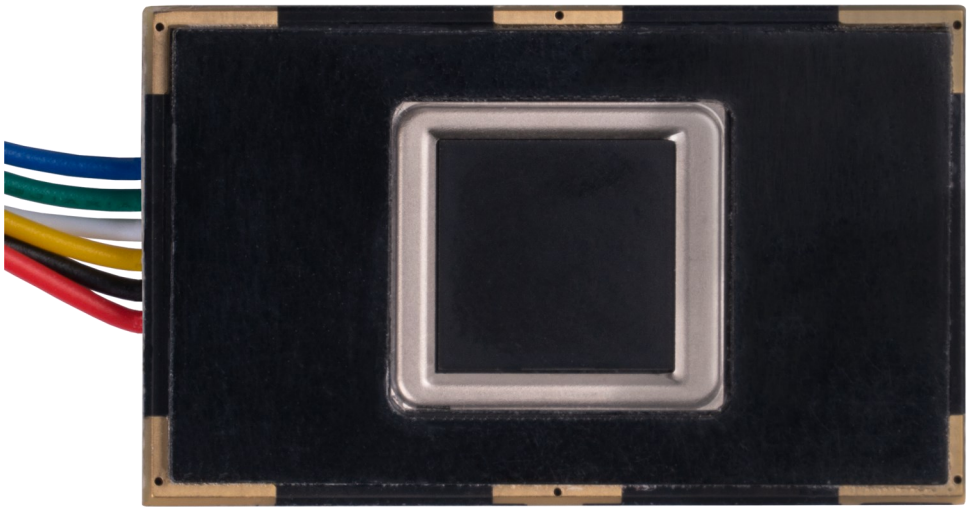
FINGERPRINT SENSOR

COM-FP-R301T



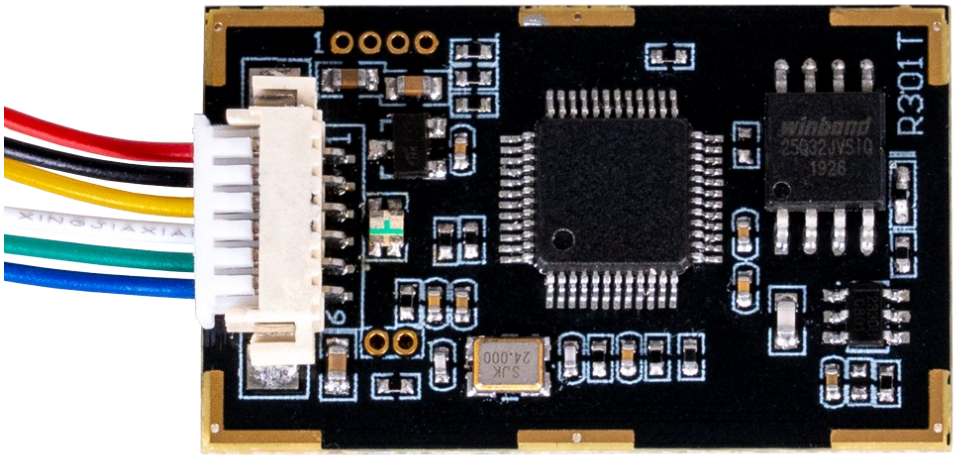
1. GENERAL INFORMATION

Dear customer,

thank you for choosing our product. In the following, we will show you how to use this device.

Should you encounter any unexpected problems during use, please do not hesitate to contact us.

2. PINOUT



Name	Colour
5 V	Red
GND	Black
TXD	Yellow
RXD	White
Touch	Green
3,3 V	Blue

3. USAGE WITH RASPBERRY PI

3.1 Connection

For the Raspberry Pi, we use a USB to TTL module. In our application example, we use our **SBC-TTL**item for this.
Therefore, we connect the fingerprint sensor to the adapter as shown below..

Fingerprint sensor	SBC-TTL
5 V (Red)	5 V
GND (Black)	GND
TXD (Yellow)	RXD
RXD (White)	TXD
Touch (Green)	-
3,3 V (Blue)	-

Make sure that the jumper is set to 3.3 V.

Now connect the SBC-TTL to one of your Raspberry Pi's USB ports.
The pin Touch is an output pin, which sends a signal, if a finger has been placed on the sensor. The sensor can be operated with the 3.3 V pin, but is then only able to detect whether a finger has been placed on it via the touch pin and cannot read the fingerprint.

3.2 Installation

We use the **pyfingerprint** library by **bastianraschke**, released under the *German Free Software License*, to control the fingerprint sensor. To install the library and all its dependencies, run the following commands:

```
sudo bash
```

```
wget -O - https://apt.pm-codeworks.de/pm-codeworks.de.gpg | apt-key add -
```

```
wget https://apt.pm-codeworks.de/pm-codeworks.list -P /etc/apt/sources.list.d/
```

```
apt-get update
```

```
apt-get install python3-fingerprint --yes
```

```
apt-get -f install
```

```
stty -F /dev/ttyAMA0 57600
```

```
exit
```

```
sudo apt install git
```

```
sudo git clone https://github.com/bastianraschke/pyfingerprint.git
```

```
cd pyfingerprint/src/files/examples
```

3.3 Usage with the library

If you now execute the following command, you can store a fingerprint.

```
python3 /usr/share/doc/python3-fingerprint/examples/example_enroll.py
```

You can use the following command to query your fingerprint to see if it is found in your data.

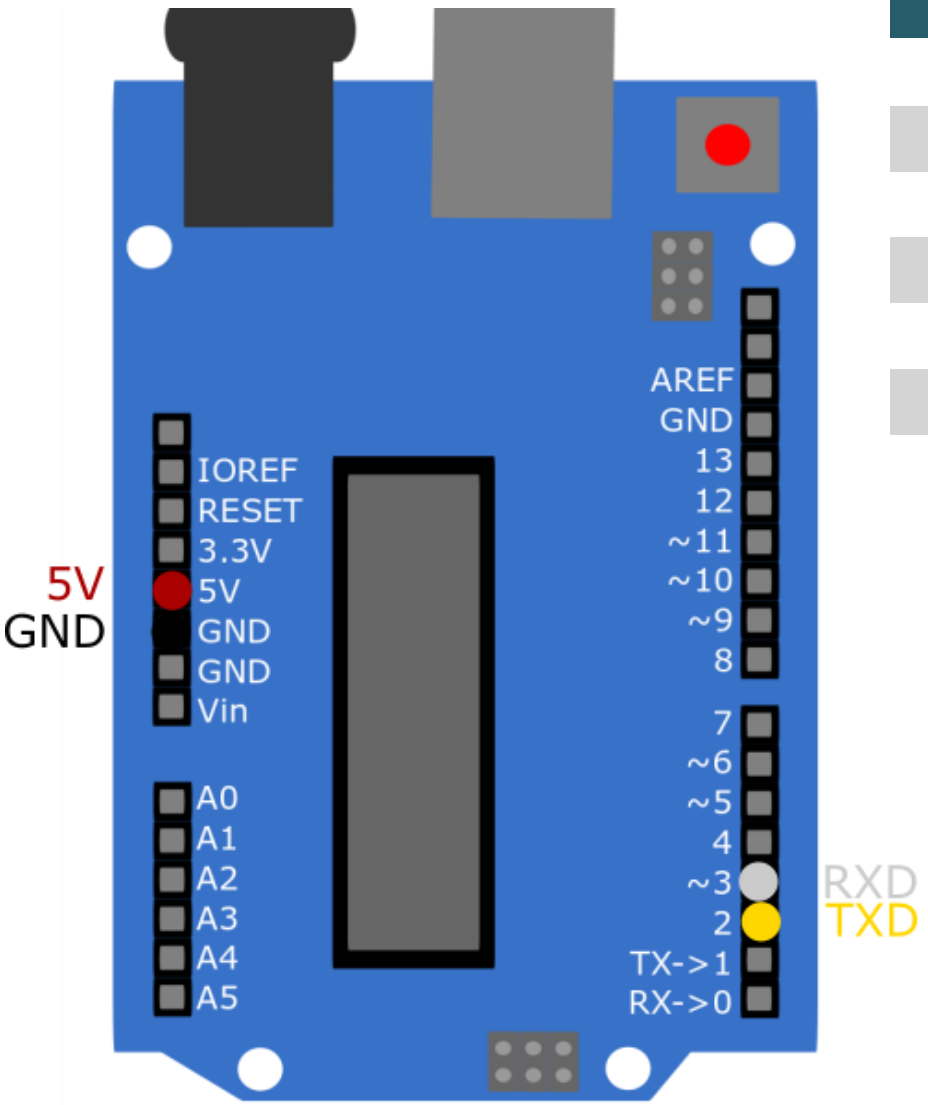
```
python3 /usr/share/doc/python3-fingerprint/examples/example_search.py
```

You can see how many fingerprints are currently stored by using the following command to see:

```
python3 /usr/share/doc/python3-fingerprint/examples/example_index.py
```

4. USAGE WITH ARDUINO

4.1 Connection



Fingerprint sensor	Arduino
5 V (Red)	5 V
GND (Black)	GND
TXD (Yellow)	Pin 2
RXD (White)	Pin 3
Touch (Green)	-
3,3 V (Blue)	-

The pin Touch is an output pin, which sends a signal, if a finger has been placed on the sensor. The sensor can be operated with the 3.3 V pin, but is then only able to detect whether a finger has been placed on it via the touch pin and cannot read the fingerprint.

4.2 Installation

We use the library **Adafruit-Fingerprint-Sensor-Library** from **Adafruit**, which is released under the *BSD License*. You can install the library in the Arduino IDE under ***Tools*** → ***Manage Libraries...*** .

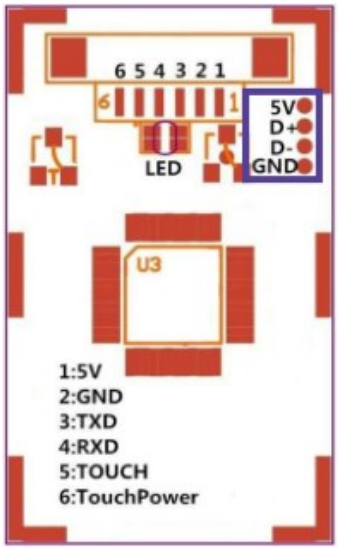
4.3 Usage with the library

You can run sample codes under ***File*** → ***Examples*** → ***Adafruit Fingerprint Sensor Library*** . You can use the *enroll* script to add fingerprints and *fingerprint* to compare a fingerprint to the stored data.
When executing this, make sure that you have selected the correct **Board** and **Port** in ***Tools***.

5. USB/UART KOMMUNIKATIONSPROTOKOLL

The communication protocol defines how the data is exchanged when the R301 series modules communicate with a control unit (Raspberry Pi, Arduino or a PC). The protocol and command sets apply to both UART and USB communication modes.
For use on a PC, the USB interface is highly recommended to increase the exchange speed, especially for fingerprint scanners. Therefore, we have collected all system instructions of the R301T for self-development below.

In the picture on the right you can see where the USB interface is located on the sensor.



5.1 Format of the data packets

During communication, the transmission and reception of commands/ data/results are wrapped in a data packet format.

Format of the data packet					
Header	Address	Package identifier	Package length	Contents of the package (Instructions/Data/Parameters)	Checksum

Definition of the data package			
Name	**Symbol**	**Length**	**Description**
Header	Start	2 Bytes	Has a fixed value of 0xEF01; high byte is transmitted first.
Address	ADDER	4 Bytes	Default value is 0xFFFFFFFF, which can be modified by command. High byte transferred first and at wrong address value, module will reject to transfer.
Package identifier	PID	1 Byte	01H Command package; 02H Data packet; The data packet must not appear alone in the execution, but must follow the command or acknowledgement packet. 07H Acknowledge package 08H End of the data package
Package length	LENGTH	2 Bytes	Refers to the length of the packet contents (command packets and data packets) plus the length of the checksum (2 bytes). Unit is bytes. The maximum length is 256 bytes. And the topmost byte is transmitted first.
Contents of the package	DATA	--	It can be commands, data, command parameters, acknowledgement results, etc. (the value of fingerprint characters and the template are also considered as data).
Checksum	SUM	2 Bytes	The arithmetic sum of the packet identifier, the packet length, and all packet contents. Overflowing bits are omitted. High byte is transmitted first.

5.2 Checking and confirming the data package

Note: Commands may only be sent to the module from a control unit (Raspberry Pi, Arduino or a PC) and the module must acknowledge the commands.
After receiving commands, the module sends the status of command execution and results to the control unit via an acknowledgement packet. The confirmation packet contains parameters and may also contain a subsequent data packet. The control unit can determine the reception status of the module or the results of command execution only through the acknowledgement packet sent by the module. The confirmation packet contains a 1-byte Confirmation code and possibly also the returned parameters.

The definition of the Confirmation code is :

00h: Command execution completed;
01h: error receiving data packets;
02h: no finger on the sensor;
03h: the finger cannot be read;
06h: character file creation fails because the fingerprint image is too disordered;
07h: Error in creating the character file due to a missing character point or too small size of the fingerprint image;
08h: Finger does not match;
09h: The matching finger was not found;
0Ah: The character files cannot be combined;
0Bh: PageID addressing is outside the finger library;
0Ch: Error reading template from library or template is invalid;
0Dh: Error uploading the template;
0Eh: The module cannot receive the following data packets;
0Fh: Error uploading the image;
10h: The template cannot be deleted;
13h: Wrong password;
15h: The image cannot be created because there is no valid primary image;
18h: Error while writing the flash;
19h: Missing definition;
1Ah: invalid register number;
1Bh: wrong configuration of the register;
1Ch: wrong page number in the notebook;
1Dh: communication port cannot be operated;
Other: system reserved;

5.3 Module command system

The R30X series provides 23 commands. By combining different commands, the application program can realize several finger authentication functions. All commands/data are transmitted in packet format. Detailed information on the packages can be found under 5.1.

5.4 System-related instructions

Password verification (VfyPwd)

Description: Checks the handshaking password of the module.
Input parameter: PassWord (4 bytes)
Return parameter: Confirmation code (1 byte)
Command code: 13H
Command (or instruction) packet format:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	4 Bytes	2 Bytes
Header	Module address	Package identifier	Package length	Command code	Password	Checksum
0xEF01	xxxx	01H	07H	13H	PassWord	Sum

Format of the confirmation package:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	2 Bytes
Header	Module address	Package identifier	Package length	Confirmati-on code	Checksum
0xEF01	xxxx	07H	03H	xxH	Sum

Note:
Confirmation code = 00H: Correct password;
Confirmation code = 01H: Error receiving the packet;
Confirmation code = 13H: Incorrect password;

Set password (SetPwd)

Description: set handshaking password for the module.
Input parameter: PassWord (4 bytes)
Return parameter: Confirmation code (1 byte)
Command code: 12H
Command (or instruction) packet format:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	4 Bytes	2 Bytes
Header	Module address	Package identifier	Package length	Command code	Password	Checksum
0xEF01	xxxx	01H	07H	12H	PassWord	Sum

Format of the confirmation packet:

2 Bytes	4 Bytes	2 Bytes	1 Byte	2 Bytes
Header	Module address	Package length	Confirmati-on code	Checksum
0xEF01	xxxx	03H	xxH	Sum

Note:
Confirmation code = 00H: Setting password completed;
Confirmation code = 01H: error receiving the packet;

Set module address (SetAdder)
Description: Set module address.
Input parameter: /
Return parameter: Confirmation code (1 byte)
Command code: 15H
Command (or instruction) packet format:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	4 Bytes	2 Bytes
Header	Module address	Package identifier	Package length	Command code	New module address	Checksum
0xEF01	xxxx	01H	07H	15H	xxxx	Sum

Format of the acknowledgement packet:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	2 Bytes
Header	Module address	Package identifier	Package length	Confirmati-on code	Checksum
0xEF01	xxxx	07H	07H	xxH	Sum

Note:
Confirmation code = 00H: Address setting completed;
Confirmation code = 01H: error receiving the packet;

Set the basic parameters of the module systems (SetSysPara).
Description: Settings of the operating parameters.
Input parameter: Parameter number (1 byte)
Return parameter: Confirmation code (1 byte)
Command code: 0eH
Command (or instruction) packet format:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	1 Byte	1 Byte	2 Bytes
Header	Module address	Package identifier	Package length	Command code	Parameter number	Content	Checksum
0xEF01	xxxx	01H	05H	0eH	4/5/6	xx	Sum

Format of the acknowledgement packet:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	2 Bytes
Header	Module address	Package identifier	Package length	Confirmati-on code	Checksum
0xEF01	xxxx	07H	03H	xxH	Sum

Note:
Confirmation code=00H: Parameter setting completed;
Confirmation code=01H: error in receiving the packet;
Confirmation code=1aH: wrong register number;

Port Control (Control)
Description:
For the UART protocol, it controls the "on/off" of the USB ports;
For USB protocol, it controls the "on/off" of the UART ports;
Input parameters: Control code (1 byte)
Control code "0" means that the port is turned off;
Control code "1" means that the port is turned on;
Return parameter: Confirmation code (1 byte)
Command code: 17H
Command (or instruction) packet format:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	1 Byte	2 Bytes
Header	Module address	Package identifier	Package length	Command code	Control code	Checksum
0xEF01	xxxx	01H	04H	17H	0/1	Sum

Format of the confirmation packet:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	2 Bytes
Header	Module address	Package identifier	Package length	Confirmation code	Checksum
0xEF01	xxxx	07H	03H	xxH	Sum

Note:
Confirmation code=00H: Port control completed;
Confirmation code=01H: Error receiving the packet;
Confirmation code=1dH: communication port operation not possible;

Read system parameters (ReadSysPara)
Description: Read the status register of the module and the basic config ration parameters of the system.
Input parameter: /
Return parameter: Confirmation code (1 byte) + Basic parameters (16 bytes).
Command code: 0fH
Command (or instruction) packet format:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	2 Bytes
Header	Module address	Package identifier	Package length	Command code	Checksum
0xEF01	xxxx	01H	03H	0fH	Sum

Format of the acknowledgement packet:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	16 Bytes	2 Bytes
Header	Module address	Package identifier	Package length	Confirmation code	Basic parameters list	Checksum
0xEF01	xxxx	07H	3 + 16	xxH	See the following table	Sum

Note:
Confirmation code=00H: Read completed;
Confirmation code=01H: Error receiving the packet;

Name	Description	Offset (Word)	Größe (Word)
Status register	Contents of the system status register	0	1
System identification code	Fixed value: 0x0009	1	1
Finger library size	Finger library size	2	1
Security level	Safety level (1, 2, 3, 4, 5)	3	1
Address of the device	32-bit device address	4	2
Data package size	Size code (0, 1, 2, 3)	6	1
Baud settings	N (Baud = 9600*N bps)	7	1

Read valid template number (TemplateNum)
Description: read the currently valid template number of the module read
Input parameter: /
Return parameter: Confirmation code (1 byte), Template number: N
Command code: 1dH
Command (or instruction) packet format:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	2 Bytes
Header	Module address	Package identifier	Package length	Command code	CheckSum
0xEF01	xxxx	01H	04H	1dH	0021H

Format of the acknowledgement packet:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	2 Bytes	2 Bytes
Header	Module address	Package identifier	Package length	Confirmati-on code	Vorlagen-nummer	CheckSum
0xEF01	xxxx	07H	5	xxH	N	Sum

Note:
Confirmation code=00H: Read completed;
Confirmation code=01H: Error receiving the packet;

5.5 Instructions for processing fingerprints

Capture the finger image (GenImg)

Description: Detect the finger and store the detected finger image in the ImageBuffer while returning a successful Confirmation code; if no finger is present, the returned Confirmation code is "can't detect finger".
Input parameter: /
Return parameter: Confirmation code (1 byte)
Command code: 01H
Command (or instruction) packet format:
Format of the confirmation packet:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	2 Bytes
Header	Module address	Package identifier	Package length	Command code	CheckSum
0xEF01	xxxx	01H	03H	01H	05H

Note:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	2 Bytes
Header	Module address	Package identifier	Package length	Confirmati-on code	CheckSum
0xEF01	xxxx	07H	03H	xxH	Sum

Confirmation code=00H: Finger scan successful;
Confirmation code=01H: Error receiving the packet;
Confirmation code=02H: Finger was not recognized;
Confirmation code=03H: Finger scanning not successful;

Upload image (UpImage)

Description: Upload an image from the Img_Buffer to the control unit.
Input parameter: /
Return parameter: Confirmation code (1 byte) + Basic parameters (16 bytes)
Command code: 0aH
Command (or instruction) packet format:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	2 Bytes
Header	Module address	Package identifier	Package length	Command code	CheckSum
0xEF01	xxxx	01H	03H	0aH	000eH

Format of the confirmation packet:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	2 Bytes
Header	Module address	Package identifier	Package length	Confirmati-on code	CheckSum
0xEF01	xxxx	07H	03H	xxH	Sum

Note 1:
Confirmation code=00H: ready to transmit the following data p
cket;
Confirmation code=01H: error receiving the packet;
Confirmation code=0fH: failed to transmit the following data packet;
Note 2:
The module must transmit the following data packet after responding to the control unit.

Download image (DownImage)
Description: Upload an image from the control unit to the Img_Buffer.
Input parameter: /
Return parameter: Confirmation code (1 byte)
Command code: 0bH
Command (or instruction) packet format:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	2 Bytes
Header	Chip Address	Package identifier	Package length	Command code	CheckSum
0xEF01	xxxx	01H	04H	0bH	000fH

Format of the confirmation packet:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	2 Bytes
Header	Chip Address	Package identifier	Package length	Confirmati-on code	CheckSum
0xEF01	xxxx	07H	03H	xxH	Sum

Note 1:
Confirmation code=00H: ready to transmit the following data packet;
Confirmation code=01H: error receiving the packet;
Confirmation code=0eH: failed to transmit the following data packet;
Note2:
The module must transmit the following data packet after responding to the control unit. The length of the data packets must be either 64, 128 or 256.

Create a character file from an image (Img2Tz)
Description: create a character file from the original finger image in ImageBuffer and save the file in CharBuffer1 or CharBuffer2.
Input parameters: BufferID (number of the character buffer) (1 byte).
Return parameter: Confirmation code (1 byte
Command code: 02H
Command (or instruction) packet format:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	1 Byte	2 Bytes
Header	Module address	Package identifier	Package length	Command code	Buffer number	CheckSum
0xEF01	xxxx	01H	04H	02H	BufferID	Sum

Format of the confirmation packet:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	2 Bytes
Header	Module address	Package identifier	Package length	Confirmati-on code	CheckSum
0xEF01	xxxx	07H	03H	xxH	Sum

Note:
Confirmation code=00H: character file generation completed;
Confirmation code=01H: Error receiving the packet;
Confirmation code=06H: character file generation failed because the fingerprint image is too disordered;
Confirmation code=07H: Error generating the character file due to a missing character dot or a fingerprint image that is too small;
Confirmation code=15H: The image cannot be created because there is no valid primary image;

Create a template (RegModel)
Description: Combine the information of character files from CharBuffer1 and CharBuffer2 and create a template that is written back to both CharBuffer1 and CharBuffer2.
Input parameter: /
Return parameter: Confirmation code (1 byte)
Command code: 05H
Command (or instruction) packet format:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	2 Bytes
Header	Module address	Package identifier	Package length	Command code	CheckSum
0xEF01	xxxx	01H	03H	05H	09H

Format of the confirmation packet:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	2 Bytes
Header	Module address	Package identifier	Package length	Confirmation code	CheckSum
0xEF01	xxxx	07H	03H	xxH	Sum

Note:
Confirmation code=00H: operation successful;
Confirmation code=01H: Error receiving the packet;
Confirmation code=0aH: The character files cannot be combined. That is, the character files do not belong to one finger.

Upload a character or template (UpChar).
Description: upload a character file or template from CharBuffer1/ CharBuffer2 to the control unit.
Input parameter: BufferID (Buffer number) (1 byte).
Return parameter: Confirmation code (1 byte)
Command code: 08H
Command (or instruction) packet format:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	1 Byte	2 Bytes
Header	Module address	Package identifier	Package length	Command code	Buffer number	CheckSum
0xEF01	xxxx	01H	04H	08H	BufferID	Sum

Note: BufferID of CharBuffer1 and CharBuffer2 are 1h and 2h, respectively. Other values (except 1h, 2h) would be processed as CharBuffer2.

Acknowledgement packet format:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	2 Bytes
Header	Module address	Package identifier	Package length	Confirmation code	CheckSum
0xEF01	xxxx	07H	03H	xxH	Sum

Note1:
Confirmation code=00H: ready for transmission of the following data packet;
Confirmation code=01H: error receiving the packet;
Confirmation code=0dH: error uploading the template;
Note 2: The module transmits the following data packets after respo ding to the control unit.
Note 3: The instruction does not affect the buffer content.

Store a template (Store)
Description: to store a template of the specified buffer (Buffer1/Buffer2) at the specified location of the Flash library.
Input parameters: BufferID (buffer number) (1 byte), PageID (flash location of the template, two bytes with high byte in front and low byte in back) (2 bytes).
Return parameter: Confirmation code (1 byte)
Command code: 06H
Command (or instruction) packet format:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	1 Byte	2 Bytes	2 Bytes
Header	Module address	Package identifier	Package length	Command code	Buffer number	Location number	CheckSum
0xEF01	xxxx	01H	06H	06H	BufferID	PageID	09H

Note: BufferID of CharBuffer1 and CharBuffer2 are 1h and 2h respectively. Other values (except 1h, 2h) would be processed as CharBuffer2.

Acknowledgement packet format:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	2 Bytes
Header	Module address	Package identifier	Package length	Confirmation code	CheckSum
0xEF01	xxxx	07H	03H	xxH	Sum

Note:
Confirmation code=00H: operation successful;
Confirmation code=01H: Error receiving the packet;
Confirmation code=0bH: Addressing PageID is outside the finger library;
Confirmation code=18H: error writing flash.

Read a template from the Flash library (LoadChar)
Description: load a template at the specified location (PageID) of the Flash library into the template buffer of CharBuffer1/CharBuffer2.
Input parameter: BufferID (buffer number) (1 byte), PageID (flash location of template, two bytes with high byte in front and low byte in back) (2 bytes).
Return parameter: Confirmation code (1 byte)
Command code: 07H
Command (or instruction) packet format:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	1 Byte	2 Bytes	2 Bytes
Header	Module address	Package identifier	Package length	Command code	Buffer number	Location number	CheckSum
0xEF01	xxxx	01H	06H	07H	BufferID	PageID	Sum

Note: BufferID of CharBuffer1 and CharBuffer2 are 1h and 2h, respectively. Other values (except 1h, 2h) would be processed as CharBuffer2.

Acknowledgement packet format:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	2 Bytes
Header	Module address	Package identifier	Package length	Confirmation code	CheckSum
0xEF01	xxxx	07H	03H	xxH	Sum

Note :
Confirmation code=00H: ready to transmit the following data packet;

Confirmation code=01H: Error while receiving the package;
Confirmation code=0cH: Error reading template from library or the read template is invalid;
Confirmation code=0BH: Addressing PageID is outside the finger library;

Delete a template (DeletChar)
Description: delete a segment (N) of Flash library templates started at the specified position (or PageID).
Input parameters: PageID (number of template in Flash), N (number of templates to delete);
Return parameter: Confirmation code (1 byte)
Command code: 0cH
Command (or instruction) packet format:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	2 Bytes	2 Byte	2 Bytes
Header	Module address	Package identifier	Package length	Command code	Location number	Number of templates to be deleted	CheckSum
0xEF01	xxxx	01H	07H	0cH	PageID	N	Sum

Format of the confirmation packet:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	2 Bytes
Header	Module address	Package identifier	Package length	Confirmati-on code	CheckSum
0xEF01	xxxx	07H	03H	xxH	Sum

Note :
Confirmation code=00H: Deletion successful;
Confirmation code=01H: error receiving the packet;
Confirmation code=10H: templates cannot be deleted;

Empty the finger library (Empty)
Description: To clear all templates in the Flash library.
Input parameter: /
Return parameter: Confirmation code (1 byte)
Command code: 0dH
Command (or instruction) packet format:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	2 Bytes
Header	Module address	Package identifier	Package length	Command code	CheckSum
0xEF01	xxxx	01H	03H	0dH	0011H

Format of the confirmation packet:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	2 Bytes
Header	Module address	Package identifier	Package length	Confirmati-on code	CheckSum
0xEF01	xxxx	07H	03H	xxH	Sum

Note :
Confirmation code=00H: Deletion successful;
Confirmation code=01H: Error receiving the packet;
Confirmation code=11H: finger library could not be deleted;

Perform precise matching of two finger templates (Match)
Description: Perform a precise matching of templates from CharBuffer1 and CharBuffer2 to provide corresponding results.
Input parameter: /
Return parameter: Confirmation code (1 byte), matching number (1 byte).
Command code: 03H
Command (or instruction) packet format:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	2 Bytes
Header	Module address	Package identifier	Package length	Command code	CheckSum
0xEF01	xxxx	01H	03H	03H	07H

Format of the confirmation packet:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	2 Bytes
Header	Module address	Package identifier	Package length	Confirmati-on code	CheckSum
0xEF01	xxxx	07H	05H	xxH	Sum

Note 1:
Confirmation code=00H: Operation successful;
Confirmation code=01H: Error receiving the packet;
Confirmation code=08H: The templates of the two buffers do not match;
Note 2: The instruction does not affect the contents of the buffers.

Searching the finger library (Search)
Description: Search the entire finger library for the template that matches the template in CharBuffer1 or CharBuffer2. If it is found, the PageID is returned.
Input parameter: BufferID (1 byte), StartPage (search start address) (2 bytes), PageNum (search numbers) (2 bytes);
Return parameters: Confirmation code (1 byte), PageID (matching template location) (2 bytes);
Command code: 04H
Command (or instruction) packet format:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	1 Byte	2 Bytes	2 Bytes	2 Bytes
Header	Module address	Package identifier	Package length	Command code	Buffer Zahl	Parame-ter	Parame-ter	CheckSum
0xEF01	xxxx	01H	08H	04H	BufferID	StartPage	PageNum	Sum

Note: BufferID of CharBuffer1 and CharBuffer2 are 1h and 2h, respectively. Other values (except 1h, 2h) would be processed as CharBuffer2.

Acknowledgement packet format:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	2 Bytes	2 Bytes	2 Bytes
Header	Module address	Package identifier	Package length	Confirmati-on code	Page	Number	CheckSum
0xEF01	xxxx	07H	7	xxH	PageID	MatchScore	Sum

Note :
Confirmation code=00H: found the matching finder;
Confirmation code=01H: error receiving the packet;
Confirmation code=09H: no match in the library (both the PageID and the match score are 0);

5.6 Other instructions

Generate a random code (GetRandomCode)

Description: command the module to generate a random number and return it to the control unit;
Input parameter: /
Return parameter: Confirmation code (1 byte)
Command code: 14H
Command (or instruction) packet format:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	2 Bytes
Header	Module address	Package identifier	Package length	Command code	CheckSum
0xEF01	xxxx	01H	03H	14H	18H

Format of the confirmation packet:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	4 Bytes	2 Bytes
Header	Module address	Package identifier	Package length	Confirmation code	Random number	CheckSum
0xEF01	xxxx	07H	07H	xxH	xxxx	Sum

Note:
Confirmation code=00H: Generation was successful;
Confirmation code=01H: Error receiving the packet;

Writing notes (WriteNotepad)

Description: Allows the control unit to write data to the specified flash page.
Input parameters: NotePageNum, user content (or data content) (32 bytes);
Return parameter: Confirmation code (1 byte);
Command code: 18H
Command (or instruction) packet format:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	1 Byte	32 Bytes	2 Bytes
Header	Module address	Package identifier	Package length	Command code	Page number	Data content	CheckSum
0xEF01	xxxx	01H	36	18H	0-15	Content	Sum

Confirmation packet format:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	2 Bytes
Header	Module address	Package identifier	Package length	Confirmation code	CheckSum
0xEF01	xxxx	07H	03H	xxH	Sum

Note :
Confirmation code=00H: Successful write;
Confirmation code=01H: Error receiving the packet;

Reading notes (ReadNotepad)
Description: Allows the control unit to read data from the specified Flash page.
Input parameter: /
Return parameter: Confirmation code (1 byte), data content (32 bytes).
Command code: 19H
Command (or instruction) packet format:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	1 Bytes	2 Bytes
Header	Module address	Package identifier	Package length	Command code	Page num-ber	CheckSum
0xEF01	xxxx	01H	04H	19H	0-15	18H

Format of the confirmation packet:

2 Bytes	4 Bytes	1 Byte	2 Bytes	1 Byte	32 Bytes	2 Bytes
Header	Module address	Package identifier	Package length	Confirmati-on code	User content	CheckSum
0xEF01	xxxx	07H	3+32	xxH	User content	Sum

Note:
Confirmation code=00H: Successful read;
Confirmation code=01H: Error receiving the packet;

5.7 Instruction table

Classified by functions

Type	Number	Code	Description
System-related	1	13H	Verify the password
	2	12H	Set password
	3	15H	Set system
	4	0EH	Setting the system parameters
	5	17H	Port control
	6	0FH	Reading the system parameters
	7	1DH	Read finger template numbers
Fingerprint processing	8	01H	Collect finger picture
	9	0AH	Upload image
	10	0BH	Download image
	11	02H	Generate characters from the image
	12	05H	Combine drawing files and creating templates.
	13	08H	Upload the template
	14	09H	Download template
	15	06H	Save the Template
	16	07H	Reading/loading templates
	17	0CH	Delete templates
	18	0DH	Empty library completely
	19	03H	Perform exact matching of two templates.
	20	04H	Browsing the finger library
Other	21	14H	Generate a random code
	22	18H	Write notes
	23	19H	Read notes

Classified according to Command code

Code	Identifier	Description
01H	GenImg	Capture the finger image
02H	Img2Tz	Creating a template file from an image
03H	Match	Perform precise matching of two finger templates
04H	Search	Browsing the finger library
05H	RegModel	Create a template
06H	Store	Saving a template
07H	LoadChar	Reading a template from the Flash library
08H	UpChar	Upload a character or template
09H	DownChar	Download template
0AH	UpImage	Upload image
0BH	DownImage	Download image
0CH	DeletChar	Delete a template
0DH	Empty	Emptying the finger library
0EH	SetSysPara	Set the basic parameters of the module systems
0FH	ReadSysPara	Read system parameters
12H	SetPwd	Set password
13H	VfyPwd	Password verification
14H	GetRandomCode	Generate a random code
15H	SetAdder	Set module address
17H	Control	Port control
18H	WriteNotepad	Note writing
19H	ReadNotepad	Reading notes
1BH	HiSpeedSearch	Quickly browse the library
1DH	TempletNum	Reading the finger template numbers

6. OTHER INFORMATION

Our information and redemption obligation according to the Electrical and Electronic Equipment Act (ElektroG)

Symbol on electrial and electronic products :
This crossed-out bin means that electrical and electronic products do not belong into the household waste. You must hand over your old appliance to a registration office. Before you can hand over the old appliance, you must remove used batteries and accumulators which are not enclosed by the device.

Return options :
As the end user, you can hand over with the purchase of a new device y-our old appliance (which has essentially the same functions as the new one) free of charge for disposal. Small devices which do not have outer dimensions greater than 25 cm can be submitted independently of the purchase of a new product in normal household quantities.

Possibility of restitution at our company location during our opening hours:
Simac GmbH, Pascalstr. 8, D-47506 Neukirchen-Vluyn

Possibility of restitution nearby :
We send you a parcel stamp with which you can send us your old appli-ance free of charge. For this possibility, you must contact us via e-mail at service@joy-it.net or via telephone.

Information about packaging:
Please package your old appliance safe during transport. Should you not have a suitable packaging material or you do not want to use your own material, you can contact us and we will send you an appropriate packa-ge.

7. SUPPORT

If any questions remain open or problems arise after your purchase, we are available by email, telephone and ticket support system to answer these.

E-Mail: service@joy-it.net
Ticket-System: http://support.joy-it.net
Telephone: +49 (0)2845 98469 – 66 (10 - 17 o‘clock)

For more information visit our website:
www.joy-it.net

Published: 14.04.2022