TrueSecure™
GH Series
Hybrid Fingerprint Sensor

Revision: V1.00 Date: February 02, 2016

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GH-8111-01, GH-8111-01P 8

1 Features

- Ultra small fingerprint sensor permits integration into low profile areas
- Physical dimensions: 14mm × 15.1mm × 1.23mm
- High speed SPI interface
- Advanced Imaging Technology
- Superior imaging quality: 256 grayscale values per pixel
- Resolution up to 1000 DPI allows examination of the tiniest fingerprint details
- Active sensing area: 320 pixels × 320 pixels
- Robust Packaging
- Strong surface scratch protection with 6H Coating and 9H Glass
- ESD tolerance: +/- 15KV Air Discharge and +/- 15KV Contact
- High abrasion resistance and capable of withstanding over 1 million touches
- Low Power Consumption
- Active mode supply current: 30 mA
- Standby mode supply current: 5 μA
- Operating temperature: -20°C ~ +60°C
- Storage temperature: -20°C ~ +80°C
- Humidity: 10% ~ 80% RH under 60°C

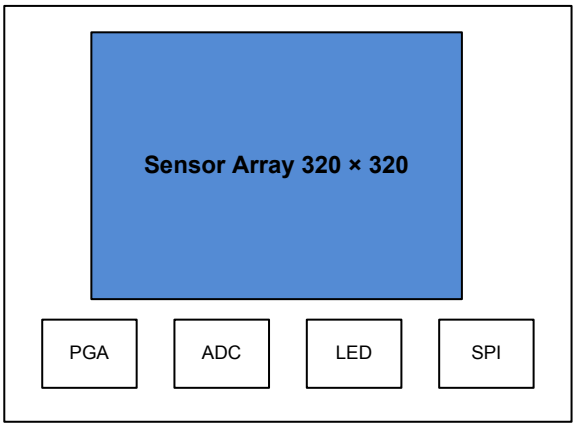
2 Applications

- Mobile Phones
- Tablets
- Personal Computers
- Low Profile Biometric Identification Products

3 Selection Table

Part No.	Effective Area (mm^2)	Resolution (DPI)	Image Pixels	Package	Inter-face	Surface Color	Metal Frame	Algo-rithm	Dimension (mm^3) (W×D×H)
GH-8111-01	8.1×8.1	1000	320×320	28PLCC	SPI	Black	—	—	13.9×13.9×1.23
GH-8111-01P								√	

4 Block Diagram



5 General Description

Fingerprint recognition technology is proving to be an increasingly popular means of secure and accurate means of biometric identification. By eliminating the need to remember multiple passwords this biometric recognition technology will continue to see more prevalent use in everyday products where security features are required.

This range of hybrid fingerprint sensors with their advanced optical and capacitive technology and their ultra thin profile, will open up new application areas in products where space is at a premium. Additional features include a durable structure, high ESD immunity, 360 degree rotation and other features. The fingerprint data can be rapidly captured and then the image data quickly transmitted to external hardware for further image processing using its internal high speed SPI interface . These patented architecture combined optical and capacitive fingerprint sensors form a range of unique high performance fingerprint sensors which are suitable for use in applications such as mobile phones, tablets and notebook PCs.

6 Pin Description

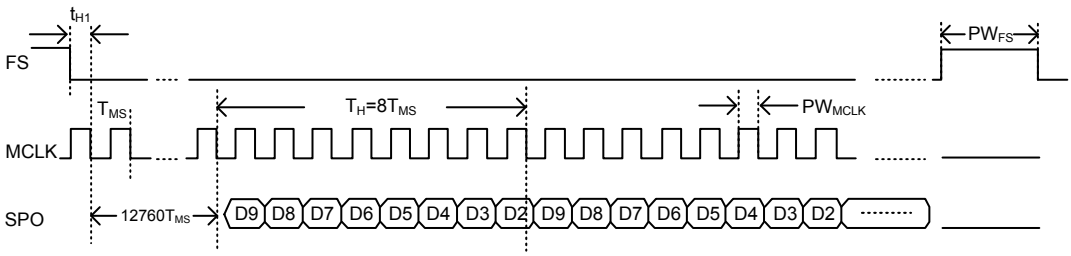
Pin No	I/O	Pin Name	Function
1	GND	Analog Ground	Analog Ground
2	VDD	Analog Power	Analog IO PAD Power Supply (2.8~3.3V)
3	PIX bias	AI	Connect 100nF capacitor to VDD
4	COL bias	AI	Connect 100nF capacitor to VDD
5	GND	Analog Ground	Analog Ground
6	BIN	DI	Mode selection – Digital Input(1.8~3.3V), High – BIN mode , Low – HD mode
7	FS	DI	Parallel mode: Frame Select, SPI mode: Chip select ,Digital Input (1.8~3.3V), active Low
8	CS	DI	Chip Select Digital Input (1.8~3.3V), active Low
9	LED_Power	LED Power	Internal LED Power Input, Current limiting resistor must be connected
10	VDDPAD	Digital Power	Digital IO PAD Power Supply (1.8~3.3V)
11	SPO	DO	SPI Data Output (1.8~3.3V)
12	MCLK	DI	Master clock Digital Input (1.8~3.3V)
13	GNDPAD	Digital Ground	Digital Ground
14	LEDon	DI	LED on control Digital Input (1.8~3.3V), active High
15	VDD	Analog Power	Analog IO PAD Power Supply (2.8~3.3V)
16	GND	Analog Ground	Analog Ground
17	G1	DI	Application gain setting pin
18	G0	DI	Application gain setting pin
19	ADCbias	AI	Connect 100nF capacitor to VDD
20	ESD-GND	Ground	ESD Ground
21	ESD-GND	Ground	ESD Ground
22	VDD_int	AO	VDD_int is the VDD output that automatically turns off following a CS high state.
23	HREF	AI	Connect 100nF capacitor to GND
24	LREF	AI	Connect 100nF capacitor to GND
25	ADCin	AI	Use resistor (0R) connected between ADCin and AMPO
26	AMPO	AO	Use resistor (0R) connected between ADCin and AMPO
27	AMPref	AI	Connect 100nF capacitor to GND
28	FOLbias	AI	Connect 100nF capacitor to GND
29	M-GND	Ground	Mechanical Ground
30	M-GND	Ground	Mechanical Ground
31	M-GND	Ground	Mechanical Ground
32	M-GND	Ground	Mechanical Ground

7 Electrical Specification

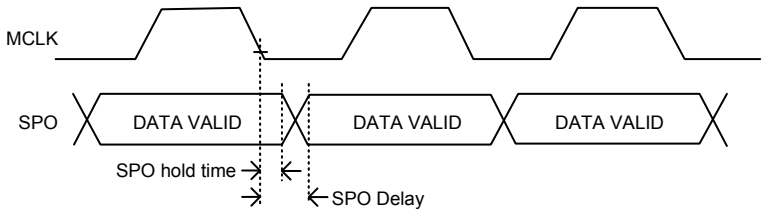
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{DD}	Analog IO PAD power supply	—	2.8	—	3.3	V
V_{PAD}	Digital IO PAD power suppy	—	1.62	—	3.3	V
V_{IH}	Low level input voltage	—	—	TBD	—	V
V_{IL}	Low level intput voltage	—	—	TBD	—	V
V_{OH}	High level output voltage	—	—	TBD	—	V
V_{OL}	Low level output voltage	—	—	TBD	—	V
I_{OP}	Operating current	V_{DD} = 3.3V, V_{PAD} = 3.3V SPI CLK = 36MHz Exposure < 10ms	—	—	30	mA
I_{PD}	Power-down current	V_{DD} = 3.3V, V_{PAD} = 3.3V	—	—	5	μA

8 Interface Description

The sensor transmits its captured image data to external hardware using an internal high speed SPI interface. Assert "BIN" to allow the sensor to enter either the HD mode or BIN mode and then output the different size image. The sensor exposure time controlled using "FS". Further details can be found in the GH-8111 application note.



Timing Overview



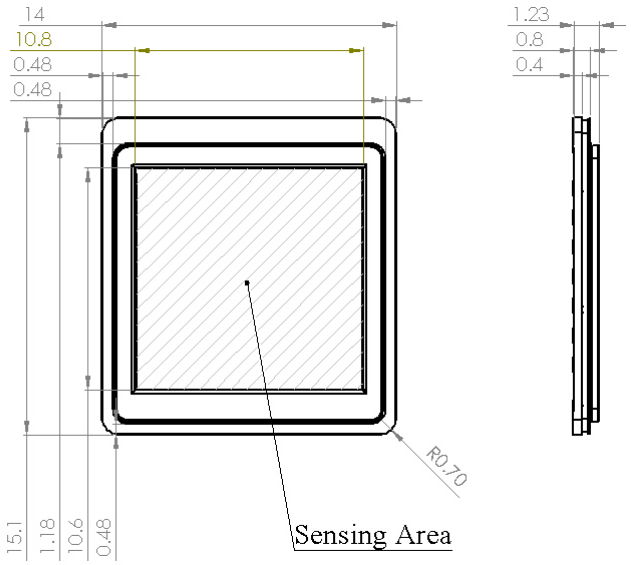
SPO Delay

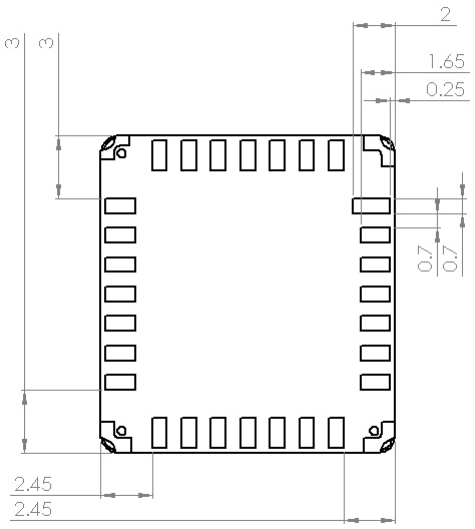
Timing Characteristics

Parameter	Name	Min.	Typ.	Max.
T_{MS}	MCLK Cycle Time	25ns	—	167ns
PW_{MCLK}	MCLK high pulse width	10ns	—	—
PW_{FS}	FS high pulse width	200μs	—	—
t_{H1}	FS falling edge to the first MCLK falling edge	5ns	—	—
SPO hold time VDDPAD=3.3V	SPO hold time vs. MCLK falling	4ns	—	—
SPO hold time VDDPAD=1.8V	SPO hold time vs. MCLK falling	8ns	—	—
SPO delay VDDPAD=3.3V	SPO delay vs. MCLK falling	—	—	7ns
SPO delay VDDPAD=1.8V	SPO delay vs. MCLK falling	—	—	15ns

9 Mechanical Specifications

GH-8111-01, GH-8111-01P





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Note that Holtek's fingerprint recognition products have been designed in conjunction with Gingy Technology.