

一种新型MEMS微波功率传感器的设计与模拟

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摘要:

提出了一种新型的三明治结构MEMS微波功率传感器结构, 与传统传感器相比, 新结构由于采用了垂直传热方式而具有较小的热损耗。在输入相同功率的情况下, 模拟了热电堆的温度分布, 三明治结构热电堆的温度高于传统结构, 因此具有更高的灵敏度。同时模拟了两种结构的阻抗匹配特性, 其差异不大, 在1~6GHz的频率范围内, 三明治结构的回波损耗小于-30dB; 在6~20GHz的频率范围内, 其回波损耗小于-20dB, 显示了良好的匹配特性。

关键词: MEMS; 微波功率传感器; 三明治结构; 热传导; 回波损耗

Design and Simulation of a Novel MEMS Microwave Power Sensor

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Abstract:

A new type of sandwich structure MEMS microwave power sensor is presented. Compared with the traditional microwave power sensor, the novel sensor has the advantages of less heat loss because of its vertical structure of heat conduction. Then the temperature distribution of the thermopile for the sensor is simulated under the same input power. The results show that the temperature distribution of the thermopile for the novel sensor is higher than the traditional one, thus the sensitivity of the new sensor is higher than the traditional sensor. At the same time, the impedance matching characteristic of the sensors is simulated. The simulation results show that the impedance matching characteristic of the sensor is good. The return loss of the sandwich structure is less than -30dB when the frequency ranges from 1GHz to 6GHz and it is less than -20dB when the frequency ranges from 6GHz to 20GHz.

Keywords: MEMS; microwave power sensor; sandwich structure; thermal conduction; return loss

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