



HF108 Fingerprint Image Sensor Data Sheet

We are dedicated to developing sensing technology, and providing customers with an innovative and diverse range of sensor products.

Our sensors and state-of-the-art fingerprint recognition algorithm technologies provide advanced and convenient fingerprint acquisition and verification.

Features

- Spatial resolution 508 DPI
- 2D sensor array of 160x160 pixels
- Sensing area 8 mm x 8 mm
- SiP package size : 12.2mm x 12.2mm x 0.45mm
- Build-in 8-bit ADC for digitizing image
- Build-in programmable voltage reference
- High speed SPI interface
- 0.08 sec read out time(TBD)
- Support 160-byte on-chip data FIFO
- 1.65Volt ~ 3.6Volt for I/O communication
- Advanced SiP package to reduce size and provide better water and dust protection
- Windowing function to crop smaller image
- Finger detection function to detect finger on sensor
- Interrupt pin to wake up host when finger on sensor at standby mode
- 1mA power consumption at standby mode
- 1uA power consumption at power down mode

General description

The HF108 fingerprint image sensor is based on capacitive-touched technology with hardened surface and enhanced ESD strength. The built-in analog and digital circuits could minimize the number of external components, and provide easy-to-use standard SPI interface to microprocessors.

The operation of HF108 is as following, a fingerprint image captured by pixel array, delivering fingerprint ridge or valley signals to A/D converter and digital processor, then to the serial peripheral interface for data-reading. The image quality of HF108 can be adjusted by setting gain, offset and reference voltage parameters internally. In addition, the internal operations and interface speed can also be configured to meet various finger conditions.

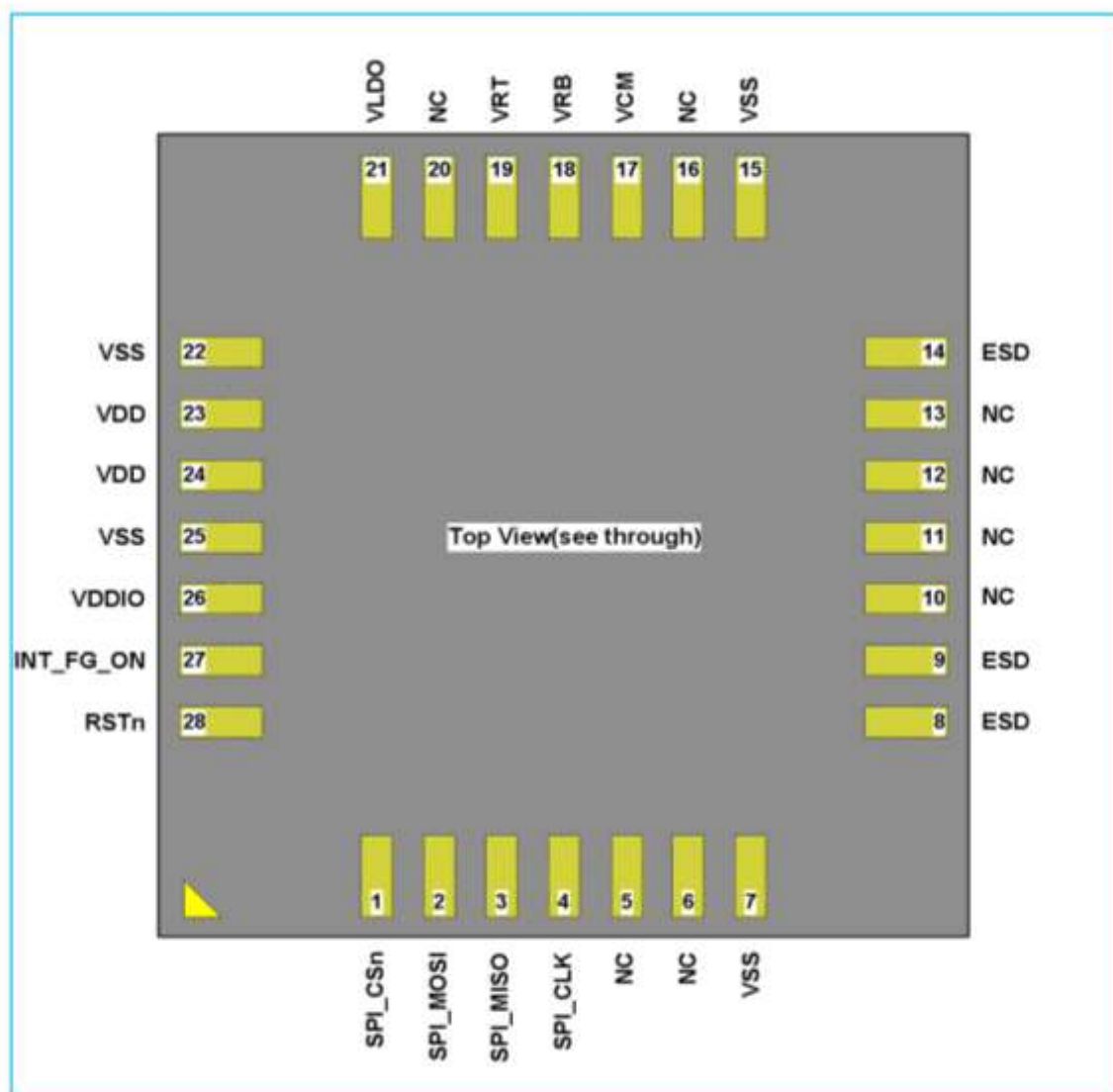
HF108 also has finger detection function and windowing function for different applications.

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1. Pinouts and pin description

1.1 HF108 pin assignment



1.2 Pin description

Pin Name	SIP order	Type	Pin Description
ESD	8,9,14	ESD	Connect ESD pin to Ground.
VSS	7,15,22,25	Power	Ground.
VDDIO	26	Input	System power. This voltage is supplied for IO interface operation. Normally it can be tied to the VDD if the IO operation voltage is 3.3V. If lower IO voltage is needed, providing the right IO voltage to this pin.
INT_FG_ON	27	Output	Standby mode finger detection interrupt pin. Use to wake up host processor.
RSTn	28	Input	A LOW on this pin resets the sensor to take on its default states.
SPI_CS _n	1	Input	Chip select for SPI.
SPI_MOSI	2	Input	SPI data in pin, master out slave in.
SPI_MISO	3	Output	SPI data out pin, master in slave out.
SPI_CLK	4	Input	The SPI clock rate provided by the master must not exceed 18MHz depend on different application, SPICLK should be adjusted for best image quality.

Pin Name	SIP order	Type	Pin Description
VDD	23,24	Input	System power. Voltage supply for core operation.
VCM	17	Output	Internal Reference voltage output.
VRB	18	Output	Internal Reference voltage output.
VRT	19	Output	Internal Reference voltage output.
VLDO	21	Output	LDO output power, internal use.

2. Electrical Characteristics

2.1 Maximum rating

Symbol	Parameter	Conditions	Value	Unit
VDD	Supply voltage		-0.3 to 4	V
V _{VDDIO}	Supply voltage of I/O		-0.3 to V _{VDD} +0.3	V
V _{I1}	Input pin voltage 1 (SPICLK, SPIDI, SPICSn)	(Note1)	-0.3 to V _{VDDIO} +0.3	V
V _{I2}	Input pin voltage 2 (RSTn)	(Note2)	-0.3 to V _{VDDIO} +0.3	V
V _{O1}	Output pin voltage 1(INTn, SPIDO)		-0.3V to V _{VDDIO} +0.3V	V
TA	Operating temperature		-20 to 70	°C
ST	Storage temperature		-40 to 85	°C
PT ₁₀	Soldering temperature (10 seconds)		250	°C
PT ₁₂₀	Soldering temperature (2 minutes)		183	°C

Note 1: Each Input and Output pin has internal ESD protection diode between pin and V_{VDDIO}.

Note 2: V_{I2} has internal pull high current of 100 μ A.

2.2 Operation condition

Symbol	Parameter	Conditions	Min.	Typ	Max	Unit
VDD	Supply voltage		3.0	3.3	3.6	V
VDD _{IO}	Supply voltage of I/O		1.65	3.3	3.6	V
IDD	Total supply current (CLK = 8Mhz)	VDD=3.3 V Sensing mode		5(TBD)		mA
IDD	Supply current(CLK = 8Mhz)	Standby mode (Note 1)		1(TBD)		mA
IDD	Supply current power down mode	Power down mode (Note 2)		1		uA
ESDKV	ESD protection	Air mode		30		kV

Note 1: User can program the system into standby mode for saving power consumption.

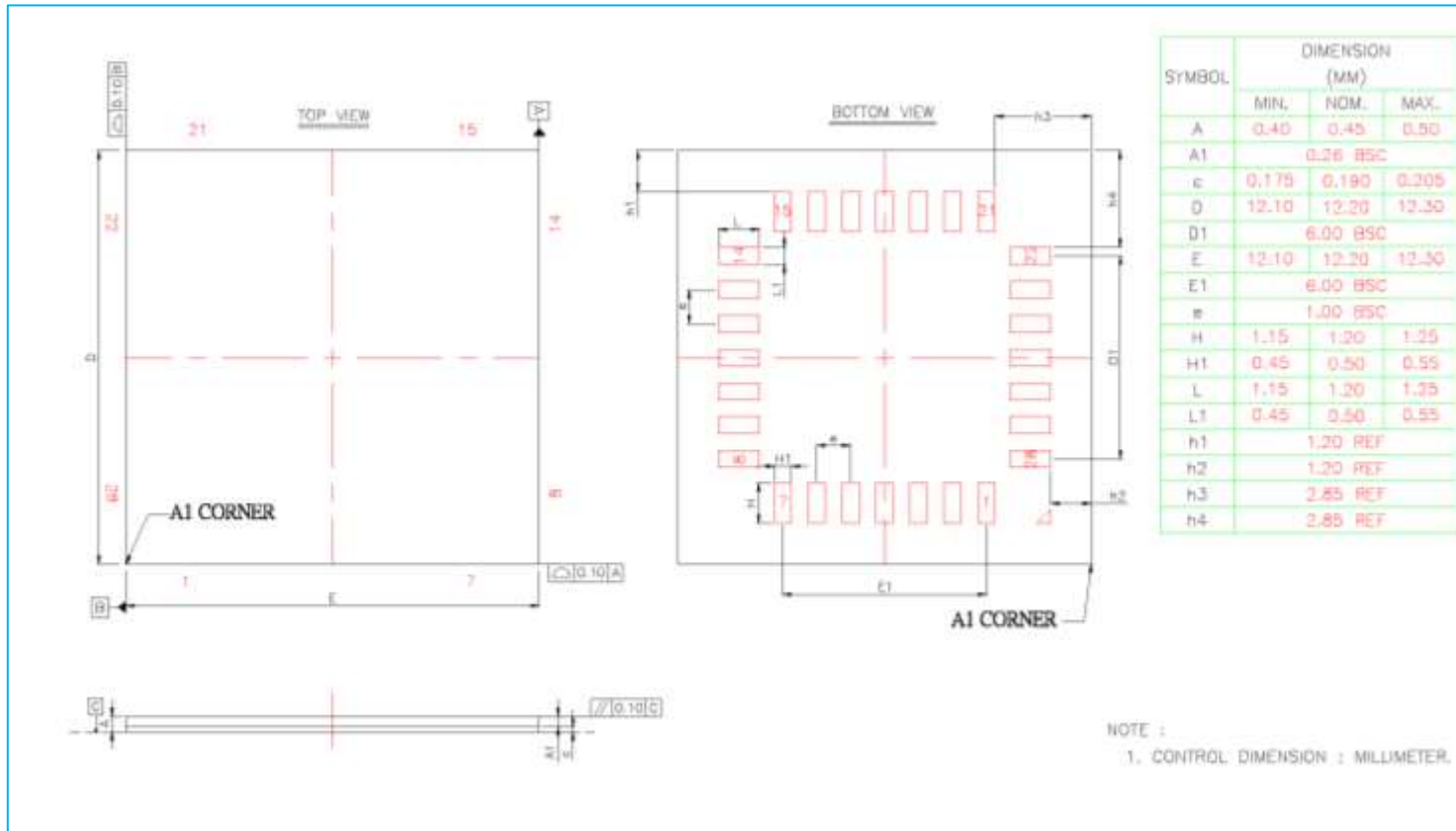
Note 2: when no use fingerprint, user can program the system into power down mode for saving power consumption.

2.3 DC Characteristics

Symbol	Parameter	Conditions	MIN	TYP	MAX	Unit
Digital inputs						
V_{IH}	High level input voltage		$0.8 \cdot V_{DD}$			V
V_{IL}	Low level input voltage				$0.2 \cdot V_{DD}$	V
I_{IH}	High level input current				1	μA
I_{IL}	Low level input current				1	μA
C_i	Input capacitance			5		pF
Digital outputs						
V_{OH}	High level output voltage	$I_{OH} = 0.25mA$		$0.8 \cdot V_{DD}$		V
V_{OL}	Low level output voltage	$I_{OL} = 0.25mA$		0.2	0.5	V

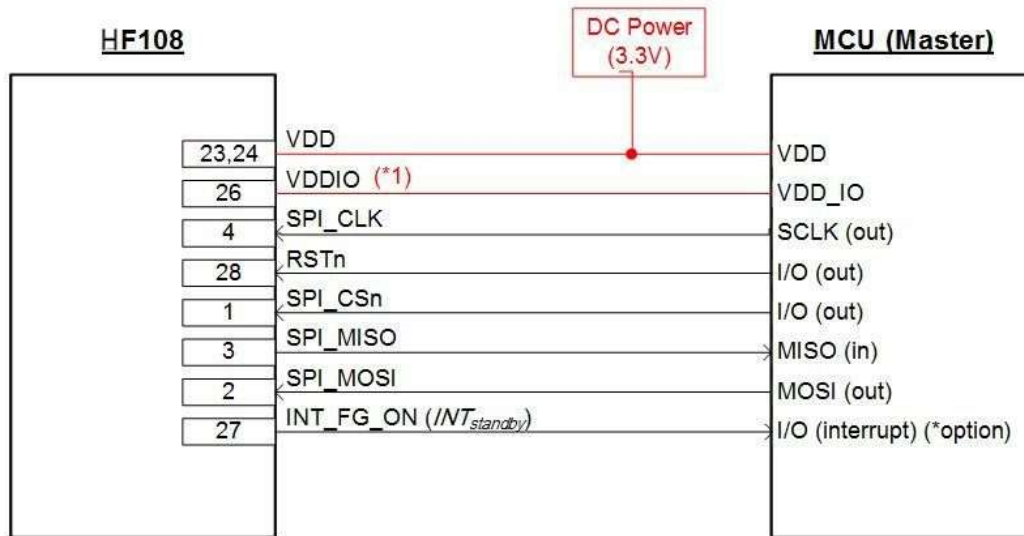
3. Package information

3.1 The HF108 package dimension



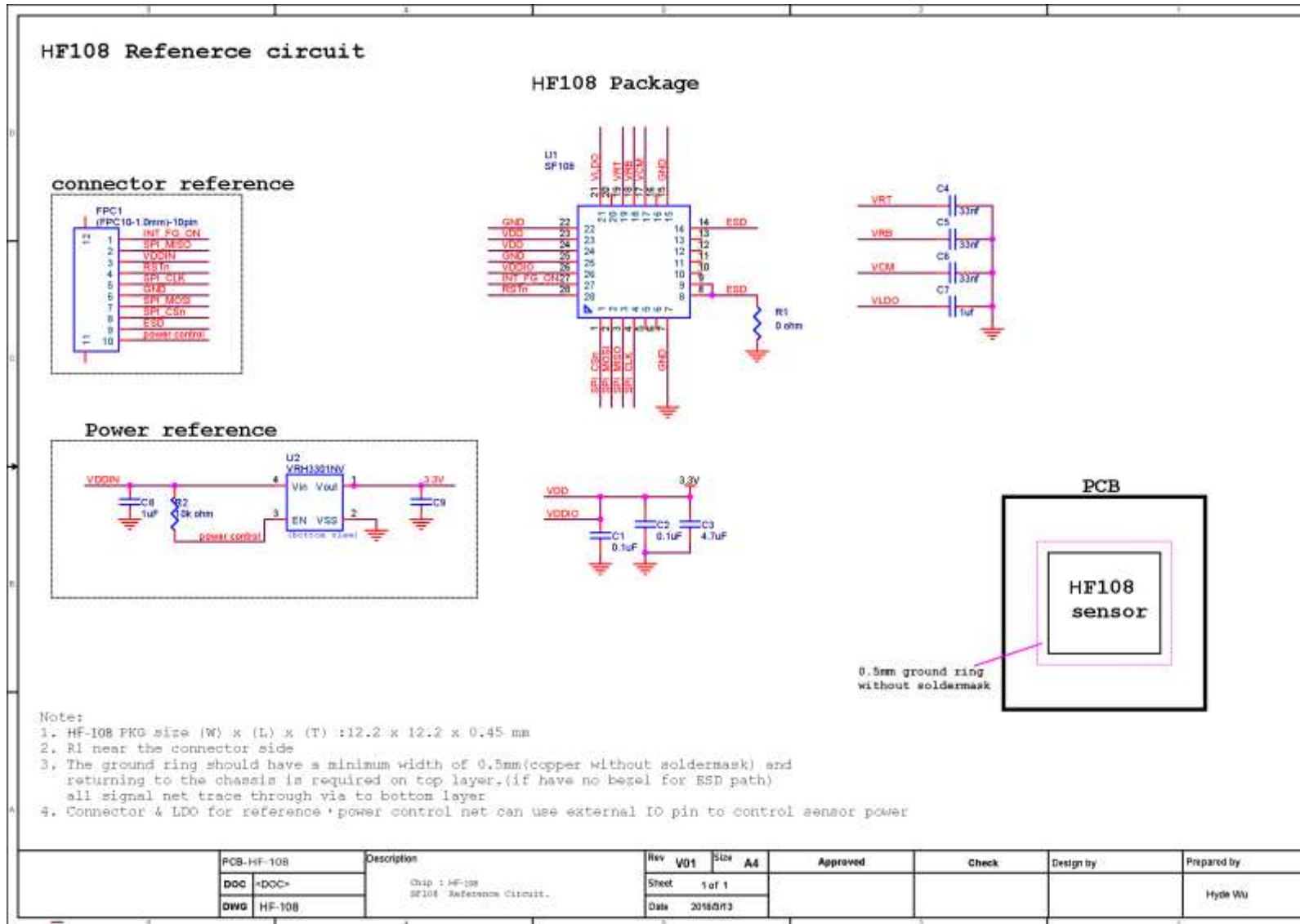
4. Reference schematic

4.1 HF108 reference schematic – SPI interface



(*1) : Should the same as MCU SPI IO voltage.

4.2 HF108 reference schematic



5. Revision history

Version	Date	Changes	Approved	Checked	Author
V0.1	2018/03/21	Initial version	PC Yu	PC Yu	Hyde Wu