

13.56Mhz RFID reader/writer with CF interface

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HF-MP-RW-CF

User Manual

Version 1.2

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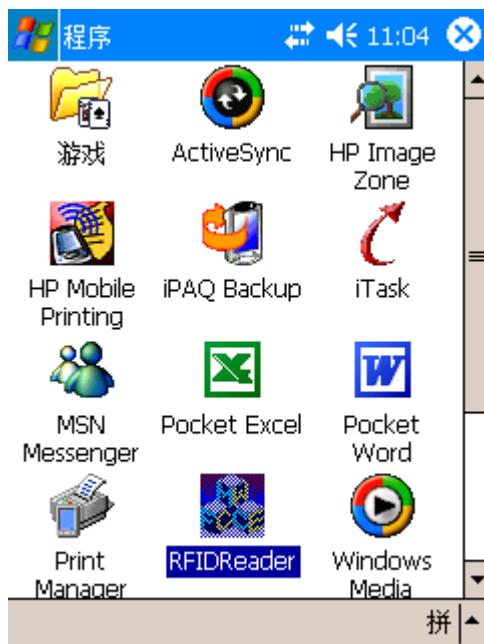
1. GENERAL INFORMATION

- Compact Flash Type II Interface
- DC3.0V - DC3.6V VDD Operating
- Pocket PC 2003/2005 Operating Systems Compatibility
- 13.56MHz RF Operating Frequency
- ISO14443A, ISO1443B & ISO15693 Protocols
- 120mA Working Current
- 5mA Idle Current
- Operating Temperature Range: -20°C - +50°C
- Storage Temperature Tange: -25°C - +60°C
- Dimension: 83 × 44 × 13 mm
- Weight: 20g

2. DEMO SOFTWARE

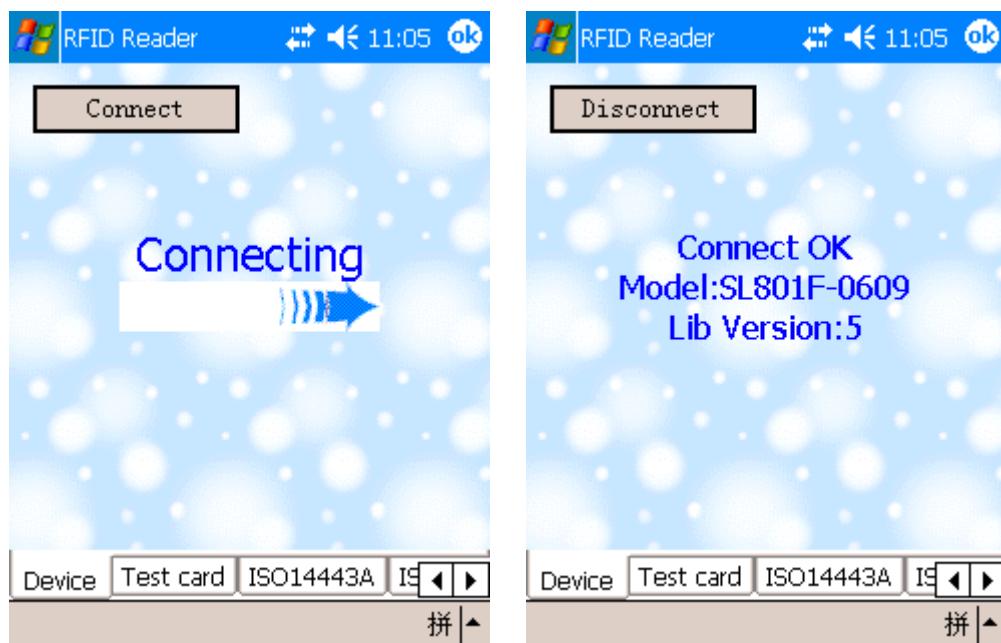
DEMO software is applicable for Pocket PC 2003/2005 operating system.

Setup.exe will install the DEMO software and DLL onto PDA, and then become a logo as follow



2.1 ONLINE

Click [Connect] button on the windows of “Device”, the software will search for the port and show corresponding module information after successful connecting.



2.2 CARDS TESTING

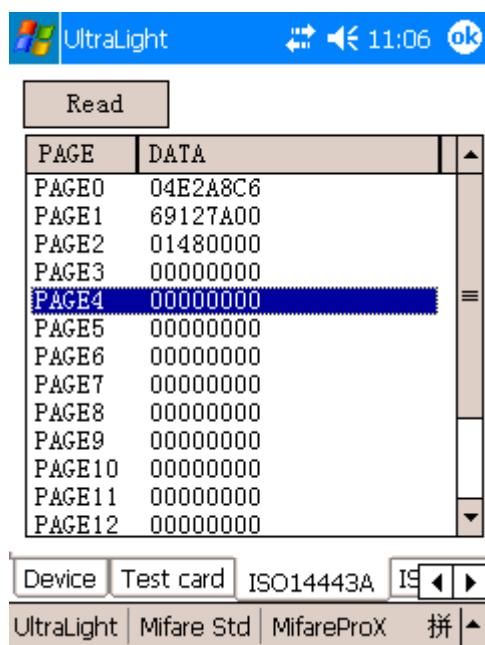
Click [Start] button on the windows of “Test Card”, you can test cards types. At this time, when all the standard card come to the antenna area, the indicator light on and shine, and show corresponding types of the card.



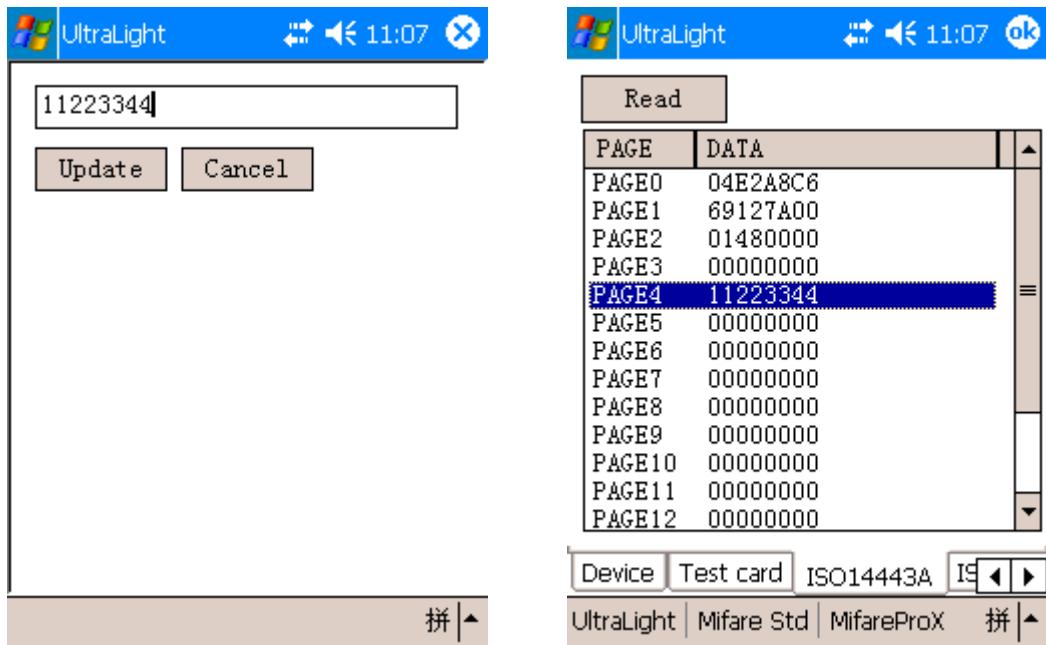
2.3 ISO14443A (Mifare class)

2.3.1 Mifare_Ultralight

Click the [Read] button to read data from UltraLight and display.

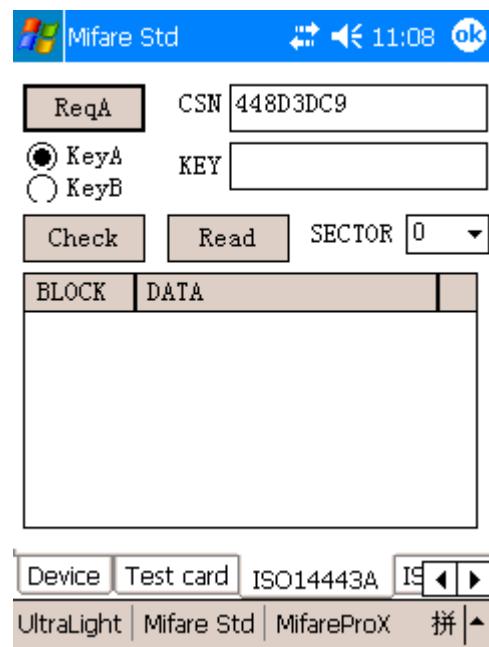


Double-clicking certain data module will pop-up a window. After input new data, click [Update] button to store the new data into corresponding address.

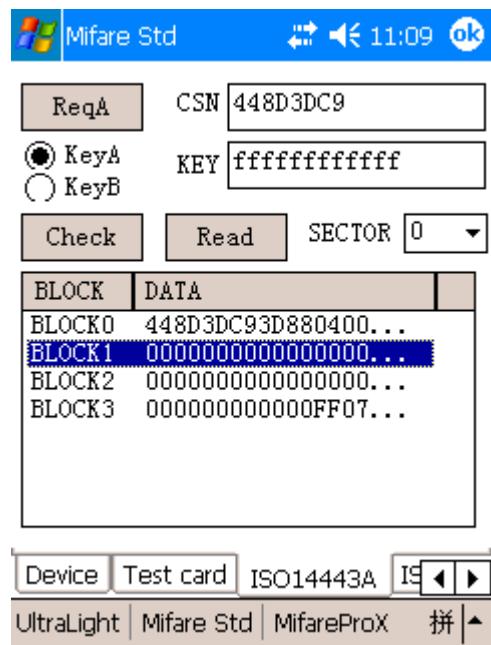


2.3.2 Mifare_Std

Click [ReqA] button to obtain the Chip unique Serial Number.

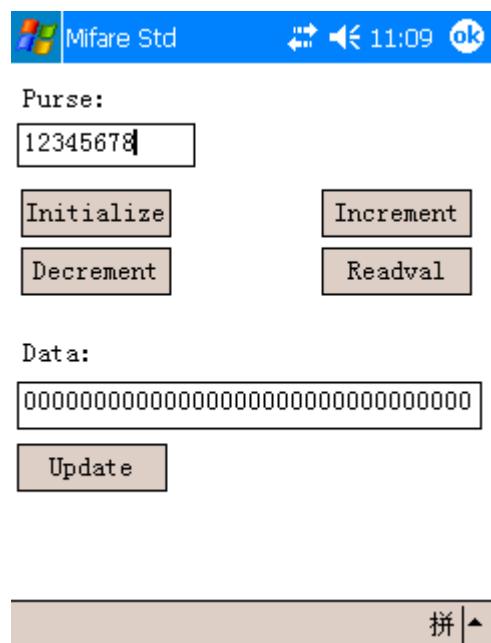


Input the correct 6 bytes password, click [Check] button to verify this password, then can read/write the tag.



Double-click certain data module will pop-up a window to rewrite data and operate the purse

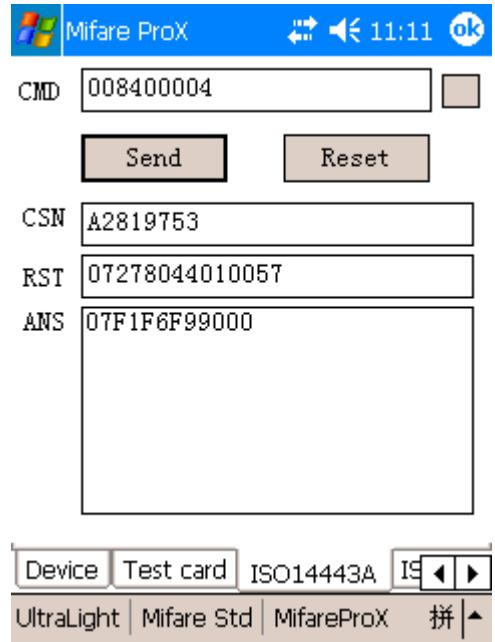
Notice: purse show at BCD, other data shows at HEX



2.3.3 Mifare_ProX

Click [Reset] button to obtain the serial number and the reposition information.

Input COS command to CMD, click [Send] button to obtain the response data from tag.

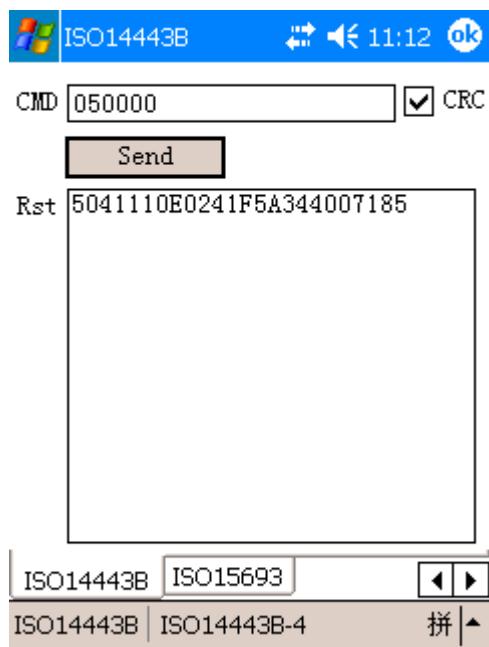


2.4 ISO14443B

There are two windows under the ISO14443B, which are ISO14443B and ISO14443B-4. The difference is on the window of ISO14443B, it will transmit and receive all data, base function “int WINAPI rf_transceive”, while on the window of ISO14443B-4, auto manage ISO14443-4 Protocol Control Byte, the transferring base function “int WINAPI rf_cos_command”.

2.4.1 ISO14443B

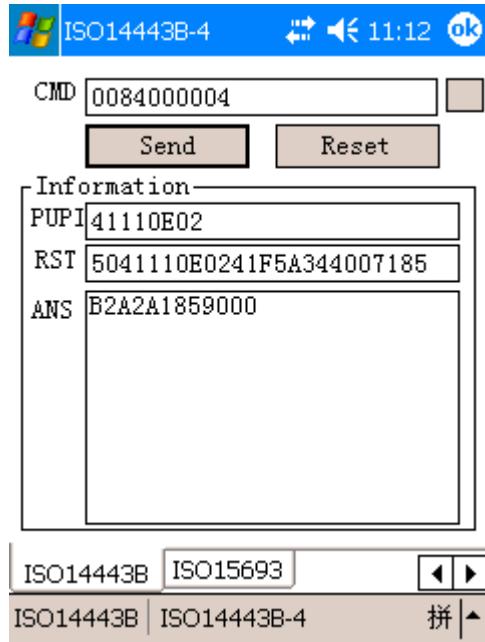
Example: Send REQB command to card on the window of the ISO14443B as follow



2.4.2 ISO14443B-4

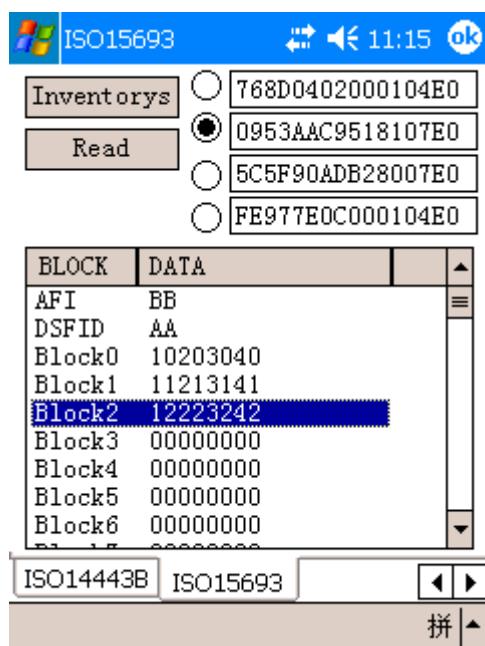
Click [Reset] button to obtain RATS information.

Input COS command to CMD, and click [Send] to obtain the response data from the card.

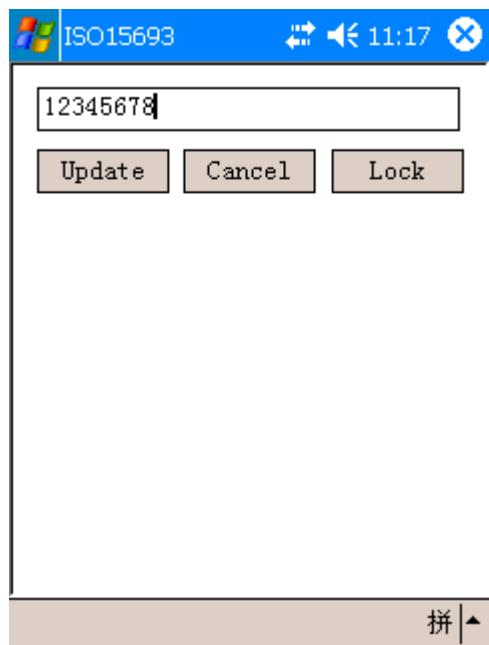


2.5 ISO15693

Click [Inventorys] button to obtain 4 sheets of UID of ISO15693 card at most, choose certain UID, click [Read] button can read the data from the card.



Double-click data module to rewrite and lock the data to corresponding block in the pop-up window.



3. DLL INFORMATION

3.1 SYSTEM FUNCTION

3.1.1 Get DLL Version

Prototype: int WINAPI lib_ver(unsigned int *pVer)
Parameter: pVer: [OUT] DLL version number
Return: return 0 if successful

3.1.2 Connect

Prototype: int WINAPI rf_init_com (int port)
Parameter: port: [IN] serial port number
Return: return 0 if successful

3.1.3 Disconnect

Prototype: int WINAPI rf_ClosePort(void)
Return: return 0 if successful

3.1.4 Get Device Type

Prototype: int WINAPI rf_get_model (unsigned char *pVersion,
 unsigned char *pLen)
Parameter: pVersion: [OUT] response information
 pLen: [OUT] the length of response information
Return: return 0 if successful

3.1.5 Manage Protocol

Prototype: int WINAPI rf_init_type(unsigned char type)
Parameter: type: [IN] woking mode of the reader
Return: return 0 if successful
Explanation: type = 'A': set module into ISO14443A mode
 type = 'B': set module into ISO14443B mode
 type = '1': set module into ISO15693 mode

3.1.6 Manage RF Transmittal

Prototype: int WINAPI rf_antenna_sta(unsigned char model)
Parameter: model: [IN] RF transmittal state
Return: return 0 if successful
Explanation: model = 0: turn off RF transmittal
 model = 1: turn on RF transmittal

3.1.7 Manage LED

Prototype: int WINAPI rf_light(unsigned char color)
Parameter: color: [IN] 0 = put out, others = light on

3.2 DES FUNCTION

3.2.1 DES_Encrypt

Prototype: int WINAPI des_encrypt(unsigned char *pSzOut,
 unsigned char *pSzIn,
 unsigned int inlen,
 unsigned char *pKey,
 unsigned int keylen)

Return: return 0 if successful

3.2.2 DES_Decrypt

Parameter: pSzOut: [OUT] data, bytes length equal to deciphering
 pSzIn: [IN] deciphering
 Inlen: [IN] length of deciphering, integer times of 8 bytes
 pKey: [IN] decrypt key
 keylen: [IN] length of key, 8 bytes for single DES,
 16 bytes for triple DES

Return: return 0 if successful

3.3 ISO14443A FUNCTION

3.3.1 REQA

Prototype: int WINAPI rf_request(unsigned char model, unsigned short *pTagType)

Parameter: model: [IN] Req mode

pTagType: [OUT] response data from tag, chip type code

Return: return 0 if successful

Explanation: mode = 0x26: REQ_STD

mode = 0x52: REQ_ALL

pTagType: 0x4400 = Ultra_Light

0x0400 = Mifare_1K

0x0200 = Mifare_4K

0x4403 = Mifare_DESFire

0x0800 = Mifare_Pro

0x0403 = Mifare_ProX

To read the ISO14443A card in influence district, you should transfer the base function hereunder in turn

Mifare_Std:

1. int WINAPI rf_request

2. int WINAPI rf_anticoll

3. int WINAPI rf_select

Card will be on activated state thereafter

UltraLight:

1. int WINAPI rf_request

2. int WINAPI rf_ul_select

This function aggregate anticollision and select command, Card will be on activated state thereafter

Mifare_DESFire:

1. int WINAPI rf_DESFire_RST

This function aggregate ReqA, anticollision, select command, Card will be on activated state thereafter

MifareProX:

1. int WINAPI rf_typea_RST

This function aggregate searching for card, anticollision ,activation and reposition order, Card will be on activated state thereafter

3.3.2 Select UltraLight

Prototype: int WINAPI int rf_ul_select (unsigned char *pSnr, unsigned char *pLen)

Parameter: pSnr: [OUT] response data from tag, unique serial number
pLen: [OUT] length of response data

Return: return 0 if successful

3.3.3 Mifare_Std Anticollision

Prototype: int WINAPI rf_anticoll(unsigned char bcnt,
 unsigned char *pSnr,
 unsigned char *pLen)

Parameter: bcnt: [IN] must be 4

pSnr: [OUT] response data from tag, unique serial number
pLen: [OUT] length of response data

Return: return 0 if successful

3.3.4 Mifare_Std Selectting

Prototype: int WINAPI rf_select(unsigned char *pSnr,
 unsigned char snrLen,
 unsigned char *pSize)

Parameter: pSnr: [IN] unique serial number of tag

snrLen: [IN] length of pSnr

pSize: [OUT] response data, capacity code

Return: return 0 if successful

3.3.5 Mifare_Std Authentify

Parameter: model: [IN] key validate mode

block: [IN] block absolute address

pKey: [IN] 6 bytes password

Return: return 0 if successful

Explanation: model = 0x60; via KeyA

model = 0x61: vua KeyB

3.3.6 Mifare_Std (UltraLight) Read

Prototype: int WINAPI rf_M1_read (unsigned char block,
 unsigned char *pData,
 unsigned char *pLen)

Parameter: block: [IN] block absolute address

pData: [OUT] response data from tag

pLen: [OUT] length of response data

Return: return 0 if successful

Explanation: this function is applicable for Ultra_Light card. Every page of Ultra_Light card has 4bytes. Transferring this function every time, return data of 4 consecutive pages..

3.3.7 Mifare_Std Write

Prototype: int WINAPI rf_M1_write (unsigned char block, unsigned char *pData)

Parameter: block: [IN] block absolute address
pData: [IN] written data, 16 bytes

Return: return 0 if successful

3.3.8 UltraLight Write

Prototype: int WINAPI int rf_ul_write (unsigned char page, unsigned char *pData)

Parameter: page: [IN] page address (0 – F)
pData: [IN] written data, 4 bytes

Return: return 0 if successful

3.3.9 Mifare_Std Initialize Value

Prototype: int WINAPI rf_M1_initval(unsigned char block, long value)

Parameter: block: [IN] block absolute address
pValue: [IN] initialize purse at HEX format, low byte in former

Return: return 0 if successful

3.3.10 Mifare_Std Read Value

Prototype: int WINAPI rf_M1_readval(unsigned char block, long *pValue)

Parameter: block: [IN] block absolute address
pValue: [OUT] return value at HEX format low byte in former

Return: return 0 if successful

3.3.11 Mifare_Std Increment

Prototype: int WINAPI rf_M1_increment (unsigned char block, long value)

Parameter: block: [IN] block absolute address
value: [IN] increase value at HEX format, low byte in former

Return: return 0 if successful

3.3.12 Mifare_Std Decrement

Prototype: int WINAPI rf_M1_decrement (unsigned char block, long value)

Parameter: block: [IN] block absolute address
value: [IN] deduct value at HEX format, low byte in former

Return: return 0 if successful

3.3.13 Mifare_Std Restore

Prototype: int WINAPI rf_M1_restore (unsigned char block)

Parameter: block: [IN] block absolute address

Return: return 0 if successful

3.3.14 Mifare_Std Transfer

Prototype: int WINAPI rf_M1_transfer (unsigned char block)

Parameter: block: [IN] block absolute address

Return: return 0 if successful

Explanation: this function only use after increment, decrement and restore order

3.3.15 Mifare_Std Halt

Prototype: int WINAPI rf_halt()

Return: return 0 if successful

3.3.16 DESFire Reset

Prototype: int WINAPI rf_DESFire_rst(unsigned char model,
 unsigned char *pData,
 unsigned char *pMsgLg)

Parameter: model: [IN] ReqA mode
 pDate: [OUT] response data from tag
 pMsgLg:[OUT] length of response data

Return: return 0 if successful

Explanation: mode = 0x26: REQ_STD

mode = 0x52: REQ_ALL

pDate = 7 bytes Chip Serial Number

+ n bytes RATS according to ISO14443-4 protocol

3.3.17 Mifare ProX Reset

Prototype: int WINAPI rf_typea_rst(unsigned char model,
 unsigned char *pData,
 unsigned char *pMsgLg)

Parameter: model: [IN] ReqA mode
 pDate: [OUT] response data from tag
 pMsgLg:[OUT] length of response data

Return: return 0 if successful

Explanation: mode = 0x26: REO STD

mode = 0x52: REQ_ALL

pDate = 7 bytes Chip Serial Number

+ n bytes ATS according to ISO14443-4 protocol

3.3.18 T=CL Protocol Transceive

Prototype: int WINAPI rf_cos_command(unsigned char *pCommand,
 unsigned char cmdLen,
 unsigned char *pData,
 unsigned char *pMsgLg)

Parameter: pCommand: [IN] cos command
 cmdLen: [IN] length of command
 pDate: [OUT] response data from tag, including SW1 & SW2
 pMsgLg: [OUT] length of response data

Return: return 0 if successful

3.3.19 T≡CL Protocol Deselect

Prototype: int WINAPI CL_Deselect()
Return: return 0 if successful

3.4 ISO14443B FUNCTION

3.4.1 ISO14443B Transceive

3.4.2 REQB

Prototype: int WINAPI rf_atqb(unsigned char model,
 unsigned char *pData,
 unsigned char *pMsgLg)

Parameter: model: [IN] 0=REQB, 1=WUPB
 pDate: [OUT] response data from tag,
 according with ISO14443 protocol
 pMsgLg: [OUT] length of response data
 Return: return 0 if successful

3.4.3 T=CL Protocol Transceive

Prototype: int WINAPI rf_cos_command(unsigned char *pCommand,
 unsigned char cmdLen,
 unsigned char *pData,
 unsigned char *pMsgLg)

Parameter: pCommand: [IN] COS command
 cmdLen: [IN] length of COS command
 pDate: [OUT] response data from tag, including SW1 &SW2
 pMsgLg: [OUT] length of response data

Return: return 0 if successful

3.4.4 T=CL Protocol Deselect

Prototype: int WINAPI rf_cl_deselect(void)

Return: return 0 if successful

3.4.5 AT88RF020 Authentify

Prototype: int WINAPI rf_at020_check (unsigned char *pKey)

Parameter: pKey: [IN] 8 bytes password

Return: return 0 if successful

3.4.6 AT88RF020 Count

Prototype: int WINAPI rf_at020_count(unsigned char *pData)

Parameter: pDate: [IN] signature, 6 bytes

Return: return 0 if successful

3.4.7 AT88RF020 Read

Prototype: int WINAPI rf_at020_read (unsigned char page,

unsigned char *pData,

unsigned char *pMsgLen)

Parameter: page: [IN] page address, 0 ~ 31

pDate: [OUT] response data from tag

pMsgLen: [OUT] length of response data

Return: return 0 if successful

3.4.8 AT88RF020 Write

Prototype: int WINAPI rf_at020_write(unsigned char page,
 unsigned char *pData)

Parameter: page: [IN] page address, 0 ~ 31

pDate: [IN] written data, 8 bytes

Return: return 0 if successful

3.4.9 AT88RF020 Lock

Prototype: int WINAPI rf_at020_lock(unsigned char *pData)

Parameter: pDate: [IN] data, 4 bytes

Return: return 0 if successful

3.4.10 AT88RF020 Deselect

Prototype: int WINAPI rf_at020_deselect(void)

Return: return 0 if successful

Explanation: card will exit active state after receiving this order and never respond other command until enter active state again.

3.4.11 ST Select

Prototype: int WINAPI rf_st_select(unsigned char *pChip_ID)

Parameter: pChip_ID: [IN] return card ID number, one byte

Return: return 0 if successful

3.4.12 SR176 Read

Parameter: block: [IN] block address

pData: [OUT] response data from tag

pLen: [OUT] length of response data

Return: return 0 if successful

3.4.13 SR176 Write

Parameter: block: [IN] block address

pData: [IN] written data, 2 bytes

Return: return 0 if successful

3.4.14 SR176 Lock

Prototype: int WINAPI int rf_sr176_protect block (unsigned char lockreg)

Parameter: lockreg: [IN] LOCKREG

Return: return 0 if successful

Explanation: SR176 has 16 modules, every lockreg controls 2 modules

lockreg	BLOCK	bit_setting	
b7	14 & 15	0:Write Enable	1:Block set as ROM
b6	12 & 13	0:Write Enable	1:Block set as ROM
b5	10 & 11	0:Write Enable	1:Block set as ROM
b4	8 & 9	0:Write Enable	1:Block set as ROM
b3	6 & 7	0:Write Enable	1:Block set as ROM
b2	4 & 5	0:Write Enable	1:Block set as ROM
b1	2 & 3	0:Write Enable	1:Block set as ROM
b0	0 & 1	0:Write Enable	1:Block set as ROM

3.4.15 SRIX4K Get UID

Parameter: pUid: [OUT] response data from tag, UID

pLen: [OUT] length of UID

Return: return 0 if successful

3.4.16 SRIX4K Read

Parameter: block: [IN] block address

pData: [OUT] response data from tag

pLen: [OUT] length of response data

Return: return 0 if successful

3.4.17 SRIX4K Write

Parameter: block: [IN] block address

pData: [IN] written data, 4 bytes

Return: return 0 if successful

3.4.18 SRIX4K Lock

Prototype: int WINAPI int rf_srix4k_protectblock (unsigned char lockreg)

Parameter: lockreg: [IN] LOCKREG

Return: return 0 if successful

Explanation: 7-15 blocks of SRIX4K card can be written-protect

lockreg	BLOCK		bit_setting
b7	15	1:Write Enable	0:Block set as ROM
b6	14	1:Write Enable	0:Block set as ROM
b5	13	1:Write Enable	0:Block set as ROM
b4	12	1:Write Enable	0:Block set as ROM
b3	11	1:Write Enable	0:Block set as ROM
b2	10	1:Write Enable	0:Block set as ROM
b1	9	1:Write Enable	0:Block set as ROM
b0	7 & 8	1:Write Enable	0:Block set as ROM

3.4.19 ST Desactived

Prototype: int WINAPI rf_st_completion(void)

Return: return 0 if successful

3.4.20 THR1064 Read

Parameter: page: [IN] page address, 0 ~ 3
 pDate: [OUT] response data from tag
 pMsgLen: [OUT] length of response data

Return: return 0 if successful

3.4.21 THR1064 Write

Parameter: page: [IN] page address, 0 ~ 3
 pDate: [IN] written data
 pMsgLen: [IN] length of written data

Return: return 0 if successful

3.4.22 THR1064 Authentify

Prototype: int WINAPI rf_thr1064_check (unsigned char *pKey)

Parameter: pKey: [IN] 8 bytes password

Return: return 0 if successful

3.5 ISO15693 FUNCTION

3.5.1 ISO15693_Inventory

Parameter: pData: [OUT] response data from tag, 1byteDSFID + 8bytesUID
pLen: [OUT] length of response data

Return: return 0 if successful

3.5.2 ISO15693_Inventorys

Parameter: pData: [OUT] response data from tag, every 9 bytes is a team,
the structure of every team is: 1byte DSFID + 8bytesUID

pLen: [OUT] length of response data

Return: return 0 if successful

3.5.3 ISO15693 Get System Information

Parameter: model: [IN] bit0=Select_flag,bit1=Address_flag,bit2=Option_flag

pUID: [IN] 8 bytes UID

pData: [OUT] response data from tag

pLen: [OUT] length of response data

Return: return 0 if successful

Explanation: If set Select_flag, only the cards on Selected state respond this command

If set Address_flag, only the cards that the UID are congruous will respond this command

Clear Option_flag

3.5.4 ISO15693_Select

Prototype: int WINAPI ISO15693_Select(unsigned char *pUID)

Parameter: pUID: [IN] 8 bytes UID

Return: return 0 if successful

3.5.5 ISO15693_Reset_To_Ready

Parameter: model: [IN] bit0=Select_flag,
bit1=Address_flag,
bit2=Option_flag

pUID: [IN] 8 bytes UID

Return: return 0 if successful

Explanation: If set Select_flag, only the cards on Selected state respond this command
If set Address_flag, only the cards that the UID are congruous will respond this command
Clear Option_flag

3.5.6 ISO15693_Stay_Quiet

Prototype: int WINAPI ISO15693_Stay_Quiet(unsigned char *pUID)

Parameter: pUID: [IN] 8 bytes UID

Return: return 0 if successful

3.5.7 ISO15693_Get_Block_Security

Parameter: model: [IN] bit0=Select_flag,
bit1=Address_flag,
bit2=Option_flag

pUID: [IN] 8 bytes UID

block: [IN] block address

number: [IN] the number of mo

pData: [OUT] response data from tag

pLen: [OUT] length of response data

return 0 if successful

Explanation: If set Select flag on

If set Address flag, only the cards that the UID are congruous will respond.

Clear Option_flag

Clear Option_Flag

3.5.8 ISO15693_Read

Prototype: int WINAPI ISO15693_Read(unsigned char model,
 unsigned char *pUID,
 unsigned char block,
 unsigned char number,
 unsigned char *pData,
 unsigned char *pLen);

Parameter: model: [IN] bit0=Select_flag,
 bit1=Address_flag,
 bit2=Option_flag
pUID: [IN] UID 8 bytes
block: [IN] block address
number: [IN] the number of module to be read, max 16 blocks
pData: [OUT] response data from tag
pLen: [OUT] length of response data

Return: return 0 if successful

Explanation: If set Select_flag, only the cards on Selected state respond this command
If set Address_flag, only the cards that the UID are congruous will respond this command
Clear Option_flag

3.5.9 ISO15693_Write

Prototype: int WINAPI ISO15693_Write (unsigned char model,
 unsigned char *pUID,
 unsigned char block,
 unsigned char *pData);

Parameter: model: [IN] bit0=Select_flag,
 bit1=Address_flag,
 bit2=Option_flag
pUID: [IN] 8 bytes UID
block: [IN] block address
pData: [IN] written data, 4bytes

Return: return 0 if successful

Explanation: If set Select_flag, only the cards on Selected state respond this command
If set Address_flag, only the cards that the UID are congruous will respond this command
If write TI card, set Option_flag,
If write I.CODE SLI card, clear Option_flag

3.5.10 ISO15693_Lock_Block

Parameter: model: [IN] bit0=Select_flag,
bit1=Address_flag,
bit2=Option_flag
pUID: [IN] 8 bytes UID

pUID: [IN] 8 bytes UID
block: [IN] block address

Return: return 0 if successful

- Explanation: If set Select_flag, only the cards on Selected state respond this command
- If set Address_flag, only the cards that the UID are congruous will respond this command
- If write TI card, set Option_flag,
- If write I.CODE SLI card, clear Option_flag

3.5.11 ISO15693_Write_AFI

Parameter: model: [IN] bit0=Select_flag,
bit1=Address_flag,
bit2=Option_flag

pUID: [IN] 8 bytes UID
AFI: [IN] written AFI

Return: return 0 if successful

- Explanation: If set Select_flag, only the cards on Selected state respond this command
- If set Address_flag, only the cards that the UID are congruous will respond this command
- If write TI card, set Option_flag,
- If write I.CODE SLI card, clear Option_flag

3.5.12 ISO15693 Lock AFI

Parameter: model: [IN] bit0=Select_flag,
bit1=Address_flag,
bit2=Option_flag

pUID: [IN] 8 bytes UID

Return: return 0 if successful

Explanation: If set Select_flag, only the cards on Selected state respond this command
If set Address_flag, only the cards that the UID are congruous will respond this command

If write TI card, set Option_flag,
If write I.CODE SLI card, clear Option_flag

3.5.13 ISO15693_Write_DSFID

Parameter: model: [IN] bit0=Select_flag,
bit1=Address_flag,
bit2=Option_flag

pUID: [IN] 8 bytes UID
DSFID: [IN] written DSFID

Return: return 0 if successful

Explanation: If set Select_flag, only the cards on Selected state respond this command
If set Address_flag, only the cards that the UID are congruous will respond this command
If write TI card, set Option_flag,
If write I.CODE SLI card, clear Option_flag

3.5.14 ISO15693 Lock DSFID

Parameter: model: [IN] bit0=Select_flag,
bit1=Address_flag,
bit2=Option_flag

pUID: [IN] 8 bytes UID

Return: return 0 if successful

Explanation: If set Select_flag, only the cards on Selected state respond this command
If set Address_flag, only the cards that the UID are congruous will respond this command
If write TI card, set Option_flag,
If write I.CODE SLI card, clear Option_flag