



## FEATURES

- **Simple Interface** - No signal conditioning required
- **Surface Mount** - RoHS & REACH compliant, lead free, Halogen free
- **Made in USA** - fully automated production, 100% testing, worldwide quality and price leader
- **Ultra Miniature Size** – 1.9 mm x 3.6 mm
- **Nano-power** - As little as 50 nA
- **Industrial Rated** - 10 year life, -40° to 85° C

## FUNCTION

- Normally closed at rest
- Omnidirectional movement sensing
- Chatters open / closed when tilted or vibrated in any direction regardless of orientation

## APPLICATIONS

- Motion triggered wake-up
- GPS tracking, RFID, vehicle electronics
- Security, anti-tamper, anti-theft, alarms

## DESCRIPTION

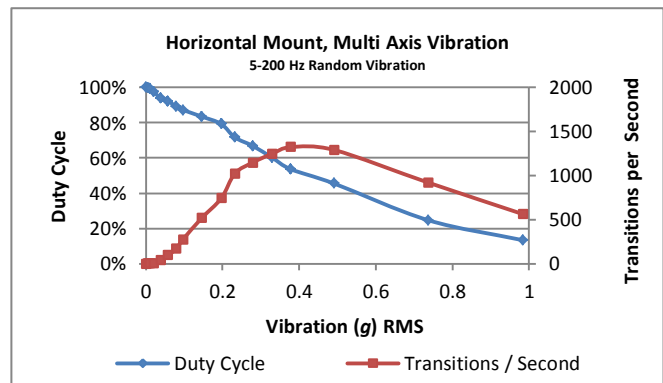
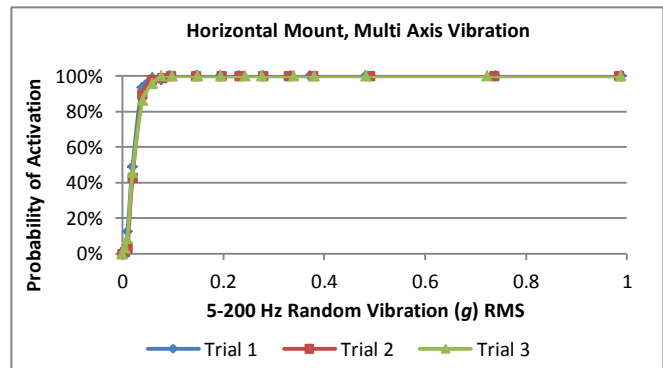
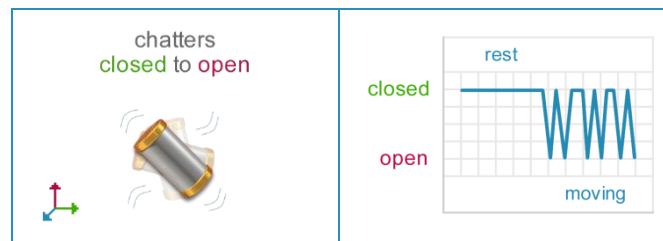
The SQ-MIN-200 series sensor acts like a normally closed switch which chatters open and closed as it is tilted or vibrated. Unlike other rolling-ball sensors, the 200 is truly an omnidirectional movement sensor. It will function regardless of how it is mounted or aligned.

When at rest, it normally settles in a closed state. When in motion, it will produce continuous on/off contact closures. It is sensitive to both tilt (static acceleration) and vibration (dynamic acceleration). The sensor can be easily used to produce a series of CMOS or TTL level logic level or pulse train using a single resistor to limit current. The signal level can be read directly by a digital input. This can be used to interrupt (wake up) a microcontroller or can be counted to estimate the amount and duration of activity. The sensor is fully passive, requires no signal conditioning, and draws as little as 50 nA of continuous current.

## PATENTS

United States: 7326866, 7067748, 7326867, Taiwan: I334019, Korea: 10-0946453, Mexico: 275272. Patents pending.

## FUNCTIONAL DIAGRAM



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## THEORY OF OPERATION

The SQ-MIN-200 series sensor acts like a normally closed switch which chatters open and closed as it is tilted or vibrated. Note that the SQ-MIN-200 is not guaranteed to be closed – occasionally the sensing mechanism may remain open when at rest. The engineer should design his or her software to look for high-to-low and low-to-high edge transitions rather than an open or closed state of the switch.

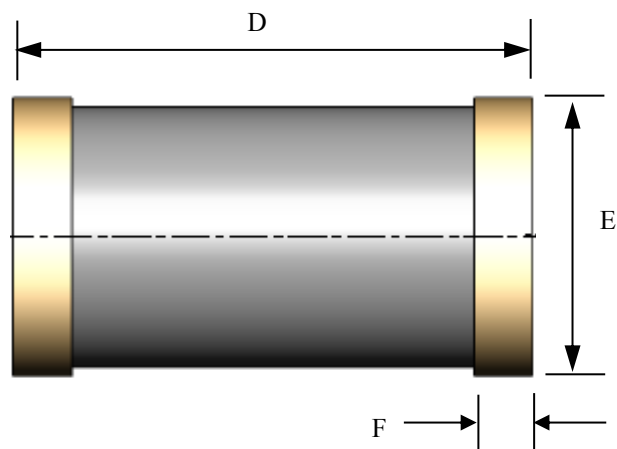
## CHARACTERISTICS

PARAMETER	MIN	MAX	CONDITIONS
Shock Survival		5,000 g	5x, 0.1 ms half-sin, any axis
Storage Temperature	-40 °C	85 °C	
Supply Voltage Range	0.5 V	12 V	
Current Sink*	50 nA	10 mA	

\* Current consumption is determined by the resistance of the application circuit and the supply voltage.

## DIMENSIONS

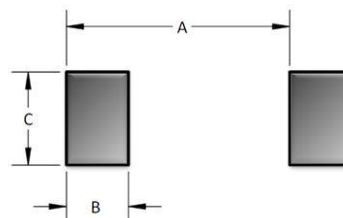
### PHYSICAL SIZE



SYMBOL	DESCRIPTION	MM	TOLERANCE
D	Length	3.60	±0.1
E	Diameter	1.95	±0.1
F	Terminal Width	0.40	±0.1

### PCB LANDING

SYMBOL	DESCRIPTION	MM
A	Pitch	3.6
B	Pad Length	1.0
C	Pad Width	1.5



\***Note:** Alternative layouts may be used to optimize size or manufacturability

**PRODUCT COMPARISON**

GRADE	ASSEMBLY METHOD	SEALED	WASHABLE	ROHS	OPERATING TEMPERATURE	CYCLES *	SERVICE LIFE (YRS)
I	Reflow Solder: 260° C peak Hand Assembly: 315° C peak, 2 -3 seconds on end terminal	Yes	Yes	Yes	-40° to +85° C	1 Billion	10
C	Reflow Solder: 260° C peak Hand Assembly: 315° C peak, 2 -3 seconds on end terminal	Yes	Yes	Yes	-25° to +70° C	1 Billion	5

\*Test conditions: 0.5 gRMS, 5 to 200 Hz flat spectrum

**ORDERING GUIDE**

PART NUMBER	PACKAGING CODE	COMPLETE ORDER NUMBER
SQ-MIN-200-C	TR - Tape on Reel	SQ-MIN-200-CTR
SQ-MIN-200-I	CT - Cut Tape TR - Tape on Reel	SQ-MIN-200-ICT SQ-MIN-200-ITR

## **LIMITATIONS AND WARNINGS**

This product is not designed for use in life support and/or safety equipment where malfunction of the product can reasonably be expected to result in personal injury or death. Buyer uses this product in such applications at Buyer's own risk and agrees to defend, indemnify, and hold harmless SignalQuest, LLC from any and all damages, claims, suits, or expenses resulting from such misuse.

## **TESTING**

The performance of each sensor is verified through build-time testing.

## **SYSTEM INTEGRATION TESTING**

Thorough testing should be carried out prior to product release to ensure system integration has not introduced unforeseen problems. The system integrator assumes the ultimate responsibility for the safety of the target application.

## **NOTICE**

Information furnished by SignalQuest, Inc is believed to be accurate and reliable. However, this document may contain ERRORS and OMMISIONS. Accordingly, the design engineer should use this document as a reference rather than a strict design guideline and should perform thorough testing of any product that incorporates this or any other SignalQuest product. No responsibility is assumed by SignalQuest, LLC for this use of this information, nor for any infringements of patents or other rights of third parties that may result from its use. Specifications are subject to change without notice. No license is granted by implication or otherwise under any patent or patent rights of SignalQuest, LLC Trademarks and registered trademarks are the property of their respective companies.

## **FURTHER INFORMATION**

For pricing, deliveries, and ordering information, please contact SignalQuest at (603) 448-6266  
For updates on this and other documents, visit our website at [www.signalquest.com](http://www.signalquest.com).

## **NOTES**