Abstracts

A new miniature uniplanar lowpass filter using series resonators

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A new variant of miniature uniplanar lowpass filter suitable for use as a building block for communication systems is investigated. A combination of CPW series resonators and low impedance line sections is used to form this lowpass filter. This is made possible by the potential power offered by the uniplanar technology in terms of the wide range of flexibility and scope for innovation. Furthermore, this alternative structure removes a number of limitations inherent to the conventional configuration. Compared to ladder type built from the cascade of alternate high and low impedance line sections, several advantages are pointed out: very wide stopband with low number of elements (no spurious responses up to 25 GHz), high cutoff rates, low insertion loss, lower radiation loss, high compactness (a significant 35% reduction of the circuit area when compared to ladder type) and additional degrees of freedom by the inclusion of the series CPW series resonators in the filter design. However, to fully benefit from these resonators, it is necessary to have reliable models of each constitutive element of the lowpass filter. It has been shown that the relative flexibility of the space domain integral equation method makes it an attractive tool for the analysis and design of these complex circuits. A principle of achieving these high-quality circuits is described and also confirmed by experimental and theoretical results, which are in good agreement up to 40 GHz. The combination of a series resonators with low impedance line sections gives a new powerful technique for the design of miniature lowpass suitable for monolithic millimetric integrated circuits.

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