



KXP74 Series

Accelerometers and Inclinometers

FEATURES

- Small Package - 5x5x1.2 DFN
- Digital SPI Output
- Lead-free Solderability
- 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 **KXP74** 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. This voltage is digitized by an on-board A/D converter and is accessed via a Serial Peripheral Interface (SPI). 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. 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	KXP74-1050	CONDITION
Range	g	±2.0	Factory programmable
Sensitivity	count/g	819 typical	
Og Offset vs. Temp.	mg/°C	±1 typical	
Sensitivity vs. Temp	%/°C	±0.015 typical	
Noise	mg / \sqrt{Hz}	175 typical	
Bandwidth ¹	Hz	0 to 3300 max (x and y) 0 to 1700 max (z)	-3dB
Non-Linearity	% of FS	0.1 typical	For 10-90% of range
Ratiometric Error	%	0.3 typical (1.5 max)	
Cross-axis Sensitivity	%	2.0 typical	
Resolution	mg	1.22 typical	
A/D Conversion Time ²	µS	40 typical	
SPI Communication Speed	MHz	5 typical	
Power Supply	V	2.8	
I/O Pads Supply Voltage	V	1.7 (min) to Vdd (max)	
Current Consumption	mA	0.8 typical	Current draw @ 2.8V
	µA	10 max	Standby—over temperature
ENVIRONMENTAL SPECIFICATIONS			
PARAMETERS	UNITS	KXP74 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
DIGITAL INPUT-PIN SPECIFICATIONS			
PARAMETERS	UNITS	KXP74 Series	CONDITION
Input Low Voltage	V	≤ 0.2 * IO Vdd	
Input High Voltage	V	≥ 0.8 * IO Vdd	
Input Pull-down Current	µA	60 typical	

NOTES

¹ The bandwidth is determined by the external capacitors: C₂, C₃, and C₄ (see Product Spec).

² A complete conversion and readback of one channel takes approximately 50µs. This allows all three channels to be repeatedly converted and read at a 6.67KHz rate, well in excess of a typical lowpass filter setting of about 200Hz.

ORDERING GUIDE

Product	Axis(es) of Sensitivity	Range (g)	Span (counts)	Sensitivity (mg/count)	Offset (counts)	Operating Voltage (V)	Temperature (°C)	Package
KXP74-1050	XYZ	2	+/- 1600	1.22	2048	2.8	-40 to +85	5x5x1.2mm DFN