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A Compact Planar Ultra-Wideband Bandpass Filter with Multiple Resonant and Defected Ground Structure

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Abstract

A compact bandpass filter with dumbbell shape Defected Ground Structure (DGS) operating on ultra wide pass band (UWB - 3.1 to 10.6 GHz) is proposed. It is based on hybrid microstrip coplanar waveguide (dual sided metal) structure. A Multiple Resonant Structure (MRS) is constructed using coplanar waveguide (CPW) planar transmission line. The MRS makes the resonance using quarter wavelength and half wavelength open-ended CPW. The equispaced three resonances at lower (3.1 GHz), center (6.85 GHz) and higher edge (10.6 GHz) of the whole Ultra Wide Band is achieved using CPW MRS. To make the band as flat as possible, two more resonances are introduced using quarter wavelength microstrip patches on top of the commonly shared substrate, so the proposed filter becomes a five pole bandpass filter. A dumbbell shaped defected ground structure on either side of CPW MRS improves the return loss almost less than 20 dB over the whole UWB passband. The simulated results of proposed filter show good transmission response within passband and good rejection in out of the band. The simulated and measured results are very close to each other which proves the efficacy of proposed design.

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