The Rectangular Microstrip Patch Antenna for 14GHz

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Abstract
In this work we have designed an Antenna for 14GHz in Ku Band using Rectangular Microstrip Patch Antenna. The antenna structure resonated ku band with bandwidth 450 impedance bandwidth. The impedance bandwidth 3.28% achieved. The proposed structure is having good impedance matching. Rectangular Microstrip Patch Antenna can easily configured for most complex multiband characteristics. Antennas which can work properly in more than one frequency region either for transmitting or receiving electromagnetic (EM) waves. The proposed antenna resonated at 14GHz of ku band and we have achieved 4.06dBi of average gain.

Keywords
Rectangular Microstrip Patch Antenna, bandwidth enhancement, Ku band

I. Introduction
Antennas can be usedfor dual-band, tri-band, penta-bandapplications. Multi-band antennas are muchmore complex than the single band antennasin their design, structures and operations. Perturbation of ground surface is named as Defected Ground Surface for slots on ground plane. RectangularMicrostrip Patch Antenna is designed by embedding suitable slots on theon the ground plane as DGS (Defected ground Structure).
Monopole antennas can easily configured for most complex multiband characteristics. Antennas which can work properly in morethan one frequency region either fortransmitting or receiving electromagnetic(EM) waves, are termed as Multi-bandantennas [1].

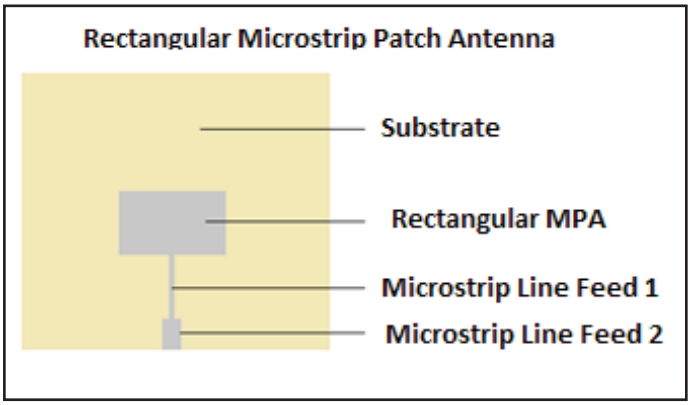

Fig. 1: The Top View of Rectangular Microstrip Patch Antenna

II. Antenna Design
The antenna is fabricated on substrate of FR4_epoxywith relative permittivity ε_r= 4.4and the thickness of 1.6mm. The Length and width of the radiating patch and ground plane are calculated using the formulas given in [1], for the resonant frequency of 14GHz.

III. Simulated Results

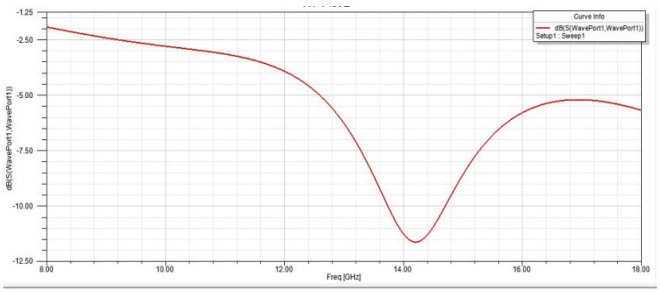

Fig. 2: Simulated Return Loss Versus Frequency of a Rectangular Microstrip Patch Antenna

Simulated s11 can be seen from fig. 2 refection co-efficient is very less at resonance return loss of the antenna is less than 10dB from 13.85GHz to 14.3GHz which is 450MHz.
Impedance match of this antenna can be seen in fig. 3, this clearly illustrating that the frequency of the interest is very near to point 1.

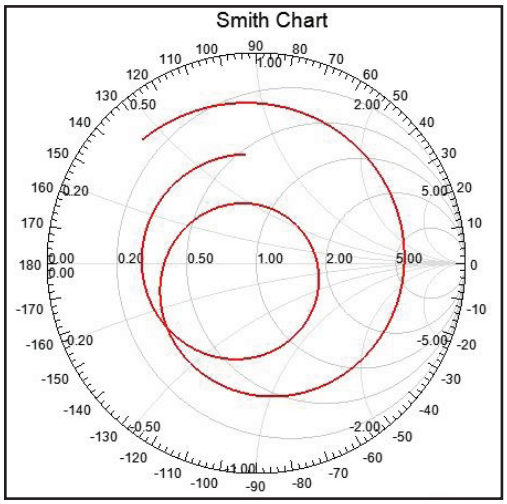

Fig. 3: Impedance Match

The radiation pattern of the proposed antenna showing the Gain total at different frequencies is shown in fig. 4. Gain total at 14is 4.06dBi

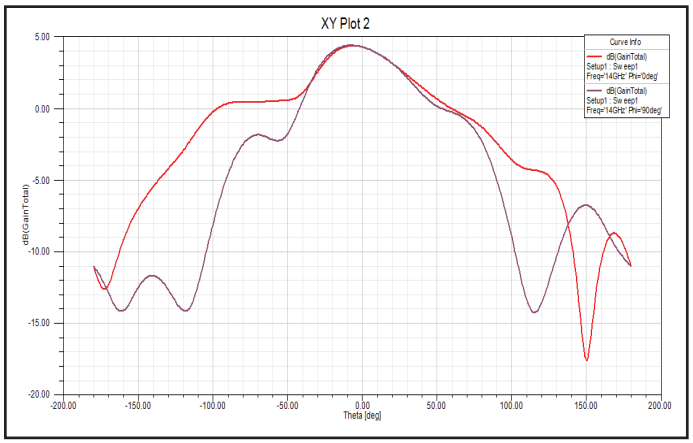

Fig. 4: Gain total at 14GHz.

The important property of any antenna is VSWR in our proposed antenna we have achieved VSWR < 2 over the operating frequency. This can be seen in fig. 5

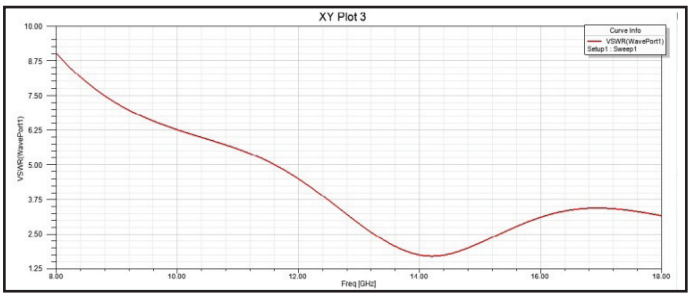

Fig. 5: VSWR of Proposed Antenna

IV. Conclusion

In this design we used effectively designed the Rectangular Printed monopole. It has bandwidth of 450MHz, average gain of 4.06dBi.

V. Acknowledgement

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