



KXTE9 Series

Accelerometers and Inclinometers

FEATURES

- Ultra-Small Package - 3x3x0.9mm LGA
- Activity-monitoring Algorithm (Active/Inactive)
- Device Orientation Detection Algorithm
- Digital I²C Communication Interface
- Very Low Power Consumption (30µA full operation)
- Lead-free Solderability
- Excellent Temperature Performance
- High Shock Survivability
- User-selectable Output Data Rate
- Factory Programmable Offset and Sensitivity
- Self-test Function

PROPRIETARY TECHNOLOGY

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 KXTE9's advanced, orientation-detection feature reports changes in landscape, portrait, face-up, and face-down conditions. This sophisticated, embedded algorithm eliminates the need for continuous data collection and complex calculations by a microprocessor. With a few adjustable parameters, the screen-rotation algorithm can be optimized for an intuitive user experience. In addition to orientation detection, the KXTE9 features an activity-monitoring function. This function reports changes in a device's motion state, either moving (active) or not moving (inactive). A highly-manufacturable product with consistent product performance across use conditions, the KXTE9 operates across a supply voltage of 1.8V to 3.6V DC.

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 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 an inter-integrated circuit (I²C).

MARKETS

APPLICATIONS

Mobile Phones and Mobile Internet Devices

- Screen Rotation
- Gesture Recognition
- User Interface
- Power Management
- Activity Monitoring

Game Controllers and Computer Peripherals

- Inclination and Tilt Sensing
- User Interface
- Power Management
- Activity Monitoring

Sports Diagnostic Equipment

- Static and Dynamic Acceleration
- Activity Monitoring



36 Thornwood Dr. - Ithaca, NY 14850 USA tel: 607-257-1080 - fax: 607-257-1146 - www.kionix.com - info@kionix.com

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PERFORMANCE SPECIFICATIONS

The performance parameters below are programmed and tested for $\pm 2.0g$, 6-bit operation at 3.3 volts and 25°C. 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	KXTE9-2050	CONDITION
Range	g	± 2.0	Factory programmable
Sensitivity	counts/g	16 typical	
Sensitivity vs. Temp	%/°C	± 0.01 (X, Y) ± 0.03 (Z) typical	
0g Offset	counts	32 typical	
0g Offset vs. Temp.	mg/°C	± 0.6 typical	
Non-Linearity	% of FS	0.1 typical	% of full scale output
Cross-axis Sensitivity	%	2.0 typical	
I ² C Communication Rate	KHz	400 max	
Power Supply	V	3.3 typical	Factory programmable
Current Consumption	μA	30 typical	Operating
	μA	0.1 typical	Standby
ENVIRONMENTAL SPECIFICATIONS			
PARAMETERS	UNITS	KXTE9-2050	CONDITION
Operating Temperature	°C	-40 to 85	Powered
Storage Temperature	°C	-55 to 150	Un-powered
Mechanical Shock	g	5000, 0.5 msec	Powered or un-powered, halversine
		10,000, 0.2 msec	
ESD	V	2000	Human body model

ORDERING GUIDE

Product	Axis(es) of Sensitivity	Range (g)	Sensitivity (counts/g)	Offset (counts)	Operating Voltage (V)	Temperature (°C)	Package
KXTE9-1026	XYZ	2	16	32	2.6	-40 to +85	3x3x0.9mm LGA
KXTE9-1050	XYZ	2	16	32	2.8	-40 to +85	3x3x0.9mm LGA
KXTE9-2050	XYZ	2	16	32	3.3	-40 to +85	3x3x0.9mm LGA
KXTE9-4100	XYZ	2	16	32	1.8	-40 to +85	3x3x0.9mm LGA