

# Command Format

This module works as a slave device, and you should control the Master device to send commands to control it.

The Communication interface is UART: 19200 8N1.

The format commands and responses should be:

## 1) =8 bytes

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

Notes:

CMD: Type of command/response

P1, P2, P3: Parameters of command

Q1, Q2, Q3: Parameters of response

Q3: Generally, Q3 is valid/invalid information of the operation, it should be:

#define ACK\_SUCCESS                0x00    //Success

#define ACK\_FAIL                    0x01    //Failed

#define ACK\_FULL                    0x04    //The database is full

#define ACK\_NOUSER                0x05    //The user is not exist

#define ACK\_USER\_OCCUPIED        0x06    //The user was exist #define

ACK\_FINGER\_OCCUPIED            0x07    //The fingerprint was exist

#define ACK\_TIMEOUT                0x08    //Time out

CHK: Checksum, it is XOR result of bytes from Byte 2 to Byte 6

## 2) >8 bytes

This data contains two parts: data head and data packet

**data head:**

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

**Note:**

CMD, Q3: same as 1)

Len: Length of valid data in data packet, 16bits (two bytes)

Hi(Len): High 8 bits of Len

Low(Len): Low 8 bits of Len

CHK: Checksum, it is XOR result of bytes from Byte 1 to Byte 6

### data packet:

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

#### Note:

Len: numbers of Data bytes

CHK: Checksum, it is XOR result of bytes from Byte 2 to Byte Len+1

data packet following data head.

## Command Types:

### 1. Modify SN number of module (CMD/ACK both 8 Byte)

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	0x08	New SN (Bit 23-16)	New SN (Bit 15-8)	New SN(Bit 7-0)	0	CHK	0xF5
ACK	0xF5	0x08	old SN (Bit 23-16)	old SN (Bit 15-8)	old SN (Bit 7-0)	0	CHK	0xF5

Notes: SN numbers is 24 bits constant.

### 2. Query Model SN (CMD/ACK both 8 Byte)

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	0x2A	0	0	0	0	CHK	0xF5
ACK	0xF5	0x2A	SN (Bit 23-16)	SN (Bit 15-8)	SN (Bit 7-0)	0	CHK	0xF5

### 3. Sleep Mode (CMD/ACK both 8 Byte)

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	0x2C	0	0	0	0	CHK	0xF5
ACK	0xF5	0x2C	0	0	0	0	CHK	0xF5

### 4. Set/Read fingerprint adding mode (CMD/ACK both 8 Byte)

There are two mode: enable duplication mode and disable duplication mode. When the module is in disabled duplication mode: the same fingerprint could only be added as one ID. If you want to add another ID with the same fingerprint, DSP response failed information. Module is in disabled mode after powering on.

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	0x2D	0	Byte5=0: 0:Enable 1:Disbale Byte5=1: 0	0: new mode 1: read current mode	0	CHK	0xF5
ACK	0xF5	0x2D	0	Current mode	ACK_SUCCUSS ACK_FAIL	0	CHK	0xF5

## 5. Add fingerprint (CMD/ACK both 8 Byte)

Master device should send commands triple times to module and add fingerprint triple times, make sure the fingerprint added is valid.

a) First

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	0x01	User ID (High 8Bit )	User ID (Low 8Bit )	Permission (1/2/3)	0	CHK	0xF5
ACK	0xF5	0x01	0	0	ACK_SUCCESS ACK_FAIL	0	CHK	0xF5

					ACK_FULL ACK_USER_OCCUPIED ACK_FINGER_OCCUPIED ACK_TIMEOUT			
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Notes:

User ID: 1~0xFFF;

User Permission: 1,2,3, (you can define the permission yourself)

b) Second

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	0x02	User ID (High 8Bit )	User ID (Low 8Bit )	Permission (1/2/3)	0	CHK	0xF5
ACK	0xF5	0x02	0	0	ACK_SUCCESS ACK_FAIL ACK_TIMEOUT	0	CHK	0xF5

c) third

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	0x03	User ID (High 8Bit )	User ID (Low 8Bit )	Permission (1/2/3)	0	CHK	0xF5
ACK	0xF5	0x03	0	0	ACK_SUCCESS ACK_FAIL ACK_TIMEOUT	0	CHK	0xF5

Notes: User ID and Permission in three commands.

## 6. Delete user (CMD/ACK both 8 Byte)

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	0x04	User ID (High 8Bit )	User ID (Low 8Bit )	0	0	CHK	0xF5
ACK	0xF5	0x04	0	0	ACK_SUCCESS ACK_FAIL	0	CHK	0xF5

**7. Delete all users (CMD/ACK both 8 Byte)**

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	0x05	0	0	0: Delete all users 1/2/3: delete users whose permission is 1/2/3	0	CHK	0xF5
ACK	0xF5	0x05	0	0	ACK_SUCCESS ACK_FAIL	0	CHK	0xF5

**8. Query count of users (CMD/ACK both 8 Byte)**

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	0x09	0	0	0: Query Count 0xFF: Query Amount	0	CHK	0xF5
ACK	0xF5	0x09	Count /Amount (High 8Bit )	Count /Amount (Low 8Bit )	ACK_SUCCESS ACK_FAIL 0xFF(CMD=0xFF)	0	CHK	0xF5

**9. Comparison 1:1 (CMD/ACK both 8Byte)**

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	0x0B	User ID (High 8 Bit )	User ID (Low 8 Bit)	0	0	CHK	0xF5
ACK	0xF5	0x0B	0	0	ACK_SUCCESS ACK_FAIL ACK_TIMEOUT	0	CHK	0xF5

**10. Comparison 1 : N (CMD/ACK both 8 Byte)**

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	0x0C	0	0	0	0	CHK	0xF5
ACK	0xF5	0x0C	User ID (High 8 Bit )	User ID (Low 8 Bit )	Permission (1/2/3) ACK_NOUSER ACK_TIMEOUT	0	CHK	0xF5

**11. Query Permission (CMD/ACK both 8 Byte)**

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	0x0A	User ID(High 8Bit )	User ID(Low8Bit )	0	0	CHK	0xF5
ACK	0xF5	0x0A	0	0	Permission (1/2/3) ACK_NOUSER	0	CHK	0xF5

**12. Set/Query comparison level (CMD/ACK both 8 Byte)**

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	0x28	0	Byte5=0: New Level Byte5=1: 0	0: Set Level 1: Query Level	0	CHK	0xF5
ACK	0xF5	0x28	0	Current Level	ACK_SUCCUSS ACK_FAIL	0	CHK	0xF5

Notes: Comparison level can be 0~9, larger the value, stricter the comparison. Default 5

**13. Acquire image and upload (CMD=8 Byte/ACK >8 Byte)**

CMD Format:

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

ACK Format:

1) Data head:

Byte	1	2	3	4	5	6	7	8
ACK	0xF5	0x24	Hi(Len)	Low(Len)	ACK_SUCCUSS ACK_FAIL ACK_TIMEOUT	0	CHK	0xF5

2) Data packet

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

Notes:

In DSP module, the pixels of fingerprint image are 280\*280, every pixel is represented by 8 bits. When uploading, DSP is skip pixels sampling in horizontal/vertical direction to reduce data size, so that the image became 140\*140, and just take the high 4 bits of pixel. each two pixels composited into one byte for transferring (previous pixel high 4-bit, last pixel low 4-pixe).

Transmission starts line by line from the first line, each line starts from the first pixel, totally transfer 140\* 140/ 2 bytes of data.

Data length of image is fixed of 9800 bytes.

Notes: Length of Eigenvalues (Len -3) is 193 bytes.

#### 14. Query information (ID and permission) of all users added (CMD=8 Byte/ACK >8Byte)

CMD Format:

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

ACK Format:

1) Data head:

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

2) Data packet

Byte	1	2	3	4---Len+1	Len+2	Len+3
ACK	0xF5	User ID (High 8 Bit)	User ID (Low 8 Bit)	User information (User ID and permission)	CHK	0xF5

Notes:

Data length of Data packet (Len) is "3\*User ID+2"

User information Format:

Byte	4	5	6	7	8	9	...
Data	User ID1 (High 8 Bit)	User ID1 (Low 8 Bit)	User 1 Permission (1/2/3)	User ID2 (High 8 Bit)	User ID2 (Low 8 Bit)	User 2 Permission (1/2/3)	...

#### 15. Set/Query fingerprint capture timeout (CMD/ACK both 8 Byte)

Byte	1	2	3	4	5	6	7	8
CMD	0xF5	0x2E	0	Byte5=0: timeout Byte5=1: 0	0: Set timeout 1: query timeout	0	CHK	0xF5
ACK	0xF5	0x2E	0	timeout	ACK_SUCCUSS ACK_FAIL	0	CHK	0xF5

Notes:

Range of fingerprint waiting timeout (tout) value is 0-255. If the value is 0, the fingerprint acquisition process will keep continue if no fingerprints press on; If the value is not 0, the system will exist for reason of timeout if no fingerprints press on in time tout \* T0.

Note: T0 is the time required for collecting/processing an image, usually 0.2- 0.3 s.