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Design A Continuously Tunable Microwave Filter With A Generalized Constant and Frequency Mapping Technique

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ABSTRACT

As the demand for agile and accurate communication increases, the fundamental of communication must be improved to support the needs. Current communication operates on an agreement, that each network company pays government to get licensed a range of frequency on the spectrum, and no others are legally allowed to use. This allows a limited number of users to operates at the same time. As the number of users increase, the spectrum become congested and user experience problem like dropping call. This problem can be solved, if users can be shifted between different licensed frequencies, depending on the capacity of the current spectrum. In this paper, a design method of continuously reconfigurable low-pass filter (LPF) is proposed, to allow shifting between different frequencies. The circuit proposed is the classic ladder type circuit in generalized unit element (GUE) form. The circuit is analyzed using techniques like even/odd-mode analysis, and synthesized using constant and frequency mapping technique. Simulation results on advanced design system (ADS) showed a band pass filter, which can be tuned from 0.5Ghz to 1.0Ghz having a bandwidth of 0.1Ghz. The filter can also be tuned to an ultra-wideband filter with bandwidth from 0.5Ghz to 1.6Ghz, and anything in between. The results have proved the validity and reliability of the design method.

KEYWORDS

Constant and frequency mapping, even-/odd-mode method, frequency dependent coupling, filter synthesis, reconfigurable, continuously tunable filter and band pass filters (BPFs)