



FIM60

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# NITGEN® FIM60 Series

Stand-Alone Fingerprint Recognition Device with Built-in CPU

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## Datasheet

(Supported Firmware Version: 2.00 or higher)

Version 1.00

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Serial Number:

Specifications can be changed without notice.

## FIM60

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### Revision Information

Date	Version	Description
2015/02	1.00	release

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## 1. General Description

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.

FIM60 is a stand-alone Fingerprint Identification Device with many excellent features. It provides benefits such as high identification performance, low power consumption and two 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.

FIM60 is compatible with FIM50. It is faster and lower power consumption than FIM50.

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### 2. Feature

- ◆ Strong Durable Optical Sensor with 500dpi
- ◆ Powerful Live Fingerprint Detection
- ◆ One ID multi-templates mode
- ◆ Up to 10,000 Templates
- ◆ More than 30,000 Logs
- ◆ Using New optical sensor OPP06
- ◆ Changeable user's verification security level
- ◆ Selectable UART communication Level (RS232 or LVCMOS)
- ◆ Selectable fingerprint rotation angle range (+/- 45 ° or +/- 180 °)
- ◆ Support Auto-Identify mode
- ◆ Support ISO19794-2 and ANSI 378 template format
- ◆ Support Device Master password
- ◆ Provide custom data area
- ◆ **Compatible template format with NITGEN eNBio API (???)**
- ◆ 8 Programmable GPIOs
- ◆ Support Watchdog timer reset

### 3. Target Application

- ◆ Access Controller
- ◆ Time and attendance management solution
- ◆ Security solution
- ◆ Safety Box
- ◆ ATM, POS and more

## 4. Specification

### 4.1. Basic Feature

#### Hardware Specification

ITEM		FIM60
Board Spec.	CPU	ATSAMA5D31A (Cortex-A5 528MHz)
	DRAM	DDR2 128MByte
	Flash ROM	8MByte
Dimension		40 x 45 [mm <sup>2</sup> ]
Sensor		NITGEN OPP06
Supply Voltage		5 / 3.3 [V]
Current Consumption	Typical	120 [mA]
	Max	200 [mA]
Operating Temperature		-20 ~ 60 [°C]
Humidity		~ 90 [% RH]
Communication Channel		2 UART (RS-232 Level, LVCMOS Level) Speed: 9600 ~ 115200 [bps] (1 start bit, 8 data bit, no parity, 1 stop bit)
External I/O		8 Programmable GPIOs
Maximum Template Storage		Up to 10,000 templates
Maximum Log Storage		Up to 30,705 Logs



**Operation Specification**

ITEM	FIM60
Capture Speed	0.2 [sec]
Verification Speed	Less than 1 [sec]
Boot Up Time <sup>1)</sup>	0.4 [sec] for 100 templates 1.7 [sec] for 1,000 templates 3.0 [sec] for 2,000 templates 4.4 [sec] for 3,000 templates 7.2 [sec] for 5,000 templates 14.0 [sec] for 10,000 templates
Data Encryption Method	AES for saving data AES for DB communication

<sup>1)</sup> Boot-up time is explained in Appendix A.

**4.2. Sensor Feature**

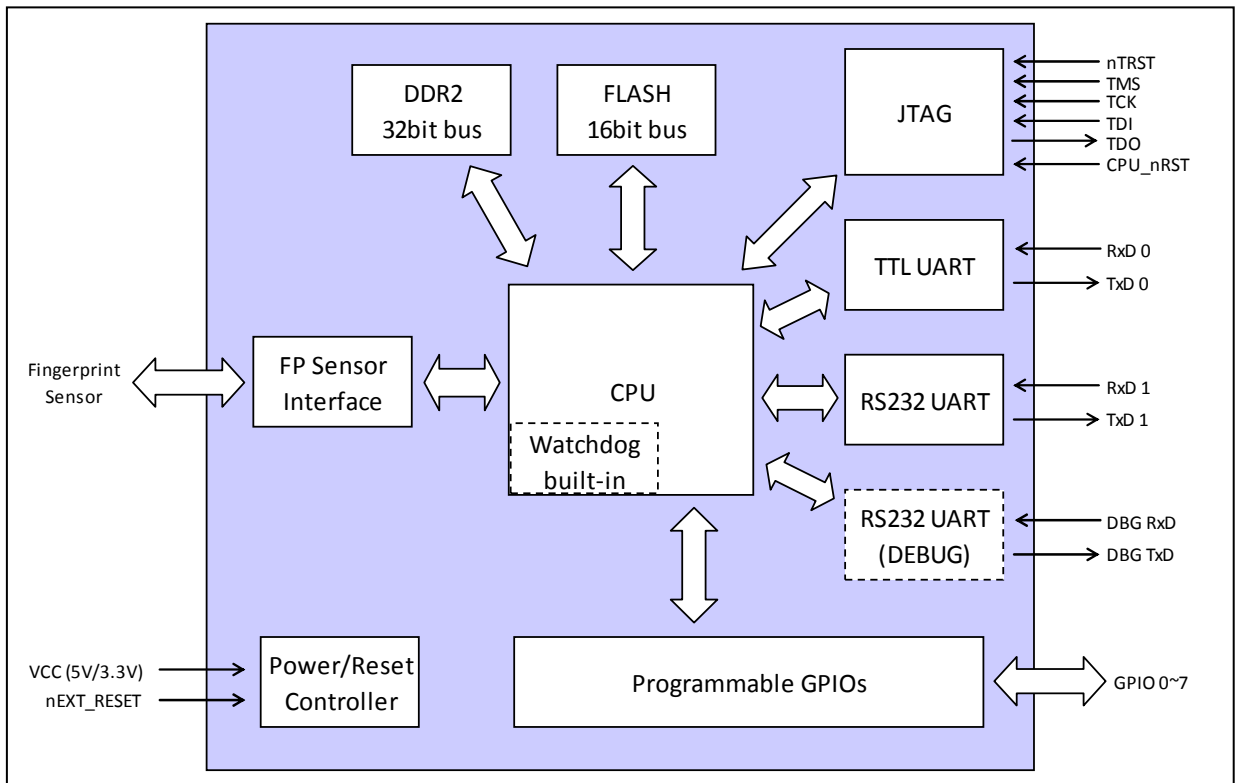
**OPP06**

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

### 4.3. Interface Feature

Interface	
Communication Channel 0 (LVCMOS Level)	LVCMOS Up to 115200bps Baud Rates supported (Default : 9600bps)
Communication Channel 1 (RS232 Level)	RS-232C Up to 115200bps Baud Rates supported (Default : 9600bps)
I/O	8 Programmable GPIOs

## 5. Block Diagram



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

## 6. Operation

### Reset

FIM60 provides external low-active reset signal port. By setting the reset port low state, FIM60 could be initialized. The reset port is internally pull-uped to VCC.

### Communication

FIM60 has two UART serial communication ports (RS232C and LVCMOS level) through those FIM60 communicates at the same time. These ports support 6 baudrate modes such as 9600, 14400, 19200, 38400, 57600, and 115200 bps.

FIM60 follows NITGEN Serial Communication protocol. For more detail information, please refer to the FIM ComProtocol document.

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

### Custom Data Area

FIM60 provides 64 Kbytes flash memory. By 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

FIM60 provides 8 programmable GPIOs. These GPIOs can be configured or activated as normal IO, key function, result output, capturing status and so on.

Please refer clause 7 of FIM ComProtocol Vol2. ErrorCode & Structures document to get more details.

### Board configuration option

The following table shows board configuration system option.

These option values can be changed by using NITGEN Serial Communication protocol.

Please refer CMD\_SET\_SYSINFO (0x4C) and CMD\_GET\_SYSINFO (0x4D) commands of FIM ComProtocol Vol1. Overview & Commands document to get more details.

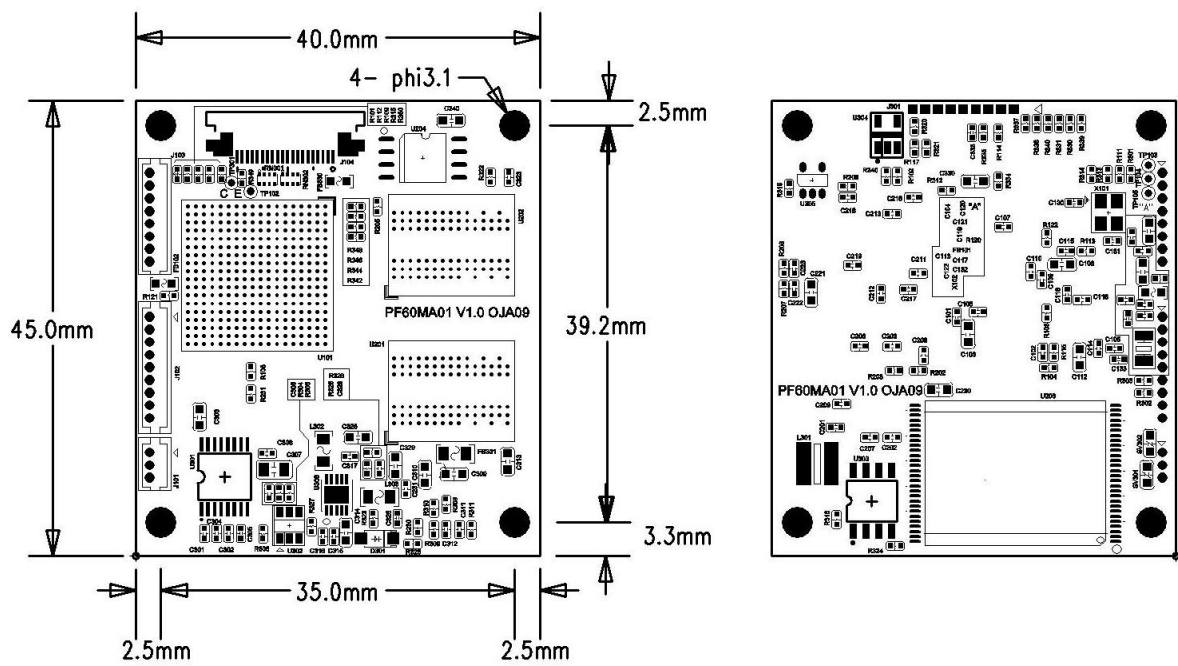
# FIM60

## 7. Technical Data

### 7.1. Physical Characteristics

#### The Feature of Board

[Unit: mm]



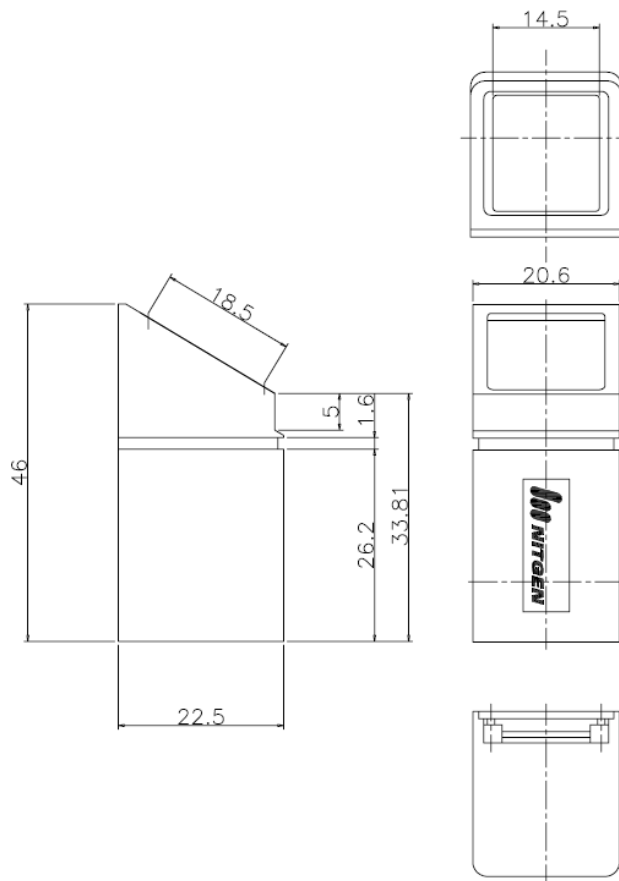
Tolerance of Board Size is  $\pm 0.3$ mm.

The PCB thickness is  $1.2\text{mm} \pm 10\%$ .

# FIM60

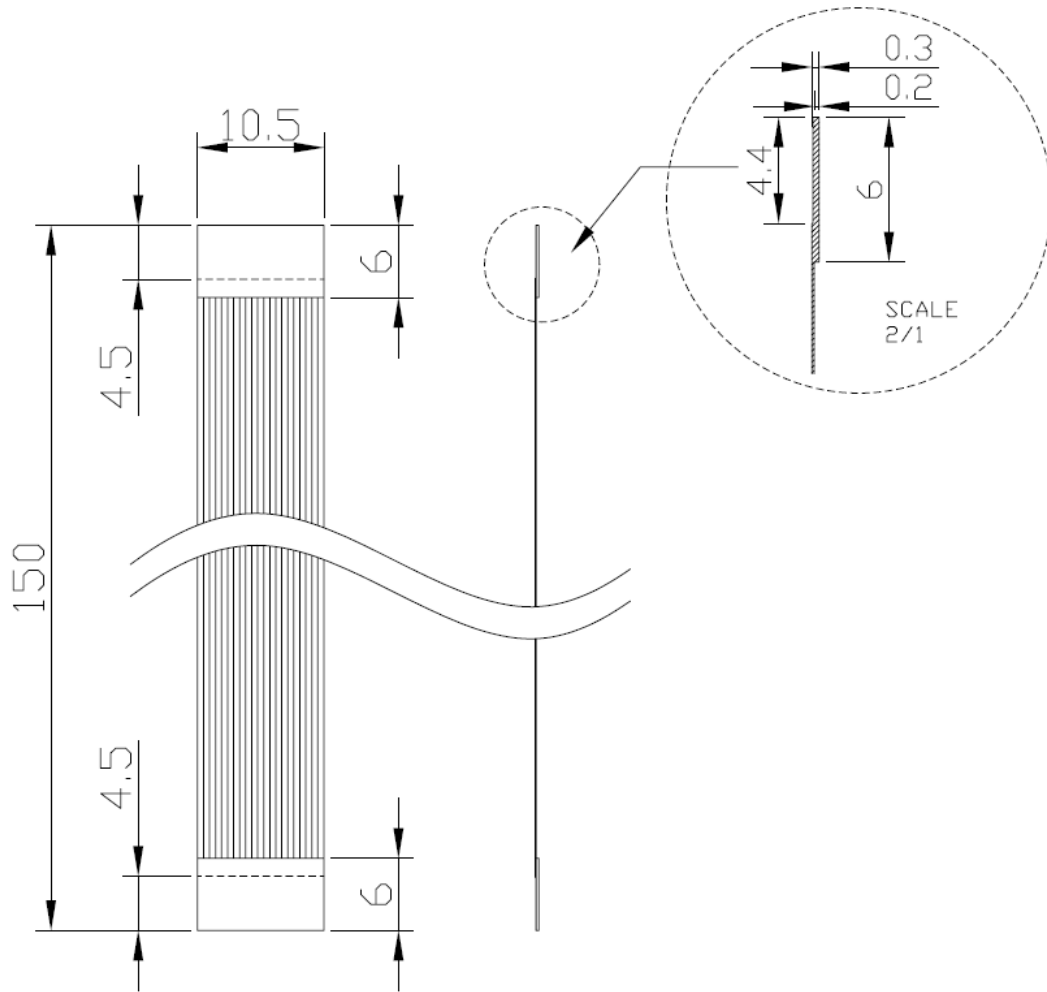
*The feature of fingerprint sensor – OPP06*

[Unit: mm]



# FIM60

## The feature of sensor Cable

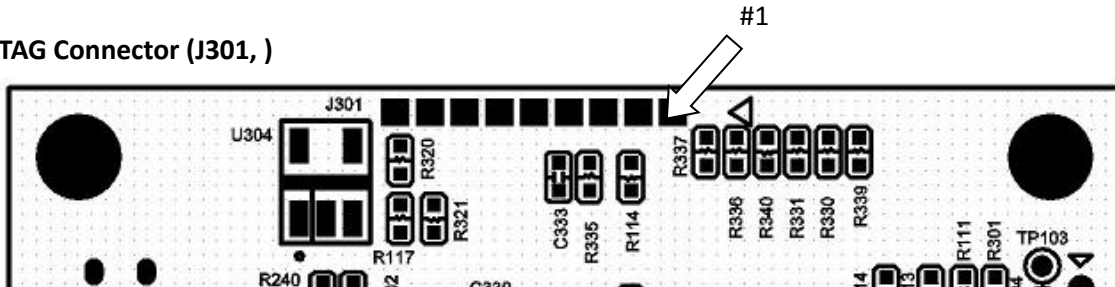


Strip Length is  $4 \pm 1$ mm.

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## 7.2. External Port

JTAG Connector (J301, )



Pin	Pin Name	Description
1	VCC	3.3V out
2	nTRST	JTAG control pin
3	TDI	JTAG control pin
4	TMS	JTAG control pin
5	TCK	JTAG control pin
6	NC	NC
7	TDO	JTAG control pin
8	CPU_nRST	JTAG control pin
9	GND	Ground

\* J301 (JTAG connector) is used only for development or emergency recovery.

9-Pin External Connector (J102)

Pin	Pin Name	Description
1	VCC	Supply Voltage (HV – 5V, LV – 3.3V)
2	RS232_RXD	UART Channel 1 port receiving signal from host (RS232 Level)
3	RS232_TXD	UART Channel 1 port transmitting signal to host (RS232 Level)
4	TTL_RXD	UART Channel 0 port receiving signal from host (LVCMOS Level)
5	TTL_TXD	UART Channel 0 port transmitting signal to host (LVCMOS Level)
6	GPIO0	General Purpose Input / Output 0
7	GPIO1	General Purpose Input / Output 1
8	EXT_nRST	Reset signal – active low
9	GND	Ground



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### 20-Pin OPP06 Sensor connector (J104)

Pin	Pin Name	Description
1	GND	Sensor Ground
2	FP_MCLK	Sensor System Clock
3	VCC	Sensor VCC (3.3V)
4	AUTO-ON	Sensor Auto-On
5	FP_nRST	Sensor Reset
6	FP_VSYNC	Vertical Sync.
7	FP_HSYNC	Horizontal Sync.
8	FP_D0	Sensor Data 0
9	FP_D1	Sensor Data 1
10	FP_D2	Sensor Data 2
11	FP_D3	Sensor Data 3
12	FP_D4	Sensor Data 4
13	FP_D5	Sensor Data 5
14	FP_D6	Sensor Data 6
15	FP_D7	Sensor Data 7
16	FP_SDA	I2C Data
17	FP_SCL	I2C Clock
18	FP_LED 1	Sensor LED 1
19	FP_PCLK	Pixel Clock
20	FP_LED 2	Sensor LED 2

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### 8-Pin External Connector (J103)

Pin	Pin Name	Description
1	VCC	3.3V
2	GPIO2	General Purpose Input / Output 2
3	GPIO3	General Purpose Input / Output 3
4	GPIO4	General Purpose Input / Output 4
5	GPIO5	General Purpose Input / Output 5
6	GPIO6	General Purpose Input / Output 6
7	GPIO7	General Purpose Input / Output 7
8	GND	Ground

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### 7.3. Connector

#### Sensor

NO	DESCRIPTION	VENDOR
1	20-PIN (SFV20R-1STE1HLF)	FCI

#### Communication

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

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## 7.4. Electrical Characteristics

Parameter	MIN.	TPY.	MAX.	UNITS
<b>Power</b>				
Supply current			200	mA
Supply Voltage (HV Model)	4.5	5.0	5.5	V
Supply Voltage (LV Model)	3.1	3.3	3.5	V
<b>UART (RS-232 Level)</b>				
Output Voltage Swing	±5.0	±5.4		V
Input Voltage Range	-15		+15	V
Input Threshold LOW			0.8	V
Input Threshold HIGH	2.0		3.3	V
Maximum data rate			115,200	BPS
<b>UART (LVCMOS Level)</b>				
Output Voltage LOW			0.4	V
Output Voltage HIGH	2.9		3.3	V
Input Threshold LOW			0.8	V
Input Threshold HIGH	2.0		3.6	V
Maximum data rate			115,200	BPS
<b>GPIO</b>				
Output Voltage LOW			0.4	V
Output Voltage HIGH	2.9		3.3	V
Input Threshold LOW			0.8	V
Input Threshold HIGH	2.0		3.6	V
<b>E.T.C.</b>				
EXT_nRST Reset pulse Width	600			ms

## 8. Ordering Information

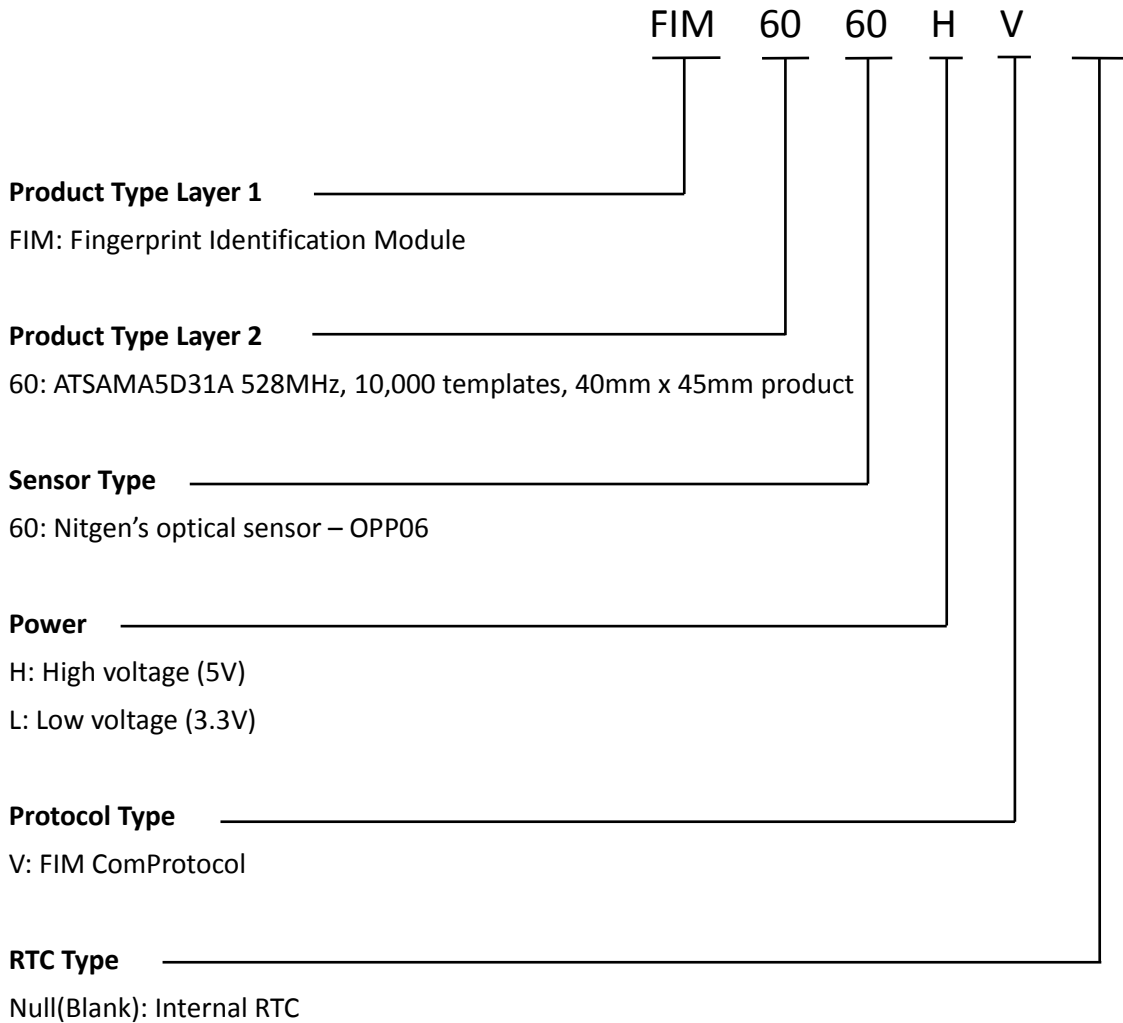
### 8.1. FIM6060 Ordering Guide

Product Name	Max. Templates	Supply Voltage [V]	RTC
FIM6060-HV	10,000	5	Internal
FIM6060-LV	10,000	3.3	Internal

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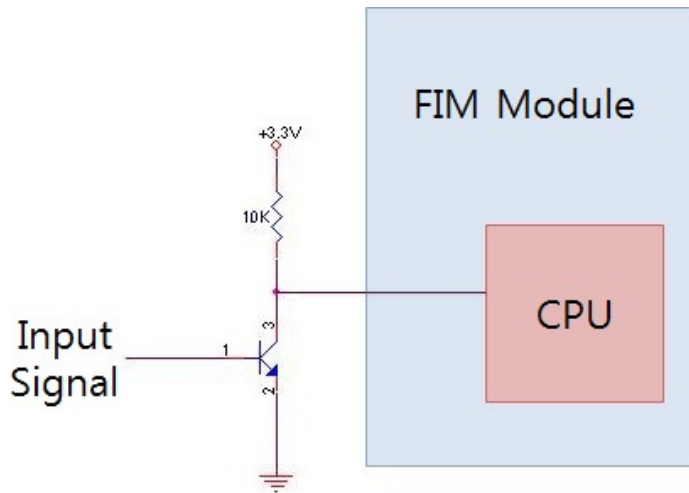
## 8.2. Naming Rule



## APPENDIX A. Recommendation Circuit and Timing

### Recommended circuit to use programmable GPIOs

#### *Circuit for low-active input*



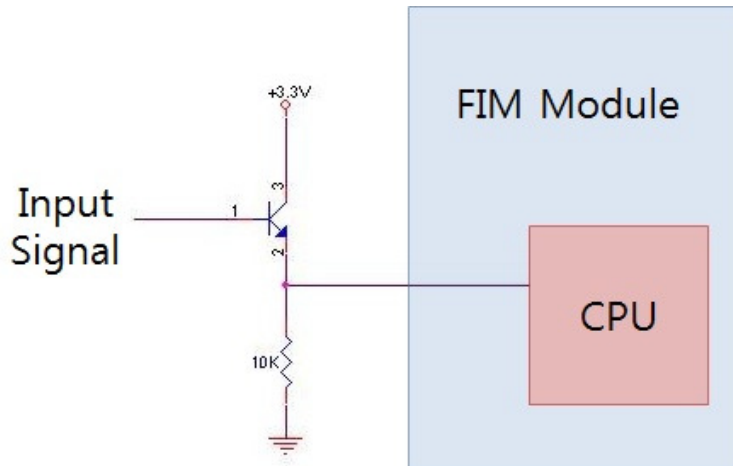
This circuit is recommended for,

- ◆ GPIO\_IN\_NORMAL (0x00)
- ◆ GPIO\_IN\_ENROLL\_LOW (0x02)
- ◆ GPIO\_IN\_DELETE\_LOW (0x04)
- ◆ GPIO\_IN\_IDENTIFY\_LOW (0x06)

\*All GPIO definitions are defined in clause 7 of FIM ComProtocol Vol2. ErrorCode & Structures document.

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### *Circuit for high-active input*



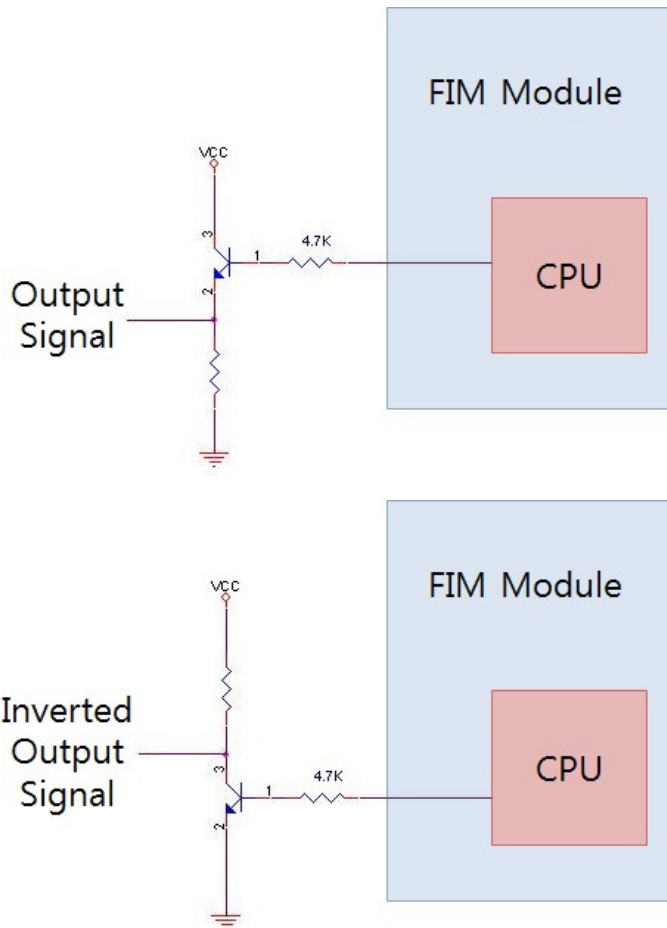
This circuit is recommended for,

- ◆ GPIO\_IN\_NORMAL (0x00)
- ◆ GPIO\_IN\_ENROLL\_HIGH (0x01)
- ◆ GPIO\_IN\_DELETE\_HIGH (0x03)
- ◆ GPIO\_IN\_IDENTIFY\_HIGH (0x05)



## FIM60

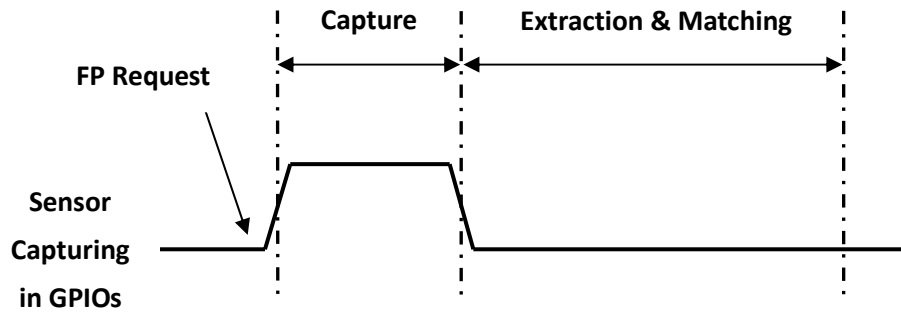
### Circuit for normal and inverted output



This circuit is recommended for,

- ◆ GPIO\_OUT\_NORMAL (0x80)
- ◆ GPIO\_OUT\_SUCCESS\_HIGH (0x81)
- ◆ GPIO\_OUT\_SUCCESS\_LOW (0x82)
- ◆ GPIO\_OUT\_FAIL\_HIGH (0x83)
- ◆ GPIO\_OUT\_FAIL\_LOW (0x84)
- ◆ GPIO\_OUT\_CAPTURING (0x85)
- ◆ GPIO\_OUT\_FP\_STATUS (0x86)

Sensor Capturing timing in programmable GPIOs



## FIM60

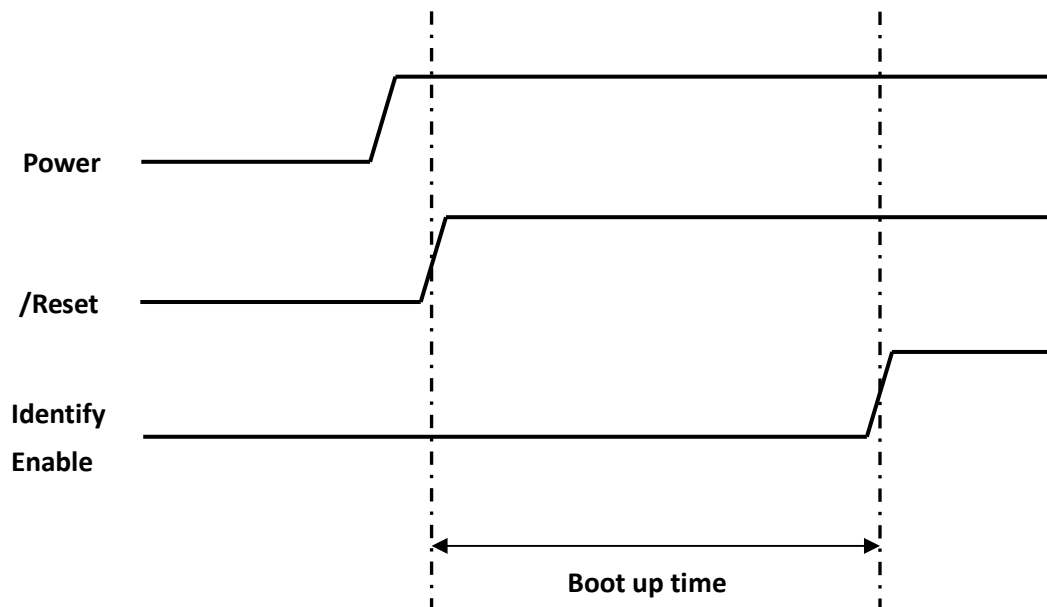
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### Boot up time

System Boot-up time means the total time consumed by FIM60 after system power and /Reset are supplied.

Boot-up time depends on the number of templates stored in FIM60.

System Boot-up time can be measured as the following.



## Appendix B. Support Information

A large, light blue circular graphic with a white border, centered on the page. Inside the circle, the company name and contact information are listed.

**NITGEN&COMPANY CO., LTD.**

B-12F PaxTower Nonhyun-dong, Gangnam-gu,

Seoul, 135-010 Korea

Tel: +82-2-556-7115

Fax: +82-2-556-7118

E-mail: [Customer@nitgen.com](mailto:Customer@nitgen.com)