

Extraction of COM Parameters and Quality Factor of One Port SAW Resonator Using FEM Based Simulation

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Abstract

The paper presents a method of extraction of coupling of modes (COM) parameters for a one port surface acoustic wave (SAW) resonator from the results of finite element analysis in COMSOL Multiphysics®. The COM parameters calculated are electromechanical coupling coefficient, reflection coefficient, and SAW phase velocity. In addition, the quality factor of the SAW resonator is determined. The parameters are calculated for various aspect ratios of the interdigital transducer (IDT) electrodes. An IDT is a metallic periodic comb-shaped structure fabricated on the surface of a piezoelectric substrate. A section of IDT structure patterned on YZ lithium niobate substrate with periodic boundary condition is incorporated in the simulation. The result of Eigen mode analysis provided by COMSOL Multiphysics® is used to calculate the COM parameters. The calculation of COM parameters and quality factor for various aspect ratios of IDT electrodes is useful in designing high frequency SAW devices.

Reference

K.-Y. Hashimoto, Surface Acoustic Wave Devices in Telecommunications: Modelling and Simulation. New York: Springer-Verlag, 2000.

Figures used in the abstract

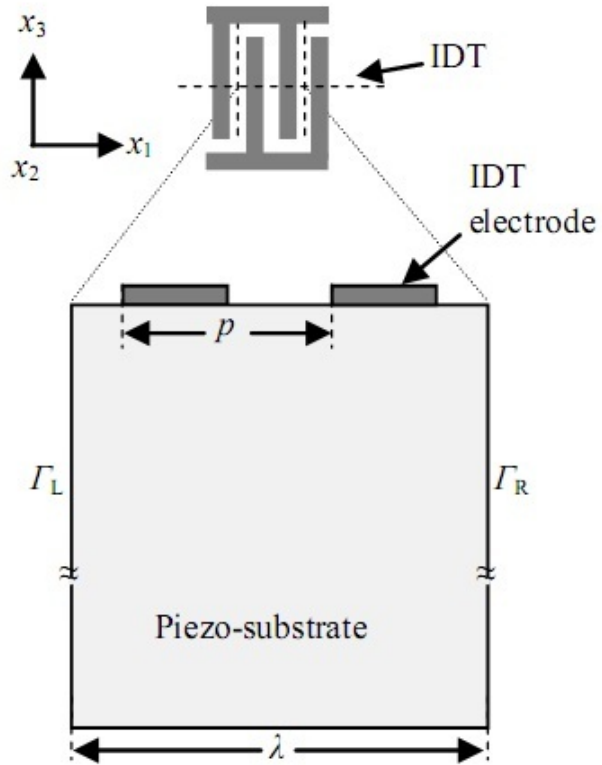


Figure 1: 2D geometry of a one port SAW resonator used for simulation.