



KGY13 Series

Gyroscopes

FEATURES

- Small Package — 5x5x0.9 mm LGA
- Tri-axis
- Digital (SPI/I²C) or Gain-selectable Analog
- Outputs
- Low Power
- User Definable Bandwidth
- Embedded Temperature Sensor
- Lead-free Solderability

MARKETS

APPLICATIONS

- Game Controllers & Computer Peripherals*
 - Tilt Sensing

- Cameras and Video Equipment*
 - Image Stabilization

- Location-based Services*
 - Dead-reckoning

- Cell Phones and Handheld PDAs*
 - Gesture Recognition

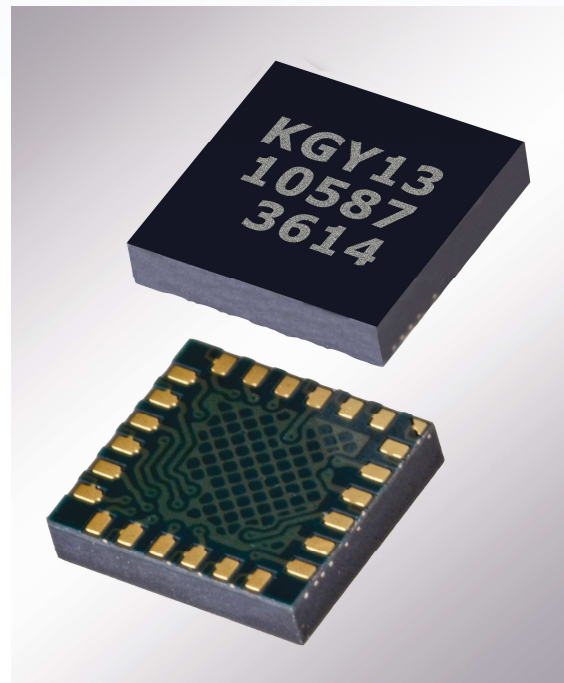
- Health Care and Fitness*
 - Body-motion Dynamics

PROPRIETARY TECHNOLOGY

The **KGY13** series is designed to strike a balance between current consumption and noise performance with excellent bias stability over temperature. These sensors can accept supply voltages between 2.6V and 3.3V, and digital communication voltages between 1.8 and 3.3V. Sensor bandwidth is user-definable.

These high-performance silicon micromachined angular rate sensors consist of a sensor element and an ASIC packaged in a 5x5x0.9mm Land Grid Array (LGA). The sensor element is fabricated from 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 sensor element functions on the principle of differential capacitance. During operation, the sensor elements are forced into vibration. When angular velocities are applied about the sensing axes, vibration is transferred to the sensing elements, causing capacitance changes at sensor electrodes. Capacitance changes are amplified and converted into digital signals, which are processed by a dedicated digital-signal-processing unit. The digital signal processor applies filtering, bias and sensitivity adjustment, as well as temperature compensation. The DSP also feeds back the driving signal to ensure the proper sensor excitation.



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PERFORMANCE SPECIFICATIONS

The performance parameters are programmed and tested at 3.0 volts. However, the device can be factory programmed to accept supply voltages from 2.6 V to 3.3 V. Performance parameters will change with supply voltage variations.

PERFORMANCE SPECIFICATIONS			
PARAMETERS	UNITS	KGY13	CONDITION
Range ¹	deg/s	±2048	Digital/Factory programmable
		±256, ±512, ±1024, ±2048	Analog/User selectable
Sensitivity	Counts/deg/s	1.6	16-bit digital
Sensitivity ²	mV/deg/s	5.85, 2.93, 1.46, 0.73	10-bit DAC analog
Zero Rate Output over Temp	± deg/s	5 typical	
Noise Density	deg/s/√Hz	0.12 typical	
Bandwidth	Hz	10, 20, 40, 80	(-3dB) User selectable
Non-Linearity	% of FS	±1 typical	% of full scale output
Sensor Mechanical Resonance	kHz	10 min	(-3dB)
Start-up Time ³	ms	300	
I ² C Communication Rate	kHz	400 max	
SPI Communication Rate ⁴	MHz	40 max	
Power Supply	V	2.6 — 3.3	Analog
		1.8 — 3.3	Digital
Current Consumption	mA	6.2 typical	Operating
		0.3 max	Standby
ENVIRONMENTAL SPECIFICATIONS			
PARAMETERS	UNITS	KGY13	CONDITION
Operating Temperature	°C	-40 to +85	Powered
Storage Temperature	°C	-55 to 150	Un-powered
Mechanical Shock	g	5,000 for 0.5 ms 10,000 for 0.2 ms	Powered or un-powered halversine
ESD	V	2,000	Human body model

NOTES

¹ Custom ranges up to 3200 deg/s.

² Analog sensitivity is user selectable via external pins.

³ Time to enable the part after power up.

⁴ Assuming max bus capacitance load of 20pF.