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SYS-IoT UHF RFID INTEGRATED READER

Demo User's Manual

V1.2.0

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CONTENTS

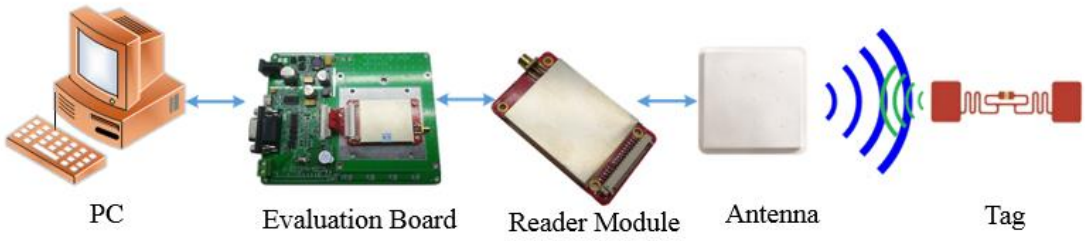
1. Overview

This document is the DEMO software instruction for the MU920X reader module on a PC. Users refer to the DEMO software instructions to design their own software system.

SYSIOT UHF READERreader module, shorten as “reader module”, is a high performance UHF RFID Reader Module, which is designed with lower dissipation, high integrated RFID chip design, cost effective and small size. It can be widely applied in many RFID application systems such as logistics, commodity inventory, cargo sorting, vehicle management, personnel management, asset management, medical systems, anti-counterfeiting systems, production process control and various temperature measurement monitoring systems and other applications.

2. Hardware Preparation

Firstly, the user should carefully read the "MU920x Reader Module Hardware Interface Design Guide V1.1" and design the module’s operation circuit according to the design requirements and connect the module as below picture:



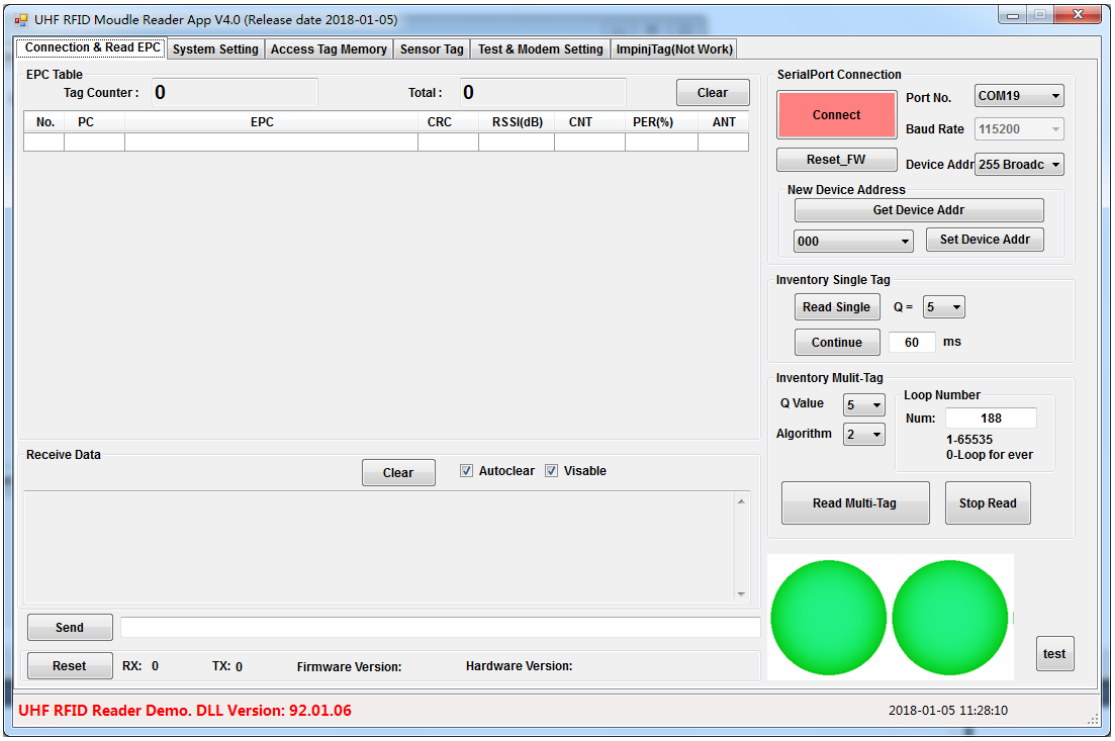
According to the above picture, connecting the hardware devices and placing the label. (please note don’t place RFID tag directly on the surface of the antenna or on the surface of the metal material.)

3. Software Demonstration

3.1 Run the Demo

Running the reader DEMO (SDK\Module Reader Demo \ModuleReaderV3.9.exe) on a PC,
The initial interface for software startup is shown in picture -1
The DEMO software provides the following types of functional modules:

1) "Connection & Read EPC": connecting module, setting and querying device address, and single-tag and multi-tag reading EPC data etc;
2) "System Setting": system setting, setting the operation of the reader GPIO port control, RF output power, frequency and antenna parameters;
3) "Access Tag Memory": access to the tag's memory, including the function of reading tags, writing tags, locking tags, and destroying tags;
4) "Sensor Tag": sensor tag function, demonstration function for rfid tag operation with temperature and moisture sensor;
5) "Test & Modem Setting": environmental test and modulation chip settings; a general evaluation test of the electromagnetic environment monitoring of the reader and the adjustment of the module modulation chip parameters.
Please note, in general, the parameters of Module modulation chip are no need to set it by user, and it is set by professional engineers according to the environmental conditions on site.



Picture 1

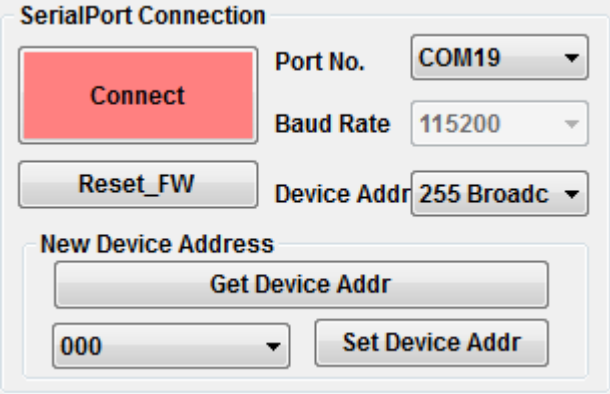
The software interface is shown in picture 1 above; different areas have differentfunctions.
1) Function switch: Different DEMO functions can be selected by clicking the switch property page;
2) Communication connection: Connecting the reader module for communication by selecting the serial port and device address;
3) Tag data: The area showing the tag data read by the module, including EPC data (EPC+PC) and CRC value of the tag, signal strength RSSI of the tag reply, amount of tags and antenna port of reading the tag;
4) Communication frame data: Recording and displaying the command frame and response frame data packet of the entire communication process of DEMO software and reader module, which can facilitate users to know the communication frame process;
5) Information display: Notification of the operation process of DEMO software;

6) Single tag reading:Demonstrating how the reader module can read multiple tags at one time and display the process in the "tag data" area;
7) Multiple tag reading: Demonstrating how the reader module can continuously read multiple tags and display the process in the "tag data" area;

3.2 Equipment Connection

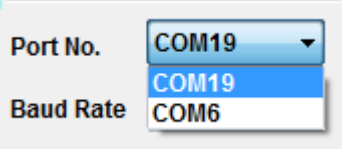
3.2.1 Module Connection

Connecting the reader module device, as shown in picture2



Picture2

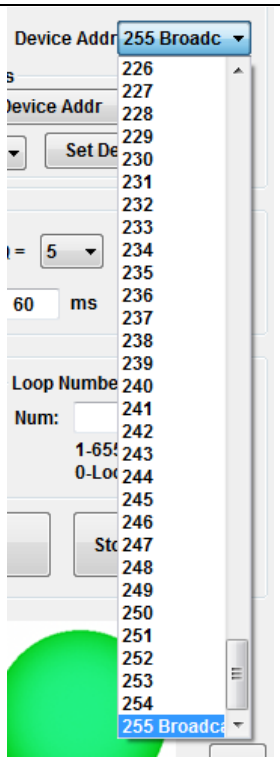
1) Selecting the serial port number. Note that if you have multiple serial ports on your PC, select the one that connects to the reader module correctly.



Picture3

Picture4

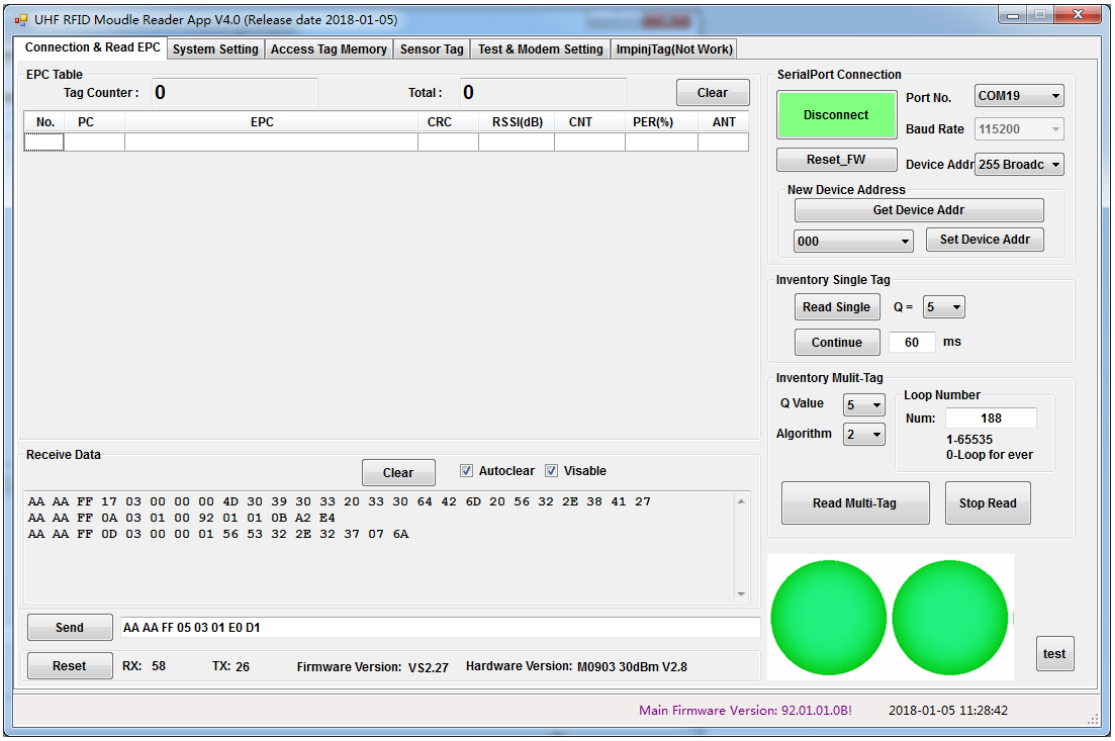
2) Selecting device address "Device Addr". If you do not know the device address set by the reader module of the current connection, you can select broadcast address 255 to connect. The broadcast address refers to the command frame in which the module receives the broadcast address. The module does not match the module local device address and actively responds to the host.



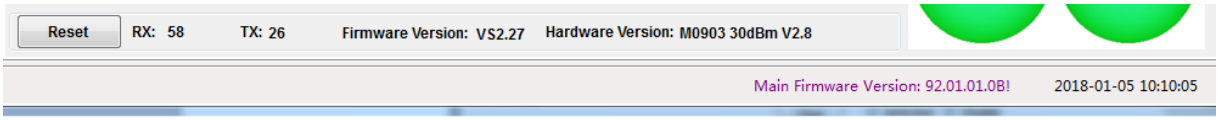
Picture 5

3) Connect the device "Connect"

Click "Connect" to connect the device as shown below.

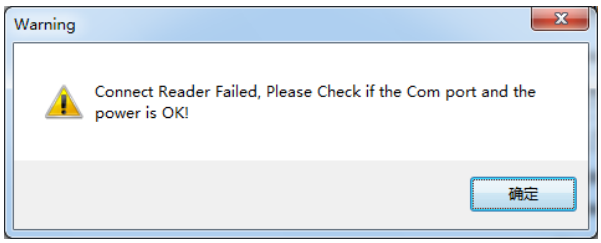


Successful connection, software prompts:



The firmware version 92.01.01.01.0b and sub-version information VS2.27 of the reader module will be displayed, as well as the hardware version information: M0903 30dBm V2.8.

If the serial port selected is incorrect, the communication line is abnormal, or the module fails to power up properly, the DEMO software cannot properly communicate with the reader module, and the following notice will be made:

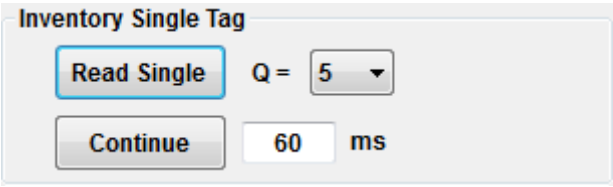


Picture7

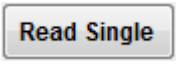
3.3 Read Tag (Connect & Read EPC)

3.3.1 Single Tag Inventory Read

By default, the radio frequency parameters of the reader module are set and can be read first.The following Pictureshows the operations to read a single tag and read multiple tags.

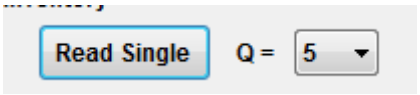


Picture8

Reading single tag 

button

Click the button to read the label once, and the reader module will automatically open the RF, amplifier and read the label only once.If there are multiple tags in the electromagnetic signal field emitted by the antenna, they will be read only once, and the RF amplifier will be automatically turned off after completion.



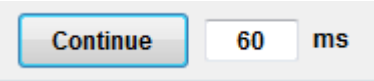
EPC Table

Tag Counter : 7 Total : 07 Clear

No.	PC	EPC	CRC	RSSI(dB)	CNT	PER(%)	ANT
01	30 00	30 08 33 B2 DD D9 01 40 00 00 00 40	71 7F	-63	1	0.000	0
02	30 00	30 08 33 B2 DD D9 01 40 00 00 00 15	7B 2F	-59	1	0.000	00
03	30 00	30 08 33 B2 DD D9 01 40 00 00 00 24	5D 5D	-62	1	0.000	00
04	30 00	30 08 33 B2 DD D9 01 40 00 00 00 29	8C F0	-63	1	0.000	00
05	30 00	30 08 33 B2 DD D9 01 40 00 00 00 10	2B 8A	-65	1	0.000	00
06	30 00	30 08 33 B2 DD D9 01 40 00 00 00 58	E2 46	-66	1	0.000	00
07	30 00	30 08 33 B2 DD D9 01 40 00 00 00 13	1B E9	-57	1	0.000	00

Picture9

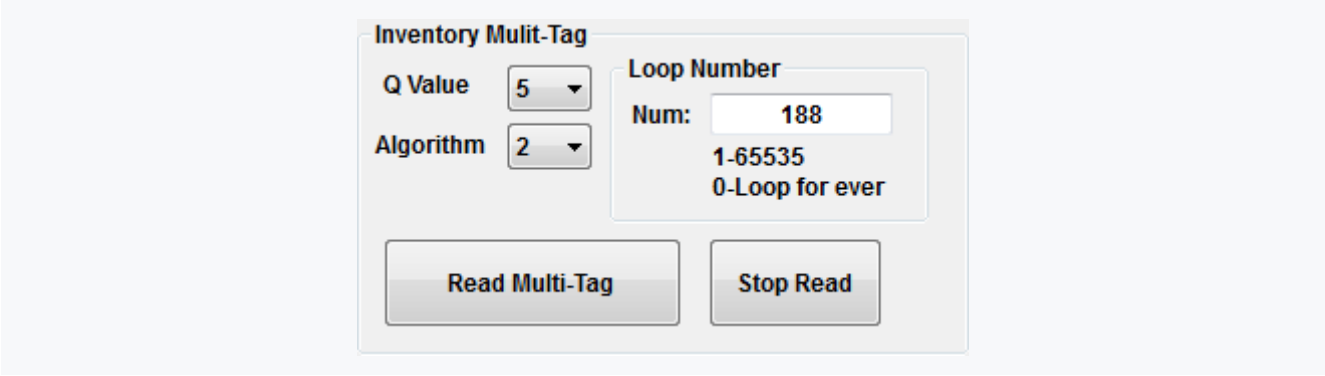
Q value, representing the approximate number of reader-module access tags: 2^Q tags. For example, Q=5, then 25=32;The larger the Q value, the longer the reading time.
The user shall set a reasonable Q value according to the actual number of each inventory label. Generally, the setting of Q value is about 25%~40% more than the actual label, the efficiency of the inventory label will be the highest.



The "Continue" button is a 60-millisecond automatic interval setting of the DEMO software for single-tag inventory reading.

3.3.2 Multi-Tag Inventory Reading

The interface for reading multi-label inventory is shown in picture- 10:



Picture10

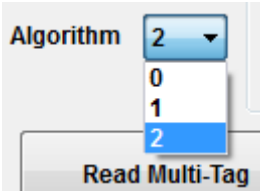
Click "Read multi-tag" buttonto read the multi-tag. The reader module will read the multi-tag inventory according to the set Q value, the algorithm of the inventory tag, the number of cycles and the number of independent inventory at the antenna port (refer to "system Settings").The reader module automatically opens the amplifier for the inventory label. According to the set number of cycles, it decides whether to close the amplifier automatically or manually.

3.3.2.1 Q Value

Q value, representing the approximate number of reader-module access tags: 2^Q tags. For example, Q=5, then 25=32; The larger the Q value, the longer the reading time.
The user shall set a reasonable Q value according to the actual number of each inventory label. Generally, the setting of Q value is about 25%~40% more than the actual label, the efficiency of the inventory label will be the highest.

3.3.2.2 Algorithm

The inventory algorithm: the algorithm of the inventory tag used when reading in a multi-tag inventory.



Picture11

The inventory rate reflects the success rate of successfully identifying the number of tags in a unit tag, reading a certain number of tags. For example, taking 100 tags and identifying 98 tags in 1 second, the inventory rate is 98%.

The read rate reflects the number of times the tag data is read per unit time, and the number of tag data may be duplicated, that is, the number of times the same tag is read. For example, the total number of times the tag data is read in 1 second.

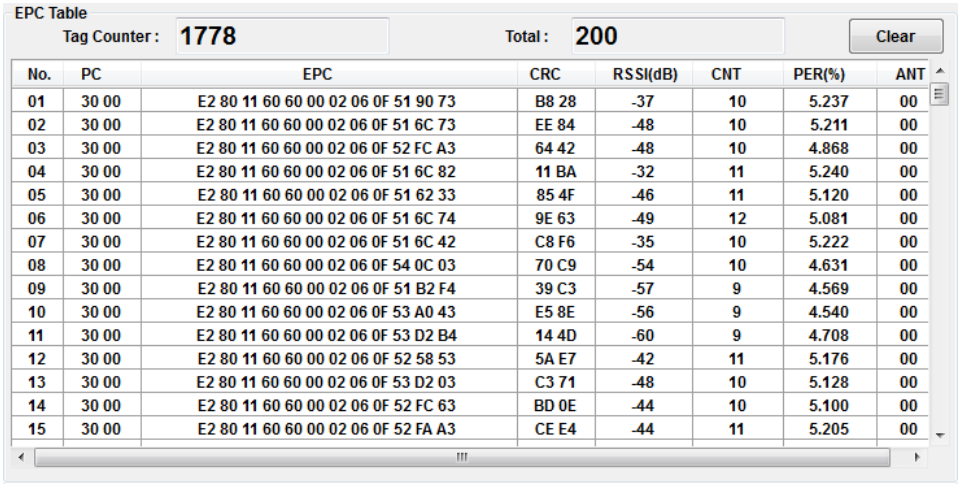
1) Algorithm 0: The tag inventory rate is high and the tag reading rate is low;
2) Algorithm 1: The tag inventory rate and the tag reading rate are compromised;
3) Algorithm 2: low tag inventory rate and high tag reading rate;

		The inventory rate	The read rate
1	Algorithm 0	high	low
2	Algorithm 1	medium	medium
3	Algorithm 2	low	high

3.3.2.3 Loop Number

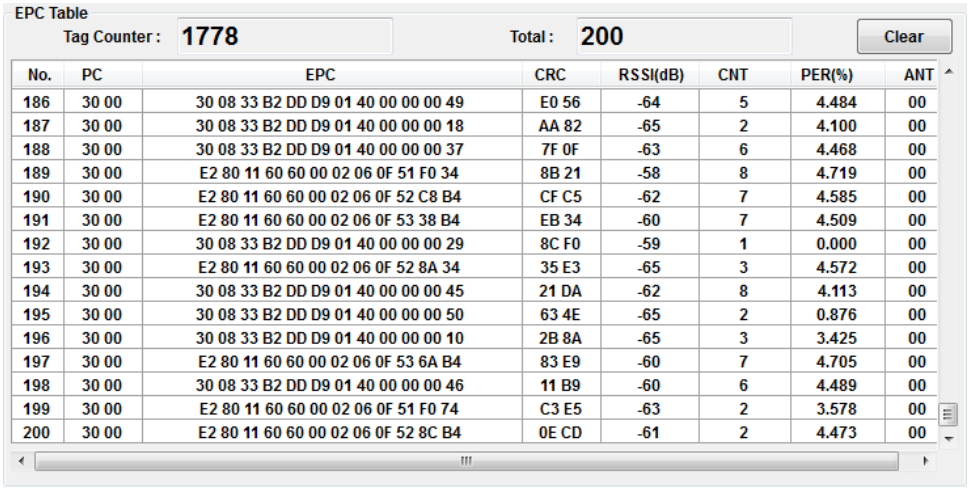
Cycle times: set the cycle times of the inventory tag of the reader module. Each inventory instruction issued by the reader module is a cycle times.The loop number is set to 0, and then the reader module keeps multiple tags until the user clicks the "Stop Read" button.The cycle times are set to non-0, 1~65535, then the cycle times from the record tag of reader module to the set will be automatically finished, and the radio frequency amplifier will be closed.

The results of the inventory multiple tags are as follows:



No.	PC	EPC	CRC	RSSI(dB)	CNT	PER(%)	ANT
01	30 00	E2 80 11 60 60 00 02 06 0F 51 90 73	B8 28	-37	10	5.237	00
02	30 00	E2 80 11 60 60 00 02 06 0F 51 6C 73	EE 84	-48	10	5.211	00
03	30 00	E2 80 11 60 60 00 02 06 0F 52 FC A3	64 42	-48	10	4.868	00
04	30 00	E2 80 11 60 60 00 02 06 0F 51 6C 82	11 BA	-32	11	5.240	00
05	30 00	E2 80 11 60 60 00 02 06 0F 51 62 33	85 4F	-46	11	5.120	00
06	30 00	E2 80 11 60 60 00 02 06 0F 51 6C 74	9E 63	-49	12	5.081	00
07	30 00	E2 80 11 60 60 00 02 06 0F 51 6C 42	C8 F6	-35	10	5.222	00
08	30 00	E2 80 11 60 60 00 02 06 0F 54 0C 03	70 C9	-54	10	4.631	00
09	30 00	E2 80 11 60 60 00 02 06 0F 51 B2 F4	39 C3	-57	9	4.569	00
10	30 00	E2 80 11 60 60 00 02 06 0F 53 A0 43	E5 8E	-56	9	4.540	00
11	30 00	E2 80 11 60 60 00 02 06 0F 53 D2 B4	14 4D	-60	9	4.708	00
12	30 00	E2 80 11 60 60 00 02 06 0F 52 58 53	5A E7	-42	11	5.176	00
13	30 00	E2 80 11 60 60 00 02 06 0F 53 D2 03	C3 71	-48	10	5.128	00
14	30 00	E2 80 11 60 60 00 02 06 0F 52 FC 63	BD 0E	-44	10	5.100	00
15	30 00	E2 80 11 60 60 00 02 06 0F 52 FA A3	CE E4	-44	11	5.205	00

Picture12



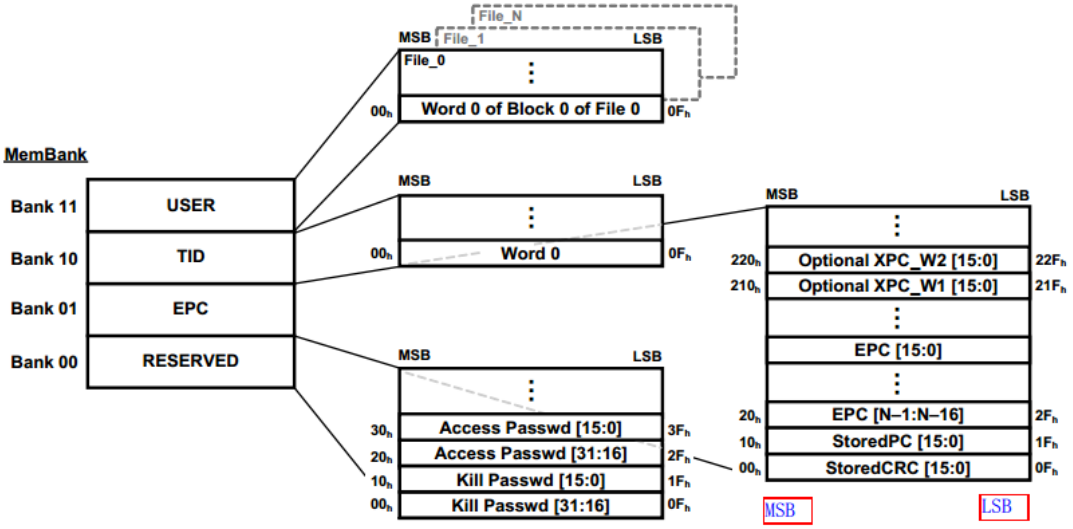
No.	PC	EPC	CRC	RSSI(dB)	CNT	PER(%)	ANT
186	30 00	30 08 33 B2 DD D9 01 40 00 00 00 49	E0 56	-64	5	4.484	00
187	30 00	30 08 33 B2 DD D9 01 40 00 00 00 18	AA 82	-65	2	4.100	00
188	30 00	30 08 33 B2 DD D9 01 40 00 00 00 37	7F 0F	-63	6	4.468	00
189	30 00	E2 80 11 60 60 00 02 06 0F 51 F0 34	8B 21	-58	8	4.719	00
190	30 00	E2 80 11 60 60 00 02 06 0F 52 C8 B4	CF C5	-62	7	4.585	00
191	30 00	E2 80 11 60 60 00 02 06 0F 53 38 B4	EB 34	-60	7	4.509	00
192	30 00	30 08 33 B2 DD D9 01 40 00 00 00 29	8C F0	-59	1	0.000	00
193	30 00	E2 80 11 60 60 00 02 06 0F 52 8A 34	35 E3	-65	3	4.572	00
194	30 00	30 08 33 B2 DD D9 01 40 00 00 00 45	21 DA	-62	8	4.113	00
195	30 00	30 08 33 B2 DD D9 01 40 00 00 00 50	63 4E	-65	2	0.876	00
196	30 00	30 08 33 B2 DD D9 01 40 00 00 00 10	2B 8A	-65	3	3.425	00
197	30 00	E2 80 11 60 60 00 02 06 0F 53 6A B4	83 E9	-60	7	4.705	00
198	30 00	30 08 33 B2 DD D9 01 40 00 00 00 46	11 B9	-60	6	4.489	00
199	30 00	E2 80 11 60 60 00 02 06 0F 51 F0 74	C3 E5	-63	2	3.578	00
200	30 00	E2 80 11 60 60 00 02 06 0F 52 8C B4	0E CD	-61	2	4.473	00

Picture 13

3.3.2.4 List Description

The memory segment of the rfid tag includes the following:

- RFU block, Reserve For Future, reserved area.
- EPC block, Electronic Product Code, usually used as the ID number of ISO18000-6C rfid tag, readable and writable; the length is generally 12 bytes, 96 bits (0x60);
- TID block, Tag Identification, tag ID number, global unique number, read-only, cannot be written; 8 bytes length;
- User block, readable and writable, ranging from 512 to 4096 bits, the length of the User area of each manufacturer's tag is different, and even some manufacturers' tag do not have a User area.



Picture 13A

(1) PC, tag protocol control word, in which the definition of the length (word length, 2 bytes) and memory structure of the tag EPC is defined. The high 15~11bit of the PC value defines the word length of the EPC data. The PC value is 10th. The UMI (User-memory indicator) defines whether the tag has a User area, UMI=0, no User area, UMI=1, and User. Area. It should be specially noted that UMI is a new addition to the new version of the ISO18000-6C labeling protocol. Some old versions of the tag may not have this parameter.

PC															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
PC Length					UMI										

The storage starts from the bit address 0x00 of the EPC area, namely the word address 0x00 is stored.
E.g:
PC=0x3000, EPClength=001102=0x06(HEX), 6 words long, 12 bytes, 96 bits long (0x60);
UMI=0, no User area.
PC = 0x3400, EPC length = 001102 = 0x06 (HEX), 6 words long, 12 bytes, 96 bits long (0x60);
UMI = 1, with User area.

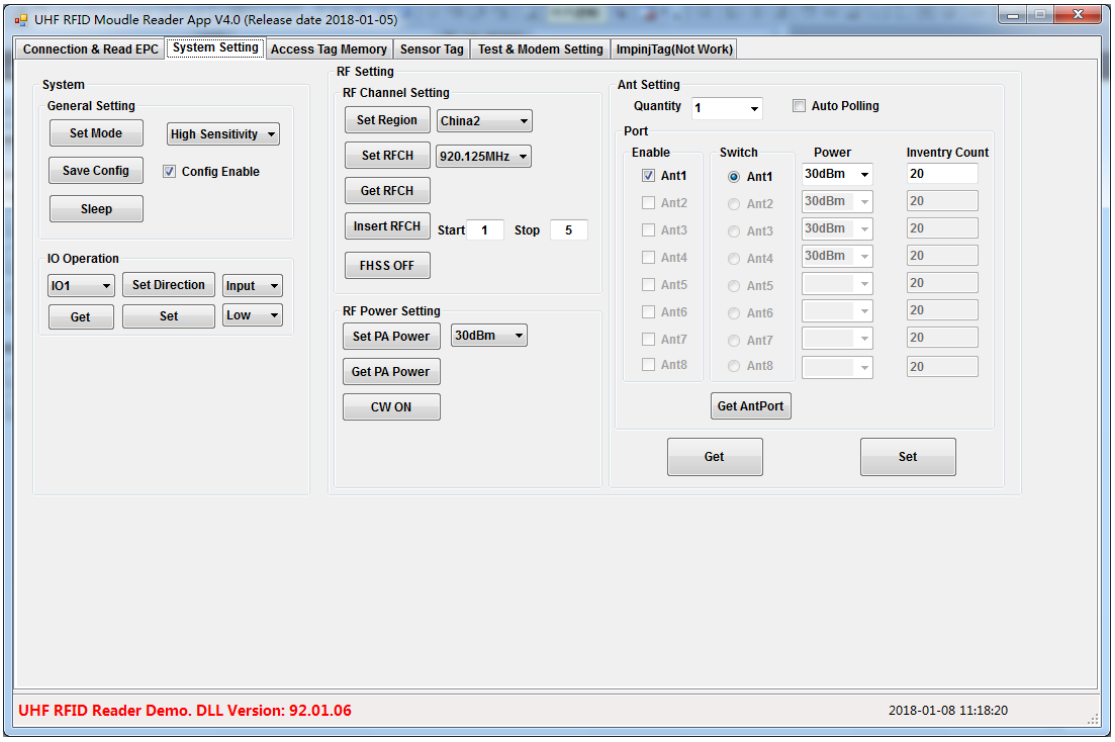
(2) EPC, Electronic Product Code, EPC data of rfid tags, as the EPC ID value of the tag, readable and writable. The storage starts from the bit address 0x20 of the EPC area, namely, the word address 0x02 is stored.
3) CRC, CRC check value, defines the CRC check value of PC+EPC data, and the tag automatically modifies and stores the value. The storage starts from the bit address 0x00 of the EPC area, namely, the word address 0x00 is stored.
(4) RSSI, Signal Strength, Received Signal Strength Indication, which reflects the return signal strength of the rfid tag received by the reader module or the quality of the received tag signal. RSSI is a negative value in dBm. The larger the RSSI, the greater the signal strength returned by the reflected label; conversely, the smaller the signal strength returned by the label. For example, the signal strength of RSSI = -53 dBm is better than RSSI = -65 dBm.
(5) CNT, Label read times statistics;;
(6) PER, Packet Error Rate, frame error rate;

(7) ANT, Antenna port, indicating the currently read EPC value, which is the EPC data read by the antenna port of the reader module.

	Antenna port	Index value
1	Ant1	0
2	Ant2	1
3	Ant3	2
1	Ant4	3

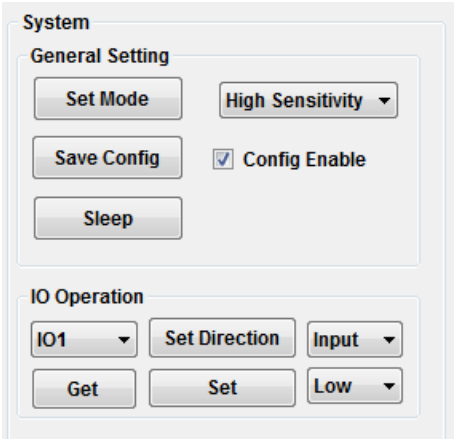
3.4 System Setting

System setting includes system control parameters, frequency channel, power control and antenna control.



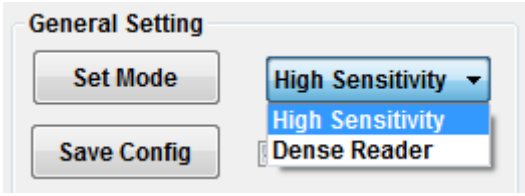
3.4.1 System Parameter

System parameters include general settings and GPIO port control settings.



3.4.1.1 Working mode

Set the highly sensitive mode and the dense mode of the reader module.As shown in picture-16



Picture16

By default, the reader is in high sensitivity mode, namely, the distance of reader is the farthest; in the dense reader mode, it is applied to a small area and has multiple reader module application scenarios;

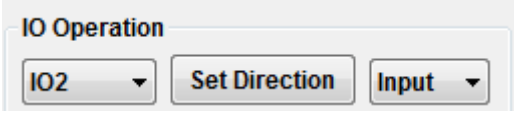
3.4.2 RF Parameter

RF parameter is used to set the module's operation frequency, RF power and antenna control and so on.

3.4.2.1 GPIO Control

The reader module has 4 GPIO ports. Each GPIO port can be set to input or output. The host can send a command to read the high and low state of the GPIO port.

1) Set the IO port to the input state.

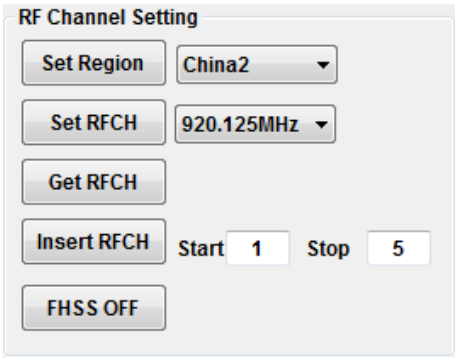


Picture17

As shown in picture 17, select IO2, select "Input", and click the "Set Direction" button to set the IO2 port as the input state. Click the "Get" button to get the current level status of IO2.

Picture18

The RF parameters determine the operating frequency; transmit power, and antenna control of the reader module.



Picture-19

3.4.2.1 RF Channel Setting

RF frequency channel setting, set the working area of the reader, working frequency and frequency hopping control.

(1) Frequency area. Each national radio management committee specifies a dedicated operating frequency band for UHF RFID radio frequency identification, which has different frequency region divisions. Users should comply with local national laws and radio management regulations and regulations, and use frequency bands that comply with local radio management regulations and regulations. The reader module provides the function of setting the frequency band used in some regions to adapt to the regulations and regulations of different countries and regions.

Picture-20

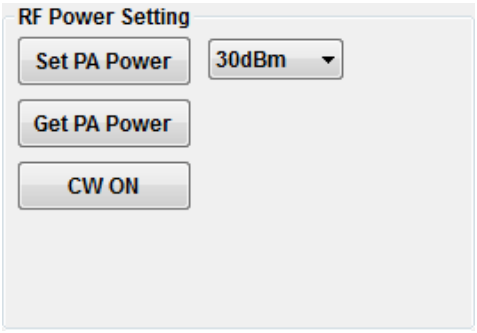
No.	Area	Frequency range	Channel number
1	China2	920.125MHz~944.875MHz	20
2	China1	840.125MHz~844.875MHz	20
3	US	902.25MHz~927.75MHz	52
4	Europe	865.1MHz~867.9MHz	15
5	Korea	917.1MHz~923.3MHz	32

(2) The "Set Region" button sets the operating frequency range of the reader module.
(3) The “Set RFCH” button sets the operating frequency channel (frequency point) of the reader module.
(4) "Get RFCH" button, read the working frequency channel of the current reader module.
(5) "FHSS OFF" and "FHSS ON", FHSS(Frequency-Hopping Spread Spectrum) is a kind of frequency hopping spread spectrum communication technology, which is an anti-interference technology. Its principle is to use the spread spectrum principle. Frequency hopping is used to achieve the purpose of "avoiding" interference.
When reading the tag, the reader module performs frequency hopping to transmit a radio frequency signal according to a pseudo random code in the spread spectrum technology to communicate with the tag within a certain time interval. When the module is powered on, the default is frequency hopping. If the "FHSS OFF" button is clicked when the fixed frequency operation is required, the reader module is in fixed frequency operation; otherwise, click "FHSS ON", and the reader module returns to the frequency hopping state.

3.4.2.2 RF Power Setting

It is used to set the RF transmit power of the module. The setting is irrelevant to the transmit power of the connected antenna. Under most circumstances, this setting is used during testing.

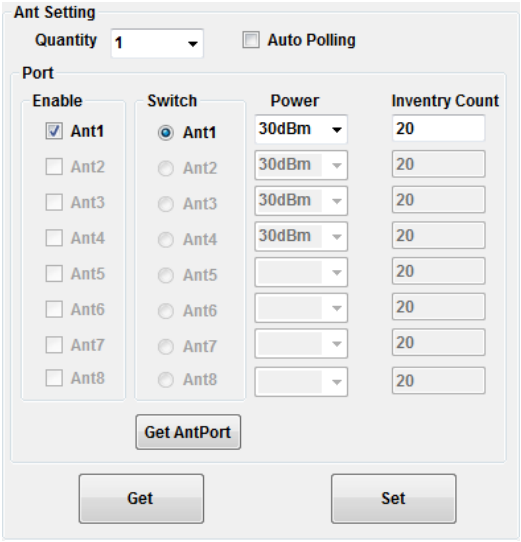
Shown as Picture21, Click “Set PA Power” and select the desired value, the range of the value is 0dBm to 30dBm. Click” Get PA Power” to show the set value, Click”CW ON” set the module to transmitcontinuous carrier RF signal which doesn’t have modulation command, this function is used during testing.



Picture 21

3.4.2.3 Antenna Setting

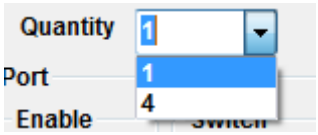
Set the relevant parameters of the module for calling the antenna ports.



Picture 22

Click"Set" after select the desired parameters of antenna. Click"Get ", get the set parameters of antenna.

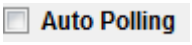
(1) Antenna quantity



Picture 23

Select"1" for one port module, and select"4" for four antenna module.

(2) "Auto Polling": if it is a multiple antenna ports module, enable"Auto Polling", when the module is set to multiple tags reading (refer to 3.3.2), the module will call the enable antenna ports successively and don't need to send antenna switch command. Important: The enable port has to be connected with 50Ωimpedance antenna and the standing wave ratio is smaller than 1.3.

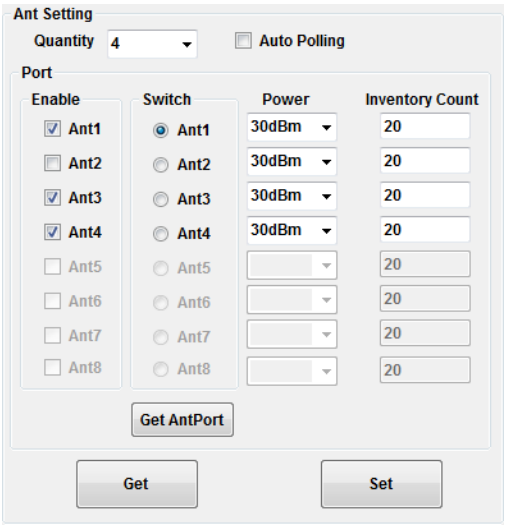


Picture 24

If disable "Auto Polling", need send Switch command to switch antenna. Please refer to the contents related to antenna switching. Important

Important: "Auto Polling" function is only used under multiple tags reading mode.

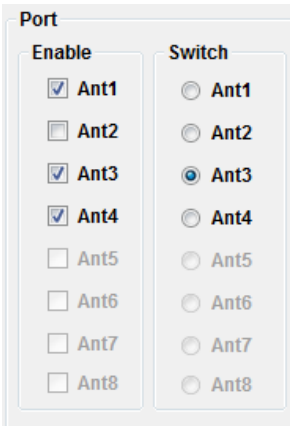
(3) Antenna "Enable", Select to enable desired antenna, unselect to disable desired antenna, Shown as Picture25, Ant1, Ant3 and Ant4 is enabled and Ant2 is disabled. Important: Port Ant1, Ant2 and Ant4 has to be connected with 50Ω impedance antenna or 50Ω impedance, otherwise, the module will be damaged if there is no antenna connected when the port is set to enable.



Picture 25

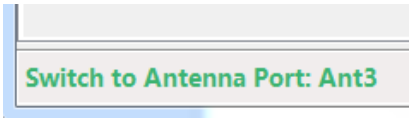
When set to ”Read Multi-tag” working mode, the module will call enabled ports as following order: Ant1->Ant3->Ant4->Ant1->Ant3->Ant4->Ant1->....., until the inventory is finished.

(4) Antenna “Switch”, change the working antenna port.



Picture 26

Shown as Picture26, Select”Ant3” in the “Switch” block, it will switch to antenna port Ant3, and in the status bar, it will show ”Switch to Antenna Port: Ant3”.

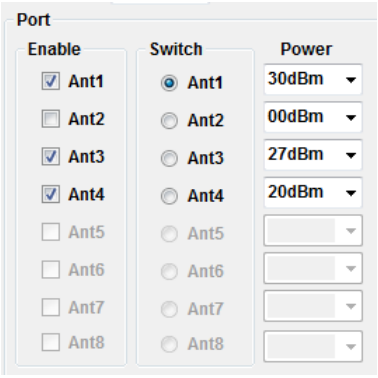


Picture 27

If try to change to disable antenna port, statue bar will show “Switch Antenna Port Failed! Please check the Antenna Setting” in read. As Picture28.

Picture 28

(5)”Power” Set transmit power for specific antenna port



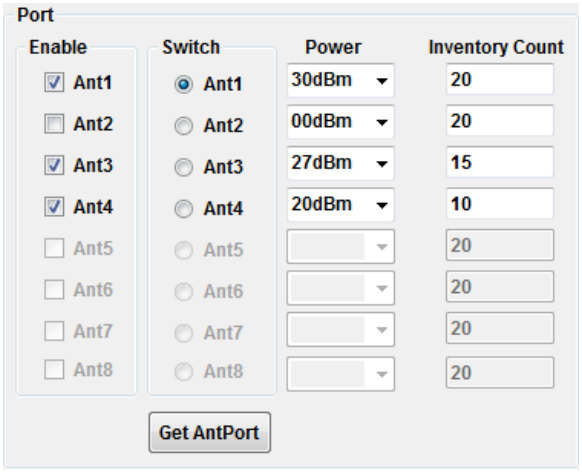
Picture 29

Shown as Picture29: The module will transmit RF signal according to the Power value set to a specific antenna port, Ant1->30dBm， Ant3->27dBm， Ant4->20dBm. 30dBm=1W,27dBm=500mW, 24dBm=250mW,21dBm=125mW.Calculation formula:

$$P_{dBm}=10\log(P_{mW})；$$

(6) ”Inventory Count”, Antenna inventory times, during multi-tag inventory, the module will send RF signal to a specific antenna port as the set value times, when it is finished, the module will send RF signal to the next enable antenna port. After module send signal to all enable ports, it will start again by sending signal to the first enable port. The module will stay more times on the port when the set value is bigger.

Important: The parameter is only effective under ”Multi-tag Inventory”.



Picture 30

Shown as Picture30,

ANT1(20)->ANT3(15)->ANT4(10)->ANT1(20)->ANT3(15)->ANT4(10)-> ……

3.5Access Tag Memory

Access tag’s memory which is comply to IOS18000-6C protocol. It includes functions ”Read”, “Write”, “Lock” and “Kill”. Note: “Write”, “Lock” and “Kill” tag need more power than “Read” tag, so the effective distance for them are much shorter, shorter than half of read distance.

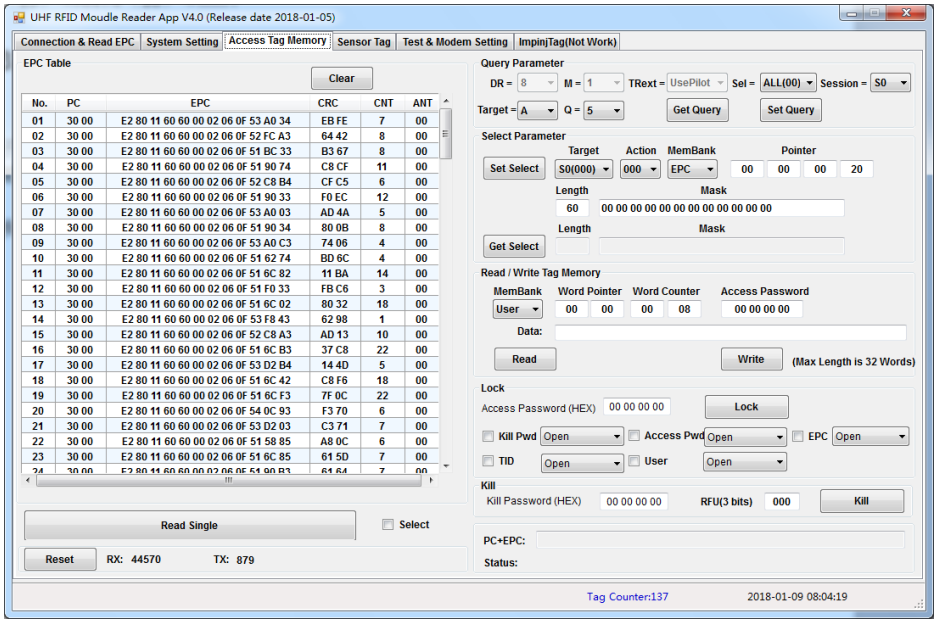
The MenBank of tag, contents: RFU(reserved), EPC, TID(tag ID) and User blocks. Note: some tags don’t have User block, so all operations that need to access User block will be failed.

Tag memory contents:

- RFU Block: Reserve For Future;
- EPC Block: Electronic Product Code, normally, it is the ID of ISO18000-6C tag and length is 12 bytes, 96bits(0x60).
- TID Block:Tag Identification, Global unique tag ID number, Read only, non-writable, 8 bytes length.
- User Block: Readable and Writable, 512 to 4096 bits length according to different tag manufacturers.

In this sector contents manual of how to access a specific tag's memory when multiple tags are read.

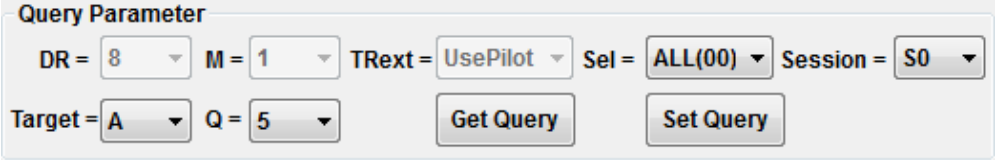
When the module is set to inventory multiple tags and read tags, introduced in sector 3.3.2, the EPC of the read tags will be listed in the EPC column when you switch the interface to "Access Tag Memory" page. Shown as Picture31.



Picture 31

3.5.1 Query Parameter

Control parameters setting for reading multipletags under "Read Single". Normally, the parameters can be set as Picture32

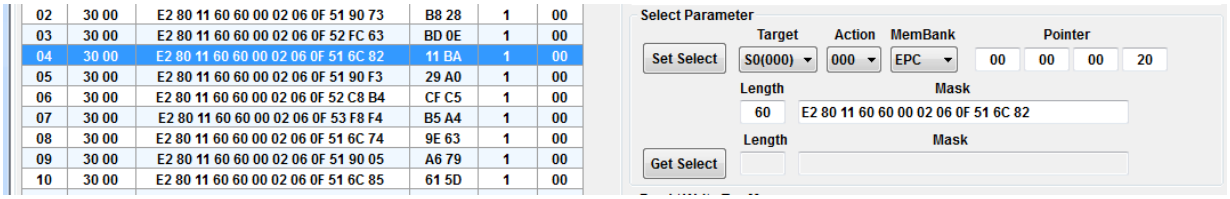


Picture 32

3.5.2 Select

Select a tag. Select a specific tag with EPC ID in the read tag list before access the tag. All tags will check with the selected parameters automatically after receive the command, only the matched tag will response to the module, the rest unmatched tags will not response to the module.

Click one tag in the left EPC tag list, the EPC value of the tag will show in the ”Mask” bar, shown as Picture33.

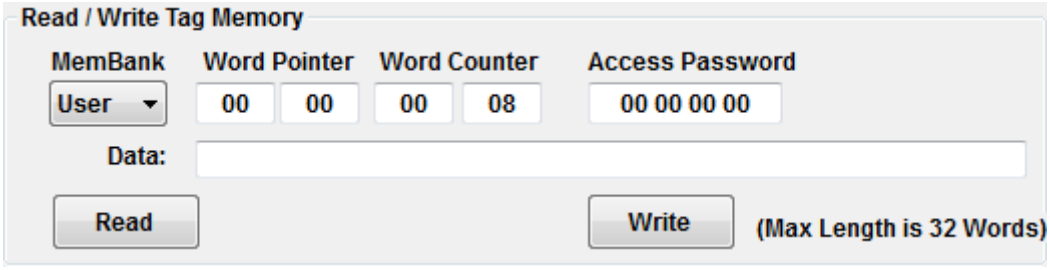


Picture33

- ”Target” and “Action”: they are tag’s command parameters, in this operation, the user don’t need to change settings, Select Target=S0， Action=000 directly.
- ”ManBank”: Select a specific block in tag’s memory to match, normally, Select EPC data for tag’s matching ID.
- ”Pointer”: Start to matching data in MemBank from the set Bit Start Address. In Picture33, 0x00000020 is the start matching address. Please also refer Picture13A in sector 3.3.2.4
- ”Length”: Match the specific length(Bit Length) of data, the length of EPC byte 0x60 bits.
- ”Set Select”: write the selected parameter to module. When access the tag, the module will get these selected parameters and operate the selected tag according to the settings.
- ”Get Select”: Get the current tag setting parameters.

3.5.3Read and Write EPC

The module can read tag data set in MemBank after set the parameters mentioned in the previous sector. Shown as Picture34.

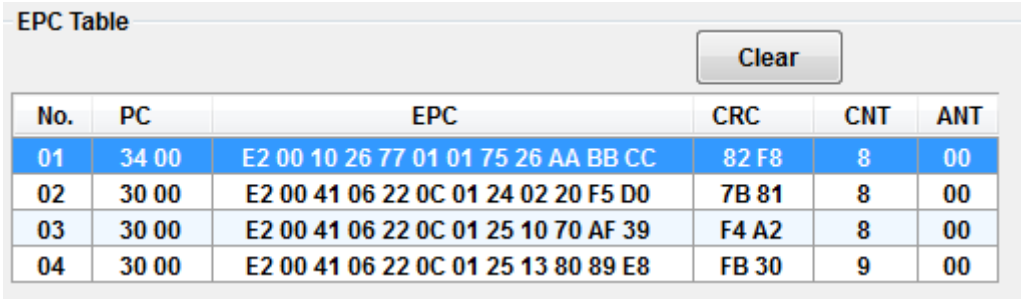


Picture34

- Word Pointer: word start address;
- Word Counter: access word length;
- Access Password: If there is no password written in the tag, then set to 0x00000000.

3.5.3.1 Read Data in USER Block

a. Inventory tag or click “Read Single” tag and get tag data.

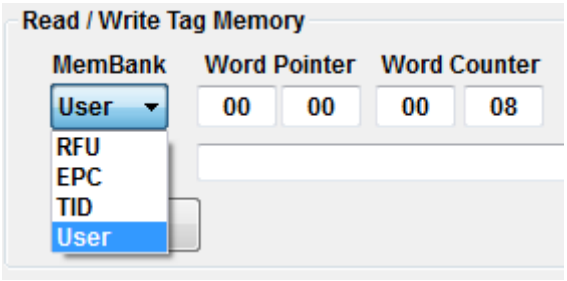


Picture35

In Picture35, EPC= “E2 00 10 26 77 01 01 75 26 AA BB CC” tag’s PC=0x3400, UMI=1, the tag as User block (not unique judge).

b. Choose tag “E2 00 10 26 77 01 01 75 26 AA BB CC”, click “Set Select” to set parameters.

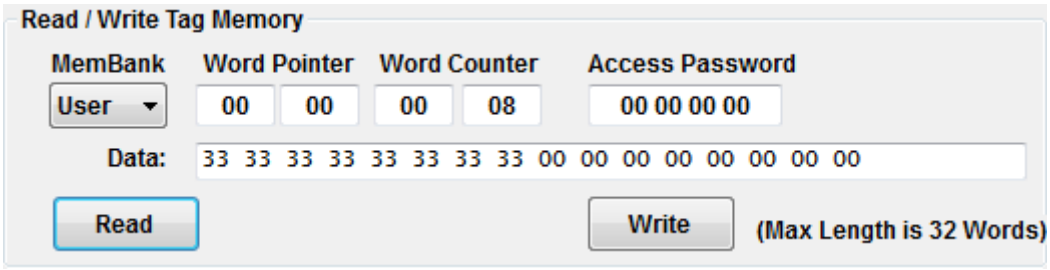
c. Select User block of the tag.



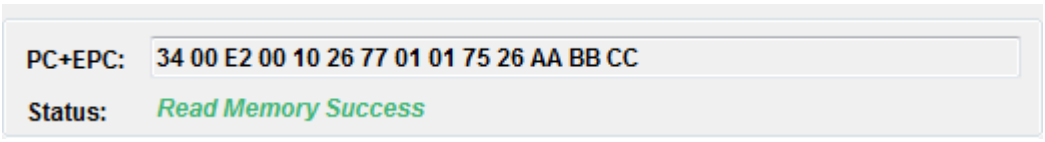
Picture 36

d. Set the byte start address(Work Pointer) and byte length, default: Word Pointer=0x0000, Word Counter=0x0008.

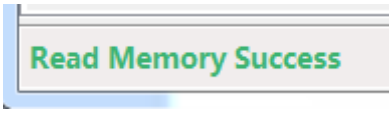
e. Click “Read”, the result will show in the Data bar. And success information “Read Memory Success” will show in Statue bar. Shown as Picture37.



Picture37

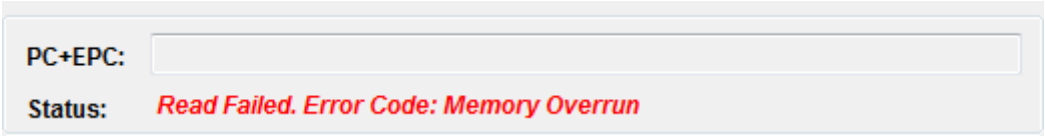


Picture38



Picture39

If the tag don't have a User Block, Status bar will show "Read Failed. Error Code: Memory Overrun", overflow to access, means there is no data in the selected memory sector.

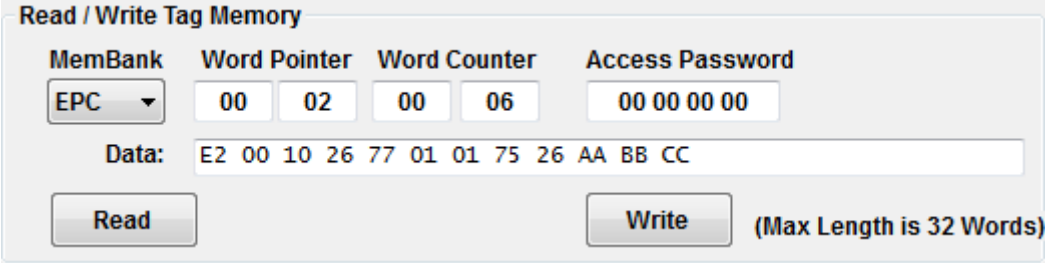


Picture40

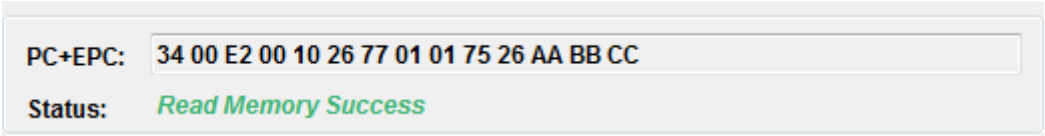
Picture41

3.5.3.2 Read EPC block data

Set parameters to the value shown in Picture42 to read data in EPC block

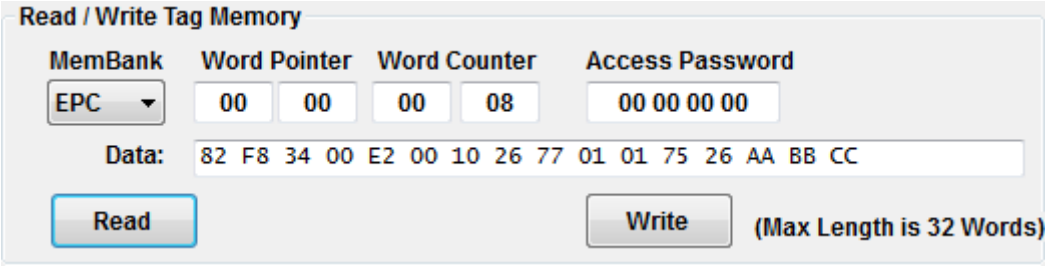


Picture42



Picture43

Read EPC data start from byte:0x0000 and length 0x08, and the result:



Picture44

Compare the result with EPC list:

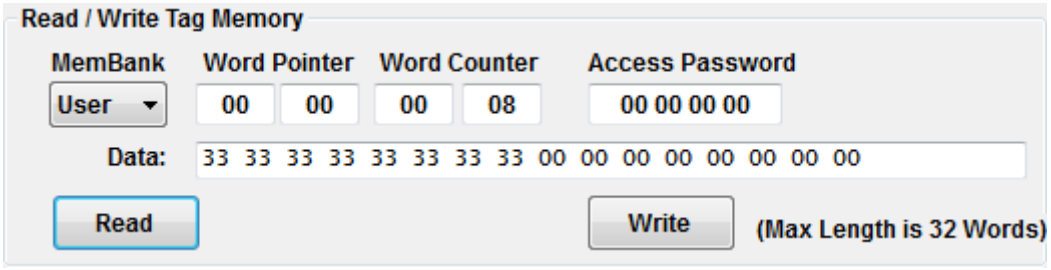
No.	PC	EPC	CRC	CNT	ANT
01	30 00	30 08 33 B2 DD D9 01 40 00 00 00 29	8C F0	9	00
02	34 00	E2 00 10 26 77 01 01 75 26 AA BB CC	82 F8	12	00
03	30 00	E2 00 41 06 22 0C 01 25 10 70 AF 39	F4 A2	11	00
04	30 00	E2 00 41 06 22 0C 01 24 03 00 F1 5F	27 50	11	00
05	34 00	E2 00 41 06 22 0C 01 22 18 60 54 65	FC 31	10	00

Picture45

As shown in the above figures, in data result “82 F8 34 00 E2 00 10 26 77 01 01 75 26 AA BB CC”, CRC=0x82F8, PC=0x34, EPC=0xE20010267701017526AABBCC. EPC data start from byte 0x0002.

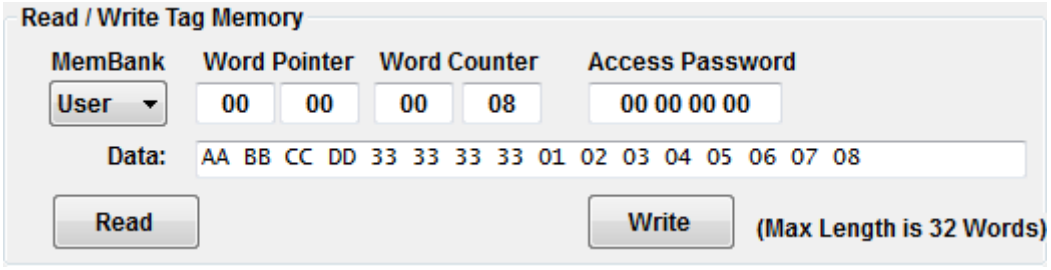
3.5.3.3 Write data into USER Block

As mentioned in 3.5.3.1, result of Read shown as below picture, Picture46.



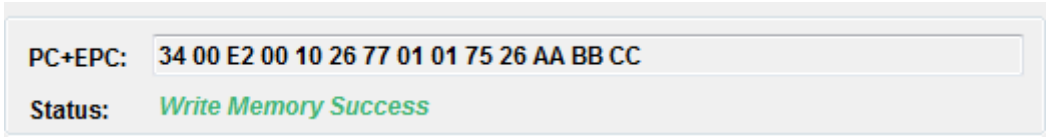
Picture46

Change the data in the Data bar, Shown as Picture47.



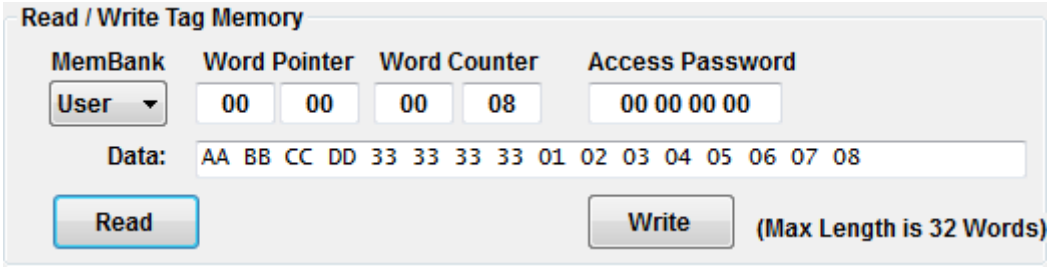
Picture47

Click “Write”, and Status bar will show “Write Memory Success”. Shown as Picture48.

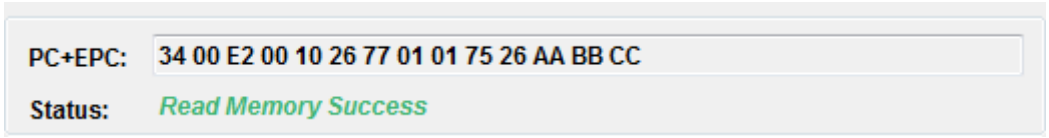


Picture48

Click “Read” to check if the write operation is success or not, If success, the status bar will show “Read Memory Success”, Shown as Picture49.



Picture49

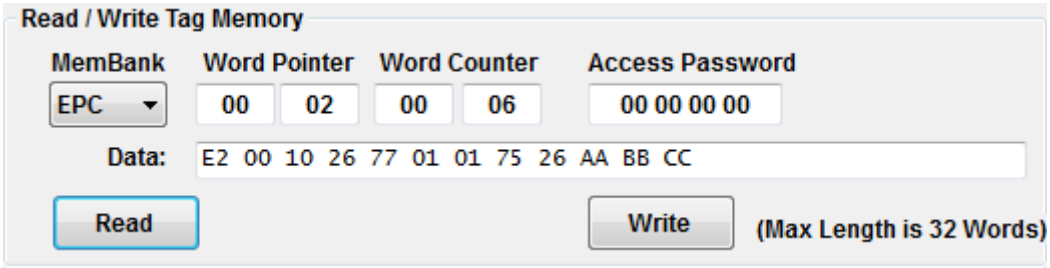


Picture50

Change user block successfully.

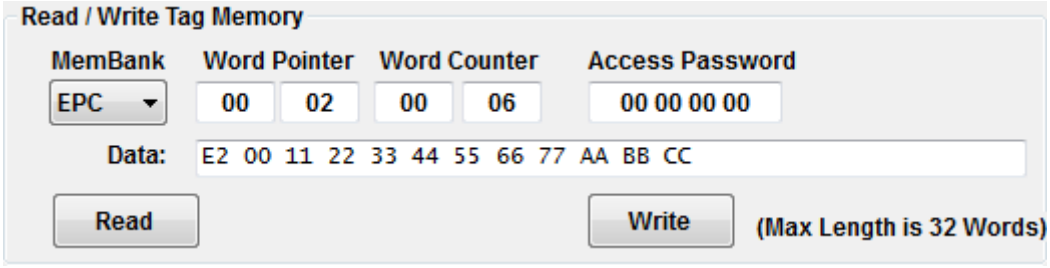
3.5.3.4 Write the appointed EPC into EPC

Write the appointed EPC into EPC data block and modify the value.
Please read the value of EPC according to the operating of chapter “3.5.3.2”

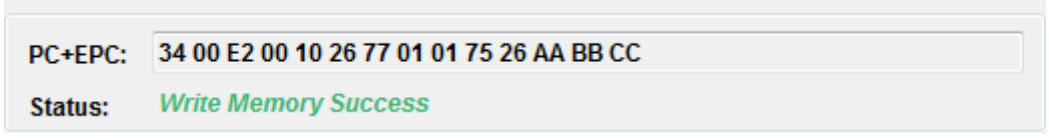


Picture 51

Please modify the data of the following data block like Picture 52



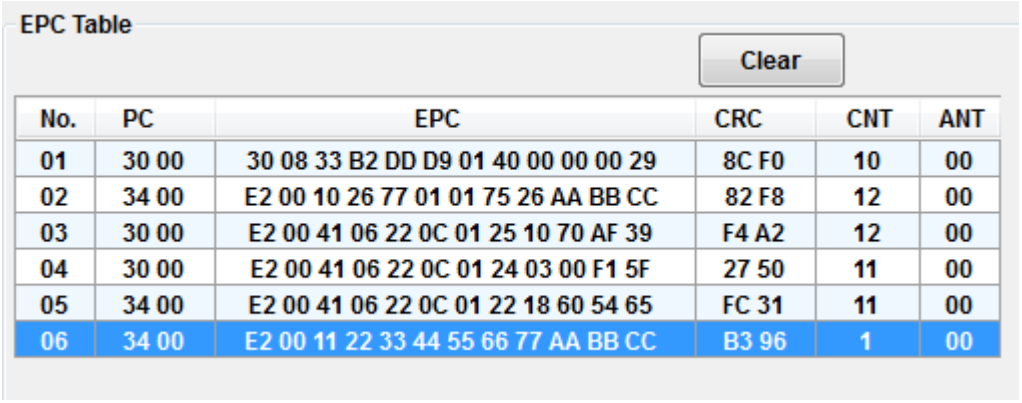
Please click the button “Write”, the status infos shows “ Write Memory Success” like Picture53



Picture53

Now, the value of EPC has been changed, and cannot proceed the appointed reading. Please click

the button of "Read Single" as the below and search the new tags. You can find the new data "E2 00 11 22 33 44 55 66 77 AA BB CC".



No.	PC	EPC	CRC	CNT	ANT
01	30 00	30 08 33 B2 DD D9 01 40 00 00 00 29	8C F0	10	00
02	34 00	E2 00 10 26 77 01 01 75 26 AA BB CC	82 F8	12	00
03	30 00	E2 00 41 06 22 0C 01 25 10 70 AF 39	F4 A2	12	00
04	30 00	E2 00 41 06 22 0C 01 24 03 00 F1 5F	27 50	11	00
05	34 00	E2 00 41 06 22 0C 01 22 18 60 54 65	FC 31	11	00
06	34 00	E2 00 11 22 33 44 55 66 77 AA BB CC	B3 96	1	00

Picture54

3.5.4 Appointed EPC lock tags

Lock tag: the operation of locking the data of tag memory. As below:

1）Lock the commands of destroy and access, and stop or promise to read/write the commands.

2）Lock the EPC, TID ROM, stop or promise to read the data into the ROM.

3）Lock the ROM of user's block, stop or promise to read user's ROM.

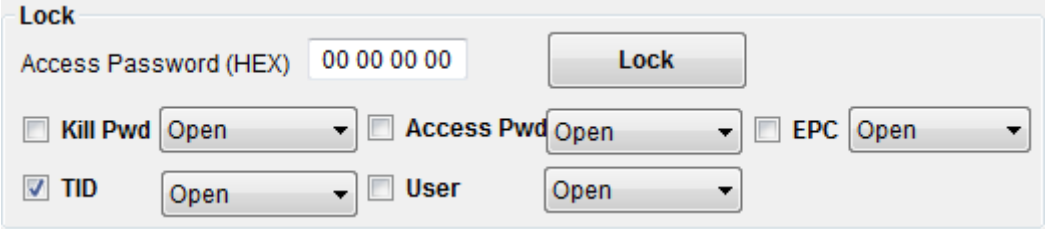
4）Commands of Perma-Lock, EPC, TID&User's block.

MemBank	Lock Type	Read/Write Control
EPC TID User	Unlock	Read/Write ROM without access password
	Lock	Secured status(access password=0): Read/write without password. Open status(access password≠0): Cannot write and you need to enter the secured status after input the correct access password
	Perma-unlock）	Read/Write ROM without access password, and you can read/write permanently, but cannot do the operation of locking.
	Perma-Lock	Only read but cannot write permanently cannot do the operation of locking.
Reserved （Kill Pwd） （Access Pwd）	Unlock）	Read/Write ROM without access password
	Lock	Under the tag secured status (access password=0) Read/Write ROM without access password, Open status(access password≠0): Cannot write. You need to input the correct access password and keep the tags enter into the secured status.

	Perma-unlock	Under the tag secured status (access password=0): Read/Write ROM without access password, Open status(access password≠0): Cannot write. You need to input the correct access password and keep the tags enter into the secured status.
	Perma-Lock	Only read but cannot write permanently Cannot do the operation of locking.

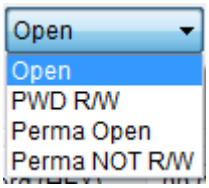
Note that users need to be careful the function of the locking tabs operation, after the label is locked, can't be modified again.

Lock operation below:



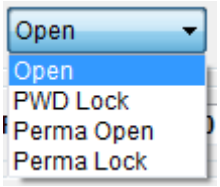
Picture55

Set the ”KillPwd”and “Access Pwd” accoding to the following Picture56



Picture56

EPC、TID & USER ROM，setting parameters as the Picture57。



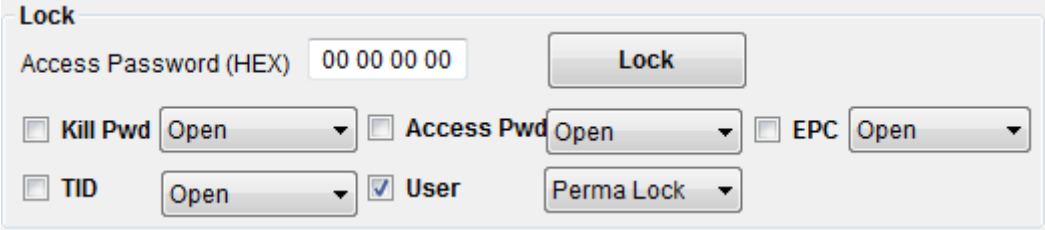
Picture 57

	Parameters	Meaning
1	Open	Unlock, Read/write
2	PWD R/W	Lock, read/write known commands
3	Perma Open	Perma-unlock
4	Perma NOT R/W	Perma-Lock, cannot read/write permanently

3.5.4.1 Appointed EPC lock user

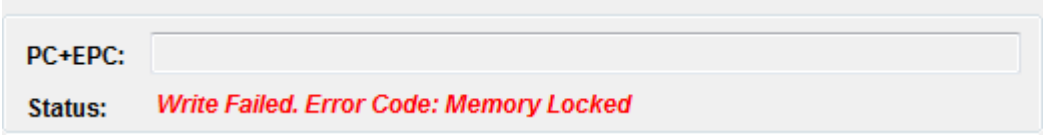
Read/write permanently for the user's block. Click the "User", and choose "Perma Lock".

Click the "Lock" and do the operation of locking. Picture 58



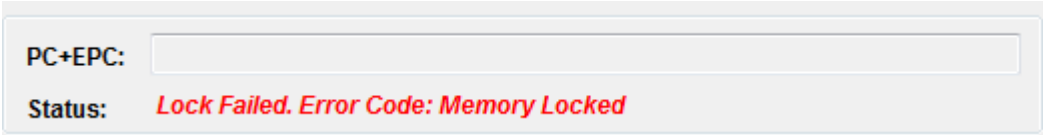
Picture58

If you try to write the data into the user's block, the software show that ROM LOCK, write failure.



Picture 59

If you try to unlock the user's block, the software shows that ROM LOCK, unlock failure.



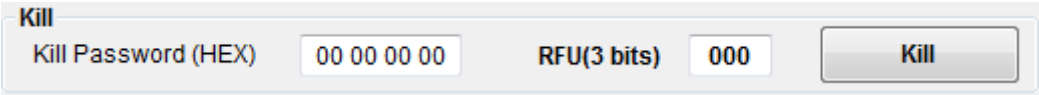
Picture 60

Operations of other ROM block are similar, please follow the above.

Please note, users should be cautious about this kind of operation.

3.5.5 Appointed EPC kill tags

Kill tags: please do the operation of kill tags, if users don't need to use tags.
Please refer to the chapter"3.5.3", kill the tags after click the "Kill".



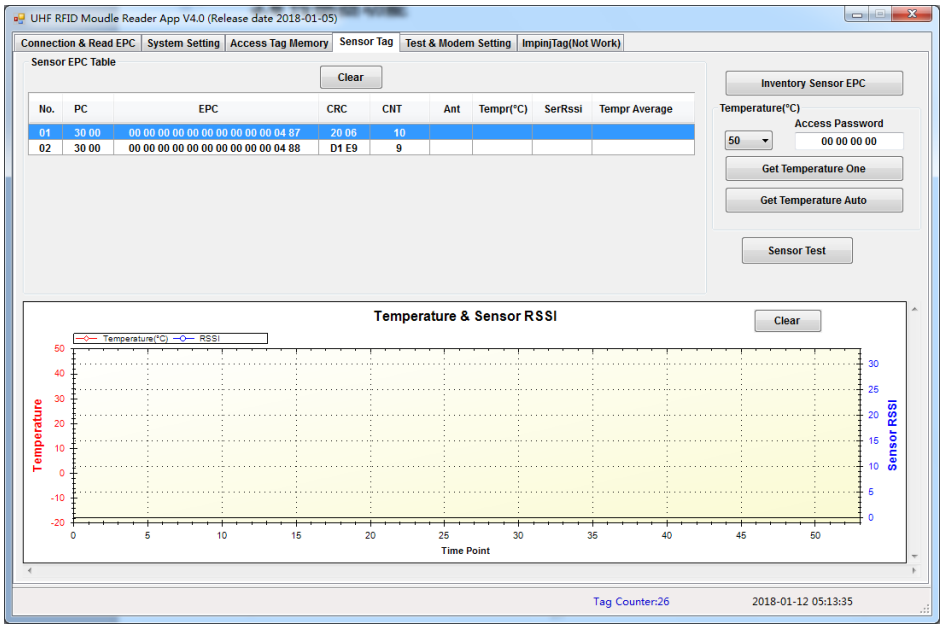
Picture61

3.6 Sensor Functions

This section describes the function of reading temperature sensor electronic tags and water dew sensor electronic tags through the reader module.

Temperature sensor electronic tags, is in addition to have standard ISO18000-6 c electronic tag function, also integrates the function of temperature sensor with low consumption. Therefore, temperature label based on ISO18000-6C function, has realized the function of measuring temperature. Temperature tag paste on the surface, can not only realize the basic recognition, and can realize the function of the temperature monitoring objects; Not only can be given ID identity information to the object, and can be awareness through radio frequency technology characteristics of the temperature parameters of the object.

The Picture62 shows the interface of temperature reader.



Picture62

Temperature sensor tags EPC:

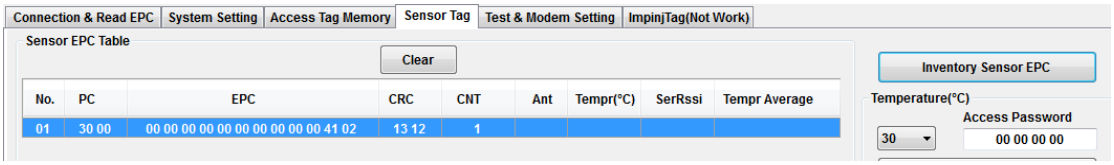
- PC, ISO-18000-6C Protocol Control,
- EPC， Electronic Product Code,
- CRC， ISO-18000-6C tags, the checksum of PC & EPC

- CNT，tags inventory times, Ant- antenna interface；
- Tempr，The temperature of the reading temperature tags；
- SerRssi, the temperature read tags, electronic tags received the launch of the rf signal intensity, read/write device, SerRssi is a relative value, positive, the range is 0 ~ 31. Temperature SerRssi labels within the scope of the 13 ~ 21, the measured temperature value is the most accurate, recommended value SerRssi = 18.User should be the launch of the rf signal power, control, speaking, reading and writing device module makes tag response SerRssi within the scope of the measuring temperature. Note that the front and the RSSI is different.

3.6.1 Get Temperature Tags

The process of reading the temperature: Reading EPC-> Setting the tags inventory times->Setting the access password-> Reading the value of the temperature tags.

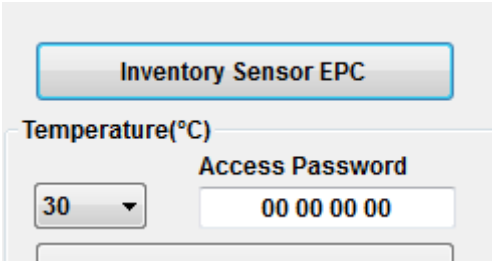
（1）Inventory the ID of the temperature tags. Please click the “Inventory Sensor EPC”



Picture 63

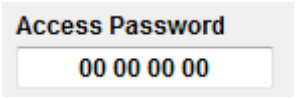
It shows the ID of the temperature tags “00 00 00 0000 0000 0000 00 41 02”.

（2）Select the number(30) of inventories for each temperature tags. Picture64



Picture64

（3）Input the access password as below:



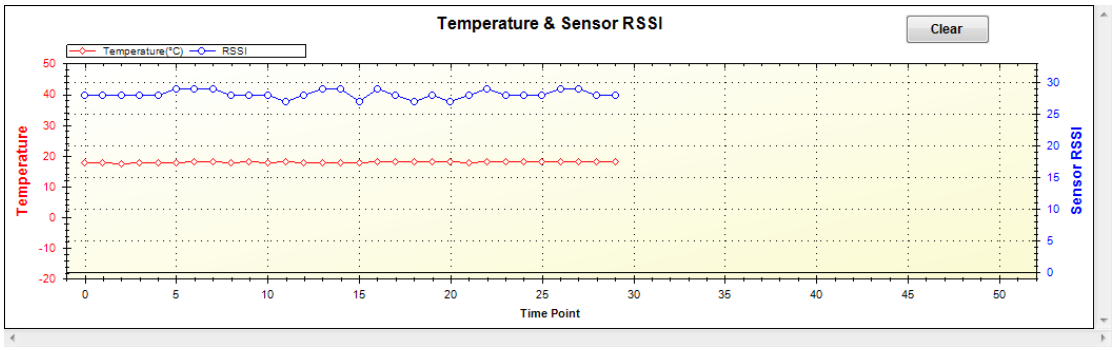
Picture65

（4）Click“Get Temperature One” , and inventory the EPC tags one by one.

No.	PC	EPC	CRC	CNT	Ant	Tempr(°C)	SerRssi	Tempr Average
01	30 00	00 00 00 00 00 00 00 00 00 00 41 02	13 12	31	00	18.1	28	

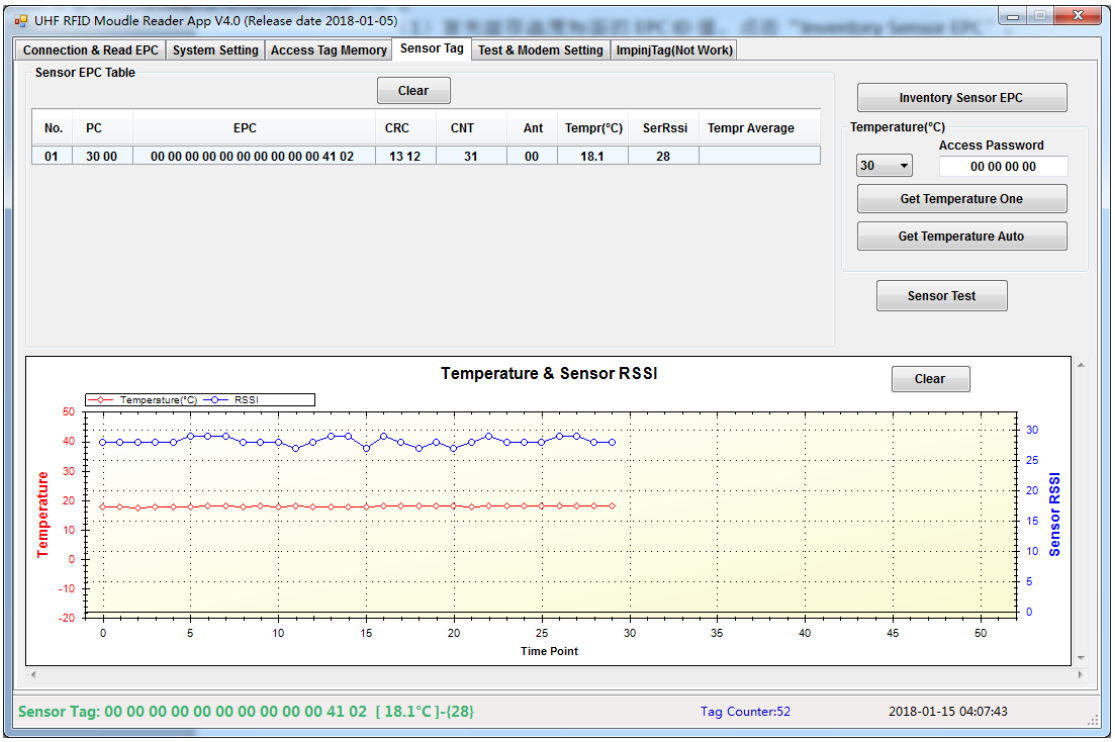
Picture66

Reading temperature tag “00 00 00 0000 0000 0000 00 41 02” 30 times as bleow:



Picture67

The Picture67 shows that the temperature value 18℃ in the red curve, SerRssi 28 on the blue curve.



Picture68

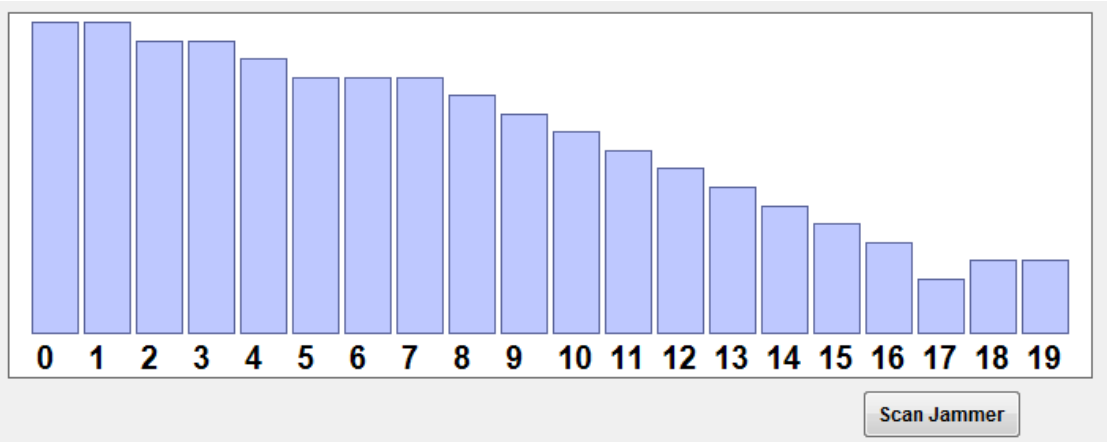
3.6.2 Get Temperature Tags Auto

“Get Temperature Auto”is the whole operation of“InventorySenosrEPC”and“Get Temperature One”.

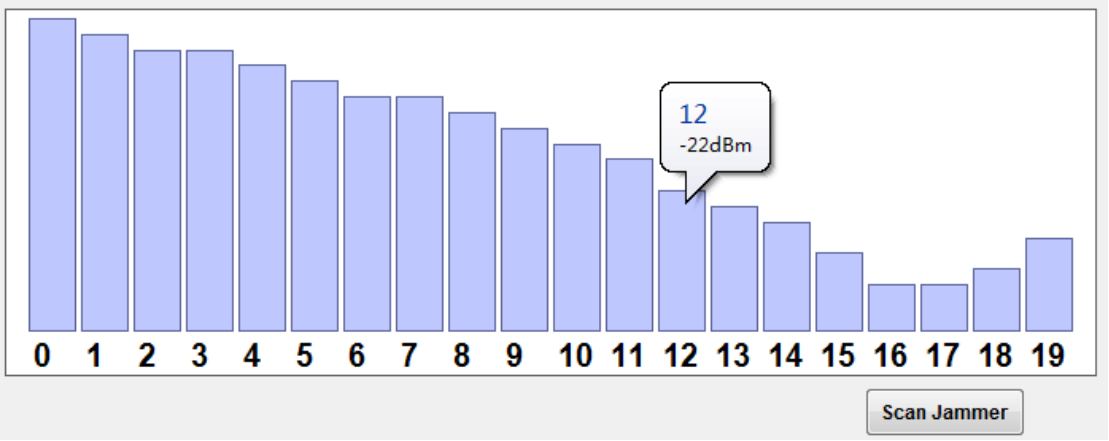
3.7 Test & Modem Setting

This section describes the block signal size (Scan Jammer) of each communication channel in the current region and the presence of a reader in the current environment（Scan RSSI）.

3.7.2 Scan Jammer

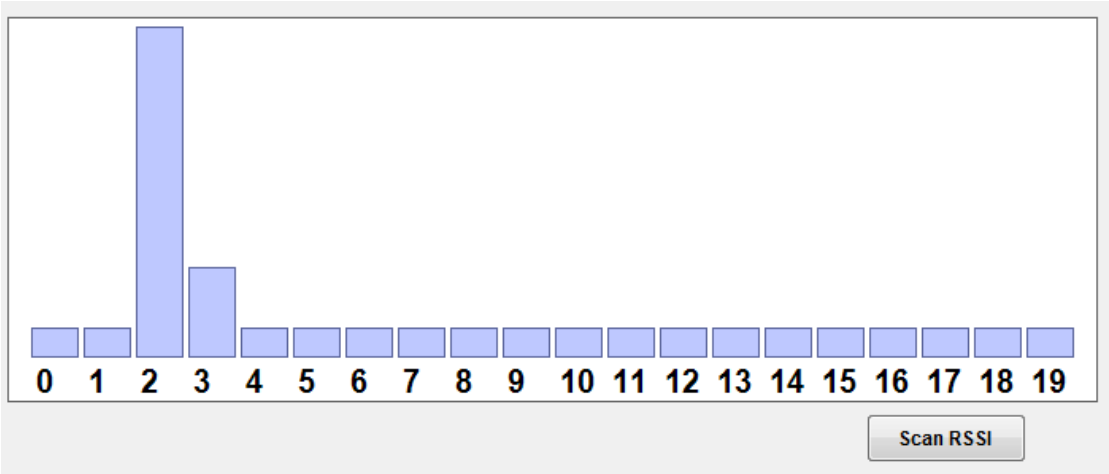


Picture69

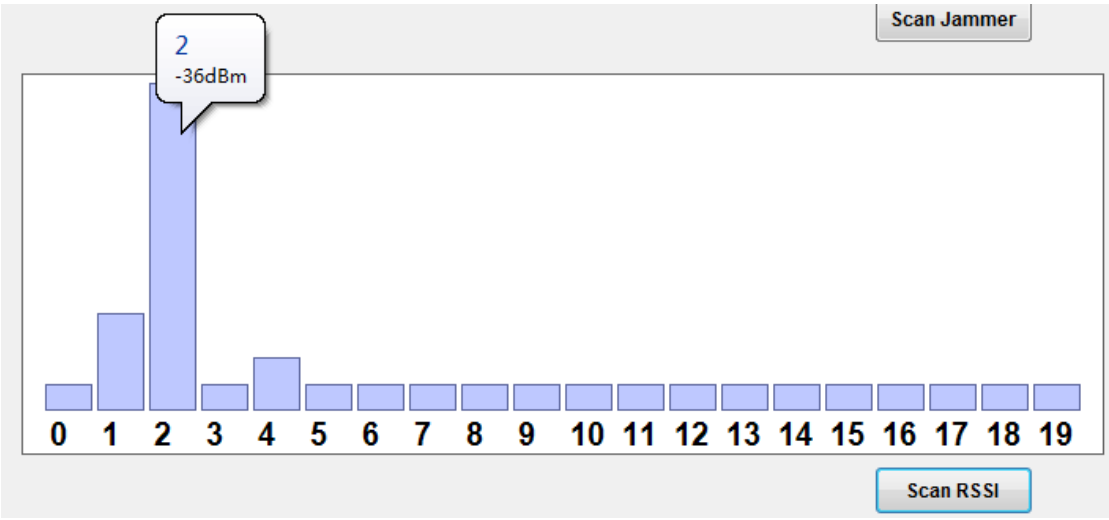


Picture70

3.7.3 Scan Jammer



Picture71



Picture72

The Picture71 and Picture72 show that the reader is occupying in the communication channel2.

3.7.4 Setup of Reader Frequency Modulation Chip

For some special application scenarios, it needs to change the RF parameters of the RF chip in the reader module to obtain the best application performance. However, for most users, this setting is not necessary. So I won't elaborate more detail here.

FCC **Caution:** Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) this device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.
This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.
If this equipment does cause harmful interference to radio or television reception,
which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
-- Reorient or relocate the receiving antenna.
-- Increase the separation between the equipment and receiver.
-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
-- Consult the dealer or an experienced radio/TV technician for help.
To maintain compliance with FCC’s RF Exposure guidelines, This equipment should be installed and operated with minimum distance between 20cm the radiator your body: Use only the supplied antenna.