KXTF9 Series

Accelerometers and Inclinometers

FEATURES

Ultra-Small Package - 3x3x0.9mm LGA
User-selectable G Range
User-selectable Output Data Rate
Directional Tap/Double-Tap™ Detection Algorithm
Active/Inactive Detection Algorithm
Device-orientation Detection Algorithm
Digital I^2C 8-bit or 12-bit Resolution
Digital High-Pass Filter Outputs
Low Power Consumption
Lead-free Solderability
Excellent Temperature Performance
High Shock Survivability
Factory Programmable Offset and Sensitivity
Self-test Function

MARKETS

APPLICATIONS

Mobile Phones and Mobile Internet Devices

User Interface
Gesture Recognition
Power Management
Active/Inactive Monitoring

Game Controllers and Computer Peripherals

Inclination and Tilt Sensing
User Interface
Power Management
Activity Monitoring
Gesture Recognition

Health Care and Fitness

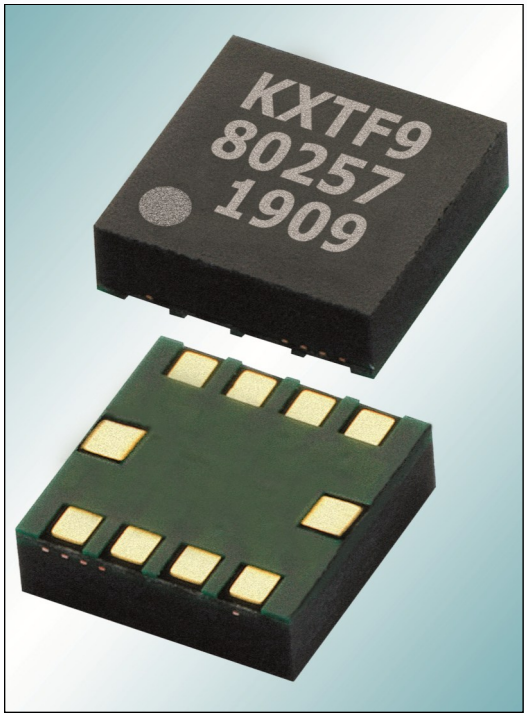
Static and Dynamic Acceleration
Activity Monitoring
Gesture Recognition

Personal Navigation Devices

E-Compass
Dead Reckoning

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 KXTF9's *Directional Tap/Double-Tap™* detection feature recognizes single-tap and double-tap input and reports the acceleration axis and direction from which each tap originated, enabling up to 12, user-defined, function commands. Its active/inactive algorithm reports changes in a device's motion state, either moving (active) or not moving (inactive), and the orientation-detection feature reports changes in landscape, portrait, face-up, and face-down conditions. A highly-manufacturable product with consistent product performance across use conditions, the KXTF9 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. The sense element design utilizes common mode cancellation to decrease errors from process variation and environmental stress. An ASIC, using a standard CMOS manufacturing process, detects and transforms capacitance changes into an analog voltage, which is proportional to acceleration. Analog signals are further processed into digital signals and within embedded digital algorithms. The device communicates to the system via I^2C bus interface.

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PERFORMANCE SPECIFICATIONS

The performance parameters below are programmed and tested at 1.8 volts (KXTF9-4100) and 3.3V (KXTF9-2050). However, the devices 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**	**KXTF9-4100**	**KXTF9-2050**	**CONDITION**
Range	g	±2.0, ±4.0, ±8.0	±2.0, ±4.0, ±8.0	User-selectable full-scale output range
Sensitivity [1]	counts/g	64, 32, 16	64, 32, 16	(8-bit) Typical
		1024, 512, 256	1024, 512, 256	(12-bit)Typical
Sensitivity vs. Temp	%/°C	±0.01 (xy) ±0.03 (z)	±0.01 (xy) ±0.03 (z)	Typical
0g Offset vs. Temp.	mg/°C	±0.7 (xy) ±0.4 (z)	±0.7 (xy) ±0.4 (z)	Typical
Mechanical Resonance [2]	Hz	3500 (xy) 1800 (z)	3500 (xy) 1800 (z)	-3dB (Typical)
Output Data Rate (ODR) [3]	Hz	25 min; 800 max	25 min; 800 max	
Bandwidth [4]	Hz	ODR/2 typical	ODR/2 typical	
Non-Linearity	% of FS	1.0 typical	1.0 typical	% of full scale output
Cross-axis Sensitivity	%	2.0 typical	2.0 typical	
I^2C Communication Rate	KHz	400 max	400 max	
Power Supply	V	1.8 typical	3.3 typical	Factory programmable, 1.8V - 3.6V
Current Consumption	µA	230 typical	360 typical	RES = 0; Operating
	µA	570 typical	840 typical	RES = 1; Operating
	µA	0.1 typical	0.1 typical	Standby
ENVIRONMENTAL SPECIFICATIONS				
PARAMETERS	**UNITS**	**KXTF9-4100**	**KXTF9-2050**	**CONDITION**
Operating Temperature	°C	-40 to 85	-40 to 85	Powered
Storage Temperature	°C	-55 to 150	-55 to 150	Un-powered
Mechanical Shock	g	5000, 0.5 msec 10,000, 0.2 msec	5000, 0.5 msec 10,000, 0.2 msec	Powered or un-powered, halversine
ESD	V	2000 Max	2000 Max	Human body model

[1] Resolution and acceleration ranges are user selectable via I^2C.
[2] Resonance as defined by the dampened mechanical sensor.
[3] User selectable.
[4] Dependent on ODR and 8-bit or 12-bit resolution.

ORDERING GUIDE

Product	Output	Axes of Sensitivity	Range (g)	Sensitivity (counts/g)	Offset (counts)	Operating Voltage (V)	Temperature (°C)	Package
KXTF9-1026	Digital I^2C	XYZ	2, 4, 8	64, 32, 16 (8-bit) 1024, 512, 256 (12-bit)	0	2.6	-40 to +85	3x3x0.9mm LGA
KXTF9-2050	Digital I^2C	XYZ	2, 4, 8	64, 32, 16 (8-bit) 1024, 512, 256 (12-bit)	0	3.3	-40 to +85	3x3x0.9mm LGA
KXTF9-4100	Digital I^2C	XYZ	2, 4, 8	64, 32, 16 (8-bit) 1024, 512, 256 (12-bit)	0	1.8	-40 to +85	3x3x0.9mm LGA