

薄膜体声波谐振器的结构参数优化分析

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摘要：

建立了微型薄膜体声波谐振器的等效电路模型，研究其整体频率响应特性。提出的等效电路模型考虑了氧化锌压电薄膜两端电极和作为支撑层的氮化硅薄膜对器整体性能的影响，将它们作为传输线引入到等效电路当中。运用PSPICE软件研究了谐振器各结构层的尺寸参数对谐振器谐振频率、品质因数和有效机电耦合的影响，并讨论了使用不同材料的电极，谐振器品质因数的变化情况。基于以上分析，对谐振器的结构参数进行优化，获得薄膜体声波谐振器性能的提高。

关键词：薄膜体声波谐振器；压电等效电路模型；结构参数优化

Analysis on Parameter Optimization of Film Bulk Acoustic Wave Resonator

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Abstract:

In this paper, we set up a new equivalent circuit model of micro film bulk acoustic wave resonator (FBAR) to study its frequency response. In this model, the electrodes of zinc oxide piezoelectric thin film and silicon nitride thin film layer, which is used for mechanical support of FBAR, are integrated into the circuit model by considering their transmission lines. The PSPICE software is employed to study the effect of the structural parameters on the resonant frequency, quality factor and effective coupling coefficient of FBAR. Based on this, the structural parameters of the FBAR are optimized to obtain improved performance for FBAR.

Keywords: Film bulk acoustic wave resonator; piezoelectric equivalent circuit model; parameter optimization

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