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Piezoelectric characteristics of CMOS compatible AlN SAW resonators

(Conference Paper)

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Abstract

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In this work, we predict the surface acoustic wave characteristics by 2D COMSOL finite element modeling. The dispersion of simulated acoustic mode shapes, acoustic phase velocity and coupling coefficient were performed on a CMOS-compatible 1.4 GHz SAW resonator. C-axis oriented Aluminium Nitride (AlN) was chosen as the piezoelectric material due to its compatibility with CMOS technology and higher phase velocity. The influences of AlN thickness on electromechanical coupling coefficient and phase velocity are discussed. High acoustic velocities ($v \sim 5220$ m/s) and coupling factors ($k^2 \sim 0.19\%$) can be observed for SAW resonator with $kh_{\text{AlN}} \sim 3.9$. The measurement results are found to be consistent with FEM results with deviation less than 6% for resonance frequency and phase velocity. Copyright 2014 IEICE.

Author keywords

Aluminium nitride CMOS Coupling coefficient Piezoelectric Surface acoustic wave

Indexed keywords

Engineering
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Acoustic surface wave devices Acoustic wave velocity measurement Acoustic waves Acoustics
 Aluminum Aluminum nitride C (programming language) CMOS integrated circuits
 Couplings Electromechanical coupling Finite element method Nitrides Phase velocity
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