ABSTRACT

This thesis introduces a simple and effective design approach of a dual-band bandpass filter with bandwidth enhancement. The microstrip parallel coupled-line bandpass filter is developed to achieve simultaneous dual-band responses and bandwidth enhancement. A 2.45 GHz / 5.2 GHz dual-band bandpass filter is implemented by integrating the two individual passband resonators. This single-band resonator, operating at 2.45 GHz and 5.2 GHz respectively, is constructed with the meandered parallel coupled-line (MPCL) structure so that the classical design formulation can be reused. The transmission line of the lower (higher) passband resonator, terminated at the input / output of the higher (lower) bandpass section, will act a load capacitance, hence enhances the passband bandwidth, counteracting the intrinsic bandwidth limitation of the microstrip parallel coupled-line bandpass filter. Spurious harmonic suppression techniques have also been applied to the lower passband resonator to improve the overall dual passband performance. Finally, two prototypes of 2.45 GHz / 5.2 GHz dual-band filters, one as the wiggly-line MPCL structure while the other as the non-uniform width MPCL structure, are simulated and measured. Good agreement is achieved with the simulated and measured results with the dual passband characteristics of both circuits' size unchanged. Furthermore, the fractional bandwidth of the wiggly-line MPCL filter reports 42.6% / 30.0% at 2.46 GHz / 5.2 GHz respectively, while those of the non-uniform width MPCL filter reach 41.2% / 28.9% at 2.45 GHz / 5.2 GHz respectively.