

Compact microstrip bandpass filter with sharp passband skirts using square spiral resonators and embedded-resonators

ABSTRACT

The aim of this paper is to produce and develop a new four-pole microstrip bandpass filter (BPF) structure for high selectivity applications. The microstrip BPF is designed using Chebychev lowpass prototype with passband ripple of 0.05 dB and bandwidth of 120 MHz, which operates at center frequency of 2.3 GHz. This filter is designed by using square spiral resonator structures and embedded-resonator topology with the same fundamental frequency to make it more compact; furthermore, it has high quality performance in terms of the frequency responses. The size of the compact microstrip filter is 24.74×21.20 mm². The proposed filter was designed, fabricated and tested. The measured results show that the minimum passband insertion loss is 2.65 dB, while the measured return loss is better than -11 dB in the passband. Very good agreement between the simulated and measured results was observed.

Keyword: Center frequency; Fundamental frequencies; High quality; High selectivity; Lowpass prototypes; Measured results; Microstrip; Microstrip band-pass filter; Microstrip bandpass filters; Microstrip filter; Pass bands; Passband ripple; Return loss; Spiral resonators