# NITGEN® FIM5360

Stand-Alone Fingerprint Identification Device with Built-in CPU

# Datasheet

Supported Firmware Version: 1.11 or above

Version 1.04

**Revision History**

| Date of Revision | Version | Description |
|---|---|---|
| 2010.11 | | release |
| 2011.01 | 1.01 | 'GPIO function' is added<br>'SI_MAX_TEMPLATE' is added<br>'Recommended circuit to use GPIOs' is added<br>'Naming Rule' is added<br>'Support Information' is renewed<br>'Block Diagram' is renewed |
| 2011.02 | 1.02 | Current Consumption specification is renewed |
| 2011.03 | 1.03 | IO function is renewed |
| 2011.04 | 1.04 | Latent Option is added |
| | | |
| | | |
| | | |

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# 1. General Descriptions

Biometric systems are recently used in various authentication systems. They are increasingly used not only in environments that require high level of security but also in many other places because they are convenient and economical. Among various biometric systems, the fingerprint recognition system takes up most of the market because it is easy to use as well as economical and capable of developing various types of applications. NITGEN, a global leader in the fingerprint recognition industry, provides various fingerprint authentication solutions such as PC security, knowledge management, vaulting service, access control, electronic approval, and financial payment. NITGEN actively responds to customer needs through continuous research, development and quality management.

FIM5360 is a stand-alone Fingerprint Identification Device with many excellent features. It provides benefits such as high identification performance, low power consumption and UART serial interfaces with the various commands for easy integration into a wide range of applications. It is a durable and compact device with fingerprint identification module containing NITGEN® optics-based fingerprint sensor inside.

- 1 ID multi-Templates mode
- Up to 2,000 Templates
- More than 30,000 logs
- Using New sensor OPP06
- Changeable user's verification security level
- Selectable UART communication Level (RS232 or LVCMOS)
- Selectable rotation angle range (+/- 45 ° or +/- 180 °)
- Support Auto-Identify mode

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- Support ISO197974-2 and ANSI 378 format
- Support Device Master password
- Provide custom data area
- Compatible template format with NITGEN eNBio API
- Support GPIO control

## 2. Target Application

Access Controller
Time and attendance management
Security application
Safety Box
ATM, POS and more

# 3. Specification

## 3.1. Basic Feature

**Hardware Specification**

| ITEM | | FIM5360 |
|---|---|---|
| Board Spec. | CPU | S3C2410 (ARM9 266Mhz) |
| | DRAM | 16MByte SDRAM |
| | Flash ROM | 8MByte |
| Dimension | | 43 x 60 [mm$^2$] |
| Sensor | | NITGEN OPP06 |
| Supply Voltage | | 5 / 3.3 [V] |
| Current Consumption | Normal | 70 [mA] |
| | Max | 220 [mA] |
| Operating Temperature | | -20 ~ 60 [℃] |
| Humidity | | ~ 90 [% RH] |
| ESD Tolerance | | ±8 [KV] (indirect) |
| Communication Channel | | RS-232 level UART Speed: 9600 ~ 115200 [bps] (1 start bit, 8 data bit, no parity, 1 stop bit) |
| Maximum Template Storage | | Up to 2,000 templates |
| Maximum Log Storage | | Up to 30,705 Logs |

**Operation Specification**

| ITEM | FIM5360 |
|---|---|
| Capture Speed | 0.2 [sec] |
| Verification Speed | Less than 1 [sec] |
| Boot Up Time | 0.4 [sec] for 100 templates<br>0.5 [sec] for 1,000 templates<br>0.7 [sec] for 2,000 templates |
| Data Encryption Method | AES for saving data<br>AES for DB communication |

Boot-up time is explained in Appendix.

## 3.2. Sensor Feature

**OPP-06**

| Sensor Name | OPP-06 |
|---|---|
| Sensing Type | Optical |
| Sensing Area | 15.0mm x 18.5mm |
| Image Resolution | 500 DPI |
| Image Size | 260 x 300 |

## 3.3. Interface Feature

**Interface**

| RS232 Level UART | RS-232C<br>Up to 115200bps Baud Rates supported<br>(Default : 9600bps) |
|---|---|
| I/O | Sensor LED control, 2 relay output |

# 4. Block Diagram
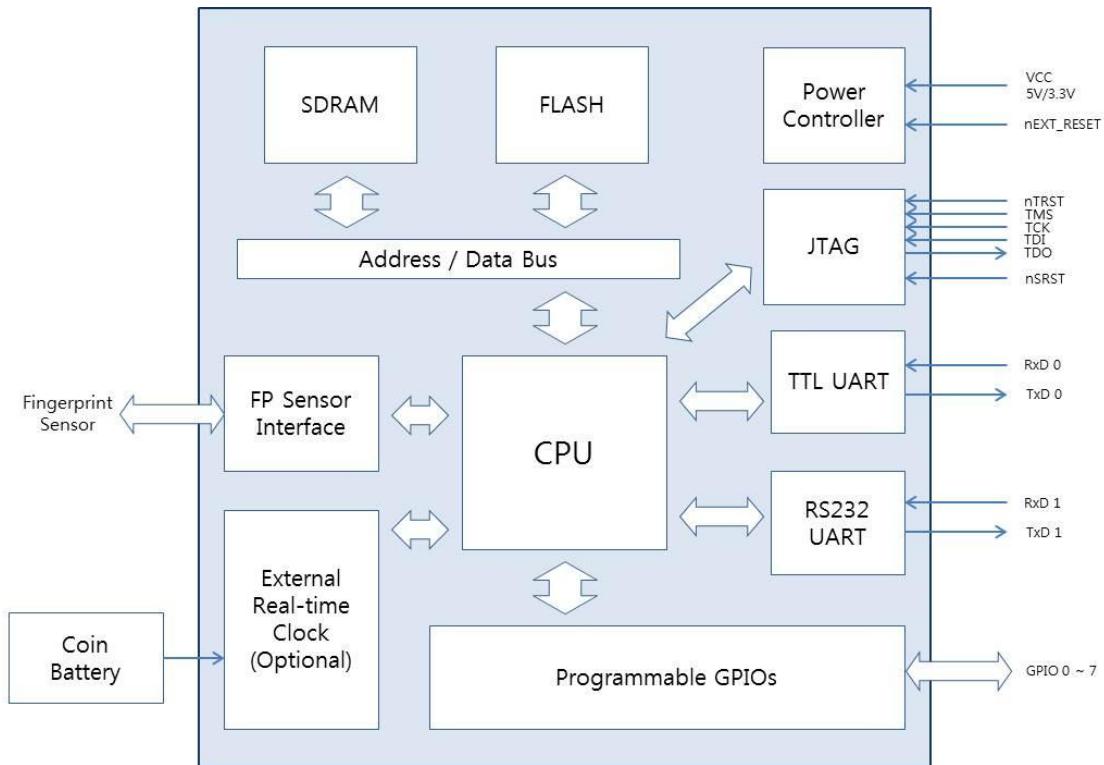


RS-232C communication data consist of 8-bit data, no parity, 1-bit start-bit and 1-bit stop-bit.

# 5. Operation

### *Reset*

FIM5360 provides external low-active reset signal port. By setting the reset port low state, FIM5360 could be initialized. The reset port is internally pull-uped to VCC.

### *Communication*

FIM5360 has RS232C UART serial communication port. This port support 6 baudrate modes such as 9600, 14400, 19200, 38400, 57600, and 115200 bps.

FIM5360 follows NITGEN Serial Communication protocol. For more detail information refer to the document "FIM ComProtocol.pdf".

UART data consists of 1 start bit, 8 data bit, no parity bit and 1 stop bit.

### *Custom Data Area*

FIM5360 provides 64 Kbytes flash memory. Using this memory, host can save private data for specific usage. The caution is needed for the responsibility for reading, writing and erasing because user data area is given to the host.

### *IO Function*

IO configuration depends on emulation mode

| Emulation mode | Description | Configurable |
|---|---|---|
| OFF | 5 Programmable GPIOs | Yes |
| FIM20 mode | GPIO0, 1 are only available as Relay Output | No |
| FIM30 mode (default) | 2 Result Outputs + 3 Key functions | No |

Default emulation mode is FIM30 emulation mode.

IO functionality of FIM30 mode

| IO | Description |
|---|---|
| GPIO0 | Output high when authentication, registration and deletion are succeeded. |
| GPIO1 | Output high when authentication, registration and deletion are failed. |
| GPIO2 | Do registration when the port level goes from high to low. |
| GPIO3 | Do deletion when the port level goes from high to low. |
| GPIO4 | Do identification when the port level goes from high to low. |

Please refer Appendix F of ComProtocol document to get more information about Programmable GPIOs.

### *Board configuration option*

The following table shows board configuration system option. Using NITGEN Serial Communication protocol, these option values can be changed.

| Code | System Information | Value Range | Default Value | |
|---|---|---|---|---|
| **0x02** | SI_USING_LOG | True/False | False | |
| **0x17** | SI_IDENTIFY_TIMEOUT | 255 or 10~250 | 30 | 100ms tick |
| **0x18** | SI_RELAY_TIME | 0 or 1~100 | 10 | 100ms ticks |
| **0x19** | SI_CAPTURE_TIMEOUT | More than 10 | 50 | 100ms ticks |
| **0x20** | SI_IMAGE_BRIGHTNESS | 0~100 | 45 | 100 - brightest |
| **0x21** | SI_IMAGE_GAIN | 1,2,4,8 | 2 | |
| **0x22** | SI_IMAGE_CONTRAST | 0~100 | 20 | |
| **0x28** | SI_ADAPTIVE_CAPTURE | True/False | False | |
| **0x30** | SI_VERIFY_SECURITY_LEVEL | 1~9 | 5 | |
| **0x31** | SI_IDENTIFY_SECURITY_LEVEL | 6~9 | 8 | |

| 0x32 | SI_REGISTER_QUALITY | 30~100 | 40 | |
|------|---------------------|--------|-----|-----|
| 0x33 | SI_VERIFY_QUALITY | 10~100 | 30 | |
| 0x38 | SI_USING_LATENT | True/False | False | |
| 0x49 | SI_CHANNEL1_BAUDRATE | 0 – 115200<br>1 – 57600<br>2 – 38400<br>3 – 19200<br>4 – 9600 | 4 | |
| 0x4A | SI_CURR_CHANNEL_BAUDRATE | | | |
| 0x50 | SI_MAX_USER | | | |
| 0x51 | SI_FP_FULL_ROTATION | True/False | False | |
| 0x52 | SI_LENGTH_OF_USER_ID | 4~15 | 10 | |
| 0x53 | SI_NUM_OF_ADAPTIVA_CAP | 1~10 | 5 | |
| 0x54 | SI_MAX_TEMPLATE | | | Read Only |

1) True means '1' and False means '0'.

2) Default value of Relay is a False.

# 6. Technical Data

## 6.1. Physical Characteristics

*The Feature of Board*

[Unit: mm]
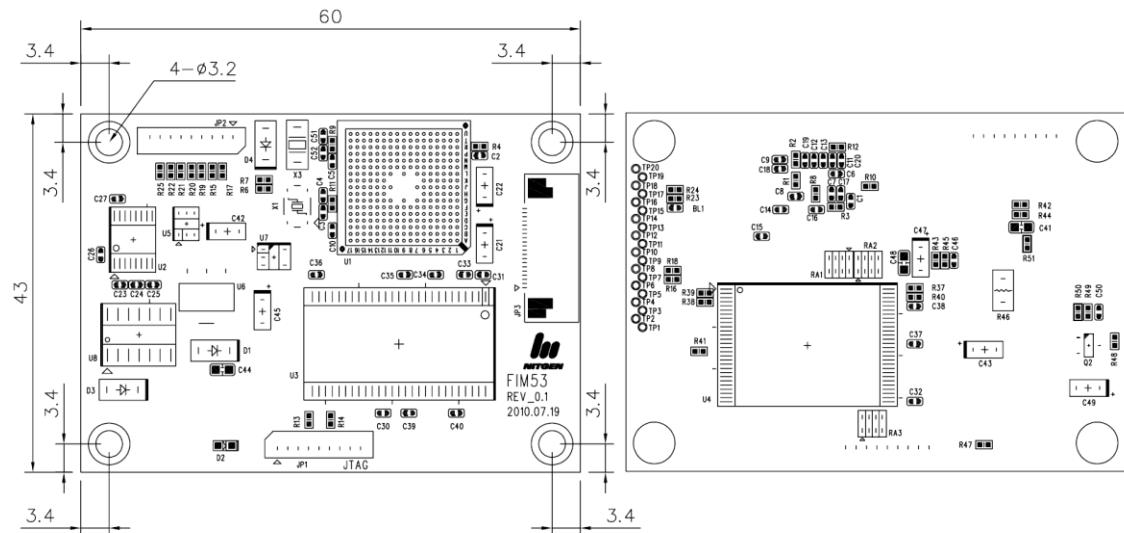
*The feature of fingerprint sensor*
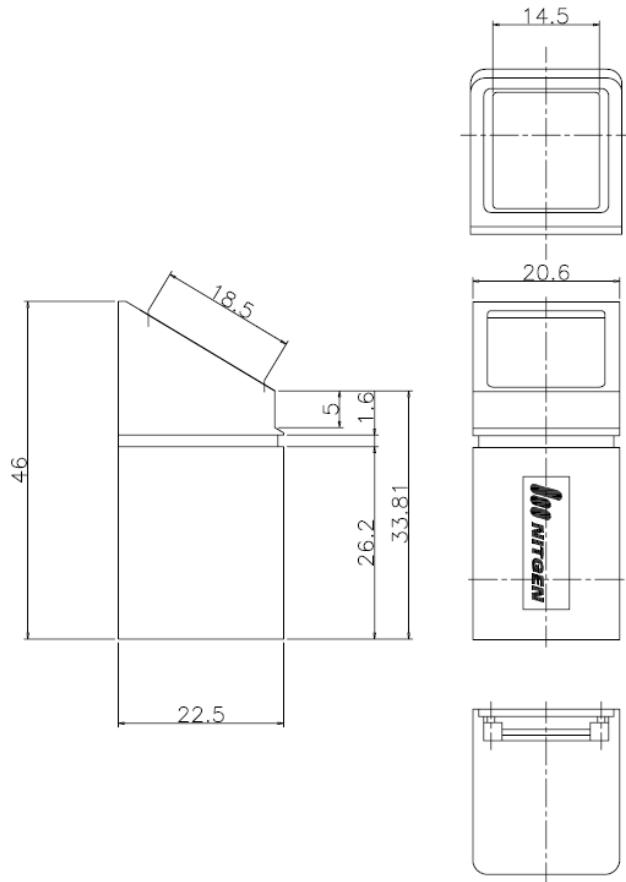


**The Dimension of OPP06 [Unit : mm]**

*The feature of sensor Cable*
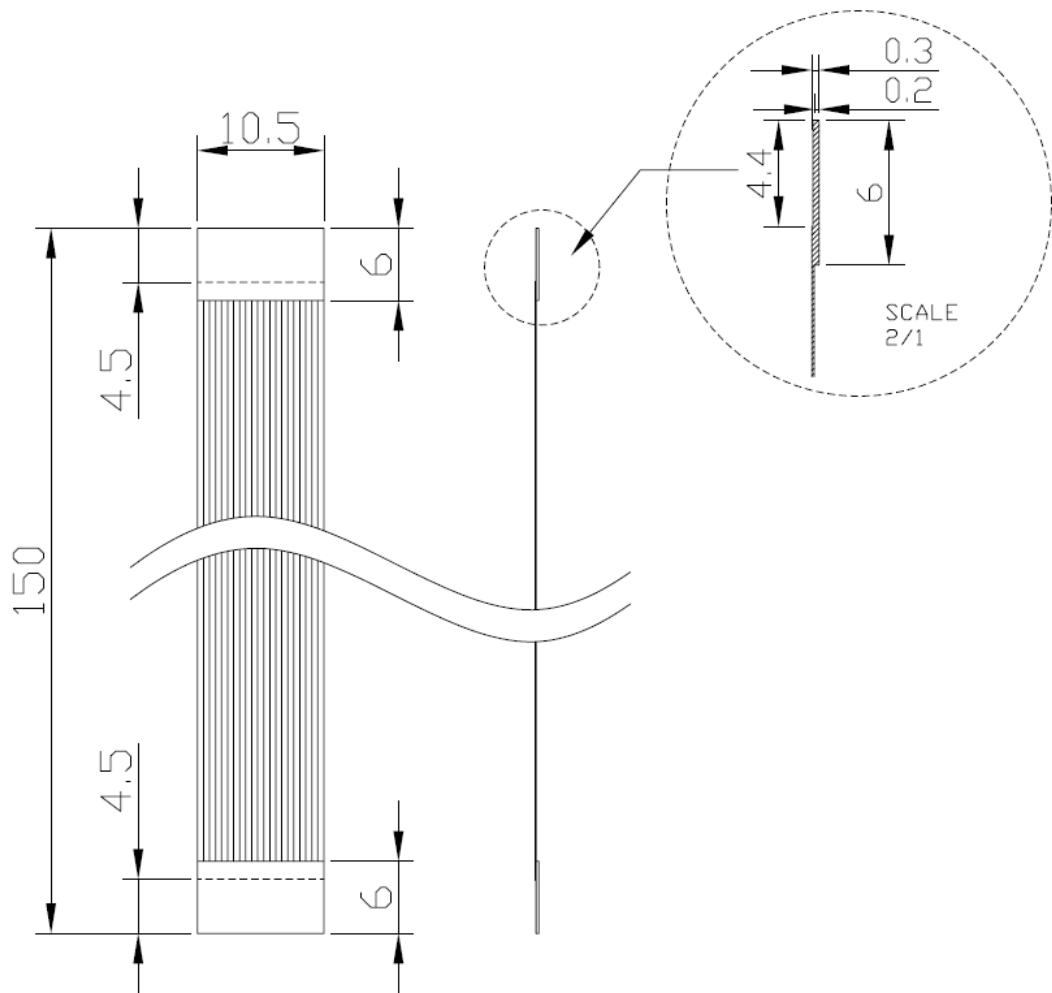
## 6.2. External Port

● **JTAG** Connector (JP1)

| Pin | Pin Name | Description |
|-----|----------|-------------|
| 1 | VCC | 3.3 Volt Power |
| 2 | N/A | N/A |
| 3 | nSRST | JTAG control pin |
| 4 | TDO | JTAG control pin |
| 5 | TDI | JTAG control pin |
| 6 | nTRST | JTAG control pin |
| 7 | TCK | JTAG control pin |
| 8 | TMS | JTAG control pin |
| 9 | GND | Ground |

* JP1 (JTAG connector) is used only for development or emergency recovery.

● 9-Pin External Connector (JP2)

| Pin | Pin Name | Description |
|-----|----------|-------------|
| 1 | VCC | Supply Voltage (HV – 5V, LV – 3.3V) |
| 2 | EXT_RXD | UART Channel 1 port receiving signal from host (RS232 Level) |
| 3 | EXT_TXD | UART Channel 1 port transmitting signal to host (RS232 Level) |
| 4 | GPIO0 | General Purpose Input / Output 0 |
| 5 | GPIO1 | General Purpose Input / Output 1 |
| 6 | GPIO2 | General Purpose Input / Output 2 |
| 7 | GPIO3 | General Purpose Input / Output 3 |
| 8 | GPIO4 | General Purpose Input / Output 4 |
| 9 | GND | Ground |

● **20-Pin OPP06 Sensor connector (JP3)**

| Name | No | States | Description |
|---|---|---|---|
| GND | 1 | POWER | Sensor Ground |
| VCLK | 2 | OUT | Sensor System Clock |
| VCC | 3 | POWER | Sensor VCC (3.3V) |
| AUTOON | 4 | IN | Sensor Auto-On |
| | 5 | | Reserved |
| VSYNC | 6 | IN | Vertical Sync. |
| HSYNC | 7 | IN | Horizontal Sync. |
| SDATA0 | 8 | IN | Sensor Data 0 |
| SDATA1 | 9 | IN | Sensor Data 1 |
| SDATA2 | 10 | IN | Sensor Data 2 |
| SDATA3 | 11 | IN | Sensor Data 3 |
| SDATA4 | 12 | IN | Sensor Data 4 |
| SDATA5 | 13 | IN | Sensor Data 5 |
| SDATA6 | 14 | IN | Sensor Data 6 |
| SDATA7 | 15 | IN | Sensor Data 7 |
| SDA | 16 | IN/OUT | I2C Data |
| SCL | 17 | OUT | I2C Clock |
| LED 1 | 18 | OUT | Sensor LED 1 |
| PIXCLK | 19 | IN | Pixel Clock |
| LED 2 | 20 | OUT | Sensor LED 2 |

## 6.3. Connector

*Sensor*

**Material List**

| NO | DESCRIPTION | VENDOR |
|----|-------------|--------|
| 1 | 20-PIN (52746-2090) | MOLEX |

*Communication*

**Material List**

| NO | DESCRIPTION | VENDOR |
|----|-------------|--------|
| 1 | 9-pin Male  (53047-0910) | MOLEX |
| 2 | 8-pin Male  (53047-0810) | MOLEX |

## 6.4. Electrical Characteristics

| Parameter | MIN. | TPY. | MAX. | UINTS |
|---|---|---|---|---|
| **Power** | | | | |
| Supply current | | | 300 | mA |
| Supply Voltage (HV Model) | 4.5 | 5.0 | 5.5 | V |
| Supply Voltage (LV Model) | 3.0 | 3.3 | 3.6 | V |
| **UART (RS-232 Level)** | | | | |
| Output Voltage Swing | ±5.0 | ±5.4 | | V |
| Input Voltage Range | -15 | | +15 | V |
| Input Threshold LOW | 0.6 | 1.2 | | V |
| Input Threshold HIGH | | 1.5 | 2.4 | V |
| Maximum data rate | | | 115,200 | BPS |
| **GPIO** | | | | |
| Output Voltage LOW | | | 0.4 | V |
| Output Voltage HIGH | 2.7 | | | V |
| Input Threshold LOW | | | 0.8 | V |
| Input Threshold HIGH | 2.4 | | 3.3 | V |
| **Etc** | | | | |
| Reset pulse Width | 1 | | | ms |

# 7. Ordering Information

## 7.1. FIM5360 Ordering Guide

| Product Name | Max. Templates | Supply Voltage [V] | RTC |
|:---:|:---:|:---:|:---:|
| FIM5360-HV | 2,000 | 5 | Internal |
| FIM5360-LV | 2,000 | 3.3 | Internal |

## 7.2. Naming Rule

FIM  53  60  H  V

**Product Type Layer 1**

FIM: Fingerprint Identification Module

**Product Type Layer 2**

53: S3C2410 266Mhz, 2,000 templates, 43mm x 60mm product

**Sensor Type**

60: Nitgen's optical sensor – OPP06

**Power**

H: High voltage (5V)

L: Low voltage (3.3V)

**Protocol Type**

V: FIM ComProtocol
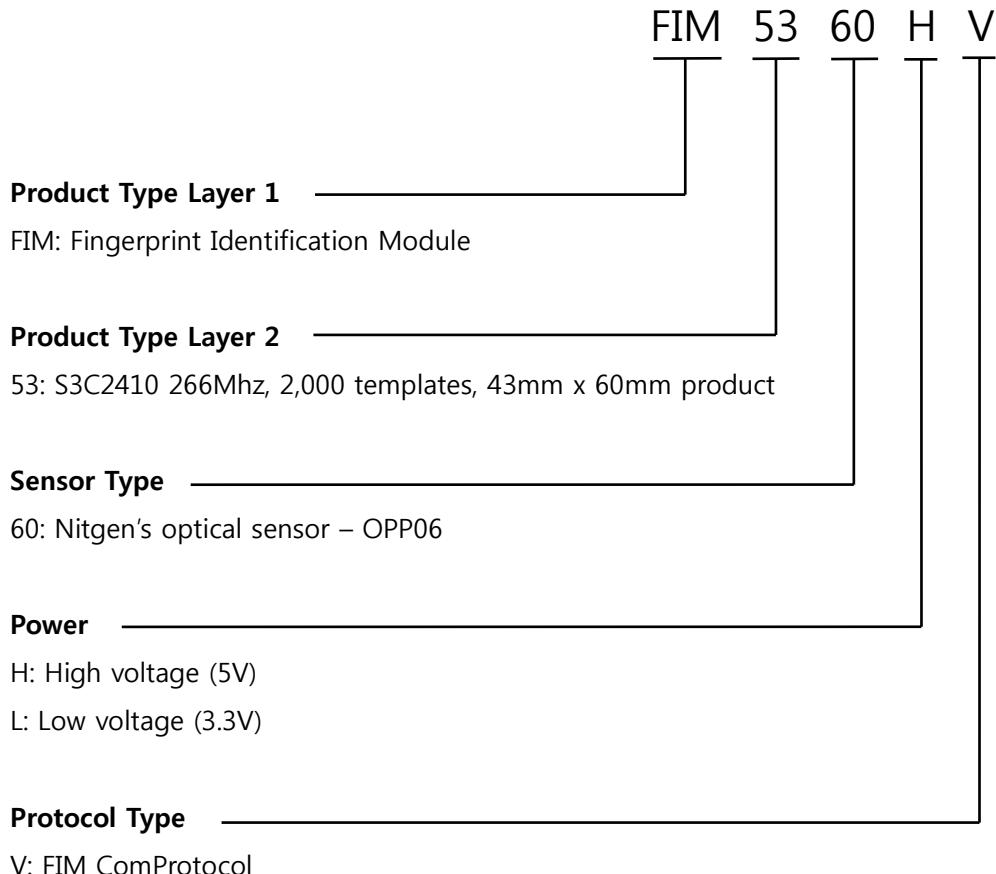
## APPENDIX

**Recommended circuit to use GPIOs**

- Key Input – Enroll, Delete, Delete All and Identify
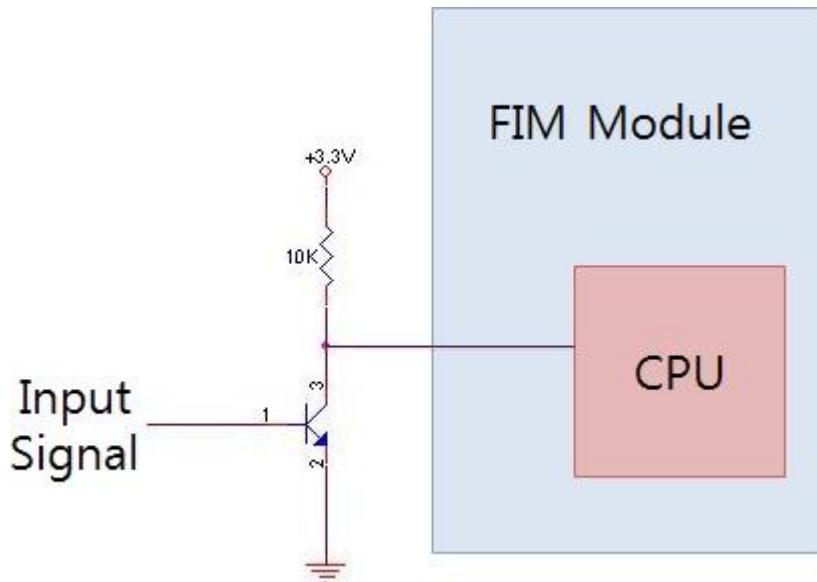
- Relay Output 0, 1 and Result Output
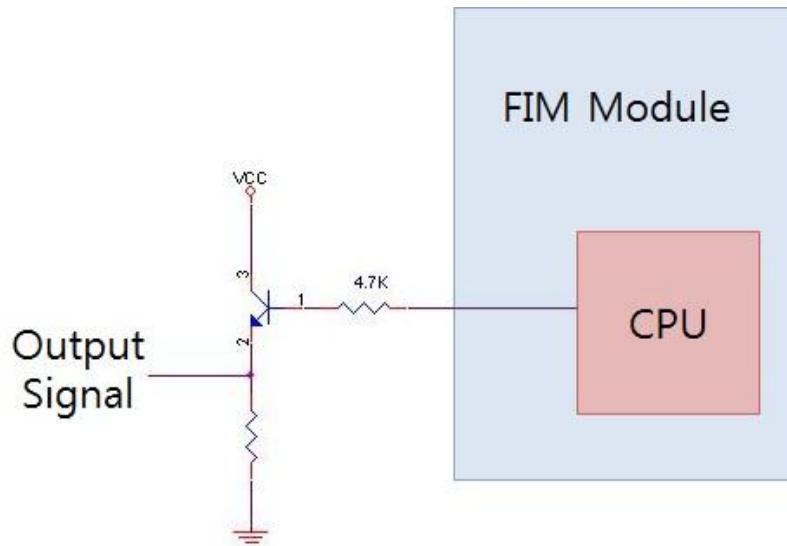
Or,
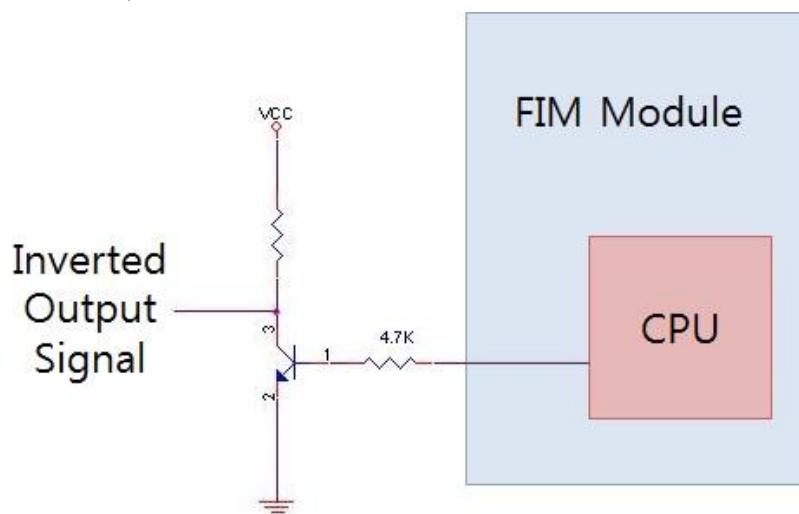
## Boot up time

System Boot-up time means the total time consumed by FIM5360 after system power and **/Reset** are supplied.
System Boot-up time can be measured as the following.

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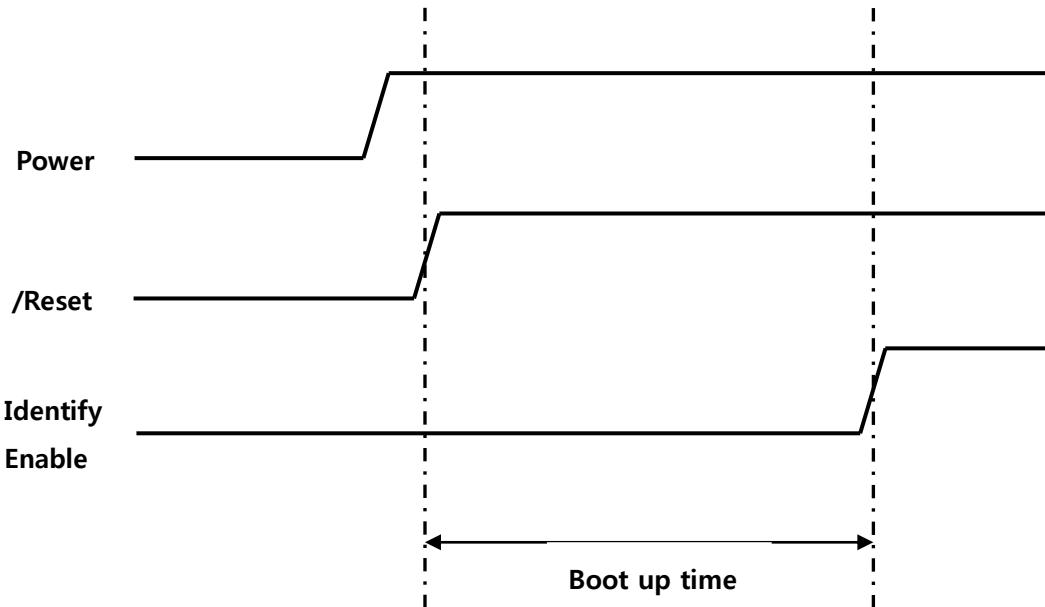
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