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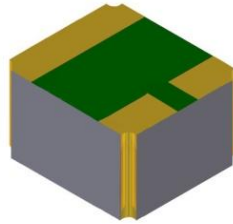
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DATASHEET

Micro Tilt and Vibration Sensor
TVS0713.180

Revision 1.1

2014, April 17



TVS0713.180

FEATURES

- Tilt and vibration sensor
- Halogen free
- Wide supply voltage range: 1.80 V to 15 V
- Low operating current
(e.g. I_{cc} max. 0.2 μ A at V_{cc} 2V and R 10Meg)
(e.g. I_{cc} max. 2.0 μ A at V_{cc} 2V and R 1Meg)
- Noiseless
- $R_{On} < 100 \Omega$
- Protected against environmental stress
- Automated SMT-mounting
- RoHS compliant, lead free
- Specified from -40 °C to +85 °C
- Size 2.85 mm x 2.45 mm x 1.7 mm
- Reacting point: approx. 50 mg

APPLICATIONS

- Motion detection
- Orientation detection – bottom or top
- System wake up – low power

MATERIAL

Package: PCB laminate material, halogen free
Inner contact material: Gold plated
Ball: Stainless steel, gold plated

DESCRIPTION

The micro tilt and vibration sensor is used for the detection of slight movements, vibration and orientation or tilt by means of a mobile micro sphere. The ball bridges two contacts reducing the resistance between the two external connection pads from several mega ohms (> 30 MOhm) to below 100 Ohms. The sensor is fully passive, requires no signal conditioning, and operates with currents as low as 0.2 μ A.

With the aid of tool-specific evaluation electronics, the micro tilt and vibration sensor controls the operation of movement-sensitive devices. The micro tilt and vibration sensor is utilised for converting many systems to environmentally friendly devices by implementing wake-up and power-down logic to conserve battery power and bringing energy consumption to a minimum, pushing the availability of green technology and green electronics into new areas of design and application.

The sensor is typically used for wake up and power down of battery operated devices depending on motion and/or orientation of the sensor, e.g. applications such as bike computers, remote controls, electronic lock systems, RFID transponders, GPS tracking systems, wireless sensor networks, illuminated dog's collars, access control systems, data loggers, bicycle lights.

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1. Operating Conditions

| PARAMETER | SYMBOL | MIN | MAX | UNIT |
|-------------------------------|-----------|-------|------|------|
| Supply voltage | V_{CC} | +1.80 | +15 | Vdc |
| Current | I_{CC} | | 2 | mA |
| R Open | R_O | - | > 30 | MOhm |
| R Closed | R_C | < 100 | - | Ohm |
| Operating ambient temperature | T_{amb} | -40 | +85 | °C |

* Current consumption is determined by the resistance of the application circuit and the supply voltage. The sensor is fully passive, requires no signal conditioning, and operates with currents as low as 0.2 μ A.

(e.g. max. I_{CC} 0.2 μ A at V_{CC} 2V and R 10Meg)

(e.g. max. I_{CC} 2.0 μ A at V_{CC} 2V and R 1Meg)

2. Soldering Process

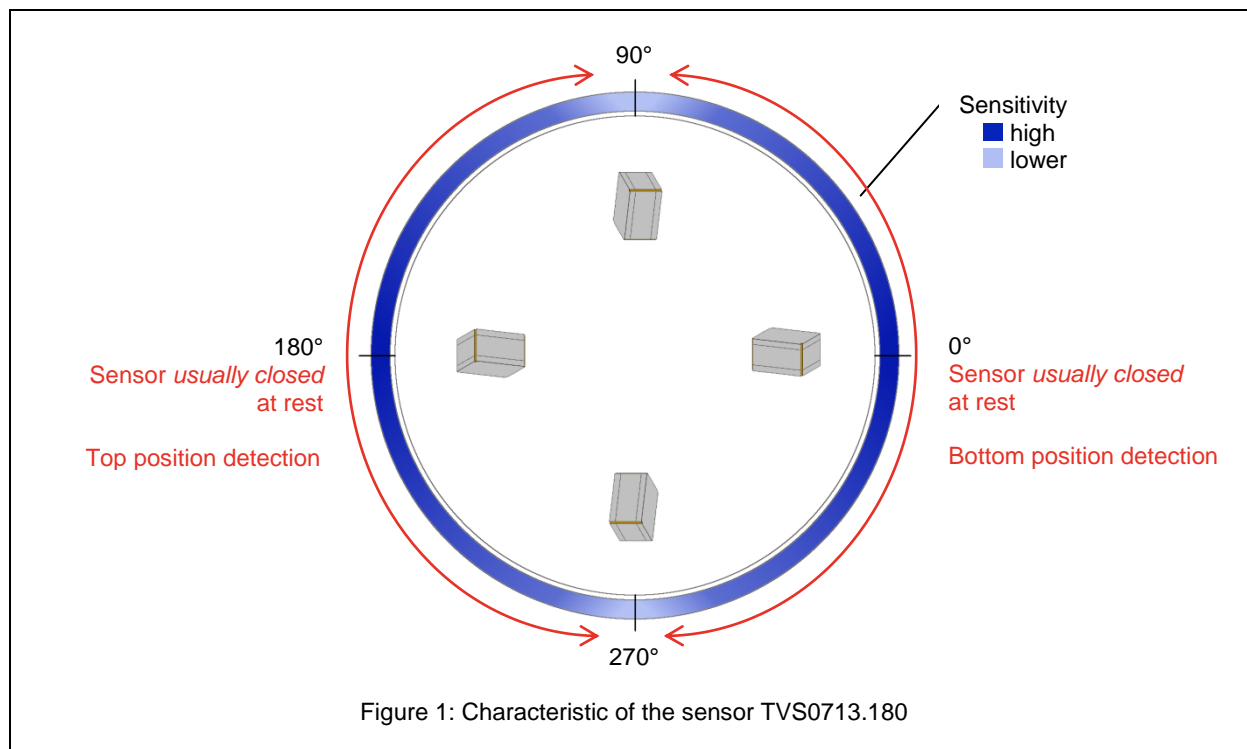
Reflow Soldering Process 260°C, 10 sec

3. Functionality

A mobile, gilded micro sphere is located inside the hollow space of the sensor. When moving, the micro sphere bridges two gilded contacts by switching over from a high resistive to a low resistive state. When the Sensor is at rest, it is **not necessarily closed**. Only in 70% - 99% of time the sensor will be closed when at rest.

Orientation detection for bottom and top, as both are kept separate out.

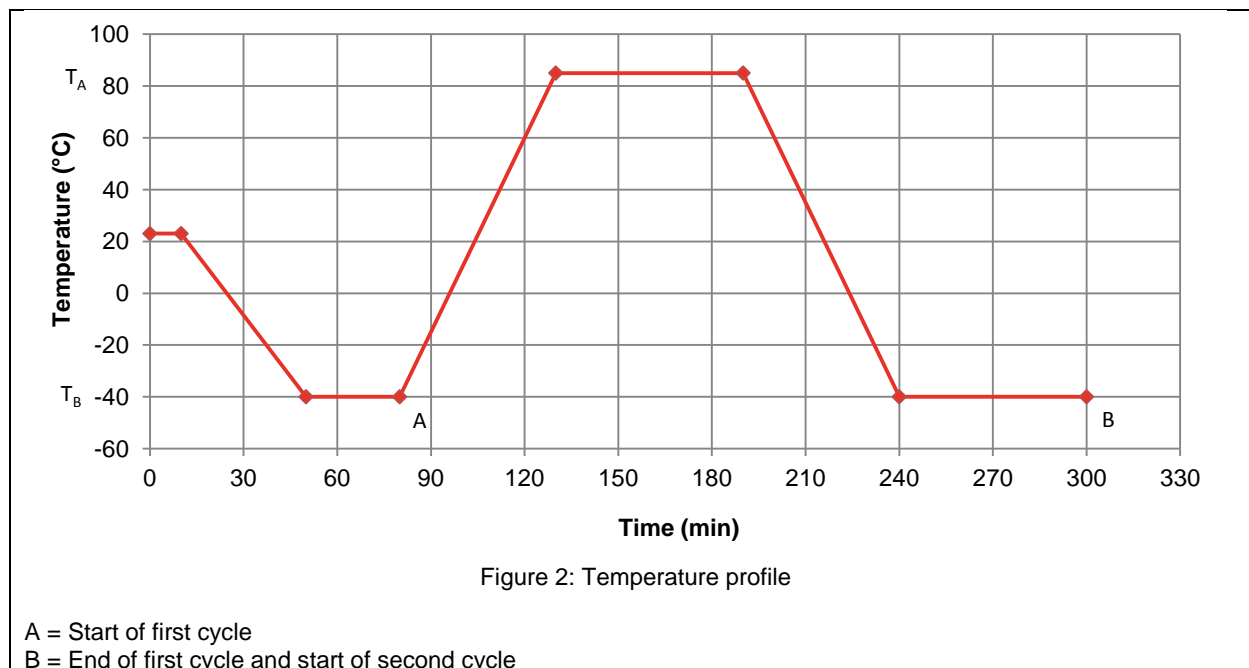
The figure shows the typical characteristics of the sensor in excitation and rest.



4. Qualification

Alternating temperature test

According DIN EN 60068-2-14 (VDE 0468-2-14):2008-02 Test Na



Test parameters

Number of test cycles: 300
 High temperature T_A : +85°C; Total time: 300h
 Low temperature T_B : -40°C; Total time: 300h
 Duration of exposure: 1h
 Rate of change between these temperatures: 2.5°C/min
 Mechanical excitation of samples: 2 min/hour

Final measurement

No evidence of internal corrosion after the test.
 No shape distortion.

Non Operation Half Sine Shock

Test cycle: Acceleration 25g at 6msec pulse width
 1000 cycles pos. 1000cycles neg.; 1Shock/s; 3 axis: X, Y, Z

Non Operational Vibration Test

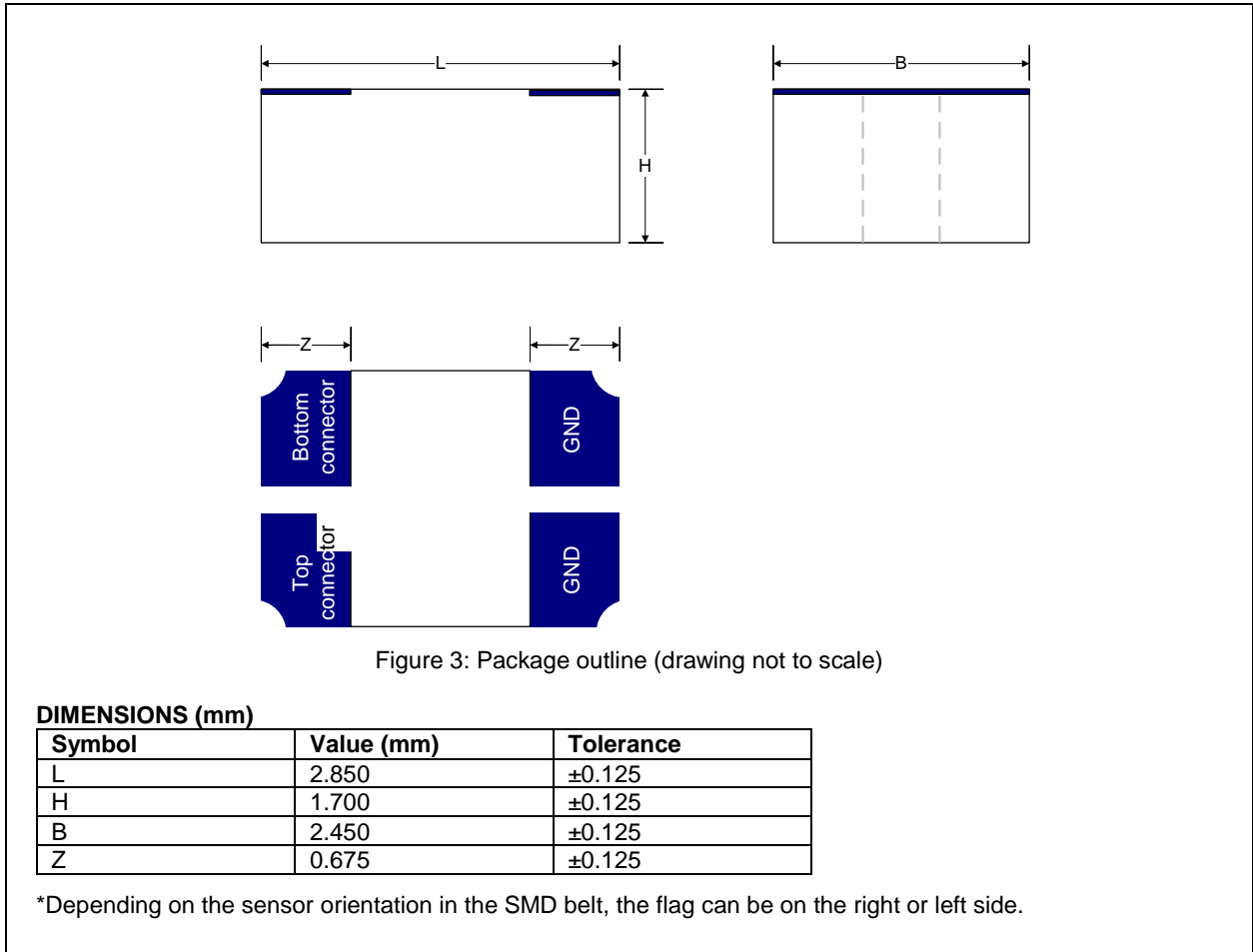
Test cycle: Sinus 10 ... 300Hz; Elongation 0.25mm / 0.25g; 5 cycles; 1 axis
 Frequency area A: 10 – 22.28Hz, amplitude in A:0.25 mm
 Frequency area B: 22.28 - 300Hz, acceleration in B: 0.25g
 Sweep speed: 1 Octave/min, Cycles: 10
 Time per Sweep: 4.9 min

Non Operational Vibration Test

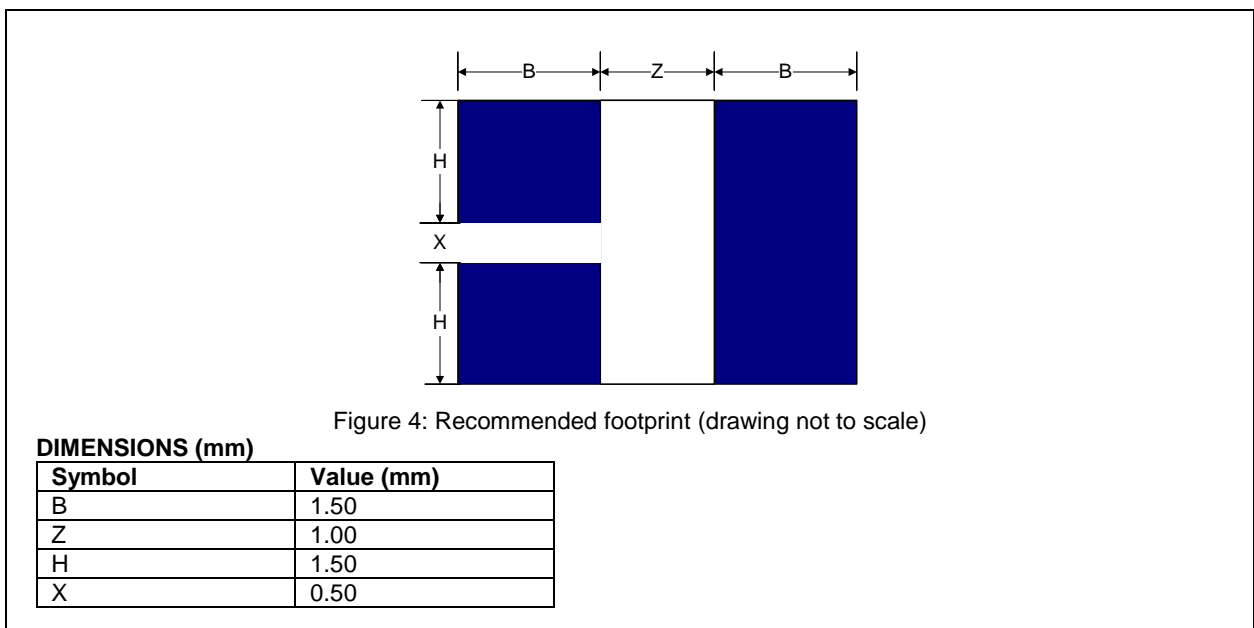
Test cycle: Sinus 10 ... 500Hz; Elongation 3.0mm / 1.5g; 5 cycles; 1 axis
Frequency area A: 10 – 15.76Hz, Amplitude in A: 3.0mm
Frequency area B: 15.76 - 500Hz, Acceleration in B: 1.5 g
Sweep speed: 1 Octave/min, Number of sweeps: 10
Time per Sweep: 5.62 min

5. Package mechanical data

5.1 Package outline



5.2 Footprint



6. Ordering information

6.1 Tape and reel (standard-packing)

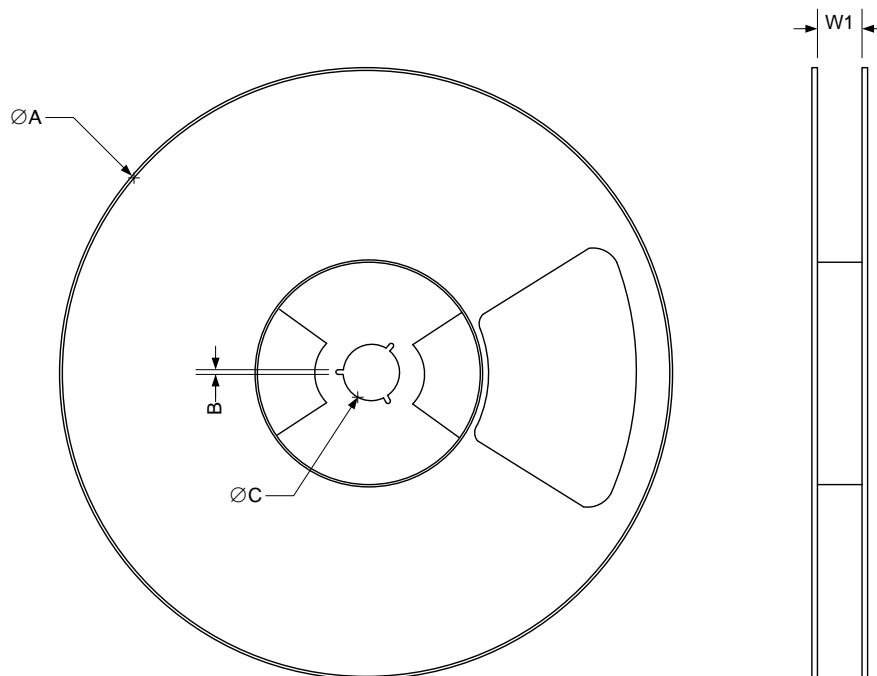


Figure 5: Reel information (drawing not to scale)

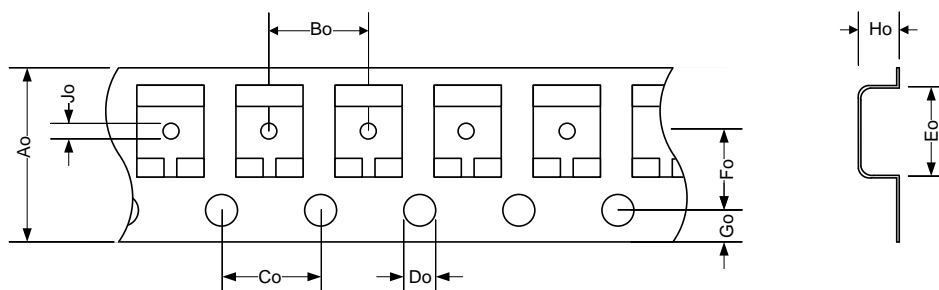


Figure 6: Tape information (drawing not to scale)

DIMENSIONS (mm)

| Symbol | Min | Max |
|-----------------|--------|--------|
| $\varnothing A$ | 179.50 | 180.50 |
| B | 2.00 | 2.50 |
| $\varnothing C$ | 8.40 | 9.90 |
| W1 | 8.40 | 9.90 |
| A_o | 7.70 | 8.30 |
| B_o | 3.90 | 4.10 |
| C_o | 3.90 | 4.10 |
| D_o | 1.40 | 1.60 |
| J_o | 0.80 | 1.20 |
| G_o | 1.74 | 1.76 |
| F_o | 3.45 | 3.55 |
| E_o | 3.50 | 3.70 |
| H_o | 1.90 | 2.10 |

7. Important Notice

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