ZFM-20 Series

Fingerprint identification module

User's manual

Hangzhou refers Security Technology Co., Ltd.

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Hangzhou refers Security Technology Co., Ltd.

Introduction and Declarations

ZFM-20 series fingerprint thanks to the acquisition of the Security Technology Co., Ltd. in Hangzhou (hereinafter referred to as: Refers to the securit

Identity Module (hereinafter referred to as: module).

The user manual is written for hardware and software application development engineers, contains hardware interface system resources, means

So that the contents of the system installation information.
In order to ensure the smooth application development, during module development before Aberdeen
Carefully read the manual.

Our best efforts to ensure the accuracy of this manual. However, if you have any questions or find an error,

Contact directly with the company and / or our authorized agents, we would be very grateful.

I pursued the company to constantly improve the purpose of improved products, modules and manual may change without

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Related performance testing tools, quality control and other technical means to support a certain extent, to meet the specifications required

Guaranteed. In addition to explicit government request in writing, it is not necessary to perform testing of all parameters of each product.

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Directory

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Chapter 1 Overview

ZFM-20 series of stand-alone fingerprint identification module Hangzhou, a security technology company launched SynoChip high-speed DSP proces
To core optical fingerprint sensor combined with independent intellectual property rights of the company, without the host computer to participate in the mar
Intelligent module for fingerprint input, image processing, fingerprint matching, search and template storage functions.

1.1 works

Fingerprint processing consists of two processes: the the fingerprint logon process, and the fingerprint matching process [which fingerprint match is div
And fingerprint search (1: N) in two ways].

Fingerprint logon, 2 times a fingerprint entry 2 entry image processing the synthetic template stored in the module.
Fingerprint matching, fingerprint head sensor input to verify the fingerprint image processing, and then with the fingerprint template module.
The row matched comparison (a template to match the specified module, called fingerprint matching method, ie 1:1 way; if with multiple
Template matching, called fingerprint search, that is, 1: N mode) module gives the matching results (pass or fail).

1.2 Ordering Information

The Company fingerprint module complete model with the following rules. Order products to our company, based on the need to complete Model
So that we can provide you with a better service.

ZFM - 20 xxx - xxx-Vxx

Software version (can be omitted items)

Lead length (in mm, can be omitted items)

Fingerprint storage capacity A: 162 pieces

B: 930 Mei

Interface type U: USB1.1

S: Serial (Series: UART)

Structure type 0: Split

1: one-piece

Optical 20 Series

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Note: **1)** lead length refers to the length of the cable connection between the module motherboard with optical fingerprint sensor. The integrated module does not lead.
2) version of the software in the first order non-specified version can be omitted, that default using the latest version of my company.

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The second chapter of the main technical indicators

Supply voltage: DC 3.66.0V
Supply current:
Operating Current: <120mA
Peak current: <150mA

Fingerprint image time: <1.0 seconds

Window area: 14 × 18 mm

Matched by:
Comparison (1:1)
Search mode (1: N)
Signature File: 256 bytes
Template files: 512 bytes

Storage capacity: 162/930

Security Level: five (from low to high: 1, 2, 3, 4, 5)

False Accept Rate (FAR): <0.001% (security level 3)

False Reject Rate (FRR): <1.0% (security level 3)

Search time: <1.0 seconds (1:200, mean)

PC interface: UART (TTL logic level) or USB1.1

Communications baud rate (UART): 9600 × N bps (where N = 1 to 12 (the default value of N = 6, i.e., 57600bps)

Working environment:

Temperature: -20 °C - +50 °C

Relative Humidity: 40% RH-85% RH (non-condensing)

Save the environment:

Temperature: -40 °C - +85 °C

Relative humidity: <85% H (no condensation)

Dimensions (L × W × H):

Split:

Mold Blocks: 42 × 25 × 8.5mm (install size: 31.5 × 19 mm)

Fingerprint sensor: 56 × 20 × 21.5mm

Integrated: 56 × 20 × 21.5mm

Chapter 3 hardware interface

3.1 PC interface (board marked: **J1)**

Whether you order UART or USB interface type (board hardware circuit factory settings different, do not mix), PCB, module and user equipment interfaces with a single row socket / pin (split core 2.0 spacing, integrated 4-core 1.27 pitch).

The user no special requirements, provide the user interface lead length is 150mm.

3.1.1 serial communication

Serial communication module with user devices, the interface the J1 pin is defined as follows:

The pin No.	Name	Type	Functional Description
1	Vin	in	Power is input. (Line color: red)
2	TD	out	Serial data output. TTL logic levels. (Line color: green)
3	RD	in	Serial data input. TTL logic levels. (Line color: white)
4	GND	-	Signal ground. The internal power supply connected. (Line color: black)
5	NC	-	Undefined, vacant. (Integrated module no such pin)

Note: the Type column in the input to the module out from the module output.

3.1.1.1 hardware connection

The Newsletter: module via a serial communication interface, can be directly related to a 3.3V or 5V power microcontroller module data Send foot (pin 2 TD) connected to the bit data reception end (RXD) the module data reception feet (3 feet RD) connected to the data bit machine Sender (TXD).

For RS-232 level (for example: PC machine) the host computer to communicate between the module and the host computer to increase the level of turn The conversion circuit (for example: MAX232 circuit).

3.1.1.2 serial protocol

Using a half-duplex asynchronous serial communication. The default baud rate is 57600bps, command set for 9600 ~ 115200bps.

Start bit									Stop bits
1	0	D0	D1	D2	D3	D4	D5	D6	D7	1

10 frame format

Frame format for transmission 10, a level start bit, 8 data bits (LSB first), and one stop bit, no parity Bit.

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3.1.1.3 Power-on delay time

Module after power-on, about **500mS** time initialization work. During this period, the module does not respond to the command of the host computer.

3.1.1.4 electrical parameters (All level power / signal ground GND reference level)

1. Power input

Item	Parameters Least	Typical	Maximum	Unit	Equipment Note
Power supply voltage Vin	3.6		6.0	V	Normal operating value
Limit voltage Vin_{max}	- 0.3		7.0	V	Beyond this range may cause permanent damage to
Operating Current Icc	90	100	110	mA	
Peak current Ipeak			150	mA	

2. **TXD** (output, **TTL** logic level)

Project	Article Item	Ginseng Least	Number Typical	Maximum	Unit	Remark
V_{OL}	I_{OL}= 4mA			0.4	V	Logic 0
V_{OH}	I_{OH}= 4mA	2.4		**3.3**	V	Logic 1

3. **The RXD** foot (input, **TTL** logic level)

Project	Article Item	Ginseng Least	Number Typical	Maximum	Unit	Remark
V_{IL}				0.6	V	Logic 0
V_{IH}		2.4			V	Logic 1
I_{IH}	V_{IH}= 5V		1		mA	
	V_{IH}= 3.3V		30		uA	
V_{Imax}		- 0.3		5.5	V	Limit the input voltage

3.1.2 USB communication

USB communication module with the user device, the interface J1 pins are defined as follows:

Pin No.	Name	Type	Functional Description
1	Vin	in	Power is input. (Electrical parameters, see 3.1.1.4)
2	DP +	In / Out	USB data cable.
3	DP-	In / Out	USB data cable.
4	GND	-	Signal ground. The internal power supply connected.
5	END	-	Protectorate. Vacant or can be accessed by the communications lead shield. (Integrated module no such pin)

Note: the Type column in the input to the module out from the module output.

3.2 sensor interface (board marked: **J2)**

The split module provides optical fingerprint sensor board dedicated interface (15-pin single row socket / pin, pin pitch 1.25mm). Interest The interface, connected via a 15-pin ribbon cable with sensor board. User no special requirements, the lead length is 150mm.

Integrated module of the interface for internal connections, without user considerations.

Chapter IV system resources

In order to meet the needs of different customers, the module system provides a large amount of resources available to the use of the user's system.

4.1 buffer

Module RAM features 72K bytes size the image buffer ImageBuffer with the two size of 512 bytes of special
Levy the file buffers CharBuffer1 and the CharBuffer2. The user can arbitrarily read or written by the instruction buffer. Image buffer
Does not save the contents of the file buffer of two features in the module power outage.

The 4.1.1 an image buffer

The image buffer ImageBuffer for storing the use of the image processing of the image data and the module interior. Upload / download images,
The image format 256 × 288 pixels.

Upload or download images through UART port in order to speed things up, only use pixel high four bytes, ie 16 gray
Each byte represents two pixels (high nibble of one pixel, the lower four bits of one pixel of the next adjacent column in the same row, is about two like
Hormone synthesis send a byte). Since the image of 16 gradations, uploaded to the PC display (corresponding BMP format),
Gray scale should be extended (extended to 256 levels of gray, 8bit bit bitmap format).

Through the USB port to transfer the entire 8 pixels, 256 gray scale.

4.1.2 The characteristics of the file buffer

The ordinary signature file the characteristics the file buffer CharBuffer1 or CharBuffer2 can be used for both storage can also be used to store
The template signature file.

4.2 fingerprint database

Opened up a module in FLASH storage area as fingerprint template store, commonly known as the fingerprint library. The fingerprint library's number
According to power protection.

Fingerprint template stored in accordance with the serial number, fingerprint storage capacity is N, the fingerprint template fingerprint library serial num
2 ..... N-2, N-1. The user can only be based on the serial number to access the contents of the fingerprint database.

4.3 System configuration parameters

(Sequence through the parameters specified for the convenience of the user, the the module open part of the system parameters, allows the user through
Number) of the parameter values.
See set the basic parameters of the module system the instructions SetSysPara and read system parameters instruction ReadSysPara.

Command of the host computer sent modify system parameters, according to the original configuration module first response, response after modify sys
Configuration record in FLASH, the next time the system after power will work in accordance with the new configuration.

4.3.1 baud rate control (the parameters NO: **4)**

This parameter control module with the host computer via the communication baud rate UART communication, if the parameter value of N (N ranges 1 12) corresponding to the baud rate (9600 * N) bps.

4.3.2 Security Level (parameters NO: 5)

The parameter control fingerprint matching and search than threshold, divided into five, range: 1, 2, 3, 4, 5.
The level of security as 1:00 False acceptance rate highest, refused to recognize the lowest rate.
The level of security for the lowest False Accept Rate, refused to recognize the highest rate of 5:00.

4.3.3 package content length (parameter ID: 6)

The maximum length, the range of the parameter control module and PC communication, allowed the transfer of the contents of the data package to: 0, 1, 2, 3, corresponds to the length (number of bytes): 32, 64, 128, 256.

4.4 System Status Register

The system status register module current work status. Can be read through the instruction ReadSysPara instruction length 1Word.
And that are defined as follows:

Bit number	15	4	3	2	1	0
Significance	Reserved		ImgBufStat	PWD	Pass	Busy

Note:

Busy: accounting for a set to 1 indicates that the system is running the command, 0 indicates that the system is idle;
Pass: representing a set of fingerprint verification;
PWD: accounting for a handshake password set to indicate that the device is authenticated;
ImgBufStat: representing a set fingerprint image buffer to the existence of an effective fingerprint image.

4.5 module password

Module power-on reset, it will be the first inspect the equipment handshake password is modified.
If you do not be modified, the module that the host computer did not Verify passwords demand, directly into the normal working state, modules password can not verify the password, the default password. Password Is 4 bytes, the factory default password is: 0x00000000.

If the module internal password has been modified (see set password the instructions SetPwd), you must first verify the device handshake Password, the password through module before entering the normal working condition. Otherwise, the module refuses to execute any command.

Modified the password, the new password is saved in Flash, power outages still save.

See verify the password VfyPwd instructions and set a password SetPwd instruction.

4.6 module address

Each module has an identification address module to communicate with the host computer, each instruction / data in the form of data packets pass Send each packet contains an address contains the address entry. Module only instruction with the same address with its own address several According to packet react.

The module address is 4 bytes, the default factory default value: 0xFFFFFFFF. The user module can be modified by instruction address (see See set the module address command SetAdder). The modified module address, the new address in the power of the module is still preserved.

4.7 random number generator.

Module integrated within the 32-bit hardware random number generator (random number seed is not required), users can command module to Generates a random number and upload, to see sampling random number instruction GetRandomCode.

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The fifth chapter of the communication protocol

The communication protocol defines the ZFM-20 series of the rules of the exchange of information between the module and the host computer. Whether using the UART hardware
USB interface type, using the same set of communications protocols and instruction set.
If the host computer using a PC, it is recommended that ordered USB interface
Type of module to improve system speed (due to the use of USB upload the image gray level fast, the module can do fingerprint

Collection instrument).

5.1 packet format

Module to communicate with the host computer, the receiving and sending of commands, data, and results are in the form of data packets.
Packet format:

Baotou Address code Packet identification Packet length packet content (instruction / data / parameters) Checksum (confirmation code)

The packet Detailed definition table

Name	Symbol	Length	Description
Baotou	START	2 bytes	Fixed to 0xef01, and send high byte first.
			The default value 0xffffffff, the user can generate a new address by instruction. Module

Address code	ADDER	4 bytes	Refused to address the error packets. Send high byte first.
Packet identification	PID	1 byte	The 0x01 command packet (Command packet). 0x02 Represents is a data packet (Data packet), and there is a subsequent packet. Packet alone can not enter the flow of execution must follow the instruction packet Or response packets behind. 0x07 said response packet (ACK packet), a follow-up package. 0x08 Represents is the last data packet, i.e. the end of the package (EndData packet).
Packet length	LENGTH	2 bytes	Maximum size is 256 bytes; packet length refers to the package contents (command / data) Length plus the length of the efficacy and content (ie packet length +2). Length in bytes Units, transfer high byte first.
Package Contents	DATA	-	May be instructions, data, parameters of the command, response results. (Fingerprint special Eigenvalues fingerprint template data)
Checksum	SUM	2 bytes	Packet marking, packet length and all of the bytes of the packet contents of the arithmetic accumulated over The 2-byte binary ignored. Send high byte first.

5.2 packet checksum response

Instructions only from the host computer to the module, the module up crew response.

Module receives instructions through the response packet, the command execution and results reported to the host computer.

Response contains parameters

The series, and with the subsequent data packets.

Host computer only to confirm receipt of the response packet module module received packet with instruction execution Situation.

Response packet includes a confirmation number of bytes (must have) and the possible return parameters.

Confirmation code definition table:

1. 0x00: instruction execution is completed or OK;
2. 0x01: packet receive errors;
3. 0x02: no finger on the sensor;
4. 0x03: Input fingerprint image failed;
5. 0x06: The fingerprint image is too messy born I was characterized;
6. 0x07: normal fingerprint image, but too few feature points (or the area is too small) born not a characteristic;
7. 0x08: fingerprints do not match;
8. 0x09: did not search for fingerprints;
9. 0x0a: characteristics merge failed;
10. 0x0b: address serial number to access the fingerprint database beyond the scope of the fingerprint database;
11. 0x0c: read template from the fingerprint database error or invalid;
12. 0x0d: said Upload characteristics failed;
13. 0x0e: module can not accept subsequent packets;
14. 0x0f: upload images fail;
15. 0x10: Remove Templates failed;
16. 0x11: Empty fingerprint database failed;
17. 0x13: incorrect password;
18. 0x15: the buffer zone without a valid original Figure born I image;
19. 0x18: read and write FLASH error;
20. 0x1a: Invalid register number;
21. 0x20: wrong address code;

22. 0x21: must verify the password;
23: System reserved.

Chapter VI module instruction system

ZFM-20 Series modules total of 21 instructions.
Application through different combinations of the command, to achieve a variety of fingerprint identification function.
All command / data transmission are in the form of packets delivered. Packet format and definition see 5.1 packet format.

6.1 system class instruction

1) Verify the password VfyPwd

Function Description: handshake password (see 4.6 module password) authentication module.
Input parameters: PassWord
Return parameters: confirmation code
Instruction code: 0x13

The instruction packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	4 bytes	2 bytes
Baotou	Module address	Packet identification	Packet length	Instruction code	Password	Checksum
0xef01	XXXX	0x01	0x0007	0x13	PassWord	Sum

Reply packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	2 bytes
Baotou	Module address	Packet identification	Packet length	Confirmation code	Checksum
0xef01	XXXX	0x07	0x0003	X	Sum

Note: confirmation code = 0x00 indicates the correct password authentication;
Confirmation code = 0x01 received packets wrong;
Confirmation code = 0x13 indicating that the password is incorrect;

★ command packet checksum (2 bytes) = packet identification (1 byte) + packet length (2 bytes) + script (1 byte) + password (4 bytes);
★ response packet checksum (2 bytes) = packet identification (1 byte) + packet length (2 bytes) + confirmation code (1 byte);
★ checksum bytes added to carry more than 2 bytes ignored, big endian transfer;
★ default module address "0xffffffff"; default password is "0x00000000".

2) Set the password SetPwd

Function Description: set modules handshake password (see 4.6 module password).
Input parameters: PassWord
Return parameter: confirm the word
Instruction code: 0x12

The instruction packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	4 byte	2 bytes

Baotou	Module address	Packet identification	Packet length	Instruction code	Password	Checksum
0xef01	XXXX	0x01	0x0007	0x12	PassWord	Sum

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Reply packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	2 bytes
Baotou	Module address	Packet identification	Packet length	Confirmation code	Checksum
0xef01	XXXX	0x07	0x0003	X	Sum

Note: The confirmation code = 0x00 means OK;
Confirmation code = 0x01 received packets wrong;

★ command packet checksum (2 bytes) = packet identification (1 byte) + packet length (2 bytes) + script (1 byte) + password (4 bytes);
★ response packet checksum (2 bytes) = packet identification (1 byte) + packet length (2 bytes) + confirmation code (1 byte);
★ checksum bytes added to carry more than 2 bytes ignored, big endian transfer;
★ default module address "0xffffffff"; default password is "0x00000000".

3) Set the module address SetAdder

Function: Set the module address (see 4.7 module address).
Input parameters: new module address
Return parameter: confirm the word
Instruction code: 0x15

The instruction packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	4 bytes	2 bytes
Baotou	Module original address	Packet identification	Packet length	Instruction code	Module new address	Checksum
0xef01	XXXX	0x01	0x0007	0x15	XXXX	Sum

Reply packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	2 bytes
Baotou	Module new address	Packet identification	Packet length	Confirmation code	Checksum
0xef01	XXXX	0x07	0x0003	X	Sum

Note: confirmation code = 0x00 means generates address successfully;
Confirmation code = 0x01 received packets wrong;

★ instruction packet checksum (2 bytes) = packet identification (1 byte) + packet length (2 bytes) + script (1 byte) + the module new address (4 bytes);
★ response packet checksum (2 bytes) = packet identification (1 byte) + packet length (2 bytes) + confirmation code (1 byte);
★ checksum bytes added to carry more than 2 bytes ignored, big endian transfer;
★ default module address "0xffffffff"; default password is "0x00000000".

4) set the basic parameters of the module system SetSysPara

Function Description: working parameter set (see 4.4 system configuration parameters).
Input parameters: Parameters No.
Return parameter: confirm the word
Instruction code: 0x0e

The instruction packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	1 byte	1 byte	2 bytes
Baotou	Module address	Packet identification	Packet length	Instruction code	Parameters No.	Content	Checksum
0xef01	XXXX	0x01	0x0005	0x0e	4/5/6	X	Sum

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Reply packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	2 bytes
Baotou	Module address	Packet identification	Packet length	Confirmation code	Checksum
0xef01	XXXX	0x07	0x0003	X	Sum

Note: The confirmation code = 0x00 means OK;
The confirmation code = 0x01 received packets wrong;
The confirmation code = 0x1a said register number;

★ command packet checksum (2 bytes) = packet marking (1 byte) + packet length (2 bytes) + script (1 byte) + parameter serial number (1 byte) + Content (1 byte);

★ response packet checksum (2 bytes) = packet identification (1 byte) + packet length (2 bytes) + confirmation code (1 byte);

★ checksum bytes added to carry more than 2 bytes ignored, big endian transfer;

★ default module address "0xffffffff"; default password is "0x00000000".

Name	Parameters No.	Content
Baud Rate	4	9600 × N bps (N range: 1 to 12)
Security level	5	Divided into five ranges: 1, 2, 3, 4, 5
The length of the packet content	6	Range: 0, 1, 2, 3, corresponding to the length (number of bytes) were: 32, 64, 128, 256

5) read system parameters ReadSysPara

Function: read module status register and the basic system configuration parameters (see 4.4 system configuration parameters and 4.5 System status register).

Input parameters: none

Return parameters: Recognition word + basic parameters

Instruction code: 0x0f

The instruction packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	2 bytes
Baotou	Module address	Packet identification	Packet length	Instruction code	Checksum
0xef01	XXXX	0x01	0x0003	0x0f	Sum

Reply packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	16 bytes	2 bytes
Baotou	Module address	Packet identification	Packet length	Confirmation code	Basic parameters	Checksum
0xef01	XXXX	0x07	0x0013	X	Structure of the table below	Sum

Note: The confirmation code = 0x00 means OK;
Confirmation code = 0x01 received packets wrong;

★ command packet checksum (2 bytes) = packet identification (1 byte) + packet length (2 bytes) + script (1 byte);

★ response packet checksum (2 bytes) = packet identification (1 byte) + packet length (2 bytes) + confirmation code (1 byte) + basic parameters (16 bytes);

★ checksum bytes added to carry more than 2 bytes ignored, big endian transfer;

★ default module address "0xffffffff"; default password is "0x00000000".

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Name	Content description	Offset (Word)	Size (word)
Status Register	System status register contents	0	1

System ID	Fixed values: 0x0000	1	1
Fingerprint database size	Fingerprint storage capacity	2	1
Security level	Security level code (1, 2, 3, 4, 5)	3	1
Device address	32-bit device address	4	2
Packet size	Packet size code (0,1,2,3)	6	1
Baud Rate Setting	N (corresponding to a baud rate of 9600 ×7 N bps)	7	1

6) to read the fingerprint template index table ReadConList

Description: Read module fingerprint template index table, and each index table to read up to 256 fingerprint templates.
Input parameters: index page
Representative of the index page 0 read 0 to 255 fingerprint template index table
Index page represents read 256 to 511 fingerprint template index table
2 represents the index page reads 512 to 767 fingerprint template index table
3 representatives of the index page reads 768 to 1,024 fingerprint templates index table
Return parameters: Recognition word the + fingerprint template index table
Instruction code: 0x1f
The instruction packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	1 byte	2 bytes
Baotou	Chip address	Packet identification	Packet length	Instruction code	Index page	Checksum
0xef01	XXXX	0x01	0x0004	0x1f	0/1/2/3	Sum

Reply packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	32 bytes	2 bytes
Baotou	Chip address	Packet identification	Packet length	Confirmation code	Index table	Checksum
0xef01	XXXX	0x07	0x0023	X	Structure of the table below	Sum

Note: 1, confirmation code = 0x00 means read the index table success;
Confirmation code = 0x01 received packets wrong;
2, each time to read up to 256 fingerprint template index data, data less than 256 complement of "0".
3, the data structure of the index table: each 8-bit as a group, and each starting from the high output. The table below:
Transmission order: Output, and each byte by high output by the low byte to high-byte order.

Lowest Significant byte	Template No. The template index table data	7 0/1	6 0/1	5 0/1	4 0/1	3 0/1	2 0/1	1 0/1	0 0/1
Low two Significant byte	Template No. The template index table data	15 0/1	14 0/1	13 0/1	12 0/1	11 0/1	10 0/1	9 0/1	8 0/1
...	...				...				
Highest Significant byte	Template No. The template index table data	255 0/1	254 0/1	253 0/1	252 0/1	251 0/1	250 0/1	249 0/1	248 0/1

Note: The index table data "0" represents the corresponding position without a valid template; corresponding to the position of "1" represents an effective te

★ command packet checksum (2 bytes) = packet identification (1 byte) + packet length (2 bytes) + script (1 byte) + (1 byte) index page;
★ response packet checksum (2 bytes) = packet marking (1 byte) + packet length (2 bytes) + confirmation code (1 byte) + index table (N bytes);
★ checksum bytes added to carry more than 2 bytes ignored, big endian transfer;
★ default module address "0xffffffff"; default password is "0x00000000".

7) to read the number of valid template TempleteNum

Function: number of fingerprint template stored in the read module.
Input parameters: none
Return parameters: Recognition word + template number N
Instruction code: 0x1d
The instruction packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	2 bytes
Baotou	Module address	Packet identification	Packet length	Instruction code	Checksum
0xef01	XXXX	0x01	0x0003	0x1d	0x0021

Reply packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	2 bytes	2 bytes
Baotou	Module address	Packet identification	Packet length	Confirmation code	Template number	Checksum
0xef01	XXXX	0x07	0x0005	X	N	Sum

Note: confirmation code = 0x00 read successfully;
Confirmation code = 0x01 received packets wrong;

★ command packet checksum (2 bytes) = packet identification (1 byte) + packet length (2 bytes) + script (1 byte);
★ response packet checksum (2 bytes) = packet identification (1 byte) + packet length (2 bytes) + confirmation code (1 byte) + template number (2 bytes);
★ checksum bytes added to carry more than 2 bytes ignored, big endian transfer;
★ default module address "0xffffffff"; default password is "0x00000000".

The 6.2 fingerprint processing class instruction

8) recorded the fingerprint image GenImg

Function Description: probing fingers, detect input fingerprint images stored in ImageBuffer, and return the entry successfully identified Code. If undetected finger directly returned no finger confirmation code.
Input parameters: none
Return parameter: confirm the word
Instruction code: 0x01

The instruction packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	2 bytes
Baotou	Module address	Packet identification	Packet length	Instruction code	Checksum
0xef01	XXXX	0x01	0x0003	0x01	0x0005

Reply packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	2 bytes
Baotou	Module address	Packet identification	Packet length	Confirmation code	Checksum

0xef01	XXXX	0x07	0x0003	X	Sum

Note: confirmation code = 0x00 entry success;
Confirmation code = 0x01 received packets wrong;
The confirmation code = 0x02 expressed no finger on the sensor;
Confirmation code = 0x03 Entry unsuccessful;

★ command packet checksum (2 bytes) = packet identification (1 byte) + packet length (2 bytes) + script (1 byte);
★ response packet checksum (2 bytes) = packet identification (1 byte) + packet length (2 bytes) + confirmation code (1 byte);
★ checksum bytes added to carry more than 2 bytes ignored, big endian transfer;
★ default module address "0xffffffff"; default password is "0x00000000".

9) Upload image UpImage

Function Description: the the module image buffer ImageBuffer in data upload uploaded to the host computer to the host computer (see 1.1.1 image buffer).
Input parameters: none
Return parameter: confirm the word
Instruction code: 0x0a

The instruction packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	2 bytes
Baotou	Module address	Packet identification	Packet length	Instruction code	Checksum

0xef01	XXXX	0x01	0x0003	0x0a	0x000e

Reply packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	2 bytes
Baotou	Module address	Packet identification	Packet length	Confirmation code	Checksum
0xef01	XXXX	0x07	0x0003	X	Sum

Packet (follow-up package) format:

2 bytes	4 bytes	1 byte	2 bytes	N bytes	2 bytes
Baotou	Module address	Packet identification	Packet length	Package Contents	Checksum
0xef01	XXXX	0x02	N +2	Image data	Sum

The end of the package (no follow-up package) format:

2 bytes	4 bytes	1 byte	2 bytes	N bytes	2 bytes
Baotou	Module address	Packet identification	Packet length	Package Contents	Checksum
0xef01	XXXX	0x08	N +2	Image data	Sum

Note: 1, confirmation code = 0x00 then sent a follow-up packet;
Confirmation code = 0x01 received packets wrong;
The confirmation code = 0x0f said can not send subsequent packets;
2, send the command packet after the module response transmission data packet or the end of the package, and the data packet and the end p
3, the value of N number of bytes of the packet content is determined by the length of the packet contents, the factory package contents is set

★ command packet checksum (2 bytes) = packet identification (1 byte) + packet length (2 bytes) + script (1 byte);
★ response packet checksum (2 bytes) = packet identification (1 byte) + packet length (2 bytes) + confirmation code (1 byte);
★ checksum bytes added to carry more than 2 bytes ignored, big endian transfer;
★ default module address "0xffffffff"; default password is "0x00000000".

10) Download image DownImage

The functionality description: the host computer to download image data to module image buffer ImageBuffer see 1.1.1 image buffer Area).
Input parameters: none
Return parameter: confirm the word
Instruction code: 0x0b

The instruction packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	2 bytes
Baotou	Module address	Packet identification	Packet length	Instruction code	Checksum
0xef01	XXXX	0x01	0x0003	0x0b	0x000f

Reply packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	2 bytes
Baotou	Module address	Packet identification	Packet length	Confirmation code	Checksum
0xef01	XXXX	0x07	0x0003	X	Sum

Packet (follow-up package) format:

2 bytes	4 bytes	1 byte	2 bytes	N bytes	2 bytes
Baotou	Module address	Packet identification	Packet length	Package Contents	Checksum
0xef01	XXXX	0x02	N +2	Image data	Sum

The end of the package (no follow-up package) format:

2 bytes	4 bytes	1 byte	2 bytes	N bytes	2 bytes
Baotou	Module address	Packet identification	Packet length	Package Contents	Checksum
0xef01	XXXX	0x08	N +2	Image data	Sum

Note: 1, confirmation code = 0x00 can receive a follow-up packet;
Confirmation code = 0x01 received packets wrong;
Confirmation code = 0x0e can not receive follow-up packet.
2, send the command packet, the module responds receive packets, or the end of the package.
3, the value of the package contents of bytes N is determined by the length of the packet content the factory package contents is set to 128 by

★ command packet checksum (2 bytes) = packet identification (1 byte) + packet length (2 bytes) + script (1 byte);
★ response packet checksum (2 bytes) = packet identification (1 byte) + packet length (2 bytes) + confirmation code (1 byte);
★ checksum bytes added to carry more than 2 bytes ignored, big endian transfer;
★ default module address "0xffffffff"; default password is "0x00000000".

11) image generation characteristics Img2Tz

Function: generate fingerprint characteristics of the original image in ImageBuffer, file be stored in CharBuffer1 or CharBuffer2.
Input parameters: BufferID (the feature buffer number)
Return parameter: confirm the word
Instruction code: 0x02

The instruction packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	1 byte	2 bytes
Baotou	Module address	Packet identification	Packet length	Instruction code	Buffer number	Checksum
0xef01	XXXX	0x01	0x0004	0x02	BufferID	Sum

Note: buffer CharBuffer1, CharBuffer2's BufferID to 0x01 and 0x02, if you specify its It values, treatment in accordance CharBuffer2.

Reply packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	2 bytes
Baotou	Module address	Packet identification	Packet length	Confirmation code	Checksum
0xef01	XXXX	0x07	0x0003	X	Sum

Note: confirmation code = 0x00 successfully generate the feature;
Confirmation code = 0x01 received packets wrong;
Confirmation code = 0x06 fingerprint image is too messy born I was characterized;
Confirmation code = 0x07 fingerprint image is normal, but the feature points are too few born I was characterized;
Confirmation code = 0x15 image buffer without a valid original Figure born I image;

★ command packet checksum (2 bytes) = packet identification (1 byte) + packet length (2 bytes) + script (1 byte) + buffer (1 byte);
★ response packet checksum (2 bytes) = packet identification (1 byte) + packet length (2 bytes) + confirmation code (1 byte);
★ checksum bytes added to carry more than 2 bytes ignored, big endian transfer;
★ default module address "0xffffffff"; default password is "0x00000000".

12) characterized synthetic template RegModel

Function: will the signature file CharBuffer1 with CharBuffer2 combined to generate a template, and the result is stored in CharBuffer1 CharBuffer2 (the contents are the same).
Input parameters: none
Return parameter: confirm the word
Instruction code: 0x05

The instruction packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	2 bytes
Baotou	Module address	Packet identification	Packet length	Instruction code	Checksum
0xef01	XXXX	0x01	0x0003	0x05	0x0009

Reply packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	2 bytes
Baotou	Module address	Packet identification	Packet length	Confirmation code	Checksum
0xef01	XXXX	0x07	0x0003	X	Sum

Note: confirmation code = 0x00 successful merger;
Confirmation code = 0x01 received packets wrong;
Confirmation code = 0x0a merger failed (two fingerprint does not belong to the same finger);

★ command packet checksum (2 bytes) = packet identification (1 byte) + packet length (2 bytes) + script (1 byte);
★ response packet checksum (2 bytes) = packet identification (1 byte) + packet length (2 bytes) + confirmation code (1 byte);
★ checksum bytes added to carry more than 2 bytes ignored, big endian transfer;

★ default module address "0xffffffff"; default password is "0x00000000".

13) Upload feature or template UpChar

Function Description: the feature buffer CharBuffer1 or CharBuffer2 in signature files uploaded to the host computer.
The input Parameters: BufferID (The buffer number)
Return parameter: confirm the word
Instruction code: 0x08

The instruction packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	1 byte	2 bytes
Baotou	Module address	Packet identification	Packet length	Instruction code	Buffer number	Checksum
0xef01	XXXX	0x01	0x0004	0x08	BufferID	Sum

Note: buffer CharBuffer1, CharBuffer2's BufferID is 0x01 and 0x02, respectively

Reply packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	2 bytes
Baotou	Module address	Packet identification	Packet length	Confirmation code	Checksum
0xef01	XXXX	0x07	0x0003	X	Sum

Packet (follow-up package) format:

2 bytes	4 bytes	1 byte	2 bytes	N bytes	2 bytes
Baotou	Module address	Packet identification	Packet length	Package Contents	Checksum
0xef01	XXXX	0x02	N +2	Template data	Sum

The end of the package (no follow-up package) format:

2 bytes	4 bytes	1 byte	2 bytes	N bytes	2 bytes
Baotou	Module address	Packet identification	Packet length	Package Contents	Checksum
0xef01	XXXX	0x08	N +2	Template data	Sum

Note: 1, confirmation code = 0x00 said subsequently issued packet;
Confirmation code = 0x01 received packets wrong;
Confirmation code = 0x0d instruction execution failed;
2, send the command packet after the module response transmission data packet or the end of the package, and the data packet and the end pa
3, the value of the package contents of bytes N is determined by the length of the packet content the factory package contents is set to 128 by
4, the directive does not affect the contents of the module characteristics buffer.

★ instruction packet checksum (2 bytes) = packet identification (1 byte) + packet length (2 bytes) + script (1 byte) + buffer (1 byte);
★ response packet checksum (2 bytes) = packet identification (1 byte) + packet length (2 bytes) + confirmation code (1 byte);
★ checksum bytes added to carry more than 2 bytes ignored, big endian transfer;
★ default module address "0xffffffff"; default password is "0x00000000".

14) download features or templates DownChar

Function Description: download the signature file to the host computer is a feature of the buffer module.
The input Parameters: BufferID (The buffer number)
Return parameter: confirm the word
Instruction code: 0x09

The instruction packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	1 byte	2 bytes
Baotou	Module address	Packet identification	Packet length	Instruction code	Buffer number	Checksum
0xef01	XXXX	0x01	0x0004	0x09	BufferID	Sum

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Note: buffer CharBuffer1, CharBuffer2's BufferID is 0x01 and 0x02, respectively

Reply packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	2 bytes
Baotou	Module address	Packet identification	Packet length	Confirmation code	Checksum
0xef01	XXXX	0x07	0x0003	X	Sum

Packet (follow-up package) format:

2 bytes	4 bytes	1 byte	2 bytes	N bytes	2 bytes
Baotou	Module address	Packet identification	Packet length	Package Contents	Checksum
0xef01	XXXX	0x02	N +2	Template data	Sum

The end of the package (no follow-up package) format:

2 bytes	4 bytes	1 byte	2 bytes	N bytes	2 bytes
Baotou	Module address	Packet identification	Packet length	Package Contents	Checksum
0xef01	XXXX	0x08	N +2	Template data	Sum

Note: 1, confirmation code = 0x00 can receive a follow-up packet;
Confirmation code = 0x01 received packets wrong;
The confirmation code = 0x0e said can not receive follow-up packet;

2, send the command packet, the module responds receive packets, or the end of the package.
3, the value of the package contents of bytes N is determined by the length of the packet content the factory package contents is set to 128 by

★ command packet checksum (2 bytes) = packet identification (1 byte) + packet length (2 bytes) + script (1 byte) + buffer (1 byte);
★ response packet checksum (2 bytes) = packet identification (1 byte) + packet length (2 bytes) + confirmation code (1 byte);
★ checksum bytes added to carry more than 2 bytes ignored, big endian transfer;
★ default module address "0xffffffff"; default password is "0x00000000".

15) stored template Store

Function Description: will the specified characteristics the buffer (CharBuffer1 CharBuffer2) template data stored in
Flash fingerprint library specified location.
Input parameters: BufferID (buffer number) + PageID (fingerprint library position number two bytes, high byte first).
Return parameter: confirm the word
Instruction code: 0x06

The instruction packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	1 byte	2 bytes	2 bytes
Baotou	Module address	Packet identification	Packet length	Instruction code	Buffer number	Position number	Checksum
0xef01	XXXX	0x01	0x0006	0x06	BufferID	PageID	Sum

Note: buffer CharBuffer1, CharBuffer2's BufferID is 0x01 and 0x02, respectively

Reply packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	2 bytes
Baotou	Module address	Packet identification	Packet length	Confirmation code	Checksum
0xef01	XXXX	0x07	0x0003	X	Sum

Note: confirmation code = 0x00 saved successfully;
Confirmation code = 0x01 received packets wrong;
Confirmation code = 0x0b PageID beyond the scope of the fingerprint database;
Confirmation code = 0x18 write FLASH error;

★ command packet checksum (2 bytes) = packet marking (1 byte) + packet length (2 bytes) + script (1 byte) + buffer number (1 byte)

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+ Position number (2 bytes);

★ response packet checksum (2 bytes) = packet identification (1 byte) + packet length (2 bytes) + confirmation code (1 byte);
★ checksum bytes added to carry more than 2 bytes ignored, big endian transfer;
★ default module address "0xffffffff"; default password is "0x00000000".

16) reads out the template LoadChar

Function Description: fingerprint template flash database specified ID number read into stencil buffer CharBuffer1 or the CharBuffer2.
Input parameters: BufferID (buffer number) + PageID (fingerprint library template number two bytes, high byte first).
Return parameter: confirm the word
Instruction code: 0x07

The instruction packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	1 byte	2 bytes	2 bytes
Baotou	Module address	Packet identification	Packet length	Instruction code	Buffer number	Page number	Checksum
0xef01	XXXX	0x01	0x0006	0x07	BufferID	PageID	Sum

Note: buffer CharBuffer1, CharBuffer2's BufferID is 0x01 and 0x02, respectively

Reply packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	2 bytes
Baotou	Module address	Packet identification	Packet length	Confirmation code	Checksum
0xef01	XXXX	0x07	0x0003	X	Sum

Note: confirmation code = 0x00 read out successfully;
Confirmation code = 0x01 received packets wrong;
Confirmation code = 0x0c read out wrong or template invalid;
Confirmation code = 0x0b PageID beyond the scope of the fingerprint database;

★ command packet checksum (2 bytes) = packet marking (1 byte) + packet length (2 bytes) + script (1 byte) + buffer number (2 bytes) + Page (2 bytes);
★ response packet checksum (2 bytes) = packet identification (1 byte) + packet length (2 bytes) + confirmation code (1 byte);
★ checksum bytes added to carry more than 2 bytes ignored, big endian transfer;
★ default module address "0xffffffff"; default password is "0x00000000".

17) Delete the template DeletChar

Function: delete module fingerprint library for a specified period (N fingerprint template) specify the ID number starting template.
Input parameters: PageID the (fingerprint Library template number) + N delete template number.
Return parameter: confirm the word
Instruction code: 0x0c

The instruction packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	2 bytes	2 bytes	2 bytes
Baotou	Module address	Packet identification	Packet length	Instruction code	Page number	Delete the number	Checksum
0xef01	XXXX	0x01	0x0007	0x0c	PageID	N	Sum

Reply packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	2 bytes
Baotou	Module address	Packet identification	Packet length	Confirmation code	Checksum
0xef01	XXXX	0x07	0x0003	X	Sum

Note: confirmation code = 0x00 Remove Templates success;
Confirmation code = 0x01 received packets wrong;
Confirmation code = 0x10 Remove Templates failed;

★ instruction packet checksum (2 bytes) = packet marking (1 byte) + packet length (2 bytes) + script (1 byte) + Page (2 bytes) + Delete number (2 bytes);
★ response packet checksum (2 bytes) = packet identification (1 byte) + packet length (2 bytes) + confirmation code (1 byte);
★ checksum bytes added to carry more than 2 bytes ignored, big endian transfer;
★ default module address "0xffffffff"; default password is "0x00000000".

18) Empty fingerprint database Empty

Function: Remove module fingerprint database fingerprint template.

Input parameters: none

Return parameter: confirm the word

Instruction code: 0x0d

The instruction packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	2 bytes
Baotou	Module address	Packet identification	Packet length	Instruction code	Checksum
0xef01	XXXX	0x01	0x0003	0x0d	0x0011

Reply packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	2 bytes
Baotou	Module address	Packet identification	Packet length	Confirmation code	Checksum
0xef01	XXXX	0x07	0x0003	X	Sum

Note: confirmation code = 0x00 Empty success;

Confirmation code = 0x01 received packets wrong;

The confirmation code = 0x11 Empty failed;

★ command packet checksum (2 bytes) = packet identification (1 byte) + packet length (2 bytes) + script (1 byte);

★ response packet checksum (2 bytes) = packet identification (1 byte) + packet length (2 bytes) + confirmation code (1 byte);

★ checksum bytes added to carry more than 2 bytes ignored, big endian transfer;

★ default module address "0xffffffff"; default password is "0x00000000".

19) accurate than two fingerprint characteristics Match

Function Description: Module accurate than (1:1) the characteristics CharBuffer1 with CharBuffer2 file and give than The results.

Input parameters: none

Return parameters: Recognition word + than the score

Instruction code: 0x03

The instruction packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	2 bytes

Baotou	Module address	Packet identification	Packet length	Instruction code	Checksum
0xef01	XXXX	0x01	0x0003	0x03	0x0007

Reply packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	2 bytes	2 bytes
Baotou	Module address	Packet identification	Packet length	Confirmation code	Score	Checksum
0xef01	XXXX	0x07	0x0005	X	XX	Sum

Note: 1, confirmation code = 0x00 fingerprint matching;

Confirmation code = 0x01 received packets wrong;

Confirmation code = 0x08 fingerprints do not match;

2, after the instruction is executed, the contents of the two characteristics in the buffer unchanged.

★ command packet checksum (2 bytes) = packet identification (1 byte) + packet length (2 bytes) + script (1 byte);

★ response packet checksum (2 bytes) = packet marking (1 byte) + packet length (2 bytes) + confirmation code (1 byte) + score (2 bytes);

★ checksum bytes added to carry more than 2 bytes ignored, big endian transfer;

★ default module address "0xffffffff"; default password is "0x00000000".

20) Search fingerprint Search

Function: characteristics to of CharBuffer1 or CharBuffer2 in file search the whole or part of the fingerprint database. If the search Cable to return to the page number.

Input parameters: the BufferID + StartPage (start page) + PageNum (Pages)

Return parameters: to confirm word + Page (matching fingerprint template)

Instruction code: 0x04

The instruction packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	1 byte	2 bytes	2 bytes	2 bytes
Baotou	Module address	packet ID	Packet length	Script	buffer number	Start Page	Pages	Checksum
0xef01	XXXX	0x01	0x0008	0x04	BufferID	StartPage	PageNum	Sum

Note: buffer CharBuffer1, CharBuffer2's BufferID is 0x01 and 0x02, respectively

Reply packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	2 bytes	2 bytes	2 bytes
Baotou	Module address	Packet identification	Packet length	Confirmation code	Page number	Score	Checksum
0xef01	XXXX	0x07	0x007	X	PageID	MatchScore	Sum

Note: 1, confirmation code = 0x00 searched;
Confirmation code = 0x01 received packets wrong;
Confirmation code = 0x09 did not search;
2, after the instruction is executed, the contents of the feature buffer unchanged.

★ command packet checksum (2 bytes) = packet marking (1 byte) + packet length (2 bytes) + script (1 byte) + buffer number (1 bytes) + Start Page (2 bytes) + pages (2 bytes);

★ response packet checksum (2 bytes) = packet marking (1 byte) + packet length (2 bytes) + confirmation code (1 byte) + Page (2 bytes) + Score (2 bytes);

★ checksum bytes added to carry more than 2 bytes ignored, big endian transfer;

★ default module address "0xffffffff"; default password is "0x00000000".

6.3 Other instructions

21) sampled random number GetRandomCode

Function Description: the module chip generates a random number and returns it to the host computer (see section 4.8 of the random number gen
Input parameters: none
Return parameter: confirm the word
Instruction code: 0x14

The instruction packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	2 bytes
Baotou	Module address	Packet identification	Packet length	Instruction code	Checksum
0xef01	XXXX	0x01	0x0003	0x14	0x0018

Reply packet format:

2 bytes	4 bytes	1 byte	2 bytes	1 byte	4 bytes	2 bytes
Baotou	Module address	Packet identification	Packet length	Confirmation code	Random number	Checksum
0xef01	XXXX	0x07	0x0007	X	XXXX	Sum

Note: confirmation code = 0x00 generate success;
Confirmation code = 0x01 received packets wrong;

★ command packet checksum (2 bytes) = packet identification (1 byte) + packet length (2 bytes) + script (1 byte);

★ response packet checksum (2 bytes) = packet identification (1 byte) + packet length (2 bytes) + confirmation code (1 byte) + random number (4 bytes);

★ checksum bytes added to carry more than 2 bytes ignored, big endian transfer;

★ default module address "0xffffffff"; default password is "0x00000000".

Chapter VII Program Development Guide

7. Program flowchart

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Input fingerprint flowchart

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Search prime fingerprint flowchart

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6.4 Instruction Set Summary Table

6.4.1 classified by function

Type	No.	Code	Function Description	Type	No.	Code	Function Description
System Collectively Class	1	0x13	efficacy password	Finger Grain Office Reason Class	13	0x08	upload feature
	2	0x12	to set a password		14	0x09	download feature
	3	0x15	to set the address		15	0x06	storage templates
	4	The 0x0e	setting system parameters		16	0x07	read out the template
	5	The 0x0f	reading system parameters		17	0x0c	Remove Templates
	6	The 0x1f	reading fingerprint template index table		18	The 0x0d	Empty fingerprint database
	7	0x1d	read the fingerprint template		19	0x03	than on fingerprint
Finger Grain Office Reason Class	8	0x01	recorded fingerprint image		20	0x04	search fingerprint
	9	The 0x0a	Upload image				
	10	The 0x0b	Download image	Its He Class	21	Number of 0x14	sampling random
	11	The 0x02	image transfer characteristics				
	12	0x05	characteristics of synthetic template				

6.4.2 instruction code sequence

Code	Mnemonic	Function Description	Code	Mnemonic	Function Description
0x01	GenImg	Recorded fingerprint image	0x0d	Empty	Empty the fingerprint database
0x02	Img2Tz	Image transfer feature	0x0e	SetSysPara	Set system parameters
0x03	Match	Fingerprint matching	0x0f	ReadSysPara	Read system parameters
0x04	Serach	Search fingerprints	0x12	SetPwd	Set the password
0x05	RegModel	Characteristics of synthetic template	0x13	VfyPwd	Efficacy password
0x06	Store	Store the template	0x14	GetRandomCode	sampled random number
0x07	LoadChar	Read out a template	0x15	SetAdder	Set address
0x08	UpChar	Upload characteristics	0x1d	TempleteNum	Read the fingerprint template number
0x09	DownChr	Download characteristics	0x1f	ReadConList	Read the fingerprint template index table
0x0a	UpImage	Upload your image			
The 0x0b	DownImage	download images			
The 0x0c	DeletChar	Remove Templates			

Attachment

Split motherboard Dimensions

2 optical fingerprint sensor (or integrated module) Dimensions (Unit: **mm)**

---------- End ----------

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