



Communication Protocol	
Version1.7	

SFM-V1.7 Fingerprint Module

Communication Protocol Overview

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Communication Protocol Overview

The host and module slaves communicate via CMD and ACK packets that begin and end with F5. The host side sends CMD command packets (8 bytes) and CMD packets (generally larger than 8 bytes) while the slave side sends back ACK command packets (8 bytes) and ACK packets (generally larger than 8 bytes)

1 eight-character section format

The data format is as follows.

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	TYPE	P1	P2	P3	0	CHK	0xF5
ACK	0xF5	TYPE	Q1	Q2	Q3	0	CHK	0xF5

Notes.

TYPE : CMD/ACK type

P1, P2, P3 : CMD

parameters Q1, Q2, Q3

: ACK parameters

Q3 is always used to return the result of command execution:

```
#define ACK_SUCCESS      0x00    //Executed
                                successfully
#define ACK_FAIL         0x01    // Failure of
                                implementation
#define ACK_FULL         0x04    // Database full
#define ACK_NOUSER       0x05    //No such user
#define ACK_USER_EXIST   0x07    //User already
                                exists
#define ACK_TIMEOUT      0x08    //Image
                                acquisition
                                timeout
#define ACK_HARDWAREERROR 0x0A    // Hardware error
#define ACK_IMAGEERROR   0x10    //Image Error
#define ACK_BREAK        0x18    //Terminate the
                                current
                                instruction
#define ACK_ALGORITHMFAIL 0x11    //Posting Attack
                                Detection
#define ACK_HOMOLOGYFAIL 0x12    // Homology
                                check error
```

CHK : Checksum, is the checksum of the 2nd byte to the 6th byte.

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2 Larger than octet, data is divided into packet header + packet

Packet header format.

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	TYPE	Hi(Len)	Low(Len)	0	0	CHK	0xF5
ACK	0xF5	TYPE	Hi(Len)	Low(Len)	Q3	0	CHK	0xF5

Caution.

The definition of Q3 can be found above

Len : the length of Real Data in the packet, two bytes
Hi(Len) : the high byte of the length of the real data packet

Low(Len) : The low byte of the real packet length.

CHK: Checksum, is the checksum of the 2nd byte to the 6th byte.

Packet format.

Byte	1	2... Len+1	Len+2	Len+3
CMD	0xF5	Real Data	CHK	0xF5
ACK	0xF5	Real Data	CHK	0xF5

Caution.

Len : Length of Real Data

CHK : Checksum, it is the heteroskedastic checksum of the 2nd byte to the 1st byte of the Len + 1 st byte. The packet is sent out immediately after the packet header.

3 Command Definition

3.1 Introduction to User Registration

There are 2 mainstream registration modes for user registration, i.e. 3C3R and NCNR (the default standard version is the 3C3R mode). The two modes are described below:

1. The 3C3R registration method is the more common registration method in the multiple-command-multiple-return registration method, because the user's operational complexity and the user's freedom of use are balanced at the same time.
2. NCNR registration method, the user can adjust the number of registrations according to the application, similar to the 3C3R registration method, generally

to N = 3 when the best user registration experience.

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The module comes with film attack detection function by default. When registering, the finger can't be pressed all the time to register, it is recommended to use 3C3R registration method (NCNR registration method can be used for multiple registrations) and guide the user to lift up the finger to register.

During all types of registration, if the TYPE field of the received ACK packet (see the description of the previous command format) is 0x03, it means that the registration is finished, if the Q3 of the ACK packet is 0, it means that the registration is successful and the ACK's

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Q1 and Q2 represent the upper 8 bits and lower 8 bits of the user ID. For details, please refer to the following explanation.

3.1.1 Multiple press registration (3C3R) (CMD/ACK

are both 8 bytes) First registration of the command

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	0x01	UserID(H igher8bi ts)	UserID(L ower8 bits)	User Role (1/2/3)	0	CHK	0xF5
ACK	0xF5	0x01	UserID(H igher8bi ts) 0	UserID (ower8 bits) 0	ack_success ack_faile ack_full ack_timeout ack_break ack_imagefaile ack_hardwareerror ACK_IMAGEERROR	0	CHK	0xF5

For the first command, you need to set the ID value and permission, User ID is 1-10000, if you set the ID to 0, the module will automatically assign an unused ID to the user, but the total number of users will not exceed the maximum number of users that can be stored in a single module.

Second registration of sent commands and return

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	0x02	0	0	0	0	CHK	0xF5
ACK	0xF5	0x02 0x03	0	0	ACK_SUCCESS ACK_FAIL ACK_FULL ACK_TIMEOUT ACK_BREAK ACK_IMAGEFAIL	0	CHK	0xF5

If the second byte of the returned ACK is 0x03, it means that the registration has been terminated prematurely, and the reason for the termination of the registration can be obtained from the fifth byte, which requires the user to restart the registration.

Command sent and returned by the third registration

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	0x03	0	0	0	0	CHK	0xF5
ACK	0xF5	0x03	UserID(H igher8bi ts) 0	UserID (ower8 bits) 0 4	ack_success ack_faile ack_full ack_timeout ack_break ack_imagefail ack_algorithmfail ACK_HOMOLOGYFAIL	0	CHK	0xF5

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Returning a registration failure at any point in the three registration processes will require a restart of the registration, e.g., the user's third order

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If ACK_SUCCESS is not returned after the command is issued, the user needs to register by sending the registration command again from the first registration. Only when the registration is successful, the third and fourth characters represent the upper 8 bits and lower 8 bits of the user ID.

3.1.2 Multiple press registration (NCNR) (CMD/ACK are both 8 bytes)

The registration command is sent after the NCNR is set, and the number of times it is sent

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	0x01	UserID(Higher8bits)	UserID(Lower8bits)	ROLE	0	CHK	0xF5
...	0xF5	0x01	0	0	0	0	CHK	0xF5
...	0xF5	0x01	0	0	0	0	CHK	0xF5
ACK	0xF5	0x03	UserID(Higher8bits)	UserID(Lower8bits)	ack_success ack_fail ack_full ack_timeout ack_break ack_imagefail ack_algorithmfail ACK_HOMOLOGYFAIL	0	CHK	0xF5

When N>3, registers successive commands sent as F5 01 00 00 00 00 01 F5, returning values other than the last one

Both are returned as F5 01 00 00 00 00 01 F5. The last time a registration success/failure result is returned or the TYPE bit is detected as 03 When determining the result of registration success/failure.

3.2 Delete specific users and users with specific privileges (CMD/ACK are both 8 bytes)

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	0x04	User ID (Higher 8 Bits)	User ID (Low 8 Bits)	Role	0	CHK	0xF5
ACK	0xF5	0x04	0	0	ACK_SUCCESS ACK_NOUSER	0	CHK	0xF5

Description:

Deletes fingerprints of a specified ID from the fingerprint database and deletes user IDs by privilege.

Example 1:

(Delete user 0001) Send the Delete Specified ID

command through the serial port F5 04 00 01 00
00 05 F5

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When the module receives the command, the module searches for user 0001 in the fingerprint database, and deletes fingerprint 0001 after successful searching.

F5 04 00 00 00 00 04 F5 (Delete Success Tip)

Failed to return a failed search

F5 04 00 00 05 00 01 F5 (user does not exist)

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Example 2:

Delete all users with privilege 02 by privilege 02

Send: F5 04 00 00 02 00 06 F5

Return: F5 04 00 00 00 00 04 F5 (Delete

Successful Prompt) Example 3:

Delete the specified user (user 00 0A) and all users with permission 03 Send: F5 04 00 0A 03 00 0D F5

Return: F5 04 00 00 00 00 04 F5 (Delete Success Tip)

3.3 Delete all users (CMD/ACK are both 8 bytes)

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	0x05	0	0	0	0	CHK	0xF5
ACK	0xF5	0x05	0	0	ACK_SUCCESS	0	CHK	0xF5

Description:

Delete all fingerprints in the fingerprint library.

Example.

Delete All Users command

sent via serial port F5 05 00

00 00 00 00 05 F5

Delete Success Prompt F5 05 00 00 00 00 00 05 F5

When deleting, you must wait for the module to have a return value before performing other operations on the module.

The module receives the command to delete all fingerprints in the module, this command does not return a failure, except when the command is used to interrupt other commands.

Example:

Send during the registration process

f5 05 00 00 00 00 05 f5

will cause the registration to terminate, and the clear command will not be executed.

3.4 Get the total number of users (CMD/ACK are both 8 bytes)

Bytes	1	2	3	4	5	6	7	8
CMD	0xF5	0x09	0	0	0	0	CHK	0xF5
ACK	0xF5	0x09	Usercount(hi gher8 bits)	Usercount(lo wer8bi ts)	ACK_SUCCESS	0	CHK	0xF5

Description:

Get the number of existing users in the fingerprint database

Example: Send the command to
get the total number of users
through the serial port F5 09 00 00
00 00 00 09 F5

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The module receives the command and searches for the number of
users present in the module. The number of users is sent out through
the serial port . f5 09 00 01 00 00 08 f5

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Indicates that there are 0001 users in the fingerprint pool.

3.5 Get user privileges (CMD/ACK are both 8 bytes)

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	0x0A	UserID (Higher 8bits)	UserID (Low 8Bits)	0	0	CHK	0xF5
ACK	0xF5	0x0A	0	0	User role (1/2/3) ACK_NOUSER	0	CHK	0xF5

Description:

Used to check if the ID has been used within the fingerprint library.

Example: (Get access to user 0001) Send F5

0A 00 01 00 00 00 0b F5 through the serial port.

After the module receives the command, if user 0001 does not exist in the fingerprint database, it returns to

f5 0a 00 00 00 05 00 0f f5

Returns if it exists

f5 0a 00 00 01 00 0b f5

3.6 1 to 1 matching (CMD/ACK are both 8 bytes)

Bytes	1	2	3	4	5	6	7	8
CMD	0xF5	0x0B	UserID (higher 8 bits)	UserID (lower 8 bits)	0	0	CHK	0xF5
ACK	0xF5	0x0B	0	0	ack_success ack_faile ack_timeout ack_break ack_hardwareerror ACK_IMAGEERROR	0	CHK	0xF5

Description:

Capture a fingerprint for comparison with a fingerprint library assigned ID user. Example:

(Comparison with user 0001)

Command F5 0B 00 01 00 00 00 0A F5 via serial port

When the module receives the command, it searches for user 0001 in

the fingerprint database, if it does not exist, it will return directly.

f5 0b 00 00 05 00 0e f5

If present, wait for user fingerprint to be captured. Serial port returns 8S after user fingerprint is not pressed.

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f5 0b 00 00 08 00 03 f5

After the user's fingerprint is pressed, the comparison fails

Serial port returns F5 0B 00 00 01 00

0A F5

Successful matching returns

f5 0b 00 00 00 00 0b f5

If other commands are received during acquisition, the current command is terminated and this command that caused the comparison command to be terminated will not be executed, return

f5 0b 00 00 18 00 13 f5

3.7 1 to N matching and privilege-specific user matching (CMD/ACK are both 8 bytes)

Bytes	1	2	3	4	5	6	7	8
CMD	0xF5	0x0C	0	0	Role	0	CHK	0xF5
ACK	0xF5	0x0C	UserID (higher 8 bits)	UserID (lower 8 bits)	User role (1/2/3)	0	CHK	0xF5

Description:

Capture fingerprints and compare them with all users in the fingerprint database, as well as compare them by privilege. Successful matching returns the first successfully matched user ID and privilege Role. if the matching is unsuccessful, then the returned ID value is 00 00.

Example 1:

Sending commands through the serial port

f5 0c 00 00 00 00 0c f5

The module receives the command and waits for the user to enter the fingerprint.

If no fingerprint is entered, the module times out and the serial port returns a timeout error

F5 0C 00 00 08 00 04 F5

If the fingerprint is input, the module searches for the fingerprint in the library and compares it with the fingerprint just collected, if the comparison fails, the serial port returns F5 0C 00 00 00 00 0C F5

If the match is successful, return the ID of the first successfully matched user: F5 0C

2bytesID 1byteRole 00 CHK F5

(e.g. F5 0C 00 05 01 00 08 F5)

Example 2:

Compare fingerprints by permission 02 (User ID: 00 0A, permission value: 02)

Send: F5 0C 00 00 02 00 0E F5 This command will only compare all fingerprints with a permission value of 02.

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Return: F5 0C 00 0A 02 00 04 F5 Successful matching returns the corresponding user ID and privilege value.

Return: F5 0C 00 00 02 00 0E F5 Match failure returns user ID 00 00 and permission value

The program can simply determine whether 2bytesID is 0 to determine whether the comparison is successful, if the comparison is successful, then 2bytesID!=0.

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3.8 Get unused user IDs (CMD/ACK are both 8 b y t e s)

Bytes	1	2	3	4	5	6	7	8
CMD	0xF5	0x0D	0	0	0	0	CHK	0xF5
ACK	0xF5	0x0D	UserID (higher 8 bits)	UserID (lower 8 bits)	ACK_SUCCESS ACK_FAIL	0	CHK	0xF5

Description: The module returns the first unused user ID. example:

Send via serial port

f5 0d 00 00 00 00 0d f5

The module receives the command

f5 0d 00 02 00 00 0f f5

then it means that user ID 0002 can be used

3.9 Set the serial port baud rate (CMD/ACK are both 8 b y t e s)

Bytes	1	2	3	4	5	6	7	8
CMD	0xF5	0x21	0	New baud rate ID	Flag	0	CHK	0xF5
ACK	0xF5	0x21	0	New baud rate ID	ACK_SUCCUSS ACK_FAIL	0	CHK	0xF5

Description:

The serial port baud rate numbers are from 1 to 5, the corresponding baud rate is 9600bps 19200bps 38400bps 57600bps 115200bps, every time the system reset, the baud rate will be restored to the default value, the default baud rate is 115200.

When Flag=0, it means to modify the baud rate temporarily, and the module will be restored to the state before modification after power down and reboot, and when Flag=1, it means to modify the baud rate permanently, and the module will record the modification information in the non-volatile memory, and the module will not be restored to the state before modification even after reboot.

Example:

Send via serial port

f5 21 00 01 00 00 20 f5

Setting 9600Bps

When the module receives the command, it checks whether the baud rate ID to be set is legal or not.

f5 21 00 01 00 00 20 f5

Illegal returns
failure for

example:

Send via serial port

f5 21 00 07 00 00 26 f5

Setting the baud rate is
not legal, return F5 21

00 07 01 00 27 F5

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3.10 Reads the image and extracts the feature values

(CMD is 8 bytes / ACK >8 bytes) CMD data Format

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	0x23	0	0	0	0	CHK	0xF5

ACK Data Format

i) Data head

Byte	1	2	3	4	5	6	7	8
ACK	0xF5	0x23	Hi (Len))	Low (Len)	ACK_SUCCESS ACK_FAIL ACK_TIMEOUT ACK_BREAK	0	CHK	0xF5

ii) Data package

Byte	1	2	3	4	5... Len+1	Len+2	Len+3
ACK	0xF5	0	0	0	Feature Data	CHK	0xF5

description.

The fingerprints are captured and the feature values of the fingerprint images are extracted and the total length of the returned values is 8206 bytes.

Example:

Host Side Send

f5 23 00 00 00 00 23 f5

The module receives the command and waits for the user to press the fingerprint.

If no fingerprint is entered, the module times out (8s)

and returns a timeout error on the module side: F5 23 20

03 08 00 08 F5

When the fingerprint is correctly pressed within the timeout period, the module side returns the fingerprint feature value packet in the above format.

In particular, this command also supports interrupt exit, i.e., while waiting for the user to press the fingerprint, the host side can retransmit the current command to let the module exit the acquisition state. The module returns:

f5 23 20 03 18 00 18 f5

3.11 Acquire image (CMD is 8 bytes / ACK

>8 bytes) CMD data Format

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	0x24	0	0	0	0	CHK	0xF5

ACK Data Format

i) Data head

Byte	1	2	3	4	5	6	7	8
ACK	0xF5	0x24	Width> >2	Height >>2	ACK_SUCCESS ACK_FAIL	0	CHK	0xF5

ii) Data package

Byte	1	2---Len+1	Len+2	Len+3
ACK	0xF5	Image Data	CHK	0xF5

description.

Send via serial port

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f5 24 00 00 00 00 24 f5

When the module receives the command, it captures the image and sends out the image bitmap data after successful capture. If the fingerprint is not captured after the timeout, it returns the timeout command .

F5 24 2C 2C 08 00 2C F5 (tested with 176*176 sensor)

In particular, this command also supports interrupt exit, i.e., while waiting for the user to press the fingerprint, the host side can retransmit the current command to let the module exit the acquisition state. The module returns:

f5 24 2c 2c 18 00 3c f5

Note: Tested with a 176*176 transducer

3.12 Get module version information (CMD is 8

bytes / ACK >8 bytes) CMD data Format

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	0x26	0	0	0	0	CHK	0xF5

ACK Data Format

i) Data head

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	0x26	Hi (Len))	Low(L en)	ACK_SUCCESS ACK_FAIL	0	CHK	0xF5

ii) Data package

Byte	1	2... .Len+1	Len+2	Len+3
ACK	0xF5	Version data	CHK	0xF5

description:

Get the module version information, which contains the program version, sensor type, registration method, compilation time and other information.

3.13 Set/get comparison level (CMD/ACK are both 8 b y t e s)

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	0x28	0	NEW matchi ng level	0	0	CHK	0xF5
ACK	0xF5	0x28	0	Old matchi ng level	ACK_SUCCESS ACK_FAIL	0	CHK	0xF5

Description:

The comparison level can be set to 0-2, the default is level 2, the higher the

comparison level, the tighter the restriction. The higher the comparison level, the stricter the restriction. The default value is restored after restarting the module.

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The relationship between the comparison level and the corresponding security level is shown in the table below.

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1		1/50w	
2		1/100w	

Example:

(Set comparison level 1) Send via serial port

f5 28 00 01 00 00 29 f5

When the module receives the command, it returns

F5 28 00 01 00 00 29 F5 (indicates that the comparison level before the setting of the module is 1)

3.14 Get the ID value and permission value of the

registered user (CMD/ACK are both 8 bytes) CMD data

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	0x2B	0	0	0	0	CHK	0xF5

ACK Data Format

i) Data Head

Byte	1	2	3	4	5	6	7	8
ACK	0xF5	0x2B	Hi (Len)	Low (Len)	ACK_SUCCESS ACK_FAIL	0	CHK	0xF5

ii) Data Package

Byte	1	2	3	4... .Len+1	Len+2	Len+3
ACK	0xF5	User Number (higher) (8bit)	User Number (lower) (8bit)	User ID and User Role	CHK	0xF5

Note: "Len" is equal to 3*User number+2 Format of user.

Byte	4	5	6	7	8	9	...
Data	User ID1 (higher 8bit)	User ID1 (lower) (8bit)	User Role1 (1/2/3)	User ID2 (higher 8bit)	User ID2 (lower) (8bit)	User Role2 (1/2/3)	...

Example:

Send via serial port

f5 2b 00 00 00 00 2b f5

After the module receives the

command, if there is no user in the

module, return to F5 2B 00 00 01 00 2A

F5

If a user returns

f5 2b 00 05 00 00 00 2e f5 f5 00 03 00 01 01 03 f5	Fingerprint Module Communication Protocol	SFM-V1.7
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3.15 Set/get registration mode (CMD/ACK

are both 8 bytes) CMD data Format

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	0x2D	0	0:Allowing same 1: Denying same	0:Set new enrollment mode 1:Get current enrollment mode	0	CHK	0xF5

ACK Data Format

Byte	1	2	3	4	5	6	7	8
ACK	0xF5	0x2D	0x01	0:Allowing same 1:Denying same	ACK_SUCCESS ACK_FAIL	0	CHK	0xF5

Description:

Fingerprint enrollment modes are divided into two types: allow duplicates and deny duplicates modes.

When the module is powered up, it defaults to Allow Repeat Registration mode. After power down, it will reset to Allow Repeat Registration Mode if it has been set to Deny Repeat Mode.

In reject duplicate mode, after the first registration command is sent during registration, ACK_USER_EXIST 0x07 is returned if a duplicate registration of an already existing user is made.

Example:

Setup to refuse to register duplicate patterns

Send: F5 2D 00 01 00 00 2C F5

Return: F5 2D 01 01 00 00 2D F5

3.16 Finger detection function (CMD/ACK are both 8 bytes)

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	0x30	0	0	0	0	CHK	0xF5
ACK	0xF5	0x30	0	0	ACK_SUCCESS ACK_FAIL	0	CHK	0xF5

Description:

Immediately after sending, detect whether there is a finger press on the module, if there is a finger press, then return to ACK_SUCCESS, if there is no finger press, then return to ACK_FAIL.

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3.17 Get the unique ID number of the fingerprint module

module (CMD/ACK are both 8 bytes) CMD data

Byte Format	1	2	3	4	5	6	7	8
CMD	0xF5	0x60	0	0	0	0	CHK	0xF5

ACK Data Format

i) Data Head

Byte	1	2	3	4	5	6	7	8
ACK	0xF5	0x60	0	0	0	0	CHK	0xF5

ii) Data Package

Byte	9	10	11	17	18	19
ACK	0xF5	Fingerprint Module Unique ID Number				CHK	0xF5

Description:

Get the unique ID number of the fingerprint module.

Send: F5 60 00 00 00 00 60 F5

Return: F5 60 00 00 00 00 00 60 F5 F5 F5 38 30 32 30 39 04 2C 15 0E F5

3.18 Configure the registration function (CMD/ACK are both 8 bytes)

CMD Data Format

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	0x3F	PID High	PID Low	PV	0	CHK	0xF5

Description:

PID High: parameter index

high byte. PID Low:

parameter index low byte.

PV: Parameter value.

Parameter Index List (PID)

0x0000:Registration Mode 1CNR, NCNR Selection.

0x0001:Homology check level.

0x0002:Hands up detection configuration.

0x0003:Number of fingerprint captures N.

0x0004:Configuration of the sticker attack detection function.

0x0040:Self-learning priority tag.

When the module is powered on, it defaults to 3C3R registration mode with homology check and no hand lift detection. After power down, the module will reset to the default registration configuration if it has been configured with other registration functions.

ncnr: f5 3f 00 00 06 00 39 f5

1.1 CNR/NCNR Registration Mode Selection:

It is categorized into 1CNR and NCNR, and N represents the number of fingerprints taken. 1CNR: F5 3F 00 00 05 00 3A F5

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2. Homology level setting (this configuration command can be sent separately)

Taking the 3C3R enrollment method as an example, during the enrollment, it is judged that at least one of the last two fingerprints captured in the three times is consistent with the first fingerprint before the enrollment is successful.

In case of 0, no homology check is done, i.e., no judgment is made on whether it is the same finger or not, and in case of 5, it is required that the collected fingerprints are identical.

Level 0: F5 3F 00 01 00 00 3E F5

Level 1: F5 3F 00 01 01 00 3F F5

Level 2: F5 3F 00 01 02 00 3C F5

Level 3: F5 3F 00 01 03 00 3D F5

Level 4: F5 3F 00 01 04 00 3A F5

Level 5: F5 3F 00 01 05 00 3B F5

3. Hands up detection (this configuration command can be sent separately)

To use the raised hand detection function:

F5 3F 00 02 01 00 3C F5 4. Acquisition count setting:

Acquisition 3 3F 00 03 03 00 3F F5
times: F5

Acquisition 4 3F 00 03 04 00 38 F5
times: F5

Acquisition 5 3F 00 03 05 00 39 F5
times: F5

5. Return before self-learning (this configuration command can be sent separately)

Send this instruction before comparing: F5 3F 00 40 00 00 7F F5

It should be noted that the self-learning time needs 150ms-250ms, and the module can be powered down only after 300ms delay after receiving the return command from the comparison, and powering down the module in advance will lead to the damage of fingerprint self-learning function.

6. Film Attack Detection Function (off by default, this configuration command can be sent separately)
sent before registration: on command: F5 3F 00 04
01 00 3A F5

Example 1: Setting the number of registrations 5 times (1C5R/5C5R)

1C5R registration mode: first send command to set to 1CNR mode F5 3F 00 00 05 00 3A F5
(successfully return F5 3F 00)

00 00 00 3F F5), and then set the number of acquisitions F5 3F 00 03 05 00 39 F5
(successful return F5 3F 00 00 00 00 00 3FF5)

5C5R registration mode: first send command to set to NCNR mode F5 3F 00 00 06 00 39 F5
(successful return F5 3F 00)

00 00 00 3F F5), and then set the number of acquisitions F5 3F 00 03 05 00 39 F5
(successful return F5 3F 00 00 00 00 00 3FF5)

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3FF5)

Two commands must be sent to set the number of registrations, the first to set the 1CNR or NCNR mode, and the second to set the number of acquisitions.

. The two commands are valid only if they are sent in sequence. Example 2: Setting the homology check level (level 0)

Send command: F5 3F 00 01 00 00 00 3E F5 (successfully return F5 3F 00 00 00 00 00 3F F5) Example 3: Set the number of registrations to 6 (NCNR mode) the homology check level to 0, and use the raised hand detection function.

Send commands in order:

F5 3F 00 00 06 00 39 F5

F5 3F 00 01 00 00 3E F5

F5 3F 00 02 01 00 3C F5

F5 3F 00 03 06 00 3A F5

The commands are sent sequentially, with each command returning F5 3F 00 00 00 00 00 3F F5 upon success, and the next command is sent after receiving a successful return from the previous 1 command.

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3.19 Aperture control commands

(CMD/ACK are both 8 bytes) CMD data

Format

i)

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	0xC3	led_Start	Led_End	Period	0	CHK	0xF5

ii) ACK data

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	0xC3	0	0	0	0	CHK	0xF5

Description:

Led Start: two colors of light switching, the color of the light at the beginning; Led End: two colors of light switching, the color of the light at the end;

Period: the cycle time from one color to another, the unit is 10ms, that is, when Period=100, the time of single color change is 1s; Period is in the range of 30-200, if it exceeds the range, the instruction will not be executed.

Start and End are represented by the lower three bits of the uint8 type variable.

0x0000 0000 The lowest three bits represent the three colors of Red Green Blue respectively, and are valid at low level.

R G B

Example:

0x03 = 0x0000 0011 Indicates that the red light is on

0x05 = 0x0000 0101 Indicates green light is on

0x06 = 0x0000 0110 Indicates that the blue light is on

0x01 = 0x0000 0001 Indicates a mix of red and green light colors

0x02 = 0x0000 0010 Indicates a mix of red

and blue lights Color Example 1:

Breat

hing

light

red

f5 c3 03 07 96 00 51 f5

green

f5 c3 05 07 96 00 57 f5

indigo plant

f5 c3 06 07 96 00 54 f5

red and green

f5 c3 01 07 96 00 53 f5

red and blue

f5 c3 02 07 96 00 50 f5

greenish blue

f5 c3 04 07 96 00 56 f5

Example 2:

Gradient Light

Red-Blue

f5 c3 03 06 96 00 50 f5

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Red-Green.

F5 C3 03 05 96 00 53 F5

Green-Blue.

F5 C3 05 06 96 00 56 F5

Red-Green-

Red-Blue.

F5 C3 01 02 96 00 56 F5

Red-Green-

Green-Blue.

F5 C3 01 04 96 00 50 F5

Red-Blue-

Green-Blue.

F5 C3 02 04 96 00 53 F5

Example 3:

Monochrome

Lamp

bonus

F5 C3 03 03 96 00 55 F5

green

F5 C3 05 05 96 00 55 F5

indigo plant

F5 C3 06 06 96 00 55 F5

red and green

F5 C3 01 01 96 00 55 F5

red and blue

F5 C3 02 02 96 00 55 F5

greenish blue

F5 C3 04 04 96 00 55 F5

Lights off (all

off) 00 55 F5

F5 C3 07 07 96

3.20 Interrupt command (CMD/ACK are both 8 bytes)

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	0xFE	0	0	0	0	CHK	0xF5
ACK	0xF5	Type	0	0	ACK_BREAK ACK_FAIL	0	CHK	0xF5

DESCRIPTION: Immediately ends the fingerprint image taking state.

Sent during comparison: F5 FE 00 00 00 00 FE F5

Interrupt successfully returned: F5 0C 00 00 18 00 14 F5

Sent in idle state: F5 FE 00 00 00 00 FE F5 Returned: F5 FE 00 00 01 00 FF F5

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Version History

version number	Modification Date	Content of the modification	modifie r
V1.0	31.12.2019	authorized strength	way
V1.1	2020.01.04	amendment	way
V1.2	2020.02.25	Addition of descriptions related to security levels	Xhaka
V1.3	2020.03.23	Add permanent modification of baud rate description	Xhaka
V1.4	2020.03.24	Modify the description of the 1 to N ratio return value	ZJ
V1.5	2020.03.26	Modified return value descriptions for some instructions	ZJ
V1.6	2020.04.18	Protocol revision based on the 8K-47.8 algorithmic program	Xhaka
V1.7	2020.06.10	Add 3.14 instruction 0x2B, 3.20 instruction 0xFE.	Xhaka