Technical Document

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Standardization._____

Approve. _____

The list.

1. Overview.

【**RFIDStation**】is an operating software demo that designed for high frequency reader of ISO15693 and ISO14443 protocols. Users will understand the functions of high frequency reader products based on ISO15693 and ISO14443 protocols quickly through this software. This software Demo currently known to support bellow devices: M321、M321A、M321B、M324、M324U、M325、M325Y、M327、D322、D322p 、 D322p、D322ED322E、D322Y、D322SE、D322SY、D330S、D330N、D330L、D332、D332N、D334A、D343、D343X、D335X、R321、R321E、R321Y、R343D、R331、R331L、R3332、R332N 、R332A、R342、R342N、R345、R345H、R342、R343D、R342N etc.

2. Interface Introduction

Open【**RFIDStation**】, the interface is as Figure 2.1:

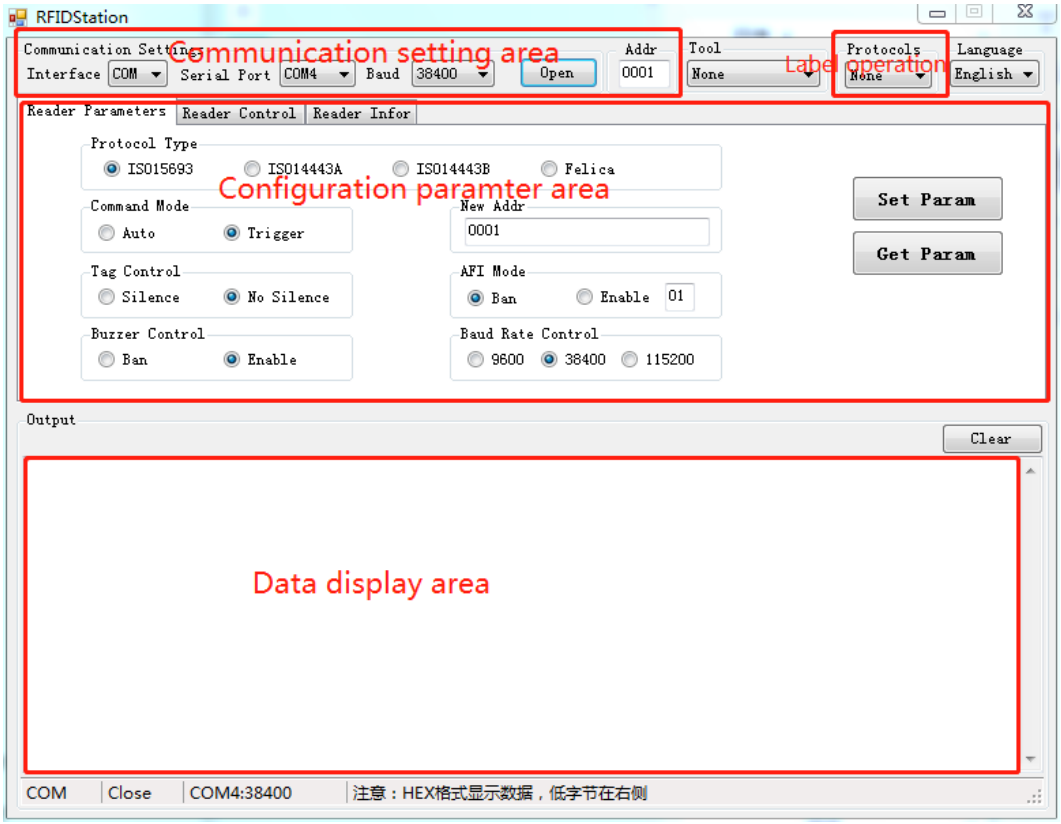

Figure 2.1 RFIDStation main interface

【**RFIDStation**】 It supports ISO15693 and ISO14443 A/B dual protocols. The main interface includes five areas: communication setting area, parameter configuration area, data display area, tools area and label operation area.

Communication setting area: Select USB, serial port (RS232/RS485) or network port (RJ45) according to the interface type supported by the reader.

Configuration parameter area: Configure the parameters related to ISO15693 and ISO14443 protocols.

Data display area: Displays communication data between the DEMO and the reader.

Label operation: Operates (read UID, read data block, write data block, etc.) label (supports ISO15693 or ISO14443 protocol).

The communication setting area, configuration parameter area, and the DEMO's UID reading, data block reading/writing and pass-through for ISO15693 and ISO14443A tags are described in more detail in a later section.

2.1 Communication settings

2.1.1 Serial Port settings

As shown in Figure 2.2, select “COM” for port. Please refer to the device manager for serial port selection. Select 38400-8-N-1 baud rate (factory default baud rate is 38400bit/s, fixed 8-bit data length, 1-bit stop bit, no parity bit). Ensure that the serial port cable is connected properly. Click "Open" to complete the serial port setting. The software reads the device version and displays it in the display area (example device: D334A).

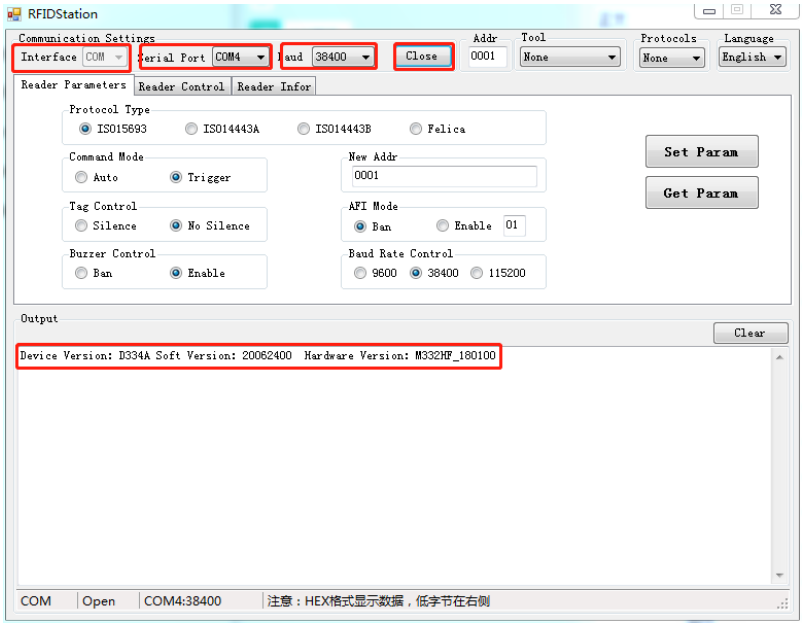

Figure 2.2 Serial Port settings

2.1.2 USB Port settings

As shown in Figure 2.3, select "USB" for port, click "open" to do the USB port settings. The software reads the device version and displays it in the display area (example device: R321). USB port supports simultaneous access of multiple devices.

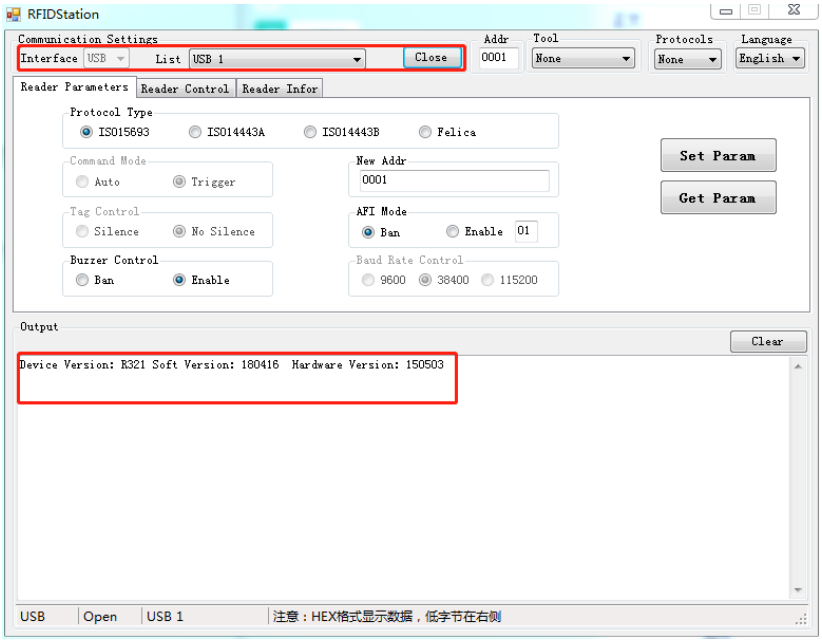

Figure 2.3 USB connector settings.

2.1.3 Network Port Settings

As shown in Figure 2.4, select “TCP” for port, fill in the device parameters for IP address and port. (IP address and port information can be looked up by using 【DeviceComTool】software’s Network Port Parameter Function. 【RFIDStation】only supports TcpSever mode. The IP address of the upper computer and the IP address of the device should be in the same network segment). Click “Open” to complete network port setting, and software reads the device version and displays it in the display area (example device: D322p) .

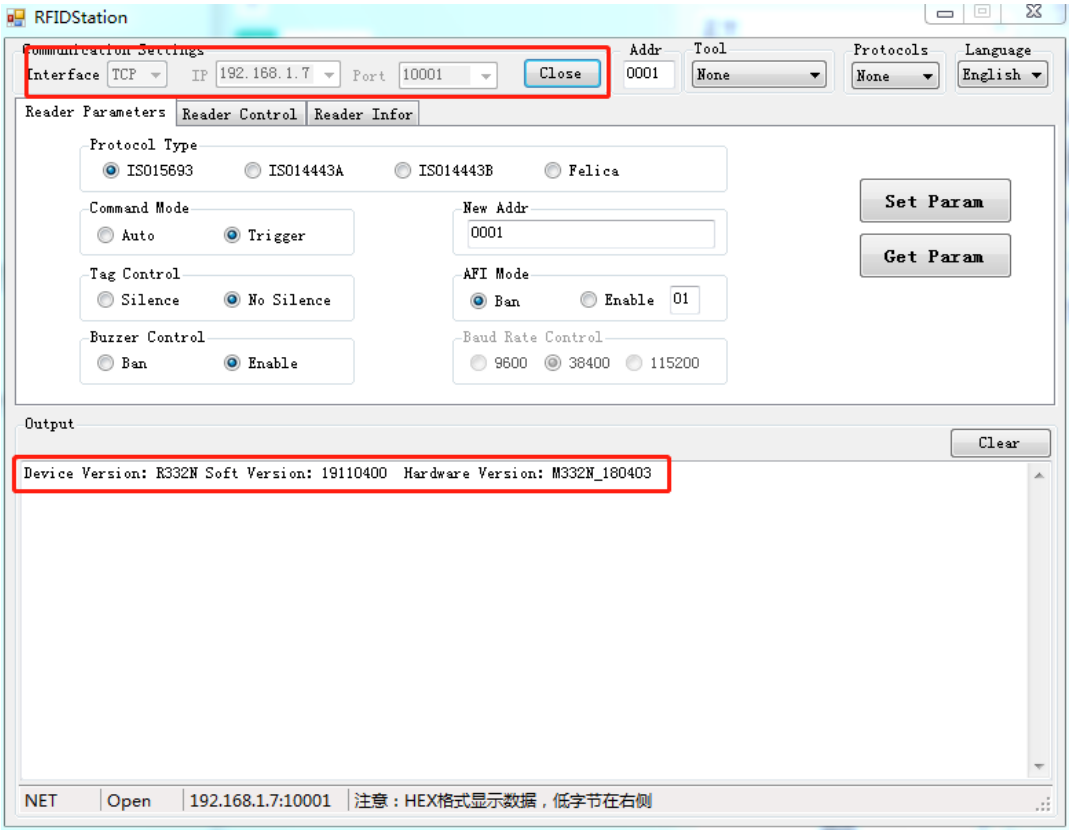

Figure 2.4 Network Port Settings

2.1.4 Communication Fault Handling

If there is no communication between the device and Demo when in use, fault handling is as below:

① If it is serial port connection mode, check whether the COM port of the device is correctly selected (check through device management), and whether the baud rate is selected correctly (the general factory configuration is 38400bit/s. If the baud rate communication fails, select 3 baud rates to try to communicate). Set the device address the broadcast address: FFFF for troubleshooting.

② If it is network port cnnection mode, check whether IP address and port information are correct. (IP address and port information can be looked up by using 【DeviceComTool】software's Network Port Parameter Function. 【RFIDStation】only supports TcpSever mode.)

③ If both of the previous communication modes fail, restart the reader, restart the Demo, and then try the communication again;

④ Check whether the serial port cable itself can communicate well;

⑤ Check whether the port of the upper computer is correctly connected;

⑥ Check whether the device's IP address conflicts with the upper machine or whether it is in the same network segment.

2.2 Parameter configuration

The parameter configuration consists of three parts:

The first part includes the selection of “protocol type”, “command mode”, “label control” and “buzzer control”.

The second part includes the setting of "device new address", "AFI mode", and "baud rate control".

The third part includes "set parameters" and "get parameters".

When users use it for the first time, please click "get parameters" to view the parameter configuration of the reader. After that, users can select parameters according to their own requirements, and click "set parameters" to complete parameter settings.

The definition of specific parameters is shown in the table below:

Parameters	Options	Description
Protocol Type	ISO 15693	Select the ISO 15693 protocol as needed
	ISO 14443A	Select the ISO 14443A protocol as needed
	ISO 14443B	Select the ISO 14443B protocol as needed
Command mode	Automatic	When the RF is turned on, the reader automatically sends the Inventory command to count the labels
	Trigger	After the RF is turned on, the reader waits for the command to count labels
Label control	Silent	After the reader gets the label UID, it sets the label silent so that the label no longer responds to the reader's Inventory command unless the label leaves the antenna RF field and then enters again
	Not silent	After the reader gets the label UID, the label still responds to the reader's Inventory command, which is typically used to test the

		reading distance of the label
Buzzer control	Ban	The buzzer does not respond (no sound) when the reader recognizes the label for the corresponding protocol
	Enable	When the reader recognizes the label for the corresponding protocol, the buzzer responds (with a “beep”)
Device address	0x0000~0xFFFF	Reader device address, where 0xFFFF is the broadcast address
AFI mode	Ban	AFI domain is banned in inventory command fram
	Enable	AFI domain is enabled in inventory command fram
Baud rate control	9600	Baud rate: 9600 bit/s .
	38400	Baud rate: 38400 bit/s .
	115200	Baud rate: 115200 bit/s .

2.2.1 Short range ISO15693 reader parameters

As shown in figure 2.5, select “ISO15693” for protocol type, “trigger” for command mode, “silent” for label control, “enable” for the buzzer, “banned” for AFI mode, 38400 for baud rate. After these settings, click “parameter configuration” to complete the configuration of ISO15693 protocol.

Figure 2.5 ISO15693 parameter configuration

Then select “ISO15693” protocol as shown in figure 2.6, and an “ISO15693” label operation window pops up as shown in figure 2.7.

Figure 2.6 Label Operation selection

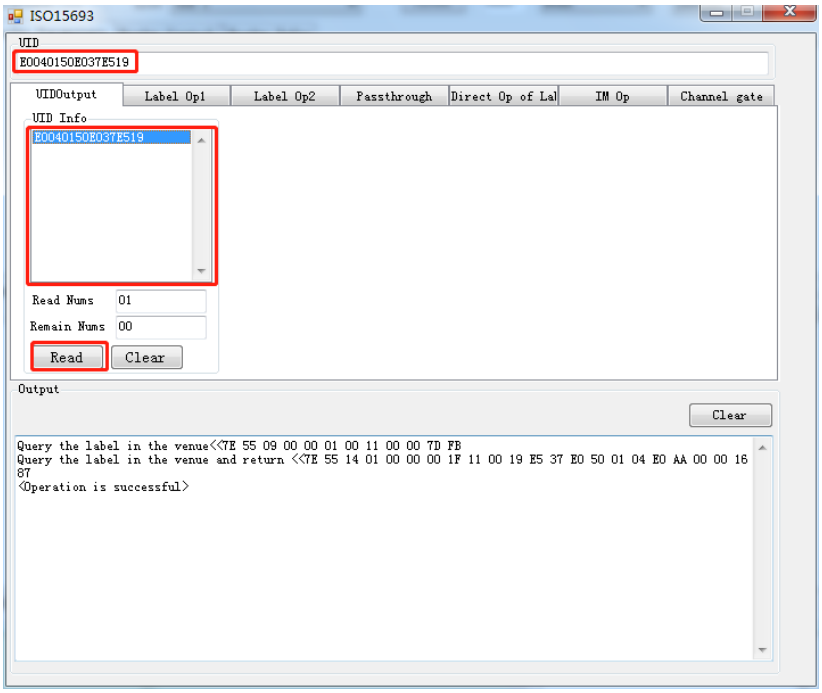

Figure 2.7 ISO15693 Label Operation window

Attention:

① **If ISO15693 label operation window shown in Figure 2.7 was closed unexpectedly during operation, click the label operation selection box shown in Figure 2.6 again.**

2.2.2 Middle range and long range ISO15693 reader parameters

As shown in figure 2.8, select “ISO15693” for protocol type, “automatic” for command mode, “silent” for label control, “enable” for the buzzer, “banned” for AFI mode, 38400 for baud rate. After these settings, click “parameter configuration” to complete the configuration of ISO15693 protocol.

Figure 2.8 ISO15693 parameter configuration

Then select “ISO15693” protocol as shown in figure 2.9, and an “ISO15693” label operation window pops up as shown in figure 2.10

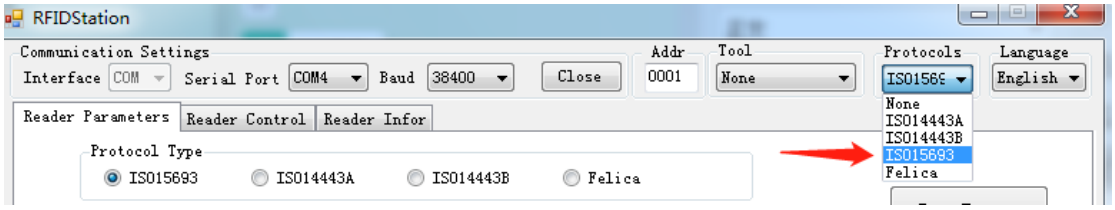

Figure 2.9 Label Operation selection

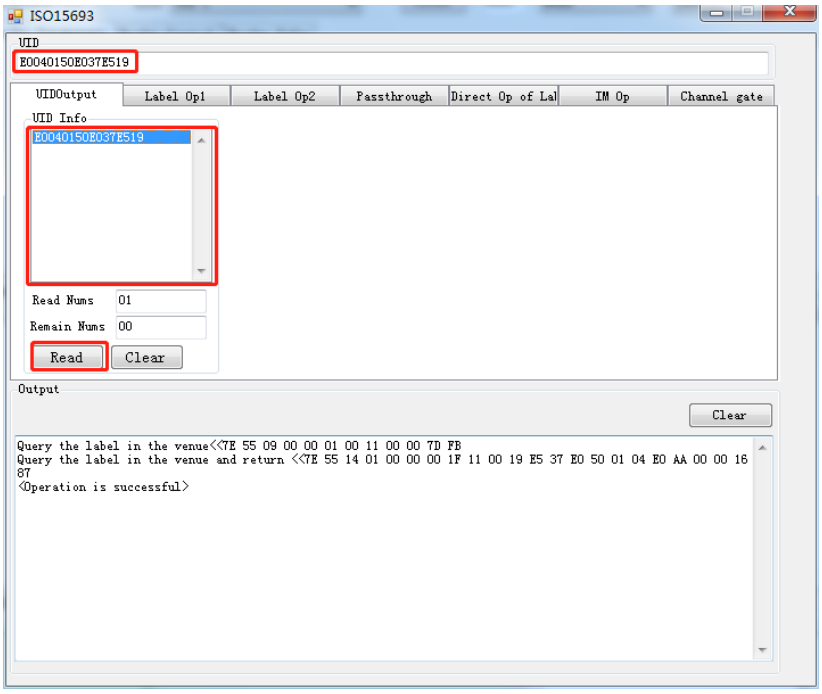

Figure 2.10 ISO15693 Label Operation window

Attention:

① **If ISO15693 label operation window shown in Figure 2.10 was closed unexpectedly during operation, click the label operation selection box shown in Figure 2.9 again.**

② **Not all devices support reading data stored in the reader, i.e. it is possible that the UID information reading failed.**

2.2.3 ISO14443 parameter configuration

As shown in figure 2.11, select “ISO14443A” for protocol type, “trigger” for command mode, “no silent” for label control, “enable” for the buzzer, 38400 for baud rate. After these settings, click “parameter configuration” to complete the configuration of ISO14443 protocol. (below device D322 as example)

Figure 2.11 ISO14443 protocol reader configuration

Then select “ISO14443A” protocol as shown in figure 2.12, an “ISO14443A” label operation window pops up as figure 2.13.

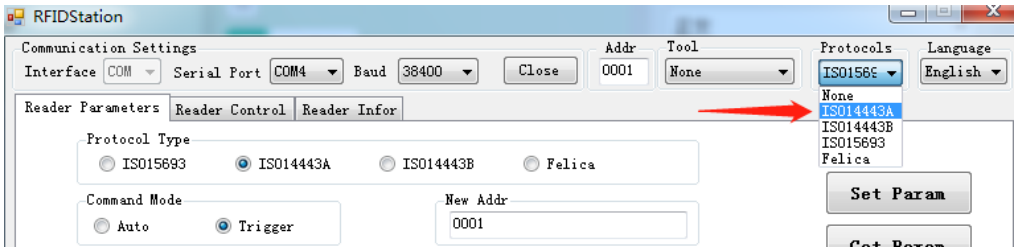

Figure 2.12 Label Operation selection

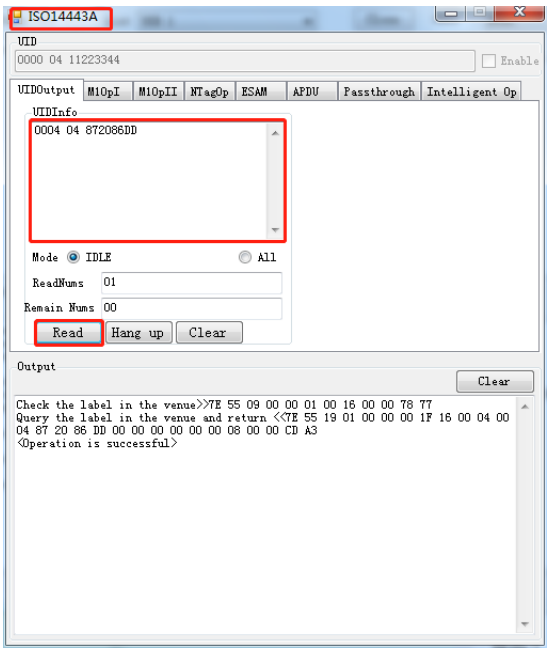

Figure 2.13 ISO14443 Label Operation window

Attention:

If ISO14443 label operation window shown in Figure 2.13 was closed unexpectedly during operation, click the label operation selection box shown in Figure 2.12 again.

2.3 Reader control

As shown in figure 2.14, reader control interface is composed of three areas: RF control, antenna control and power control.

RF control: turn on/off RF output; reset RF. (start RF output 20ms after RF is turned off)

Antenna control: Number of antennas should be the same as device actual number of antennas, so that the antenna to be connected can be selected.

Power control: select the number of corresponding antenna, and set the level of power (from low to high **LV0、LV1、LV2、LV3**).

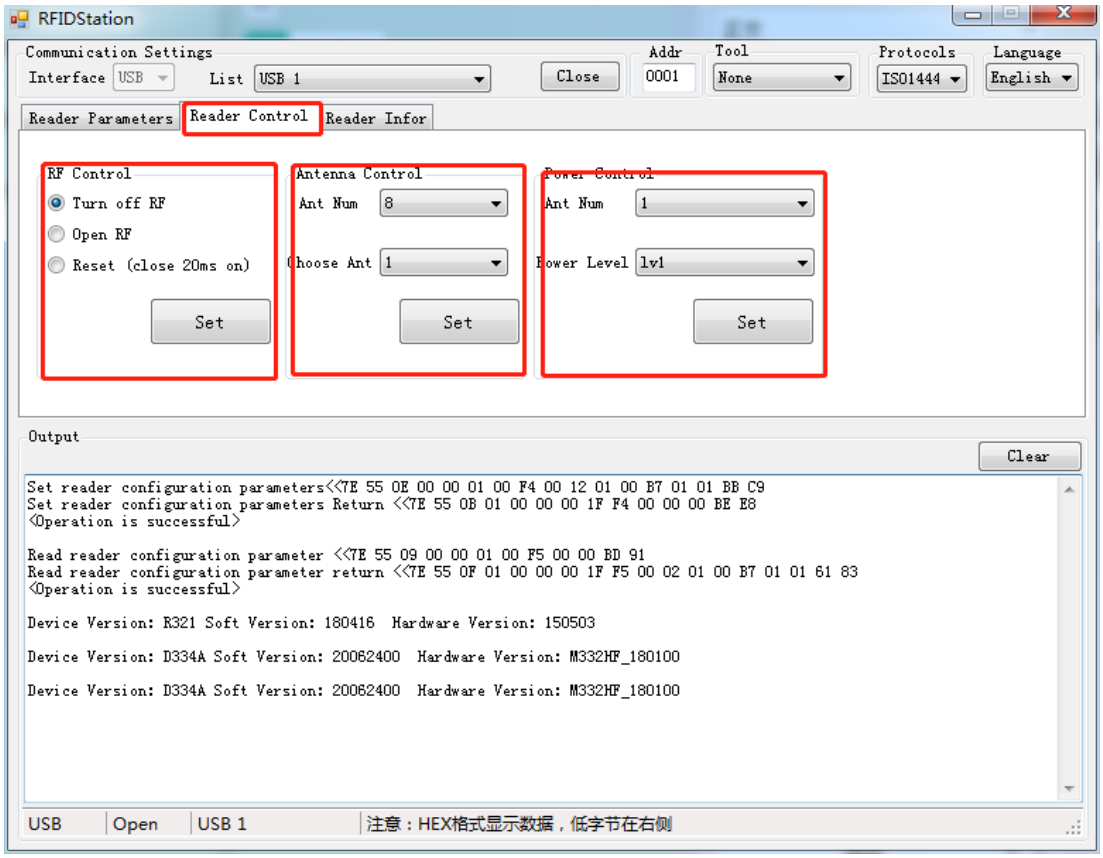

Figure 2.14 Reader control

Attention:

① **Only multiple antennae supported devices have antennae control fuction, otherwise it is invalid;**

② **Only power adjustable devices have power control function, otherwise it is invalid.**

2.4 Reader information

After the device is connected successfully, device and software and hardware

information can be obtained by click “OK” button in “reader information” area, as shown in figure 2.15.

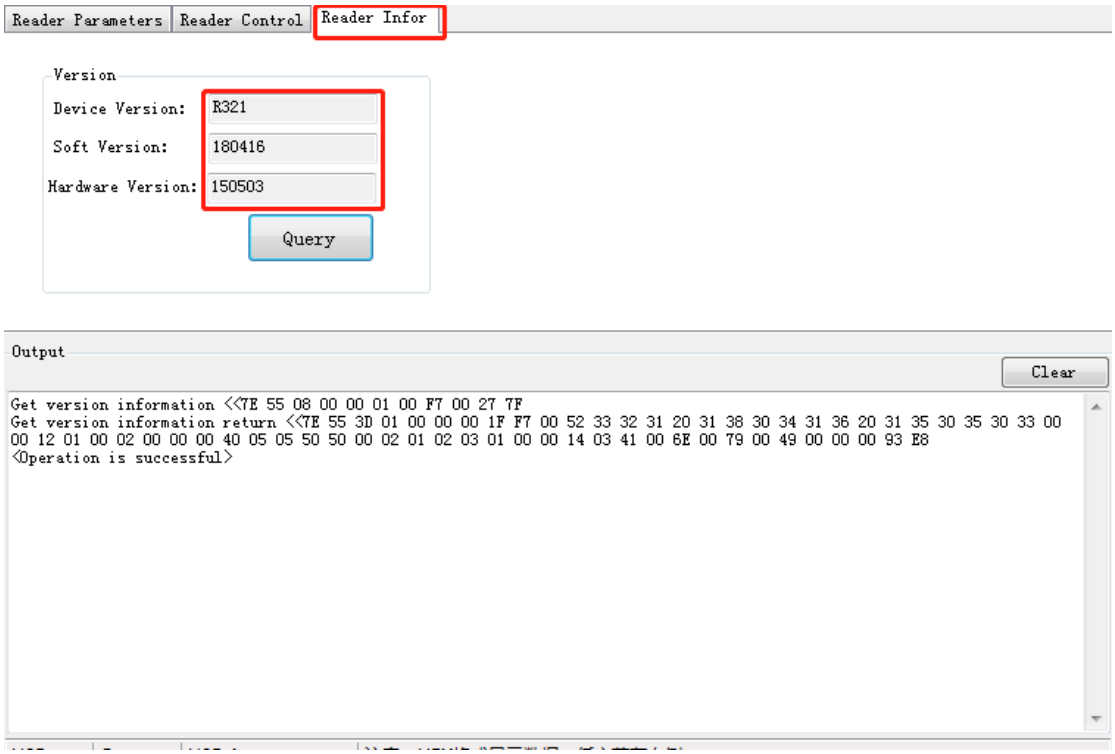

Figure 2.15 Reader control

3. Label operation

3.1 ISO15693 label operation

Based on ISO15693 parameter configuration according to chapter 2.2.1, ISO15693 label operation function of the software is introduced as blow.

3.1.1 UID output

Put an ISO15693 label in reader working field. Set up the parameters, reset RF, and click “read” button in ISO15693 operation frame, UID read displays in “UID information” frame, as shown in figure 3.1. (device D322 as example)

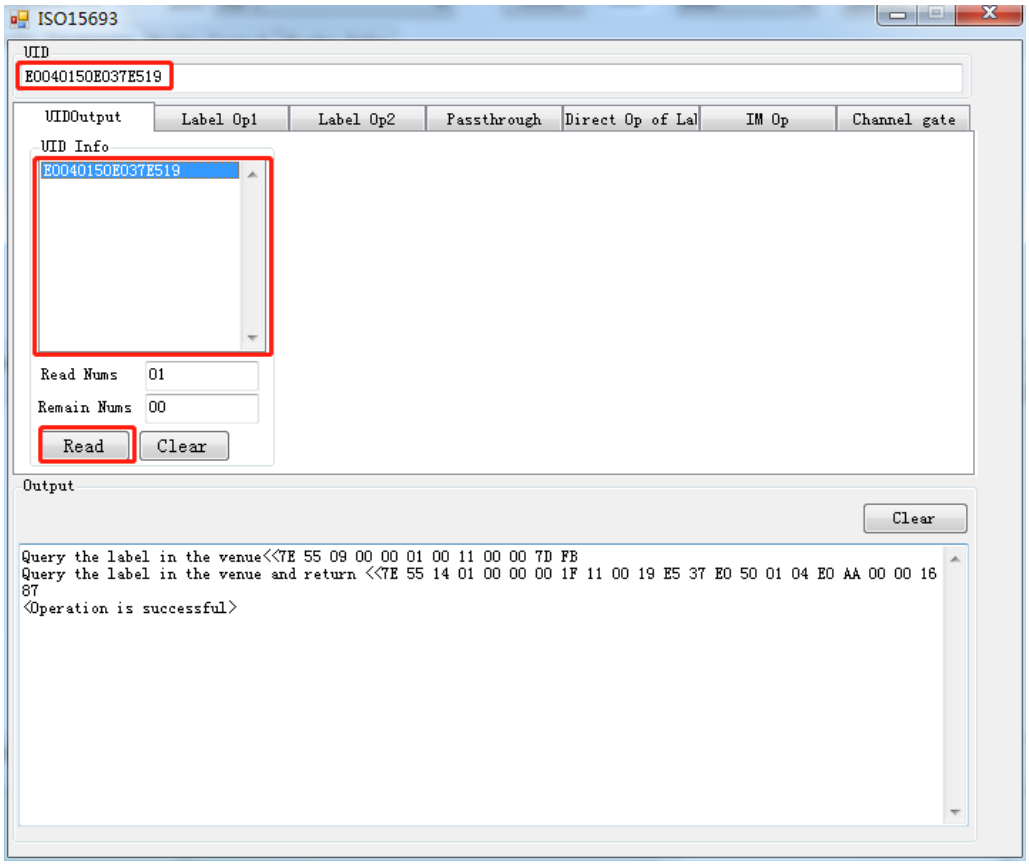

Figure 3.1 read ISO15693 UID

3.1.2 Label operation 1

Read data block: a label’s UID must be selected before the label’s data block is read. (as shown in figure 3.1, click “label UID” in “UID information frame” with left mouse button, “UID information” frame on top changes to the label UID). Click “read”, and “data” frame displays label’s data block, as shown in figure 3.2.

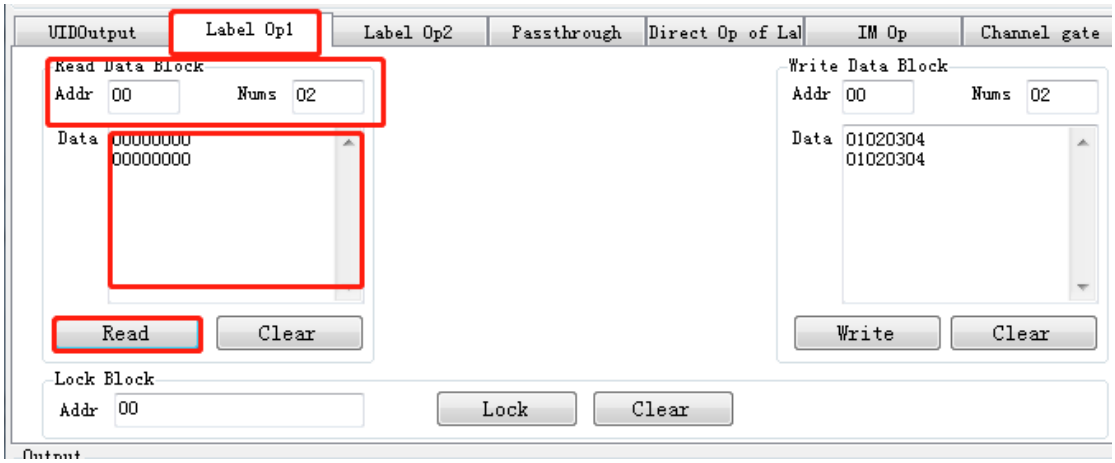

Figure 3.2 Read label's data block

Attention：as shown in figure 3.2, when inputting data block's head address and block number, the data format should be hexadecimal, and the data length should be 1 byte.

Write data block： a label's UID must be selected before the label's data block is written (as shown in figure 3.1, click "label UID" in "UID information frame" with left mouse button, "UID information" frame on top changes to the label UID). Click "write". Data block is written successfully if the return result of multiple blocks writing in "output" frame is not blank. As it is shown in figure 3.3.

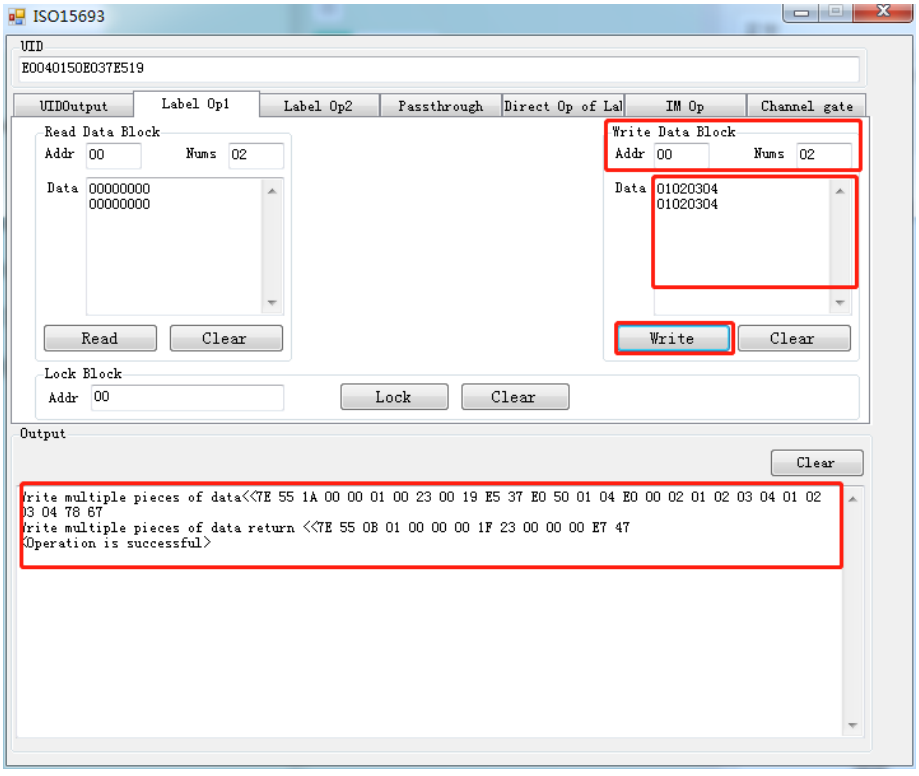

Figure 3.3 write ISO15693 data block

Attention：as shown in figure 3.2, when inputting data block's head address and block number, the data

format should be hexadecimal, and the data length should be 1 byte.

① **Data format written in label is hexadecimal;**

② **The length of a data block is 4 byte, so the length of the data written in a “data” frame must be 4 times of the number of blocks;**

③ **Block address must be within the label's actual memory address;**

④ **If the address of the data block to be written to the label is locked and cannot be written, the "output" frame shows that the write multiple data block returns blank;**

⑤ **The lock block operation is irreversible. Once the data block of the label is locked, the address corresponding to the label will never be written into data.**

3.1.3 Label operation 2

As shown in figure 3.4, “label operation 2” is composed of four areas: AFI operation, EAS operation, DSFID operation and information acquisition.

AFI operation: input data format should be hexadecimal, and the data length should be 1 byte. Operation is irreversible.

EAS operation: electronic anti-theft system.

DSFID operation: input data format should be hexadecimal, and the data length should be 1 byte. Operation is irreversible.

Information acquisition：click “OK” and get label information.

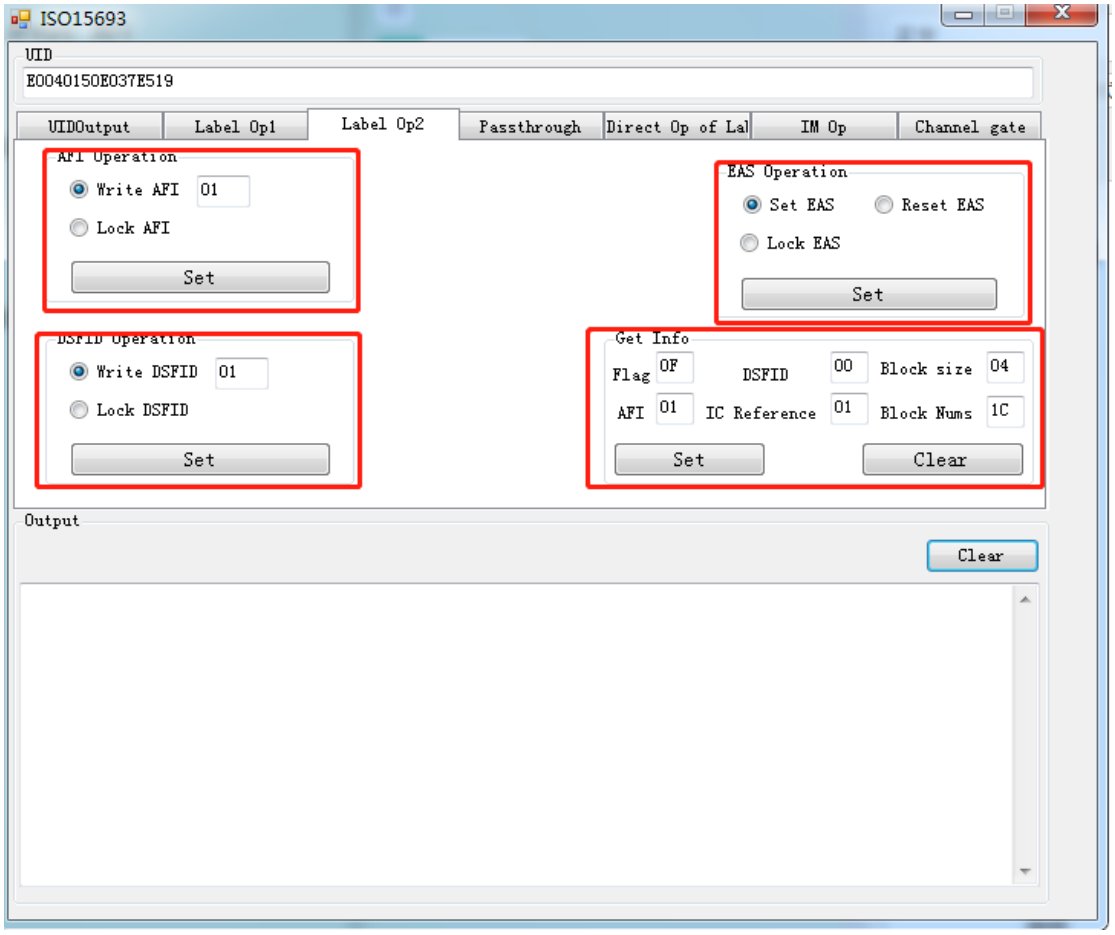

Figure 3.4 ISO15693 label special function mark operation

3.1.4 Passthrough

Passthrough function enables users operate the cards using readers directly. The operation specification must strictly comply with ISO15693 protocol. Open the Passthrough page, send the data frame to the label, and receive the information returned by the label. It is shown as figure 3.5. (device D322 as example)

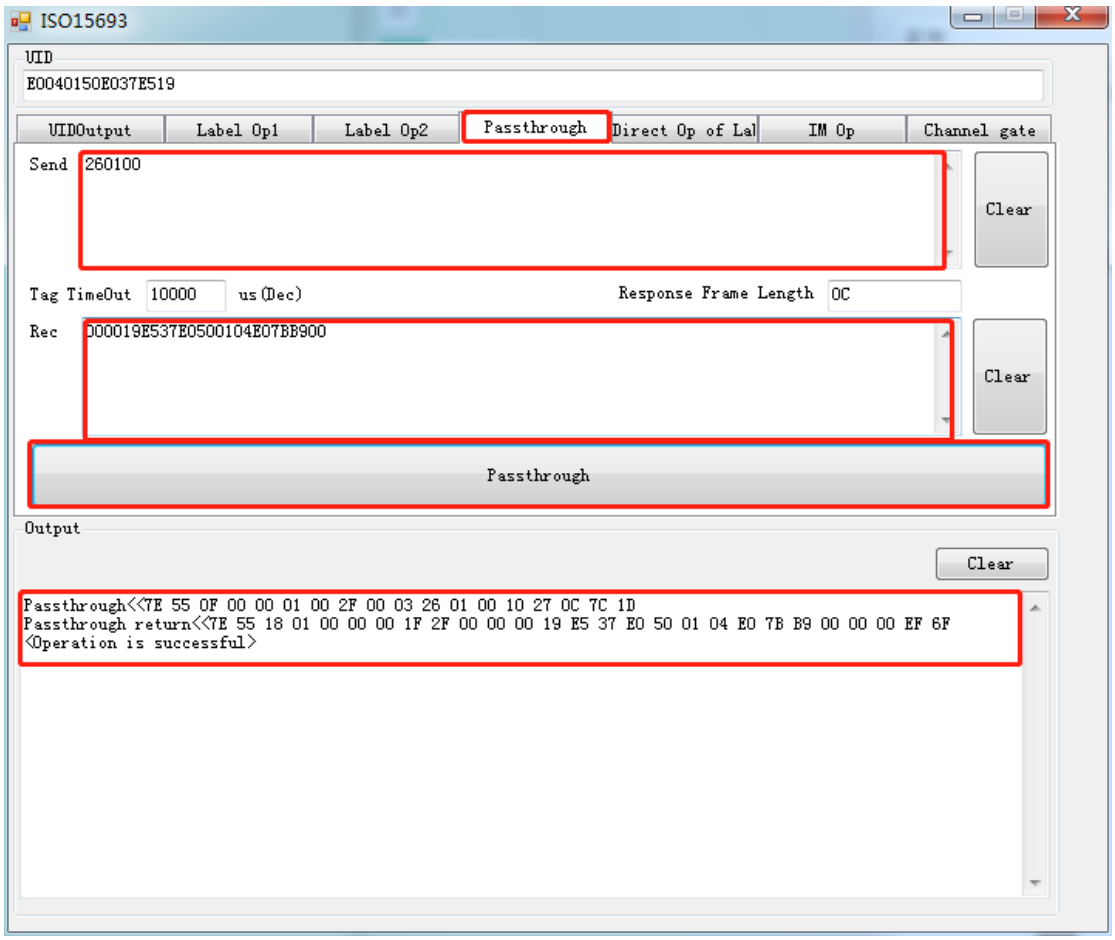

Figure 3.5 ISO15693 label passthrough

Attention:

① **Label response time:** $Inventory: 15000\mu s$, $Read: 15000\mu s$, $Write: 20000\mu s$

② data format is hexadecimal, and no interval between bytes, e.g.**120325**...

Examples:

UID: E00222252B831BE6

$Inventory$:

>>> 260100

<<< 0000E61B832B252202E0

Write – Block :

>>>2221E61B832B252202E00022222222

<<<00

Read – Block :

>>> 2220E61B832B252202E000

<<< 0022222222

Read – Inf :

>>> 222BE61B832B252202E0

<<< 000FE61B832B252202E000003F0322

3.1.5 Direct operation of labels

As it is shown in figure 3.6, this function can operate batch label directly such as UID reading, data block reading, data block writing, AFI writing without reading label UID first (support multiple label devices). This function is applicable to some of the M-series, D-series and R-Series devices supporting ISO15693 protocol. (D322、D322p、D322E、D322Y、D322SE、D322SY、D330S、D330N、D330L、D332、D332N、D343、D343X、D335X、R343D etc.）

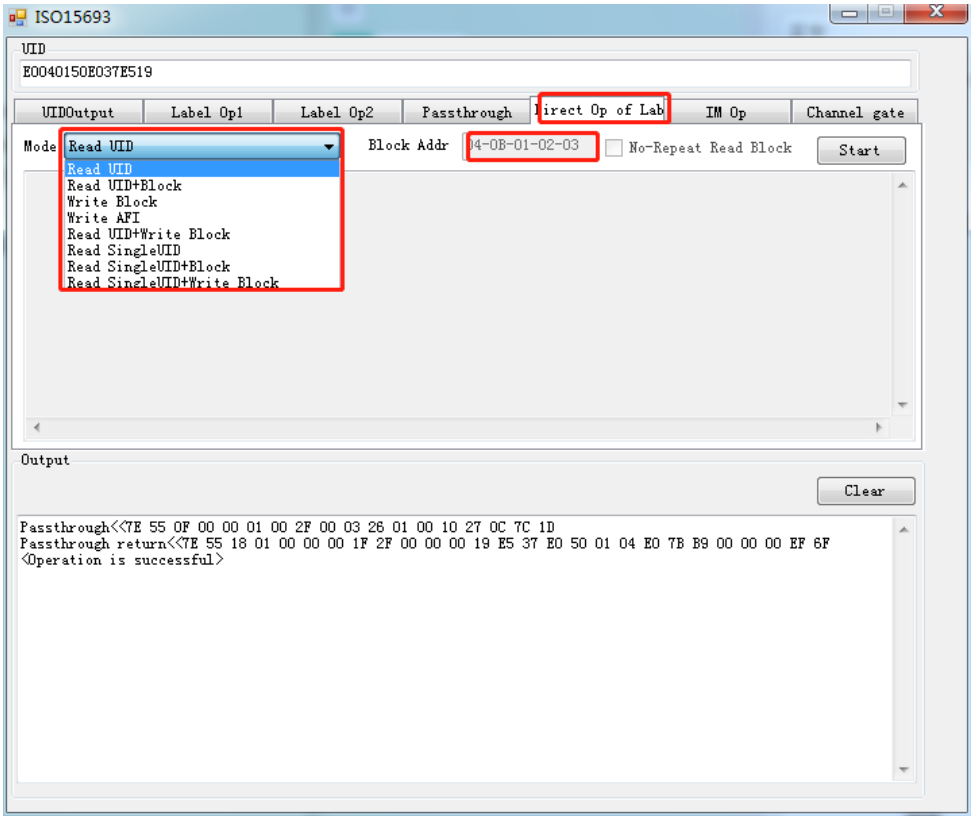

Figure 3.6.0 Function select

UID reading: After the device communicates with the upper computer normally, put the label in the device's working field, and click "start" to output the label UID and time used.

Block reading：After the device communicates with the upper computer normally, put the label in the device's working field, and click "start" to output the label UID and time used. The block reading address and number can be set.

Block writing：After the device communicates with the upper computer normally, put the label in the device's working field, and click "start" to output the label UID and time used. The block reading address and number can be set.

AFI writing：AFI value can be written in the range of 0-255. After the device communicates with the upper computer normally, put the label in the device's working field, and then input AFI value, and click "start" to output the label UID and time used.

3.1.6 IM operation

As it is shown in figure 3.7, this function enables batch labels operation (use multiple labels supported devices) of UID reading, data block reading without reading the label UID first. This function is applicable to some R-Series devices of our company that support ISO15693 protocol（R332、R332N 、R342、R342N、R345、R345H etc.）

UID reading: After the device communicates with the upper computer normally, put the label in the device's working field, and select the antenna to work (it can be single antenna or multi round scanning antenna). Click "start" to output the label UID and time used.

Block reading： After the device communicates with the upper computer normally, put the label in the device's working field, and select the antenna to work (it can be single antenna or multi round scanning antenna). Click "start" to output the label UID and time used. The address and number of read blocks can be set.

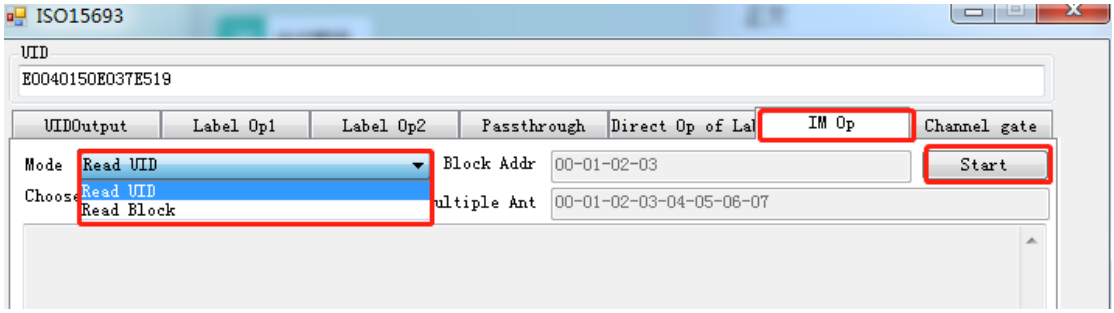

Figure 3.7 label reading of IM operation

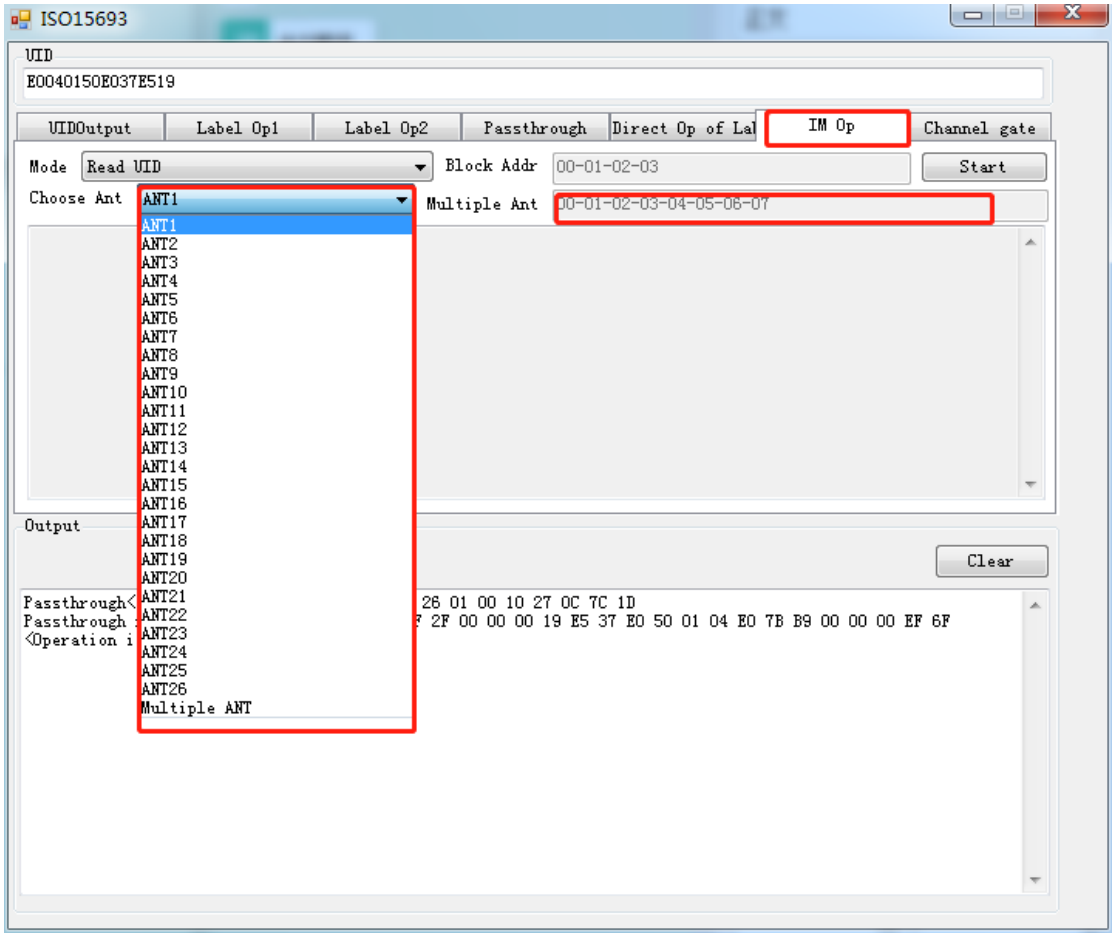

Figure 3.8 select antenna to work of IM operation

Attention：

① **To avoid antenna damage, do not turn on the RF to the port which doesn't connected to an antenna.**

② **Process of multiple antennae turning: select antenna——reset RF——counting label times completed or timeout——turn off RF——switch antenna**

3.1.7 Channel gate

As it is shown in figure 3.9, make single select or multiple select to the antennae 口 ports (corresponding to the antenna connected with the reader). Click “set” so that the selection is confirmed. Select “enable scan antennae” and confirm selection. Click “start display alarming UID”, as a result label UID is displayed. This function is applicable to some R-Series devices of our company that support ISO15693 protocol (R342、R342N etc.).

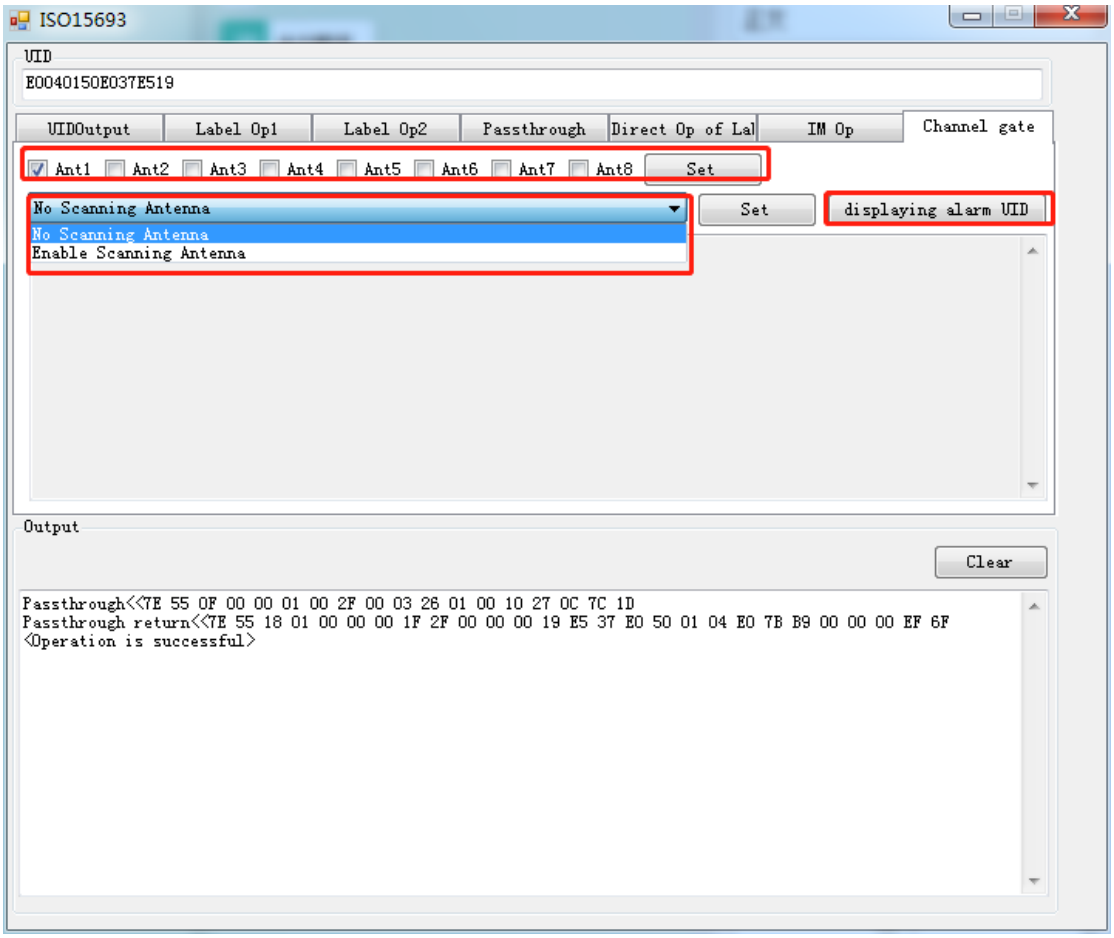

Figure 3.9 select antenna

"Disable scanning antenna / enable scanning antenna" is to turn off and turn on antenna scanning function respectively. Select "enable scanning antenna", click "set", and the reader will start to install the selected antenna round scanning labels in antenna field.

"Start displaying alarm UID" is a special AFI alarm function, which gives alarm prompt to the label with specific AFI value written in, and displays its UID in the output port below.

3.2 ISO14443A label operation

Based on ISO14443A parameter configuration according to chapter 2.2.2, ISO14443A label operation function of the software is introduced as blow.

3.2.1 Information output

Put an ISO14443A label in reader working field. Set up the parameters, and click "read" button in ISO14443A operation "UID output" frame. UID read displays in "UID information" frame, as shown in figure 3.10. (device D322 as example)

Read UID sending instruction: REQA-AC-SELECT three instructions. If the UID is read successfully, the label will be in active state. If the first read UID is successful, the second read UID will send the same instruction. According to ISO14443A protocol, the label returns to the IDLE state, so the read fails.

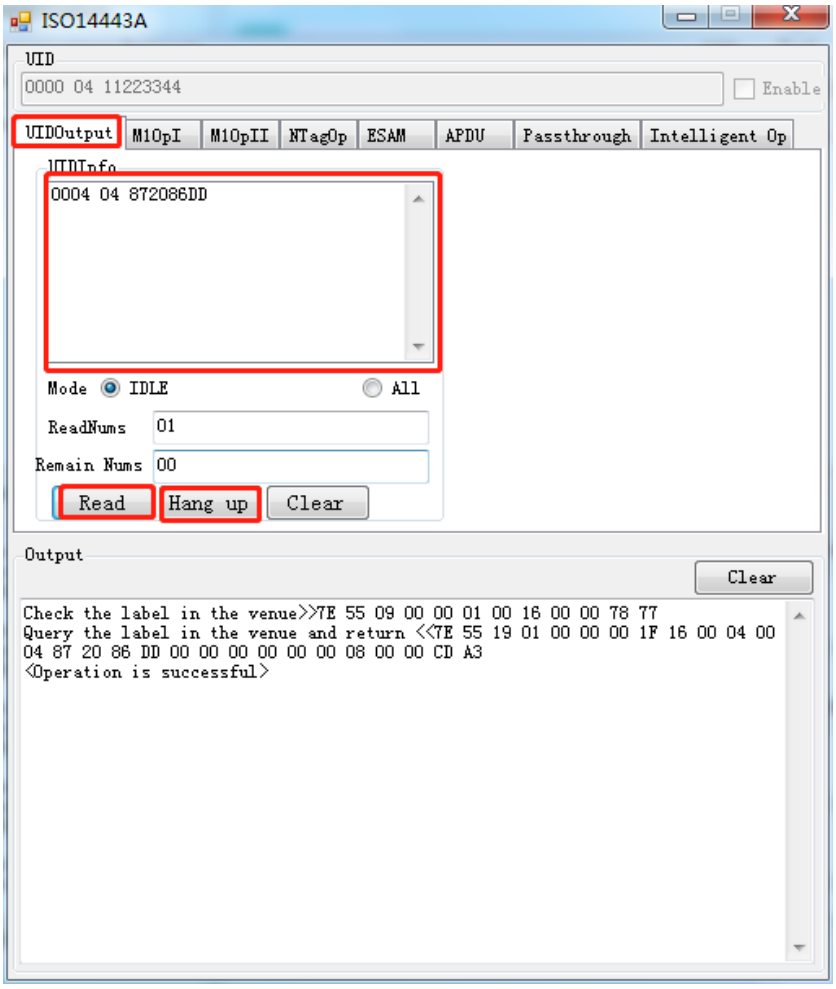

Figure 3.10 read ISO14443A label UID

Attention:

① **Read: this operation (read label UID) is a necessary prerequisite for other operations;**

② **Suspend: the suspended label will not be able to perform other operations (unless you return it to the factory to read the label UID after leaving the factory; or change the label mode to “ALL”l). Please refer to ISO14443A protocol for details.**

3.2.2 M1 operationI

Data block writing: in **M1 operationI,** write the head "address" of the data block. The key type (**KeyA/KeyB**) and key (6 bytes) strictly comply with ISO14443A protocol (label factory default key: FFFFFFFFFFFF). Click the "write data block" button, the "output" window returns "operation successful", which indicates that the write data block is successful.

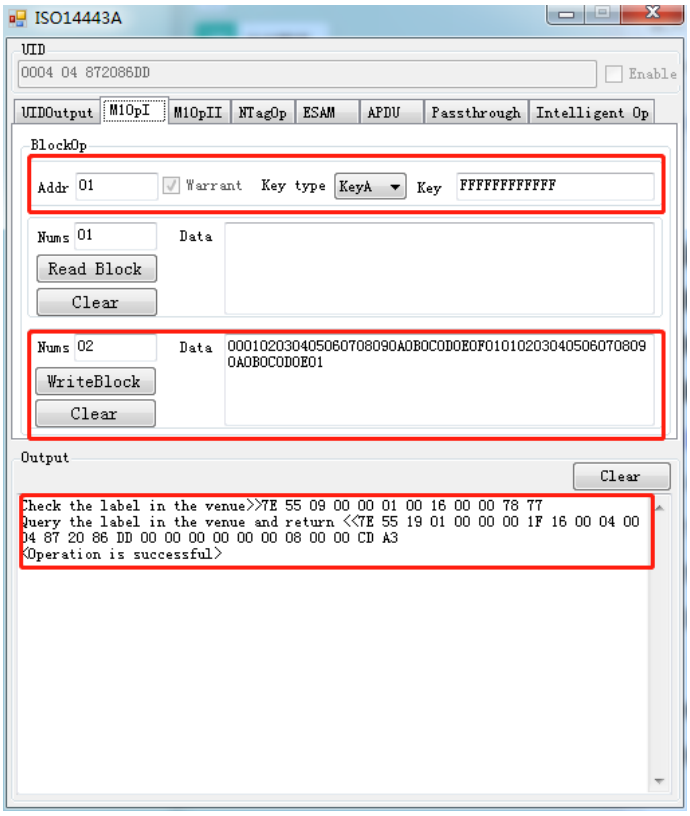

Figure 3.11 write M1 data block

Attention：

① **Before this operation, the label UID must be read once (entering the third layer), and after the operation error, the label UID must be read again;**

② **The input data format is hexadecimal;**

③ **Block 3 of each sector is the cipher area, which should be written carefully. As shown in Figure 3.12;**

④ **Block 0 of sector 0 is the manufacturer flag code. If you fill in 00 in the address column, a write error will occur. Then a startover from reading UID is needed after the error;**

⑤ **The block address must be within the label's actual memory address. The number of blocks has been set to 1 by default. One block (16bytes) is written at a time.**

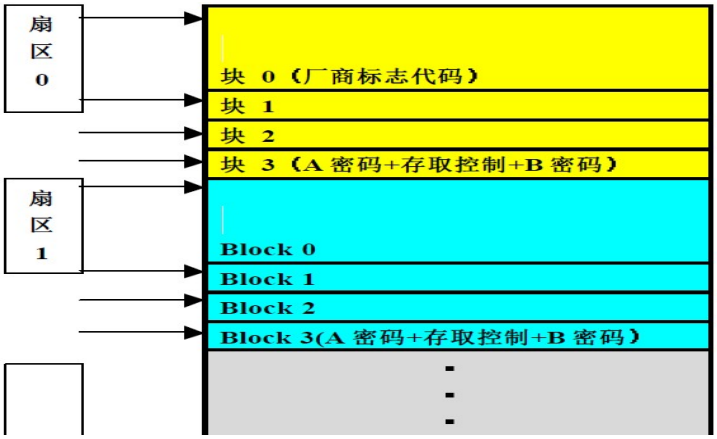

Figure 3.12 M1 card storage structure

Read data block：in **M1opertion I,** write the head "address" of the read data block. The key type (**KeyA/KeyB**) and key (6 bytes) strictly comply with ISO14443A protocol (label factory default key: FFFFFFFFFFFF). Click the "read data block" button, the "output" window returns "operation successful", which indicates that the read data block is successful. As shown in figure 3.13.

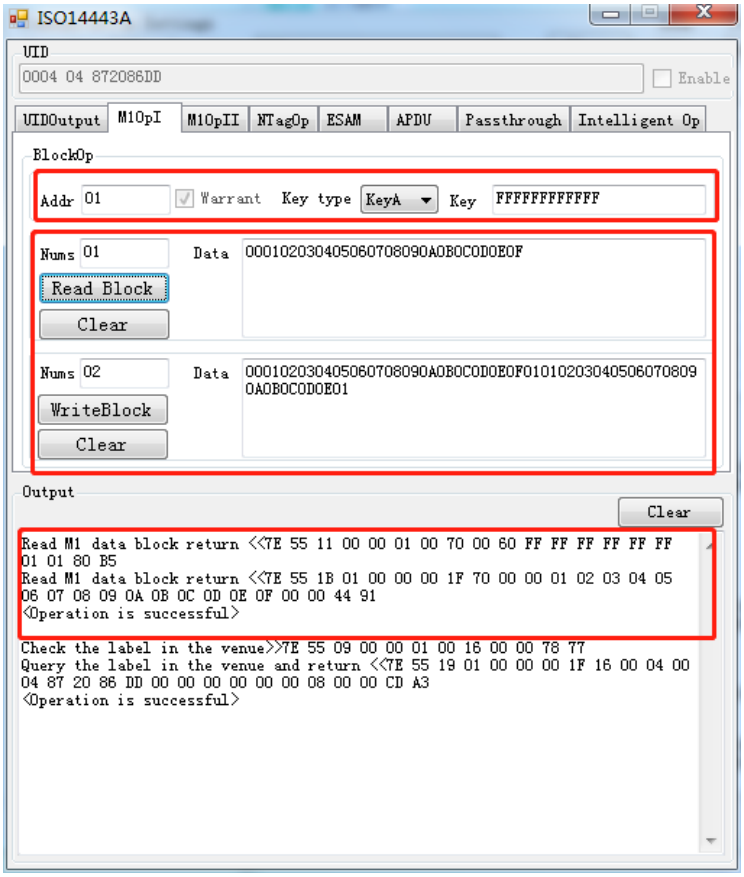

Figure 3.13 read data block

Attention：

① Before this operation, the label UID must be read once (entering the third layer), and after the

operation error, the label UID must be read again;

② **The block address must be within the label's actual memory address. The number of blocks has been set to 1 by default. One block (16bytes) is read at a time.**

3.2.3 M1 operation II

As shown in figure 3.14, in **M1opertion II,** write the head "address" of the value operation. The key type (**KeyA/KeyB**) and key (6 bytes) strictly comply with ISO14443A protocol (label factory default key: FFFFFFFFFFFF). Click “read value, write value, decrease value, add value, transfer” button, and the "output" window returns "operation successful", which indicates that the value operation is successful.

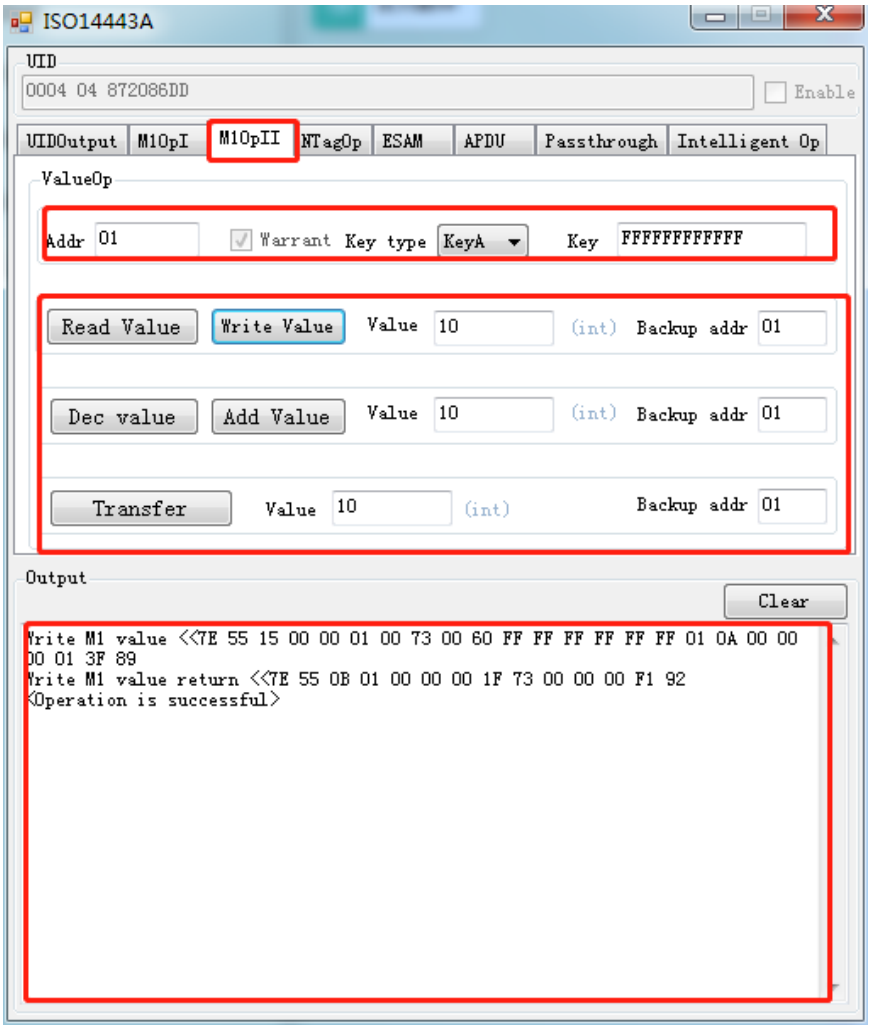

Figure 3.14 M1operation II

Attention：

① **Before this operation, the label UID must be read once (entering the third layer), and after the operation error, the label UID must be read again;**

② **This value address and data block address are not of the same concept.**

3.2.4 NTag operation（M0 operation）

Read data page: Write the head "address" and "number" of the data page, click the "read data page" button, and "success" in the "output" window indicates that the data page is read successfully. As shown in Figure 3.15.

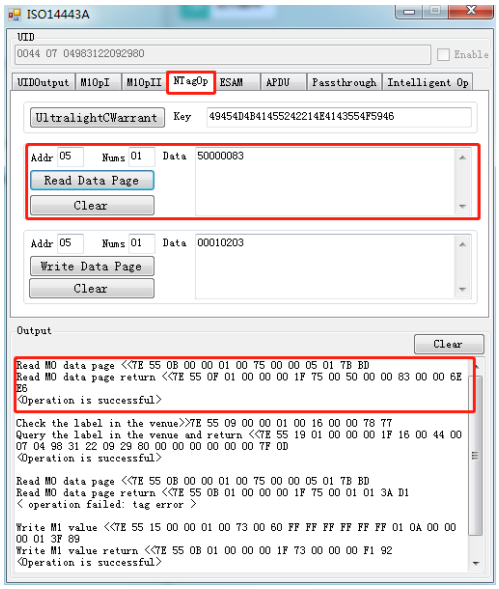

Figure 3.15 read M0 label data page

Write data page: Write the head "address" and "number" of the read data block. Click the "write data page" button, and "success" is returned in the output window, indicating that the data page is successfully written, as shown in Figure 3.16.

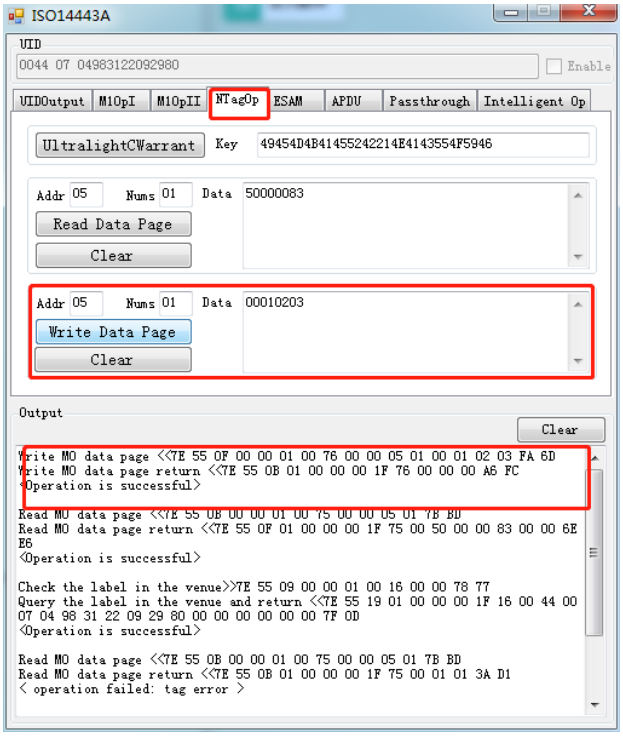

Figure 3.16 M0 label write data page

Attention：

① **Before this operation, the label UID must be read once (entering the third layer), and after the operation error, the label UID must be read again;**

② **The input data format is hexadecimal, and M0 card data page address starts from 04;**

③ **The page address must be within the label's actual memory address;**

④ **The length of the input data is 4 times of the number, that is, a data page is of 4 bytes.**

3.2.5 ESAM

As shown in figure 3.17, the function of this interface can control ESAM1/ESAM2 to power on, power off or reset (the device in this example is M327).

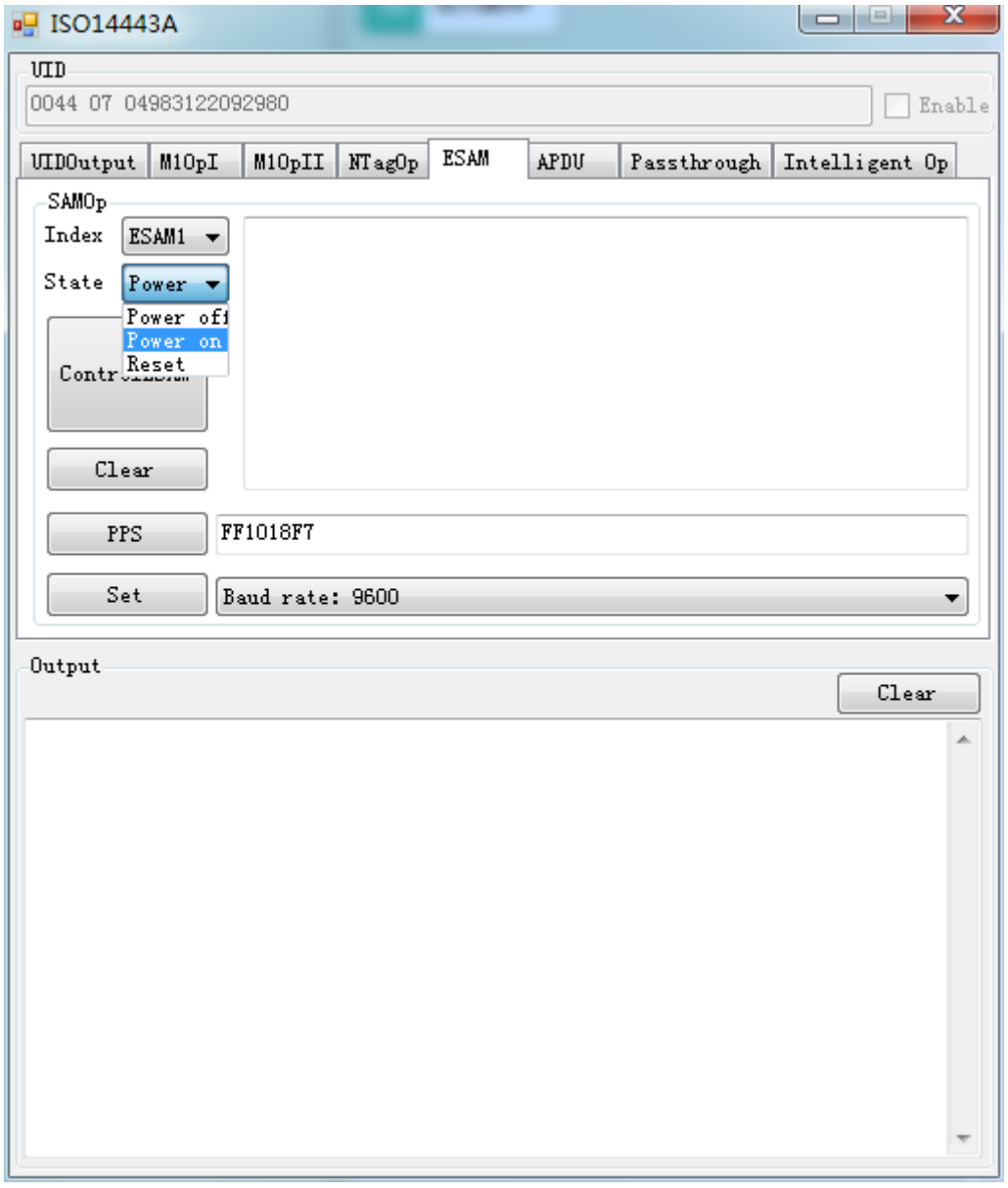

Figure 3.17 ESAM

3.2.6 APDU

As shown in figure 3.18, at this time, the test label is CPU card. Click "Rats", and the label information will be displayed in the display frame. For details, please refer to ISO / IEC 14443-4 protocol (example device: R321).

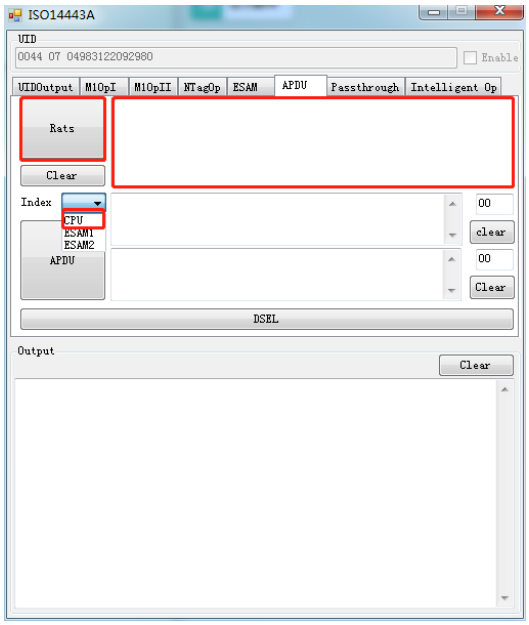

Figure 3.18 RATS

Attention：

① **Before this operation, the label UID must be read once (entering the third layer), and after the operation error, the label UID must be read again.**

As shown in Figure 3.19, select the index type to be communicated, edit the data in the data frame input box, and click "APDU" and the Information for index type communication returned. For details, please refer to **ISO/IEC7816-1/2/3/4** protocol (example device: M327).

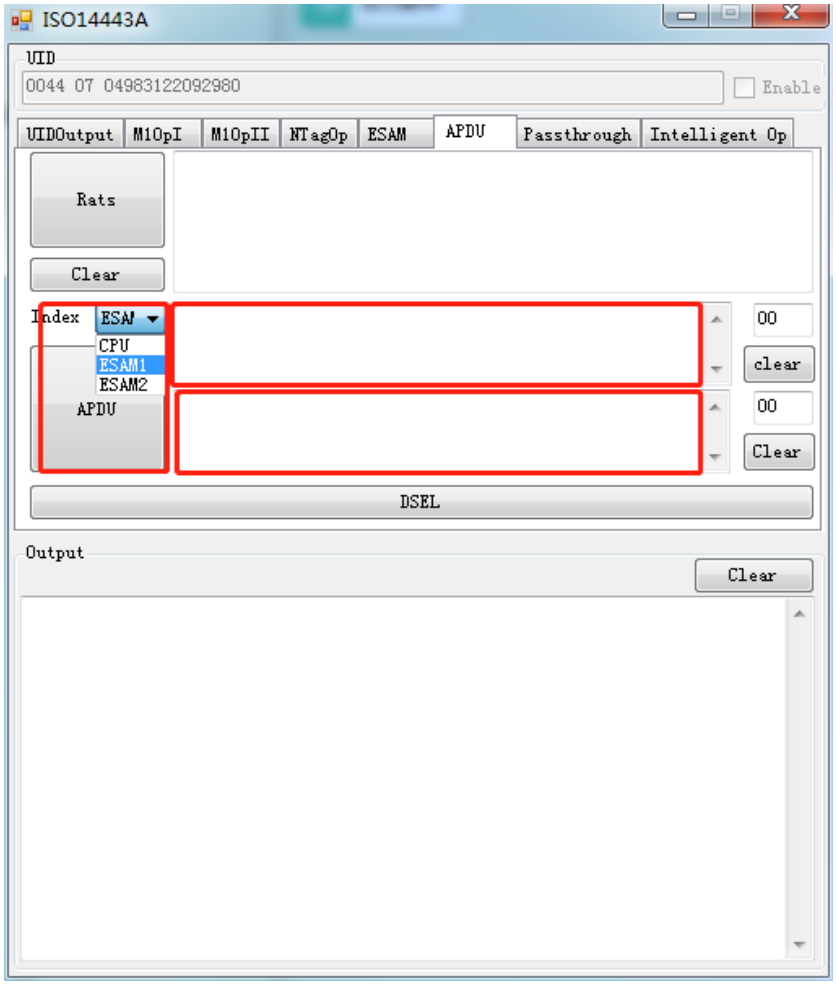

Figure 3.19 APDU

Attention：

① **Before this operation, the power on operation in section 3.2.5 must be performed, otherwise the communication fails.**

3.2.7 Passthrough

The passthrought function allows users to operate the card directly through the reader, and the operation specification must strictly comply with ISO14443A protocol. Open the passthrough page, send the data frame (the data content of REQA is "26") to the label, and receive the information returned by the label, as shown in Figure 3.20 (example device is D322).

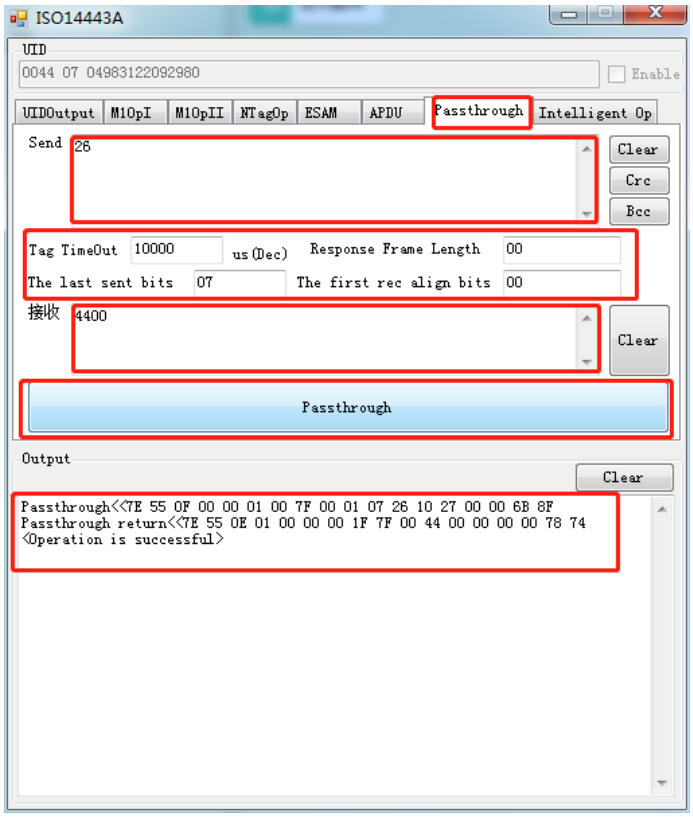

Figure 3.20 passthrough

attention：

① **Label respond time：** $Inventory:10000\mu s$ $Read:10000\mu s$ $Write:15000\mu s$

② **Label response frame length is not required;**

③ **Click Crc button in Figure 3.20 to add Crc verification;**

④ **The number of bits sent by the last byte strictly follows the protocol specification;**

⑤ **The data is sent in hexadecimal format with no space between bytes, such as 120325…**

Example：

short range reader

UID:0004 04 1E06CEF7（M1 card）

Inventory:

＞＞＞26（Bit number of last byte sent：07）

＜＜＜0400

＞＞＞9320（Bit number of last byte sent：00）

＜＜＜1E06CEF721

＞＞＞93701E06CEF721+CRC（Bit number of last byte sent：00）

＜＜＜68B0BE

Middle/long range reader：Please refer to your label manual for label timeout, label response frame length, and the number of bits sent in the last byte.

3.2.8 Intelligent operation

Put an ISO14443A label into the reader's workplace, set the parameters, select the working mode "read UID / read block / write block" in the "intelligent operation" column of the ISO14443A operation box, and click the "start" button. The read UID will be displayed in the "result" box, and the read data block will be displayed in the "data block" box, as shown in Figure 3.21 (example device: D334A).

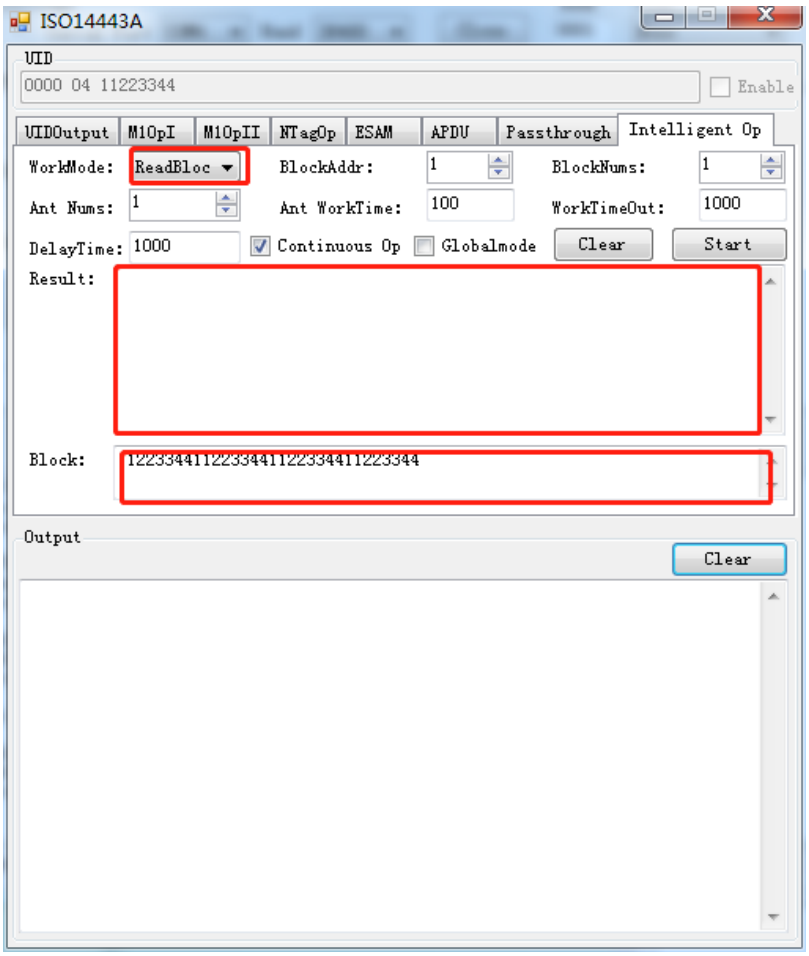

Figure 3.21 IM operation

Attention：

① **When "read UID" is selected, the address and number of blocks do not need to be changed;**

② **When "read block" or "write block" is selected, the range of data block address should be defined according to the type of test label (M1 card data block address starts from 01, M0 card data page address starts from 04);**

③ **Check "continuous operation" to repeat one of the three operations of "read UID", "read block" and "write block";**

④ **When "write block" is checked, the data to be written into the data block is edited in the "data" box in Figure 3.20. The input data format is hexadecimal, and the data length is determined by the type of label and the number of blocks to be written.**