



RESEARCH ARTICLE

A very compact microstrip diplexer fabrication with superior performance for broadband wireless applications

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Abstract

This study presents a planar dual-channel bandpass microstrip diplexer based on a novel structure. It has the very compact size of $0.0081 \lambda_g^2$ (95.7 mm^2) fabricated on 0.787 mm dielectric substrate height. Due to the use of close microstrip sections, several coupling capacitors are created. These capacitors can increase the degree of freedom for controlling the diplexer performance while it is optimized easily. Accordingly, the designed diplexer has a high performance in terms of wide fractional bandwidths, attenuated harmonics, flat channels, high return losses and low insertion losses. The wide fractional bandwidths (FBWs%) of 34.3% at the first channel and 38.6% at the second channel make the proposed diplexer appropriate for the broadband applications. The resonance frequencies are located at $f_1 = 1.6 \text{ GHz}$ for the L-band and $f_2 = 3 \text{ GHz}$ for WiMAX applications. The maximum harmonic level is less than -20 dB for the frequencies up to 6.5 GHz ($4f_1$). The maximum group delays are $<1.26 \text{ ns}$ at the first passband and 0.56 ns at the second passband. The proposed diplexer is fabricated and measured for verification. The comparison shows that both measured and simulated results are in a reasonable agreement.