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ISBC UHF SLR G1104
User Manual V1.0

Содержание

Chapter 1：Product Introduction

"ISBC UHF SLR G1104 user manual " gives a detailed introduction and description of ISBC UHF SLR G1104 reader's product characteristics, technical parameters, interface definition, installation and connection mode and software operation guidance, so as to facilitate users to quickly complete the construction of UHF RFID test and evaluation platform. If users have further requirements for software secondary development, they shall read related API instructions, EPC global Gen2 protocol and communication protocol in combination.

1.1 Product Features

ISBC UHF SLR G1104 is a thin, four-channel UHF RFID reader with an ultra-thin body design and excellent performance. It has excellent sensitivity, ultra-high channel isolation, excellent inventory capacity, and stable and reliable performance, which can fully meet the complex environment of warehousing, logistics, production and manufacturing, especially suitable for the application occasions with special requirements on the size and performance of the body.

Key features:

- Excellent reading sensitivity, up to -88dBm;
- High channel isolation, up to -40dB;
- Excellent reading distance, up to 12m with 6dBi antenna;
- Excellent anti-collision algorithm, the tag read rate is up to 400pcs/s;
- Global Gen2 platform, adapt to worldwide RFID application;
- Four RF output ports, which can save external device payment;
- With network port, RS232, RS485 (customizable), CAN (customizable), GPIO and other communication peripheral interfaces;
- High power output, up to 33dBm.

1.2 Technical Parameters

Table 1 Technical parameter

RFID Features	
RF protocol	EPC global Gen2(ISO 18000-6C)
Working frequency	China: 920-925MHz (SRRC) America: 902-928MHz (FCC part 15) Europe: 865-868MHz (ETSI EN 302 208) 840-960MHz: Can be customized according to needs and local status
Output power	5-33dBm adjustable, step1dB, accuracy ±1dB
Max output power	10W @33dBm
Reading rate	400 tag/s
Reading range	Up to 12m with 6dBi antenna (Reading range varies with types of tags)
Channel isolation	-40dB
Communication interface	TCP/IP (RJ45), RS232 (DB9 female), isolated RS485 (customizable), isolated CAN (customizable)
Antenna interface	4-channel SMA-K (outside screw inner hole) interface
GPIO interface	4 input, 4 output (compatible with 5 ~ 24V level),Output low level current Max.500mA
Tag RSSI	Support
Upgrade	Firmware online updates are supported
Development language	Support C#, JAVA
Power Supply	
Input Voltage	12～24VDC (recommend configured 12V power supply) or 802.3af POE (Power Over Ethernet) power supply
Physical Properties	
Outfit	Aluminium alloy
Size	216*155*25 mm
Weight	790g
Color	Deep gray
Working Ambient	
Working temperature	-25℃~+60℃
Storage temperature	-40℃~+85℃
Working humidity	10%~95%RH
Application	Indoor
Spare Parts	
Standard Configuration	Power adapter
Standard Configuration	Network cable (2m)

1.3 Product size

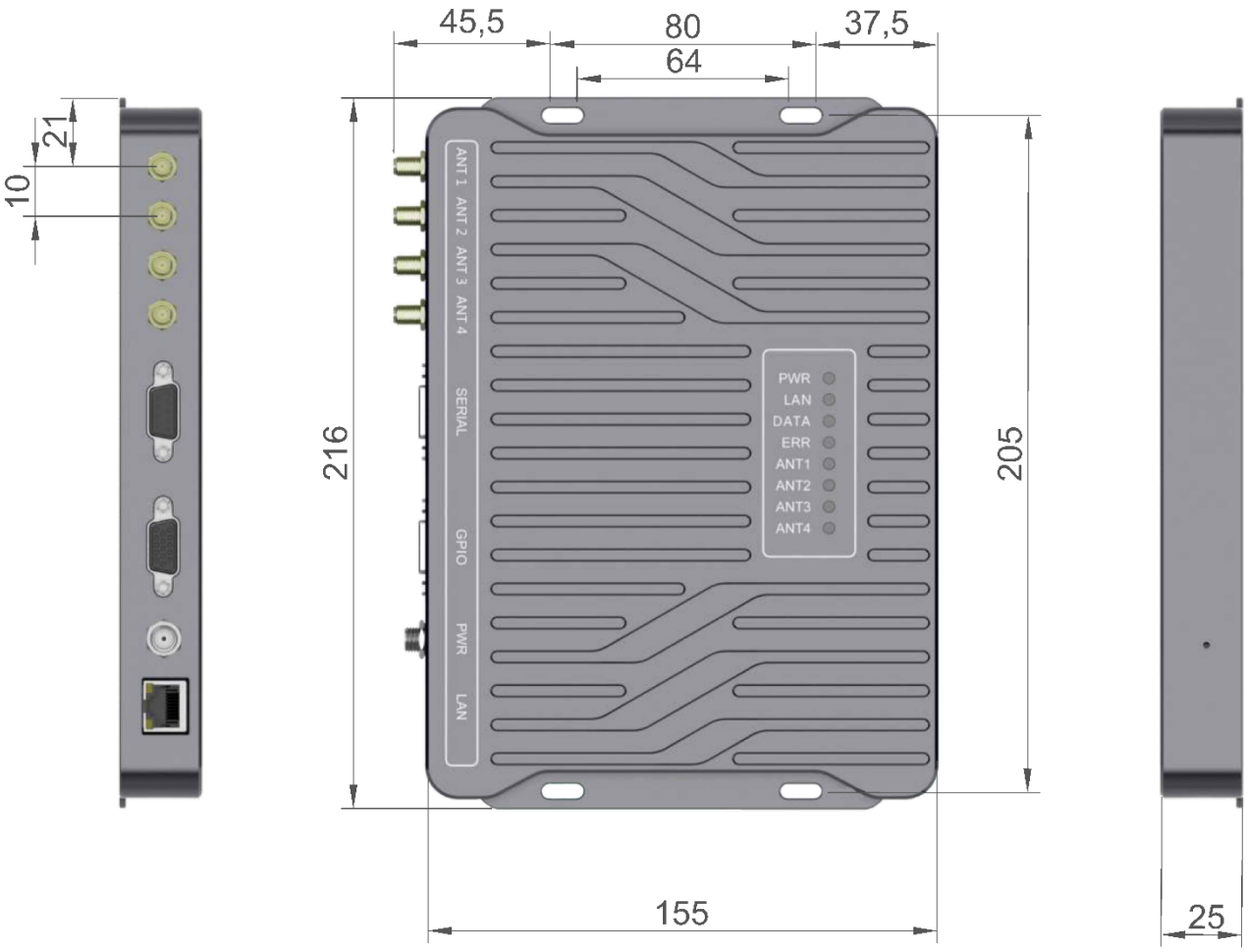

Figure 1 Dimension Figure (Unit: mm)

1.4 Product size

ISBC UHF SLR G1104 reader has abundant interface resources and can provide users with diversified communication solutions:

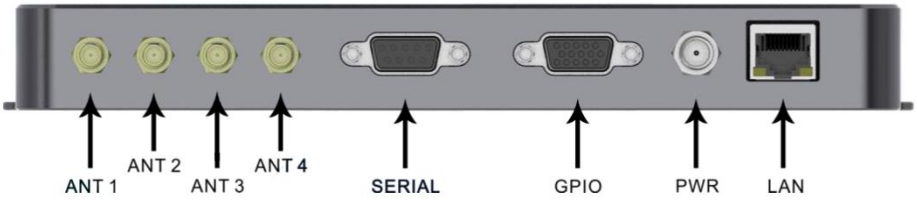

Figure 2 Product interface diagram

- ANT1~ANT4: 4 channel SMA-K (outside screw inner hole) connector;

- SERIAL: Serial interface, which contains RS232 (DB9 female), isolated RS485 (customizable), isolated CAN (customizable);
- GPIO: 4 input, 4 output (compatible with 5 ~ 24V level) photoelectric isolation;
- PWR: Power interface, 12 ~ 24VDC wide voltage dc power supply, recommend users to use 12V original power adapter power supply;
- LAN : TCP/IP network interface, network cable direct connection can meet the user POE power demand;

1.4.1 Power interface

Device dc power input interface PWR. This interface is 5.5*2.5 DC headers. Power supply diagram of power interface is as follows:

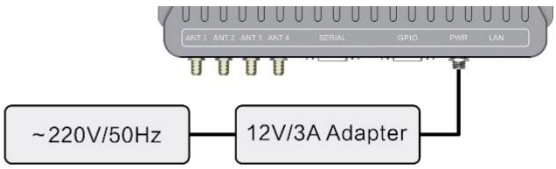

Figure 3 Schematic diagram of power supply

This power supply port is the main dc power input interface of the equipment. In addition to the power supply port, the equipment supports power supply from 802.3af POE network port and power supply can be realized through direct connection of network cable.

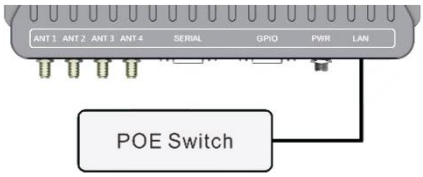

Figure 4 Schematic diagram of power supply to equipment through POE

1.4.2 Serial interface

The serial interface is DB9 female, as shown in the interface diagram below.

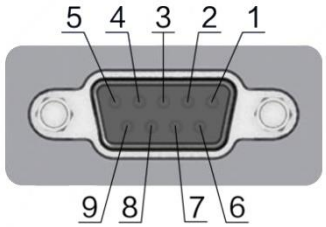

Figure 5 Serial interface diagram

Connection to the comport is carried out with the parameters:

Speed (baud)	115200
Data bits	8
Stop bits	1
Parity	None
Flow control	None

This serial port provides a variety of communication methods. Among them, RS232 is the default interface. If users need to use RS485 or CAN to communicate, they CAN propose customized requirements according to the actual situation. The specific pin is defined as follows:

Table 2 DB9 Serial interface pin definition

DB9 Female pin definition	
PIN Number	**Interface function: isolated RS232，isolated RS485 communication (customizable), CAN communication (customizable)**
PIN 1	485A (customizable)
PIN 2	RS232TXD
PIN 3	RS232RXD
PIN 4	485B(customizable)
PIN 5	GND
PIN 6	RFU (Reserved for Future Use)
PIN 7	RFU (Reserved for Future Use)

PIN 8	CANL (customizable)
PIN 9	CANH (customizable)

1.4.3 TCP/IP Network

The reader port of ISBC UHF SLR G1104 supports TCP/IP communication, and the interface form adopts the air port of RJ-45, as shown in the interface diagram below:

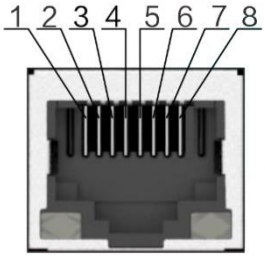

Figure 6 TCP/IP Interface diagram

TCP/IP port definition is shown in the following table:

Table 3 TCP/IP network definition

PIN Number	**Interface function: TCP/IP Network communications**
PIN 1	TX+
PIN 2	TX-
PIN 3	RX+
PIN 4	POE V+
PIN 5	POE V+
PIN 6	RX-
PIN 7	POE V-
PIN 8	POE V-

1.4.4 GPIO Connector

GPIO connector adopts DB15 female interface to output:

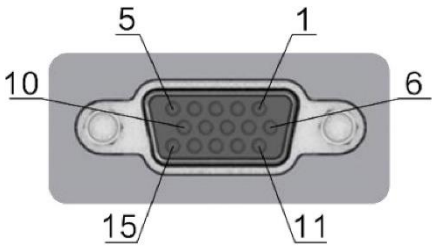

Figure 7 GPIO Connector diagram

The GPIO connector has 4 input channels and 4 output channels, and the interface definition is shown in the following table:

Table 4 GPIO PIN definition

GPIO PIN definition		
PIN Number	**Definition**	**Function**
PIN 1 ~ PIN 4	GPO1 ~ GPO4	Universal logic output port, compatible with 5 ~ 24V level, low level current tolerance Max 500mA, high level output without this driving ability
PIN 5	OPT VCC	Photoelectric isolated power supply (external power supply) input, power supply range 5 ~ 24V
PIN 6	PWR OUT	Auxiliary power supply output end, output voltage ≈PWR voltage -0.5v, can output the maximum power supply of 18W (determined by the power adapter), the maximum output current of 750mA
PIN 10	OPT GND	Optoelectronic GND (external power supply)
PIN 11 ~ PIN 14	GPI1 ~ GPI4	Universal logic input port, compatible with 5 ~ 24V level
PIN 15	GND	Device GND

PIN 5 and PIN 10 are external power input terminals, which can supply power to GPIO and the peripherals (alarms) connected to GPIO.

PIN6 and PIN 15 (PWR OUT) is the output end of auxiliary power, which is the internal output power of the device. When there is no external power supply to GPIO power supply port (PIN 5 and PIN 10), power supply can be provided to GPIO through PWR OUT, that is, PIN6, PIN 15 and PIN 5 and PIN 10 are connected. It should be noted that when GPIO is powered by external power supply, it has photoelectric isolation function. When GPIO is powered by PWR OUT of PIN6 and PIN 15, the photoelectric isolation function will not work.

The principle of GPI and GPO circuits is as follows.

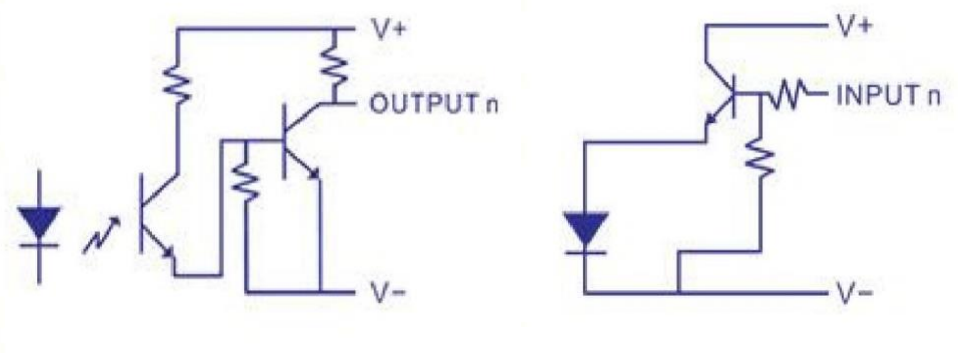

Figure 8 GPIO circuits

1.4.5 Status indicator

Figure 9 Diagram of status indicator

Table 5 Definition of status indicator

Definition of status indicator	
Indicator light	**State definition**
PWR	Power indication: the red light is always on when the power supply is normal
LAN	The network port is connected and always on
DATA	Data flickers
ERR	Error indication: if the equipment is abnormal, the red light will always be on
ANT1-ANT4	Antenna indicator: displays the current open antenna port number, blue

1.4.6 Buzzer indicator

Table 6 Buzzer definition

Buzzer definition	
Warning tone	**Directive function**
Repeatedly	Equipment starts normally
1 short (loud)	Network malfunction
1 long 1 short (two loud)	RF module fault
1 long, 2 short (three rings)	Both the network and RF modules fail

1.4.7 Reset button

There is a reset hole in the back of the device, as shown in the figure below. Press the reset button in the reset hole and the product can be restarted.

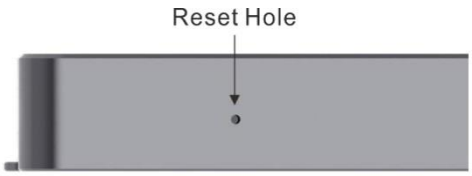

Figure 10 Reset hole diagram

Chapter 2：Equipment installations and hardware connection

2.1 Installation preparation

Before setting up the test platform, the following equipment and materials should be prepared:

- A set of ISBC UHF SLR G1104 reader;
- A set of standard 12V power adapter;
- A set of standard communication cable (network cable);
- 1 ~ 4 sets of UHF antenna (4-channel SMA-K (outside screw inner hole) connector);
- A number of EPC C1G2/ISO 18000-6C UHF tags;
- A set of PC with WINXP or above operating system.

Before connecting the equipment, install the equipment in a solid and reliable installation position on site.

As shown in the figure below:

Figure 11 Installation diagram

2.2 Hardware connection

Recommended hardware connection sequence: Antenna feeder connection → communication cable connection → power adapter connection.

2.2.1 Antenna feeder connection

Fix the antenna to the specified position and connect the feeder cable to the reader to specify the SMA antenna interface.

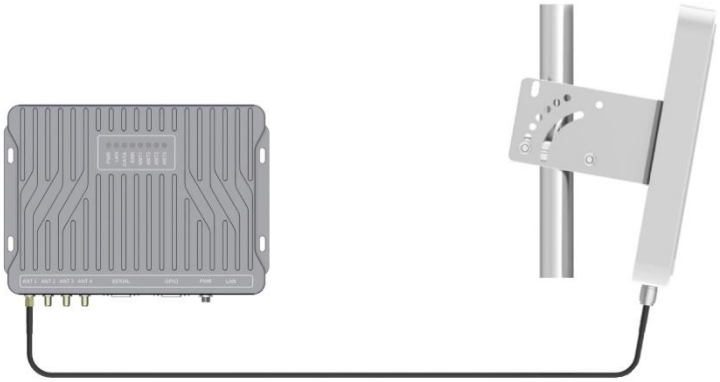

Figure 12 Schematic diagram of antenna feeder connection

2.2.2 Communication cable connection

According to different communication requirements, users can choose DB9 serial port transfer cable (optional) to establish COM port communication with host client software, or establish TCP/IP connection with host client through network port transfer (standard).

2.2.3 Power adapter connection

After the above connection is confirmed to be correct, power supply shall be connected to the device. After the device starts normally, relevant tests can be carried out by connecting the device with Demo software. The system framework is shown in the figure below:

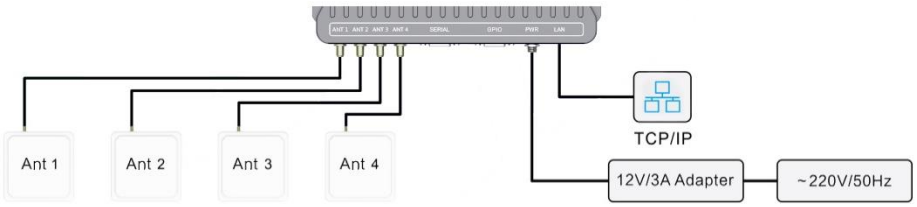

Figure 12 System diagram

Chapter 3：Client Demo Software Description

Through PC client Demo software, the user can connect the serial port or TCP/IP of the device, and the user can choose any kind of communication port to connect the device according to the actual situation.

3.1 Device Connection

Open the Demo software and click the icon shown below:

Figure 13 Demo software icon

The software interface is opened as shown in the figure below, where the left side shows the function menu bar, which includes: device connection, tag inventory, tag operate, tag memory, device setting, protocol setting and version information.

Connection to the comport is carried out with the parameters:

Speed (baud)	115200
Data bits	8
Stop bits	1
Parity	None
Flow control	None

The right function window includes: device connection and ethernet tools. Device connection supports serial connection or network connection; When using serial port for connection, select the correct serial port number and click the serial port connection button; When using the network port to connect, you need to fill in the correct device IP address and port number before clicking the network port to connect (note: the network port connection timeout is 2s).

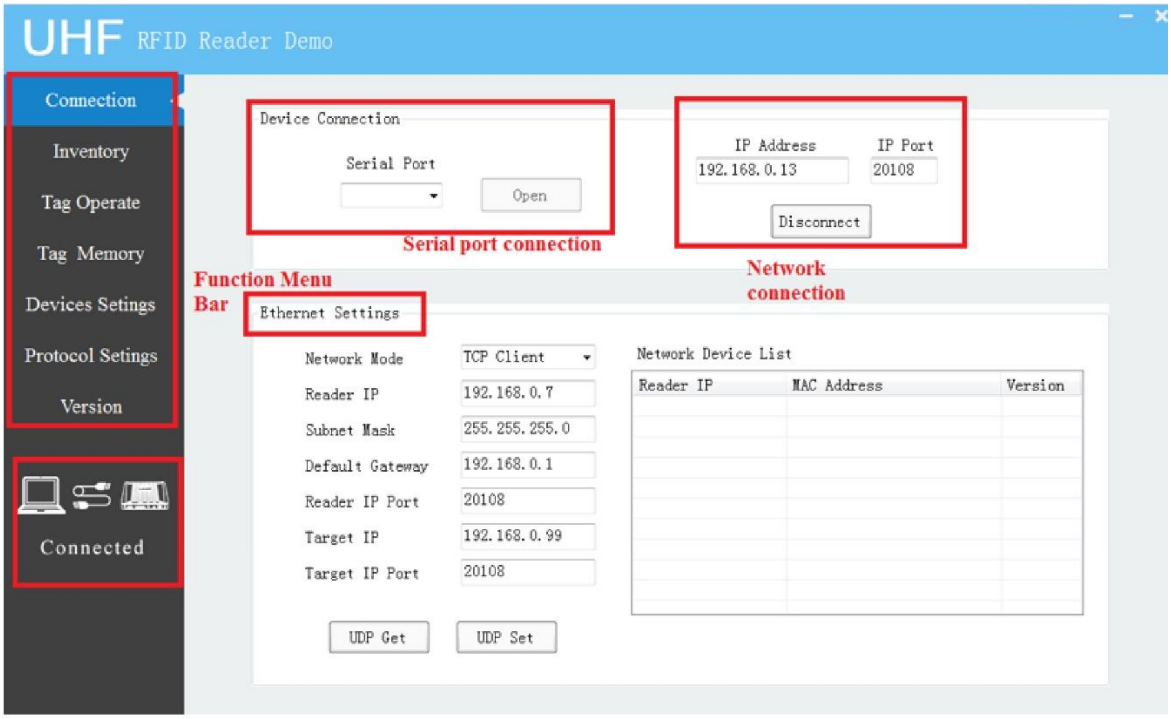

Figure 14 Interface of connection

The network tool is used to query the device connection status of the PC access network segment and set the device network information. After obtaining the device information through UDP, the information can be modified. As shown in the figure below, click “UDP Get”, the list of network devices and the network setting information on the left will be updated, select the devices in the list of network devices to be modified, fill in or select the network information, click “UDP Set” to update the network settings.

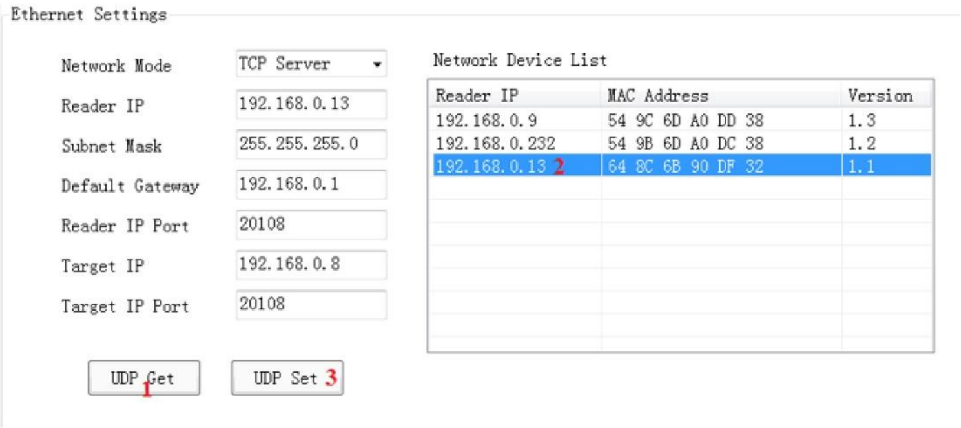

Figure 15 Ethernet setting diagram

When using the network connection, connect the network cable well, and fill in the IP address consistent with the IP address of the reader (Figure 3-1-4 IP), then the network

connection can be carried out. After successful connection, "Connected" will be displayed at the bottom of the function information bar.

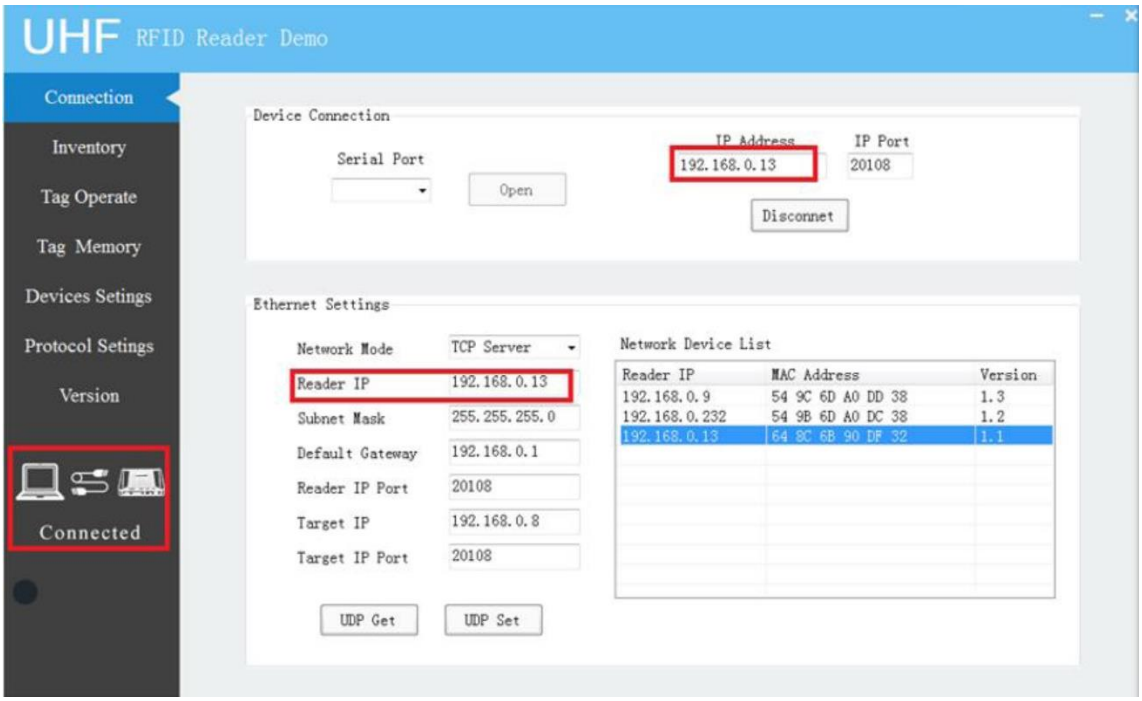

Figure 16 IP address Settings for network connections

3.2 Tag Inventory

When the device connection is completed, the tag inventory page will be unlocked. Click to enter the tag inventory. The software display interface is as follows:

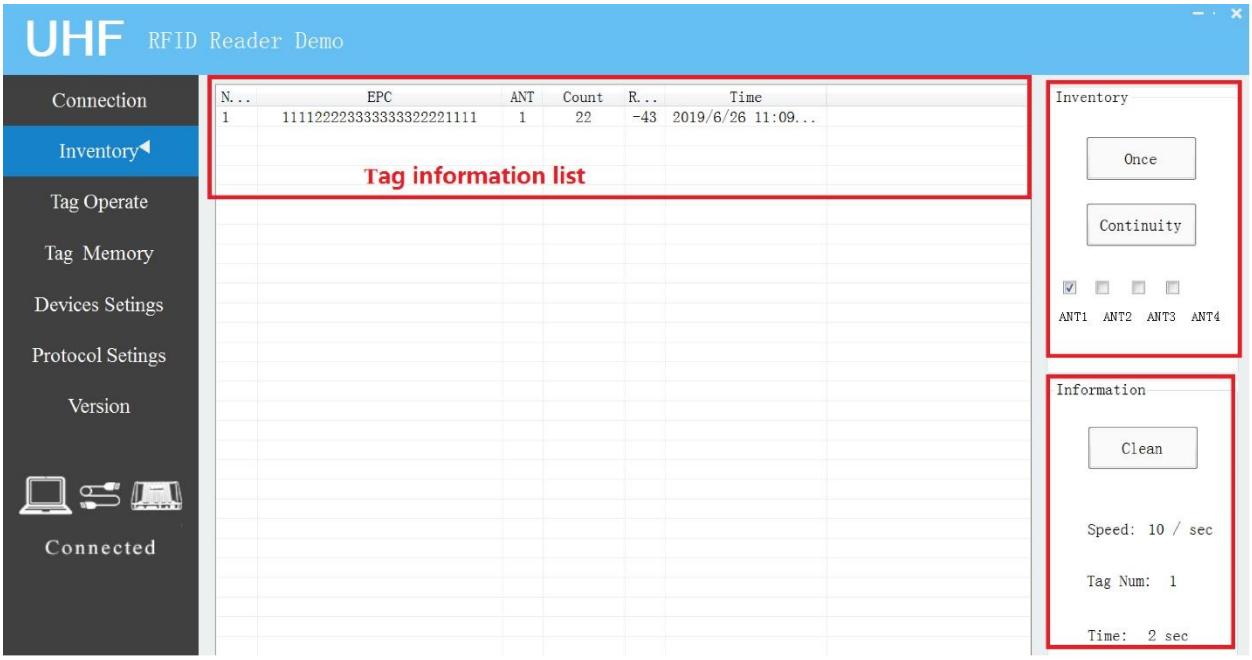

Figure 17 Interface for tag inventory

Tag inventory interface function window includes: tag information list, inventory and information statistics. For multi-channel equipment, the inventory antenna can be selected according to need. Information summary section includes: clean (clear tag information list), speed (continuous inventory speed), number of tags (number of tags in the information list) and time (inventory time).

After inventory tag, the information will be displayed in the information list, including Num. (tag sorting number), EPC, ANT (only multi-channel reader has this information), ANT information is intended to display the antenna number of the tag read. If more than one antennas read the same tag, record the largest RSSI antenna number. Count (the number of times the tag be counted), RSSI (the maximum RSSI value returned by the tag) and Time (the time of the last count to the tag).You can select the tag (click the corresponding line with the left mouse button, note: in the case of continuous inventory, you need to stop continuous inventory to carry out this step), and then switch from the function menu bar to tag operation or tag memory to realize the related operation of the tag; or when the tag is selected , click the right mouse button to enter the function menu.

Note: in addition to tag operation and tag memory, the right mouse button has added a function of exporting Excel files, which can transfer all information of the current list into Excel files.

3.3 Tag Operate

After selecting the tags to be operated on the tag inventory interface, enter the tag operation interface, in which users can read, write, block write, block erase, lock and kill tags. After entering this function, the interface as shown in the figure below can be seen.

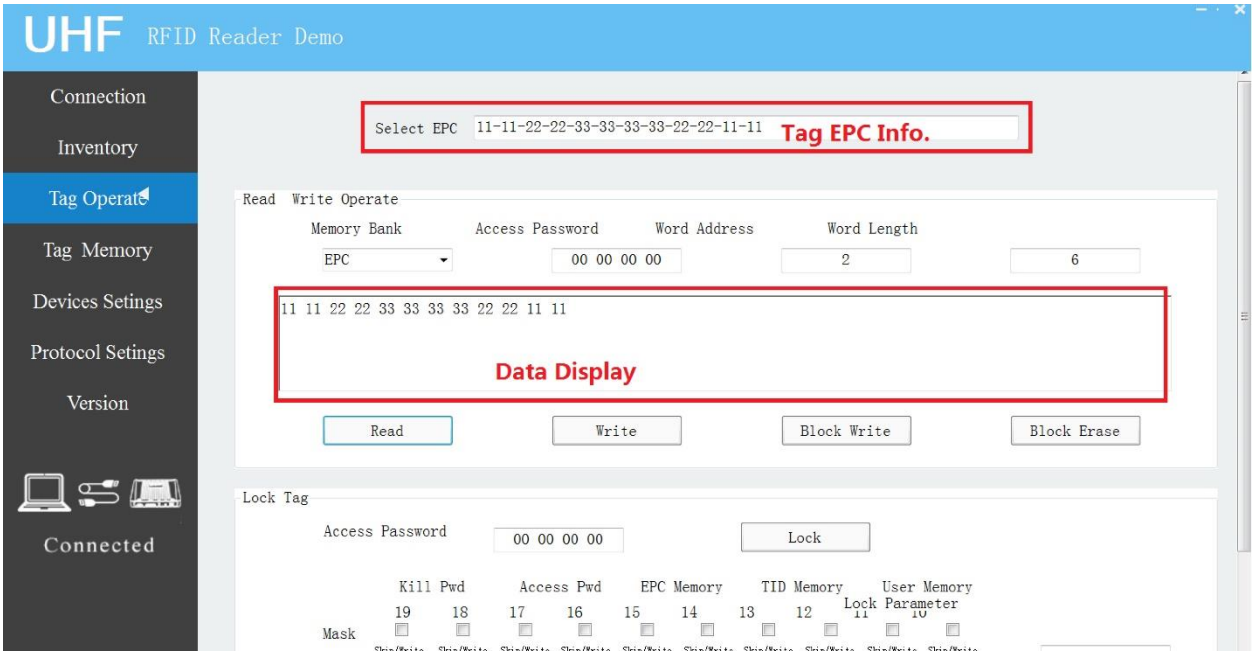

Figure 18 Tag operate interface

The read-write operate of the reader is shown in the figure below:

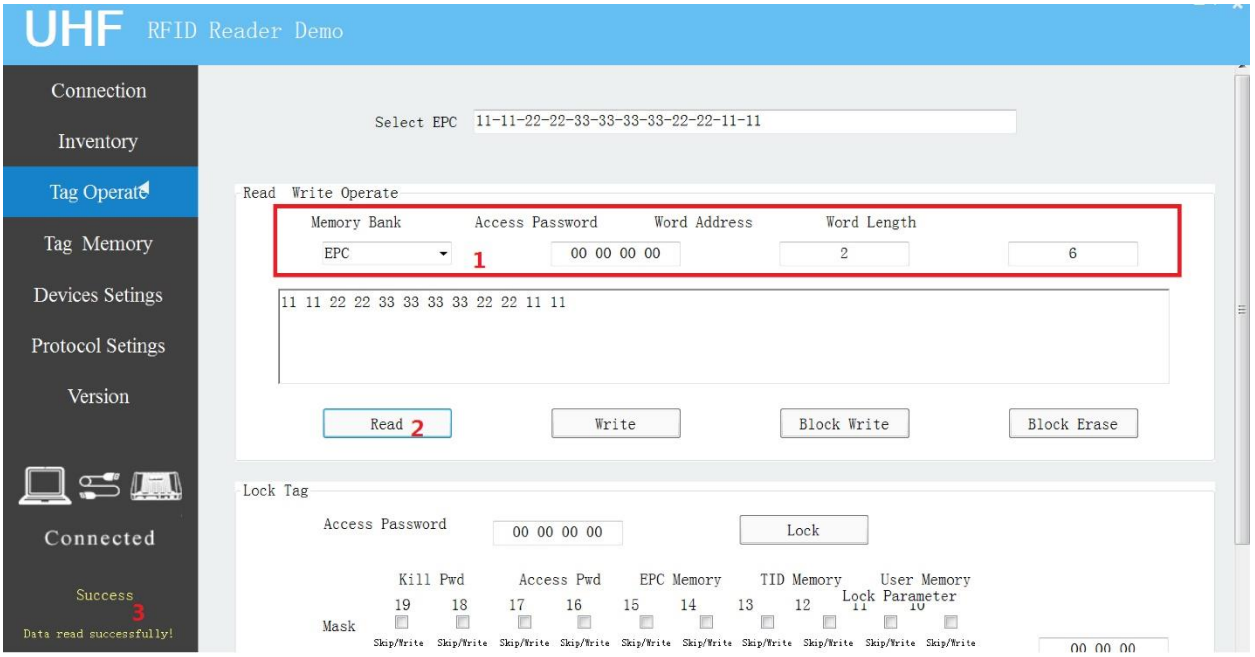

Figure 19 Tag operate interface 2

In the read-write operation bar, tag reading, writing, block writing, block erase operation can be realized. Before performing these operations, you should select or fill in the information such as storage area, access password, word address, and word length. Note: 1 word = 2 bytes. The access password is expressed as a hexadecimal string. Spaces or space characters in between is to increase readability. The above figure is an operation example of

tag reading content. 1. Complete parameter setting of read and write operation; 2. Click read; 3. Viewing the operation result schematic area (successful, successful data reading), and at the same time, you can see the corresponding data in the data display window.

Lock tag interface is as shown in the figure below, the user can operate according to the steps: 1. Fill out the access password first. 2. Click the content that needs to be operated (Note: this figure takes locking EPC memory as an example, the parameters set in line with the ISO 18000-6C protocol, locking parameter is automatically generated according to check the situation, the user cannot modify, just for reference). 3, click on the lock, the results can be seen in the operating results indicated area.

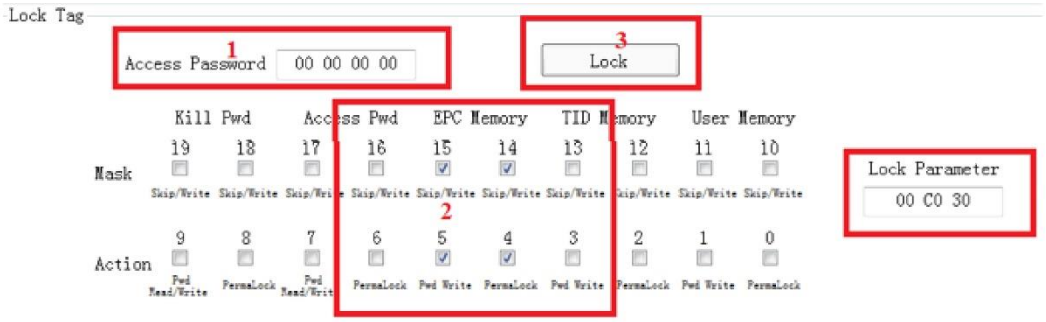

Figure 20 Look tag interface

The killing tag interface is shown in the figure below. Follow this step: 1. Fill in the kill password (Note: before execution, the kill password of the tag should be changed to non-0, otherwise this command is invalid).

Note: once the tag is killed, it cannot be resurrected. Please be careful!

3.4 Tag Memory

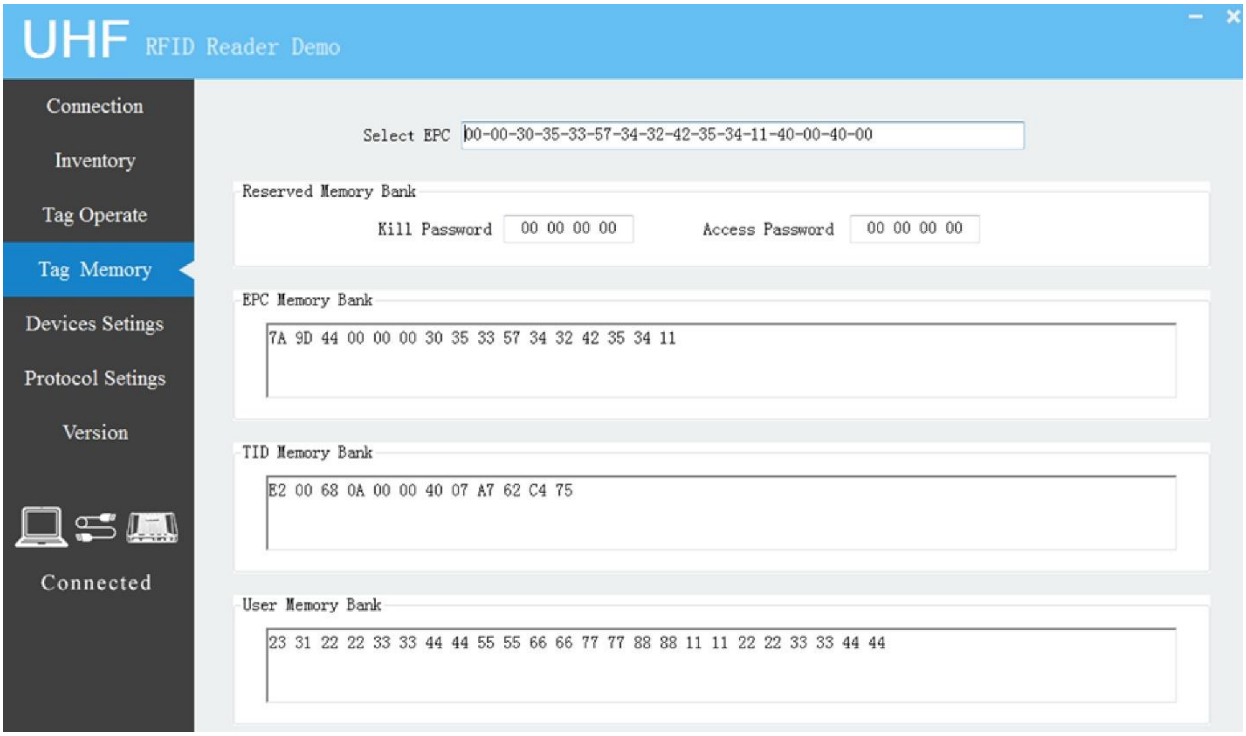

Figure 21 Tag memory interface

After selecting the tags that need to be operated in the tag inventory interface, enter the tag memory interface, and you can view the related data contents of kill password, access password, EPC memory bank, TID memory bank and User memory bank. If the memory reading fails, the display content will be empty.

3.5 Device Settings

The device setting interface can realize the acquisition and setting of reader-related parameters, including: power setting, zone setting, frequency hop setting, carrier setting, temperature information, GPIO setting, buzzer setting, GPIO trigger setting, heartbeat frame setting, save setting and firmware update.

Power Setting: The range is 5-33dBm; click "Get" or fill in the power value required, and click "Set". For multi-antenna devices, the read and write power of antenna1~N needs to be set separately.

Regional Settings: Click "Get" and the default is "Europe 1". If you are not a user of this area, you can select the desired area from the drop-down menu. After selecting the area, click "Set".

Frequency Hop Setting: Click "Get" and the corresponding frequency hop point will appear; if you need to modify the frequency point, it is suggested to modify the frequency point based on the content format after clicking get, and then click "Set" to realize relevant functions.

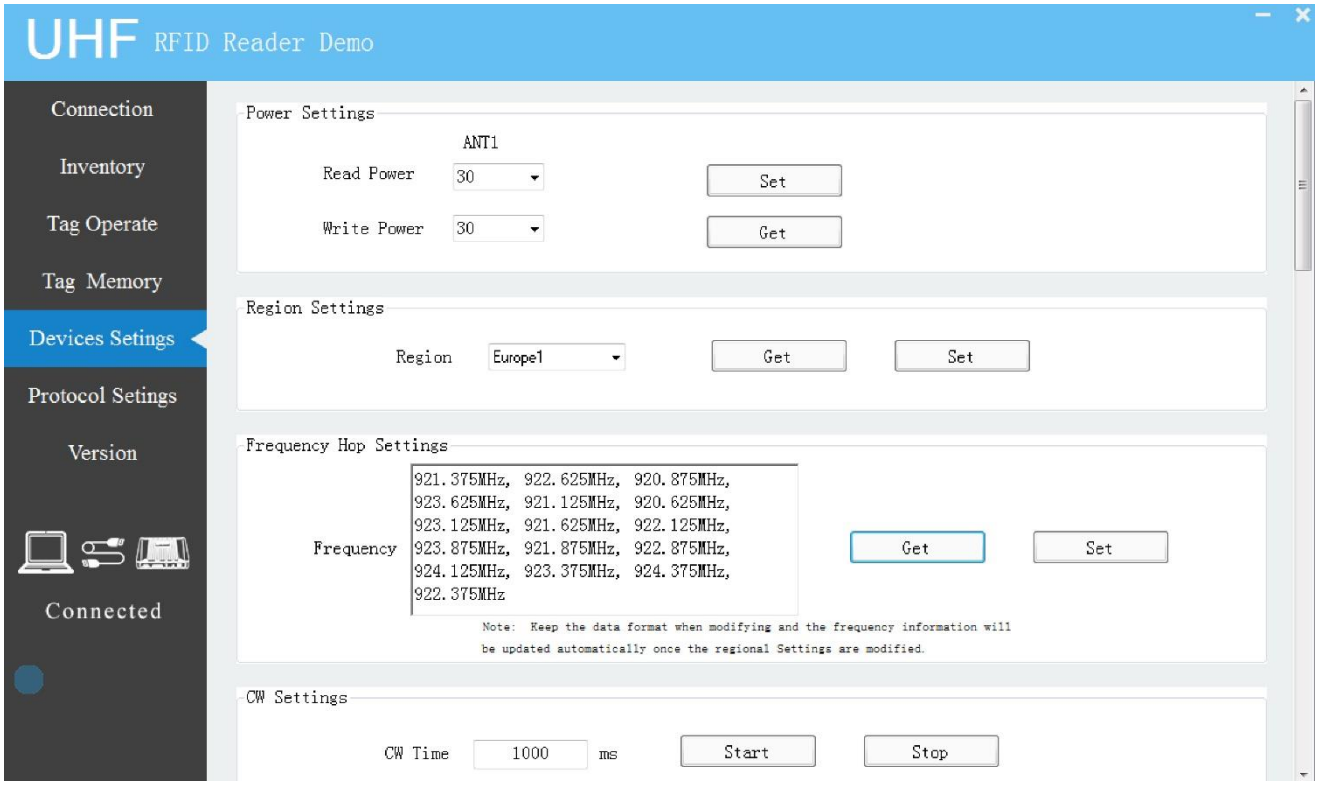

Figure 22 Device setting interface 1

Carrier Setting: Sets the time of transmitting carrier in millisecond. When the time is set to 0, it means infinite time.

Temperature Acquisition: Obtain highest temperature point of the device.

GPIO Settings: The settings consist of two parts: GPI states and GPO states.

The GPI state is determined by the system and can only be read, not be set.

GPO status can be set by the user as needed. Each GPO has three states, high, low, and reverse. The low level state is the GPO on state.

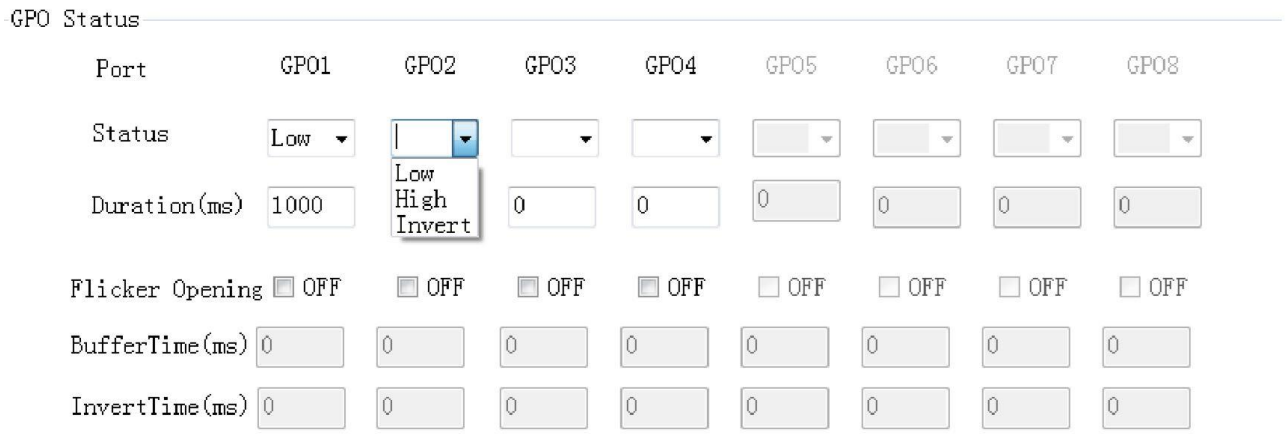

Figure 23 GPO status

The duration can be set arbitrarily, with the default 0ms representing unlimited time. GPO states can be roughly divided into the following six categories:

1. Turn off flicker and set the GPO to low, the status is as follows.

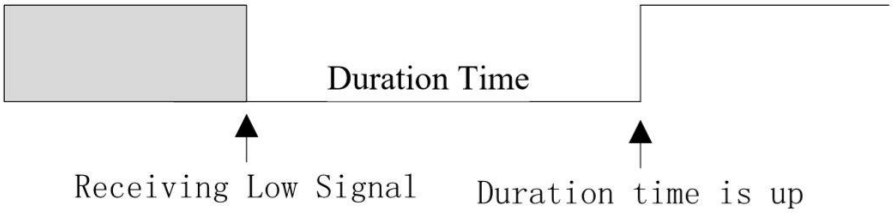

Figure 24 Turn off flicker and set GPO to low state diagram

Example: When the flicker is turned off, the GPO state is set to low and the duration is set to 1000ms, it means that the GPO signal will continue to output the low level of 1000ms after receiving the low level setting. After 1000ms, the GPO level turns to high until the next action.

2. Turn off flicker and set the GPO to high, the status is as follows.

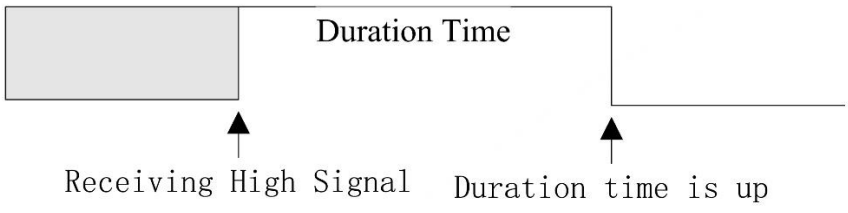

Figure 25 Turn off flicker and set GPO to high state diagram

Example: When the flicker is turned off, the GPO is set to high level with a duration of 1000ms, it means that the GPO signal will continue to output a high level of 1000ms after receiving the high level setting. After 1000ms, the GPO level turns to low until the next action.

3. Turn off flicker and set GPO to reverse, the status is as follows.

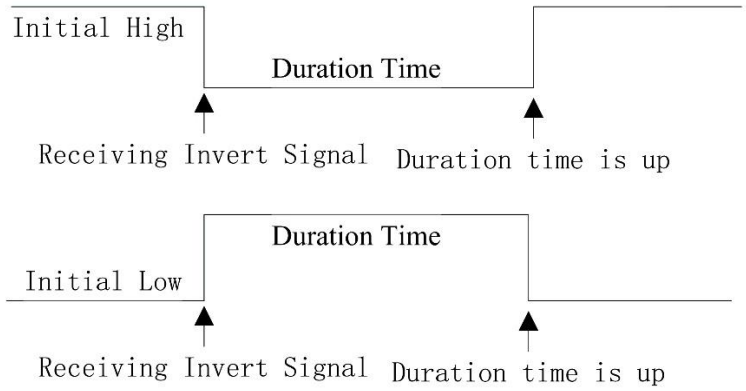

Figure 26 Turn off flicker and set the GPO to invert state diagram

Example: Turn off the flicker, the initial state of GPO is normally high, and when the GPO is set to reverse state with a duration of 1000ms, it means that after receiving the reverse setting, the GPO signal will continuously output the low level of 1000ms (as opposed to the initial level state). After 1000ms, the GPO level returns to the high level until the next action. If the GPO starts low, the action is reversed.

4. Turn on flicker and set GPO to low, the status is as follows.

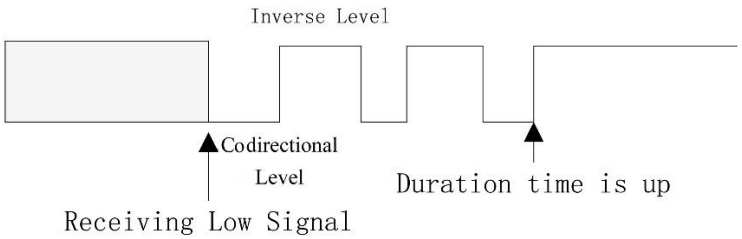

Figure 27 With flicker on and GPO set to low state diagram

Example: When the flicker is turned on, the state of GPO is set to low level, lasting 1000ms, the time of the co directional level (in the same direction with the set level) is 200ms, and the time of the inverse level (in the opposite direction with the set level) is 200ms. When

the action of GPO setting is received, the GPO signal will maintain 200ms at low level (co directional level duration) and 200ms at high level (inverse level duration), so repetitively. At the end of 1000ms, it returns to high level until the next action.

5. Turn on flicker and set GPO to high, the status is as follows.

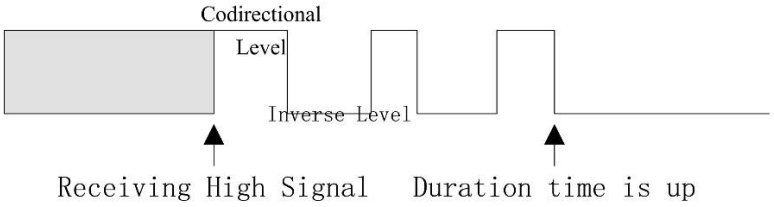

Figure 28 With flicker on and GPO set to high state diagram

Example: When flicker is turned on, the GPO state is set to high level, lasting 1000ms, the time of the co-directional level (in the same direction with the set level) is 200 ms, and the time of the inverse level (in the opposite direction with the set level) is 200 ms. When the action of GPO setting is received, the GPO signal will maintain 200ms at high level (co directional level duration), then converted to a low level for 200ms (inverse level duration), so repetitively. At the end of 1000ms, the low level is returned to low level until the next action.

6. With flicker on and GPO set to reverse, the status is as follows.

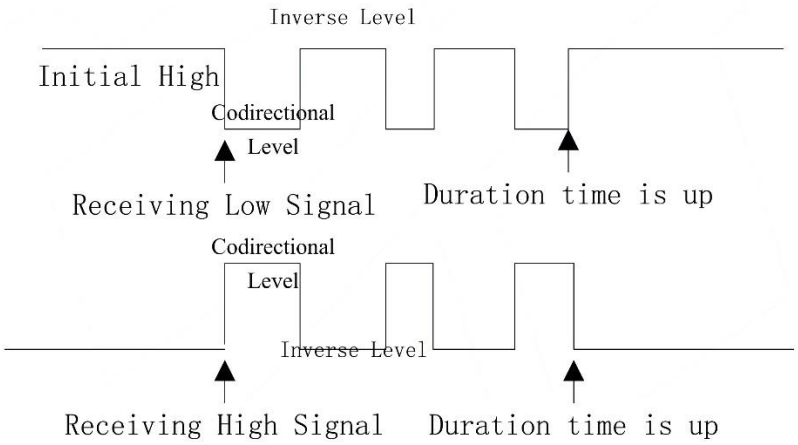

Figure 29 With flicker on and the GPO set to invert state diagram

Example: When flicker is turned on, the initial state of the GPO is high, lasting 1000ms and the duration of the co-directional level is 200ms, the duration of the inverse level is 200ms.When the GPO setting action is received, the GPO signal is maintained at a low level

for 200ms (co-directional level duration), then converted to a high level for 200ms (inverse level duration), so repetitively. At the end of 1000ms, the low level is returned until the next action. If the initial state is low, the action is reversed.

Buzzer Setting: When the buzzer is set to open, there are two buzzer response modes, one is the buzzer response, that is, click the setting once, and the buzzer will ring once. The other mode is the tag response mode, that is, the buzzer will ring when encounter tag inventory. The maintenance time of specific sound is set during the sound time.

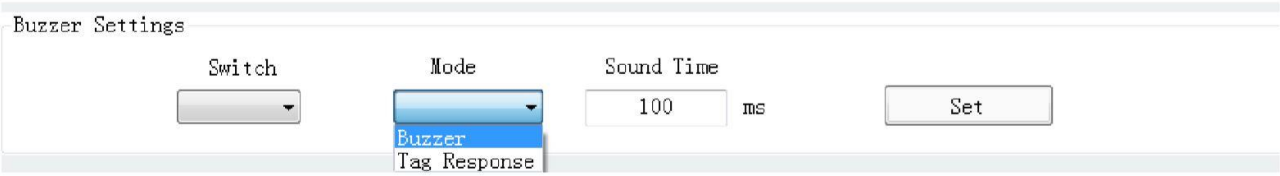

Figure 30 Setting diagram of buzzer

GPIO Trigger Settings: Trigger port and trigger mode can be selected. The trigger port is selected according to the number of GPIOs. Taking four GPIO ports as examples, trigger ports can be selected from GPI1 to GPI4.There are four trigger modes: rising edge trigger, falling edge trigger, any edge trigger and close. Selecting close does not trigger.

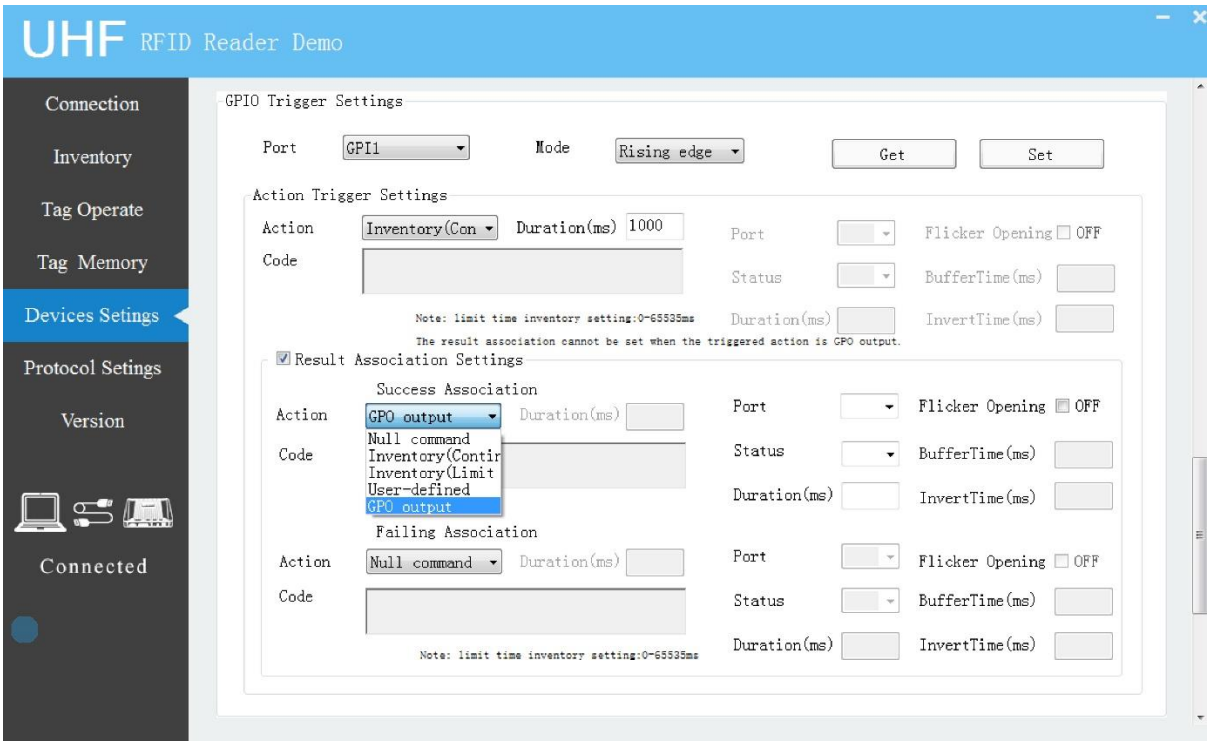

Figure 31 GPIO trigger setting diagram

There are five options for action trigger setting, which are: null command, inventory (continuity), inventory (limit time), user-defined and GPO output. Among them, null command means that there is no action after triggering; inventory (continuity), inventory (limit time) means that there will be corresponding operation after triggering; if user chooses user-defined, he can define the action after triggering by himself, noting that the action code of custom instruction needs to correspond to the corresponding instruction code of communication protocol provided by us; when choosing GPO output, there is no need for the following association settings, but the GPO setting on the right side is unlocked and can be set accordingly.

Result correlation refers to what is the next associated action after the result of the triggered action is produced. There are two kinds of association settings, success association and failure association, which refer to the association triggering actions that trigger success and failure respectively. The specific settings and options are consistent with the previous trigger action.

Heartbeat Frame Setting: Heartbeat frame is a reminder of whether the network is well connected. When the corresponding heartbeat frame is set and the heartbeat frame continues to return, the network connection is normal; otherwise, the network connection problem is indicated. There are two settings for heartbeat frame, regular return and idle return, which can be selected by the user as needed.

Figure 32 Heartbeat frame setting diagram

Save Settings: Click "Save Settings" to save the relevant parameters set before.

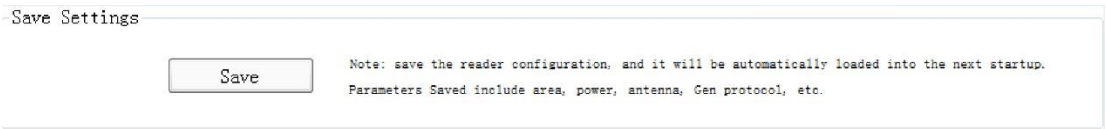

Figure 33 Save the Settings diagram

Firmware Upgrade: Users can upgrade the firmware by importing the corresponding files.

3.6 Protocol Settings

The protocol setting interface shows ISO18000-6C Gen2 protocol parameter setting of the reader. The interface is as follows:

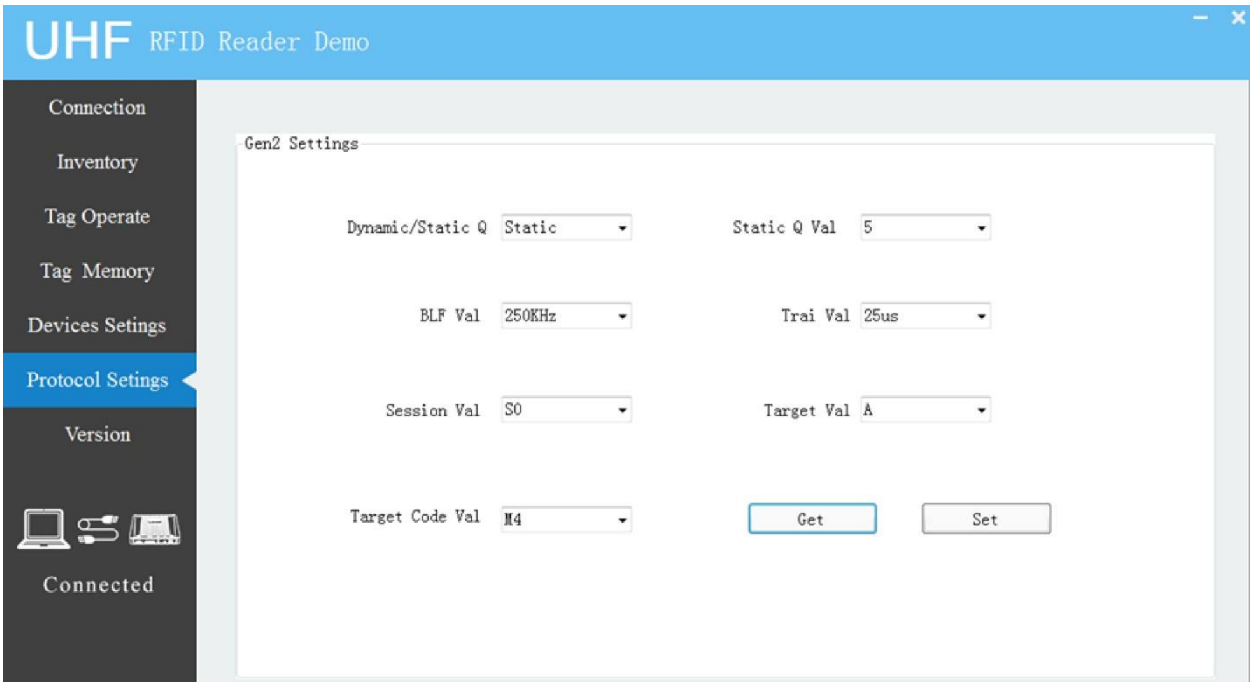

Figure 34 Protocol setting interface

It is recommended to use the factory default settings of the reader. If it is necessary to set the protocol parameters, it is recommended to follow the following steps: 1. Click "Get" and the contents of the parameter area will be updated; 2. Results can be viewed in the action results area.

Figure 35 Protocol modification example

3.7 Version Information

Following information can be seen: software version, module version and reader version:

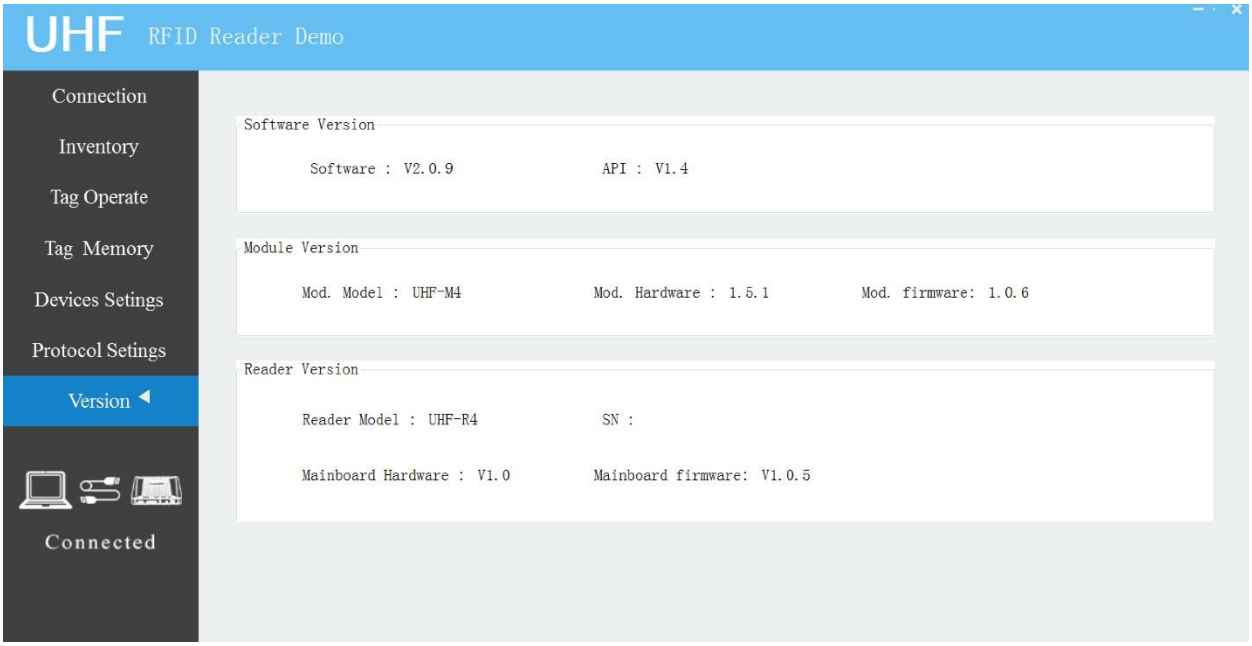

Figure 36 Version information interface

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