



RS-RD52XX Series User Manual

ISO 15693 HF RFID Fixed Reader

- ◆ Before you use this product, please read this manual carefully and properly keep it for future reference.
- ◆ As our products continue improving, they may be changed without advanced notice.
- ◆ The copyright of this manual belongs to our company. Unauthorized plagiarism or dissemination will be held legally responsible.

Version:V1.5

Safety Instructions

- This device could only be used for the purposes specified by manufacturer.
- Modification of the equipment without permission or use additional equipment not sold or recommended by the equipment manufacturer may result in fire, electric shock or personal injury. We are not responsible for damage caused by this behavior.
- If the equipment breakdown, it can only be repaired by the manufacturer.
- Installation, operation and maintenance procedures can only be carried out by professionals.
- The use and installation of the equipment must comply with national legal requirements and local electrical regulations.
- When the device is powered on, it must comply with effective safety regulations.
- Do not touch the device frequently when the device is not powered off.

Contents

1. Product Overview	1
1.1. Introduction	1
1.2. Product Features	1
1.3. Product Model	2
1.4. Main Parameter	3
2. Hardware Interface Description	4
2.1. Overview	4
2.2. Antenna Interface	5
2.3. Power Interface	6
2.4. Communication Interface	7
2.4.1. Ethernet Interface	7
2.4.2. USB Interface	8
2.4.3. RS232 Interface	8
2.5. S1, S2 Input/output Ports	10
3. Indicator Light Description	12
4. Installation Instructions	14
4.1. RS-RD5201/RS-RD5206/RS-RD5212	14
4.2. RS-RD5224	15
4.3. RS-RD5230	15
5. Device Connection	16
6. Device Configuration And Test Instructions	18
6.1. Configuration Description Of Parameters	21
6.1.1. System Basic	21
6.1.2. Communication Interface	22
6.1.3. GPIO	23
6.1.4. RF And Air Protocol	24
6.1.5. Inventory General Parameters	25
6.1.6. Read/Write Command Parameters	27
6.1.7. Antenna Port Parameters	28
6.1.8. Auto Read Mode	28
6.1.9. Host Mode	35
6.2. Testing	37
6.2.1. Multi-tags Inventory Testing	37
6.2.2. Single Tag Operation Testing	38
6.3. Diagnosis	39
6.3.1. System Error Flag	40
6.3.2. Standing-wave Ratio	40
6.3.3. Temperature	41
6.3.4. Noise	42
7. Failure Analysis	44

1. Product Overview

1.1. Introduction

RS-RD52XX series high frequency high-power reader is a read-write device with high sensitive read-write performance and fast anti-collision processing algorithm. It integrates a variety of communication interfaces such as Ethernet, USB, RS232 and RS485. The products has stable performance which is suitable for RFID integration projects with higher requirements on reading and writing, such as: intensive reading of large quantities of electronic tags, remote reading fields.

The products have been widely used in jewelry management, chip management, production automation, personnel access control and other fields.

1.2. Product Features

- Support ISO 15693 and ISO 18000-3M1 standard .
- RF power: 1~8W (adjustable) .
- Antenna interface: adopts multiantenna interface design, which can connect up to 30 antennas;
- Support noise detection, be able to detect whether the environment has interference.
- Fast anti-collision processing algorithm; the speed of reading the tag is up to 70pcs/sec.
- Reading and writing range: single antenna can reach 118cm (antenna size: 560*650 mm); (this distance is related to card performance and antenna size).

- Communication interface: RS232, RS485, Ethernet, USB ,CAN.
- With short circuit protection and overheat protection function.
- Support antenna standing wave detection.

1.3. Product Model



RS -RD5201



RS -RD5206



RS -RD5212



RS -RD5224



RS -RD5230



1.4. Main Parameter

The detailed technical parameters of this series of products are as follows:

Table 1 Description of main technical parameters of the product

Parameter/Model	RS – RD5201	RS – RD5206	RS – RD5212	RS –RD5224	RS –RD5230
Operating Frequency	13.56 MHz				
Support Standard	ISO/IEC 15693 and ISO/IEC 18000-3M1				
RF Power	1~8W(configurable , the system default setting is 4W)				
Antenna Interface	SMA×1	SMA×6	SMA×12	SMA×24	SMA×30
Communication Interface	RS232, RS485, Ethernet, USB				
Working Mode	host mode and auto read mode (configurable)				
Supply Voltage	12V DC				
Maximum Power Consumption	≤35W				
Shell Material	aluminum alloy			metal plate	
Dimensions	200×168×33mm			308.5×207×38mm	438.6×207×38mm
Maximum Operating Temperature	50°C				

2. Hardware Interface Description

2.1. Overview

Due to the different number of antenna interfaces in this series, the sizes of some models are also different, but the appearance and the interfaces of each model is basically the same so model RS-RD5212 is taken as an example in the following description.



Figure 1 Reader hardware interface description

Note: RS-RD52XX series readers have 1 to 30 antennas and the number of antenna interfaces is different for different models.

2.2. Reset Button

After the button is pressed, the work indicator lights up. Continue to press for more than 5 seconds until the work indicator and the system error indicator flash together to indicate that the recovery is complete. It will take effect after the device is restarted. Once it takes effect, all configuration data will be restored to the factory default configuration.

2.3. Antenna Interface

This product uses an external antenna port design. Different models have different numbers of antenna interfaces (the following figure shows the RS-RD5212 reader antenna interface). The antenna connector uses a standard SMA female connector with a matching impedance of 50Ω , as shown below:



Figure 2 Antenna interface

Table 2 Description of the number of antenna connectors for different models

Model	The Number Of Antenna Connectors	Function
RS-RD5201	1	Used to connect

RS -RD5206	6	the antenna (input impedance 50Ω)
RS -RD5212	12	
RS -RD5224	24	
RS -RD5230	30	

Note:

- The VSWR of the antenna should be less than 1.5.
- In order to achieve the best reading range, the coaxial cable between the reader and the antenna must have a certain length. For all antennas of our company (such as DA3806), the optimal length of coaxial cable is 2~2.5 meters.
- To prevent external coupling noise, the antenna cable can be installed with an attached EMC ferrite ring core of 28mm x 20mm. The antenna cable must be wrapped around the ring core for 3 to 5 turns.



Figure 3 Antenna cable with EMC loop antenna

- When connecting an antenna, ensure that it does not exceed the permissible limits as prescribed by the national regulations for RF devices.

2.4. Power Interface

The power interface of this product uses a standard DC power socket (Ø5.5*2.1mm, length of 8.0mm with thread) and the power supply voltage is DC 12V, as shown below:



Figure 4 Power interface

Note: To reduce noise, the power cord can be equipped with a 28 mm x 20 mm EMC ring core. The power cord must be wound around the ring core for at least 3 turns.

2.5. CommunicationInterface

This product adopts a variety of communication interface designs to meet the application requirements of different customers. It has an Ethernet interface, an RS232 serial interface and a USB communication interface, as shown below:



Figure 5 Communicationinterface

2.5.1. Ethernet Interface

The reader has an RJ-45 network port for integrating 10/100 base-T. To ensure reliable data transmission, it is recommended to use the shielded twisted pair STP CAT5 cable for connection.

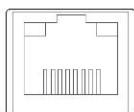


Figure 6 LAN interface for host communication

- Communication protocol: TCP/IP
- Default IP address : 10.168.1.222
- Default subnet mask : 255.255.255.0
- Default gateway address : 10.168.1.1
- Default port : 9909

The default setting information can be modified by the configuration software.

2.5.2. USB Interface

When connecting with the host, it can be directly connected and used through the USB cable.



Figure 7 USB interface for host communication

Table 3 Pin description of USB interface

Pin	Definition	Description
1	VCC	+5V
2	D-	Data cable negative
3	D+	Data cable positive
4	GND	GND

2.5.3. RS232 Interface

The parameters are as follows:

- Baud rate 38400
- Data bit8

- Parity check:even parity
- Stop bits:1

RS232 interface pin definition:

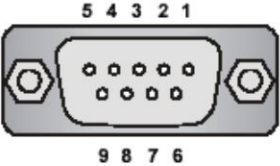


Figure 8 RS232 interface for host communication (DB9 connector)

Table 4 Pin definition of RS232 interface

Pin	Definition	Description
1	NC	Reserved
2	TXD	RS232 data output
3	RXD	RS232 data input
4	NC	Reserved
5	GND	Ground
6	NC	Reserved
7	NC	Reserved
8	NC	Reserved
9	NC	Reserved

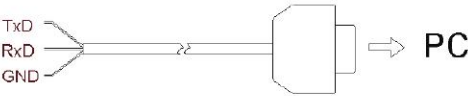


Figure 9 Wiring example for connecting RS232 interface

Remarks: If the user's computer does not have an RS232 serial port, the USB to RS232 converter of our company can be selected (non-standard products, must be purchased separately), install the USB driver and use the reader through the USB interface of the computer.

2.6. S1, S2 Input/output Ports

The S1 and S2 connection ports are general-purpose input/output ports, which are expansion ports:



Figure 10 S1, S2 connection port

GPIO interface pin definition:

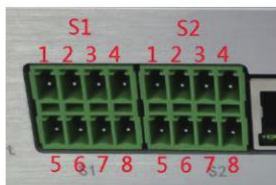


Figure 11 S1, S2 connection port pin identification

Table 5 Pin definition of S1, S2 connection port

Interface Name	Pin	Definition	Description
S1	Pin1	MOS	MOS transistor port
	Pin2	NO	Relay port: normally open port
	Pin3	NC	Relay port: normally closed port
	Pin4	COM	Relay port: common port
	Pin5	IN1	Data input
	Pin6	GND	GND
	Pin7	RS485 -A	DATA+
	Pin8	RS485 -B	DATA -
S2	Pin1	IO-1	GPIO
	Pin2	IO-2	GPIO

	Pin3	IO-3	GPIO
	Pin4	IO-4	GPIO
	Pin5	12V	12V level signal output
	Pin6	GND	GND
	Pin7	CAN -L	Low data line
	Pin1	CAN -H	High data line

3. Indicator Light Description



Figure 12 Reader indicator light



Figure 13 Antenna indicator light

Table 6 Description of reader indicator light

Type	Mark/Position	Name	Colour	Functional Description
Device Indicator Light	V1	Work light	Blue	Host mode: After the device starts normally, the indicator flashes at intervals of 200ms. After receiving the command from the host, the indicator stays on until the command execution is complete. If there are no other commands, the indicator flashes again. Auto read mode: After the device starts normally, the indicator flashes at 50ms intervals.

	V2	Tag detection indicator light	Orange	Host mode: When the inventory command is executed, the indicator will be lit when a new label is found. Auto read mode: The indicator will light up when the label is found.
	V3	Error indicator light	Red	During the device startup or operation process, the indicator will light up when the system detects an error and only turn off when the error returns to normal. When this indicator is on, you can check the error type through the device diagnostic function of R-tool software.
Ethernet indicator light	Left of RJ45 port	Ethernet connection indicator light	Green	After the network connection is successful, the light turns green. Otherwise, the light is off.
	Right of RJ45 port	Ethernet communication indicator light	Yellow	When there is data communication, this light flashes yellow. Otherwise, the light is off.
Antenna indicator light	PWR	Antenna interface electricity output indicator light	Blue	Blue light is always on: the antenna interface is set to output with electricity. Blue light flashing: The antenna interface setting does not match the actual antenna properties, you need to check whether the antenna is electrified Blue light is off: the antenna interface is set to output without electricity.
	ANT1~ANT30	Antenna port RF indicator light	Yellow	When RF of the antenna is open, the yellow light will always be on. Otherwise, the light is off.

4. Installation Instructions

This product provides holes for installation in the housing, so there is no need to open the housing during installation. The installation dimensions are as follows (unit: mm):

4.1. RS-RD5201/ RS-RD5206/ RS-RD5212

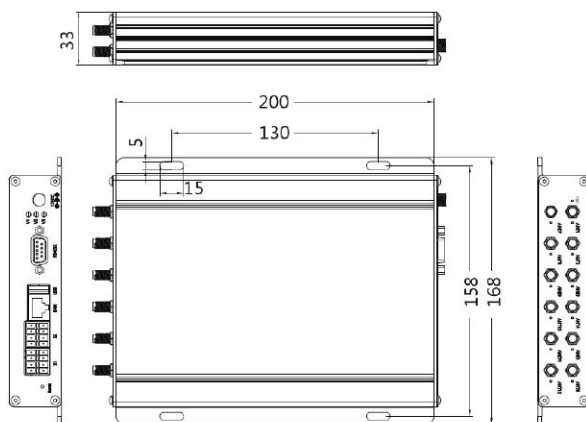


Figure 14 RS-RD5201/ RS-RD5206/ RS-RD5212 installation size

4.2. RS-RD5224

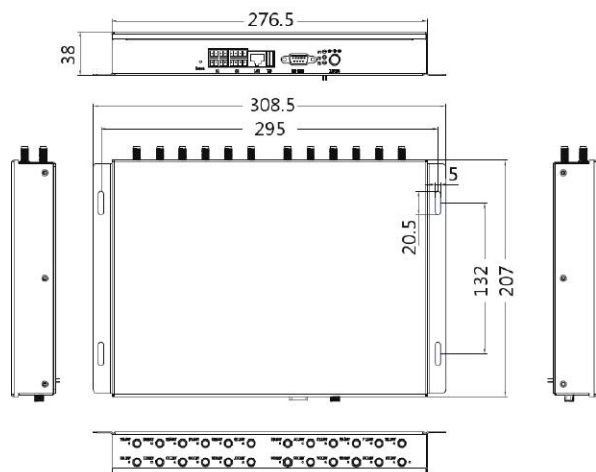


Figure 15 RS-RD5224 installation size

4.3. RS-RD5230

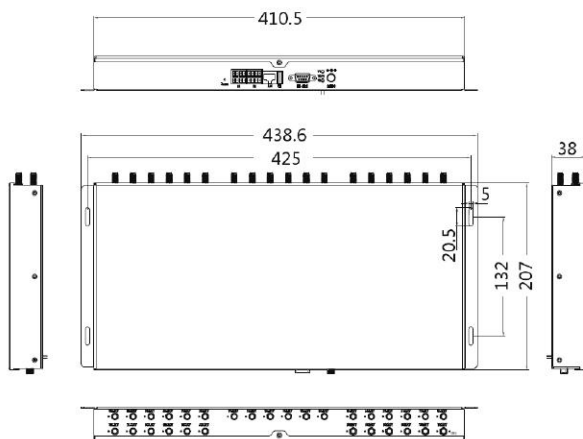


Figure 16 RS-RD5230 installation size

5. Device Connection

1) Connect antenna

In order to meet the needs of various projects, the devices adopts antenna and reader separation design. Therefore, when the reader is working , one or more antennas must be connected to read and write electronic tags normally (up to 30 antennas can be connected) Customers can choose different antennas according to the actual needs of the project.

Tighten the connector clockwise when connecting the antenna feeder to the reader antenna connector.

2) Connect communication interface

This series of readers has three communication interfaces: Ethernet LAN port, RS232 interface, USB interface, users can choose different communication interfaces to connect according to their needs, as described below:

① Connect PC and reader via network cable: use a cross-connect network cable to connect the PC and the reader; or connect the PC and the reader through a network switch. Note: If the PC supports automatic cross direct connection, you can use a common network cable to connect.

② Connect PC and reader via RS232 serial cable: this device can be connected via RS232 serial cable or USB To RS232 converter.

③ Connect the PC and the reader via the USB cable.

3) Power connection:

AC220V power output DC12V to connect reader.

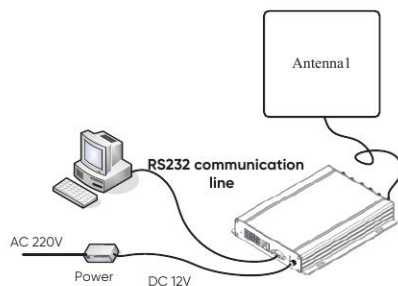


Figure 17 schematic diagram of using serial port communication connection

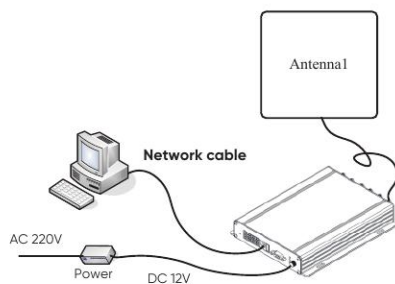


Figure 18 Schematic diagram of using Ethernet port connection

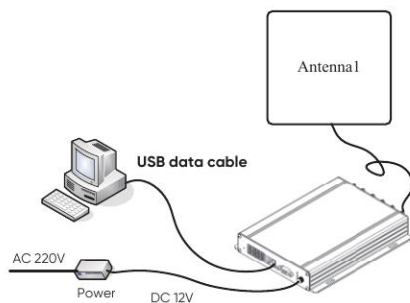


Figure 19 Schematic diagram of using USB communication connection

6. Device Configuration And Test Instructions

Refer to Chapter 5 "Device Connection" to connect the device and power on the reader. Through the indicator light to ensure that the reader is working properly, and then you can configure the reader parameters through the configuration software.

Open the R-Tool folder and find the file  **R-Tool** in the folder directory, double-click this file to open the test tool, as shown below:

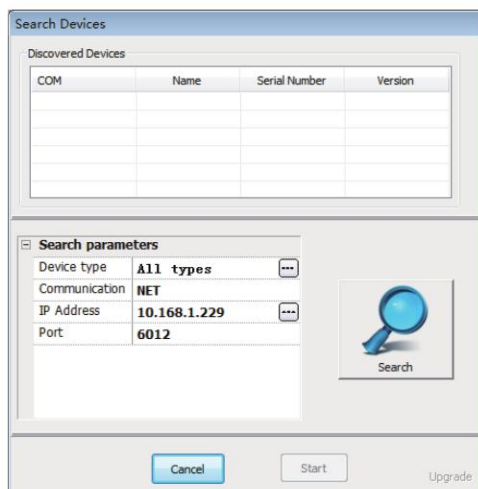


Figure 20 R-Tool connection interface

Select the corresponding communication method according to the actual interface type used by the device.

① When connected by RS232 interface, choose "COM" from [Communication] under [Search parameters]. Choose "All" for [COM name], set [Baud rate] as 38400, set [Frame] as 8E1, and set [address] as 255;

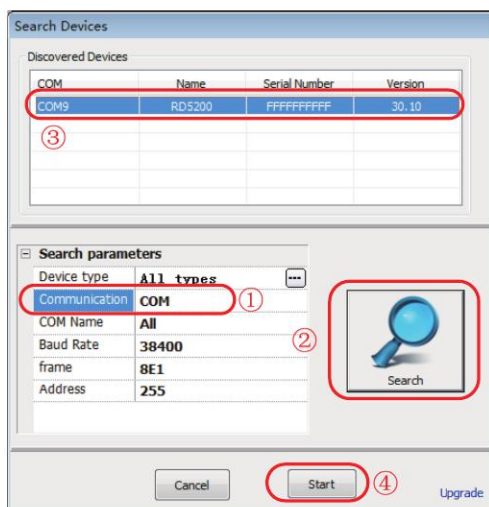


Figure 21 Operation steps when use RS232 interfaceconnection

②When connected by USB interfacechoose "USB" from [Communication] under [Searchparameters]:

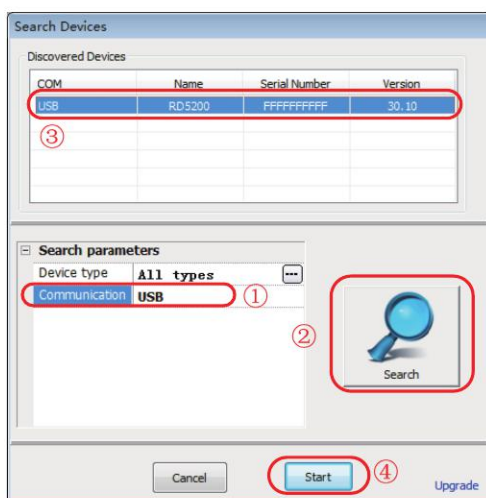


Figure 22 Operation steps when use USB interface connection

③When connected through Ethernet port, choose "NET" under

[Communication] of [Search Parameters]. Click apostrophe button at right of IP address to search corresponding IP.

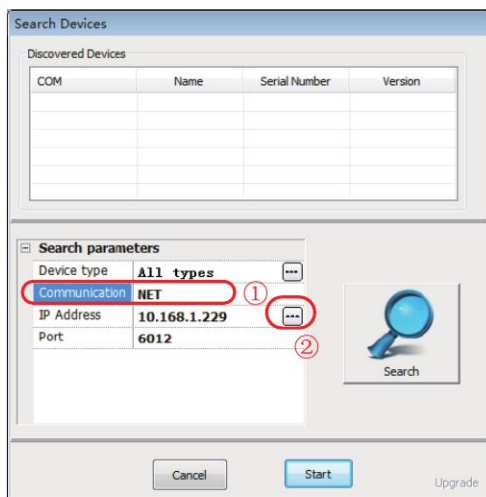


Figure 23 Operation steps when use LAN port connection

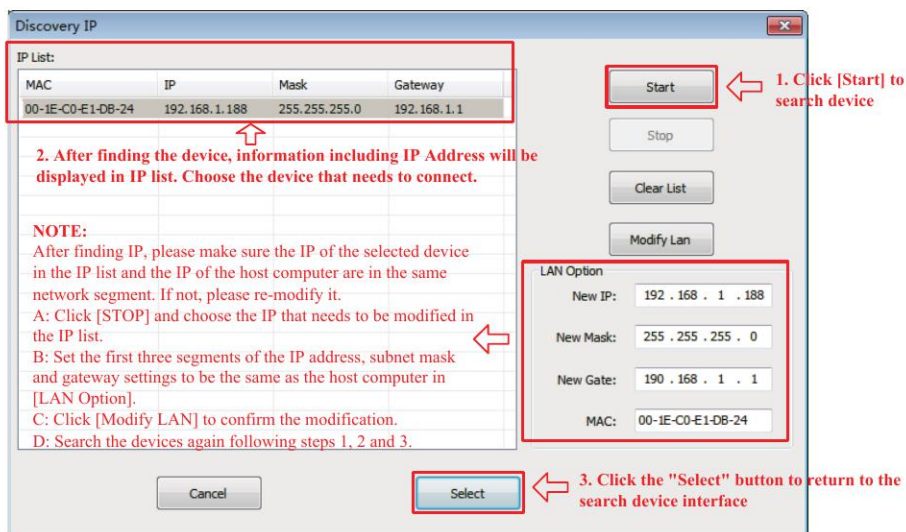


Figure 24 Operation stepsof discover devices by searching IP

Click [Select] button to return to equipment searching interface. Choose 9909 port number. Click [Start] button for successful connection and enter into main interface of software configuration.

Notice: Following two points should be noticed when use Ethernet port connection.

1) When using cross direct-connect cable to connect PC and reader-writer, the IP of testing PC should be set as static IP.

2) When using Ethernet port to connect PC and reader-writer, confirm whether the searched IP is at the same network segment with IP of testing PC in the connection interface for R-tool configuration software. If they are not the network segment, please set the subnet mask, gateway and first three segments of IP the same as testing PC, and search again.

6.1. Configuration Description Of Parameters

6.1.1. System Basic

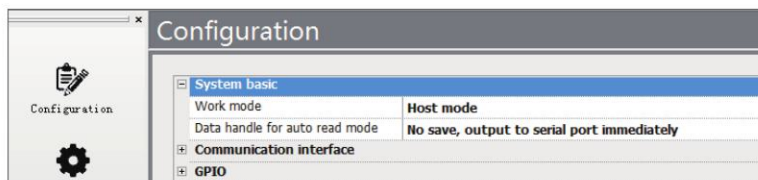


Figure 25 Configuration interface for system basic

- **Work mode:** the system work mode can be set to "Host mode" and "Auto read mode", which will take effect immediately after setting:
 - A. Host mode:** in this mode, after the device starts, it is in a passive state. It responds to and returns results by receiving commands from the host.
 - B. Auto read mode:** in this mode, it will actively take inventory of the

electronic tags in the sensing area according to the actively read configuration parameters.

- **Data handle for auto read mode:** currently only the default option, which is " No save, output to serial port immediately."

6.1.2. CommunicationInterface

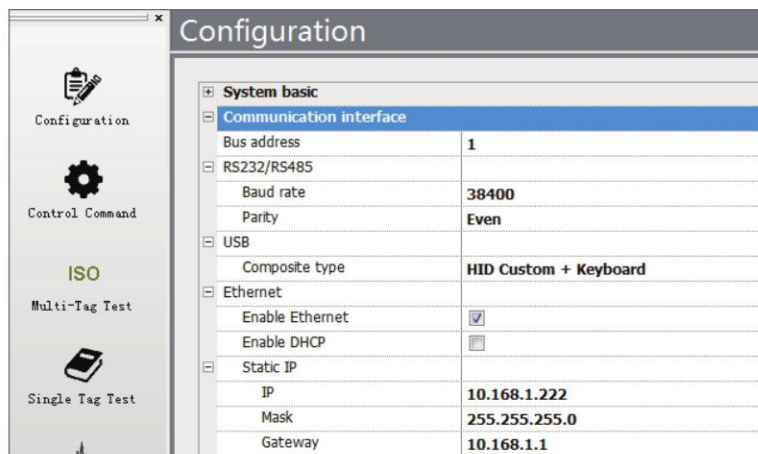


Figure 26 Configuration interface for Communication interface

- **Bus address:** this parameter is mainly used on the RS485 bus. When multiple readers are connected to a bus, different bus addresses need to be configured for each device, with a value range of 1-255.
- **RS232/RS485 :** it needs to be powered on again to take effect after setting. (Note: this parameter is shared with RS485 interface)
Baud rate: serial communication rate, the default setting is 38400;
Parity: None, Odd, Even, the default setting is even.
- **USB:**
Compound type: It needs to be powered on again to take effect.
A. HID Custom + Keyboard: HID custom interface + keyboard emulation

output;

B. HID Custom + VCP: HID custom interface+ virtual serial port;

Note:

Keyboard emulation output: it is available in auto read mode;

Virtual serial port: need to install the driver.

- **Ethernet:**

Enable Ethernet: check to enable.

Enable DHCP: check to enable.

Static IP: set IP, Mask and Gateway

6.1.3. GPIO

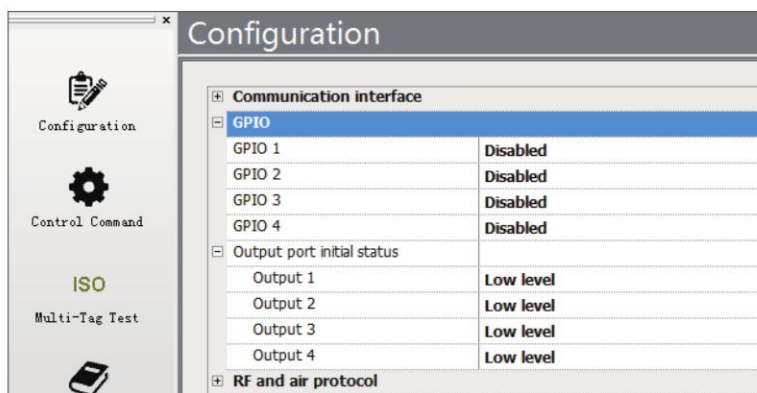


Figure 27 Configuration interface forGPIO

- **GPIO x:** define the functions of the four GPIOs, it need to be powered on again to take effect;
 - ① Disabled: don't use this GPIO;
 - ② As input x: After the setting takes effect, you can use the get Input Status command to read the current level status of the GPIO;
 - ③ As output x: After the setting takes effect, you can use the output

control command to make the GPIO output high or low levels;

- Output port initial status it needs to be powered on again to take effect
Output x: the default setting is low level. After the device is powered on, the default state of the output port is low level.

6.1.4. RF And Air Protocol

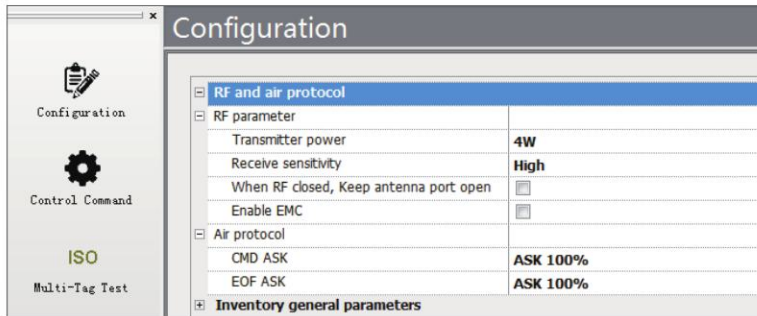


Figure 28 Configuration interface for RF and air protocol

- **RF parameter:**

Transmitter power: 1W~8W , the default setting is 4W.

Receive sensitivity: the default setting is high.

When RF closed, Keep antenna port opencheck to take effect

Enable EMC: check to enable EMC mode.

- **Air protocol:**

CMD ASK : set whether the communication frame of ISO 15693 protocol adopts 100% or 10% modulation;

EOF ASK : when using 16 slot counts, whether the EOF of the switching time slot is 100% or 10% modulation.

6.1.5. Inventory General Parameters

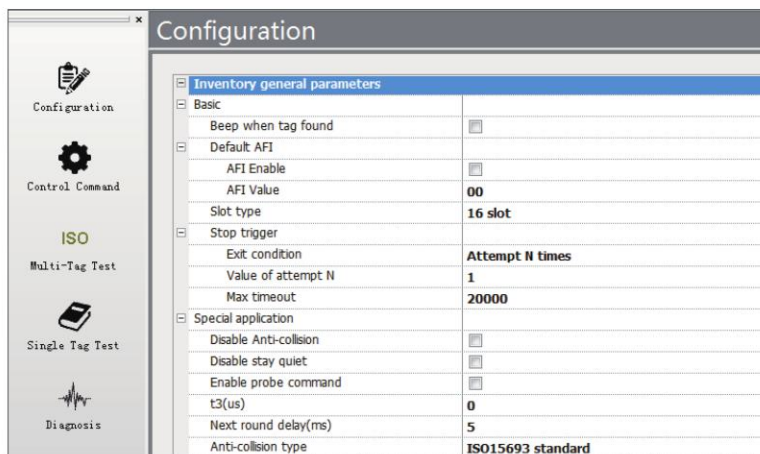


Figure 29 Configuration interface for inventory general parameters

- **Basic:**

① Beep when tag found if this option is checked, the buzzer will sound when a tag is detected.

② Default AFI [Note: if the command has AFI parameters, the command is used firstly]:

AFI Enable: if this option is checked, the AFI value of the comparison tag required during the inventory process can be filled in the following AFI parameters;

AFI Value: this parameter is valid only if the "AFI Enable" option is checked;

③ Slot type:

1 Slot : suitable for inventory within 8 tags;

16 Slot : when the number of tags is more than 8, it is more appropriate to use 16 slots than 1 slot;

- ④ Stop trigger: the trigger condition for the inventory stop.

Exit condition: when the inventory command is executed on an antenna, set the conditions for inventory stop;

A. Attempt N times;

B. Max timeout;

Value of attempt N: this parameter is only valid when "Exit condition" is selected as A;

Max timeout the maximum time to read a card on an antenna;

● **Special application**

- ① Disable Anti-collision:

Disable anti-collision doesn't mean reading only one tag. If it is an inventory of 1 slot, it can read up to 2 tags after turning off this function. If it is an inventory of 16 slots, turning off this function can read up to 16 tags.

- ② Disable stay quiet

If the feature is checked, it will not sleep after the tag inventory.

③ Enable probe command the speed can be increased in the case of multiple antennas.

- ④ t3(us) : the default value of this time is 0. Changing this time will affect the time of inventory.

- ⑤ Next round delay(ms): next round delay(ms) time of regenerate the response.

- ⑥ Anti-collision type:

A. ISO 15693 standard

B. ICODE SLI Persistent

6.1.6. Read/Write Command Parameters

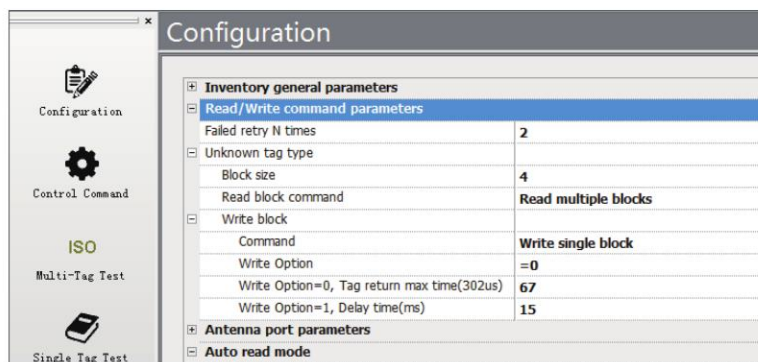


Figure 30 Configuration interface for Read/Write command parameters

- **Failed retry N times :**

For example, the read data block command is likely to fail in a disturbed environment, the anti-jamming capability can be enhanced by trying multiple times.

- **Unidentified tag type:** (The following configuration requires professional knowledge)

- ① Block size: the number of bytes per block, NXP ICODE SLI series chips are 4 bytes per block;
- ② Read block command for unrecognized tags, we do not know whether it supports reading single block and reading multiple blocks, if both are supported, then choose to "Read multiple blocks";
- ③ Write block:

Command for unrecognized tags, we don't know whether it supports writing single block and writing multiple blocks, if both are supported, then choose to "Write multiple blocks";

6.1.7. Antenna Port Parameters

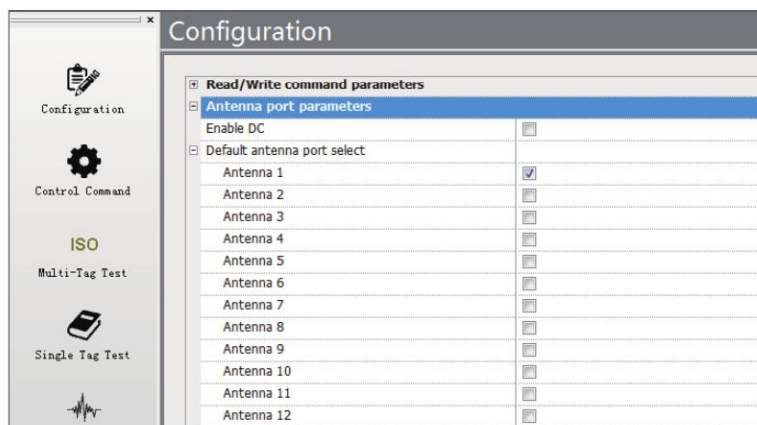


Figure 31 Configuration interface for antenna port parameters

- **Enable DC:** when checked, the reader antenna interface is output with electricity.
- **Default antenna port select** When the reader has multiple antenna interfaces, the antenna is enabled according to the actual connection. Check to enable.

6.1.8. Auto ReadMode

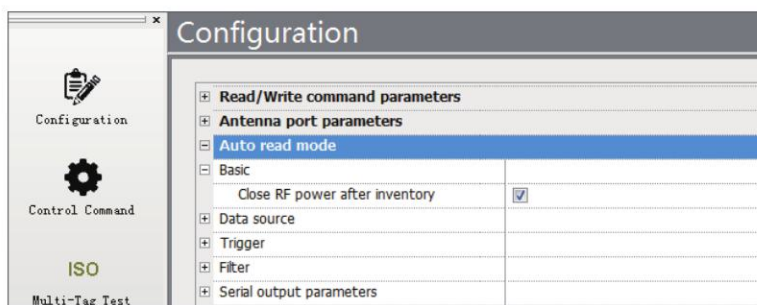


Figure 32 Configuration interface for auto read mode

- **Basic:**

Close RF power after inventory: if this parameter is checked, RF will be turned off automatically after an inventory process is completed.

● Data source

[-] Auto read mode	
[+] Basic	
[-] Data source	
[-] Data field select	
UID	☒
User block	☐
Antenna ID	☐
Input status	☐
[-] Data field parameters	
UID Length	8
[-] User block	
Start byte offset	0
Bytes num to read	4
Key index	0
[-] Input port select	
Input 1	☐
Input 2	☐
Input 3	☐
Input 4	☐
Optocoupler input	☐
[-] Data format	
UID data format	Raw bytes output
Reverse UID	☐
User block data format	Raw bytes output
Others data format	Raw bytes output

Figure 33 Configuration interface for data source

① Data field select

UID: whether to output the 64-bit unique serial number of the discovered tag;

User block: whether to output the data block content of the discovered tag;

Antenna ID: whether to output the antenna ID of the tag;

Input status: whether to output the status of the input port;

② Data field parameters

➤ UID Length:

The default is to output all 8 bytes. This parameter is valid when the UID of the "Data field select" is ticked;

➤ User block:

Start byte offset The offset is calculated by bytes. Take the tag of ICODE SLI as an example, if the offset byte=5, then it starts to read at the first byte of the first data block, if the offset byte=3, then it starts to read at the third byte of the 0th data block;

Bytes num to read Starting from the offset byte, read N bytes;

Key index: reserve;

➤ Input port select

Input x / Optocouplerinput: checking indicates that the state of the port is to be read, but the "Input status" in the "Data field select" must be checked firstly.

③ Data format

➤ UID data format

A. Raw bytes output: without any conversion, directly output 64-bit data stream;

B. Hex string output: each byte outputs 2 hexadecimal characters;

C. Lower 3 bytes integer character output : the lower 3 bytes of the serial number are converted into a decimal string;

D. Lower 4 bytes integer character output the lower 4 bytes of the serial number are converted into a decimal string;

E. Wiegand type 1 output: the lower 3 bytes of the serial number are converted into the format output of the micro tillage controller;

F. Wiegand type 2 output the lower 3 bytes of the serial number are converted into fixed-length format output of the micro tillage

controller;

Micro tillage controller format output instructions:

For example, the serial number is E004040001020304, take out 02h and convert it to a decimal string 2, then convert 0304h to a decimal string 772. If there are not enough 5 digits, fill in zeros before 00772, and finally add 2 and 00772 to output 200772; if It is a fixed-length 8-bit, that is, 200772 is not 8-bit enough, then the front is padded with zeros to get 00200772

➤ Reverse UID:

The byte order of the serial number is reversed

For example, if the serial number is E004040001020304, the reversed number is 04030201000 404E0;

➤ User block data format

A. Raw bytes output output in raw bytes, which is ASCII;

B. Hex string output;

➤ Others data format

A. Raw bytes output;

B. Hex string output;

● **Trigger:**

Auto read mode	
Basic	
Data source	
Trigger	
Trigger way	Periodic trigger
Periodic trigger parameters	
Internal(ms)	20
Inventory count(0 means once)	0
Filter	
Serial output parameters	

Figure 34 Configuration interface for trigger

① Trigger way:

- Periodic trigger, trigger reading data every N milliseconds;
- ② Periodic trigger parameters
- Internal (ms): trigger with an interval of N milliseconds;
- Inventory count (0 means once) how many times to inventory after triggering.

- **Filter:**

Auto read mode	
Basic	
Data source	
Trigger	
Filter	
UID effective time(100ms)	50
Serial output parameters	

Figure 35 Configuration interface for filter

UID effective time (100ms) : It only outputs once when reading the same tag within the valid time.

- **Serial output parameters :**

[-] Auto read mode	
[+] Basic	
[+] Data source	
[+] Trigger	
[-] Filter	
UID effective time(100ms)	
[-] Serial output parameters	
Output port select	RS232
[-] Data frame definition	
[-] Frame option	
Enable header	☐
Enable separator	☐
Enable Terminator	☐
separator	System separator
Terminator	System terminator
System separator	, 0x2C
Custom separator	00
System terminator	Enter and New line 0x0D+0x0A
[-] Custom header	
Length	1
Byte 1	00
Byte 2	00
Byte 3	00
Byte 4	00
[-] Custom terminator	
Length	1
Byte 1	00
Byte 2	00
Byte 3	00

Figure 36 Configuration interface for serial output parameters

① Output port select :

- A. None: read-only does not output any data;
- B. RS232 : output data through RS232 interface;
- C. HID Custom: output data through the HID Custom interface If use this interface output, the USB interface must be enabled;
- D. HID Keyboard: The output characters are output in the form of simulated keys, without any software support. It outputs at the place where the cursor of the operating system stops. If use this interface,

the USB interface must be enabled, and the USB multiplexing type is USB Custom + Keyboard;

② Data frame definition:

Frame option frame header + data field + separator+ data field + Terminator;

- ✓ Enable header:whether to output the frame header byte;
- ✓ Enable separator when the output data contains multiple fields, if the item is checked, the fields are separated by a separator, such as the comma separator "E004050102030405, 01";
- ✓ Enable Terminator: whether to output the terminator;
- ✓ Separator whether to use the system separator or the custom separator;
- ✓ Terminator: whether to use the system terminator or the custom terminator.

System separator System separator selection

Custom separator custom separator can be set to any value

System terminator: system terminator selection

Custom header up to 4 bytes of frame header data can be defined

Custom terminator up to 3 bytes of terminator data can be defined

6.1.9. Host Mode

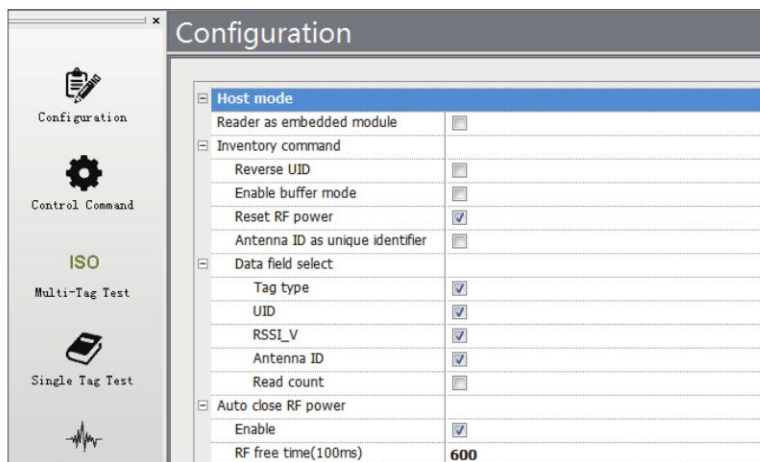


Figure 37 Configuration interface for host mode

- **Reader as embedded module**

When checked, the reader is used as an embedded submodule.

- **Inventory command:**

① Reverse UID: the sequence number contained in the data packet of the inventory command is reversed;

② Enable buffer mode: If checked, the buffer mode is used; if not checked, the asynchronous output mode is used.

Buffer mode: buffer the read tags in the memory of the reader, and output them after the inventory is finished.

Asynchronous output mode it will be output a data packet with a serial number when a tag is read every time, the end package is output after the inventory is completed.

③ Reset RF power:

Whether to reset the RF power before the inventory command. If it is

not reset, then the next inventory will not be able to inventory to the dormant tag.

④ Antenna ID as unique identifier: this parameter only applies to buffer mode.

For example: the tag E00405FF11223344 was read by antennas 1, 2 and 3:

Antenna ID as unique identifier:

Table 7 Example of inventory when setting antenna number as unique identifier

No.	Antenna ID	Tag ID
1	1	E00405FF11223344
2	2	E00405FF11223344
3	3	E00405FF11223344

Antenna ID is not used as unique identifier:

Table 8 Example of inventory when setting antenna number not used as unique identifier

No.	Antenna ID	Tag ID
1		E00405FF11223344

⑤ Data field select

Tag type whether the tag Data field contains the tag type field.

UID: whether the tag Data field contains the tag UID.

RSSI_V: whether the tag Data field contains RSSI field.

Antenna ID: whether the tag Data field contains antennaID.

Read count whether the tag Data field contains this field.

● Auto close RF power :

① Enable:

If it is enabled, after the RF is turned on, it will be turned off when Idle

time exceeds the set time.

② RF idle time(100ms) : timeout.

Note: after the " Auto close RF power" function is enabled, the operation of password authentication for the tag may cause failure.

6.2. Testing

6.2.1. Multi-tags Inventory Testing

After entering the main interface of RTool test software, select "ISO Multi-Tag Test", carry out the procedure as shown in the following figure①, ② and③ for tags inventory test:

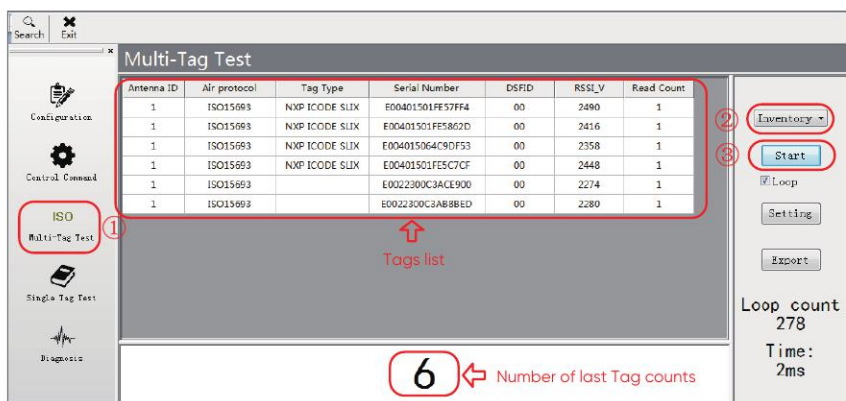


Figure 38 Multi-Tag inventory test steps

Note:

Step 1: Select the menu "ISO Multi-Tag Test" in the main interface of the software;

Step 2: Select the "Inventory " in the drop-down list above the "Start" button;

Step 3: Click the "Start" button to carry out the inventory testing.

6.2.2. Single Tag Operation Testing

After entering the main interface of RTool test software, select " Single Tag Test" , carry out the procedure as shown in the following figure ①,②,③,④ and ⑤ for tags test:

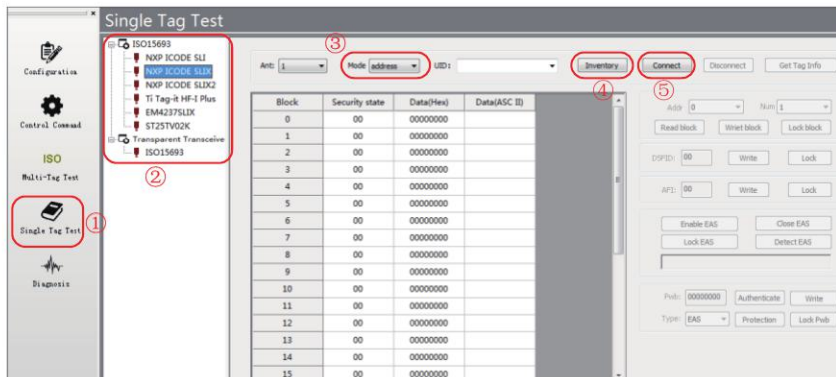


Figure 39 Single tagoperation test steps

Note:

Step 1: In the software main interface, select the menu "Single Tag Test";

Step 2: In the "Single Tag Test" interface, select the type of tag to be operated;

Step 3: mode: none address, address.

1) For a single tag,select the "none address" mode.

2) For multiple tags, select the "address" mode.

Step 4: Click the "Inventory" button to display the UID list in UID drop-down box.

Step 5: 1) For a single tag: click the "Connect" button;

2) For multiple tags: in UID drop -down box, select the tags required to be operated, and then click the "Connect" button;

After the above steps, you can read and write tags, as shown below:

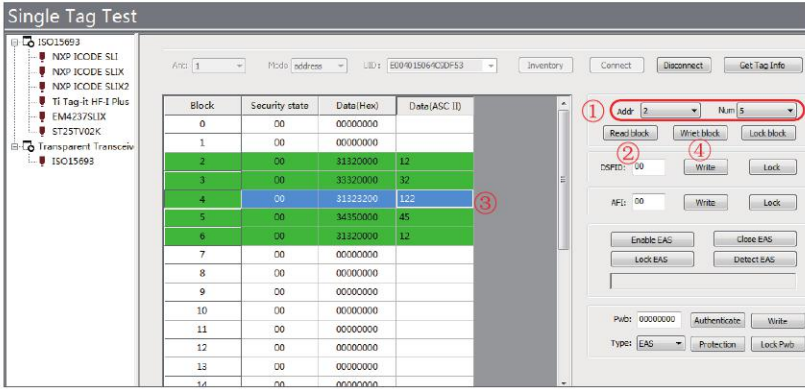


Figure 40 Single tag reading and writing steps

Steps:

- 1) Set the data block of the tag to be operated in the Addr drop-down box and the Num drop-down box. After setting, the operable data block is displayed in green indicating that it can be operated;
- 2) Click [Read Block] to read the data value of the data block selected in step 1;
- 3) Write the value in the line (green area) of the data block whose value should be written, and then click [Write Block];
- 4) After the operation is completed, click the [Disconnect] button to disconnect the tag connection.

6.3. Diagnosis

When using the reader, you may experience problems, such as it may not be able to read the tag normally, or the distance drops or intermittently when reading a single tag, unstable when reading multiple tags, the reading speed is slow or the number of changes is large, etc.

When these problems occur, the performance and usage environment of the reader can be detected and checked according to the following.

6.3.1. System Error Flag

When the reader fails, you can detect it to find out the cause of the failure based on the error identification.

Diagnosis																				
Diagnosis Option System Error Flag Standing-wave ratio Temperature Noise	<table> <tr> <th>No.</th><th>Error Flag</th><th>Status</th></tr> <tr> <td>0</td><td>Temperature alarm</td><td>False</td></tr> <tr> <td>1</td><td>RF power protection</td><td>False</td></tr> <tr> <td>2</td><td>Antenna error</td><td>False</td></tr> <tr> <td>3</td><td>Antenna circuit protection</td><td>False</td></tr> <tr> <td>4</td><td>RF configuration failed</td><td>False</td></tr> </table>	No.	Error Flag	Status	0	Temperature alarm	False	1	RF power protection	False	2	Antenna error	False	3	Antenna circuit protection	False	4	RF configuration failed	False	☒ Loop Stop
No.	Error Flag	Status																		
0	Temperature alarm	False																		
1	RF power protection	False																		
2	Antenna error	False																		
3	Antenna circuit protection	False																		
4	RF configuration failed	False																		

Figure 41 System error flag

Table 9 Description of systemerror flag

No.	Error Flag	Description
0	Temperature alarm	The operating temperature of the reader is too high
1	RF power protection	Voltage standing wave ratio is too high
2	Antenna error	Antenna parameter configuration error or offset
3	Antenna circuit protection	The antenna interface is configured output with electricity , which is inconsistent with the actual antenna
4	RF configuration failed	RF configuration failed

6.3.2. Standing-wave Ratio

When the device reading tag is unstable, you can check the standing wave

ratio of the antenna used to check whether the value is normal

The normal standing wave ratio of the antenna is close to 1.0. If it deviates too much from 1.0, it means that the antenna parameters are abnormal, which will lead to poor card reading performance. If this happens, it is possible that the antenna is aging or the antenna is too close to the metal surface. The following figure shows the VSWR detected when the device is not connected to an antenna:

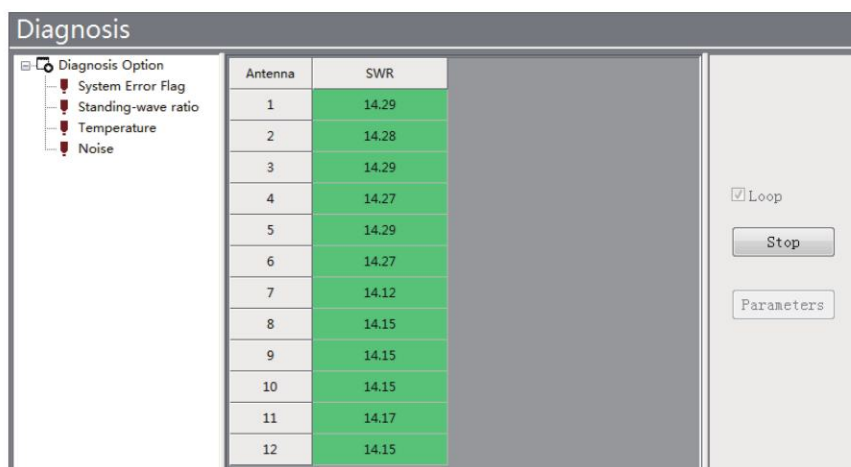


Figure 42 Standing-wave ratio

6.3.3. Temperature

If the temperature is too high when the device is running, it will affect the work of the device. When the reader performance is unstable, you can check the temperature of the device to see whether it is caused by excessive temperature or not.

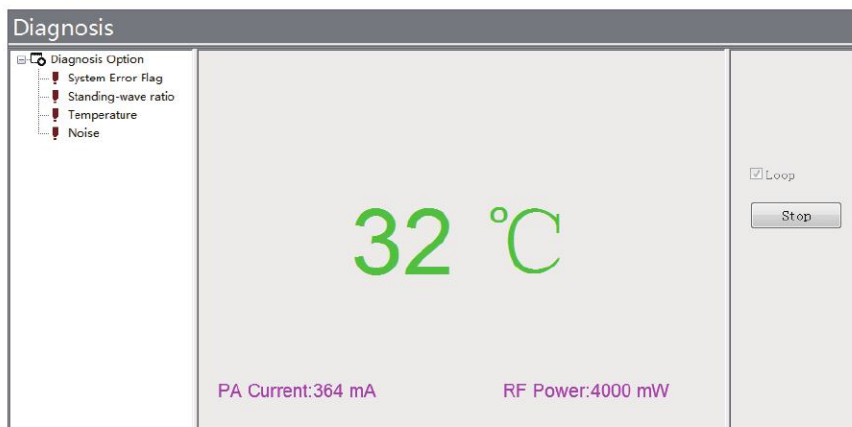


Figure 43 Temperature check

6.3.4. Noise

The "Noise" function can be used to detect noise on the spot, as shown below:

1. The noise waveform is normal, indicating that there is no interference signal or the interference signal is small in the environment;
2. When the noise waveform has a large square shape or a parabolic shape, it indicates that the environment has interference signals and the interference source needs to be eliminated.

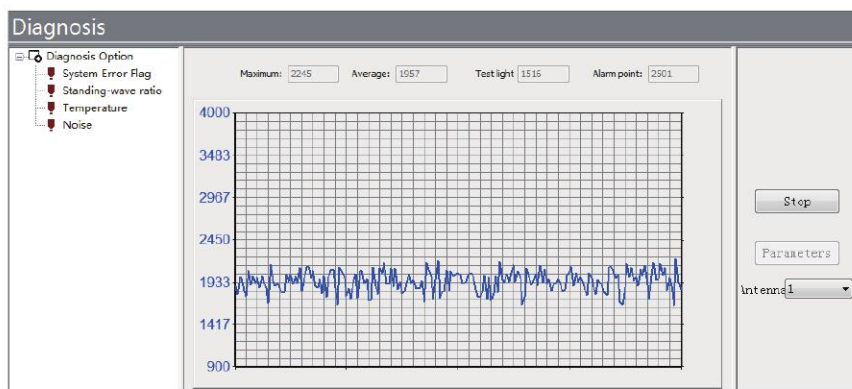


Figure 44 Noise check

➤ **Interference source analysis**

(1) Power adapter: laptop power supply, display power supply, LED light power supply, surveillance camera power supply, electric car charger, power supply of other electric equipment.

(2) Card reader with the same frequency band: access card reader, desktop card issuer.

(3) Motor equipment.

➤ **Troubleshooting**

Turn on the Noise Detection function, and switch off the power of the interference source one by one. At the same time, observe changes of the interface waveform, in order to determine the interference source.

7. Failure Analysis

1. The reader doesn't respond:

- The working indicator light is off → whether the input power supply voltage is correct; whether the external power adapter is working properly; Whether the power socket is firmly in contact; Whether the input voltage fluctuates too much.
- The work indicator light is on → check the connection of related cables. Check whether the network cable interface is loose when the network port is connected and check whether the network port connection is normal according to the status of the related indicator. In the case of serial port connection, check whether the interface has been tightened and whether there is a problem with the connection wire. The connection wire can be replaced for testing.
- In the state of network port communication → check whether the connected IP is correct; check whether the IP address conflicts.
- Serial port connection → Whether the port number of the serial port connected to the reader on the computer is the same as that of the reader.
- Check whether the antenna setting on the RTool configuration software is correct and the antenna connection is normal.

2. Read/writes tags incorrectly

- Check whether the corresponding configuration of the reader is correct (such as inventory parameter configuration, read/write parameter configuration).
- Whether the reader is compatible with the tag

- Check the RF power setting of the antenna, adjust the position of the tag, and check whether the tag is in the effective read-write range of the antenna.
- Whether there is electromagnetic interference between the reader and other devices; (refer to section 6.3.4 Noise detection for troubleshooting).
- Whether the tag needs access password and whether the password is correct.
- Check whether the tag is damaged, you can replace multiple tags for testing.

3. The range of reading and writing does not meet the requirements:

- It is possible to try to increase the antenna RF power, but you must ensure that the antenna parameters are normal, otherwise the reader temperature may be too high due to abnormal antenna parameters
- Check whether there are metal facilities around the reader.