

中文摘要

本研究利用微機電(MEMS)技術，製作並設計 20GHz 雙模態濾波器。此一雙模態濾波器具有大約 55dB 的返回損失(Return Loss)及 2dB 的差入損失(Insertion Loss)。然而，以高頻印刷電路板(FR4 板)為基材之雙模態濾波器，其返回損失和差入損失均是只有 10dB 和 8dB 左右。在比較傳輸零點之相對間隔時，微機電結構式之濾波器比 FR4 板為基材之濾波器之距離為短，因而造成訊號在頻寬外衰減得更快，這使微機電結構式濾波器的訊號選擇性具有更佳表現。以上高頻特性之改進，是基於利用微機電技術所研製之懸浮型介電薄膜，其相對介質係數接近於 1，因而可降低微帶線的介質損失。

英文摘要

In this paper, the microelectromechanical system (MEMS) technology is applied to fabricate a 20 GHz dual-mode filter. This MEMS dual-mode filter has both return loss and insertion loss to be about 55dB and 2dB, respectively. However, by using high-frequency printed circuit board (FR4 circuit board) as the substrate, the filter only has both return loss and insertion loss to be about 10dB and 8dB, respectively. In comparison of the relative distance between the transmission zeros, the MEMS filter has the shorter separation than the one using FR4 circuit board. It makes the signal attenuation behind the bandwidth is much faster and results in better signal selectivity for the MEMS dual-mode filter. The overall high frequency improvements of the MEMS dual-mode filter could be explained by the fact that the air-floating dielectric membrane fabricated by MEMS technology has relative dielectric constant nearly equal to 1 ($\epsilon_r \approx 1$). Therefore such structure could effectively reduce the dielectric loss of a microstrip line.