

Compact Quad-Band Bandpass Filter Using Quad-Mode Stepped Impedance Resonator and Multiple Coupling Circuits

The paper can be cited as follows:

Denis Bukuru, Kaijun Song, Fan Zhang, Yu Zhu, and Maoyu Fan, IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES, VOL. 65, NO. 3, pp. 783-791, MARCH 2017

Abstract:

A compact quad-band bandpass filter using quad-mode stepped impedance resonator (QMSIR) is investigated in this paper. To get suitable coupling within the four passbands, the multiple coupling circuits between the input/output ports and QMSIR are applied. Based on the symmetry of the QMSIR, even and odd-mode theory is used to analyze the equivalent circuits of the QMSIR. Design equations are derived, and they are used to guide the design of the circuits. Four passbands can be easily tuned by its physical dimensions. Upper stopband is improved by adding the open-loop SIRs at both I/O ports. Transmission zeros among each passbands are generated, resulting in high isolation and frequency selectivity. An experimental circuit is fabricated and evaluated to validate the design concept. The measurement results are in good agreement with the full-wave simulation results.

Index Terms

Bandpass filter (BPF), compact, quad-band, quad-mode, stepped impedance resonator (SIR).