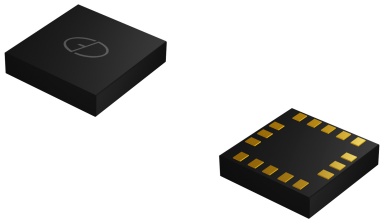
GSDA312
Three-Axis Digital Accelerometer

Features

- Low Profile and Small Footprint
- Wide Selectable Data Output Rate
- Digital I^2C/SPI Output Interface
- High Resolution
- Low Power Consumption
- Two Programmable Interrupt Generators Operating Independently for Motion Detection
- Embedded Self-test Function
- Factory Programmable Offset and Sensitivity
- RoHS Compliant



PACKAGE: LGA-16
3 x3 x0.9mm
(LxWxH max value in mm)

Applications

- User Interface for Mobile and PMP
- Display Orientation
- Gesture Recognition
- Active/Inactive Monitoring
- Free-fall Detection
- Double/Click Recognition
- Power Management
- Vibration Monitoring
- Inclination and Tilt Sensing
- Pedometer

Key Specifications

- LGA-16 Package 3x3x0.9 mm
- User Selectable Range ±2g, ±4g, ±8g, ±16g
- Data Output Rate from 1Hz to 1K Hz
- Supply Voltage 1.62V to 3.6V
- Digital Resolution 14-bit
- Operation Temperature Range -40°C to +85°C

Description

The GSDA312 is a capacitive three-axis linear accelerometer specifically designed to meet the requirements for low-power consumer electronics. Packaged in 3x3x0.9mm land grid array (LGA-16), the device has an outstanding operating temperature range of -40°C to +85°C. Utilizing state of the art techniques and process, GSDA312 sensor element is fabricated by single crystal silicon with DRIE process and is protected by hermetically sealed silicon cap. The device features full-scale measurement range up of ±2g/ ±4g/ ±8g/ ±16g , high resolution of 14-bit and a wide of data output rate while embedding signal condition, temperature compensation, self-test, power-down mode, flexible interrupt, digital interface of I^2C and SPI enable design engineers most flexibility to configure desired patterns and functionalities.

Mechanical Characteristics

(V_{DD}=2.5V, T=25°C unless otherwise noted)

Symbol	Parameter	Test conditions	Min	Type	Max	Unit
FS	Measurement Range	FS bit set to 00		±2		g
		FS bit set to 01		±4		g
		FS bit set to 10		±8		g
		FS bit set to 11		±16		g
So	Sensitivity	FS bit set to 00		4096		LSB/g
		FS bit set to 01		2048		LSB/g
		FS bit set to 10		1024		LSB/g
		FS bit set to 11		512		LSB/g
TCSo	Sensitivity Change vs. Temperature	FS bit set to 00		0.01		%/°C
Tyoff	Typical Zero-g Level Offset Accuracy			70		mg
Tcoff	Zero-g Level Change vs. Temperature	Max delta from 25°C		±0.6		mg/°C
An	Acceleration Noise Density	FS bit set to 00, Normal Mode, ODR = 1000Hz		150	200	ug/sqrt(Hz)
Vst	Self-test Output Change	X: FS bit set to 00		400		mg
		Y: FS bit set to 00		400		mg
		Z: FS bit set to 00		400		mg
Top	Operation Temperature Range		-40		85	°C

Note:

1. The product is factory calibrated at 2.5 V. The operational power supply range is from 1.62V to 3.6 V.

Electrical Characteristics

(V_{DD}=2.5V, T=25°C unless otherwise noted)

Symbol	Parameter	Test conditions	Min	Typ.	Max	Unit
V_{DD}	Supply Voltage		1.62	2.5	3.6	V
V_{DD_IO}	I/O Pins Supply Voltage		1.62		3.6	V
I_{DD}	Current Consumption in Normal Mode	Top=25°C, ODR=1kHz		180		uA
I_{DD_LP}	Current Consumption in Low Power Mode	Top=25°C, ODR=62.5Hz, BW=500Hz		40		uA
I_{DD_SM}	Current Consumption in Suspend Mode	Top=25°C				uA
V_{IH}	Digital High Level Input Voltage	SPI & I^2C	$0.7*V_{DD\_IO}$			V
V_{IL}	Digital Low Level Input Voltage	SPI & I^2C			$0.3*V_{DD\_IO}$	V
V_{OH}	High Level Output Voltage		$0.9*V_{DD\_IO}$			V
V_{OL}	Low Level Output Voltage				$0.1*V_{DD\_IO}$	V
BW	System Bandwidth		1.95		500	Hz
ODR	Output Data Rate		1		1000	Hz
Wake-up Time	twu	From Stand-by		1		ms
Start-up Time	tsu	From Power-off		3		ms
PSRR	Power Supply Rejection Rate	Top=25°C			20	mg/V

Absolute Maximum Ratings

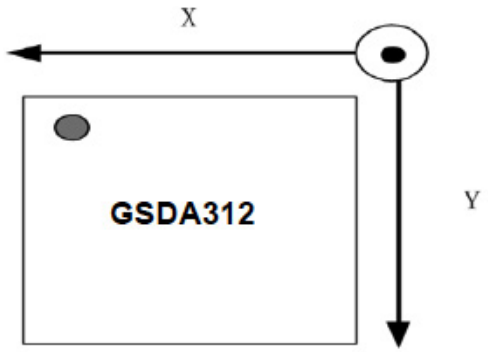
Parameter	Test conditions	Min	Max	Unit
Storage Temperature		-45	125	℃
Supply Voltage	Supply Pins	-0.3	4.25	V
Supply Voltage	Logic Pins	-0.3	Vdd_I_O+0.3	V
ESD Rating	HMB,R=1.5k,C=100pF		±2	kV
Mechanical Shock	Duration<200us		10,000	g

Notes:

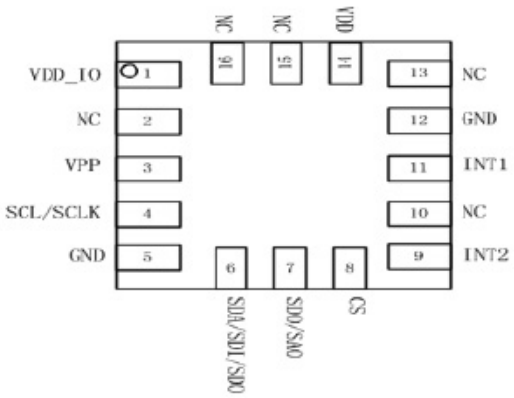
1. Stresses above those listed as “absolute maximum ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device under these conditions is not implied. Exposure to maximum rating conditions for extended periods may affect device reliability.
2. Supply voltage on any pin should never exceed 4.25V.
3. This is a mechanical shock sensitive device, improper handling can cause permanent damages to the part.

4. This is an ESD sensitive device, improper handling can cause permanent damages to the part.

Pin Configuration



(Top View)

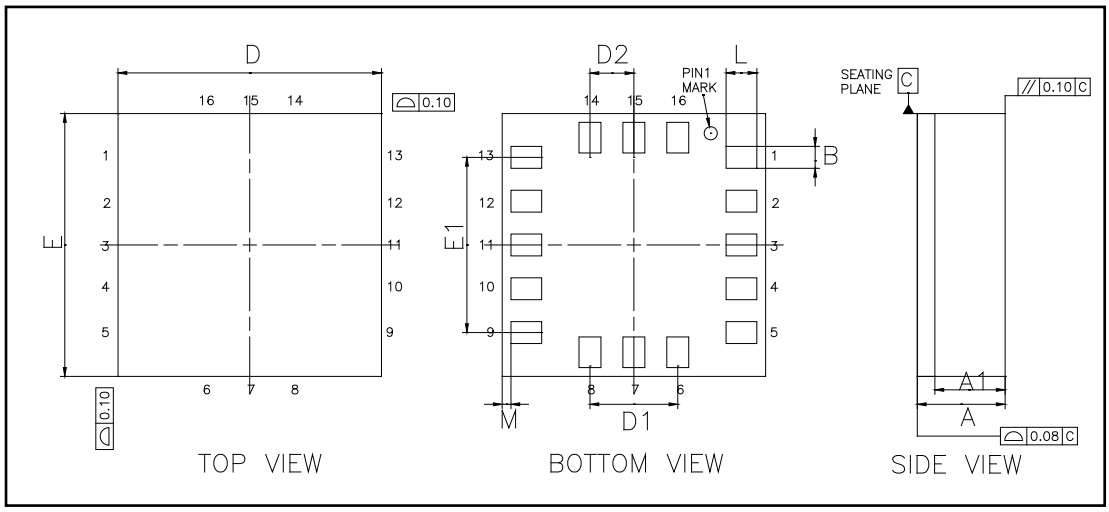


(Bottom View)

Pin Description

Pin#	Name	Function
1	VDD_IO	Power Supply for I/O Pins
2	NC	Not Connected
3	VPP	VPP for OTP
4	SCL SCLK	I²C Serial Clock (SCL) SPI Serial Port Clock (SCLK)
5	GND	0V Supply
6	SDA SDI SDO	I²C Serial Data (SDA) SPI Serial Data Input (SDI) 3-Wire Interface Serial Data Output (SDO)
7	SDO SA0	SPI Serial Data Output (SDO) I²C Less Significant Bit of The Device Address (SA0)
8	CS	SPI Enable I2C/SPI Mode Selection (1: I²C mode; 0: SPI Enabled)
9	INT2	Inertial Interrupt 2
10	NC	Not Connected
11	INT1	Inertial Interrupt 1
12	GND	0V Supply
13	NC	Not Connected
14	VDD	Power Supply
15	NC	Not Connected
16	NC	Not Connected

Mechanical Data and Package Dimensions : 16 Pin LGA



SYMBOL	DIMENSION (MM)		
	MIN.	NOM.	MAX.
A	0.84	0.92	1.00
A1	0.68	0.73	0.78
B	0.20	0.25	0.30
D	2.90	3.00	3.10
D1	0.90	1.00	1.10
D2	0.50 NOM.		
E	2.90	3.00	3.10
E1	1.90	2.00	2.10
L	0.30	0.35	0.40
M	0.04	0.10	0.16