by SP1 and SP2 (9600, 19200, 115200), a START bit, 8 data bits, and a STOP bit, no parity, select CR and LF.
Try sending from PC **+ + +** , if you will get **OK** then the communication is correct.
Type **ATCC**, you will get good response in confirming the exit from Command Mode.

## Available Registers and Commands

The commands that can be sent to the module regard the reading and writing of the registers containing the operation setting of the device.
The reading and writing of the configuration registers and the sending of the commands to the module are carried out by entering the '**AT**' sequence ( Standards used in PSTN modem) before the command's or register's name.

Below is listed the available commands, for their usage follows the writing and reading examples of the registers:

| AT | COMMAND | <CR> |
|---|---|---|
| Upper case characters that always proceed a command or register | The commands are codes that contain one or more characters. | The command always end with <CR> Carriage Return |

| Register | Name | Function | Values | R/W |
|---|---|---|---|---|
| **S2** | **CHANNEL** | Working radio channel | **0** = 869,45MHz<br>**1** = 869,475MHz<br>**2** = 869,5MHz (default)<br>**3** = 869,525MHz<br>**4** = 869,55MHz<br>**5** = 869,575MHz<br>**6** = 869,6MHz | **R/W** |
| **S3** | **POWER** | Output RF power | **0** = +8 dBm<br>**1** = +16dBm<br>**2** = +22dBm<br>**3** = +25dBm<br>**4** = +27dBm (default) | **R/W** |
| **S8** | **RADIO_SPEED** | | **0**= 600bps<br>**1**= 1200bps (default)<br>**2**= 2400bps<br>**3**= 9600bps | **R/W** |
| **S9** | **TEST_MODE** | **TBD** | **TBD** | |
| **S15** | **VERSION** | Firmware version | **Variable** | **R** |

| Command | Name | Function |
|---|---|---|
| **WR** | **WRITE** | Writing of the value in EEPROM registers |
| **CC** | **COMMAND CLOSE** | Output from Command Mode |

**Tab. 2**: commands

***Answers to the commands and to the operation on registers:***

Positive answer: **OK<*CR*><*LF*>**

Negative answer: **<*bl*> ERROR<*CR*><*LF*>**

Forbidden operation: **<*bl*> NO ACCESS<*CR*><*LF*>**

With <CR> Carriage Return, ASCII 13 character; <LF> Line Feed, ASCII 10 character; <bl> ASCII 32 character.

***Reading of a Register:***

**Syntax:** **ATSx<*CR*><*LF*>** [x = 1, ...,16 Register to be read]

**Answer :** the value contained in the register if the command has been given correctly . It's followed by <CR> <LF>.

The value of registers is returned digit by digit in ASCII value.

**Example:** '16' is the series of ASCII 0x31,0x36 codes, corresponding to '1' e '6' digits.
It must follow this procedure of interpretation even in the case of writing the value of a register.

***Writing of a register:***

**Syntax:** **ATSx=Y<*CR*><*LF*>** [x = 2, 3, 4 register to write, y = value to insert]

**Answer :** as described : 'Answer to the commands'

All programmed values in the registers cause a change in the operating conditions of the module that will be lost when it's powered off, unless they have been stored in the EEPROM of the microcontroller with the appropriate command **ATWR**: in this case the changed values will be active also the next switching-on.

***Command for saving the value of the registers in EEPROM***

**Syntax:** **ATWR<*CR*><*LF*>**
**Answer :** as described : 'Answer to the commands'

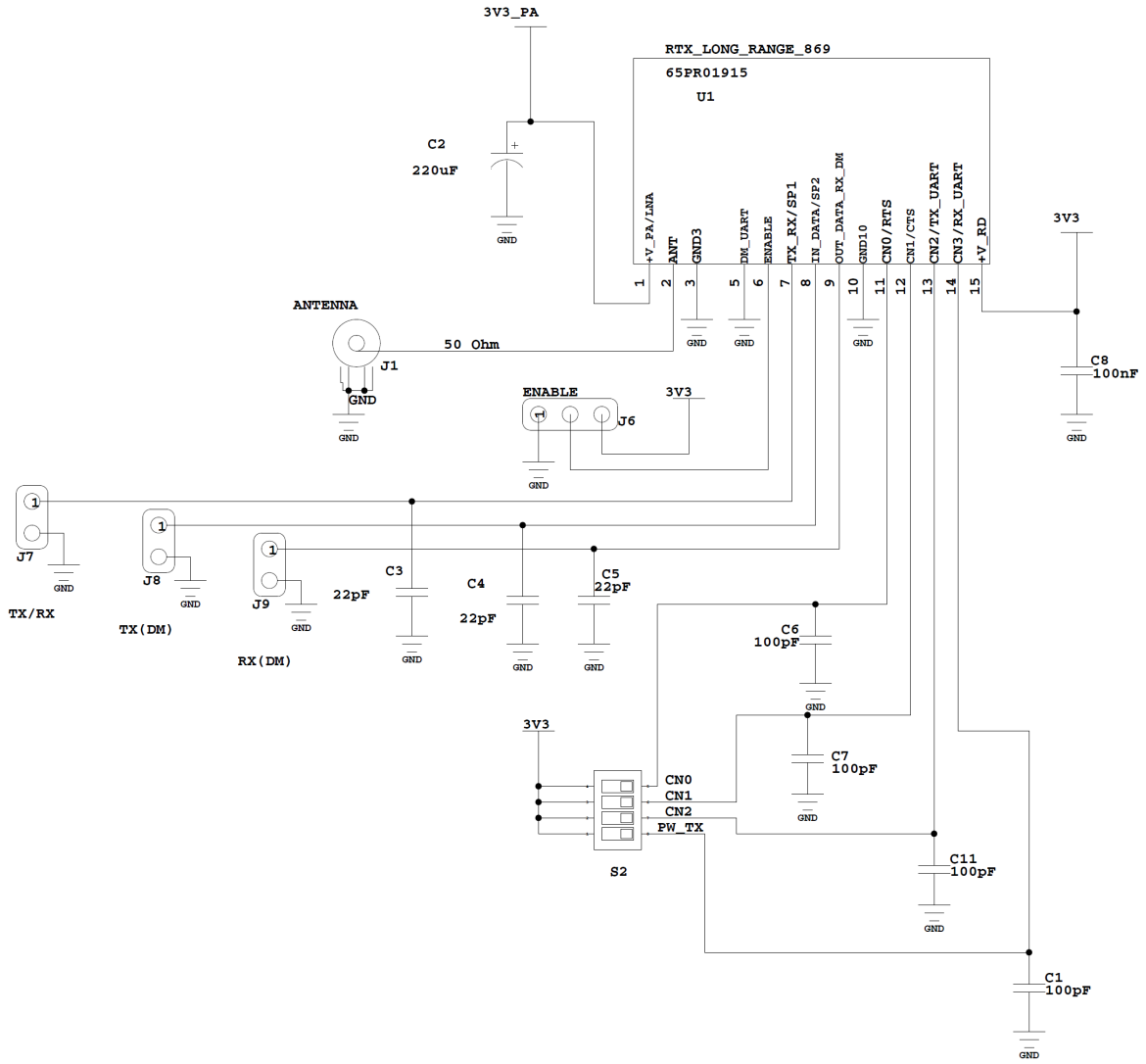
***Comando di uscita da Command Mode***

**Syntax:** **ATCC<*CR*><*LF*>**
**Answer :** as described : 'Answer to the commands'

The escape from Command Mode, in absence of **ATCC** command, occurs automatically after 5 seconds of inactivity.

## DIRECT-MODE electrical diagram:

The Direct Mode allows the transmission and reception of digital data from proprietary protocols.
The transmission is activated by carrying high the pin 7 (TX / RX) and entering the data directly on the connector J8 (TX), similarly the received data are available on the J9 connector (RX) with pin (TX / RX) is kept low.
The data must have a length in between 20ms and 350us (defined as the length of single bit high + low). However in order to avoid problems in the reconstruction of the signals to the demodulator, we recommend the implementation of a protocol containing a preamble and data coded with Manchester or Miller or other similar techniques.
The modulation of pin8 with data from UART is not recommended. The dip-switches 1-3 of S2 select the radio channel, or during the RX phase or after to the exchange RX → TX or POWER_DOWN → TX, during the TX phase they are disabled. The dip 4 of S2 decrease the power by 6 dB for the purpose of the homologation of the transmitting part, in applications where you need an external antenna with a gain of 6-8dBm.

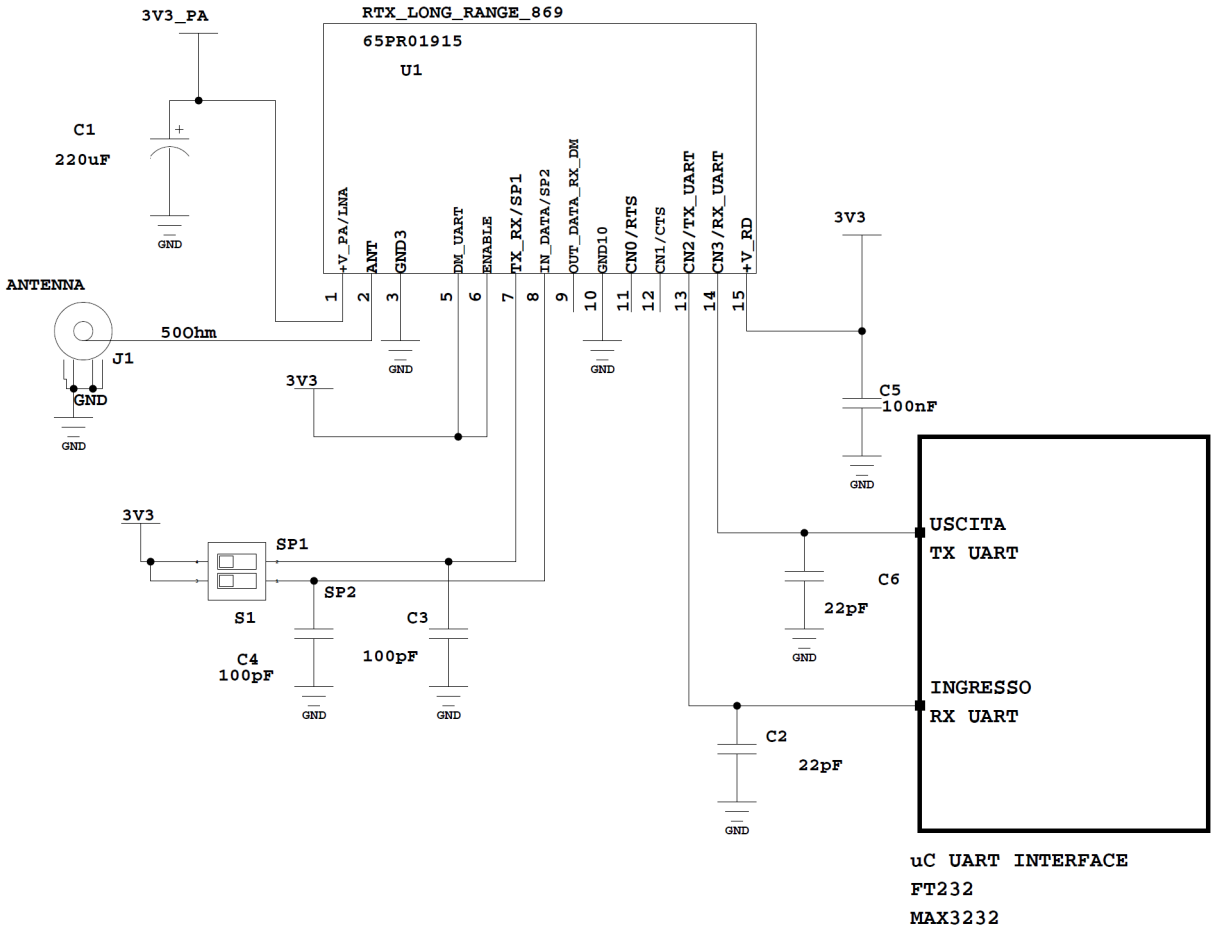



**Picture 4:** Direct-Mode electrical schematic

## PACKET-MODE electrical diagram:

The connection of the module for the operation in packet-mode is extremely simple.
The dip-switch S1 selects the speed of the UART interface, the transmission and reception signals, and the settings of the radio module are obtained through the communication input asynchronous serial interface output.
The controls for the serial CTS and RTS are not implemented yet and therefore together with pin9 (out-date DM) will not be connected.

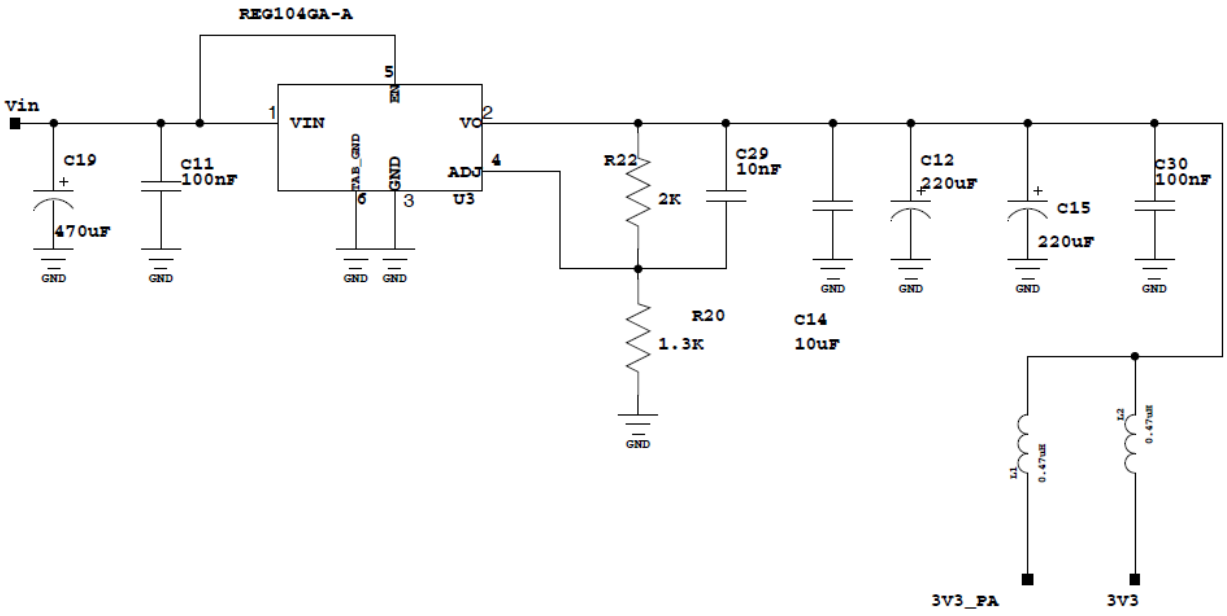
The module always operates in receive mode, the switching from reception to transmit part is automatically activated when the first byte of data enters in the pin. 14 (RX_UART).




**Picture 5:** Packet-Mode Electrical diagram

## Power supply:

The transceiver in the transmission phase can absorb current peaks of up to 600mA. It's necessary to use a power supply system that maintains stable and clean voltage supply in the fast transient current. In case it's requested to use a voltage regulator it's recommended the choice of models with characteristic of "fast transient response", following it's suggested a project tested by Aurel suitable for the module RTX-LONG-RANGE.




**Picture 6:** Fixed power supply 3V-1A DC-DC

## Device usage

In order to obtain the performances described in the technical specifications and to comply with the operating conditions which characterize the Certification, the transmitter should be mounted on a printed circuit taking into account the following:

## Voltage Supply:

1. The transmitter must be supplied from very low voltage safety source protected against the printed circuits. Maximum voltage variations allowed: 2.7 ÷ 3.6 V.
However it is preferable to maintain a stable voltage to a predetermined value in the range of voltage as specified above, using a voltage regulator "Fast transient response" (see paragraph power supply).

2. Decoupling, next to the transmitter, with a ceramic capacitor of minimum 100.000 pF.

3. Connect electrolytic capacitor 220uF-470uF, low ESR, close to the pin 1 (+ V_PA / LNA).

**Pin interface:**

Put a capacity of 22-100pF close to the corresponding pins of signal connection, connected between them and the ground plane.
The capacitance value varies according to the pin of the module, so please follow to the electrical schematic of Figure 4 and 5 and the lay-out of figure 6.

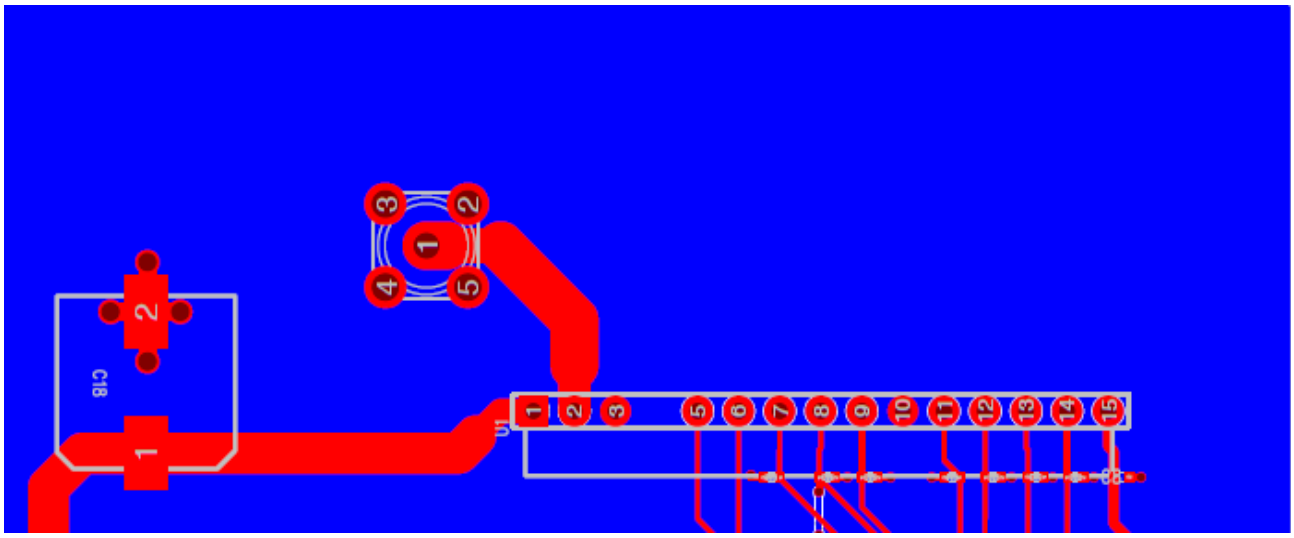
**Ground:**

The mass must surround at the best the welding area of the module and must also be realized in the lower face in order to obtain the optimal result, with the through holes connecting the two ground planes.

**Antenna:**

Connect pin 2 (antenna) to the coaxial connector or antenna, with microstrip constant impedance of 50R, width 3.2 mm for PCB with thickness 1.6 mm and 1.6 mm for PCB with thickness 1mm. (see Figure 6)
The antenna is a typical rigid copper wire (insulated or not) of 8cm length and cross-section of 0.5 mm $^2$ placed vertically to the ground plane.
Other placements of antenna (bend, spiral) will work but performance are not predictable.
As an alternative to connect the module to an external antenna, connect an SMA connector into PCB using microstrip 50 (see figure below).

The proposed lay-out below, for example, shows the connections of signals and power supply on the top and a ground plane on the bottom side of the extended PCB that surrounds the radio module. The cross-link antenna impedance 50R is 3.2 mm wide, specifically, calculated for double-sided Fr-4 epoxy glass 1.6 mm thick. The pin 1 of the power supply, is connect to the power supply with 2mm wide track. A 220uF electrolytic capacitor must be placed nearby.
The pins of the input output signals of the module are connected to the ceramic capacitors from 22 to 100pF, places close by the same.




**Picture 7:** Example of lay-out, the connection tracks on PCB on the top side and ground plane in the button side.

## Reference Rules

The RTX_LONG-RANGE-869MHZ transceiver is compliant with the European set of rules **EN 300 220 V2.4.1 (2012-05)**, and **EN 301 489-3 V1.5.1 (2012-07)**.
Tests has been performed through transmissions of Pseudo Code Random at 500 bps(CEPT 70-03).
The occupancy of bandwidth has been performed through transmissions of Pseudo Code Random at 500 bps.
In addition, the product has been tested according to **EN 60950** and it can be utilized inside a special insulated housing that assures the compliance with the above mentioned rules. The transceiver must be operated from a very low voltage source, safety protected against short circuits.
The usage of the transceiver is foreseen inside housings that assure the overcoming of the rule EN 61000-4-2 not directly applicable to the module itself. In particular, it is the user's care the insulation of the external antenna connection and antenna itself since the RF output of the receiver is not able to directly bear the electrostatic charges foreseen by the above mentioned rule.

## CEPT 70-03 Recommendation

The RTX_LONG-RANGE-869MHz transceiver operates in a harmonized frequency band and therefore, in order to comply with local regulations, the device must be used on the time scale with maximum duty-cycle time 10% (equivalent to 6 to 60 minutes of usage ).

## ERRATA:

Rev. 3.4 Adding the maximum buffer size and serial timeout