KXUD9 Series

Accelerometers and Inclinometers

FEATURES

Ultra-small Package - 3x3x0.9mm LGA

Digital SPI/I^2C Output

User-programmable g-Range

User-programmable Low Pass Filter

Ultra-low Power Consumption

Lead-free Solderability

High Shock Survivability

Auxiliary Input for A/D Conversion

Self-test Function

MARKETS

APPLICATIONS

Cell Phones and Handheld PDAs

Gesture Recognition and User Interface Function

Game Controllers & Computer Peripherals

Inclination and Tilt Sensing

Ultra-Mobile PCs/Laptops/Hard Disk Drives

Free-fall Detection

Cameras and Video Equipment

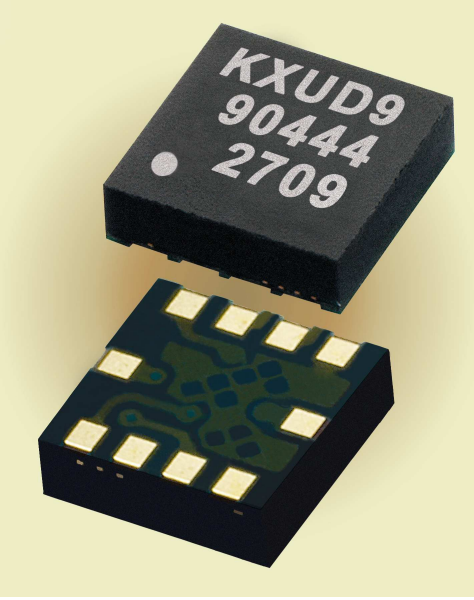
Image Stabilization

Sports Diagnostic Equipment/Pedometers

Static or Dynamic Acceleration

PROPRIETARY TECHNOLOGY

The KXUD9 series is designed to provide flexibility. These sensors can accept supply voltages between 1.8V and 3.6V. Sensitivity is user selectable at 2g, 4g, 6g, and 8g. Several user-programmable internal low pass filters eliminate the need for external filter capacitors. The auxiliary input provides access to the embedded A/D converter.



These high-performance silicon micromachined linear accelerometers and inclinometers consist of a sensor element and an ASIC packaged in a 3x3x0.9mm Land Grid Array (LGA). The sensor element is fabricated from single-crystal silicon with proprietary Deep Reactive Ion Etching (DRIE) processes, and is protected from the environment by a hermetically-sealed silicon cap at the wafer level.

The sensor element functions on the principle of differential capacitance. Acceleration causes displacement of a silicon structure resulting in a change in capacitance. An ASIC, fabricated using a standard CMOS manufacturing process, detects and transforms changes in capacitance into an digital output voltage, which is proportional to acceleration. The sense element design utilizes common mode cancellation to decrease errors from process variation and environmental stress. The voltage is digitized by an on-board A/D converter and is accessed via inter-integrated circuit (I^2C) or serial peripheral interface (SPI) digital communications.

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PERFORMANCE SPECIFICATIONS

The performance parameters below are programmed and tested at 2.6V and 3.3V. However, the device can be factory programmed to accept supply voltages from 1.8V to 3.6V. Performance parameters will change with supply voltage variations.

PERFORMANCE SPECIFICATIONS				
PARAMETERS	**UNITS**	**KXUD9-1026**	**KXUD9-2050**	**CONDITION**
Range	g	±2.0, ±4.0, ±6.0, ±8.0		User-selectable full-scale output range
Sensitivity [1]	Counts/g	819, 410, 273, 205 typical		
0g Offset vs. Temp	mg/°C	±0.5 typical		-40°C to +85°C
Sensitivity vs. Temp	%/°C	±0.01 (xy) ±0.04 (z) typical		-40°C to +85°C
Noise Density	$\mu g / \sqrt{Hz}$	750 typical		
Mechanical Resonance [2]	Hz	3500 (xy) 1800 (z)		-3dB
-40°C to +85°C	Hz	50 default 100, 500, 1000, 2000, no filter (available settings)		User programmable
Non-Linearity	% of FS	0.1 typical		% of full scale output
Cross-axis Sensitivity	%	2.0 typical		
A/D Conversion Time	µs	200 typical		
SPI Communication Rate [3]	MHz	1 max		
I^2C Communication Rate	kHz	400 max		
Power Supply	V	2.6 typical (3.6 max)	3.3 typical (3.6 max)	Standard
Current Consumption	µA	220 typical		Operating
	µA	0.3 typical		Standby
ENVIRONMENTAL SPECIFICATIONS				
PARAMETERS	**UNITS**	**KXUD9-1026**	**KXUD9-2050**	**CONDITION**
Operating Temperature	°C	-40 to 85		Powered
Storage Temperature	°C	-55 to 150		Un-powered
Mechanical Shock	g	5,000 for 0.5 ms 10,000 for 0.2 ms		Powered or un-powered halversine
ESD	V	2,000		Human body model

NOTES

[1] User selectable from CTRL_REGC.

[2] Resonance as defined by the dampened mechanical sensor.

[3] SPI communication rate can be optimized for faster communication. See SPI timing diagram, page 4 of Product Specifications.

ORDERING GUIDE

Product	Output	Axes of Sensitivity	Range (g)	Sensitivity (counts/g)	Offset (counts)	Operating Voltage (V)	Temperature (℃)	Package
KXUD9-1026	Digital SPI/I^2C	XYZ	2, 4, 6, 8	819, 410, 273, 205	2048	2.6	-40 to +85	3x3x0.9mm LGA
KXUD9-2050	Digital SPI/I^2C	XYZ	2, 4, 6, 8	819, 410, 273, 205	2048	3.3	-40 to +85	3x3x0.9mm LGA