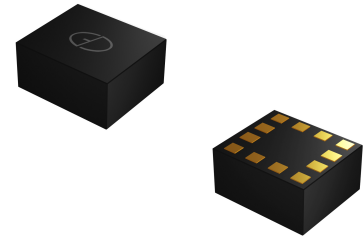


# GSDA213

## Three-Axis Digital Accelerometer

### Features

- Low Profile and Small Footprint
- Selectable Full-scale Measurement Range
- Wide Data Output Range
- Digital I<sup>2</sup>C/SPI Output Interface
- Free-fall Detection
- High Resolution
- Low Power Consumption
- Two Programmable Interrupt Generators Operating Independently for Motion Detection
- Factory Programmable Offset and Sensitivity
- RoHS Compliant



PACKAGE: LGA-12  
2 x 2 x 1.1 mm  
(LxWxH max value in mm)

### Applications

- User interface for mobile phone and PMP
- Gesture recognition
- Active monitoring
- Power management
- Vibration monitoring

### Key Specifications

- LGA-12 Package 2x2x1.1mm
- User Selectable Range  $\pm 2g$ ,  $\pm 4g$ ,  $\pm 8g$ ,  $\pm 16g$
- Data Output Rate from 1Hz to 1K Hz
- Supply Voltage 1.62V to 3.6V
- Digital Resolution 14-bit
- Operation Temperature Range  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$

### Description

The GSDA213 is a capacitive three-axis linear accelerometer specifically designed to meet the requirements for Ultra-Low-Power consumer electronics. Packaged in 2x2x1.1mm land grid array (LGA), the device has an outstanding operating temperature range of  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ . Utilizing state of the art techniques and process, GSDA213 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 to 16g, high resolution of 14-bit and a wide range of data output rate while embedding signal condition, temperature compensation, and motion detection. Power-down mode, two independent and flexible interrupts, and digital interface of I<sup>2</sup>C offer design engineers most flexibility to configure desired patterns and functionalities.

# GSDA213

## Three-Axis Digital Accelerometer

### Mechanical Characteristics

( $V_{DD}=2.5V$ ,  $T = 25^{\circ}C$  unless otherwise noted)

Symbol	Parameter	Test conditions	Min	Type	Max	Unit
FS	Measurement range	FS bit set to 00	-	$\pm 2$	-	g
		FS bit set to 01	-	$\pm 4$	-	g
		FS bit set to 10	-	$\pm 8$	-	g
		FS bit set to 11	-	$\pm 16$	-	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	-	$\pm 0.01$	-	%/ $^{\circ}C$
Tyoff	Typical zero-g level offset accuracy	-	-	$\pm 70$	-	mg
Tcoff	Zero-g level change vs. temperature	Max delta from $25^{\circ}C$	-	$\pm 0.6$	-	mg/ $^{\circ}C$
An	Acceleration noise density	FS bit set to 00, Normal Mode, ODR = 125Hz	-	200	-	ug/sqrt (Hz)
XY noise	XY STDEVA noise	FS bit set to 00, Normal Mode, ODR = 125Hz	-	2.2	-	mg
Z noise	Z STDEVA noise	FS bit set to 00, Normal Mode, ODR = 125Hz	-	3.8	-	mg
Top	Operation temperature range	-	-40	-	85	$^{\circ}C$

# GSDA213

## Three-Axis Digital Accelerometer

### Electrical Characteristics

( $V_{DD} = 2.5V$ ,  $T = 25^{\circ}C$  unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ.	Max	Unit
VDD	Supply voltage	-	1.62	2.5	3.6	V
VDD_IO	I/O Pins supply voltage	-	1.62		VDD	V
IDD	current consumption in normal mode	Top=25°C, ODR=1kHz	-	180	-	uA
IDD_LP	current consumption in low power mode	Top=25°C, ODR=62.5Hz, BW=500Hz	-	40	-	uA
IDD_SM	current consumption in suspend mode	Top=25°C	-	0.7	-	uA
VIH	Digital high level input voltage	SPI&I2C	0.7*Vdd _IO	-	-	V
VIL	Digital low level input voltage	SPI&I2C	-	-	0.3*Vdd _IO	V
VOH	high level output voltage	-	0.9*Vdd _IO	-	-	V
VOL	Low level output voltage	-	-	-	0.1*Vdd _IO	V
BW	System bandwidth	-	1.95	-	500	Hz
ODR	Output data rate	-	1	-	1000	Hz
TWU	Wake-up time	From stand-by	-	1	-	ms
TSU	Start-up time	From power off	-	3	-	ms
PSRR	Power Supply Rejection Rate	Top=25°C	-	-	20	mg/V

# GSDA213

## Three-Axis Digital Accelerometer

### Absolute Maximum Ratings

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

Note:

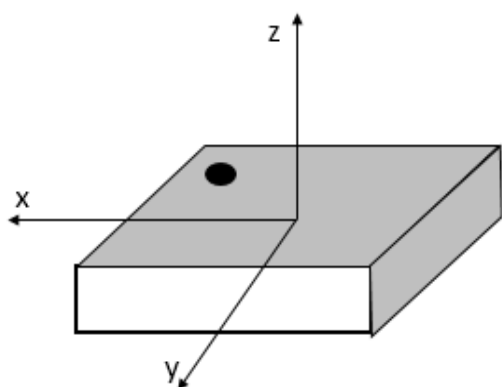
- Stresses above those listed as “absolute maximum ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device under these conditions is not implied. Exposure to maximum rating conditions for extended periods may affect device reliability.
-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



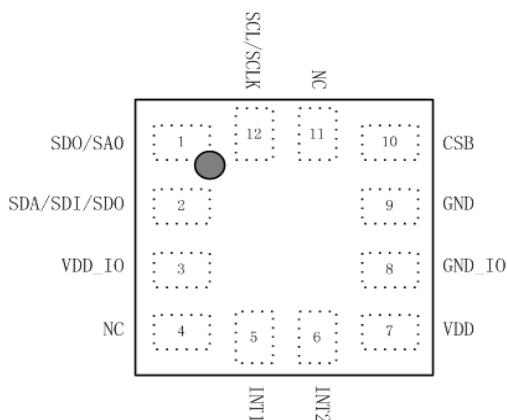
- This is an ESD sensitive device, improper handling can cause permanent damages to the part.



### Pin Configuration



(Top View)



(Top View)

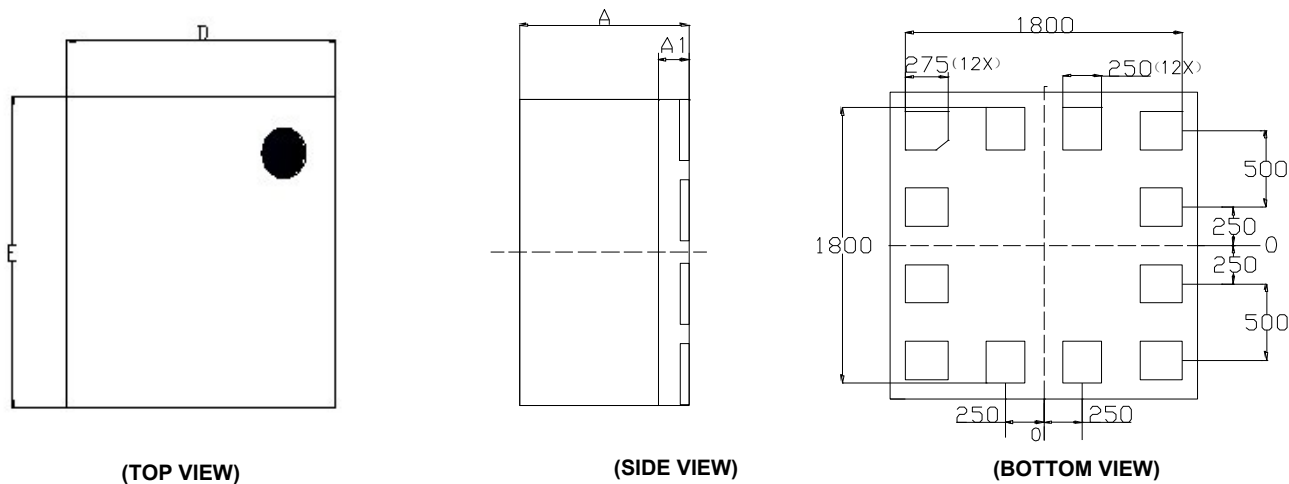
### Pin Description

Pin#	Name	I/O Type	Function
1	SDO SA0	Digital out	SPI (4-wire mode) serial data output (SDO) I2C less significant bit of the device address (SA0)
2	SDA SDI SDO	Digital I/O	I2C serial data input/output (SDA) SPI (4-wire mode) serial data input (SDI) 3-wire interface serial data input/output (SDO)
3	VDD_IO	Supply	Power supply for I/O pins
4	NC	-	Not connected, This pin must be floating or connected to GND
5	INT1	Digital out	Interrupt pin1
6	INT2	Digital out	Interrupt pin2
7	VDD	Supply	Power supply
8	GND_IO	Ground	Ground supply for I/O pins
9	GND	Ground	Ground supply
10	CSB	Digital in	Chip select for SPI When using the I2C communication, CS pin must be connected to VDDIO or floating
11	NC	-	Not connected
12	SCL SCLK	Digital in	I2C serial clock (SCL) SPI serial clock (SCLK)

# GSDA213

## Three-Axis Digital Accelerometer

### Mechanical Data and Package Dimensions: 12 Pin LGA



COMMON DIMENSIONS (UM)			
PKG.	W:VERYVERY THIN		
REF.	MIN.	NOM.	MAX
A	1000	1100	1200
A1	200 REF.		
D	1900	2000	2100
E	1900	2000	2100