

UniFinger SFM3520-OP

Datasheet

Ver. 1.0



Revision History

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Overview

The UniFinger modules are stand-alone fingerprint systems ideal for embedded system applications where biometric security is needed. The modules are designed for manufacturers searching for an inexpensive, reliable and easy-to-integrate biometric system. The UniFinger modules provide complete fingerprint solutions by incorporating fingerprint sensor interface and embedded fingerprint recognition algorithm into a half business card sized module.

The UniFinger SFM3500 series is the latest UniFinger module equipped with world's leading fingerprint authentication algorithm (ranked No. 1 in FVC2004) and powerful DSP technology. Also, it supports wide range of fingerprint sensor interoperability giving you a freedom to select suitable sensor that most fits to your application. Furthermore, the fingerprint data for enrollment and verification are compatible among different sensors, even if they are based on different technologies. This feature of unification presents application manufacturers and system integrators with much more flexibility than ever before.

In addition to these features, the miniature sized UniFinger module has a state-of-the-art low power design making it a perfect match in a wide range of applications from battery operated mobile equipments to network based security systems. The UniFinger stands ready to meet your requirements and adapt to your applications.

1. UniFinger SFM3500 Series

The UniFinger SFM3500 series is the latest UniFinger module equipped with world's leading fingerprint authentication algorithm, which ranked No. 1 in FVC2004. The SFM3500 series is based on powerful DSP technology, optimized for performance while minimizing power consumptions.

Table 1 summarizes available combinations of modules and sensors.

Table 1 UniFinger SFM3500 Series combinations

| Model name | Supported sensors | Main board |
|-------------------|--------------------------|-------------------|
| SFM3500-FL | Authentec AF-S2 | SFM3500 |
| SFM3500-PR | BMF BLP-100 | |
| SFM3550-TC | UPEK TouchChip | SFM3550 |
| SFM3510-FC | Atmel Fingerchip | SFM3510 |
| SFM3520-OP | Optical sensor I | SFM3520 |

2. Features

- **World best authentication performance (ranked No. 1 in FVC2004)**
- High speed fingerprint verification
- Compact size
- Low power consumption
- Fast power on time
- Supports various communication interfaces
- Supports fingerprint data encryption
- Supports various fingerprint sensors
- Highly configurable I/O signals
- Operates with a single 5.0v dc supply

3. Fingerprint Authentication Specifications

3.1. Fingerprint Authentication Performance

| | |
|-------------------|--------|
| EER* | <0.1% |
| Enrollment time | <1 sec |
| Verification time | <1 sec |

*EER is dependent on databases

3.2. Fingerprint Sensor Specifications

| | |
|--------------------|------------------|
| Device Name | Optical sensor I |
| Sensor technology | Optical |
| Sensing area | 16.0mm x 19.0mm |
| Image size(pixels) | 272x320 |
| Image resolution | 500 dpi |

3.3. Data storage

| | |
|-------------------|------------------------------------|
| Template capacity | 9,000 at 4M Flash (19,000 at 8M) |
| LOG capacity | 12,800 event |
| User memory | 256 Bytes |

4. Hardware Specifications

4.1. Operating range

| Parameter | Symbol | Min | Typ | Max | Units |
|-----------------------|-----------------|-----|-----|-----|-------|
| Supply voltage | V _{DD} | 4.5 | 5.0 | 5.5 | V |
| Operating temperature | T _{OP} | 0 | | 70 | °C |

4.2. Absolute Maximum Ratings

| Parameter | Symbol | Min. | Max. | Units |
|------------------------------|-----------------|------|------|-------|
| Power supply voltage | V _{DD} | -0.3 | 6 | V |
| Input voltage on signal pins | V _{IN} | -0.3 | 6 | V |

4.3. Electrical DC characteristics(V_{DD} = 5.0Vdc, T_{OP} = 25°C)

| Parameter | Symbol | Min. | Typ. | Max. | Units |
|------------------------------|------------------|------|------|------|-------|
| Supply current (idle) | I _{DD1} | | 120 | | mA |
| Supply current (scanning) | I _{DD2} | | 130 | | mA |
| Supply current (identifying) | I _{DD3} | | 150 | 170 | mA |
| High level input voltage | V _{IH} | 2.0 | | 5.5 | V |
| Low level input voltage | V _{IL} | -0.3 | | 0.6 | V |

4.4. Interface

| Type | Description |
|--------------------|---|
| Host communication | RS-232C or RS422/485 level Baud rates up to 115.2kbps (factory default: 115.2kbps) |
| Aux communication | RS-232C or CMOS level Baud rates up to 115.2kbps (factory default: 115.2kbps) |
| Digital I/O | CMOS(0~5V) level 3 CMOS input, 3 CMOS output pins |
| LED driver | 3 LED drivers. Common anode. Active low outputs. |
| Wiegand | CMOS(0~5V) level Input and output ports supported |

4.5. Connector Specifications

| Connector | Usage |
|-----------|---|
| J1 | LED output port |
| J2 | Digital I/O port. CMOS(0~5V), 3 Inputs, 2 Outputs |
| J3 | Wiegand I/O port. |
| J4 | Aux interface port |
| J5 | Host interface port |
| J6 | Battery connector for time keeping |
| J7 | Internal use only |
| J8 | Sensor interface port |

1. Connectors J1 ~ J6 are Molex 53261-8090 compatible board-to-wire

connectors.

2. Power can be supplied by one of J2, J3, J4 or J5 connectors.

4.5.1. LED port(J1) pin assignment

| Name | pin # | Type | Functions |
|------|-------|--------|---|
| GND | 1 | Power | Power Ground |
| LED0 | 2 | Output | Active low, Current sink up to 20mA Current limit resistors integrated (220 Ohm) |
| LED1 | 3 | Output | |
| LED2 | 4 | Output | |
| VCC | 5 | Power | Power Supply for LEDs. 5Vdc |

4.5.2. Digital I/O port (J2) pin assignment

| Name | pin # | Type | Functions |
|------|-------|--------|---|
| GND | 1 | Power | Power Ground |
| IN0 | 2 | Input | CMOS(0~5V), Active high input Internally pulled down with 47kOhm resistors |
| IN1 | 3 | Input | |
| IN2 | 4 | Input | |
| VCC | 5 | Power | Power Supply. 5Vdc |
| OUT0 | 6 | Output | CMOS(0~5V), Active high output |
| OUT1 | 7 | Output | |
| OUT2 | 8 | Output | |
| GND | 9 | Power | Power Ground |

4.5.3. Wiegand I/O port (J3) pin assignment

| Name | pin # | Type | Functions |
|-------|-------|------------|-------------------------|
| GND | 1 | Power | Power Ground |
| WIN0 | 2 | TTL input | Wiegand input, DATA0 |
| WIN1 | 3 | TTL input | Wiegand input, DATA1 |
| NC | 4 | No connect | Reserved for future use |
| VCC | 5 | Power | Power Supply. 5Vdc |
| WOUT0 | 6 | TTL output | Wiegand output, DATA0 |
| WOUT1 | 7 | TTL output | Wiegand output, DATA1 |
| NC | 8 | No connect | Reserved for future use |
| GND | 9 | Power | Power Ground |

4.5.4. Aux interface port (J4) pin assignment

| Name | pin # | Type | Functions |
|------|-------|--------|------------------------|
| GND | 1 | Power | Power Ground |
| TX3 | 2 | RS232C | Aux port transmit data |
| RX3 | 3 | RS232C | Aux port receive data |
| VCC | 4 | Power | Power Supply. 5Vdc |
| TX4C | 5 | CMOS | Aux port transmit data |
| RX4C | 6 | CMOS | Aux port receive data |
| GND | 7 | Power | Power Ground |

4.5.5. Host interface port (J5) pin assignment

| Name | pin # | Type | Functions |
|------|-------|-----------|---------------------------------------|
| GND | 1 | Power | Power Ground |
| TX1 | 2 | RS232C | Host port transmit data |
| RX1 | 3 | RS232C | Host port receive data |
| TX2P | 4 | RS422/485 | Host port non inverting transmit data |
| VCC | 5 | Power | Power Supply. 5Vdc |
| RX2P | 6 | RS422/485 | Host port non inverting receive data |
| TX2N | 7 | RS422/485 | Host port inverting transmit data |
| RX2N | 8 | RS422/485 | Host port inverting receive data |
| GND | 9 | Power | Power Ground |

4.5.6. Battery connector (J6) pin assignment

| Name | pin # | Type | Functions |
|-------|-------|-------|--------------------------|
| GND | 1 | Power | Power Ground |
| VBATT | 2 | Power | RTC power supply. 3~3.6V |
| GND | 3 | Power | Power Ground |

4.6. Physical Dimensions

| Parameter | Values |
|------------|------------------------------|
| Main board | 63mm x 43mm x 10mm (LxWxH) |
| Sensor | 25mm x 20.5mm x 52mm (LxWxH) |

Figure 1 Main board dimensions

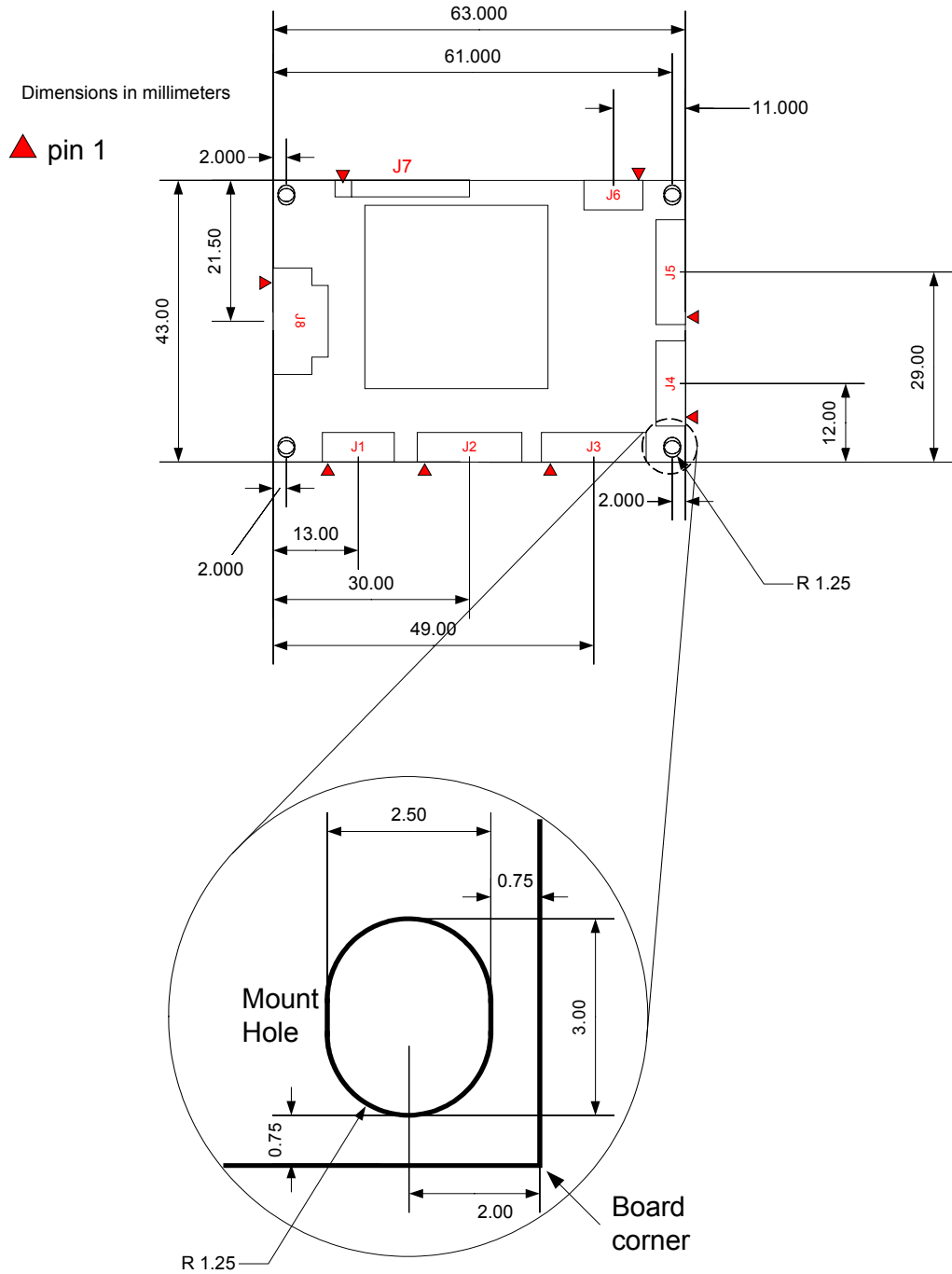
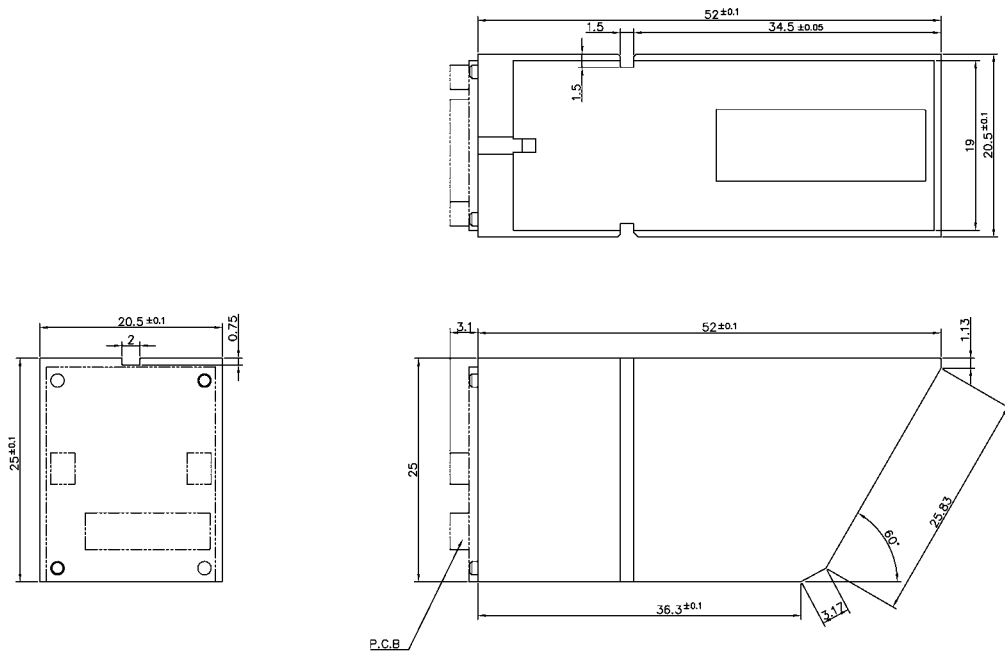


Figure 2 **Sensor dimensions**

Dimensions in millimeters

5. Communication Protocol Summary

The UniFinger provides a proprietary communication protocol for easy interface with most host systems. The protocol based on fixed sized packets. Only fingerprint image, template data, and user lists are transmitted as appended to the packet. Checksum functionality is supported to ensure consistency of transmitted data.

Please refer to *UniFinger Protocol Manual* for detailed information.

5.1. Packet Structure

| Start code | Command | Param | Size | Flag | Checksum | End code |
|------------|---------|--------|--------|-------|----------|----------|
| 1byte | 1byte | 4bytes | 4bytes | 1byte | 1byte | 1byte |

5.2. Command Summary

| Command | Code | Description |
|---------|------|------------------------------------|
| SW | 0x01 | Write system parameter |
| SF | 0x02 | Save system parameter |
| SR | 0x03 | Read system parameter |
| CS | 0x1A | Calibrate sensor |
| SS | 0x04 | Check system status |
| CA | 0x60 | Cancel |
| ES | 0x05 | Enroll by scan |
| ESA | 0x70 | ES with administrator verification |
| EI | 0x06 | Enroll by image |
| EIX | 0x80 | EI through data transfer protocol |
| ET | 0x07 | Enroll by template |
| EW | 0x1C | Enroll by Wiegand ID |
| EWA | 0x71 | EW with administrator verification |
| VS | 0x08 | Verify by scan |
| VI | 0x09 | Verify by image |
| VIX | 0x82 | VI through data transfer protocol |
| VT | 0x10 | Verify by template |
| VW | 0x1D | Verify by Wiegand ID |

| | | |
|-----|------|------------------------------------|
| VH | 0x22 | Verify host template by scan |
| IS | 0x11 | Identify by scan |
| II | 0x12 | Identify by image |
| IIX | 0x81 | II through data transfer protocol |
| IT | 0x13 | Identify by template |
| DA | 0x17 | Delete all templates |
| DAA | 0x74 | DA with administrator verification |
| DT | 0x16 | Delete template |
| DS | 0x1E | Delete by scan |
| DSA | 0x72 | DS with administrator verification |
| DW | 0x1F | Delete by Wiegand ID |
| DWA | 0x73 | DW with administrator verification |
| LT | 0x18 | List user ID |
| CT | 0x19 | Check user ID |
| FP | 0x23 | Fix all provisional templates |
| DP | 0x24 | Delete all provisional templates |
| RI | 0x20 | Read image |
| RIX | 0x84 | RI through data transfer protocol |
| SI | 0x15 | Scan image |
| SIX | 0x83 | SI through data transfer protocol |
| RT | 0x14 | Read template |
| ST | 0x21 | Scan template |
| KS | 0x35 | Scan template with challenge data |
| KW | 0x34 | Write encryption key |
| ML | 0x31 | Get size of user memory |
| MW | 0x32 | Write to user memory |
| MR | 0x33 | Read from user memory |
| TW | 0x3A | Write current time |
| TR | 0x3B | Read current time |
| LN | 0x3C | Get number of log data |
| LR | 0x3D | Read log data |
| LD | 0x3E | Delete log data |
| WW | 0x41 | Write Wiegand configuration |

| | | |
|----|------|----------------------------------|
| WR | 0x42 | Read Wiegand configuration |
| WG | 0x43 | Get Wiegand input |
| WS | 0x44 | Set Wiegand output |
| WM | 0x68 | Map Wiegand id to input function |
| WL | 0x69 | List Wiegand id mapping |
| WC | 0x6A | Clear Wiegand id mapping |
| IW | 0x47 | Write input configuration |
| IR | 0x48 | Read input configuration |
| IG | 0x49 | Get input state |
| OW | 0x4A | Write output configuration |
| OR | 0x4B | Read output configuration |
| OL | 0x4C | Read output configuration list |
| OS | 0x4D | Set output state |
| GW | 0x37 | Write GPIO configuration |
| GR | 0x36 | Read GPIO configuration |
| GC | 0x38 | Clear GPIO configuration |
| GD | 0x39 | Set default GPIO configuration |
| AW | 0x65 | Write administration level |
| AR | 0x66 | Read administration level |
| AC | 0x67 | Clear administration level |

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