

OEM-HF-R840-SET-V2
13.56 MHz OEM RFID Module
Read/Write & HID Operation
Software Manual

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1 Introduction

1.1 Function Description

This RFID device can be either operated in full read/write mode or in automatic read mode with keyboard emulation. The keyboard emulation works as compatible HID device, so that it will operate with most common operating systems.

When in keyboard emulation mode, it is not possible to do normal read/write operations with “RFID Reader.exe”.

1.2 USB Driver Installation

If the device is connected to a PC for the first time, it can take some time for automatic installation of the Silicon Labs 210x Series VCP driver. If this is the case, pls. wait until this is fully done.

Normally the USB drivers are automatically installed with Windows operating systems. In rare cases it is possible, that automatic installation fails. Then perform a manual installation. You can download the latest drivers here:

<http://www.silabs.com/products/mcu/pages/usbtouartbridgevcpdrivers.aspx>

1.3 Supporting Software

KEMUSettings	for configuration of the keyboard emulation (data tag types, memory part to be read, output format)
RFID Reader	for normal read/write operation of the device

2 Configuration Software "KEMU Setting"

2.1 Software Overview

The screenshot shows the 'KEMU Setting' application window. It is divided into three main sections: 'Connectivity', 'Settings', and 'Protocol Screen'.
1. **Connectivity**: Includes options for 'Connection' (COM or USB), 'Com Port' (COM3), 'Baudrate' (9600), and 'Address' (0). A 'Connect' button is present.
2. **Settings**: Includes a 'Set Reader to Keyboard Mode' toggle, 'Tag Data' (1444 UID - LSB), 'Memory Position', 'Data' (0), 'Data Length' (16), 'Key' (FF FF FF FF FF FF), and 'Output Format' (HEX). A 'Set Reader' button is at the bottom right.
3. **Protocol Screen**: A text area showing communication logs with hex data.
Four callout boxes provide instructions:
- 'FIRST: Select the communication parameters, then click on [Connect]' points to the Connectivity section.
- 'SECOND: Select the data tag type you are using and configure the desired data.' points to the Tag Data and Data fields.
- 'THIRD: Start the keyboard emulation.' points to the Set Reader to Keyboard Mode toggle.
- A large callout at the bottom states: 'You can monitor the communication between this configuration software and the RFID device.' pointing to the Protocol Screen.

KEMU Setting

Connectivity

Connection: ☒ COM ☐ USB

Com Port: COM3 Baudrate: 9600 Address: 0 **Connect**

Settings

Set Reader to Keyboard Mode ☐ ☒

Tag Data 1444 UID - LSB Data 0 Data Length 16

Memory Position

Key FF FF FF FF FF FF

Output Format HEX **Set Reader**

Protocol Screen

```
>> AA 00 01 83 82 BB
<< AA 00 0A 00 00 FF FF FF FF FF FF FF FF 0A BB
>> AA 00 01 86 87 BB
<< AA 00 11 00 49 44 54 35 32 37 45 2D 56 35 2E 30 2D 53 45 54 02 BB
```

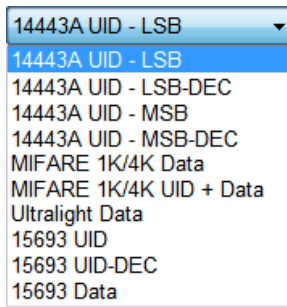
First: Select the communication parameters, then click on [Connect]

Second: Select the data tag type you are using and configure the desired data.

Third: Start the keyboard emulation.

You can monitor the communication between this configuration software and the RFID device.

2.2 Keyboard Emulation – Function Overview



14443 A UID – LSB

Outputs the UID compatible with our other readers as hexadecimal number.

14443 A UID – LSB-DEC

Outputs the UID compatible with our other readers as decimal number.

14443 A UID – MSB

Outputs the UID in reverse byte order as hexadecimal number.

14443 A UID – MSB-DEC

Outputs the UID in reverse byte order as decimal number.

Mifare 1K/4K Data

Outputs selectable Bytes from a selectable memory block.

Mifare 1K/4K UID + Data

Outputs the UID compatible with our other readers as hexadecimal number.

Furthermore selectable Bytes from a selectable memory block are added to the output.

Ultralight Data

Outputs selectable memory page (4 Bytes).

15693 UID

Outputs the UID compatible with our other readers as hexadecimal number. This is 8 Bytes = 16 characters in size.

15693 UID-DEC

Outputs the UID compatible with our other readers as decimal number. This can give numbers up to E0FFFFFFFFFFFFFF = 16212958658533785599

15693 Data

Outputs selectable Bytes from a selectable memory block.

2.3 Operation

2.3.1 Connect your Device for Configuration

Plug in the device first before starting the configuration software "KEMU Setting".

If the device is connected to a PC for the first time, it can take some time for automatic installation of the Silicon Labs 210x Series VCP driver. If this is the case, pls. wait until this is fully done.

Now start the configuration software "KEMU Setting".



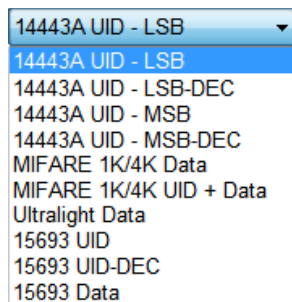
The Connectivity window shows options for Connection (COM and USB), Com Port (COM3), Baudrate (9600), and Address (0). A Connect button is present.

Select the correct com port, which has been set by the driver.

Baudrate 9600 and device address address 0 are factory default values.

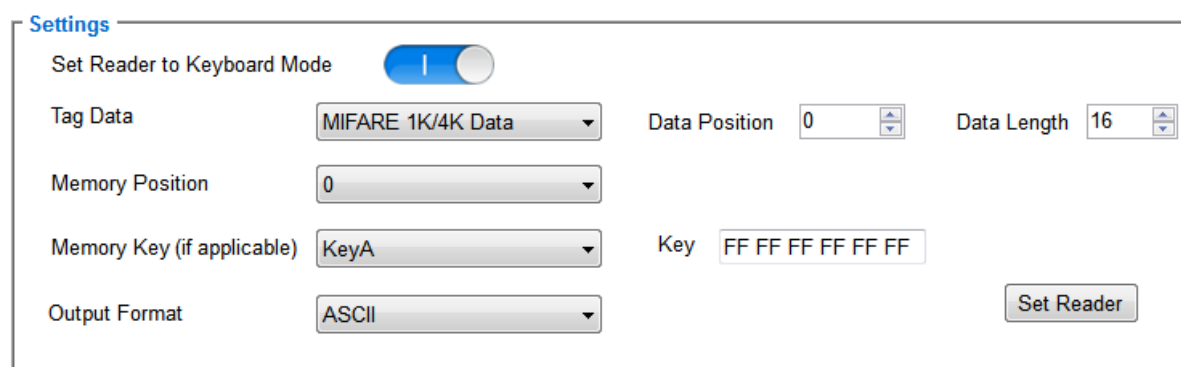
The connect with 

2.3.2 Select Your Data Tag Type and Output Format



The dropdown menu lists various data tag types: 14443A UID - LSB, 14443A UID - LSB-DEC, 14443A UID - MSB, 14443A UID - MSB-DEC, MIFARE 1K/4K Data, MIFARE 1K/4K UID + Data, Ultralight Data, 15693 UID, 15693 UID-DEC, and 15693 Data.

2.3.3 Settings with most Tag Types



The Settings window includes a toggle for 'Set Reader to Keyboard Mode', dropdowns for 'Tag Data' (MIFARE 1K/4K Data), 'Memory Position' (0), 'Memory Key (if applicable)' (KeyA), and 'Output Format' (ASCII). It also has spinners for 'Data Position' (0) and 'Data Length' (16), a text field for 'Key' (FF FF FF FF FF FF), and a Set Reader button.

Memory Position: Select the memory block (16 Bytes) from which data is read.

Data Position: Cut a part from the data read from the selected memory block. Data Position gives the start byte.

Data Length: Cut a part from the data read from the selected memory block. Data Length gives the number of bytes.

2.3.4 Settings with Mifare Ultralight

Settings

Set Reader to Keyboard Mode ☒

Tag Data: Ultralight Data Data Position: 0 Data Length: 4

Memory Position: 0

Memory Key(if applicable): KeyA Key: FF FF FF FF FF FF

Output Format: HEX Set Reader

"Memory Position" selects the memory page (4 Bytes) that is read from this tag type.

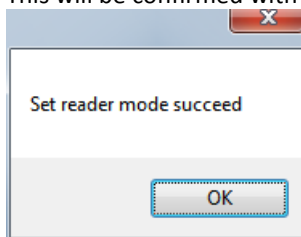
2.3.5 Switch on the Keyboard Emulation

Settings

Set Reader to Keyboard Mode ☒ Set Reader

switch the function on and confirm with

This will be confirmed with a dialog:



Disconnect the device, so the com port gets freed for other software.

DisConnect

2.3.6 Output Format Hex or ASCII

Output Format: HEX

HEX

ASCII

The hexadecimal value of the UID and Data is shown in ASCII Numbers.

Example of Mifare with 7 Bytes UID

- Hexadecimal value: 044969aa2b2b80
- ASCII Numbers: 3034343936394141324232423830

Example of Mifare with 4 Bytes UID

- Hexadecimal value: 03e7fb6b
- ASCII Numbers: 3033453746423642

3 Test & Demo Software "RFID Reader"

3.1 Introduction

This testing demo is usable for any kinds of readers with TTL or RS232 interface, and support to operate read/write cards compliant with ISO/IEC 14443A/B, ISO/IEC 15693 Standards, etc.

This DEMO is just for testing used, other specific app or request on function button, please refer to API documents, demo code and other second development files for your own program, or contact our sales for customization.

Remark: For USB-Com reader, before using this demo, please install the driver included on the file package, no need for RS232/TTL module.

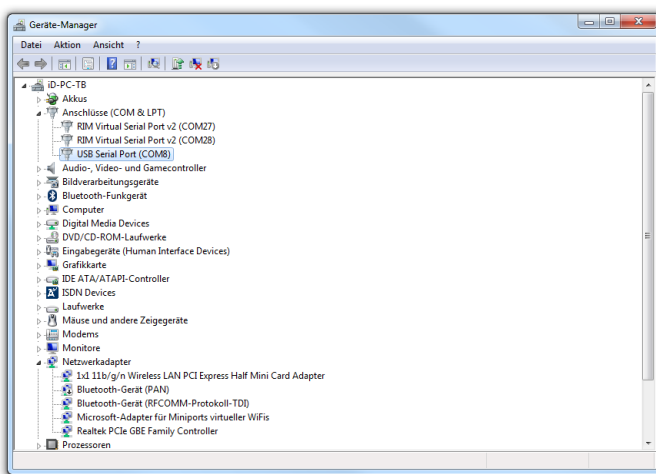
3.2 Operation procedure

3.2.1 Connection

Here taken Testing on PC side by using tool of UART-TO-USB.

Please refer to the PIN definition of different modules, which shown on the Specification including on whole SDK.

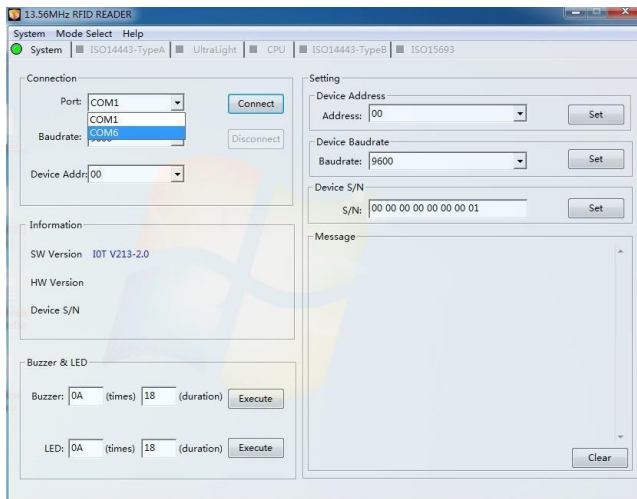
Connect USB tool to PC, and check if the device be recognized, please look for the right COM Port number for connection in menu of "Device manager", see below:



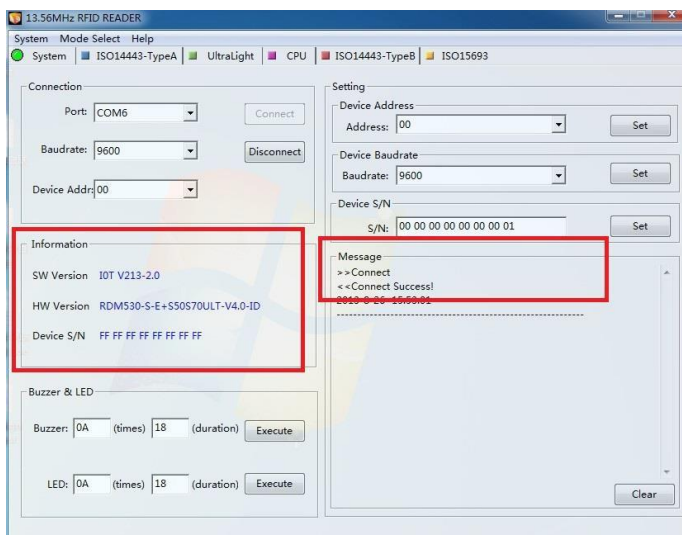
Remark: if failed, there will be no according device display.

3.2.2 System parameter setup

After succeed in hardware connection, please open SW of "DEMO" and the port matching up, as following picture:



Then please click “Connect” to build up communication port, and feedback displaying according device information and Message box, as below:



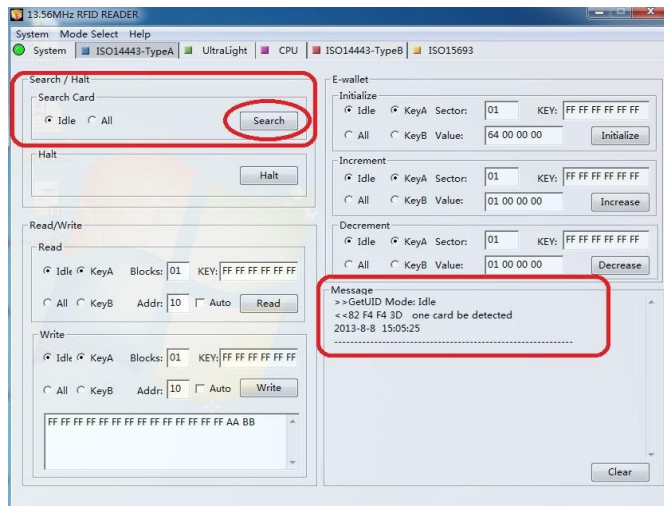
In this system setup, there are function button for changing working mode of Buzzer and LED, detail command definition and format, please refer to document of API parameter.

Also you could setup the address of the device and serial number in this operation interface. (Note: this is only used when there are multiple device working together).

3.2.3 ISO14443 Type A operation

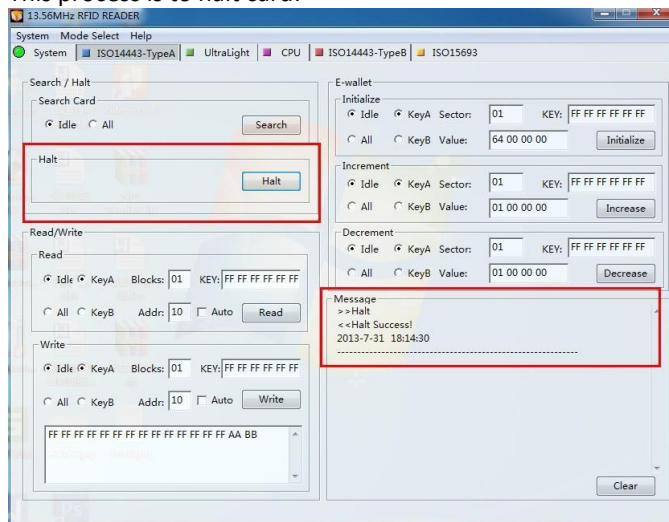
ISO14443A Search card

Please enter to “ISO14443A Type A” operation interface, and click “Search” to look for cards in the reading field, then get back UID of the card if succeed, shown as:



Card Halting operation

This process is to halt card:



Read data of card blocks

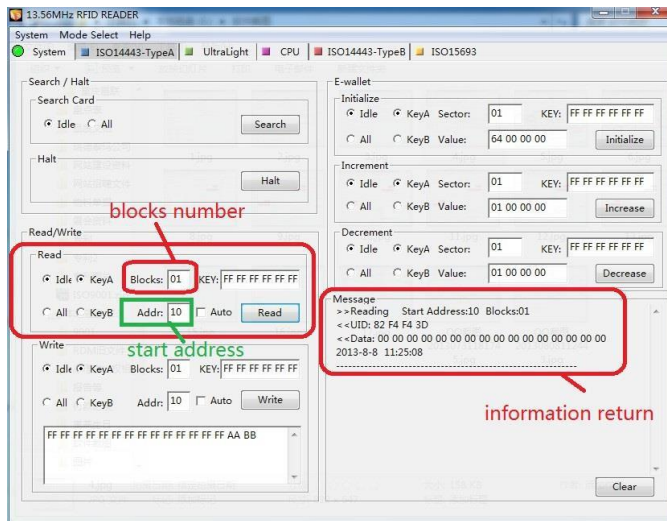
To operate card blocks information reading, card supporting types can be MIFARE 1K, MIFARE 4K, and the working mode optional with Idle mode and All mode.

Remark:

- Under idle mode, all cards in the IDLE state shall respond synchronously with ATQA
- Under All mode, all the card in the IDLE or HALT state shall respond synchronously with ATQA.

"Blocks" dialog box stands for the blocks number to be read in one time, and the "Addr" is the start address of this reading, the "KEY" default is FF FF FF FF FF.

If the writing block/blocks is/are protected, please get and input the special key, see following:



If successfully, then Message box will return right information about the operation; if failed, then feedback with wrong code, please refer to Wrong code list to know their definition.

Write data into card blocks

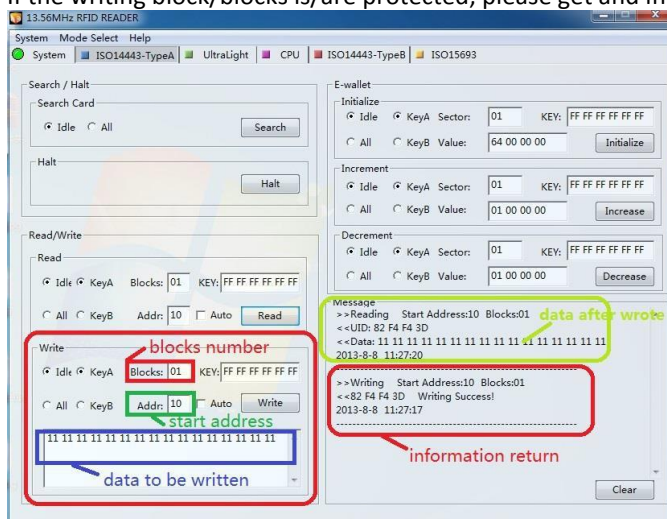
To operate card blocks information writing, card supporting types can be MIFARE 1K, MIFARE 4K, and the working mode optional with Idle mode and All mode.

Remark:

- Under idle mode, all cards in the IDLE state shall respond synchronously with ATQA
- Under All mode, all the card in the IDLE or HALT state shall respond synchronously with ATQA.

“Blocks” dialog box stands for the blocks number to be written in one time, and the “Addr” is the start address of this writing, the “KEY” default is FF FF FF FF FF.

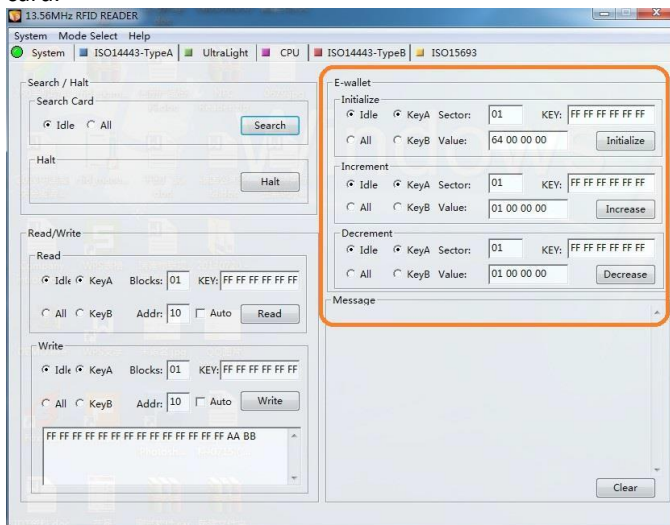
If the writing block/blocks is/are protected, please get and input the special key, see following:



If successfully, then Message box will return right information about the operation; if failed, then feedback with wrong code, please refer to Wrong code list to know their definition.

E-Wallet operation

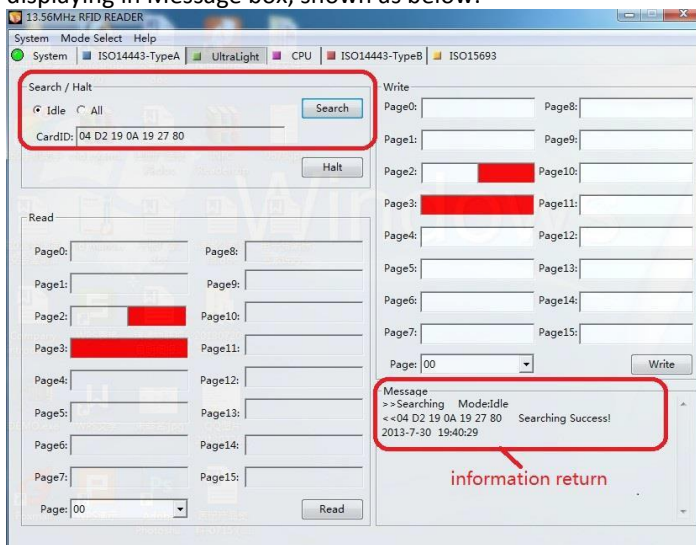
Here in this demo, we just provide a simple operation interface, to demonstrate the using procedure of E-wallet, which including initialize, increment, decrement, detail operating sectors and value command, please refer to use manual of the card.



3.2.4 Mifare Ultralight operation

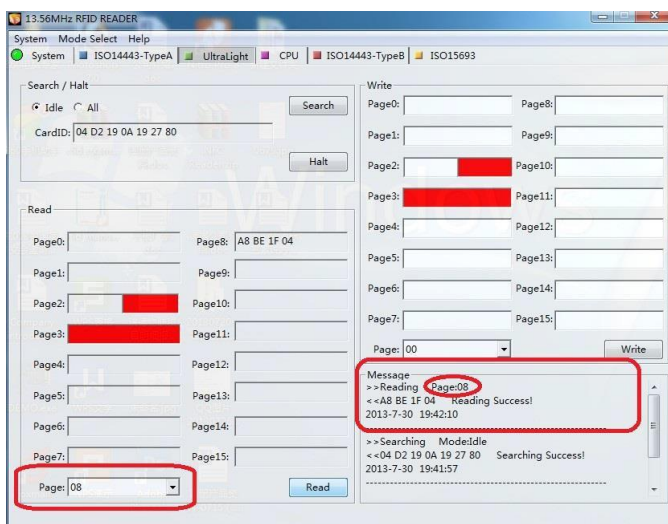
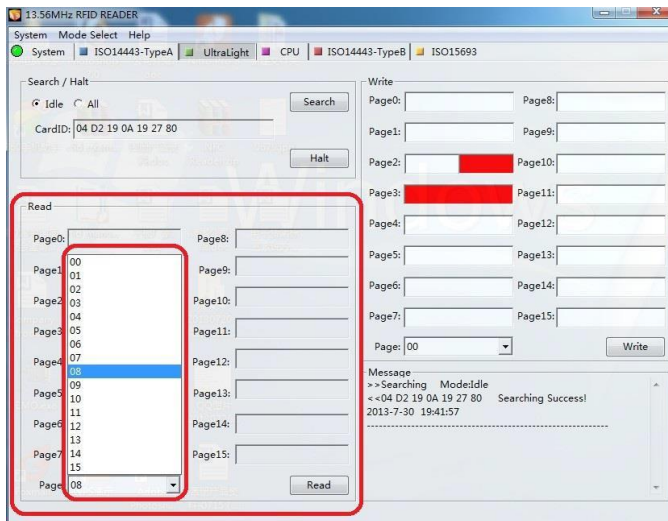
Search MIFARE Ultralight

This procedure is need before reading or writing any specific page, just click the "Search", then you will get the CardID displaying in Message box, shown as below:



Read data from page

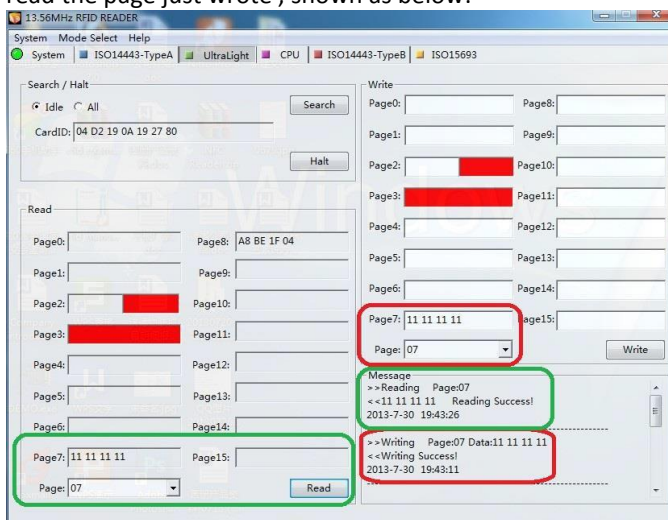
Please choose the page number in the drop-down list box, then click "Read", then get the information of the selected memory page.



Write data to page

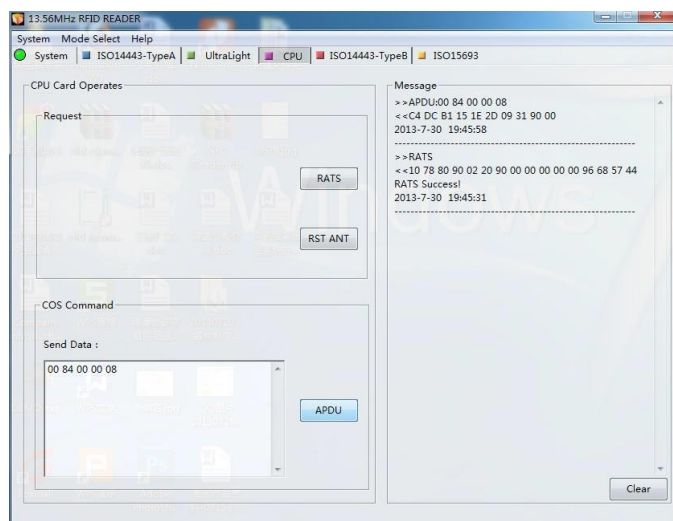
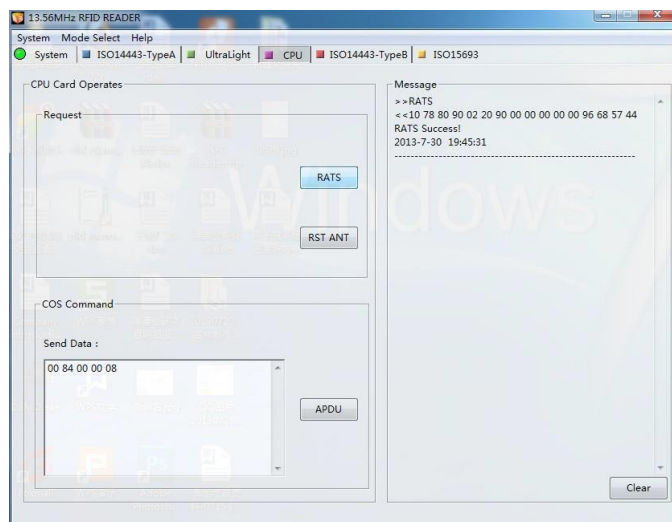
To write information to the page, select the page number to be written under drop-down list box, input data need to be written into (4 bytes), then click “Write”.

To check out if the writing success, you could see the information return in the Message box, also you could operate to read the page just wrote , shown as below:



3.2.5 CPU card operation

This interface is used for contactless CPU cards compliant with ISO 14443A standard, here we provide three function buttons, including RATS (Request for Answer to Select), RST ANT (Reset Antenna) and Send APDU. These three functions are fit for all common types of contactless CPU cards.



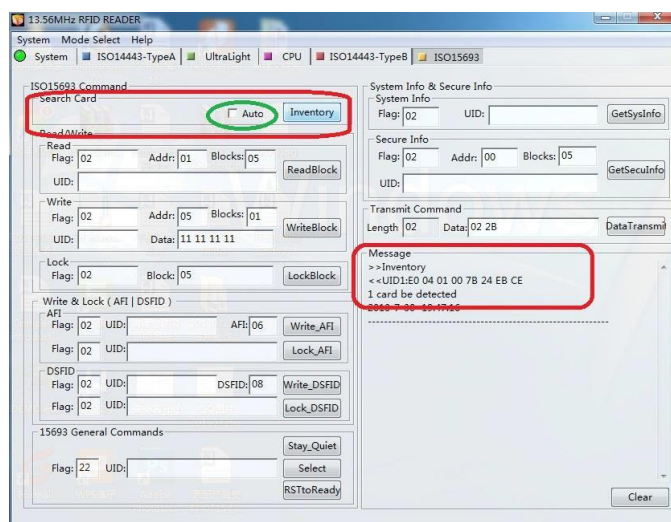
3.2.6 ISO14443 Type B

Detail operation, there is other demo to do it.

3.2.7 ISO15693 Operation

Inventory

To search the card or cards in the reading field:

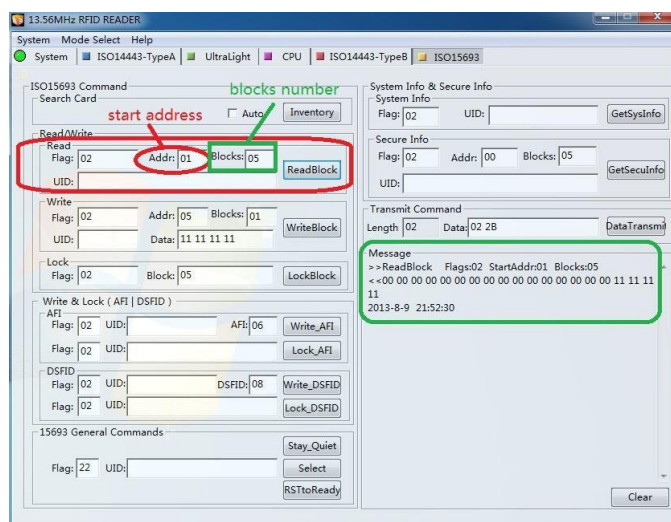


Read block

To read data of the block.

Please refer to user manual of different chip cards, to get the Flag value, then input the right one, and chose the start address and blocks number to be read.

Following is the example for the I CODE SLI chip cards, the Flag value is 02, as following:

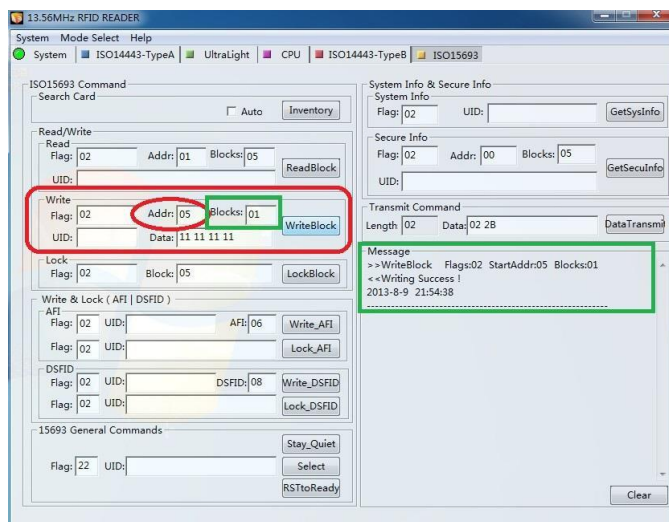


Write block

To write data of the block

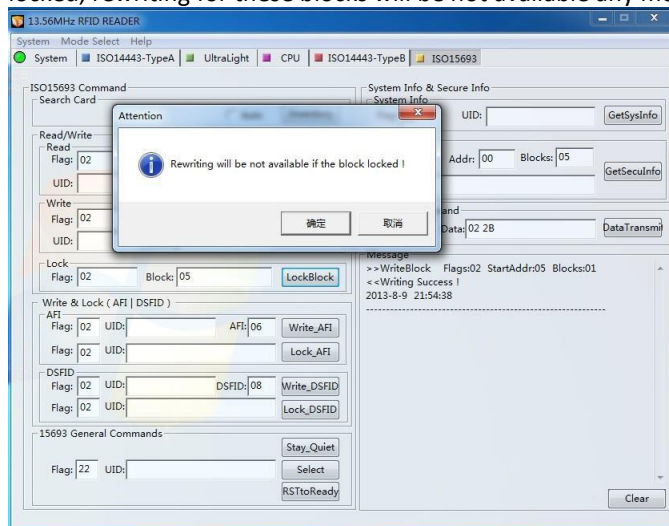
Please refer to user manual of different chip cards, to get the Flag value, then input the right one, and chose the start address and blocks number to be written.

Following is the example for the I CODE SLI chip cards, the Flag value is 02:



Lock block

Here needed to input the right Flag of the using card and choose the blocks number to be locked. Attention: if the block locked, rewriting for these blocks will be not available any more.



Write & Lock (AFI/DSFID)

Please refer to the ISO15693 standard.

ISO15693 General Commands

- | | |
|--------------|--|
| Stay_Quiet | This will bring the RFID card into sleep mode. |
| Select | To select a single card in the reading field. |
| RST to Ready | To wake-up a single card from sleep mode. |

System info & Secure info

This is to get the system & secure information of the card, here this testing demo is available with three buttons of "GetSysInfo", "GetSecurInfo" and "Data Transmit".

For further functions, please refer to the API document for reference for developing you own software.