# Design of a MEMS Resonator for a Centre Frequency Greater Than 26.35 MHz and Temperature Coefficient Frequency Less Than 0.5 Ppm

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## Abstract

The variability of the design parameters caused by material properties like thermal conductivity is the major challenge in Micro Electromechanical System (MEMS). In resonator design the basic problem is that the frequency changes with temperature variation and quantitative explanation with respect to this varies.
The change can be attributed to the stability in terms of frequency drift in parts per million (ppm) and Temperature coefficient of frequency (TCF).The research on filters, oscillators and sensors is related with Temperature compensated Resonator of high centre frequency and high Q factor.

The MEMS resonator should not degrade its performance in high temperature as shown in Figure 1.

In COMSOL Multiphysics® the problem can be modeled using Electromechanics physics. The use of Electromechanics physics is to create electrostatic excitation. The Expected result of the resonator should have a center frequency above 40 MHz and temperature coefficient of frequency nearer to zero. The graph will be plotted for the temperature versus the frequency drift and the temperature versus the quality factor. To achieve temperature compensation the Sio2 (Silicon dioxide) with thermal conductivity of 0.014 (W/cm-oC) is integrated in resonator body in the form of filling the trenches and making the pillars with variable measurements providing thermal insulation to the resonator.

## Reference

## Figures used in the abstract

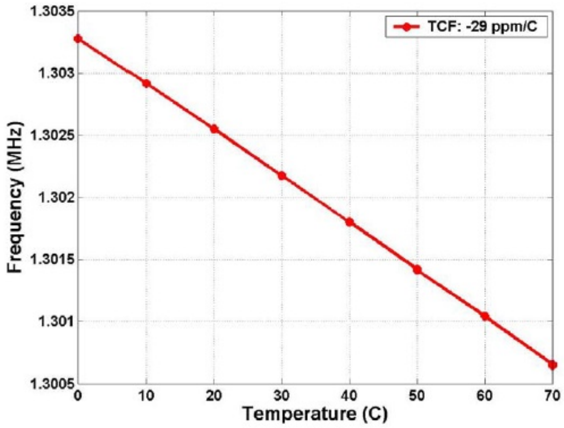


**Figure 1**: Temperature versus Frequency drift