



FINGERPRINTS

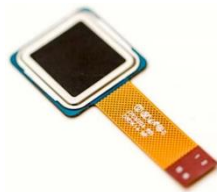
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Product Specification

FPC1020AM

Area Sensor Module

Revision B





FINGERPRINTS

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1 Overview

The FPC1020AM includes a capacitive touch fingerprint sensor with low power consumption, specifically developed and optimized for mobile devices. The FPC1020AM sensor offers smartphone, tablet and PC OEMs unprecedented performance and the opportunity to relieve consumers from the burden of using PIN codes and passwords for user verification. The FPC1020AM sensor includes the following features:

- Fingerprint touch sensor
- Integrated conductive bezel
- Ultra-thin 16-pin PCB flex film connector
- Superior 3D image quality
- 508 dpi resolution
- 192 x 192 pixels with 8-bit depth
- High-speed SPI interface
- Ultra low power consumption
- 1.8 Volt operation
- Extended ESD range 30kV
- Wake-up functionality



Securing mobile devices, mobile payments, accessing cloud services, and assigning shortcuts to different fingers are among the use cases for the FPC1020AM sensor.

The robustness, low price and ultra-thin flex cable make the FPC1020AM ideal for integration into cost sensitive consumer electronics, such as mobile phones and tablets. In addition to this, the low power consumption makes it very attractive to use in battery powered units.

1.1 General Description

The FPC1020AM module package is built around Fingerprint Cards (FPC) proprietary CMOS implementation FPC1020, offering superior, high-resolution fingerprint images and a high speed serial interface. The FPC1020AM interface features include:

- Analog and digital power supplies with individual filtering/decoupling.
- Interrupt (finger detect) and reset
- Integrated support for ESD protection

Only a few additional low-cost, passive components are necessary to integrate the FPC1020AM sensor into a system. The FPC1020AM module package includes a Transient Voltage Suppressor (TVS) for Electrostatic Discharge (ESD) protection purposes, and RC filters. The sensor is easily integrated using a few simple software commands sent over the high speed SPI interface. The module is connected to a main board by an 16-pin PCB flex film connector cable.

The FPC1020AM delivers superior image quality, with 256 grey scale values in every single pixel. The fingerprint image is delivered in a raw unprocessed format from the sensor, giving the user the opportunity to further process the image.

The FPC1020AM module is suitable for numerous types of authentication systems. These systems may be based on a number of CPUs. Software drivers are available which enable the full functionality of the sensor module.



1.2 Technical Features

An overview of the technical features of the FPC1020AM module is shown in Table 1.

Parameter	Description	Value	Unit
Package type	Module	-	-
Sensor dimension	Sensor body (W x L x T), nominal	12.15 x 11.37 x 0.7	mm
Weight	Sensor body	<1	gram
Active sensing area	-	9.6 x 9.6	mm
Sensing array	Size (W x L)	192 x 192	pixel
Spatial resolution	-	508	dpi
Pixel resolution	256 gray scale levels	8	bit
Supply voltage	DC voltage, typical (IO voltage 1.8 - 3.3)	1.8 (3.3)	V
Supply current	Typical at 1.8V	6	mA
Supply current sleep mode	Finger detection active, typical	2.6	µA
Supply current deep sleep mode	Finger detection active, typical	1.3	µA
Storage temperature	-	- 40 ... + 85	°C
Operating temperature	-	- 40 ... + 85	°C
ESD ¹	IEC61000-4-2, level X, air discharge	±30	kV

Note 1: With proper integration according to this specification.

Table 1: Technical features



2 Mechanical Properties

This chapter gives an overview of the mechanical properties of the FPC1020AM module.

- All measurements are in millimeters.
- Dimensional data is based on nominal values.
- Tolerance ranges are defined in the corresponding mechanical drawing.

2.1 Module

The following views of the FPC1020AM module are illustrated below as part drawings:

- Top
- Bottom
- Side
- Side Detail 'A'

2.1.1 Top View

A part drawing for the top view of the FPC1020AM module is shown in Figure 1.

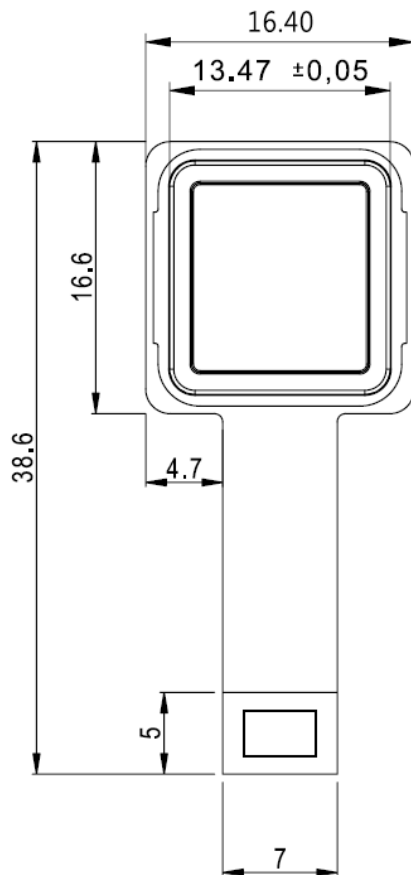


Figure 1: Part drawing - module top view

Shielding

The front side of the flex connector is shielded.



2.1.2 Bottom View

A part drawing for the bottom view of the FPC1020AM module is shown in Figure 2.

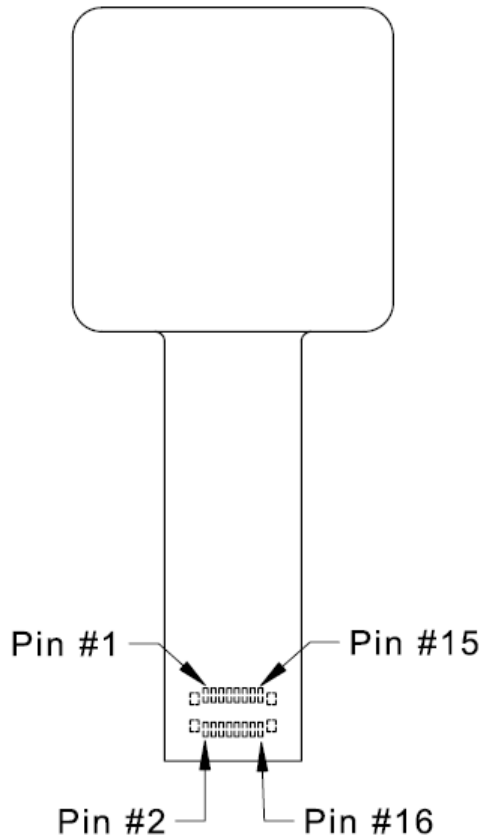


Figure 2: Part drawing - module bottom view

Grounding

The back side of the flex connector is grounded.

PCB Connector

For the recommended mounting pattern and dimensions for the 16-pin PCB connector please see the Hirose website – www.hirose.com for your nearest distributor.

The part number is BM10NB(0.8)-16DS-0.4V(51).



2.1.3 Side View

A part drawing for the side view of the FPC1020AM module is shown in Figure 3.

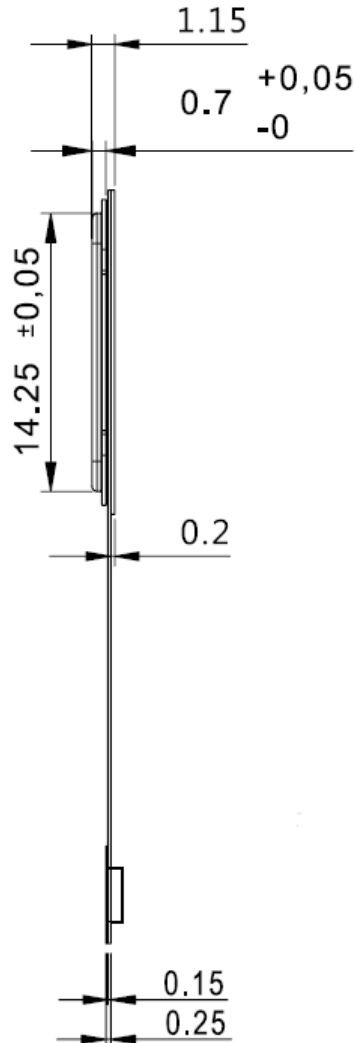


Figure 3: Part drawing – module side view



2.1.4 Side View Detail

A part drawing for a detailed side view – A – of the FPC1020AM module is shown in Figure 4.

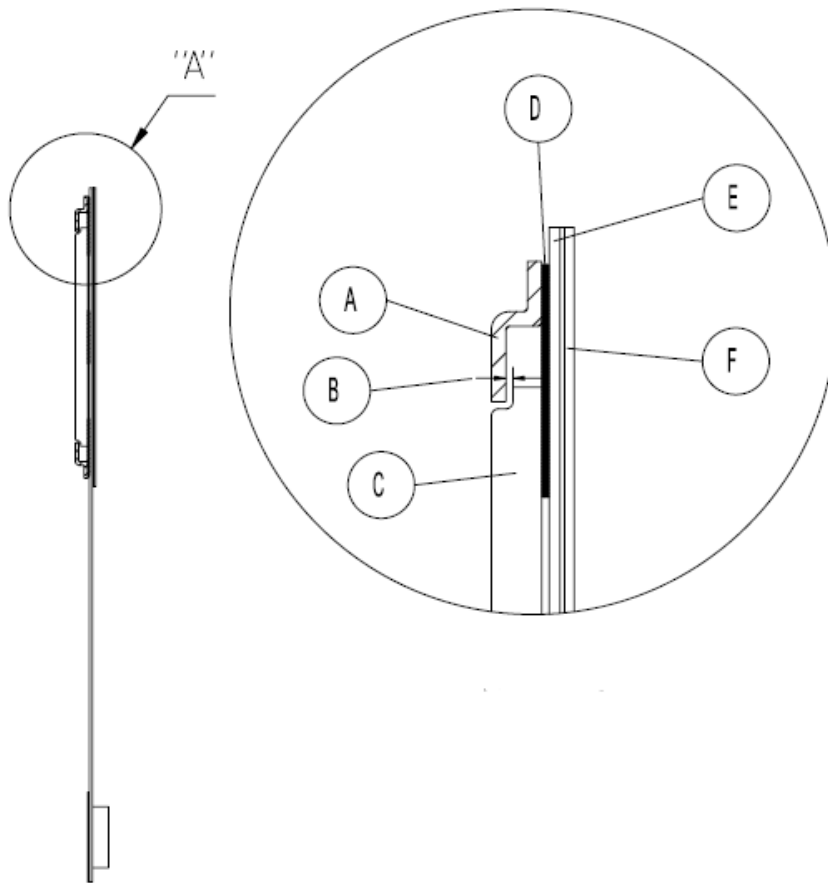


Figure 4: Part drawing – module side detail view

The thickness of the components in the side detail illustrated in Figure 4 can be seen in Table 2.

Component	Part Name	Thickness (mm)
A	Bezel (SUS)	0.2
B	Bezel LGA Gap	0.1
C	LGA Package	0.4
D	Solder	0.1
E	FPCB	0.15
F	Stiffener(SUS), including 0,05 mm conductive adhesive towards FPCB	0.2
Total Thickness		1.15

Table 2: Module Component Thickness



3 Reference Schematic

The FPC1020AM sensor module consists of a flexible 16-pin PCB interface. The PCB interface is highlighted in the reference schematic shown in Figure 5.

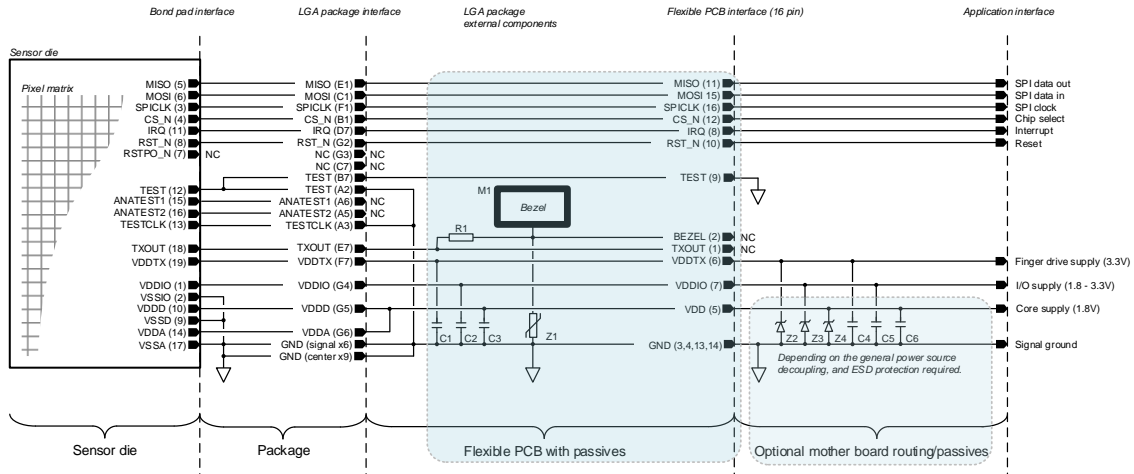


Figure 5: Reference Schematic

3.1 Bill of Materials

Optional surface-mounted device (SMD) motherboard components for the FPC1020AM interface are shown in the reference schematic in Figure 5. These SMD are described in Table 3.

Part	Value	Description	Comment
C5, C6	100 nF	Decoupling	Optional
C7, C8	4.7uF	Decoupling	Optional
Z2, Z3	3.3V	-	Optional ESD Protection

Table 3: Bill of materials

3.2 Flex Cable Pin Configuration

Each pin on the flex cable can be configured to represent a signal when connected to a mainboard. The flex cable pin configuration is outlined in Table 4.

No.	Name	Description
1	TXOUT	Drive signal
3	GND	Local ground plane/shield
5	VDD	Core Supply
7	VDDIO	I/O Supply
9	TEST	Connect to GND
11	MISO	SPI data out
13	GND	Local ground plane/shield
15	MOSI	SPI data in

No.	Name	Description
2	BEZEL	External TVS, NC
4	GND	Local ground plane/shield
6	VDDTX	Power Supply TXOUT
8	IRQ	Interrupt
10	RST_N	Reset
12	CS_N	Chip Select
14	GND	Local ground plane/shield
16	SPICLK	SPI Clock

Table 4: Flex cable pin configuration



4 Application Information

This chapter gives an overview of the application information relevant to the FPC1020AM module.

4.1 Module Integration

Due to the conductive bezel, a smooth transition to exterior mechanics can easily be obtained.

Important! Avoid galvanic contact

The module must be mounted in such way that electrical insulation to adjacent conductive surfaces is achieved. It is also recommended to avoid grounded surfaces nearby the bezel, as this may interfere with sensor operation.

Contact Fingerprint Cards for details on the mechanical reference design. 2D and 3D drawings are available.

Important! Mechanical force outside the maximum rating may cause permanent damage to the sensor.

4.2 ESD Sensor Protection

The FPC1020AM sensor has a robust sensor surface coating, which deflects discharges to the surrounding bezel. From the bezel, the discharge current is conducted via the Transient Voltage Suppressor (TVS) to the local ESD drain node. The at the bezel is thereby limited. The 100 Ω resistor limits the current towards the sensor chip to very safe levels.



5 Product Updates

An overview of the latest updates to the FPC1020AM sensor can be found in this section.

5.1 Product History

An overview of the previous versions of the FPC1020AM sensor product is shown in Table 5.

Revision	Date	Description	Details
1A	2014-08	First release of FPC1020AM module sensor package	Article number: FPC1020AM-CM03

Table 5: Product History

5.2 Document History

The updates and changes between the previous versions of this specification are outlined in Table 6.

Revision	Date	Changes
B	2014-09	Minor update, VDDTX, figure 4.
A	2014-08	New document

Table 6: Document History