COMPARISON OF H-SHAPED MICROSTRIP PATCH ANTENNA WITH AND WITHOUT RECTANGULAR PATCH ON TOP

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Abstract: The H shaped micro strip patch antennas are designed on a substrate of 30×50 mm^2. They have shown the bandwidth of , 6.5 GHz ranging from 5.75 GHz to 12.25 GHz for patch with rectangular patch on the top with 1 mm thickness of substrate and 5.8 GHz to 11.45 GHz for patch without rectangular patch covering bandwidth of 6.65 GHz with 2 mm thickness, with VSWR < 2 and Return Loss (S_{11}) < -10 dB. The ground is divided in 4 parts with 0.25 mm gap between them. The antenna has been successfully simulated on HFSS 13.0. This antenna is designed for the match impedance with 50 ohm of characteristic impedance. FR4 Epoxy substrate material is used with 0.02 as dielectric loss tangent and 4.4 as permittivity.

Keywords: Microstrip Patch antenna, Return Loss, Ultra Wide band antenna and VSWR.

Introduction: Recently, ultra wideband (UWB) technology has been popular and widely uses for many wireless communications areas. With its wide bandwidth, UWB has a potential to offer a capacity much higher than the current narrowband systems for short-range applications. UWB has several applications from wireless communications to radar imaging, and vehicular radar. Therefore, UWB became part of the wireless world, including wireless home networking, high-density use in office buildings and business cores, UWB wireless mouse, keyboard, wireless speakers, wireless USB, high-speed wireless personal/business area networks (WPAN/WBAN), wireless sensors network wireless telemetry, and telemedicine. Another important in UWB wireless systems is the design of antennas. The most difficult for design antenna include broadband response of impedance matching, gain, phase, radiation patterns, and polarization. Many of the current applications of UWB require power efficient, low cost, and small sized UWB transceivers and related to UWB receivers. Therefore, practical and low complexity implementation of transceivers is the importance for the successful of the UWB technology The UWB communication systems covering from 3.1 GHz to 10.6 GHz released by the Federal Communications Commission (FCC) in 2002. Since then, the various antennas for ultra wideband operation those are suitable for low-cost communications systems have been studied and design. The microstrip antenna is suitable design for UWB system because of low profile, small size, light weight, simple and inexpensive to manufacture using modern printed circuit technology, conformable to planar and non-planar surfaces. In this paper, we proposed the slot antenna fed by CPW feed line for UWB antenna. Coplanar waveguide (CPW) transmission lines have been widely used as feeding networks with slot antennas. CPW lines have many useful design characteristics such as low radiation leakage, less dispersion, little dependence of the characteristic impedance on substrate height, and uniplanar configuration. They also allow easy mounting and integration with other microwave integrated circuits and RF frequency devices. The microstrip antenna is widely used in various applications because of its large number of design possibilities such as planar, conformal or array and can be fed using many different methods. It can be compact, reconfigurable and suitable for smart antenna applications. Beam steering and ultra wideband features of microstrip antenna make the applications highly promising and interesting. These are used in applications which requires high-performance, low-cost planar antennas such as imaging array, phased array and collision avoidance radars.

Conclusion: Increasing the length of the substrate increases the bandwidth of the antenna designed but here we see that having a 2 mm substrate and removing some part of the patch both has adverse effect on the bandwidth of the design.Both the designs having approximately same antenna working bandwidth but with different working frequencies and the offset frequencies. These designs have vast application due to the range of frequencies covered by them.

We come to a conclusion that more the patch more will be its bandwidth and height of substrate is directly proportional to the bandwidth but up to a certain limit beyond a there is no use of increasing the height of substrate or the area covered by patch.

Helpful Hints :Without rectangular patch on the top

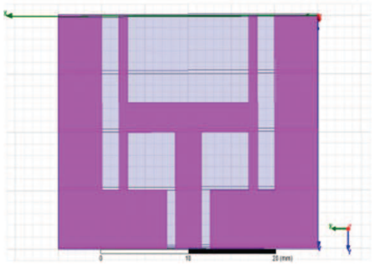

Fig. 1 Design

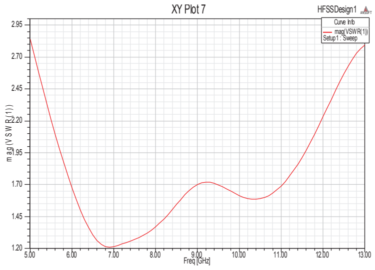

Fig. 2 VSWR

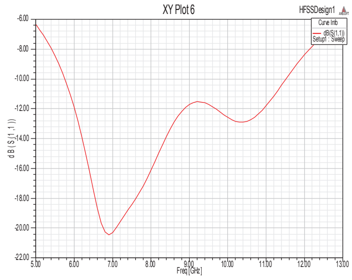

Fig. 3 Return loss(S_{11})

With rectangular patch on the top

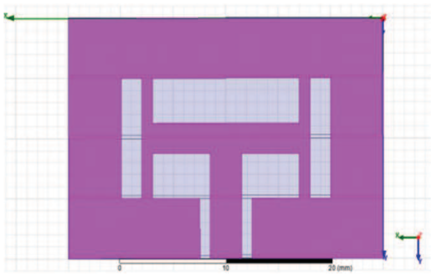

Fig. 4 Design

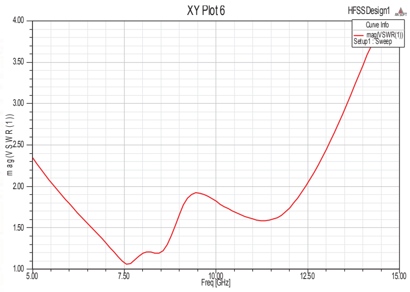

Fig. 5 VSWR

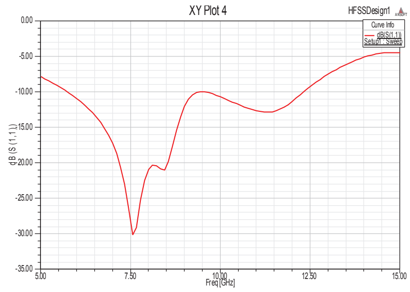

Fig. 6 Return loss(S_{11})

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