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# Design and fabrication of a low-loss microstrip lowpass-bandpass diplexer for WiMAX applications

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### Abstract

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This work presents a compact low-pass-bandpass microstrip diplexer with a novel configuration. It consists of a lowpass filter integrated with a bandpass filter via a simple compact junction. The proposed bandpass filter consists of four rectangular patch cells and some thin strips. The step impedance structures, with a radial cell, are applied to achieve a lowpass frequency response. The lowpass channel of the introduced diplexer has 2.64 GHz cut-off frequency, whereas, the bandpass channel center frequency is 3.73 GHz for WiMAX applications and covers the frequencies 3.31 GHz to 4 GHz. In addition to having novel structures, both filters have other advantages in terms of high return loss, low insertion loss and high selectivity. The presented microstrip diplexer has the compact size of 29 mm x 13.8 mm x 0.762 mm, calculated at 2.64 GHz. The obtained insertion losses are 0.20 dB (for the first channel) and 0.25 dB (for the second channel), which make the proposed diplexer suitable for energy harvesting. The stopband properties of both bandpass and lowpass filters are improved by creating several transmission zeros. The comparison results show that the lowest insertion losses, the minimum gap between channels, good return losses, and good isolation are obtained.

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