# Product Features (Fingerprint scanner module: SAP3523)

## Main Specifications

- Module dimension ：35 x 23mm$^2$ with Oval-shaped sensor
- Pixel Array ：192 x 192
- Sensing Area ：9.6 x 9.6 mm$^2$
- Resolution ：508DPI
- Gray Levels ：8 bits
- Enroll times: 1 times or 3 times
- Fingerprint database storage :3000 sets
- Module Interface ：UART / USB
- Supply current @ voltage ：TBD @ 3.3V
- Low Power Design with Metal Ring ( Decorative )
- Finger Press Direction ：360 degrees arbitrary
- Sapphire Glass support to 9H hardness
- Anti-interference ：ESD protection circuit, Reset circuit, anti-noise circuit, etc.
- ESD performance ：+- 15KV Air / +-8KV Contact discharge
- Waterproof performance ：IP67
- Module interface connector ：Refer to the connector shape specification

## Application

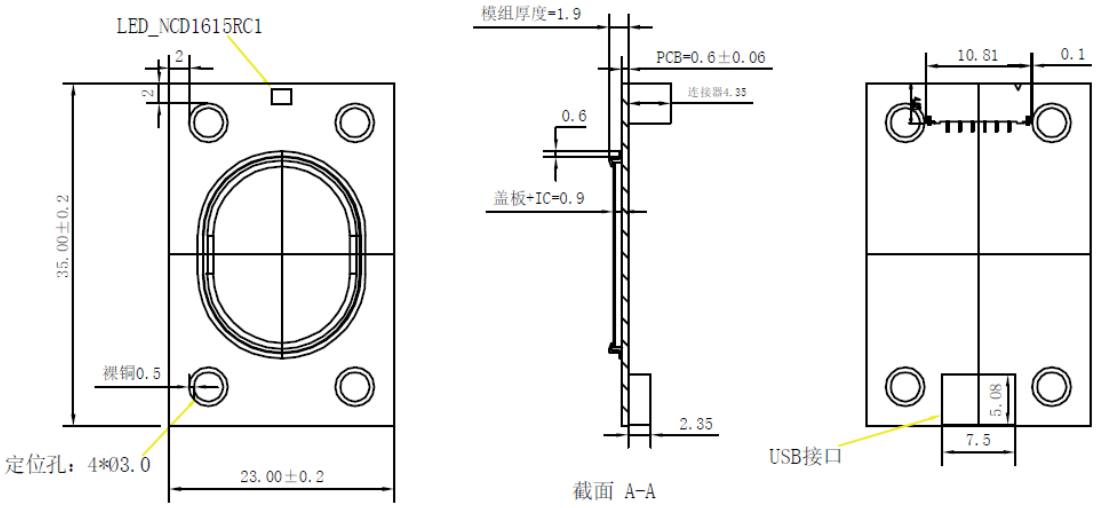
- Industry Fingerprint Applications
- Smart Password Lock devices
- Other Devices
- Time attendance

## Overview

- This module is a capacitive touch fingerprint recognition module with a Sapphire glass surface, offering outstanding features such as anti-static, wear resistance, and corrosion resistance.
- It is combined with an exceptional fingerprint recognition algorithm and mature application software to deliver an excellent user experience in fingerprint industry applications

# 1、Module package specification

## 1.1 Module architecture:




## 1.2 Pin Descriptions( UART / USB )

| Pin No. | Pin Name | Type | Function Description |
|---|---|---|---|
| 1 | GND | Ground | Module Ground |
| 2 | UART-RXD | Input | Serial port reception pin |
| 3 | UART-TXD | Output | Serial port transmission pin |
| 4 | 3V3MCU | Power | Power for MCU |
| 5 | INT-OUT | Output | Serial port transmission pin |
| 6 | 3V3SENSOR | Power | Power for sensor |

Table 1-1.UART Pin descriptions

| Pin No. | Pin Name | Type | Function Description |
|---|---|---|---|
| 1 | GND | Ground | Module Ground |
| 2 | NC | - | - |
| 3 | DP | - | USB signal |
| 4 | DN | | USB signal |
| 5 | 5V | Power | Power |

Table 1-2. USB Pin descriptions

Power Saving Instructions ：TBD

# 2. Related Characteristics

## 2.1 Module Operating Conditions

| Condition | | Mini value | Typical value | Max value |
|---|---|---|---|---|
| Operating Voltage | 3V3MCU /3V3SENSOR | 2.8V | 3.3V | 3.6V |
| Temperature | Operating Temp | -40℃ | - | 85℃ |
| | Storage Temp | -40℃ | - | 85℃ |

Table 2-1. Module Operating Conditions

## 2.2 Module DC Characteristics

| 3V3MCU / 3V3SENSOR | | Mini value | Typical value | Max value |
|---|---|---|---|---|
| Operating Current | Working mode | -- | TBD mA | TBD mA |
| | Detection Mode (5Hz) | TBD uA | TBD uA | TBD uA |
| | Idle Mode | -- | TBD uA | -- |

| Item | Symbol | Test Condition | Mini value | Typical | Max value | Unit |
|---|---|---|---|---|---|---|
| Input high-level voltage | VIH | | 0.9VDDIO | - | - | V |
| Input low-level voltage | VIL | | - | - | 0.3 | V |
| Output high-level voltage | VOH | | 0.9VDDIO | - | - | V |
| Output low-level voltage | VOL | | - | - | 0.3 | V |

Table 2-2. Module DC Characteristics (AVDD = 3.3V)

## 2.3 Module Waterproof Performance

| Test Item | Test Conditions | Test Qty | Test Result |
|---|---|---|---|

| | | | |
|---|---|---|---|
| **IP67** | Put the sample into the water tank with the sample immersed in the ink. 1.2M / 1 hour. | 5 | TBD |

## 2.4 Module Electrostatic Performance

| Test Item | Test Conditions | Test Qty | Test Result |
|---|---|---|---|
| ESD- Air discharge | ±15kV | 5 | PASS |
| ESD- Contact discharge | ±8kV | 5 | PASS |

## 2.5 Algorithm Performance

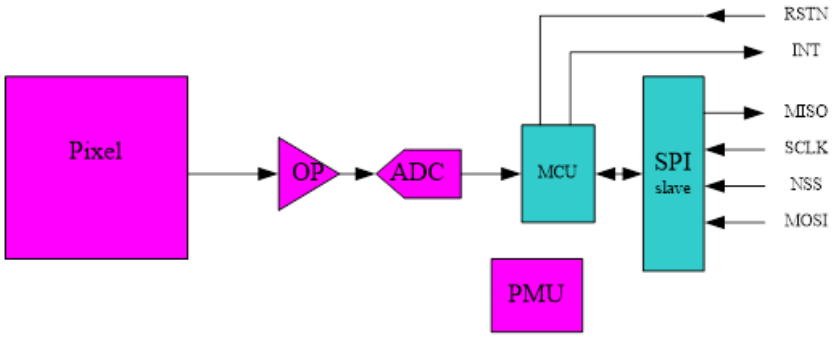
1、Fingerprint Recognition time：<=1.5 seconds

2、Biometric False Acceptance Rate ( FAR ) TBD %，False Rejection Rate ( FRR ) TBD %

3、Fingerprint Storage Capacity　3000 / 5000 fingerprints.

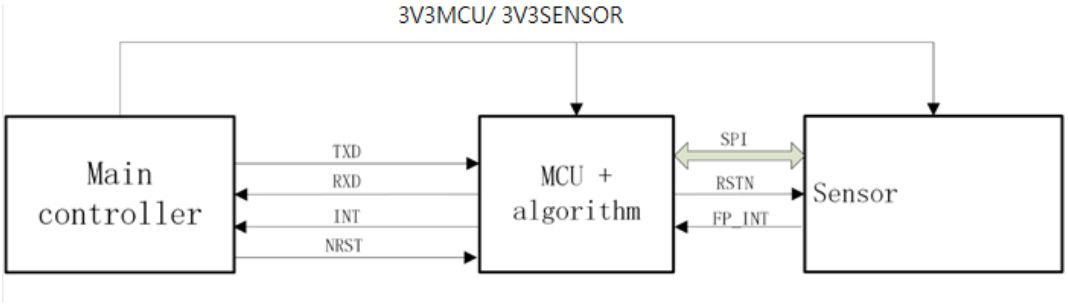
# 3.Operating Principles

## 3.1 Module Sensor Principle Block Diagram




Illustrated in Figure 3-1 The operating principle block diagram of the module

## 3.2Module block diagram




This module is a highly integrated fingerprint image acquisition module, mainly composed of the fingerprint sensor with algorithm chip, inside excellent fingerprint algorithm. Brief description is as follows:

1)Sensor chip : 192x192 pixel array，capable of capturing fingerprint image data from the corresponding area when a finger is touched.

2)Interface : Uart interface, MCU and INT to main controller

3)Algorithm MCU : Contains excellent fingerprint algorithm for system flow control, image digital signal processing. etc.

## 3.3 Serial protocol

Adjustable serial communication protocol