Overview
The SMB43x accelerometers are designed for vibration control. They are particularly suitable for usage in second level housings as a peripheral sensor. The main applications are active suspension systems, in which the SMB43x sense accelerations of the chassis or wheel. Depending on the road conditions, active damping systems adjust damping forces to a comfortable but also safe level. Both sensors consist of a micromechanical (MEMS) sensor element and a signal processing ASIC mounted in a molded plastic housing for PCB mounting.

Product description
The SMB431/433 are linear, single-axis (ay/ax) low-g sensors with a measurement range of ±1.6 g or ±16 g. Both sensors allow for the measurement of static as well as dynamic accelerations.

A fully digital signal and filtering path provides an excellent signal performance with small tolerances. In combination with the digital PSI5 interface (Peripheral Sensor Interface) signal degradation between sensor and control is effectively impeded.

The SMB43x allows the construction of cost-efficient systems. The 2-wire PSI5 interface reduces the harness costs, while the small size of the sensor and the need of only few passive elements leads to reduced housing/PCB costs. Further synergies are possible due to identical package and programming interface as our 4th generation airbag sensors.

Both sensors are applicable in the temperature range from -40 °C to +125 °C and can be operated with a power supply between 5 V and 11 V.
Products

<table>
<thead>
<tr>
<th>Type</th>
<th>Range</th>
<th>Sens. axes</th>
<th>Sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMB431</td>
<td>±1.6 g</td>
<td>Y</td>
<td>300 LSB/g</td>
</tr>
<tr>
<td>SMB433</td>
<td>±16 g</td>
<td>X</td>
<td>30 LSB/g</td>
</tr>
<tr>
<td>SMB437</td>
<td>±1.6 g</td>
<td>Y</td>
<td>300 LSB/g</td>
</tr>
</tbody>
</table>

Parameters SMB43x

Measurement and functional characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity tolerance</td>
<td>±5 % (SMB431/437)</td>
</tr>
<tr>
<td>Nonlinearity of sensitivity</td>
<td>±2 %</td>
</tr>
<tr>
<td>Cut-off frequency (-3dB)²</td>
<td>30 Hz, 60 Hz, 120 Hz, 240</td>
</tr>
<tr>
<td>Acceleration data resolution</td>
<td>10 bit</td>
</tr>
<tr>
<td>Cross axis sensitivity</td>
<td>&lt; ±3.5 %</td>
</tr>
</tbody>
</table>

Operating conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>5 - 11 V</td>
</tr>
<tr>
<td>Quiescent supply current</td>
<td>&lt; 8 mA</td>
</tr>
<tr>
<td>Temperature range</td>
<td>-40 °C ... +125 °C</td>
</tr>
</tbody>
</table>

1) Output signal due to acceleration in any axis perpendicular to the sensing axis.
2) Nominal values

Outline SOIC14n package

Dimensions in millimeters

Working principle

The acceleration sensors SMB43x are manufactured by using surface micromachining technology. The acceleration sensors feature suspended free moving comb-like seismic mass elements and fixed counter-electrodes. As a result of external forces acting on the vehicle, deflections of the seismic masses along the sensitive axis generate changes in system capacitance. These changes are detected using a differential measurement principle.

Interface

The SMB43x sensors communicate via a digital (Peripheral Sensor Interface) PSI5 interface. For further information, please visit: www.spi5.org.

Package

The sensors are RoHS compliant and packaged in SOIC14n housings (processability according to Jedec Level 1).

Portfolio

The SMB43x sensors are part of a larger sensor portfolio. The portfolio consists of acceleration sensors, angular rate sensors, pressure sensors, and combined inertial sensors for occupant safety systems, vehicle dynamics control VDC, active suspension systems, motor management, transmission control systems, and navigation.

Bosch has been active in the field of micro-electromechanical systems (MEMS) for more than 20 years, and is established as one of the pioneers of this technology. With more than 1000 MEMS patents, hundreds of engineers in this field, and more than 3 billion MEMS sensors shipped to date, Bosch is the global market leader for MEMS sensors.

For more information about automotive MEMS sensors, visit www.bosch-sensors.com.

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