

# Capacitive Accelerometer Characteristics Study

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## Abstract

This paper will describe the dependence of capacitive accelerometer characteristics on the accelerometers physical dimension and its material properties. The sense element of the accelerometer is designed on the basis of a commercially available torsion based accelerometer technology. The sense element consists of an asymmetrically shaped flat plate of metal supported above a substrate surface by two torsion bars mounted on a central pedestal. The sense element is free to rotate around the torsion bars. Capacitor plates located on the substrate surface are used to detect the acceleration. Multiphysics simulation software using FEM technique called "COMSOL Multiphysics" is used in designing the geometry of the accelerometer. It is followed by simulation using the same software. The accelerometer characteristics such as frequency response, dynamic range, sensitivity, and temperature range are measured. Further, (i) the mass of the sense element is varied (ii) a material with a different stiffness ratio is used for the torsion bar. Each of these different geometries is simulated, followed by measurement of accelerometer characteristics. The dependence of the physical dimensions and the stiffness of the torsion bar of the accelerometer on the characteristics of the accelerometer are studied in this paper.

## Reference

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