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Design and simulation of film bulk acoustic wave resonator in kuband

Abstract

This paper presents the design of a Film Bulk Acoustic Wave Resonators (FBARs) operating in Ku-band. The one-dimensional (1-D) numerical and the three-dimension (3-D) Finite Element Method (FEM)simulation results are analysed and compared. The results show that coupling coefficient (k2 eff) up to 6.5% can be obtained with optimised thickness ratio of electrode/piezoelectric layers of operating frequencies greater than 15GHz. The FBARs have areas of 1.69x10-4μm2 and 7.84x10-4μm2 for series resonance frequency of 14.7GHz and 15.9GHz respectively and achieves quality (Q) factor of 300. The designed FBAR filter operating in Ku-band has the centre frequency of 15.5 GHz, the insertion loss of 3.5dB, out-of-band rejection of 13dB and fractional bandwidth of 6.6%

Keywords

Fbar; Fbar filter; Ku-band; Rf mems