1. Hardware Guide

1.1 Clock

1) MCU SOC requires an external 12 MHz oscillator, to ensure the normal work of USB;

2) MCU SOC operates at typical clock frequency 120MHz, which can be configured by user through the load of initialization program, however no more than 168MHz;

1.2 UART

- UART default baud is 57.6kbps;
- The default baud of UART is configurable through the loading configure table;
- UART baud can also set by instruction, from 9600bps to 921600bps;
- UART_TD and UART_RD can be linked to receive and transfer pin of a MCU directly; However if the host is a PC, a RS232 level converter is needed for the right connection.

1.3 USB

- Standard USB interface, with USB protocol embedded;
- compatible with USB2.0 and able to work at Low Speed/Full Speed;
- Default VID=0x0453; default PID=0x9005;
- Both VID and PID can be configured by user.

1.4 Cooperation Between UART and USB

- The host can communicates with MCU SOC via UART, or USB;
- Both of them use the same communication protocol and command;
- The two share the same data buffer;
- The two can work alone, or simultaneously（not recommended）;
- Can disable one of them by instruction (for example, you can shut-off USB interface by UART interface command, and vice versa).

1.5 Sensor

- MCU SOC can interface with a variety type of sensors.

1.6 Power Supply

a) Core voltage: the core voltage of MCU SOC is 1.8V±5%; while its power consumption no more than 60mA;

b) I/O voltage: the I/O voltage of MCU SOC is 3.3V±10%; while its power consumption no more than 20mA;

c) Reset: MCU SOC integrates POR reset circuit. RESETN(P51) pin can be pulled up with 10k resistance, or route to reset circuit/chip directly;

1.7 Operation Temperature and Humidity

The operation temperature of MCU SOC is -40℃-85℃（its main frequency lower than 144Mhz）, humidity: 30%--85%; if its main frequency exceeds 144 MHz, the chip can only operates at the

commercial temperature range of 0℃-70℃.

1.8 Soldering Temperature

MCU SOC can tolerate 240℃ reflowing soldering.

2. Software Developing Guide

2.1 Parameter Table

a) Parameter table contains the basic parameters for the running of protocol and algorithm. The whole software system will access this content. So understanding it and carefully setting the Parameter Table is vital for the correct use of the chip.

b) The parameter table is configured by MCU initialization program (ROM-resident or user-defined) at the chip's first power on, with the result being stored in the parameter section of the serial FLASH. For the successive power up, the DSP initialization program will load the parameter table to RAM before initialize the system registers according to it. The length of parameter table is 64 words（128 bytes）.

c) Structure:

Type	Number	Name	Length (word)	Default/content	Description
PART1	1	**SSR**	1	0	State register
	2	**SensorType**	1	0--15	Sensor type. According to the value of GPIO[13,10]
	3	**DataBaseSize**	1	according to FLASH	Fingerprint Database size
PART2	4	**SecurLevel**	1	3	Security level: divided into 5 levels
	5	**DeviceAddress**	2	0xffffffff	Device address: Chip address, can be set by instruction
	6	**CFG_PktSize**	1	1	Data packet size
	7	**CFG_BaudRate**	1	6	Baudrate factor

	8	**CFG_VID**	1		
	9	**CFG_PID**	1		
	10	Reserved	1		The eight registers (6~13) are system configuration table
	11	Reserved	1		
	12	Reserved	1		
	13	Reserved	1		
	14	**ProductSN**	4	Product SN, ASCII code	Device descriptor
	15	**SoftwareVersion**	4	ASCII code	
	16	**Manufacturer**	4	ASCII code	
	17	**SensorName**	4	ASCII code	
	18	**Password**	2	00000000H	
	19	**JtagLockFlag**	2	00000000H	
	20	**SensorInitEntry**	1	Entry address	Sensor initialization routine entry
	21	**SensorGetImageEntry**	1	Entry address	Get-image program entry
	22	**Reserved**	27		
PART3	23	**ParaTableFlag**	1	0X1234	Parameter Table valid flag

d) The **parameter table** is located at the first page of the SPM (System Parameter Memory);

e) The **parameter table** is loaded from FLASH to RAM space (0x200~0x23F) after power on with its structure and order remain the same;

f) Detailed **description of the parameter table**:

SSR (Addr: 0x200; Access Instruction: PS_ReadSysPara**)**

Name	Access	Reset	Bits	Description
--	R	0	15:4	Reserved
ImgBufStat	R	0	3	1: fingerprint image buffer contains valid image.
PWD	R	0	2	1: device handshake password is accepted.
Pass	R	0	1	1: the fingerprint passes verification.
Busy	R	0	0	0: system is free; 1: system is on command;

SensorType (Addr: 0x201; Access instruction: PS_ReadSysPara)

Name	Access	Reset	Bits	Description
--	R	Value of GPIO[13:10] at power on	15:0	different sensor driver is called according to this value

DataBaseSize (Addr: 0x202; Access instruction: PS_ReadSysPara)

Name	Access	Reset	Bits	Description
--	R	Dependent on the FLASH size	15:0	To show the fingerprint database capability

SecurLevel (Addr: 0x203; Access instruction: PS_ReadSysPara/ PS_WriteReg)

Name	Access	Reset	Bits	Description
--	R/W	3	15:0	Security level indication, the system set corresponding matching threshold according to this value. Totally there are 5 levels, with Level 1 being the lowest and Level 5 being the highest.

DeviceAddress (Addr: 0x204; Access instruction: PS_ReadSysPara/ PS_SetChipAddr)

Name	Access	Reset	Bits	Description
--	R/W	0xFFFFFFFF	31:0	system only receives address-matched instruction/data packets

CFG_PktSize (Addr: 0x206; Access instruction: PS_ReadSysPara /PS_WriteReg)

Name	Access	Reset	Bits	Description
--	R/W	1	15:0	when transmitting data， the system adjusts the length of unit data packet according to this value

CFG_BaudRate (Addr: 0x207; Access instruction: PS_ReadSysPara /PS_WriteReg)

Name	Access	Reset	Bits	Description
--	R/W	6	15:0	Configure UART Baudrate, which is the result of CFG_BaudRate*9600

CFG_VID (Addr: 0x208; Access instruction: PS_ReadINFpage)

Name	Access	Reset	Bits	Description
--	R	0x0453	15:0	embedded USB protocol VID

CFG_PID (Addr: 0x209; Access instruction: PS_ReadINFpage)

Name	Access	Reset	Bits	Description
--	R	0x9005	15:0	embedded USB protocol PID

ProductSN (Addr: 0x20E~0x211; Access instruction: PS_ReadINFpage)

Name	Access	Reset	Bits	Description
--	R	initialization value at first power on	15:0	Denote product model

SoftwareVersion (Addr: 0x212~0x215; Access instruction: PS_ReadINFpage)

Name	Access	Reset	Bits	Description
--	R	initialization value at first power on	15:0	Denote software version No.

Manufacturer (Addr: 0x216~0x219; Access instruction: PS_ReadINFpage)

Name	Access	Reset	Bits	Description
--	R	initialization value at first power on	15:0	Denote manufacturer name

SensorName (Addr: 0x20A~0x21D; Access instruction: PS_ReadINFpage)

Name	Access	Reset	Bits	Description
--	R	initialization value at first power on	15:0	Denote sensor name

Password (Addr: 0x21E~0x21F; Access instruction: PS_ReadINFpage/ PS_SetPwd)

Name	Access	Reset	Bits	Description
--	R/W	0	15:0	Handshake signal. System won't respond until it receives correct password.

JtagLockFlag (Addr: 0x220~0x221; Access instruction: PS_ReadINFpage)

Name	Access	Reset	Bits	Description
--	R	initialization value at first power on	15:0	JTAG port will be shut off if specific value are written to the system on the first power up

SensorInitEntry (Addr: 0x222; Access instruction: PS_ReadINFpage)

Name	Access	Reset	Bits	Description
--	R	initialization value at first power on	15:0	System learns where to call the sensor initialization routine according to this value

SensorGetImageEntry (Addr: 0x223; Access instruction: PS_ReadINFpage)

Name	Access	Reset	Bits	Description
--	R	initialization value at first power on	15:0	System learns where to call the sensor GetImage routine according to this value

ParaTableFlag (Addr: 0x23f; Access instruction: PS_ReadINFpage)

Name	Access	Reset	Bits	Description
--	R	0x1234	15:0	0x1234: P**arameter table** has been initialized；0x0204: Only PART1 of the **parameter table is initialized**； Others: System needs to initialize the whole **parameter table**.

2.2 FLASH Memory Structure

a) Memory Structure：

Address	Content	Size
0x0000—0x7fff	Codes	32k words
0x8000—0x87ff	System Parameter Memory(SPM)	2k words
0x8800—0xffff	Fingerprint Database	The rest of flash

b) This memory structure is defined by ROM system. However, if user chooses to develop the whole DSP software by themselves, no such restriction will be applied;

c) The size of fingerprint database changes with the FLASH capacity which the system will identify automatically.

2.3 System Parameter Memory Structure

a) System Parameter Memory Structure

Physical Address(by Byte)	**PageNum**	**Content**	**Comment**
0x8000	0	Reserved	
0x8200	1	Parameter table	
0x8400	2	User's Notepad	
0x8600	3	Reserved	
0x8800	4	Reserved	
0x8a00	5	Reserved	
0x8c00	6	Reserved	
0x8e00	7	Index of fingerprint database	Can index as much as 2048 templets

b) System Parameter Memory is divided into 8 pages，512 bytes per page.

2.4 Notepad

512-byte memory is set aside in flash for User's notepad. The notepad is divided into 16 pages logically, 32 bytes per page. The host can access any page by instruction PS_WriteNotepad or PS_ReadNotepad.

Note: when written, the whole page is taken as a whole and its former contents will be replaced.

2.5 Buffer and Fingerprint Database

There are a 72K-byte image buffer **ImageBuffer** and two 512-byte feature file buffers **CharBuffer1** and **CharBuffer2** in the chip. Users can read/write any of the above buffers by instructions. CharBuffer1 or CharBuffer2 can be used to store general feature file as well as template feature file. In order to cut down the communication time when uploading or downloading image through UART interface, only the upper 4 bits of the pixel byte are applied, i.e. to combine two pixels bytes into one byte in transmitting. No such tricks are made when transmitting through USB interface.

The capacity of fingerprint database changes with FLASH memory capacity, which is identified by the system automatically. Fingerprint templates are stored sequentially according to the SN, while the definition of SN is: 0~(N-1)（N=fingerprint database capacity）.

Note: Only through SN index will users access the fingerprint database.

2.6 Features and Templates

Fingerprint feature file occupies 256 bytes, including general information as well as minutiae information; Template file occupies 512 bytes, sum of two features files of the same fingerprint.

2.7 Feature file structure：

- The minutiae number of a feature file is no more than 50. Of the total 256 bytes (size of feature file is 256 bytes)， the first 56 bytes is the file header used for general information；The latter 200 bytes are to store minutiae information, 4 bytes for each minutiae.

File Header Format

Name	Bytes	Description
Flag	0	Feature file flag. To distinguish the feature files generated by different sensors or algorithms. "0": the feature file is invalid or deleted. So no feature file can be stored to database when the flag is "0"
Type	1	Feature file type. 0: the file only contains file header; 1: the file contains file header and reduced minutiae information. 2: the file contains file header and complete minutiae information.
Quality	2	Quality of feature. Value range is 0~100 with the larger value indicating the higher feature quality.
Number	3	Minutiae number within the range of 5~50.
SN	4~5	Searching assistant.
Background table	6~39	Zipped information of background table
Singularity point coordinate	40~43	Includes (x, y) coordination information of the two centre points.
--	44~55	Reserved

Feature Unit Structure (4 bytes)

31 23	22 14	13 5	4 1	0
x	y	Angle	minutiae quality	Attribute

2.8 ROM

ROM contains complete fingerprint identification system, including communication protocol, command interpretation, algorithm, FLASH management and drivers for sensors FPC1011C and LTT C500. So there would be no need to load or write extra drivers in the building of complete system except the proper setting of pins GPIO[13: 8] if sensor FPC1011C or LTT C500 is implemented.

3. Instruction Set

3.1 PS_GetImage

- Instruction Code：01H
- Function：Reading images from sensor and store them in the image buffer

3.2 PS_GenChar

- Instruction Code：02H
- Function：Generating fingerprint features according to original images and store them in CharBuffer1 or CharBuffer2

3.3 PS_Match

- Instruction Code：03H
- Function: Pattern-matching the feature file in CharBuffer1 and CharBuffer2

3.4 PS_Search

- Instruction Code：04H
- Function：Using the feature files in CharBuffer1 or CharBuffer2 to search the whole or part of fingerprint database

3.5 PS_RegModel

- Instruction Code：05H
- Function： Merging the feature files in CharBuffer1 and CharBuffer2 and generate them into template to store in CharBuffer2

3.6 PS_StoreChar

- Instruction Code：06H
- Function：Storing files in the feature buffer to FLASH fingerprint database

3.7 PS_LoadChar

- Instruction Code：07H
- Function：Reading a template from FLASH fingerprint database to feature buffer

3.8 PS_UpChar

- Instruction Code：08H
- Function：Uploading files in the feature buffer to the host

3.9 PS_DownChar

- Instruction Code：09H
- Function：Downloading a feature file from the host to the feature buffer

3.10 PS_UpImage

- Instruction Code：0AH
- Function: Uploading original image

3.11 PS_DownImage

- Instruction Code：0BH
- Function: Downloading original image

3.12 PS_DeletChar

- Instruction Code：0CH
- Function：Deleting a feature file of the FLASH fingerprint database

3.13 PS_Empty

- Instruction Code：0DH
- Function：Clearing FLASH fingerprint database

3.14 PS_WriteReg

- Instruction Code：0EH Function：
- Writing SOC system register

3.15 PS_ReadSysPara

- Instruction Code：0FH
- Function：Reading system basic parameter

3.16 PS_Enroll

- Instruction Code：10H
- Function：Enrolling template

3.17 PS_ Identify

- Instruction Code：11H Function：
- Verifying fingerprint

3.18 PS_SetPwd

- Instruction Code：12H
- Function： Setting device handshake passwords

3.19 PS_VfyPwd

- Instruction Code：13H
- Function：Verifying device handshake passwords

3.20 PS_GetRandomCode

- Instruction Code：14H
- Function：Sampling random code

3.21 PS_SetChipAddr

- Instruction Code：15H
- Function：Setting chip address

3.22 PS_ReadINFpage

- Instruction Code：16H
- Function：Reading contents of FLASH Information Page

3.23 PS_Port_Control

- Instruction Code：17H
- Function：Communication port（UART/USB） switch control

3.24 PS_WriteNotepad

- Instruction Code：18H
- Function：Writing notepad

3.25 PS_ReadNotepad

- Instruction Code：19H
- Function：Reading notepad

3.26 PS_BurnCode（in MCU SOC this instruction used for burning external FLASH code）

- Instruction code：1AH Function：
- Burning on-chip FLASH

3.27 PS_HighSpeedSearch

- Instruction Code：1BH
- Function：Fast-classifying FLASH

3.28 PS_GenBinImage

- Instruction Code：1CH
- Function：Generating to binary fingerprint image

3.29 PS_ValidTemplateeNum

- Instruction Code：1dH
- Function：Reading valid template number

4. Instruction Form specification

MCU SOC can form complete fingerprint identification module with several necessary periphery circuit （sensor, flash, power supply, etc.）. The module is in Slave mode all the time. The host can issue different instructions to the module, for various functions. The host instruction, modules ACK and data exchanges are all work according to given format data packet. The host should packet instructions and data which need transmitting as well as analyze received data packets based-on the following format. For multi-byte data, the high byte is in front, low byte retro, e.g. two-byte data 00 60 should be expressed as 0060, not 0600.

4.1 Data packet Form

Instruction /data packet altogether be classified into three categories：

Packet flag=01 Command packet

Packet flag=02 Data packet， and with continue packet

Packet flag=08 The last data packet，i.e. end packet

All data packets should be with packetheader：0xEF01

01 Command packet format：

Byte NO.	2bytes	4bytes	1 byte	2 bytes	1byte	… …			2 bytes
Name	Packet header	Chip address	Packet flag	Packet length	Instruction	Para-meter 1	…	Para-meter n	Check sum
Content	0xEF01	xxxx	01	N=					

02 Data packet format：

Byte NO.	2bytes	4bytes	1 byte	2 bytes	N bytes…	2 bytes
Name	Packet header	Chip address	Packet flag	Packet length	Data	Check sum
Content	0xEF01	xxxx	02			

08 End packet format：

Byte NO.	2bytes	4bytes	1 byte	2 bytes	N bytes…	2 bytes
Name	Packet header	Chip address	Packet flag	Packet length	Data	Check sum
Content	0xEF01	xxxx	08			

- The data packet should not enter implement flow respectively, but behind the instruction packet or ACK packet;
- Downloaded or uploaded data packet are in the same format ;
- Packet length= The total byte number from packet length to Sum（instruction, parameter or data）, including Sum, but not the byte number of packet length itself;
- Sum is the total bytes from packet flag to Sum, the carry will be ignored if it exceed 2 bytes;
- The default chip address is 0xFFFFFFFF before its issue. Once the host issues chip address by instruction, all data packets should receive and transmit according to the address. Chip will reject packets with wrong address.

4.2 Instruction ACK

ACK is to report relevant command running condition and result to the host, the ACK packet contains parameter and can be with continue data packet. Only when the host received the ACK packet of SOC can it confirm the condition of SOC packet receiving and instruction implementing.

ACK packet format：

2 bytes	4bytes	1 byte	2 byte	1 bytes	N bytes	2 bytes
0xEF01	Chip address	Packet flag 07	Packet length	Confirm code	Return value	Check sum

Definition of Confirm codes：

1. 00h：Indicates instruction implementing end or OK;
2. 01h：Indicates data packet receiving error;
3. 02h：Indicates no finger on the sensor;
4. 03h：Indicates getting fingerprint image failed;
5. 04h：Indicates the fingerprint image is too dry or too light to generate feature;
6. 05h：Indicates the fingerprint image is too humid or too blurry to generate feature;
7. 06h：Indicates the fingerprint image is too amorphous to generate feature;

8. 07h：Indicates the fingerprint image is in order, but with too little minutiaes（or too small area）to generate feature;
9. 08h：Indicates the fingerprint unmatched;
10. 09h：Indicates no fingerprint searched;
11. 0ah：Indicates the feature merging failed;
12. 0bh：Indicates the address SN exceeding the range of fingerprint database when accessing to it;
13. 0ch：Indicates template reading error or invalid from the fingerprint database;
14. 0dh：Indicates feature uploading failed;
15. 0eh：Indicates the module cannot receive continue data packet;
16. 0fh：Indicates image uploading failed;
17. 10h：Indicates module deleting failed;
18. 11h：Indicates the fingerprint database clearing failed;
19. 12h：Indicates cannot be in low power consumption;
20. 13h：Indicates the password incorrect;
21. 14h：Indicates the system reset failed;
22. 15H：Indicates there is no valid original image in buffer to generate image;
23. 16H：Indicates on-line upgrading failed;
24. 17H：Indicates there are incomplete fingerprint or finger stay still between twice image capturing;
25. 18H：Indicates read-write FLASH error;
26. 0xf0：Existing instruction of continue data packet, ACK with 0xf0 after receiving correctly;
27. 0xf1：Existing instruction of continue data packet, the command packet ACK with 0xf1;
28. 0xf2：Indicates Sum error when burning internal FLASH;
29. 0xf3：Indicates packet flag error when burning internal FLASH;
30. 0xf4：Indicates packet length error when burning internal FLASH;
31. 0xf5：Indicates the code length too long when burning internal FLASH;
32. 0xf6：Indicates burning FLASH failed when burning internal FLASH;
33. 0x19：Non-defined error;
34. 0x1a：Invalid register number;
35. 0x1b：Register distributing content wrong number;
36. 0x1c：Notepad page number appointing error;
37. 0x1d：Port operation failed;
38. 0x1e：Automatic enroll failed;
39. 0x1f：Fingerprint database is full;
40. 0x20—0xefh：Reserved.

Instructions can only be transmitted from the host to the module, and the module ACK to the host.

After the system power on reset, it will first check whether the default device handshake passwords have been modified or not. If not, the system will ensure the host no passwords verification, then SOC enters into normal work directly; if yes, should first verify the device handshake passwords, SOC enters into normal work after passing passwords.

4.3 Detail Instruction

GetImage PS_GetImage

Function description： Detecting finger, then get the fingerprint image and store it in ImageBuffer. Returning to confirm code to show: getting success, no finger, etc.

Input parameter: none

Return value: Confirm words

Instruction Code: 01H

Instruction packet format:2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Instruction code	Check sum
0xEF01	xxxx	01H	03H	01H	05H

ACK packet format:

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Confirm Code	Check sum
0xEF01	xxxx	07H	03H	xxH	sum

Comment：Confirm Code=00H shows getting success;

Confirm Code=01H shows receiving packet error;

Confirm Code=02H shows no finger on the sensor;

Confirm Code=03H shows getting failed;

Sum=Check sum.

Generate Feature PS_GenChar

Function description： Generating the original image in ImageBuffer to fingerprint feature file and store it in CharBuffer1 or CharBuffer2

Input parameter: BufferID(feature buffer number)

Return value: Confirm words

Instruction Code: 02H

Instruction packet format:

2 bytes	4bytes	1 byte	2 bytes	1 byte	1 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Instruction code	Buffer number	Check sum
0xEF01	xxxx	01H	04H	02H	BufferID	sum

Comment：The BufferID in CharBuffer1 and CharBuffer2 are 1h and 2h，if appoints other values, then process according to CharBuffer2.

ACK packet format:

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Confirm code	Check sum
0xEF01	xxxx	07H	03H	XxH	sum

Comment：Confirm Code=00H shows generating success;
Confirm Code=01H shows receiving packet error;
Confirm Code=06H Shows the fingerprint image is too amorphous to generate feature;
Confirm Code=07H Shows the fingerprint image is in order, but with too little minutiaes to generate feature;
Confirm Code=15H Shows there is no valid original image in buffer to generate image;
Sum=Check sum.

Pattern-Match Two Fingerprints Feature PS_Match

Function description： Pattern-matching the feature files in CharBuffer1 and CharBuffer2
Input parameter： none
Return value： Confirm words，match scores
Instruction code： 03H
Instruction packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Instruction code	Check sum
0xEF01	xxxx	01H	03H	03H	07H

ACK packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes	2 bytes
Packet header	Chip address	Packet flag	Packet length	Confirm code	Score	Check sum
0xEF01	xxxx	07H	05H	XxH	XxH	sum

Comment：Confirm Code=00H shows fingerprint matched;
Confirm Code=01H shows receiving packet error;
Confirm Code=08H shows fingerprint unmatched;
Sum=Check sum.

Search Fingerprint PS_Search

Function description： To search the whole or part of fingerprint database with feature files in CharBuffer1 or CharBuffer2. If get, jump to the original page.
Input parameter： BufferID， StartPage，PageNum
Return value： Confirm words，page number（Matched fingerprint template）
Instruction code：04H
Instruction packet format:

2 bytes	4bytes	1 byte	2 bytes	1 byte	1 byte	2 bytes	2 bytes	2 bytes
Packet header	Chip address	Packet flag	Packet length	Instruction code	Buffer number	parameter	parameter	Check sum
0xEF01	xxxx	01H	08H	04H	BufferID	StartPage	PageNum	sum

Comment：The BufferID in CharBuffer1 and CharBuffer2 are 1h and 2h.
ACK packet format:

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes	2 bytes	2 bytes
Packet header	Chip address	Packet flag	Packet length	Confirm code	page number	Score	Check sum
0xEF01	xxxx	07H	7	xxH	PageID	MatchScore	sum

Comment：Confirm Code=00H shows searching success;
Confirm Code=01H shows receiving packet error;
Confirm Code=09H shows unsearched, here the page number and score are "0";
Sum=Check sum.

Merge Features（Generating Template） PS_RegModel

Function description： Merging feature files in CharBuffer1 and CharBuffer2 to generate templates， store the result in CharBuffer1 and CharBuffer2.
Input parameter： none
Return value： Confirm words
Instruction code：05H
Instruction packet format:

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Instruction code	Check sum
0xEF01	xxxx	01H	03H	05H	09H

ACK packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes
Packet	Chip	Packet flag	Packet	Confirm	Check

header	address		length	code	sum
0xEF01	xxxx	07H	03H	xxH	sum

Comment：Confirm Code=00H shows merging success;
Confirm Code=01H shows receiving packet error;
Confirm Code=0aH shows merging failed（two fingerprints are not from the same finger）;
Sum=Check sum.

Store Templates PS_StoreChar

Function description： Storing the template files in CharBuffer1 or CharBuffer2 to the location of PageIDNum flash database.
Input parameter： BufferID(buffer number)， PageID （fingerprint database location number）
Return value： Confirm words
Instruction code：06H
Instruction packet format:

2 bytes	4bytes	1 byte	2 bytes	1 byte	1 byte	2 bytes	2 bytes
Packet header	Chip address	Packet flag	Packet length	Instruction code	Buffer number	Location number	Check sum
0xEF01	xxxx	01H	06H	06H	BufferID	PageID	sum

Comment：The BufferID in CharBuffer1 and CharBuffer2 are 1h and 2h.
ACK packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Confirm code	Check sum
0xEF01	xxxx	07H	03H	xxH	sum

Comment：Confirm Code=00H shows storing success;
Confirm Code=01H shows receiving packet error;
Confirm Code=0bH shows PageID exceeded the range of fingerprint database;
Confirm Code=18H shows writing FLASH error;
Sum=Check sum.

Readout Templates PS_LoadChar

Function description： Readin the fingerprint templates which appointed IDNum in flash database to template buffer CharBuffer1 or CharBuffer2
Input parameter： BufferID(buffer number)， PageID （fingerprint database template number）
Return value： Confirm words

Instruction code： 07H

Instruction packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	1 byte	2 bytes	2 bytes
Packet header	Chip address	Packet flag	Packet length	Instruction code	Buffer number	Page number	Check sum
0xEF01	xxxx	01H	06H	07H	BufferID	PageID	sum

Comment：The BufferID in CharBuffer1 and CharBuffer2 are 1h and 2h.

ACK packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Confirm code	Check sum
0xEF01	xxxx	07H	03H	XxH	sum

Comment：Confirm Code=00H shows reading success;
Confirm Code=01H shows receiving packet error;
Confirm Code=0cH shows reading error or template invalid;
Confirm Code=0bH shows PageID exceeded the range of fingerprint database;
Sum=Check sum.

upload feature or templates PS_UpChar

Function description: Uploading the feature files in feature buffer to the host.

Input parameter： BufferID(buffer number)

Return value： Confirm words

Instruction code： 08H

Instruction packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	1 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Instruction code	Buffer number	Check sum
0xEF01	xxxx	01H	04H	08H	BufferID	sum

Comment：The BufferID in CharBuffer1 and CharBuffer2 are 1h and 2h.

ACK packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Packet length	Check sum
0xEF01	xxxx	07H	03H	xxH	sum

Comment：Confirm Code=00H shows transmitting data packet later;
Confirm Code=01H shows receiving packet error;
Confirm Code=01H shows instruction running error;
Sum=Check sum.

Transmitting continue data packet after ACK

Download Feature or Templates PS_DownChar

Function description： The host download feature files to one feature buffer of the module

Input parameter： BufferID(buffer number)

Return value： Confirm words

Instruction code： 09H

Instruction packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	1 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Instruction code	Buffer number	Check sum
0xEF01	xxxx	01H	04H	09H	BufferID	sum

Comment：The BufferID in CharBuffer1 and CharBuffer2 are 1h and 2h.

ACK packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Confirm code	Check sum
0xEF01	xxxx	07H	03H	xxH	sum

Comment：Confirm Code=00H shows can receive continue data packet;
Confirm Code=01H shows receiving packet error;
Confirm Code=0eH shows cannot receive continue data packet;
Sum=Check sum.

Receiving continue data packet after ACK

Image PS_UpImage

Function description： Uploading data in image buffer to the host

Input parameter： none

Return value： Confirm words

Instruction code： 0aH

Instruction packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Instruction code	Check sum
0xEF01	xxxx	01H	03H	0aH	000eH

ACK packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Confirm code	Check sum
0xEF01	xxxx	07H	03H	xxH	sum

Comment：Confirm Code=00H shows going on transmitting continue data packet;
Confirm Code=01H shows receiving packet error;
Confirm Code=0fH shows cannot transmit continue data packet;
Sum=Check sum.

Transmitting continue data packet after ACK

A byte contains two pixels， each pixel with 4bits

Download Image PS_DownImage

Function description： The host download image data to the module

Input parameter： none

Return value： Confirm words

Instruction code： 0bH

Instruction packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Instruction code	Check sum
0xEF01	xxxx	01H	03H	0bH	000fH

ACK packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Confirm code	Check sum
0xEF01	xxxx	07H	03H	xxH	sum

Comment：Confirm Code=00H shows can receive continue data packet;
Confirm Code=01H shows receiving packet error;
Confirm Code=0eH shows cannot receive continue data packet;
Sum=Check sum.

Receiving continue data packet after ACK， the data packet length should be 64，128 or 256

A byte contains two pixels， each pixel with 4bits

Delete Template PS_DeletChar

Function description： Deleting the beginning N fingerprint templates which appointed IDNum in flash database

Input parameter： PageID(fingerprint database template number)，N=deleted templates number

Return value： Confirm words

Instruction code： 0cH

Instruction packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes	2bytes	2 bytes
Packet header	Chip address	Packet flag	Packet length	Instruction code	Page number	Delete number	Check sum
0xEF01	xxxx	01H	07H	0cH	PageID	N	sum

ACK packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Confirm code	Check sum
0xEF01	xxxx	07H	03H	xxH	sum

Comment：Confirm Code=00H shows deleting module success;
Confirm Code=01H shows receiving packet error;
Confirm Code=10H shows deleting module failed;
Sum=Check sum.Clear Fingerprint Database PS_Empty

Function description： Deleting all fingerprint modules in flash database
Input parameter： none
Return value： Confirm words
Instruction code： 0dH
Instruction packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Instruction code	Check sum
0xEF01	xxxx	01H	03H	0dH	0011H

ACK packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Confirm code	Check sum
0xEF01	xxxx	07H	03H	xxH	sum

Comment：Confirm Code=00H shows clearing success;
Confirm Code=01H shows receiving packet error;
Confirm Code=11H shows clearing failed;
Sum=Check sum.

Write System Registers PS_WriteReg

Function description： Writing module registers
Input parameter： Register SN
Return value： Confirm words
Instruction code： 0eH
Instruction packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	1byte	1byte	2 bytes
Packet	Chip	Packet	Packet	Instruction	SN of	Content	Check

header	address	flag	length	code	registers		sum
0xEF01	xxxx	01H	05H	0eH	4/5/6	xx	sum

ACK packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Confirm code	Check sum
0xEF01	xxxx	07H	03H	xxH	sum

Register NO.	Register Name	Content description
4	Baudrate control register	9600 * N
5	Match threshold register	1：level1 2：level2 3：level3 4：level4 5：level5
6	Packet size register	0：32bytes 1：64bytes 2：128bytes 3：256bytes

Comment1：Confirm code=00H shows OK;
Confirm Code=01H shows receiving packet error;
Confirm Code=1aH shows register SN error;
Sum=Check sum.

Comment2：When write the instruction implementing of system register（PS_WriteReg）, first ACK with the original configuration，after that modify the system configuration and record it to FLASH. At next power on, the system will work with new configuration.

Read System Basic Parameter PS_ReadSysPara

Function description：

- Read the module's basic parameter（baudrate，packet size etc.）.
- The former 16 bytes of **Parameter Table** stores module's basic information of communication and configuration，which are module's basic parameters.

Input parameter： none

- Return value： Confirm words + basic parameter（16bytes）

Instruction code： 0fH

Instruction packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Instruction code	Check sum

0xEF01	xxxx	01H	03H	0fH	0013H

ACK packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	16 bytes	2 bytes
Packet header	Chip address	Packet flag	Packet length	Confirm code	Basic **parameter table**	Check sum
0xEF01	xxxx	07H	3+16	xxH	Refer to the following table	sum

Comment：Confirm code=00H shows OK;
Confirm Code=01H shows receiving packet error;
Sum=check sum.

Name	Content description	Offset (word)	Size（word）
State register	Content of system's state registers	0	1
Sensor type	Sensor type code: 0：fpc1011c； 2：Ligh Tuning c500；3：Ligh Tuning s500 strip；7 ： Shenzhen Micro-chip strip；9：User-defined sensor；Others：reserved	1	1
Fingerprint database size	Fingerprint database capacity	2	1
		3	1
Security rank	Security level code（1/2/3/4/5）	4	2
Device address	32 bits device address		
Data packet size	Data packet size code：0：32bytes 1：62bytes 2：128bytes 3：256bytes	6	1
Baudrate configuration	N (Baudrate=9600*N bps)	7	1

Auto-Enroll Template PS_Enroll

Function description： Capturing fingerprint enroll template for once, and search for empty space in the fingerprint database and store it, finally jump to memory ID
Input parameter： none
Return value： Confirm words，page number（matched fingerprint template）
Instruction code： 10H

Instruction packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Instruction code	Check sum
0xEF01	xxxx	01H	0003H	10H	0014H

ACK packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes	2 bytes
Packet header	Chip address	Packet flag	Packet length	Confirm code	Page number	Check sum
0xEF01	xxxx	07H	5	xxH	PageID	sum

Comment：Confirm Code=00H shows enrolling success;
Confirm Code=01H shows receiving packet error;
Confirm Code=1eH shows enrolling failed;
Sum==check sum.

Auto-Identify Fingerprint PS_Identify

Function description：

- Capturing fingerprint automatically，search target module in fingerprint database and return to searching result.
- If the match score of target module with current captured fingerprint is higher than the maximum threshold value and the target module is incomplete feature, then update the blank area of target module with captured feature.

Input parameter： none
Return value： Confirm words，page number（matched fingerprint template）
Instruction code： 11H
Instruction packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Instruction code	Check sum
0xEF01	xxxx	01H	0003H	11H	0015H

ACK packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes	2 bytes	2 bytes
Packet header	Chip address	Packet flag	Packet length	Confirm code	Page number	Score	Check sum
0xEF01	xxxx	07H	7	xxH	PageID	MatchScore	sum

Comment：Confirm Code=00H shows searching success;
Confirm Code=01H shows receiving packet error;
Confirm Code=09H shows searching failed, here the page number and score are "0";

Sum==check sum.

Set Password PS_SetPwd

Function description： Setting module handshake password

Input parameter： Password

Return value： Confirm words

Instruction code： 12H

Instruction packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	4 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Instruction code	Password	Check sum
0xEF01	xxxx	01H	07H	12H	Password	sum

Comment：The default value of module address is "0"

ACK packet format：

2 bytes	4 byte	1 byte	2 bytes	1 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Confirm code	Check sum
0xEF01	xxxx	07H	03H	xxH	sum

Comment：Confirm code=00H shows OK;

Confirm Code=01H shows receiving packet error;

Sum=check sum.

Verify Password PS_VfyPwd

Function description： Verifying module handshake passwords

Input parameter： Password

Return value： Confirm words

Instruction code： 13H

Instruction packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	4 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Instruction code	Password	Check sum
0xEF01	xxxx	01H	07H	13H	PassWord	sum

ACK packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Confirm code	Check sum
0xEF01	xxxx	07H	03H	xxH	sum

Comment：Confirm code=00H shows password correct;
Confirm Code=01H shows receiving packet error;
Confirm Code=13H shows password incorrect;
Sum=check sum.

Get Random Code PS_GetRandomCode

Function description： Making chip generate a random code and return to the host
Input parameter： none
Return value： Confirm words
Instruction code： 14H
Instruction packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Instruction code	Check sum
0xEF01	xxxx	01H	03H	14H	0018H

ACK packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	4 bytes	2 bytes
Packet header	Chip address	Packet flag	Packet length	Confirm code	Random code	Check sum
0xEF01	xxxx	07H	07H	xxH	xxxx	sum

Comment：Confirm Code=00H shows generating success;
Confirm Code=01H shows receiving packet error;
Sum=check sum.

Set Chip Address PS_SetChipAddr

Function description： Setting chip address
Input parameter： none
Return value： Confirm words
Instruction code： 15H
Instruction packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	4 bytes	2 bytes
Packet header	Chip address	Packet flag	Packet length	Instruction code	Chip address	Check sum
0xEF01	xxxx	01H	07H	15H	xxxx	sum

ACK packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Confirm code	Check sum

0xEF01	xxxx	07H	07H	xxH	sum

Comment：Confirm Code=00H shows generating address success;
Confirm Code=01H shows receiving packet error;
Sum=check sum.

- When the host download instruction packet, the chip address adopts default address：0xffffffff; the ACK packet address space adopts the newly generated address;
- After running the instruction, the chip address be fixed，remains no change. Only to clear FLASH can you change it;
- After running the instruction，all data packets should apply the generated address.

Read Flash Info Page PS_ReadINFpage

Function description： Reading the information page in FLASH (512bytes)
Input parameter： none
Return value： Confirm words
Instruction code： 16H
Instruction packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Instruction code	Check sum
0xEF01	xxxx	01H	03H	16H	001aH

ACK packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Confirm code	Check sum
0xEF01	xxxx	07H	03H	xxH	sum

Comment：Confirm Code=00H shows transmitting data packet later;
Confirm Code=01H shows receiving packet error;
Confirm Code=0dH shows instruction running failed;
Sum=check sum.
Transmitting continue data packet after ACK

Port Control PS_Port_Control

Function description：

- To UART protocol，this command control the switch of USB communication port;
- To USB protocol，this command control the switch of UART port.

Input parameter： Control code

- Control code 0 means to close the port
- Control code 1 means to open the port

Return value： Confirm words

Instruction code： 17H

Instruction packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	1byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Instruction code	Control code	Check sum
0xEF01	xxxx	01H	04H	17H	0/1	sum

ACK packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Confirm code	Check sum
0xEF01	xxxx	07H	03H	xxH	sum

Comment：Confirm Code=00H shows port operating success;
Confirm Code=01H shows receiving packet error;
Confirm Code=1dH shows port operating failed;
Sum=check sum.

Write Notepad PS_WriteNotepad

- Function description： Distributing a-256-bytes FLASH space for storing user's data in the module, named as user notepad. The pad is divided into 16 pages logically. To write the notepad command --- for read-in user's 32 bytes data to appointed notepad page.

Input parameter： NotePageNum, user content

Return value： Confirm words

Instruction code： 18H

Instruction packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	1byte	32 bytes	2 bytes
Packet header	Chip address	Packet flag	Packet length	Instruction code	Page number	User information	Check sum
0xEF01	xxxx	01H	36	18H	0~15	content	sum

ACK packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Confirm code	Check sum
0xEF01	xxxx	07H	03H	xxH	sum

Comment：Confirm code=00H shows OK;
Confirm Code=01H shows receiving packet error;
Sum=check sum.

Read Notepad PS_ReadNotepad

Function description： Reading 128bytes data in FLASH user field

Input parameter： none

Return value： Confirm words + User information

Instruction code： 19H

Instruction packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	1byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Instruction code	Page number	Check sum
0xEF01	xxxx	01H	04H	19H	0~15	xxH

ACK packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	32bytes	2 bytes
Packet header	Chip address	Packet flag	Packet length	Confirm code	User information	Check sum
0xEF01	xxxx	07H	3+32	xxH	User content	sum

Comment：Confirm code=00H shows OK;

Confirm Code=01H shows receiving packet error;

Sum=check sum.

Burn on-chip FLASH PS_ BurnCode

Function description： The host download code data and write in FLASH

Input parameter： none

Return value： Confirm words

Instruction code： 01AH

Instruction packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	1 bytes	2 bytes
Packet header	Chip address	Packet flag	Packet length	Instruction code	Upgrade mode	Check sum
0xEF01	xxxx	01H	04H	1AH	0/1	sum

Upgrade mode 0：Only upgrade information page

Upgrade mode 1：Complete upgrading Others：

Error

ACK packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Confirm code	Check sum
0xEF01	xxxx	07H	03H	xxH	sum

Comment：Confirm Code=00H shows can receive continue data packet;

Confirm Code=01H shows receiving packet error;

Confirm Code=0eH shows cannot receive continue data packet;
Sum=Check sum.

Receiving continue data packet after ACK， the data packet length should be 64，128 or 256

High Speed Search PS_HighSpeedSearch

Function description：

- High-speed searching the whole or part of fingerprint database with the feature files in CharBuffer1 or CharBuffer2.If get, jump to the original page.
- The instruction will soon work out the searching result if the fingerprint really be in the database and with good quality.

Input parameter： BufferID， StartPage，PageNum

Return value： Confirm words，Page number（matched fingerprint template）

Instruction code： 1bH

Instruction packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	1 byte	2 bytes	2 bytes	2 bytes
Packet header	Chip address	Packet flag	Packet length	Instruction code	Buffer number	Parameter	Parameter	Check sum
0xEF01	xxxx	01H	08H	1bH	BufferID	StartPage	PageNum	sum

Comment：The BufferID in CharBuffer1 and CharBuffer2 are 1h and 2h.

ACK packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes	2 bytes	2 bytes
Packet header	Chip address	Packet flag	Packet length	Confirm code	Page number	Score	Check sum
0xEF01	xxxx	07H	7	xxH	PageID	MatchScore	sum

Comment：Confirm Code=00H shows searching success;
Confirm Code=01H shows receiving packet error;
Confirm Code=09H shows searching failed, here the page number and score are "0";
Sum=check sum.

Generate to Minutiae Fingerprint Image PS_GenBinImage

Function description： Processing the fingerprint image in image buffer and generate it to minutiae fingerprint image

Input parameter： BinImgTpye

- 0：Binary images
- 1：Minutiae images without minutiae flag
- 2 or others：Minutiae images with minutiae flag

Return value： Confirm words

Instruction code： 1cH

Instruction packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	1 bytes	2 bytes
Packet header	Chip address	Packet flag	Packet length	Instruction code	Target type	Check sum
0xEF01	xxxx	01H	04H	1cH	0/1/2	sum

ACK packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Confirm code	Check sum
0xEF01	xxxx	07H	03H	xxH	sum

Comment：Confirm Code=01H shows receiving packet error;
Confirm Code=15H shows invalid fingerprint images;
Confirm Code=07H shows without enough feature information;
Confirm Code=06H shows images with too low quality;
Sum=check sum.

Read valid template number PS_ValidTemplateeNum

Function description： Reading valid template number

Input parameter： none

Return value： Confirm words，valid template number (ValidN)

Instruction code： 1dH

Instruction packet format：

2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes
Packet header	Chip address	Packet flag	Packet length	Instruction code	Check sum
0xEF01	xxxx	01H	0003H	1dH	0021H

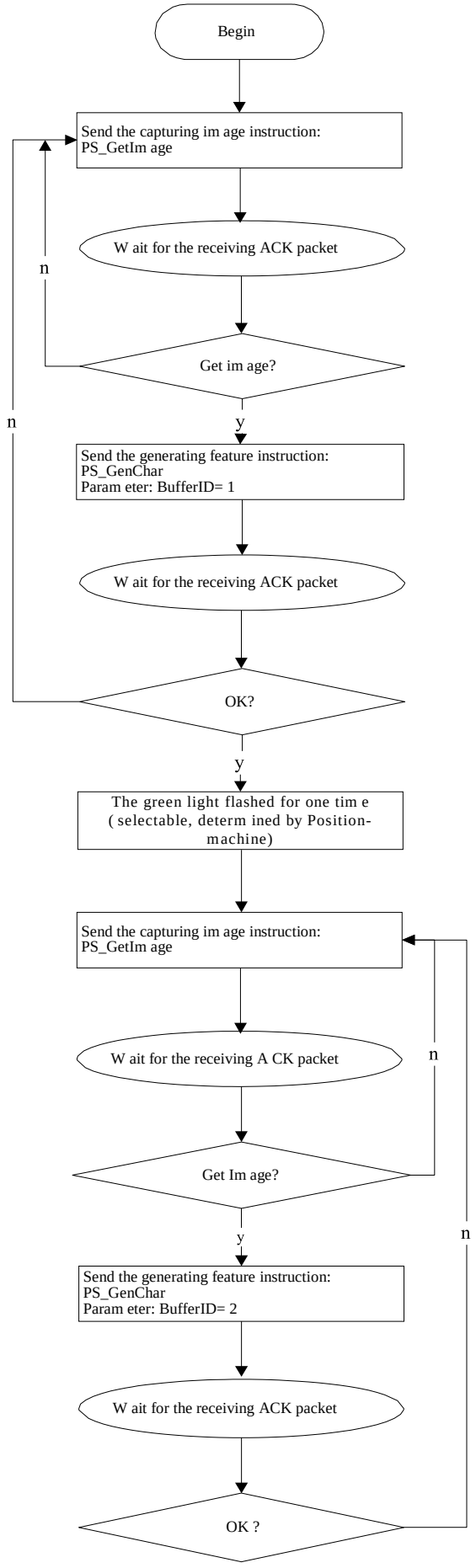
ACK packet format：

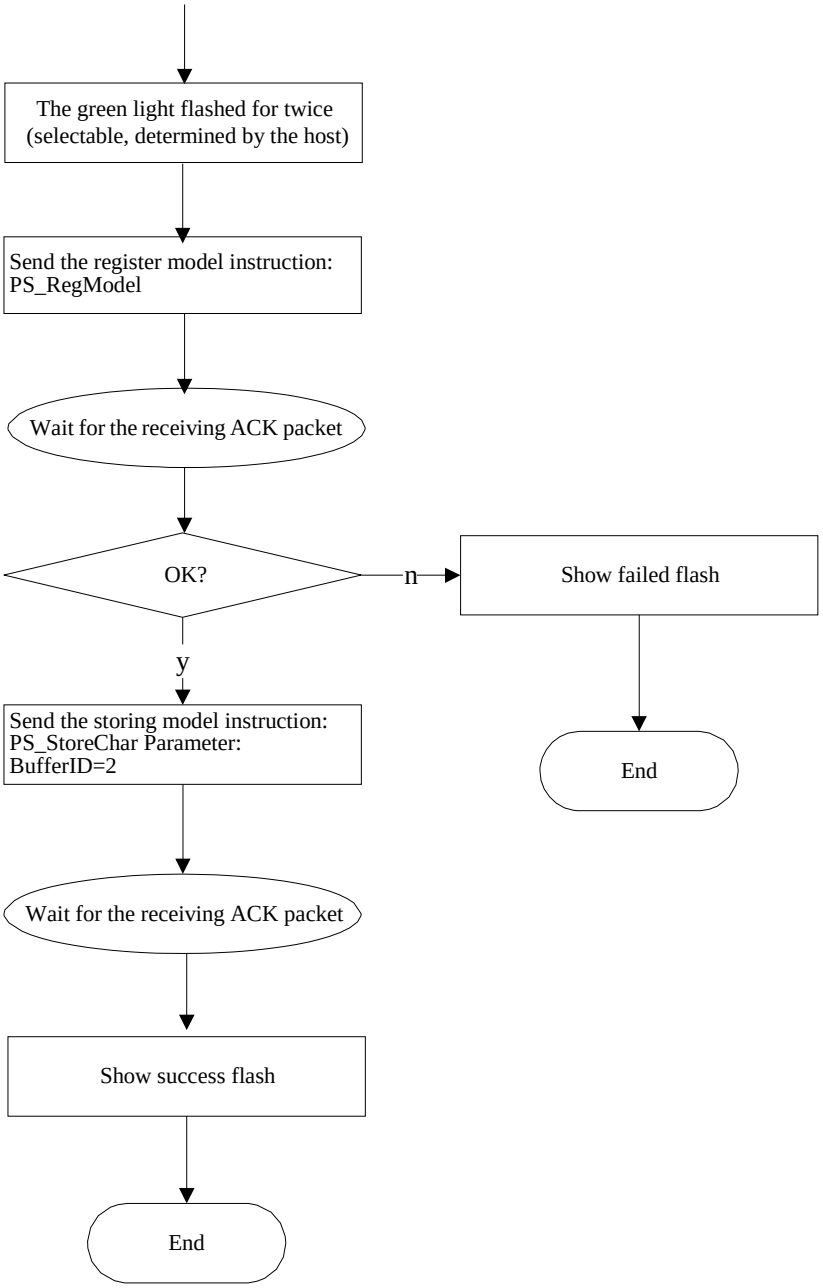
2 bytes	4bytes	1 byte	2 bytes	1 byte	2 bytes	2 bytes
Packet header	Chip address	Packet flag	Packet length	Confirm code	valid template number	Check sum
0xEF01	xxxx	07H	5	xxH	ValidN	sum

Comment：Confirm Code=00H indicates reading success;
Confirm Code=01H indicates receiving packet error;
Sum=check sum

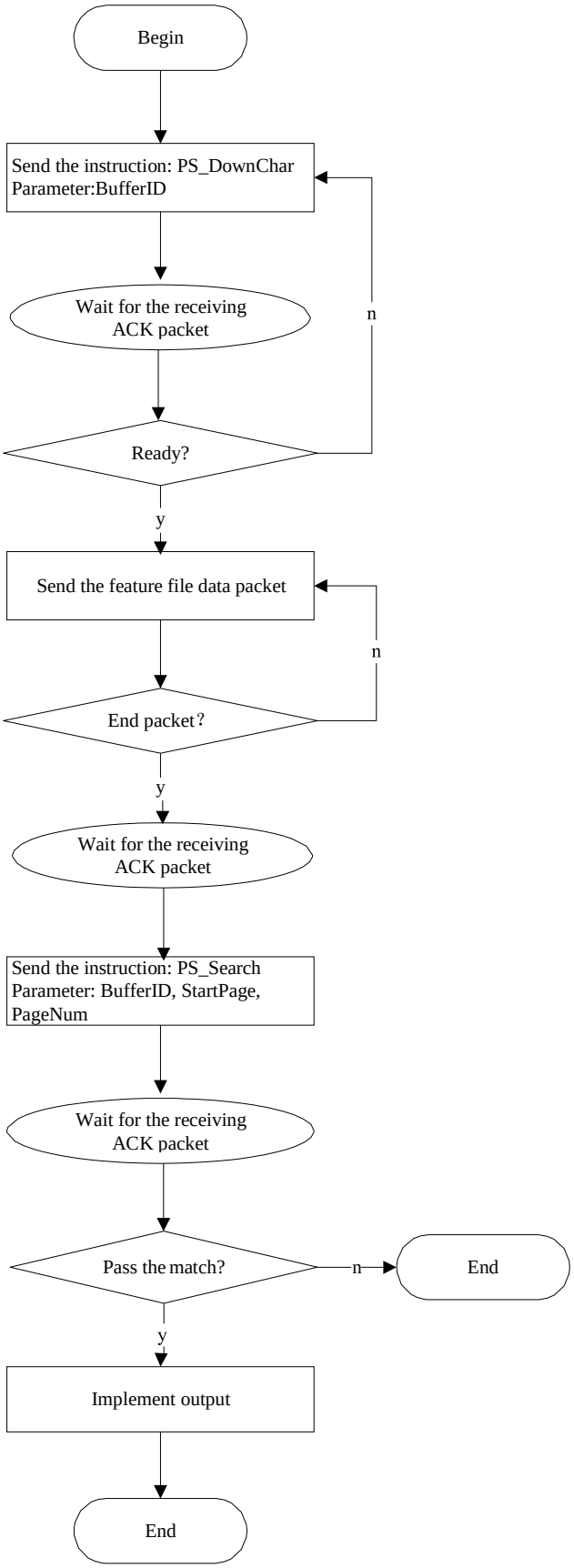
5. Function Implement Illustration

a) Pressing fingerprint twice to record a template and store in flash fingerprint database;

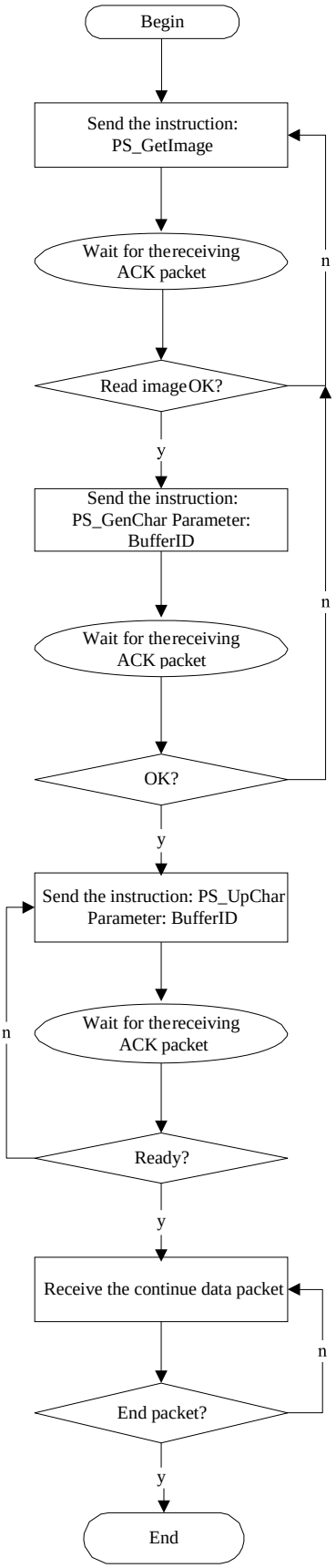

Begin
Send the capturing im age instruction:
PS_GetIm age
W ait for the receiving ACK packet
n
Get im age?
n
y
Send the generating feature instruction:
PS_GenChar
Param eter: BufferID= 1
W ait for the receiving ACK packet
OK?
y
The green light flashed for one tim e
(selectable, determ ined by Position-
machine)
Send the capturing im age instruction:
PS_GetIm age
W ait for the receiving A CK packet
n
Get Im age?
y
n
Send the generating feature instruction:
PS_GenChar
Param eter: BufferID= 2
W ait for the receiving ACK packet
OK ?


The green light flashed for twice (selectable, determined by the host)
Send the register model instruction: PS_RegModel
Wait for the receiving ACK packet
OK?
n
Show failed flash
End
y
Send the storing model instruction: PS_StoreChar Parameter: BufferID=2
Wait for the receiving ACK packet
Show success flash
End

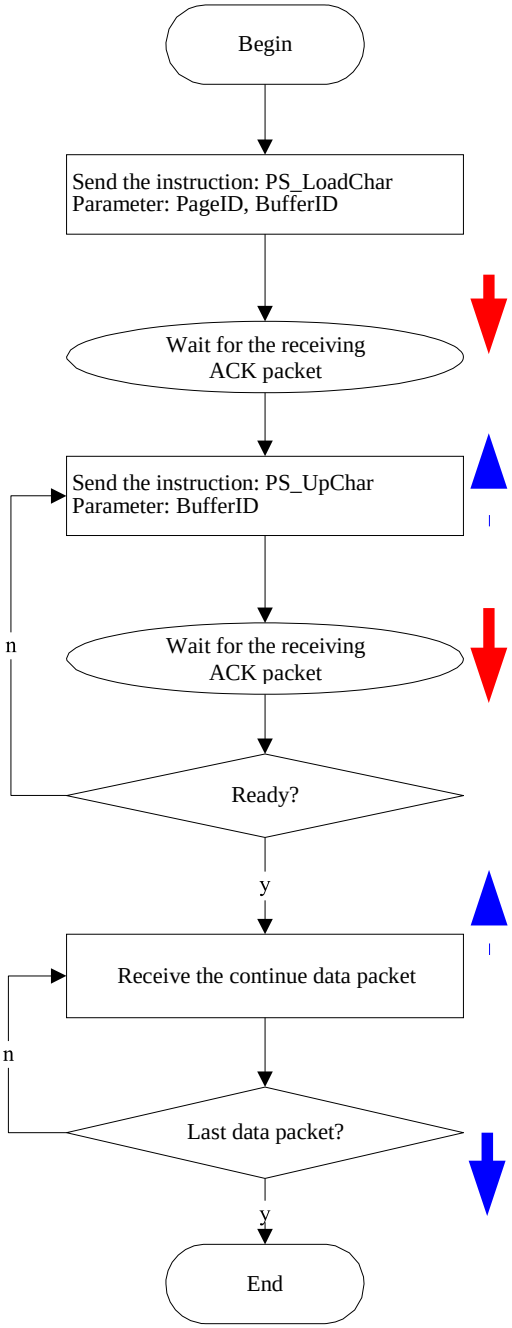
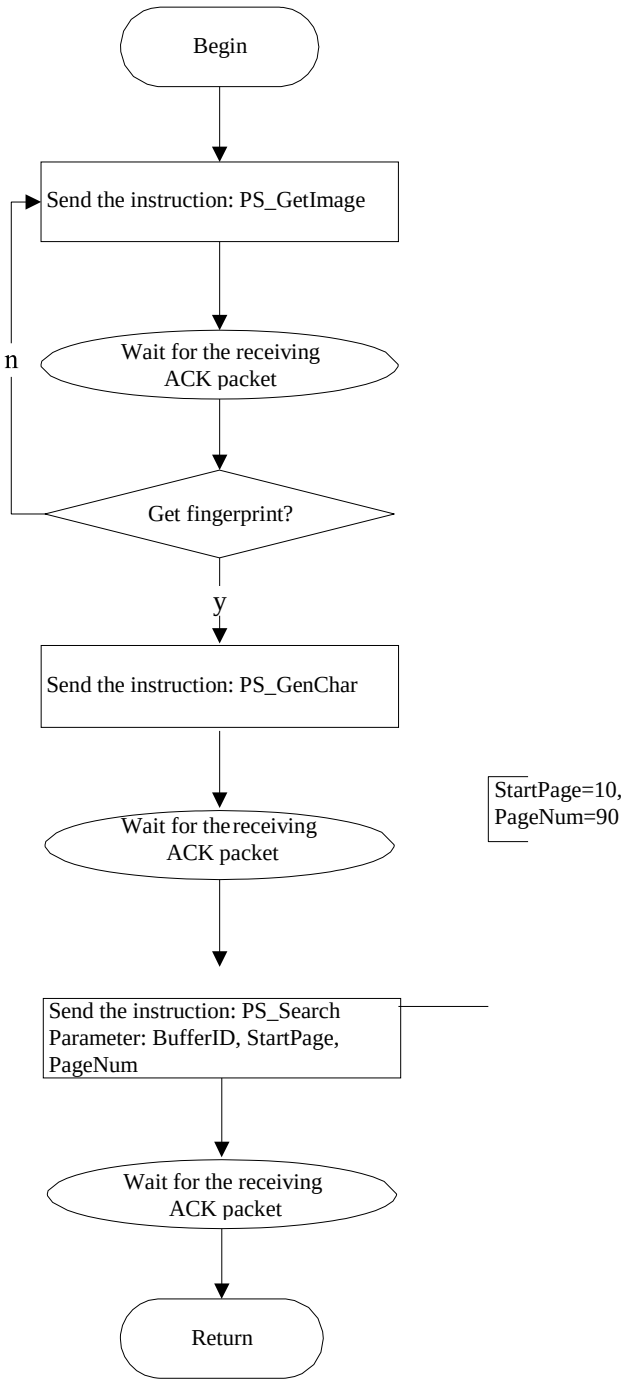
b) Downloading a fingerprint feature from the host and searching the fingerprint database with it;



c) Capturing a fingerprint image from sensor and generating the feature file, then upload to the host;



d) Reading a appointed template from flash fingerprint database and uploading;



e) Reading an image from sensor and searching the database field from 10—100.