

Chapter 4

Conclusion

In this thesis, four bandpass filters (BPFs) for wireless communications are presented. The objective of this thesis concerns how to reduce the filter size. For the first design, a compact SIR-based BPF with tunable TZs has been implemented in an FR4 substrate. It has a center frequency of 3.5 GHz and an FBW of 7.2%. Moreover, a novel technique to create TZs was developed. The overall size of this BPF is 4.2 mm \times 5.2 mm without considering the feed lines. For the second design, a miniaturized BPF was developed by adding four via holes to change the TZ frequencies. The isolation ring slots used with the via holes also provide an effective way to tune the TZ frequencies.

The third design presents a compact tri-band BPF using SSIRs. Its advantages including high selectivity and tunable TZs have been successfully demonstrated by simulation and experiment. This BPF has a small size of 2.1 mm \times 2.7 mm. The fourth design is a small quad-band BPF that is also based on SSIRs. Its first and third resonant frequencies depend on the metallic patten in the first layer while the second and fourth resonant frequencies depend on that in the second layer. The TZs can be controlled by changing the resonator gap spacings. Adjusting each gap spacing in different layer offers superior degrees of freedom to individually shift the TZs.

