

※※※CAUTION※※※

changes of modifications not expressly approved by the part responsible for compliance could void the user's authority to operate the equipment.

# XCRF-804 Interrogator User manual



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## 1 Introduction

Thank you for using XCRF-804 interrogator made in Shenzhen Invengo Information Technology Co. Ltd. The interrogator can offer stability and reliability, while strictly following the EPC C1G2 recommendation..

Front panel and rear panel layout

XCRF-804 interrogator layout as below: figure 2—1:

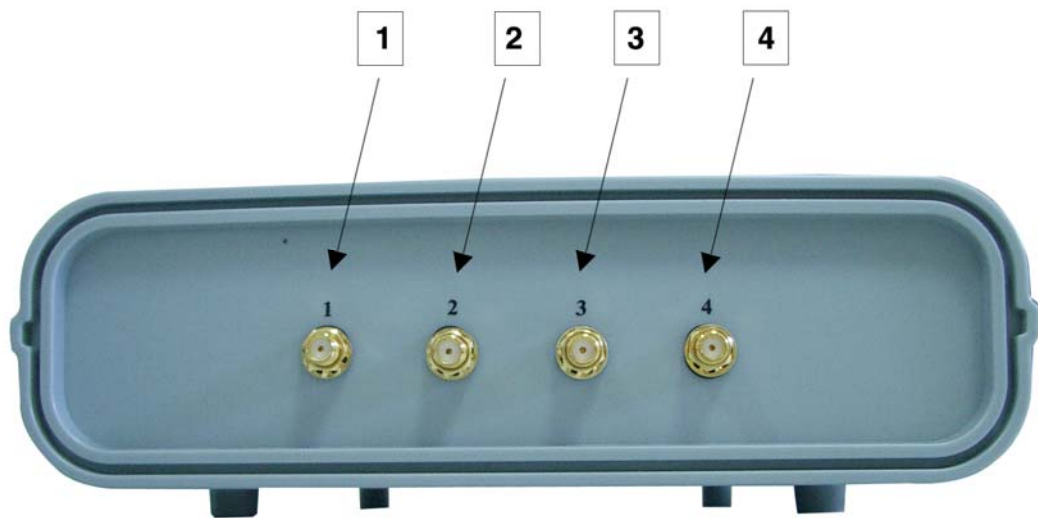


figure 2—1 XCRF-804 interrogator front panel layout

1—antenna port1;

2—antenna port2;

3—antenna port3;

4—antenna port4;



Note: Every antenna interface must connect with an antenna or 50 ohm load before the interrogator power up. otherwise the interrogator will be damaged.

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XCRF-804 interrogator rear panel figure 2—2:

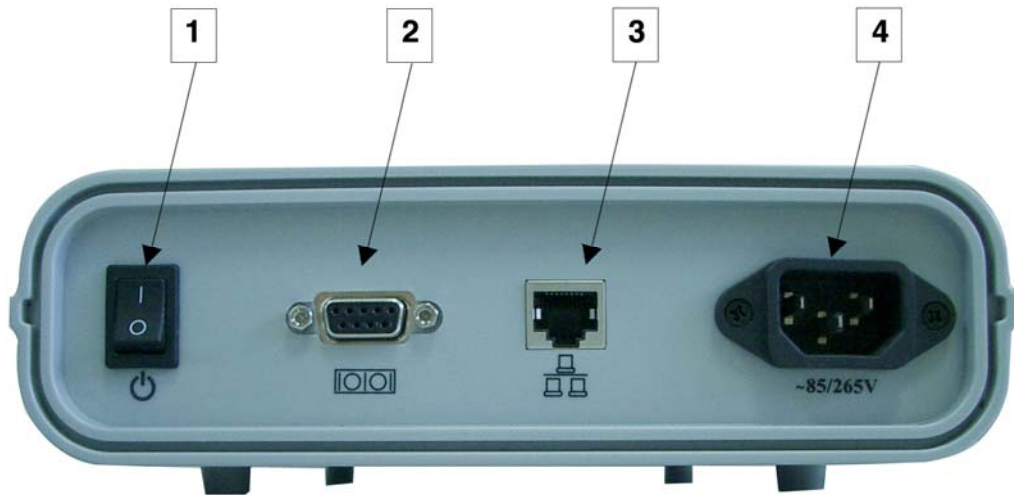


figure 2—2 XCRF-804 interrogator rear panel figure 2—2

1—power switch;

2—RS-232 serial port, a physical interface between a computer and interrogator.

The pin no, signal name and direction list as below. And the pin number is same as the number showed on DB9 connector.

pin	signal	direction
2	RXD	input
3	TXD	output
5	Ground	ground

3—Network Interface between a computer and interrogator. Plug one end of the cable into the RJ45 jack on the back of your PC. Plug the other end into RJ45 port on the interrogator. Device provides 10M/100M self-adaptive Ethernet interfaces.

4—AC INLET;

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XCRF-804 interrogator surface as figure2—3:



figure 2—3

#### XCRF-804interrogator surface

1— Power/Power Amplifier Indicator, two-colour light(green or red),green light indicates that the interrogator power on. Red light indicates the interrogator power up;

2— antenna1/3,two-colour light(green or red),green light indicates that the antenna1 of interrogator is working, red light indicates that the antenna3 of interrogator is working;

3— antenna2/4,two-color light(green or red),green light indicates that the No2 antenna of interrogator is working. Red light indicates that the No4 antenna of interrogator is working;

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4—Decode /error, two-colour light(green or red),green lighting indicates that the interrogator read the tag data correctly. Red lighting indicates that the interrogator read tag data error;

5—communicate/connect, two-colour light(green or red),green lighting indicates that the interrogator is transmitting data to PC via Network Interface. Red lighting indicates that the interrogator established a network connection to PC successfully;

## 2 Performance Parameter

### 2.1 General Features

- Operating temperature:  $-10^{\circ}\text{C} \sim +60^{\circ}\text{C}$  ( $14^{\circ}\text{F} \sim +140^{\circ}\text{F}$ )
- Storage temperature:  $-20^{\circ}\text{C} \sim +70^{\circ}\text{C}$  ( $-4^{\circ}\text{F} \sim +158^{\circ}\text{F}$ )
- Operating humidity:20%~95%
- Power supply voltage:AC:85V~265V/200mA
- Size:28.8 x 20.4 x 6.8cm ( 11.3 x 8 x 2.8inches )
- Weight:about1.25Kg ( 2.97lb )

### 2.2 Key feature

- Protocol:EPC Global Class1/Gen2/ISO 180006B
- Tag data rates:40kbps
- Number of antenna:up to 4 , electronically switched
- Antenna port isolation:  $\cong 22\text{dB}$
- Transmitter type:On/Off Keying
- Usable channels:50
- Occupied frequency bandwidth:<400KHz

### 2.3 Technical specification

- Frequency of operating:902MHz ~928MHz
  - Output power:1.0Watt (+30dBm) ,20dB digital Control range, minimum interval 0.5dB
  - Frequency stability:  $\cong \pm 5\text{ppm}$
  - Operating mode: fixed-frequency /frequency hopping selective
-

availability.maximal optional frequency number is 50pcs, frequency interval is 500KHz.

- Maximal reading distance up to 3.5~4.5m (11.48~14.75feet)(EIRP=36dBm,related to tags.)
- Write distance:Distances up to70% of the read distance under the same condition.
- Multi-tag reading rate:  $\cong 60$  pcs/second (it's related to protocol)

### 3 Design fundamentals

#### 3.1 Device compose

As figure 4-1 and 4-2,XCRF-804 interrrogator has 5 parts:RF unit, baseband unit,power unit、 data interface unit、 case unit.

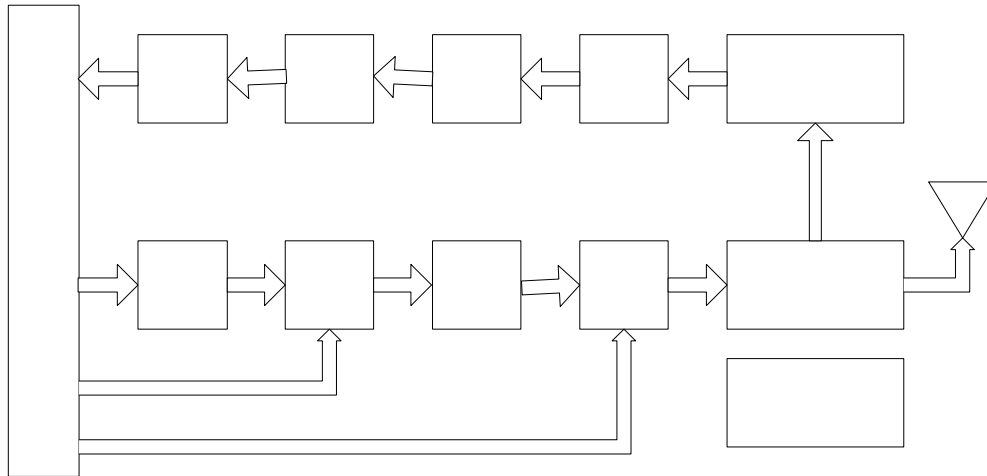


figure 4-1 interrogator RF unit fundamental block diagram

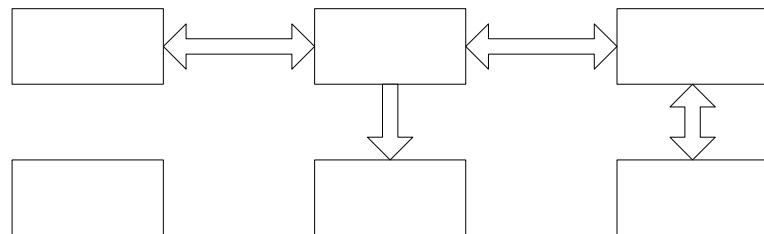


figure 4-2 interrogator baseband unit fundamental block diagram

#### 3.1.1 RF unit:

→The RF unit receive baseband signal and modulate carrier,then amplify the

Compar  
ation  
circuit

Low\_pa  
ss filter

Second  
amplify

Baseb  
and



modulated carrier signals and transmit the signals by selected antenna.

→The unit receive the back scatter signal from the RFID tag.After demodulating , amplifying ,comparing the signals ,the unit transmit the signals up to baseband unit.

→The unit adjust output power and frequency of the antenna interface under the control of the baseband unit.

### **3. 1. 2 Baseband unit:**

→The unit receive data & command from PC via RS-232 interface,or send data & results to PC ;

→The unit transmit control signals of tags to RF unit;

→The unit accept tag signals from RF unit, modulate signals and checkout;

→The unit can modify or query configure information of interrogator under the control of PC command ;

### **3. 1. 3 Power unit:**

→converts incoming alternating current (AC) to direct current (DC),out DC power supply for the integrated equipment.

### **3. 1. 4 Data interface unit:**

→Standard connector to connect the COM port ,network and power interface with the rear panel of the integrated equipment ;

### **3. 1. 5 Case unit:**

→The interrrogator case is made of molded-in ABS/PC. And the anti-static coating was sprayed over the inner surface of the case;

## **3. 2 Fundamental working principle**

The complete RFID system is consist of XCRF-804 interrogator, antenna, tags, and pc.

The baseband send the command to RF unit under the control of PC.RF unit send signals to tags according to the tag type. When the tag is activated, it sends out its number as well as other information .

The tags' response signals was amplified and shaped by the received-data

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circuit. Then the signals was send to baseband unit. The baseband will decode the received signal and then sends to PC via the communication interface of the baseband unit.

The transmitting part of the RF unit will take the function of carrier generation, carrier modulation, amplification and emission. The receiving part of the RF unit will take the function of demodulation, amplify , compare etc.

The FPGA part of baseband will take the code/decode function to tag data. MCU will take the function of communication with PC.

## 4 Usage and operation

### 4.1 Interrogator connection

There are 4 antenna port on the XCRF-804 interrrogator .The output port of antenna interface is SMA plug.

You can find antenna Cable with reversed SMA-Plug to N-Plug Connector in the product accessories. Joint the antenna SMA plug to the SMA interface of interrrogator and tight the bolt. The fit another port of the antenna cable with proper antenna.

### 4.2 Interrogator usage and operation

Connect the device as stated above, and the interrrogator will work under the control of PC command. Our company provide API function and interrogator demo software .User can use the software to test the interrrogator. Please read user manual of the interrrogator demo software to get the information about test procedure and test method.

## 5 Usual failure analysis and exclusion

- When the interrrogator is power on the signal lamp is not lighted:
    - power fault: check if the input alternating current power is normal. The alternating current voltage should between 85V~265V;
    - If the other signal lamp is light, there is MCU or FPGA fault in the device. Once you meet this problem, you can only contact with Invengon company to repair the
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device;

- Can't read tag data:
  - Please check if the serial port or the network cable is connect to the interrogator correctly. If the cable is not joint firmly, interrogator can not get command from PC.
  - If the power amplifier signal lamp is light ,user need to check if the antenna SMA connector is screw down, or if the tag is fault. But if the power amplifier is not light, maybe the FPGA or MCU is fault. User should contact Invengo company to repair the device;

## 6 Other notice

### 6.1 Production warranty

The warranty: period of our products is 2 years from delivery . If a defective is found due to material processibility qualified problems of the product , we will perform warranty commitment. Invengo company will decide whether reparaire or replace the fault product with certain qualified problem.

If a problem occurred is because the user's operation environment is not accord with the product Specifications, or a problem occurred due to installation reasons, we will not perform warranty commitment. we may charge the maintenance costs.

### 6.2 Safety note

When interrrogator is working (emitting microwave),person who install or operate the device should be 30cm away from antenna to meet the FCC safety standards requirement about maximal tolerant radiation human body can take.

The item should be carry out when user intall or operate the interrrogator.

Not undertake item:

Any RF device, include this interrogator , maybe disturb the medical device without correct protection. If you face this problem , you should listen to the counsel of medical device manufactory . This interrrogator may disturb other device when

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working .

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