PLANAR MICROSTRIP ULTRA-WIDEBAND BANDPASS FILTER WITH DUMBBELL-SHAPED DEFECTED GROUND STRUCTURE

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ABSTRACT

Ultra Wide Band (UWB) is a new spectrum allocation which was recently approved by the Federal Communication Commission (FCC). It has emerged as a solution to provide low complexity, low cost, low power consumption, and high-data-rate wireless connectivity devices entering the personal space. Any wireless system that has a fractional bandwidth greater than 20% and a total bandwidth larger than 500MHz enters in the UWB definition. At the emission level, UWB signals have a mask that limits its spectral power density to -41.3dBM/MHz between 3.1Ghz and 10.6GHz. The objective of this thesis is to study, design, fabricate and test a planar UWB bandpass filter with dumbbell-shaped defected ground structure (DGS) by cascading a low pass filter and a high pass filter. The designed filter used a transmission line with U-shaped coupling structure and dumbbell shaped defected ground structure (DGS) on the ground plane. The coupling structure is very weak without DGS. The introduction of DGS generates strong coupling and improves the passband response. The performance of the bandpass filter was evaluated by using CST software and the results demonstrate good UWB responses which the return loss is more than 15 dB and insertion loss is approximately equal to 0 dB within the frequency range of 2.73 GHz to 9.85 GHz.

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