

**Introduction**

The TeleControlli Module “TC Open Radio RXQ7-ORP” is programmed with a Test Firmware ‘in factory’. With this application, it is possible to test and verify the radio section capability and all the digital I/O ports. The firmware implements a transmission/reception demo test too (data sent/received in transparent mode): it will be described hereafter.

The TC Open Radio RXQ7-ORP module has an embedded boot loader. With the use of a dedicated software installed on a PC (**RXQ7 Configuration Utility**) and by simply connecting the Module with a RS-232 link, it is possible to download applications, to upgrade or to modify them, without using dedicated hardware and/or software tools. The application developed by Telecontrolli is free of charge and downloadable from the TeleControlli Website.

The “**RXQ7 Configuration utility**” program permits to use all the available tests in an easy way. Three function Modes have been implemented: **Mode 0 (Default)**, **Mode 1** and **Mode 2** , see the below table. The function mode is selected at the reset, based on two pin’s configuration, pin 9 and pin 16 for the PTH version and pin 9 and 10 for the SMD version.

PTH	Pin 9	Pin 16	Mode
SMD	Pin 10	Pin 9	
	H (OPEN)	H (OPEN)	Mode 0
	L (CLOSE)	H (OPEN)	Mode 1
	H (OPEN)	L (CLOSE)	Mode 2
	L (CLOSE)	L (CLOSE)	Mode 0
<i>Note: At the reset, all I/O are programmed as digital input , open drain with “weak” internally pulled up.</i>			

Below a their brief description.

**Mode 0**, It has to be used with a PC SW application through a RS232 serial link communication. It is possible to launch and to manage all the tests to check all the functionalities of the Module under test.

This is the **Default** function Mode.

The serial link communication channel of the RXQ7-ORP is configured as per below parameters :

Bps: 115000  
 Data Bit: 8  
 Parity: None  
 Stop Bit: 1  
 Handshake: None

**Mode 1**, The Module goes automatically in ‘RX transparent mode’.

It will be described later, see **TX ON (Raw data out) and TX Off**. The serial link is not working .

**Mode 2**, The Module goes automatically in ‘TX transparent mode’.

It will be described later, see **Raw data in** . Serial link is not working .

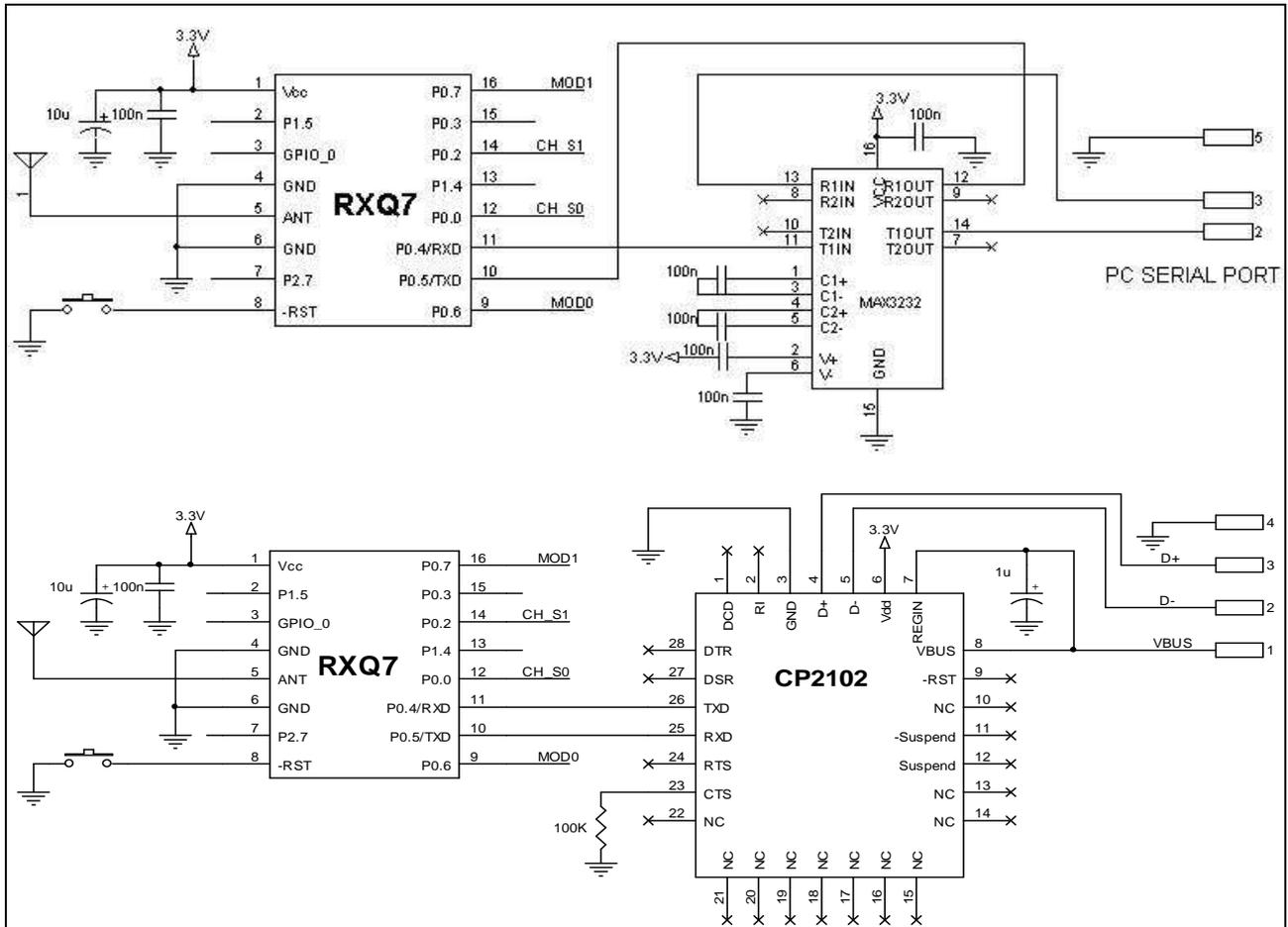
**Connection (schematics and pin out) - RXQ7-ORP- PTH version**

The RXQ7-ORP needs to be powered with a nominal voltage of 3.3Vdc applied between the pins Vcc and GND. A serial port (CMOS level) is available at the P0.5/TXD (Pin 10) and P0.4/RXD (Pin 11) pins. It is directly connectable via an RS232 drive to a PC Serial communication port.

Below it is represented a simple schematics to connect the RXQ7 module to a PC serial port or to a RS232–USB Silicon Lab CP2102 converter and the module pin out, with the connections between the internal component and the external Module pins.

The PTH version uses two internal connections between the pin 15 (SDN) and the pin 9 (P1.6) and between the pin 11 (nIRQ) and the pin 35 (P1.6) of wireless Silicon Labs MCU, to manage the Radio shutdown signal and the Radio shutdown signal respectively.

**In case of development of your own firmware application, take care of the upper info.**

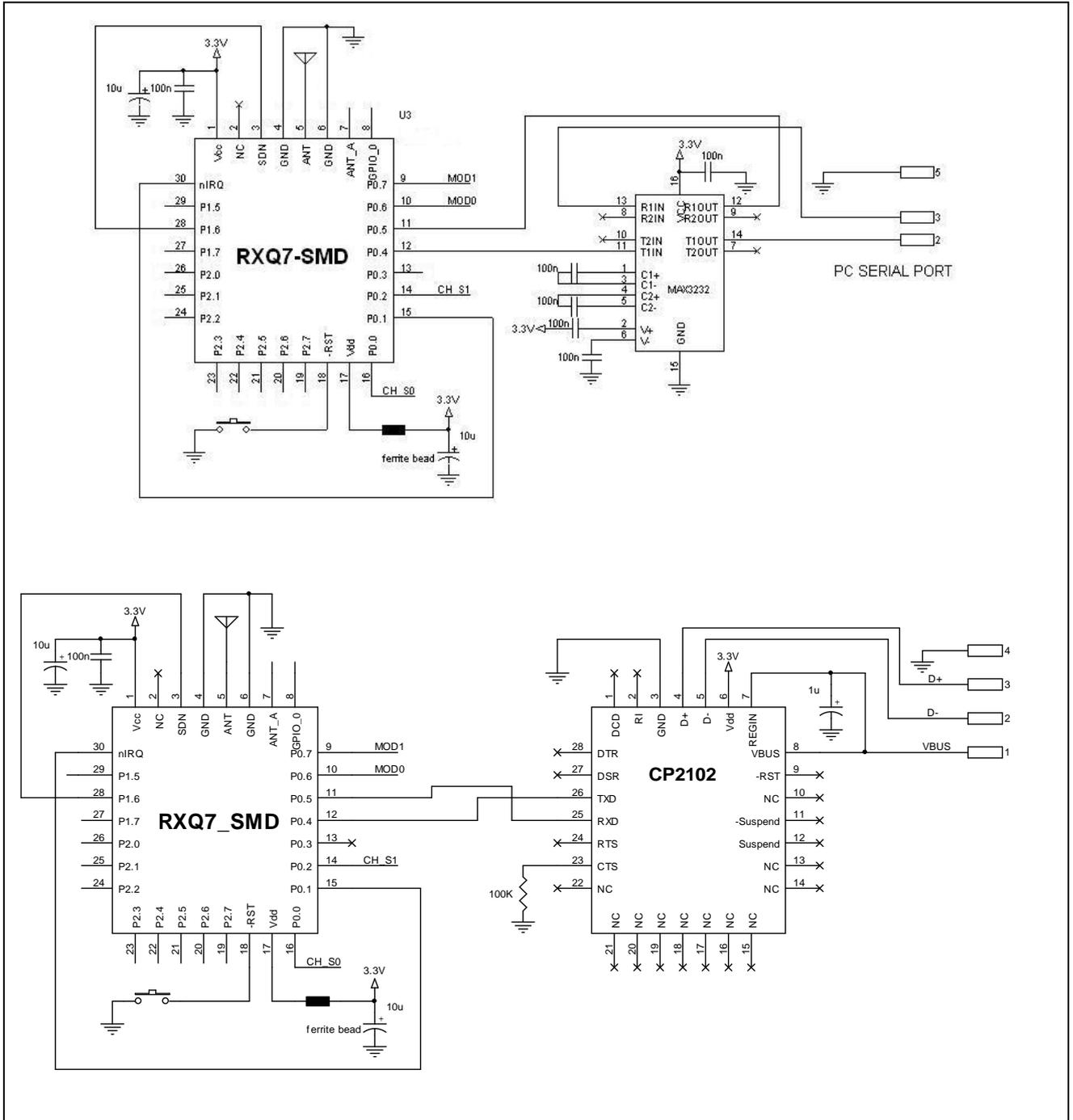


<b>RXQ7 Pin</b>	<b>Name</b>	<b>Si1010 Pin</b>	<b>Type</b>
1	Vcc	16, 38	Supply voltage
2	P1.5	5	D I/O or A In
3	GPIO_0	24	D I/O or A In
4	GND	23, 37	Ground
5	ANT	-	Antenna
6	GND	23, 37	Ground
7	P2.7	40	D I/O
8	-RST	39	RESET
9	P0.6	30	D I/O or A In
10	P0.5/TXD	31	UART RX D I/O or A In
11	P0.4/RXD	32	UART TX D I/O or A In
12	P0.0	36	D I/O or A In
13	P1.4	6	D I/O or A In
14	P0.2	34	D I/O or A In
15	P0.3	33	D I/O or A In
16	P0.7	29	D I/O or A In

**Connection ( schematics and pin out ) - RXQ7-ORP- SMD version**

Below it is represented a simple schematics to connect the RXQ7 module, to a PC serial port or to an serial – USB Silicon Lab CP2102 converter and the module pin out with the connections between the internal component and the external pins of the Module .

To use the Telecontrolli demo Firmware on the SMD version, you need to connect the Shutdown Radio signal pin 3 (SDN) with the pin 28 (P1.6) and the Radio Interrupt signal Pin 30 (nIRQ) with the pin 15 (P0.1) .



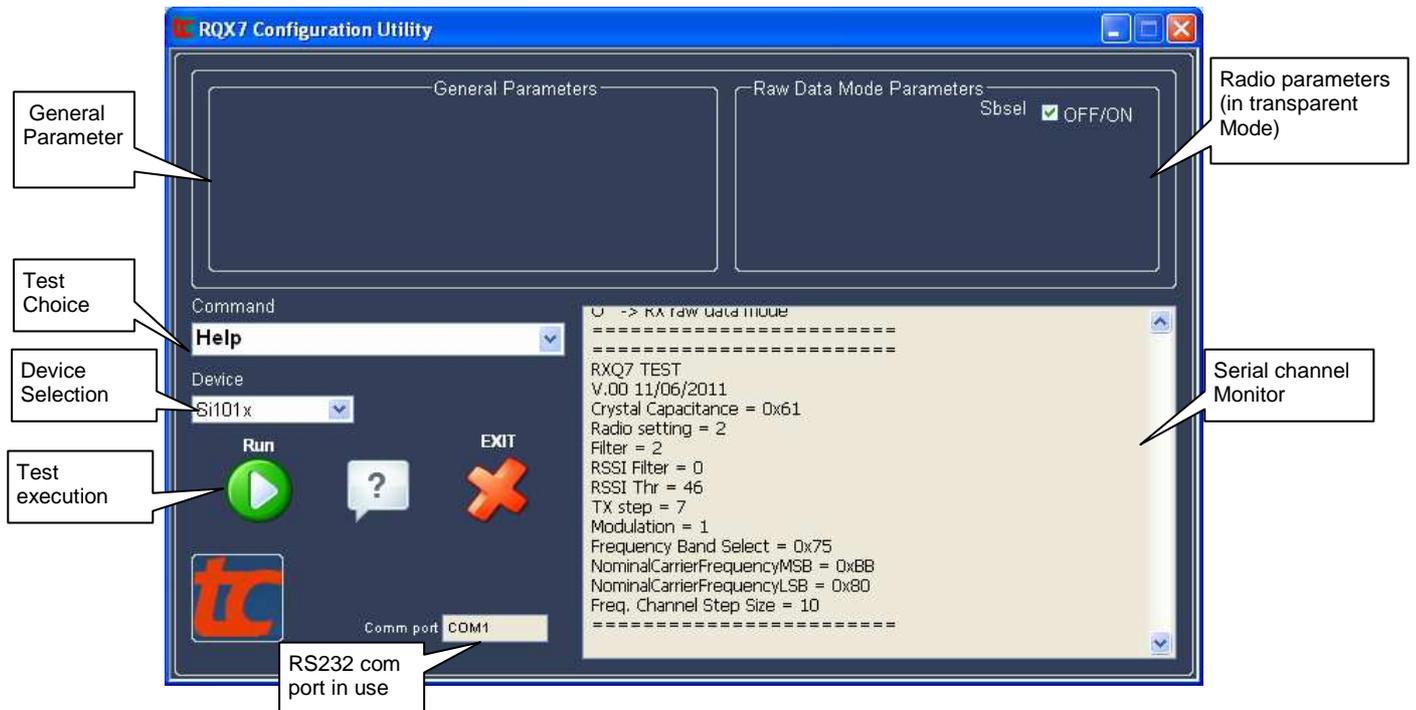
<i>RXQ7SMD Pin</i>	<i>Name</i>	<i>Si100x Pin</i>	<i>Type</i>
1	Vcc	16	Power RF
2	NC		
3	SDN	15	D IN
4	GND	23, 37	Ground
5	ANT	-	Antenna
6	GND	23, 37	Ground
7	ANT_A	21	D OUT
8	GPIO_0	24	D I/O or A In
9	P0.7	29	D I/O or A In
10	P0.6	30	D I/O or A In
11	P0.5	31	UART RX D I/O or A In
12	P0.4	32	UART TX D I/O or A In
13	P0.3	33	D I/O or A In
14	P0.2	34	D I/O or A In
15	P0.1	35	D I/O or A In
16	P0.0	36	D I/O or A In
17	VDIG	38	Digital Power
18	-RST	39	RESET
19	P2.7	40	D I/O
20	P2.6	41	D I/O or A In
21	P2.5	2	D I/O or A In
22	P2.4	3	D I/O or A In
23	P2.3	4	D I/O or A In
24	P2.2	5	D I/O or A In
25	P2.1	6	D I/O or A In
26	P2.0	7	D I/O or A In
27	P1.7	8	D I/O or A In
28	P1.6	9	D I/O or A In
29	P1.5	10	D I/O or A In
30	nIRQ	11	D OUT

## RXQ7 Configuration utility

### General Description

The '**RXQ7 Configuration utility**', is the software instrument to be used to execute, manage and update the test firmware and to upload and to download (through the boot loader) all the applications.

The main mask is showed below.



Through the "**Command**" pop up menu, it is possible to select several tests/commands: the selected test is executed when the "**Run**" button is pressed. The upper windows show how the single parameter is configured for each test/command. Here after there is a brief presentation of all test/command.

To use the "RXQ7 Configuration utility" program you need to select the function **Mode 0**.

The final part of this document describes the installation procedure of '**RXQ7 Configuration utility**' program.

### Default configuration

At the reset, the IC radio section is initialized with default parameters loaded from the flash. It is possible to modify them with the use of the **Load non volatile data** command (explained later in this paragraph).

At the reset, the Module could signal some errors codes in the Serial channel window.

```
Radio Error: Code x ; Chk Error, Reset data to default
```

```
x code could assume three different value :
Code 2 > SPI not communicating
Code 3 > Radio version unsupported
Code 4 > Radio XTAL not running, check XTAL
```

The second error code (Chk Error) indicates that non volatile data are corrupted. Memory data will be automatically self restored to the default parameters by the Firmware.

**“Serial channel window” messages showed at the Reset**

```
RXQ7 TEST
V.xx xx/xx/xxxx
Channel 0
Crystal Capacitance = 0x61
Radio setting = x
Filter = xx
RSSI Filter = xx
RSSI Thr = xx
TX step = xx
Modulation = xx
Frequency Band Select = 0x73
NominalCarrierFrequencyMSB = 0x68
NominalCarrierFrequencyLSB = 0x60
Freq. Channel Step Size = xx
```

**Nominal Frequency (default = 868.35MHz)**

```
NominalCarrierFrequencyMSB = 0x68
NominalCarrierFrequencyLSB = 0x60
Freq. Channel Step Size = 10
```

At the reset the values of the three upper registers are shown. They are used to obtain the required frequency.

**Crystal Capacitance (default=0x61)**

```
Crystal Capacitance = 0x61
```

Inside the IC’s Si1010 e Si1001 there is a programmable load capacitance crystal. This parameter is used to make the radio channel frequency ‘fine tuning’ . The default value is programmed to 10pF capacitor.

**Channel frequency deviation (def=10kHz)**

```
Freq. Channel Step Size = xx
```

The radio channel is defined by the state of two pins.

At the reset the FW detects the state of the pins 12 and 14 (PTH version) and the pins 14 and 16 (SMD version) .

The radio channel is defined as per below formula

$$F = F_{nom} + (N\_Chan * 10 * Freq. Hopping Step Size) \text{ kHz}$$

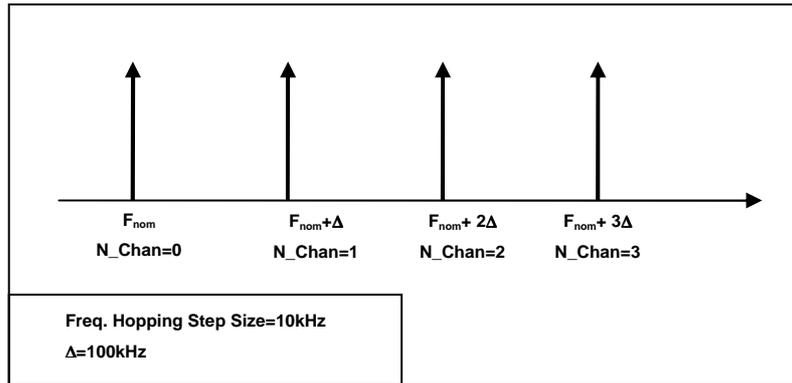
where **N\_Chan** is the channel number defined as described in the below table (**pins state**)

PTH SMD	PIN 12 (P0.0) PIN 16 (P0.0)	PIN 14 (P0.2) PIN 14 (P0.2)	Channel
	1 (OPEN)	1 (OPEN)	0
	0 (CLOSE GND)	1 (OPEN)	1
	1 (OPEN)	0 (CLOSE GND)	2
	0 (CLOSE GND)	0 (CLOSE GND)	3

and **Freq. Hopping Step Size** is the channel frequency deviation as 10\*kHz step.

The **Freq. Hopping Step Size** default value is 10\*10 kHz=100 kHz.

The below figure graphically shows the channels allocation with the default **Freq. Hopping Step Size** value.



The **Freq. Hopping Step Size** value can be changed and stored in flash with the use of the **Load non volatile data** command. It is possible also to modify (but not to save it in flash) the radio channel , through the **Set channel** command .

### **Radio setting for RX and TX ‘transparent mode’ (default=2)**

Radio setting = 2

It is implemented a transparent transmission and a transparent reception test. The TX source data are sent through a digital input pin (pin 3 on PTH version and pin 8 on SMD version) and the RX output digital data are received on a digital output pin (pin 7 PTH version and pin 19 SMD version). The radio transmitted frame is sent ‘as it is’ (transparent) , so it is possible to send data without the use of standard preamble, standard synch words and packets structure.

It’s possible to choose between eight different pre-defined radio setups (modulation and data rate) as described in the below table.

- 0 = OOK modulation Data Rate < 2.4 kbps
- 1 = OOK modulation Data Rate < 4.8 kbps
- 2 = OOK modulation Data Rate < 10 kbps (**default**)
- 3 = FSK/GFSK modulation Data Rate < 4.8 kbps, narrow deviation
- 4 = FSK/GFSK modulation Data Rate < 4.8 kbps, wide deviation
- 5 = FSK/GFSK modulation Data Rate < 4.8 kbps, wide deviation
- 6 = FSK/GFSK modulation Data Rate < 4.8 kbps, narrow deviation
- 7 = FSK/GFSK modulation ALL Data Rate, wide deviation

### **Filter (default=2)**

Filter = 2

In ‘transparent mode’ it’s possible to apply a digital filter to improve the RX sensibility: for further details, refer to the application note AN463 available on the [www.silabs.com](http://www.silabs.com) website.

It’s possible to select three different values

- 0 = no filter
- 1 = adaptative filter
- 2 = median filter

### **RSSI filter (default=OFF ), RSSI threshold (default=46)**

RSSI Filter = xx  
RSSI Thr = xx

As alternative, it is possible to add a digital filter that puts to zero the digital output if the RSSI value is lower than the RSSI Threshold level expressed as register’s decimal value.

### **TX step (default=7) and Modulation (default=OOK)**

TX step = 7  
Modulation = 1

The TX power level and the modulation used in 'transparent mode' are stored in flash .

The output power level is calculated with the formula  $3 * TX\_Step = XX\ dBm$  , where the parameter **TX\_Step** is in the range [0 .. 7].

These parameters can be modified with the **Load non volatile data** command.

*Note: The TX nominal power output level is intended to be measured on the IC Si10xx component antenna pin). For example the default TX output level is  $3 * 7 = 21\ dBm$  (level measured on the output pin of the component).*

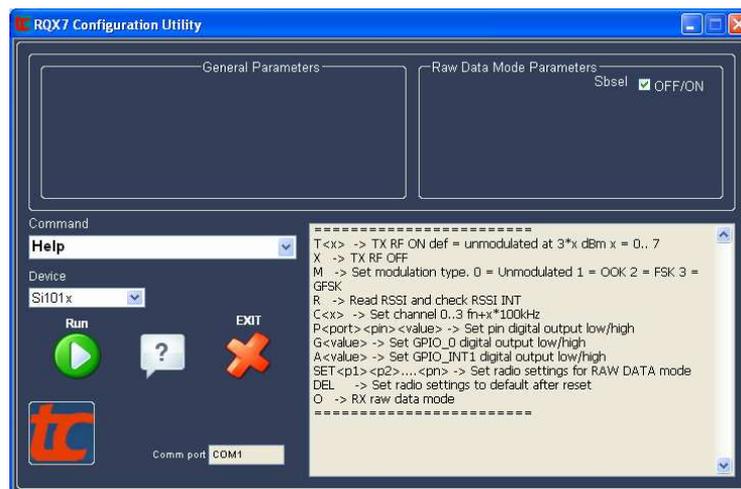
## Commands and tests

For the execution of a test/command, the test firmware receives a sequence of characters through the RS232 and it replies with a sequence of characters. To send these test/command sequences it is possible to use also a program like HyperTerminal.

Here after are described all the available commands and tests and it's explained how to use them through the '**RXQ7 Configuration utility**' application user interface.

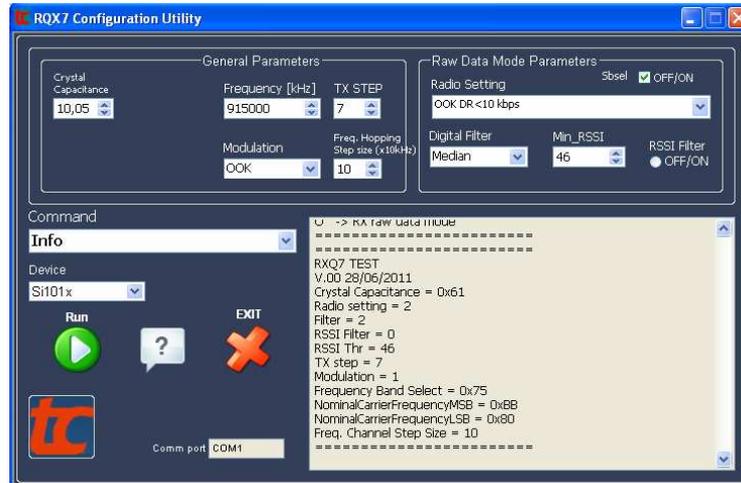
### HELP

**Command string : H**



This command returns the 'commands list'.

## INFO

**Command string : ?**

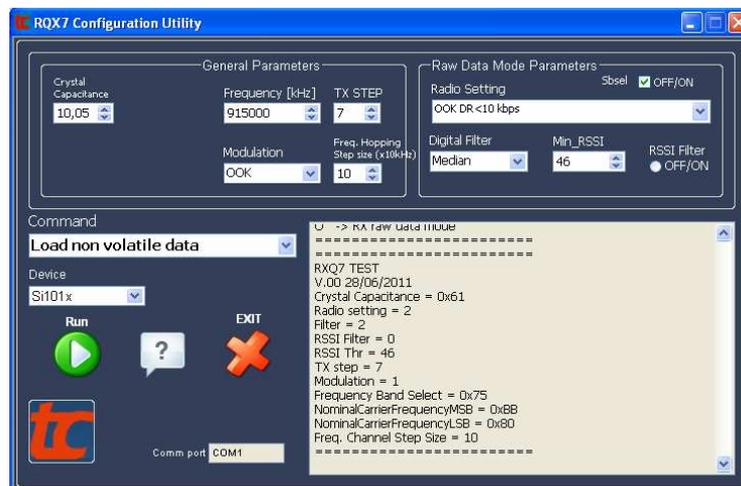
This command returns all the parameters stored in the non volatile memory .

Select **Info** and press **Run**: In the 'General Parameters' and 'Raw Data Mode Parameters' windows are shown the values stored into the module .

**Load non volatile data**

**Command string : SET <rs> <df> <rssicheck> <minrssi> . <txlev> <mod> <FreqBandSelect> <NominalCarrierFrequencyMSB> <NominalCarrierFrequencyLSB> <Freq. Hopping Step Size> <CapLoad> .**

Each command parameter is explained below in the paragraph.



This command writes into the non volatile data memory (scratchpad memory) all the **Load non volatile data** parameters. Thanks to the GUI of '**RQX7 Configuration utility**' application, it is very easy to modify these parameters. Below is explained the procedure to be used :

1. Select **Info**.
2. Press **Run** and the '**General Parameters**' and the '**Raw Data Mode Parameters**' windows are updated with the parameters stored into the module .

3. Select **Load non volatile data**.
4. Modify the parameters as you need.
5. Press **Run** and the module will be updated with the parameters shown in the '**General Parameters**' and '**Raw Data Mode Parameters**' windows .

**Command string:** **SET** <parameters> where the parameters are listed and described below  
**rs** (default=2) . Modulation and data rate Radio setup, optimized for transparent mode.

- 0 = OOK modulation Data Rate <2.4 kbps
- 1 = OOK modulation Data Rate <4.8 kbps
- 2 = OOK modulation Data Rate <10 kbps (**default**)
- 3 = FSK/GFSK modulation Data Rate <4.8 kbps, narrow deviation
- 4 = FSK/GFSK modulation Data Rate <4.8 kbps, wide deviation
- 5 = FSK/GFSK modulation Data Rate <4.8 kbps, wide deviation
- 6 = FSK/GFSK modulation Data Rate <4.8 kbps, narrow deviation
- 7 = FSK/GFSK modulation ALL Data Rate, wide deviation

**df** (default=2) optional digital filter to use in 'transparent mode' to improve the RX sensibility.

For further details, refer to the application note AN463 available on the [www.silabs.com](http://www.silabs.com) website.

- 0 = no filter
- 1 = adaptative filter
- 2 = median filter (**default**)

**Rssicheck** (default=0), add a digital filter for the free channel. It is useful in presence of data signals starting with long sequence of "zero" .

- 0 = disable
- 1 = enable

**Minrssi** (default=46)

Defines the RSSI level (Threshold) for the RSSI check filter activation.

The RSSI value in dBm is calculated using the formula

$$RSSI_{dbm} = RSSI * 10 / 19 - 128$$

**Txlev** (default=7)

Defines the RF signal output level . The output level is about **3\*Txlev = XX dBm**.

The output level can be also be changed as volatile value with the command **TX RF ON**.

**Mod** (default=1)

Defines the modulation used in 'transparent mode'.

- 0 = Unmodulated
- 1 = OOK
- 2 = FSK
- 3 = GFSK

**FreqBandSelect, NominalCarrierFrequencyMSB, NominalCarrierFrequencyLSB**

(defaults=0x73, 0x68, 0x60)

With these three registers the nominal frequency is defined (TX and RX). The default nominal frequency is 868,35 MHz.

**Freq. Hopping Step Size** (default=10)

Defines the channels spacing in 10kHz steps.

So the default value is 10\*10 kHz=100 kHz

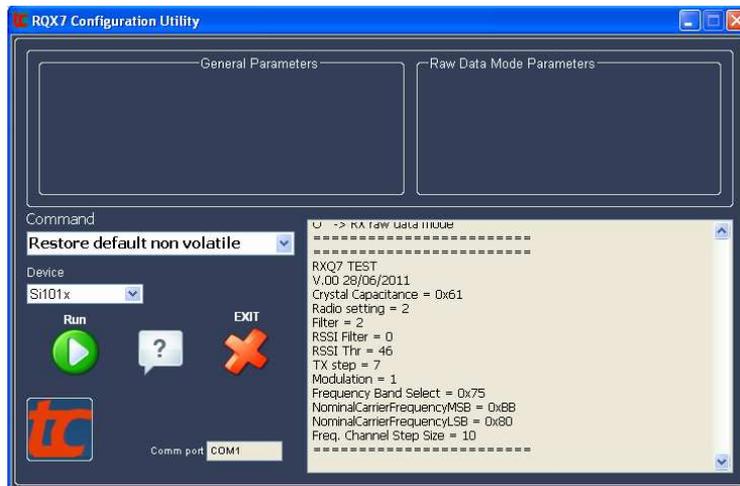
**CapLoad** (default = 0x61)

Defines the crystal programmable load capacitance integrated into the Si10xx.

This parameter is used for the radio channel frequency 'fine tuning' . The default value is 10pF.

**Restore default non volatile data**

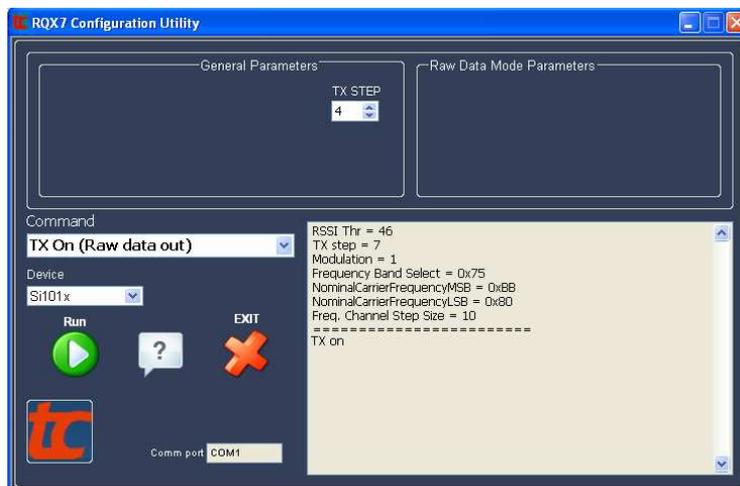
**Command string : DEL**



This command restores all non volatile data at the default values. After the command execution the module is automatically restarted.

**TX ON (Raw data out) & TX Off**

**Command String : T<x> x=[0..7]**



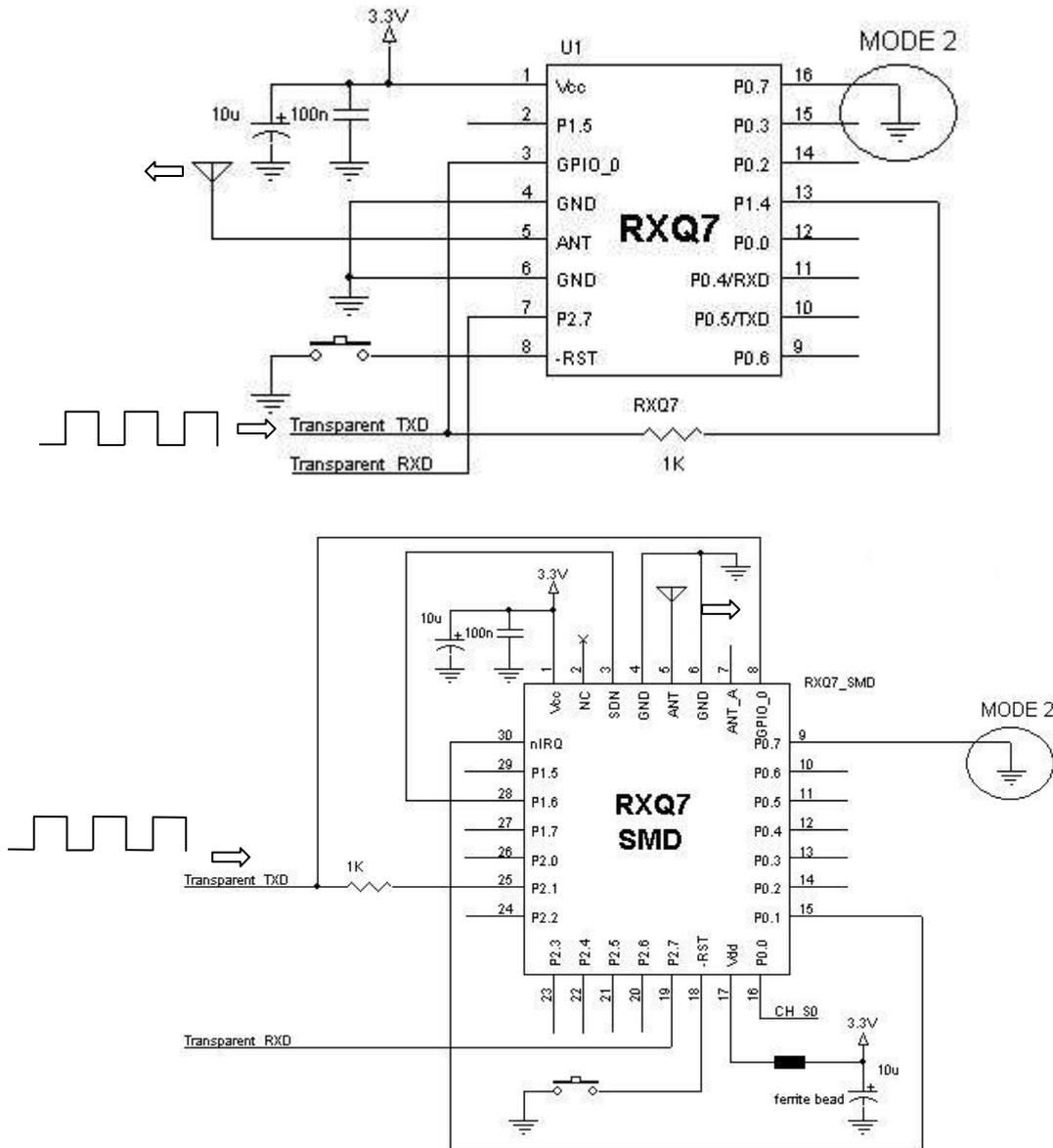
The Module transmits a RF carrier. The RF Level is defined with the formula

$$(3 * TX\_STEP) = dBm \text{ where } TX\_STEP = [0..7].$$

This test is useful to verify the TX section.

The modulation type is selectable via the **Set modulation (volatile)** command.

This test activates the 'TX transparent mode' too. The digital data input have to be sent to the module pin 3 (GPIO\_0) for the RXQ7-PTH version and to the module pin 8 (GPIO\_0) for the RXQ7-SMD version.

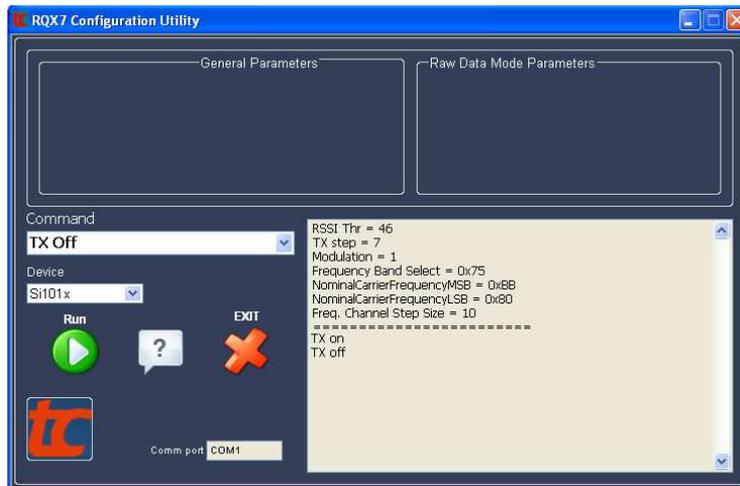


The recommended procedure is as below :

- 1) Verify the non volatile data are correct for the requested frequency.
- 2) Check the selected channel is zero .
- 3) Through the **Set Modulation (volatile)** command, select un-modulated carrier and press **Run** .
- 4) Choose the requested **TX level** ( 0 to 7 ) then select **TX ON** and press **Run**.
- 5) Repeat the point 4 to use other different TX levels .

**TX Off**

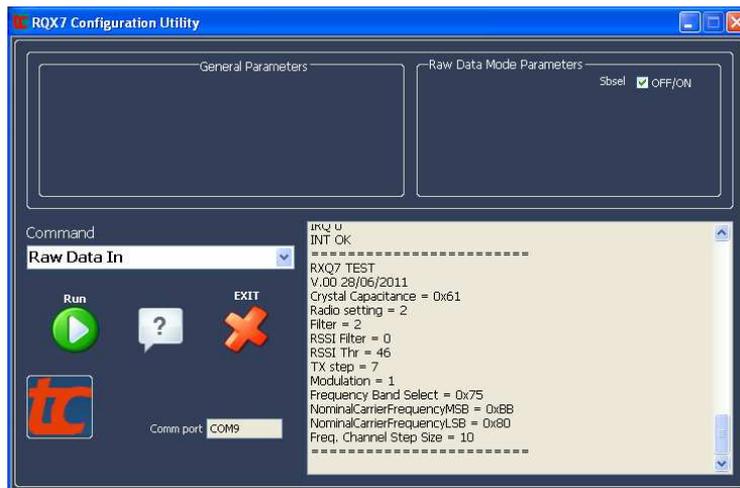
**Command string: X**



To stop the RF transmission choose the command **TX Off** and press **Run**.

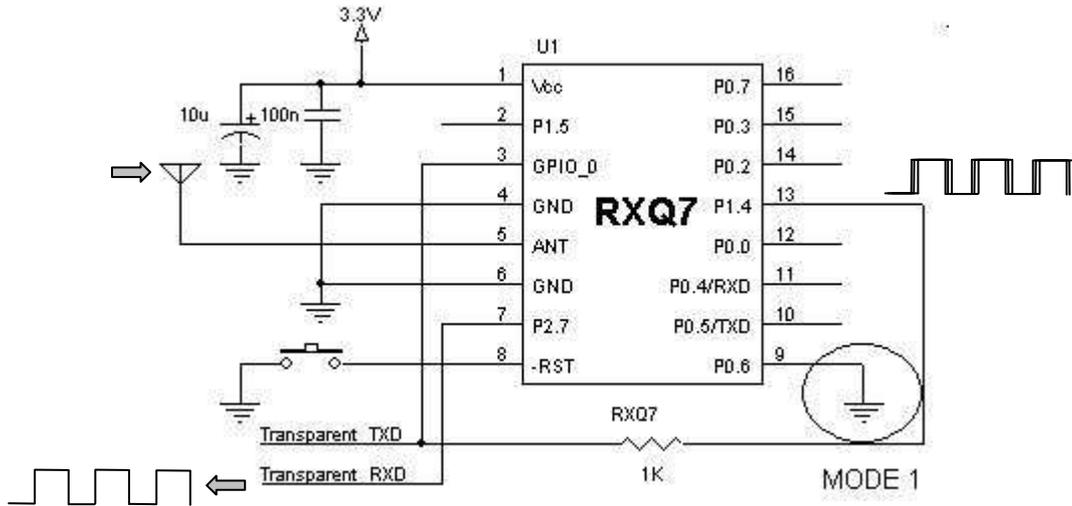
**Raw Data In**

**Command string : O**

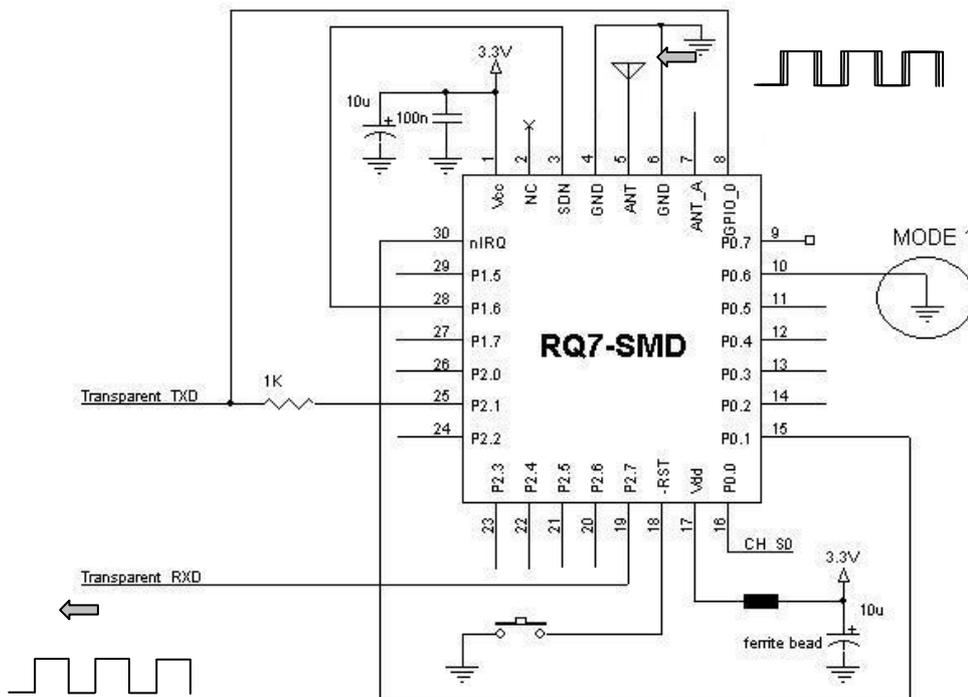


The command activates the 'RX transparent mode'. For the correct operations it's necessary to connect the pin 3 (GPIO\_0) and the pin 13 (P1.4) through a 1KOhm resistance.

On the pin 13 the demodulated signal is present. On the pin 7 (P2.7) the demodulated and digitally filtered signal is present instead (as described in the command **Load non volatile data** ) .

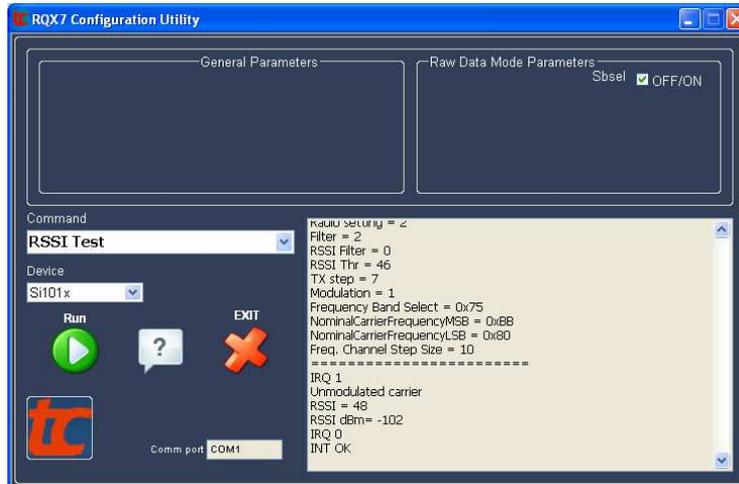


For the SMD module correct operations, connect the pin 8 (GPIO\_0) and the pin 25 (P2.1) through a 1KOhm resistance. On the pin 8 the demodulated signal is present. The demodulated and digitally filtered signal instead is present on the pin 19 (P2.7) ( as described in the command **Load non volatile data** ) .



**RSSI Test**

**Command string : R**



This command returns the RSSI level and it can be used to test the Radio Module receiver section. Only for factory purposes, the test is also used to check the right functionality of the IRQ /P0.1 signals. The meaning of the lines displayed on the Monitor window menu (data sent through RS232) is here by briefly described.

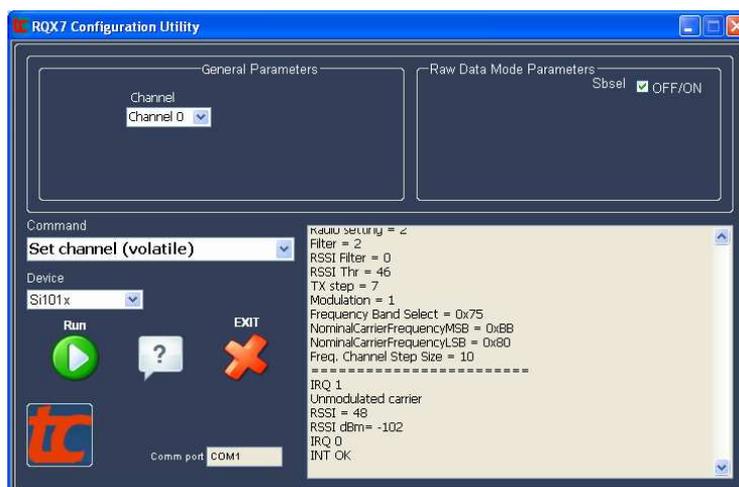
- IRQ 1 (high)* -> IRQ line : OK if is equal to 1
- Un-modulated carrier* -> carrier modulation type
- RSSI = 56* -> HEX value of RSSI
- RSSI dBm= -98* -> RSSI value converted in dBm
- IRQ 0 (low)* -> IRQ line : OK is in this phase is equal to 0
- INT OK* -> OK means that the IRQ signals had the right transaction from 1 to 0

The RSSI value in dBm is calculated with the formula

$$RSSI_{dbm} = RSSI * 10 / 19 - 128$$

**Set channel (volatile)**

**Command string : C<x>**



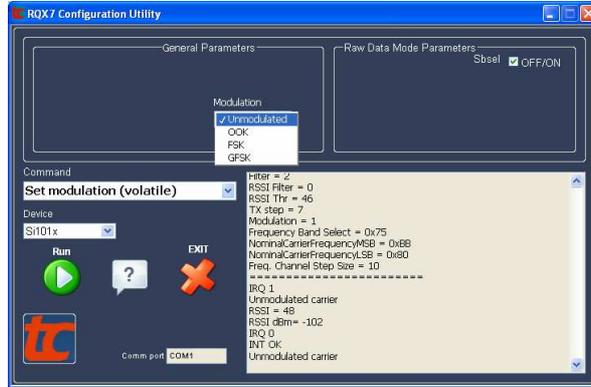
With this command is possible to modify the radio channel according to the formula

$$F = (F_{nom} + x * 10 * \text{Freq. Hopping Step Size}) \text{ kHz}$$

This parameter is not stored in flash so that at the reset the channel is defined by the P0.0 and P0.2 ports configuration. (Pin 12 and 14 for the RXQ7-PTH version and Pin 16 and 14 for the RXQ7-SMD version).

**Set modulation (volatile)**

**Command string : M<x>** with x= [0..3]

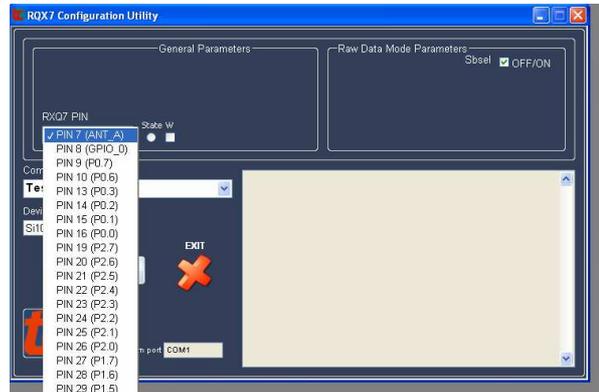
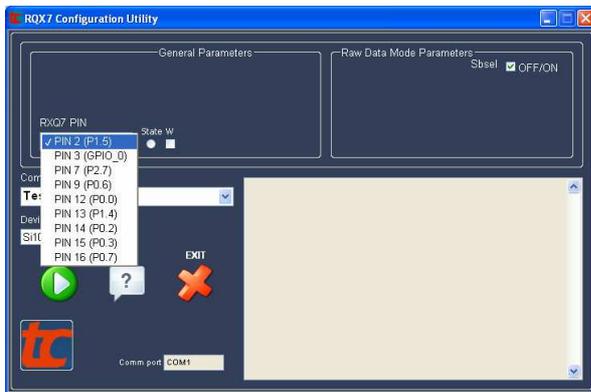
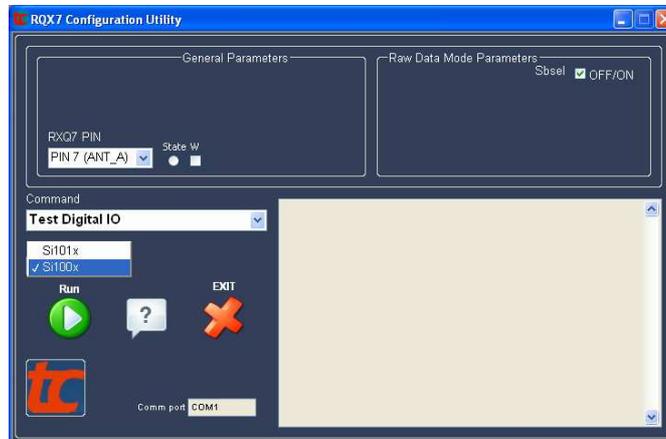


With this command it is possible to change the modulation type. It's a volatile parameter. Possibile values are

- 0 = Unmodulated
- 1 = OOK
- 2 = FSK
- 3 = GFSK

**Test Digital IO**

**Command string : P<port><pin><value>**

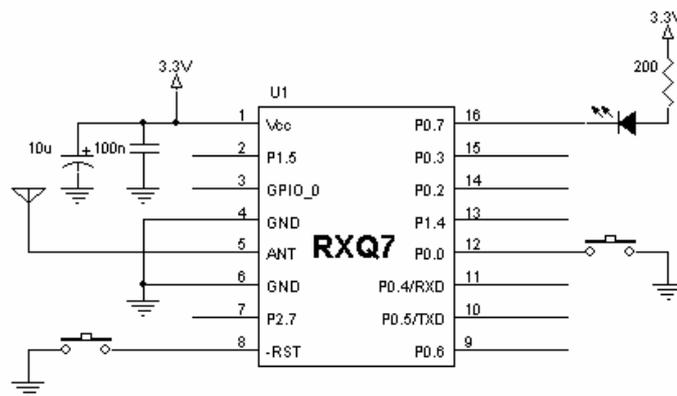


With this command it is possible to test and to activate **all the DIGITAL I/O PINS** as input or output.

Use the below procedure :

1. Choose the device type, **S101x** for RXQ7-PTH and **S100x** for RXQ7-SMD).
2. Select from the pop-up menu "**RXQ7 PIN**" the pin to be tested.
3. To configure the I/O port as digital output, check the box **W** . To configure the I/O port as digital input uncheck the box **W**.
4. When an I/O port is configured as digital output, it is possible to change its level (high to low and vice versa ) checking or un-checking the box **State** . (Blank = low level and Green = high level). Press every time the **Run** command to really change the port level.
5. When an I/O port is configured as digital input, press **Run** to check its level in the **State** box. (Blank = low level and Green = high level).

Please note the input ports are configured as open-drain with an internal 'weak pull-up' . Below different kinds of connections schematics are shown.



**Command string** : **P<port><pin><value>** ; It is used to test the MCU ports P0, P1 and P2

The **port** and **pin** parameters are used to choose the digital port **port.pin** to be tested, and the parameter **value** sets the port to Low or High logic level .

**value =0** ⇒ **P<port><pin>** set the pin as digital output Low logic level .

**value =1** ⇒ **P<port><pin>** set the pin as digital output High logic level .

For example : Command string P011 set the pin P0.1 High. Command string P010 set pin P0.1 Low.

**Value =?** ⇒ If the **value** parameter is set to '?' the command returns the P0, P1 e P2 ports values.

For example : Command string **P01?** Returns the string '**P0=xx, P1=yy, P2=zz**' where **xx** is the HEX value of the P0 port and so on. Below the tables with available ports for RXQ7-PTH and for RXQ7-SMD .

<b>RXQ7-PTH Pin</b>	<b>Name</b>	<b>Si1010 Pin</b>	<b>Type</b>
2	P1.5	5	D I/O or A In
7	P2.7	40	D I/O
9	P0.6	30	D I/O or A In
12	P0.0	36	D I/O or A In
13	P1.4	6	D I/O or A In
14	P0.2	34	D I/O or A In
15	P0.3	33	D I/O or A In
16	P0.7	29	D I/O or A In

<i><b>RXQ7SMD Pin</b></i>	<i><b>Name</b></i>	<i><b>Si100x Pin</b></i>	<i><b>Type</b></i>
9	P0.7	29	D I/O or A In
10	P0.6	30	D I/O or A In
11	P0.5	31	UART RX D I/O or A In
12	P0.4	32	UART TX D I/O or A In
13	P0.3	33	D I/O or A In
14	P0.2	34	D I/O or A In
16	P0.0	36	D I/O or A In
19	P2.7	40	D I/O
20	P2.6	41	D I/O or A In
21	P2.5	2	D I/O or A In
22	P2.4	3	D I/O or A In
23	P2.3	4	D I/O or A In
24	P2.2	5	D I/O or A In
25	P2.1	6	D I/O or A In
26	P2.0	7	D I/O or A In
27	P1.7	8	D I/O or A In
29	P1.5	10	D I/O or A In

**Command string : G<value>**

This command string is used to verify the pin GPIO\_0 .

The parameter **value** sets the **GPIO\_0** pin as digital output to Low or High logic level.

**Value =0** ⇒ set **GPIO\_0** pin as digital output Low logic level

**Value =1** ⇒ set **GPIO\_0** pin as digital output High logic level

**Value =?** ⇒ read the **GPIO\_0** pin status

<i><b>RXQ7 Pin</b></i>	<i><b>Pin name</b></i>	<i><b>Si1010 Pin</b></i>	<i><b>Type</b></i>
3	GPIO_0	24	D I/O or A In
<i><b>RXQ SMD Pin</b></i>	<i><b>Pin name</b></i>	<i><b>Si1010 Pin</b></i>	<i><b>Type</b></i>
8	GPIO_0	24	D I/O or A In

**Command string : A<value>** (for SMD version only )

This command string is used to verify the pin ANT\_A : this pin is available only on the SMD version.

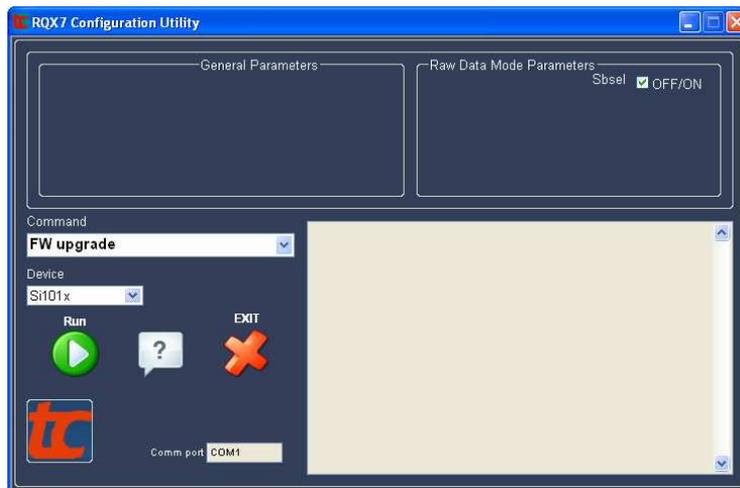
The parameter **value** set the **ANT\_A** pin ( pin 7) as digital output Low or High logic level.

**Value =0** ⇒ set pin 7 (**ANT\_A**) as digital output Low logic level

**Value =1** ⇒ set pin 7 (**ANT\_A**) as digital output High logic level

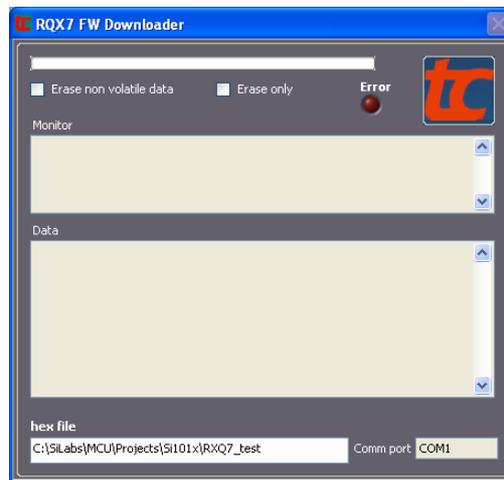
**Value =?** ⇒ read the pin 7 (**ANT\_A**) status

**FW upgrade**

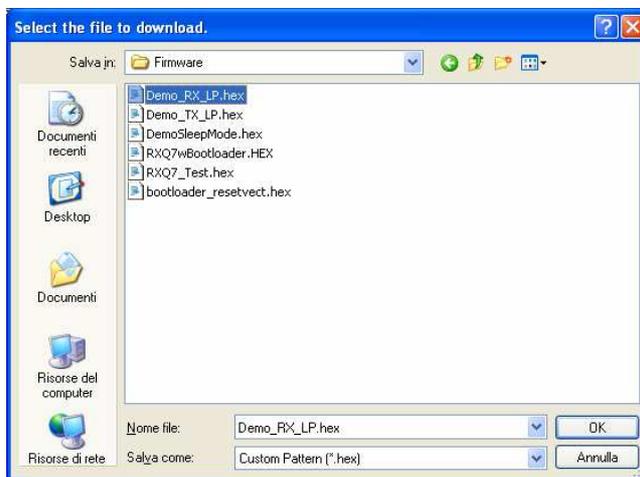


With the **'RQX7 Configuration utility'** it is very easy to use the boot loader to download applications .

- Select the function **Upgrade FW** from the **Command** pop-up menu and press **Run**.



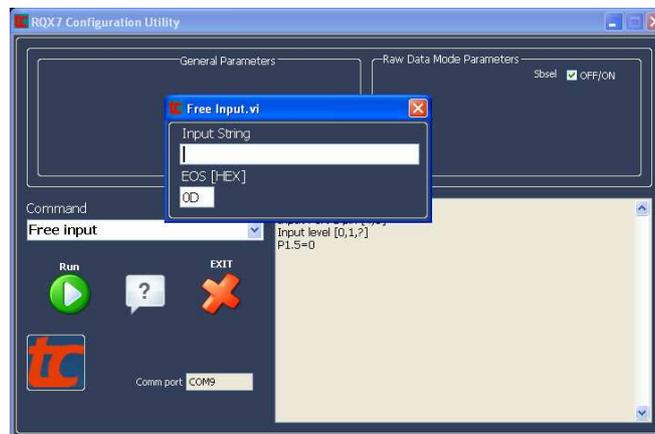
- When the downloader window appears you have to reset the module within 1s to synchronize the RXQ7 boot loader and the PC software downloader. A window will be opened to select the HEX file to load, select it and press **OK**: the download will start. In case of no synchronization an error message will appear and the downloader window will be closed.





By default, the non volatile data area is not deleted: to delete it, check the box **“Erase non volatile data”** .  
 If the box **“Erase only”** is checked the flash program area will be deleted too.

**Free input**



For maximum flexibility it is possible to send a free string to the module. To do this select the function **“Free input”** from the command pop up menu and press **Run** . Write your characters string. The end of string character (default=0x0D) can be changed .

**Boot loader**

The RXQ7 has a boot loader on board (preloaded). The boot loader is allocated in the last two blocks of flash code area .

**ATTENTION!!!! The boot loader erasing operation is possible only with the use of Silicon Labs USB debug adapter. If the boot loader is erased it will be impossible the use of TeleControlli firmware.**

The boot loader takes care of the proper allocation of the reset and interrupt vectors of the application to be loaded . It is possible to load files in Intel-HEX format. The user application can be linked without take care about the reset and interrupt vectors offsets.

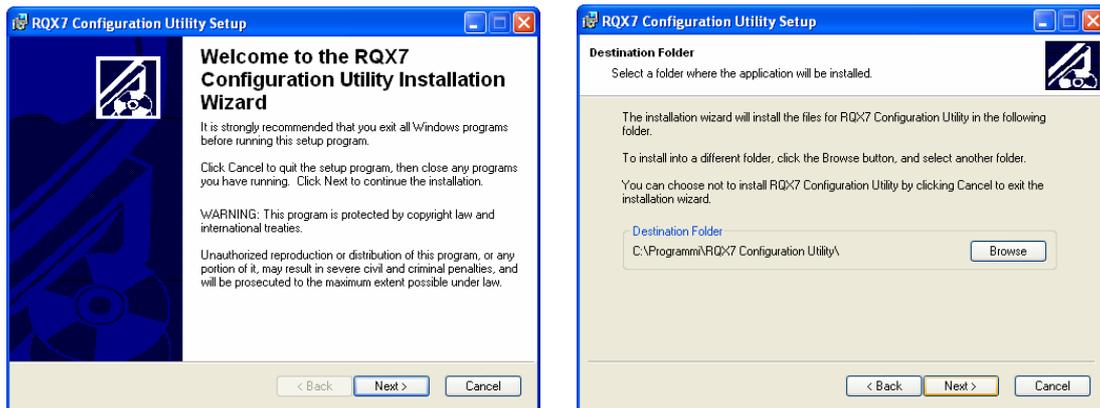
The available flash memory address space is 0x0000 – 0x37FB for the RXQ7-PTH version and 0x0000 – 0x77FB for RXQ7-SMD version. The boot loader can optionally erase the ‘scratchpad memory’ area dedicated to store the “non volatile” data.

The Flash memory organization of area ‘program’ is shown in the below figure.

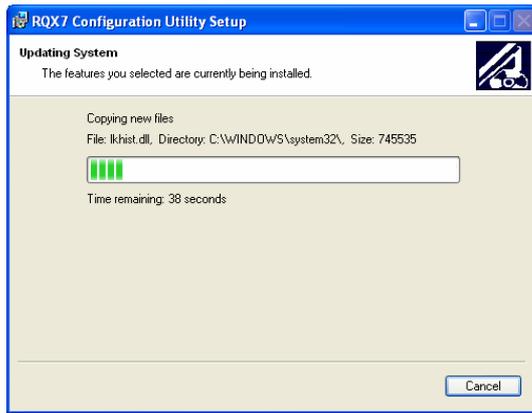
RXQ7 PTH		RXQ7 SMD	
3FFF	RESERVED	FFFF	RESERVED
....		8000	
3C00		7FFF	
3BFF	Lock Byte	7FFE	Lock Byte
3BFE	BOOTLOADER	....	BOOTLOADER
....		7A00	
3A00		....	
....		7800	
3800		77FF-77FC	
37FF-37FC	APPL. VECTOR RESET	77FB	APPLICATION
37FB	....		
....	....		
....	....		
....	....		
00AA	APPL. INTERRUPT VECTOR	00AA	
009A		009A	
....		....	
0001	BOOTLOADER VECTOR RESET	0001	BOOTLOADER VECTOR RESET
0000		0000	

**Appendix: Installation procedure of ‘RXQ7 configuration utility’ program**

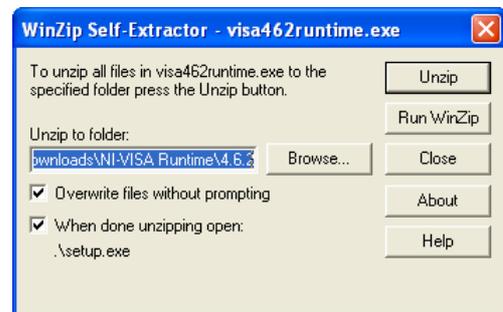
To install the application, a self extracting archive ‘**Installer RXQ7 Configuration Utility.exe**’ [http://www.telecontrolli.com/resources/download/rqx7files/174-installer-rqx7-configuration-utility\\_en.html](http://www.telecontrolli.com/resources/download/rqx7files/174-installer-rqx7-configuration-utility_en.html) is supplied. It creates a folder named **Installer RQX7 Configuration Utility** with all the necessary application files . Inside the directory **Installer RQX7 Configuration Utility**, execute the **Setup.exe** program.



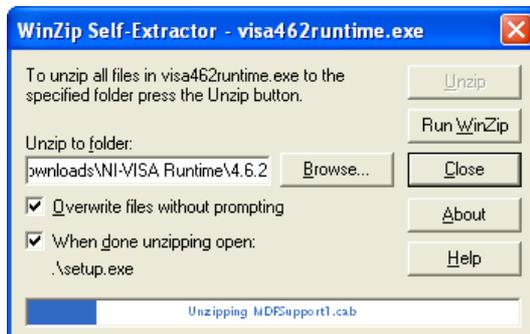
Select the destination directory (if it’s different from the default), follow the program instructions and wait till the end of program installation.



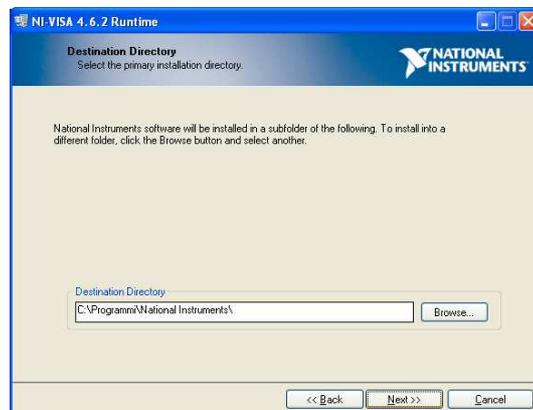
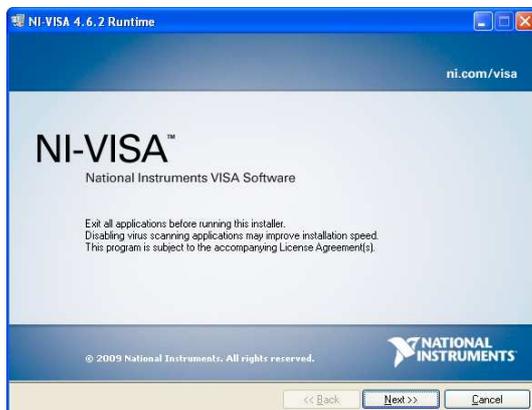
At the end, run the self extracting archive **visa462runtime.exe** that will be used to manage in the right way the serial ports: it will create another directory .

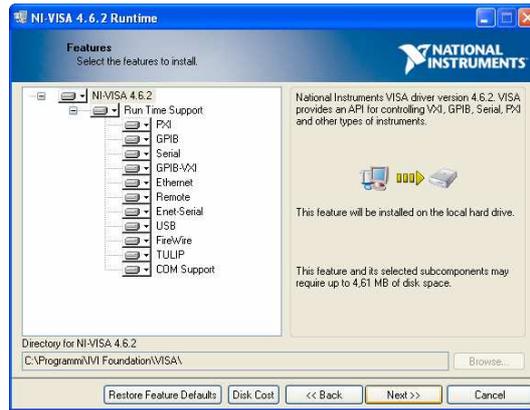


Press on the **Unzip** button and wait for the end of files extraction .

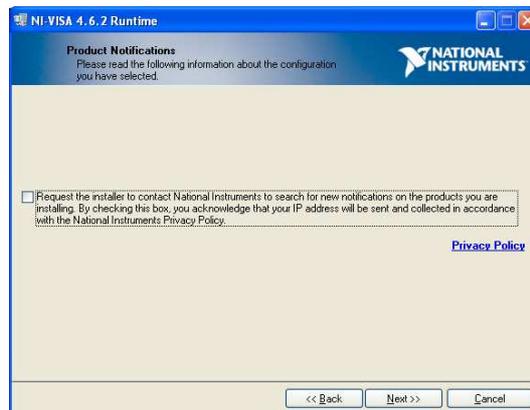


Press on the **OK** button and the installation of **'NI VISA Runtime installer'** program will start.

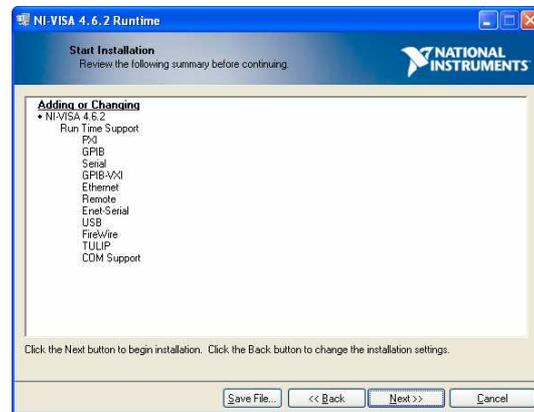
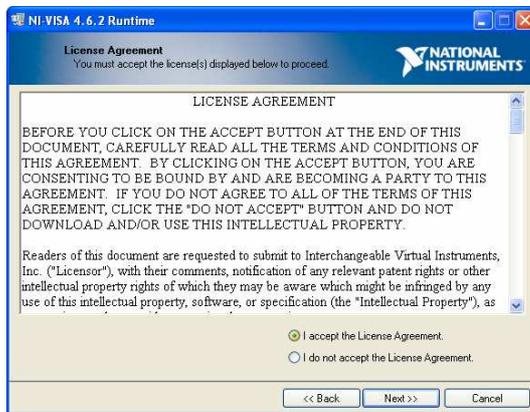




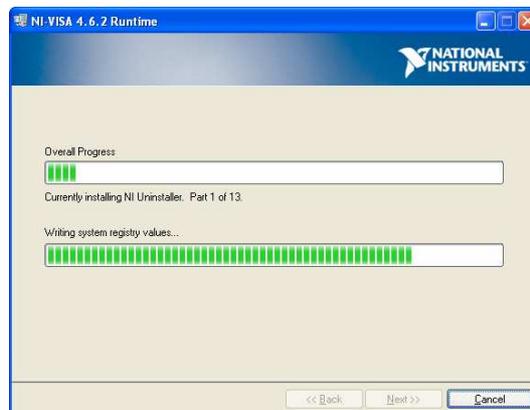
Press the **Next** button to continue until the below window will appear.



Check the box and press **Next** to continue.



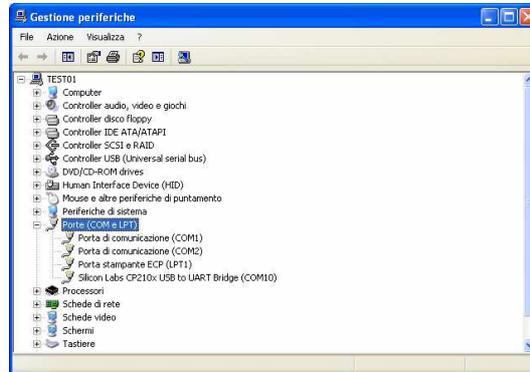
Accept twice 'License Agreements' (check box) and press the **Next** button to start the program installation.



At the end of the installation, it will be required to restart the computer. Accept it.

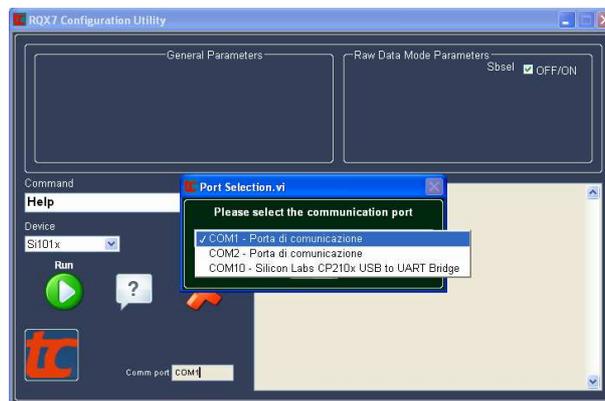
If an USB-RS232 converter is used, install the proper software drivers and connect it to the PC.

If more interfaces are used on the PC, it could be useful to verify through the **Panel Control** the Virtual serial port name/number assignment.



Run the **RXQ7 Configuration Utility** program.

Select from the **Comm Port** pop up menu command the serial port to be used .



The application is ready to be used.

### **Where to download all the files and files list .**

Under the Download area [http://www.telecontrolli.com/resources/download/164-rxq7files\\_en.html](http://www.telecontrolli.com/resources/download/164-rxq7files_en.html) of TeleControlli website "RXQ7 directory" are available , to download, all the files of RXQ7 product .

This area will be continuously update every time we will release a new demo application .

Files available now are:

- 1) Guida all'utilizzo del Firmware test RXQ7 > Firmware User Guide in Italian .
- 2) RXQ7-ORP\_PTH SMD version\_Firmware user guide > Frimware User Guide in English .
- 3) RXQ7\_Si100X\_Test.HEX > Test Firmware for SMD version .
- 4) RXQ7\_Test.HEX > Test Firmware for PTH version .
- 5) Installer RXQ7 configuration utility.exe > executable file to install the "RXQ7 configuration utility" .
- 6) Packet transmission and receiving in power saving mode : Firmware User Guide for demo application "Packet transmission and receiving in power saving mode" .
- 7) Demo\_RX\_LP.HEX > Firmware Packet receiving in power saving mode
- 8) Demo\_TX\_LP.HEX > Firmware Packet transmission in power saving mode

**SUMMARY**

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