User Manual

SmartCard_Contact Less Reader_ATT5930

Asia Tech Trading Co. Ltd

Revision History

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1. Introduction

EMP5930 PCSC reader is designed with ARM microprocessor and NXP PN512 radio frequency chip. The design offers fast operation and elegant appearance. EMP5930 supports various categories of cards such as ISO14443-A, ISO14443-B, ISO18092 standard contactless cards.

HID interfaces are applied in EMP5930 reader and the reader can work in Win98, Win NT, Win7 platform without additional driver. Dll API interface is also provided for further developments through routine program.

2. Technical Parameters

- Radio frequency: ISO14443-A, Felica
- Power supply: USB power supply
- Maximum power consumption: 150mA
- Read-write distance: 80mm(Max.)
- Dimensions: 112x82x26(mm)
- Weight: 100g
- LED: two LEDs (red, green)
- Interface: USB HID

3. Readable Card Type

3.1 ISO14443-Type A

- Mifare One S50
- Mifare One S70
- Mifare Ultra Light
- Mifare Ultra Light C
- Mifare DesFire
- Mifare Plus (all functions supported)

- ISO14443-4 (T=CL) TYPE A contactless IC card

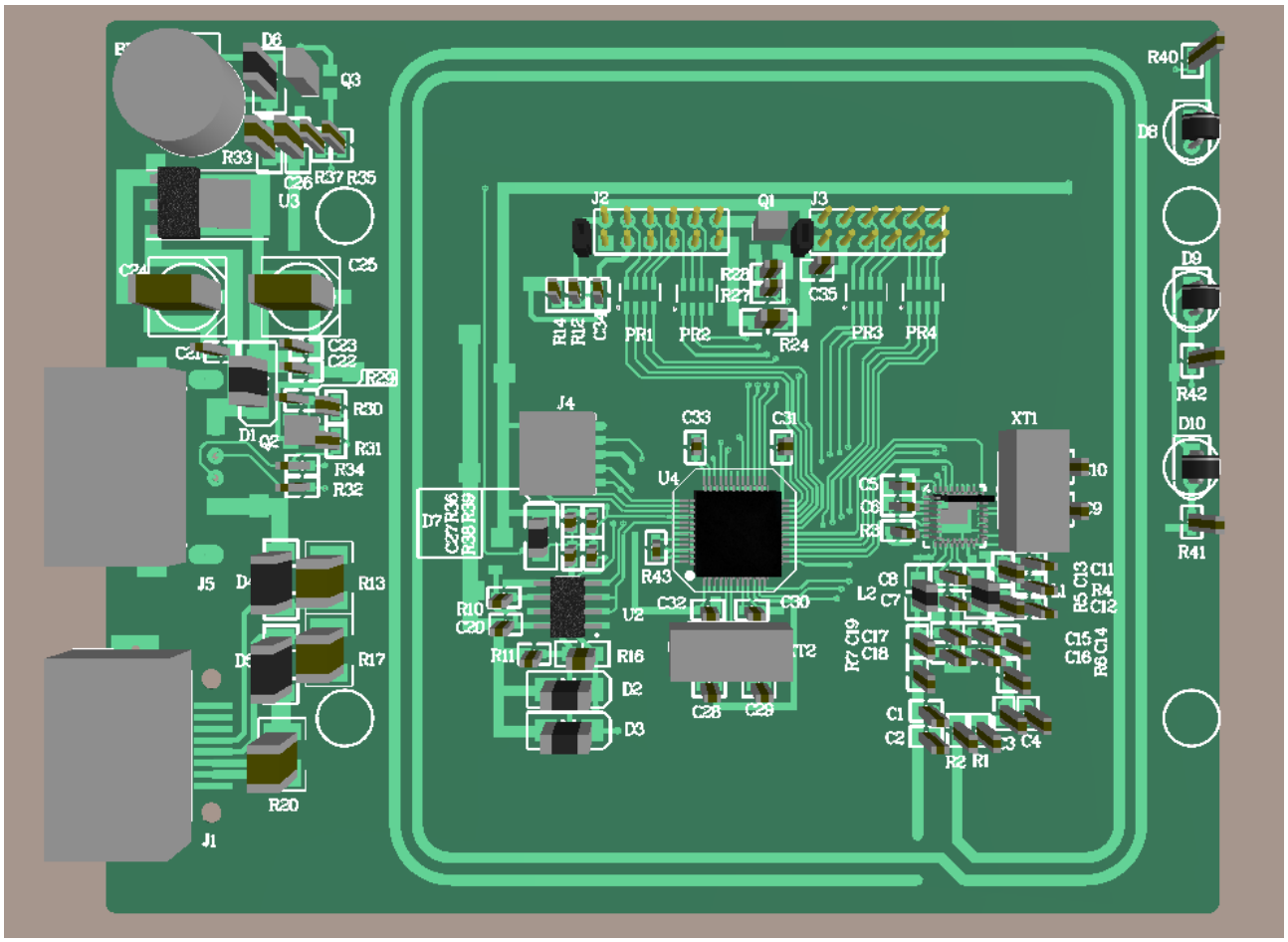
3.2 ISO14443-Type B

- AT88RF020
- AT88RF080
- SR176
- SRI512
- SRI1K
- RI2K
- SRI4K
- SRIX4K
- ISO14443-4 (T=CL) TYPE B contactless IC card

3.3 ISO18092

- Felica

4. Description of Interface

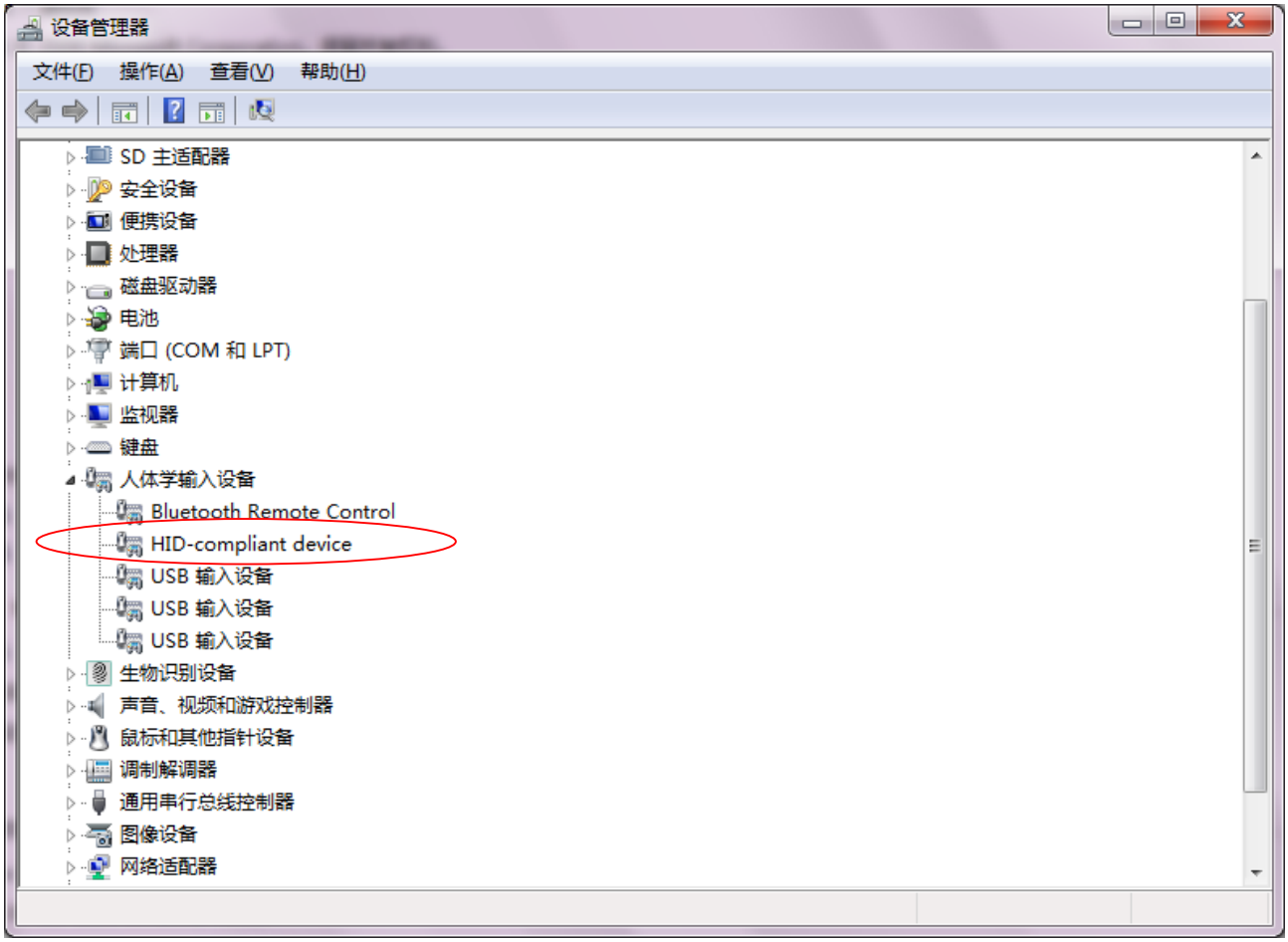


4.1 USB Interface

The description of the USB interface (J5) is as follows.

Pin	Signal	Function
1	VBus	+5V power supply
2	D-	Data line+
3	D+	Data line-
4	GND	Power supply

After power-on, check the connection of the reader according to the following steps: My computer->Property->Hardware->Device manager; find “HID-compliance device”



4.2 RS-485 Interface

LAN base is applied as RS-485 interface (J1); Description of the interface is as follows

Pin	Signal	Function
1	NC	
2	NC	
3	NC	
4	A	RS-485 A
5	B	RS-485 B
6	GND	Power ground
7	GND	Power ground
8	NC	

4.3 LCD-1602 Interface

Description of the 2.0x6 LCD-1602 interface (J2) on the reader boards is as follows

Pin	Signal	Function
1	GND	Power ground
2	+5V	+5V power output
3	VL	LCD bias signal
4	RS	Data/command select
5	RW	Read/write select
6	E	Enable signal
7	D4	Data IO4
8	D5	Data IO5
9	D6	Data IO6
10	D7	Data IO7
11	BLA	Backlight anode
12	BLK	Backlight cathode

4.4 IO Expansion Interface

Description of the 2.0x6 IO expansion interface (J3) is as follows

Pin	Signal	Function
1	+5V	+5V power output
2	+5V	+5V power output
3	GND	Power ground
4	GND	Power ground
5	GPIO1	GPIO 1
6	GPIO2	GPIO 2
7	GPIO3	GPIO 3
8	GPIO4	GPIO 4
9	GPIO5	GPIO 5
10	GPIO6	GPIO 6
11	GPIO7	GPIO 7
12	GPIO8	GPIO 8

5. Guide for Secondary Development

5.1 iMX-100.h

The header file includes the basic operating function, for example, turn on/off reader, turn on/off of radio frequency and application interface of RF card.

5.1.1 Turn on the reader

Function prototype: HANDLE _stdcall Mif_OpenPort(long nReaderPort);

Parameter:

Parameter	Input/Output	Type	Meaning
nReaderPort	I	long	Connecting port of the reader≥20

Returned value: reader operating handle: >0 is success， <0 is failure ；

5.1.2 Turn off the reader

Function prototype: long _stdcall Mif_ClosePort(HANDLE hReader);

Parameter:

Parameter	Input/Output	Type	Meaning
hReader	I	HANDLE	reader operating handle=returned value when turn on the reader

Returned value: 1=success, if not, failure

5.1.3 Read mifare specified block

Function prototype：long _stdcall Mif_DirectRead(HANDLE hReader, Key *kKey);

Parameter list:

Parameter	Input/output	Type	Meaning
hReader	I	long	Reader operating handle
kKey->Keyab	I	unsigned char	Mifare authentication key type =1，4，use key B to authenticate =2, use key B as Key A to authenticate =Other，Use key A to authenticate
kKey->Sector	I	unsigned char	Mifare sector number 00H-0FH

kKey->Block	I	unsigned char	Mifare data block number 00H-FFH
kKey->Data	O	unsigned char *	Block data 00H-0FH byte is block data 10H-13H byte is card UID
kKey->RequestAll		unsigned char	Reserved

Returned value: 1= success, other=failure

Note: please download the key to the reader first

5.1.4 ISO14443-3 Type A Request Command

Function prototype：long _stdcall Mif_Request(HANDLE hReader);

Parameter list:

Parameter	Input/output	Type	Meaning
hReader	I	long	Reader operating handle

Returned value: 1= success, other=failure

5.1.5 ISO14443-3 Type A Request All Command

Function: Wake up the card in HALT state

Function prototype：long _stdcall Mif_RequestAll(HANDLE hReader);

Parameter list：

Parameter	Input/output	Type	Meaning
hReader	I	long	Reader operating handle

Returned value：1= success, other=failure

5.1.6 ISO14443-3 Type A Anticol Level 1Command

Function prototype：long _stdcall Mif_Anticol(HANDLE hReader, CardID *pCardID);

Parameter list：

Parameter	Input/output	Type	Meaning
hReader	I	long	Reader operating handle
pCardID->ID	O	unsigned char*	4-byte card UID

Returned value：1= success, other=failure

5.1.7 ISO14443-3 Type A Select Level 1Command

Function prototype：long _stdcall Mif_Select(HANDLE hReader, CardID *cardID);

Parameter list：

Parameter	Input/output	Type	Meaning
hReader	I	long	Reader operating handle
pCardID->ID	O	unsigned char*	UID(4)+ SAK(1)

Returned value：1= success, other=failure

5.1.8 ISO14443-3 Type A Anticol Level 2 Command

Function prototype：long _stdcall Mif_Anticol2(HANDLE hReader, CardID *pCardID);

Parameter list：

Parameter	Input/output	Type	Meaning
hReader	I	long	Reader operating handle
pCardID->ID	O	unsigned char*	4-byte card UID

Returned value：1= success, other=failure

5.1.9 ISO14443-3 Type A Select Level 2 Command

Function prototype：long _stdcall Mif_Select2(HANDLE hReader, CardID *cardID);

Parameter list：

Parameter	Input/output	Type	Meaning
hReader	I	long	Reader operating handle
pCardID->ID	O	unsigned char*	UID(4)+ SAK(1)

Returned value：1= success, other=failure

5.1.10 ISO14443-3 Type A Anticol Level 3 Command

Function prototype：long _stdcall Mif_Anticol2(HANDLE hReader, CardID *pCardID);

Parameter list:

Parameter	Input/output	Type	Meaning
hReader	I	long	Reader operating handle
pCardID->ID	O	unsigned char*	4-byte card UID

Returned value：1= success, other=failure

5.1.11 ISO14443-3 Type A Select Level 3 Command

Function prototype：long _stdcall Mif_Select3(HANDLE hReader, CardID *cardID);

Parameter list：

Parameter	Input/output	Type	Meaning
hReader	I	long	Reader operating handle
pCardID->ID	O	unsigned char*	UID(4)+ SAK(1)

Returned value：1= success, other=failure

5.1.12 Mifare Authentication Command

Function prototype：long _stdcall Mif_Auth(HANDLE hReader, Key *kKey);

5.1.13 Mifare Authentication Command Expansion

Function prototype：long _stdcall Mif_AuthEx(HANDLE hReader, int nKeyType, int nSectorNo);

5.1.14 Mifare Write Command

Function prototype：long _stdcall Mif_Write(HANDLE hReader, Key *kKey);

5.1.15 Turn-on the Reader Buzzer

Function prototype：long _stdcall Mif_BuzOn(HANDLE hReader);

5.1.16 Turn-off the Reader Buzzer

Function prototype：long _stdcall Mif_BuzOff(HANDLE hReader);

5.1.17 Mifare Read Command

Function prototype：long _stdcall Mif_Read(HANDLE hReader, Key *kKey);

5.1.18 Mifare Halt Command

Function prototype：long _stdcall Mif_Halt(HANDLE hReader);

5.1.19 Green Light-On

Function prototype：long _stdcall Mif_LEDOn(HANDLE hReader);

5.1.20 Green Light-off

Function prototype：long _stdcall Mif_LEDOff(HANDLE hReader);

5.1.21 Download Mifare Key

Function prototype：long _stdcall Mif_Key(HANDLE hReader, Key *kKey);

5.1.22 Mifare Increment Command

Function prototype：long _stdcall Mif_Inc(HANDLE hReader, Key *kKey);

5.1.23 Mifare Decrement Command

Function prototype：long _stdcall Mif_Dec(HANDLE hReader, Key *kKey);

5.1.24 Mifare Transfer Command

Function prototype：long _stdcall Mif_Transfer(HANDLE hReader, Key *kKey);

5.1.25 Mifare Read Command Expansion

Function prototype：long _stdcall Mif_ReadBlockEx(HANDLE hReader, int nSectorNo, int nBlockNo, unsigned char *pbData);

5.1.26 Mifare Write Command Expansion

Function prototype：long _stdcall Mif_WriteBlockEx(HANDLE hReader, int nSectorNo, int nBlockNo, unsigned char *pbData);

5.1.27 Expansion Download Mifare Key

Function prototype：long _stdcall Mif_LoadKeyToReaderEx(HANDLE hReader, int nSectorNo, int nKeyType, unsigned char *pbKey);

5.1.28 Reade mifare Specified Block

Function prototype：long _stdcall Mif_ReadBlock(HANDLE hReader, unsigned char bSector, unsigned char bBlock, unsigned char* pbBlockData,unsigned char* pbCardID, unsigned char bKeyMode=0,unsigned char bRequestMode=0);

5.1.29 Write mifare Specified Block

Function prototype：long _stdcall Mif_DirectWriteBlock(HANDLE hReader, unsigned char bSector,

unsigned char bBlock, unsigned char* pbBlockData,
unsigned char bKeyMode=0,unsigned char bRequestMode=0);

5.1.30 Acquire Reader Version

Function prototype：long _stdcall Mif_GetReaderVersion(HANDLE hReader, char* pszReaderVersion, DWORD dwBufferSize);

5.1.31 Read Card UID

Function prototype：long _stdcall Mif_GetCardID(HANDLE hReader, char* pszBuffer, DWORD dwBufferSize);

5.1.32 Download mifare Key

Function prototype：long _stdcall Mif_LoadKeyToReader(HANDLE hReader, int nSector, int nKeyType, unsigned char pbKey[6]);

5.1.33 Dynamic Mifare Key Authentication

Function: Execute authentication through external key
Function prototype：long _stdcall Mif_AuthExKey(HANDLE hReader, Key *kKey);

5.1.34 Close Radio Frequency Signal

Function prototype：long _stdcall RF_Close(HANDLE hReader);

5.1.35 Felica Poll Command

Function prototype：long _stdcall Felica_Poll(HANDLE hReader, unsigned char *pIDm);

5.1.36 Felica Command Transfer

Function prototype：long _stdcall Felica_Transceiver(HANDLE hReader,
unsigned char *pSend, int dwSendLen,
unsigned char *pReceive, int *pdwRecevieLen);

5.1.37 Transfer Original RF Data

Function prototype：long _stdcall RF_Transceiver(HANDLE hReader,
unsigned char *pSend, int dwSendLen,
unsigned char *pReceive, int *pdwRecevieLen);

5.1.38 ISO14443-3 Type A Polling Command

Function: Complete REQA of Type A, Anticollision, Select

Function prototype：long _stdcall TYPEA_Polling(HANDLE hReader, int cReqMode,
unsigned char *pReceive, int *pdwRecevieLen);

Parameter list：

Parameter	Input/output	Type	Meaning
hReader	I	long	Reader operating handle
cReqMode	I	int	Request Mode
pReceive	O	Unsigned char*	ATQA(2)+SAK(1)+UID_LEN(1)+UID(n)
pdwRecevieLen	O	int*	Length of output data

Returned value：1= success, other=failure

5.1.39 ISO14443-4 Type A RATS Command

Function prototype：long _stdcall TYPEA_Rats(HANDLE hReader,
int cid,
unsigned char *pReceive, int *pdwRecevieLen);

5.1.40 ISO14443-4 Type A Deselect Command

Function prototype：long _stdcall TYPEA_Deselect(HANDLE hReader,
int cid);

5.1.41 ISO14443-4 APDU Command Transfer (T=CL)

Function prototype：long _stdcall ISO14443_Apdu(HANDLE hReader,
int cid, unsigned char *pSend, int dwSendLen,
unsigned char *pReceive, int *pdwRecevieLen);

5.1.42 Acquire DLL Version

Function prototype：long _stdcall DLL_GetVersion(char* pszDllVersion);

Parameter list：

Parameter	Input/output	Type	Meaning
pszDllVersion	O	Char *	DLL version

Returned value：1=success, <=0 is failure

5.1.43 ISO14443-3 Type B Request Command

Function prototype：long _stdcall TYPEB_REQB(HANDLE hReader, int afi, int param, unsigned char *pATQB, int *ATQB_len);

Parameter list：

Parameter	Input/output	Type	Meaning
hReader	I	long	Reader operating handle
afi	I	int	Set card AFI as “0”, all cards in the reading zone respond; Otherwise, only the cards corresponding to AFI respond.
param	I	int	b7-b4: reserved as 0 b3: 1, wake up cards in halt state (WUPB) 0, wake up cards in idle state b2-b0: slot number 0--- 1 slot 1---2 slot 2---4 slot 3---8 slot 4---16 slot Other: 保留
pATQB	O	unsigned char*	n*12(0x50+PUPI(4)+ Application Data(4)+ Protocol Info(3))
ATQB_len	O	Int*	

Returned value：1= success, other=failure

5.1.44 ISO14443-3 Type B Attrib command

Function prototype：long _stdcall TYPEB_Attrib(HANDLE hReader, unsigned char *pUID, int cid, unsigned char *pINF, int inf_len, unsigned char *pATA, int* ATA_len);

Parameter list：

Parameter	Input/output	Type	Meaning
hReader	I	long	Reader operating handle
pUID	I	int	Card UID
cid	I	int	Card communication ID
pINF	I	unsigned char*	Higher layer INF
Inf_len	I	int	Higher layer INF length
*pATA	O	unsigned char*	Higher layer Response
ATA_len	O	int*	Higher layer Response length

Returned value：1= success, other=failure

5.1.45 ISO14443-3 Type B Halt Command

Function prototype：long _stdcall TYPEB_Halt(HANDLE hReader, unsigned char *pUID);

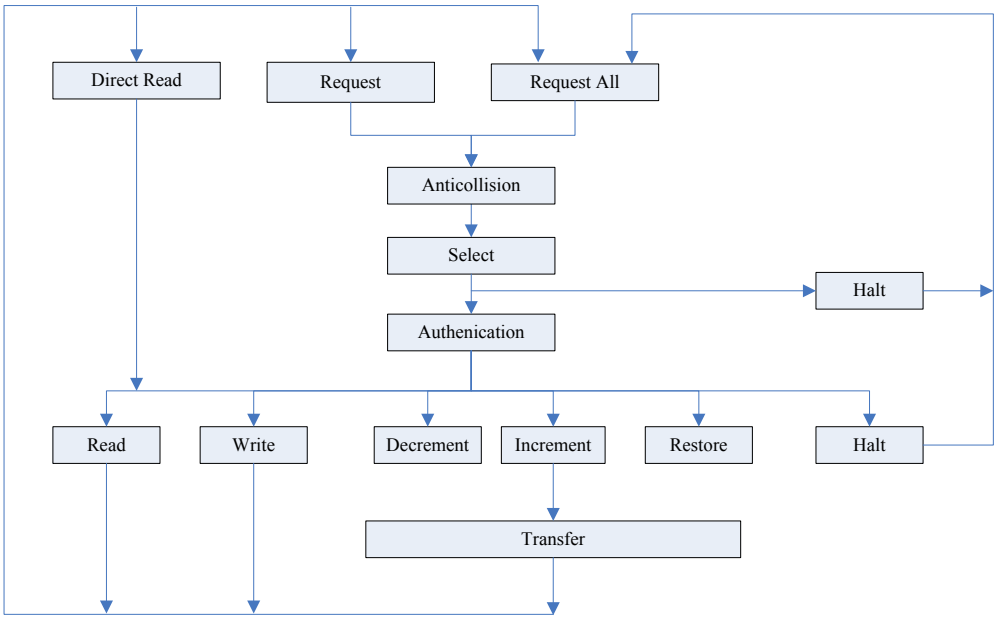
Parameter list：

Parameter	Input/output	Type	Meaning
hReader	I	long	Reader operating handle
pUID	I	Unsigned char *	Card UID(4 bytes)

Returned value：1= success, other=failure

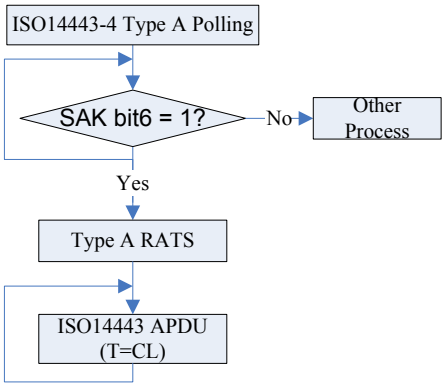
6. Basic Operating Flow

6.1 Mifare S50/S70(ISO14443-3 Protocol)



6.2 ISO14443-4 (T=CL)

6.2.1 Type A



6.2.2 Type B