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

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

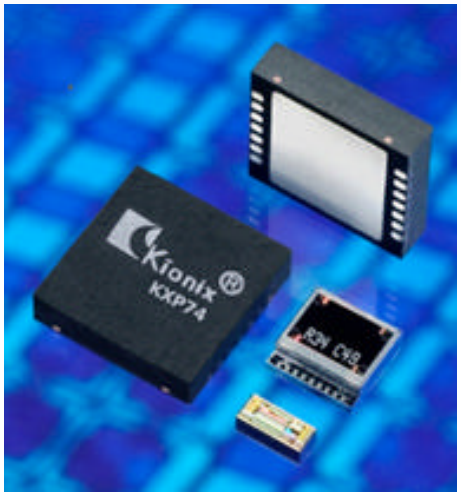
Static or Dynamic Acceleration

Personal Navigation Devices

Inertial Navigation and Dead Reckoning

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 ±1.5g to ±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.

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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	
0g 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: C_2 , C_3 , and C_4 (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