



KXPA4 Series

Accelerometers and Inclinometers

FEATURES

- Small Package - 5x5x1.2mm DFN
- Lead-free Solderability
- Multiplexed Analog Output
- High Shock Survivability
- Excellent Temperature Performance
- Low Noise Density
- Low Power Consumption
- Selectable Power Reduction Modes
- User Definable Bandwidth
- Factory Programmable Offset and Sensitivity
- Self-test Function

PROPRIETARY TECHNOLOGY

These high-performance silicon micromachined linear accelerometers and inclinometers consists of a sensor element and an ASIC packaged in a 5x5x1.2mm Dual Flat No-lead (DFN). 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.

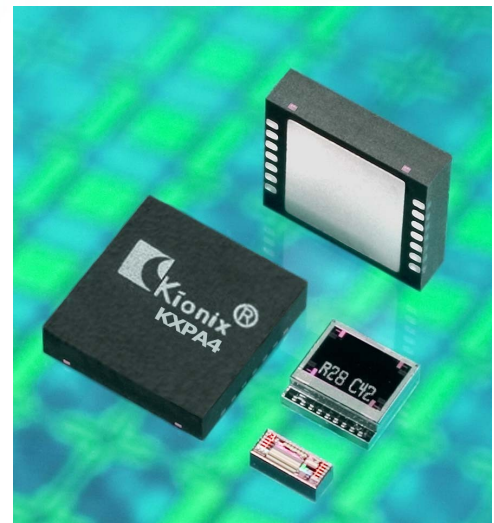
The **KXPA4** series is designed to provide a high signal-to-noise ratio with excellent performance over temperature. These sensors can accept supply voltages between 2.7V and 5.25V. Sensitivity is factory programmable allowing customization for applications requiring from $\pm 1.5g$ to $\pm 6.0g$ ranges. Sensor bandwidth is user-definable.

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, using a standard CMOS manufacturing process, detects and transforms changes in capacitance into an analog output voltage, which is proportional to acceleration. The analog output is also accessed through an on-board 3 channel multiplexer. The sense element design utilizes common mode cancellation to decrease errors from process variation and environmental stress.

MARKETS

APPLICATIONS

- Hard Disk Drives/Laptops*
 - Free-fall Detection
- Cell Phones and Handheld PDAs*
 - Gesture Recognition
- Game Controllers & Computer Peripherals*
 - Inclination and Tilt Sensing
- Cameras and Video Equipment*
 - Image Stabilization
- Sports Diagnostic Equipment/Pedometers*
 - Static or Dynamic Acceleration
- Personal Navigation Devices*
 - Inertial Navigation and Dead Reckoning



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PERFORMANCE SPECIFICATIONS

The performance parameters are programmed and tested at 2.8 volts (KXPA4-1050) and 3.3V (KXPA4-2050). However, the device can be factory programmed to accept supply voltages from 2.7 V to 5.25 V. Operation at reduced supply voltages, down to 2.6 V, can be achieved by narrowing the operating temperature range. Performance parameters will change with supply voltage variations.

PERFORMANCE SPECIFICATIONS				
PARAMETERS	UNITS	KXPA4-1050	KXPA4-2050	CONDITION
Range ¹	g	±2.0		Factory programmable
Sensitivity	mV/g	560	660	
0g Offset vs. Temp.	mg/°C	±1 typical		
Sensitivity vs. Temp	%/°C	±0.015 typical		
Span	mV	±1120	±1320	
Noise	$\mu\text{g} / \sqrt{\text{Hz}}$	175 typical		
Bandwidth ²	Hz	3300 max (x and y) 1700 max (z)		-3dB
Output Resistance ³	Ω	32K typical		
Non-Linearity	% of FS	0.1 typical		
Ratiometric Error	%	0.3 typical (1.5 max)		
Cross-axis Sensitivity	%	2.0 typical		
Power Supply	V	2.8	3.3	
	V	-0.3 (min) 7.0 (max)		Absolute min/max
	mA	1.1 typical		
	μA	10 max		Shutdown pin connected to GND
	ms	1.6		Power-up time @ 500 Hz ⁴
ENVIRONMENTAL SPECIFICATIONS				
PARAMETERS	UNITS	KXPA4 Series		CONDITION
Operating Temperature	°C	-40 to 85		Powered
Storage Temperature	°C	-55 to 150		Unpowered
Mechanical Shock	g	5000		Powered or unpowered, 0.5 msec halversine
ESD	V	3000		Human body model

NOTES

- ¹ Custom ranges from 1.5g to 6g available.
- ² Lower bandwidth can be achieved by using the external C₂, C₃, and C₄ (see Product Spec).
- ³ 32K Ω resistor connects the output amplifier to the output pin. Resistive loading may reduce sensitivity or cause a shift in offset. Maintaining a load resistance at 3.2M Ω will prevent appreciable changes.
- ⁴ The power-up time will increase or decrease according to bandwidth (5*R_{out}*C).

ORDERING GUIDE

Product	Axis(es) of Sensitivity	Range	Sensitivity (mV/g)	Offset (V)	Operating Voltage (V)	Temperature (°C)	Package
KXPA4-1050	XYZ	2g	560	1.40	2.8	-40 to +85	5x5x1.2mm DFN
KXPA4-2050	XYZ	2g	660	1.65	3.3	-40 to +85	5x5x1.2mm DFN