

RoHS compliant,  
lead-free SMD  
package

## FUNCTION

- On / off tilt sensing
- Normally open when above horizontal
- Normally closed when below horizontal
- Chatters open / closed when vibrated

## FEATURES

- **Ultra low power** - As little as 0.25 uA continuous
- **Surface mount device (SMD)** - RoHS compliant, lead-free, tape and reel
- **High sensitivity & long life** - 99.97% pure gold plating
- **Miniature size** - 3.3 mm x 6.9 mm
- **Simple interface** - No signal conditioning required
- **Quiet** - Undetectable sounds level

## APPLICATIONS

- Tilt angle detection, vibration sensing
- Security, anti-tamper, anti-theft
- Alarms, automotive

## FUNCTIONAL REPLACEMENT FOR

- SQ-SEN-001P
- SQ-SEN-001PS

## PATENTS

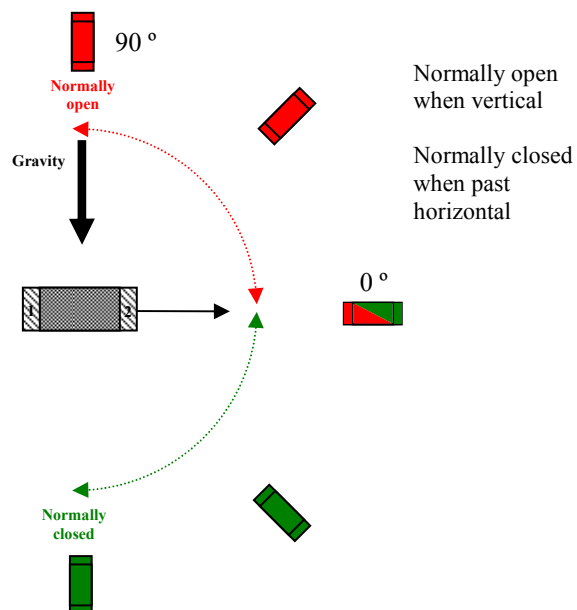
- US 7326866, 7067748, 7326867, 7421793.  
Patents pending.

## DESCRIPTION

The SQ-SEN-390 series sensor acts like a position sensitive switch which is normally closed when below horizontal and normally open when above horizontal.

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 0.25uA of continuous current.

## FUNCTIONAL DIAGRAM



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## THEORY OF OPERATION

The SQ-SEN-3XX series sensor acts like a position sensitive switch which is normally open in a range of orientations, and a normally closed in another range of orientations. When resting in a normally open orientation, contacts are virtually guaranteed to be open. When resting in the normally closed orientation (unlike normally open) contacts are not guaranteed to be closed. A good rule of thumb is that they will be closed 75% - 99% of the time, when at rest.

When in a normally closed orientation, the sensor will chatter open and closed as it is vibrated. The engineer should design his or her software to look for high-to-low and low-to-high edge transitions rather than an open of closed state of the switch.

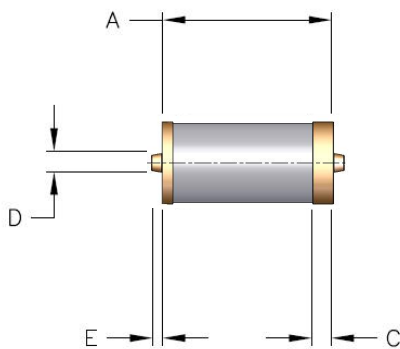
## ELECTRICAL CHARACTERISTICS

PARAMETER	MIN	MAX	UNITS
Supply Voltage Range	2.7	12	Vdc
Current Sink*	0.00025	5	mA

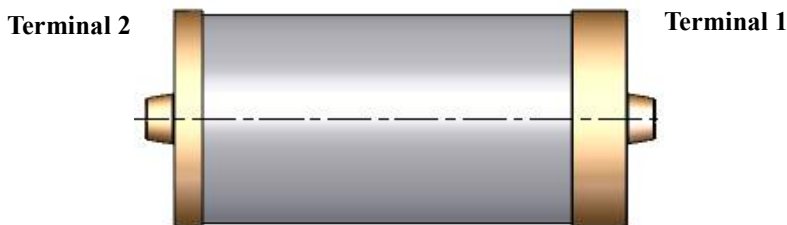
\* Current consumption is determined by the resistance of the application circuit and the supply voltage.

## DIMENSIONS

### PHYSICAL SIZE



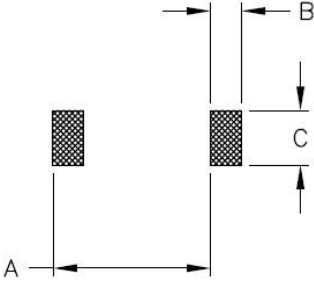
SYMBOL	DESCRIPTION	MM	TOLERANCE
A	Length	6.8	±0.25
B	Diameter	3.3	±0.1
C	Terminal Width	0.8	±0.25
D	Solder Nub Diameter	0.9	±0.25
E	Solder Nub Length	0.4	±0.1



**EXAMPLE PCB LANDING**

RECOMMENDED PCB LANDING			ALTERNATE, PCB CUTOUT LANDING (USE FOR LOWEST PROFILE)		
<b>SYMBOL</b>	<b>DESCRIPTION</b>	<b>MM</b>	<b>SYMBOL</b>	<b>DESCRIPTION</b>	<b>MM</b>
A	Pitch	6.0	A	Recess Length	7.25
B	Pad Length	1.2	B	Pad Length	0.8
C	Pad Width	2.1	C	Pad Width	1.5
			D	Recess Width	3.6

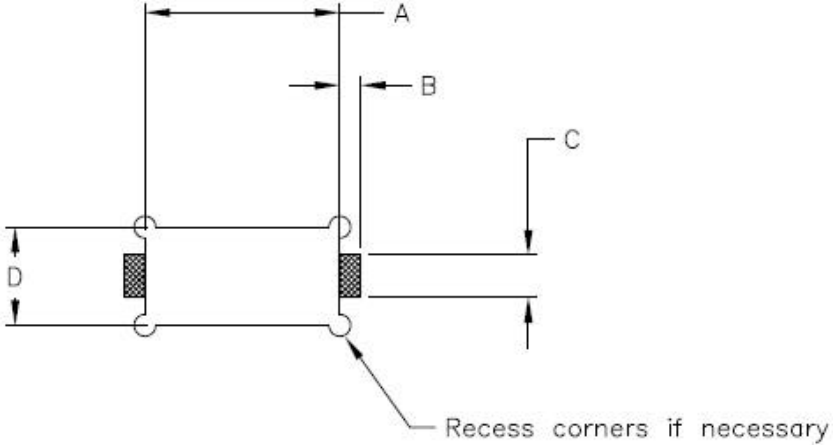
  



A

B

C



A

B

C

D

Recess corners if necessary

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

## PRODUCT COMPARISON

GRADE	ASSEMBLY METHOD	SEALING	WASH TOLERANCE	PB-FREE, ROHS	OPERATING TEMPERATURE
C	Reflow Solder: 260° C peak Hand Assembly: 315° C peak, 2 -3 seconds on end terminal	Yes	Washable	Yes	0C to + 70C
I	Reflow Solder: 260° C peak Hand Assembly: 315° C peak, 2 -3 seconds on end terminal	Yes	Washable	Yes	-40C to + 85C

## ORDERING GUIDE

PART NUMBER	PACKAGING CODE	COMPLETE ORDER NUMBER
SQ-SEN-390-C	BB - Bulk Bag CT - Cut Tape TR - Tape on Reel	SQ-SEN-390-CBB SQ-SEN-390-CCT SQ-SEN-390-CTR
SQ-SEN-390-I	BB - Bulk Bag CT - Cut Tape TR - Tape on Reel	SQ-SEN-390-IBB SQ-SEN-390-ICT SQ-SEN-390-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, Inc. 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 OMISSIONS. 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, Inc. 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, Inc. Trademarks and registered trademarks are the property of their respective companies.

## FURTHER INFORMATION

For pricing, delivery, 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**