Dual Patches Microstrip Fed Antenna with Wide Bandwidth

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Introduction

Planar inverted F antennas (PIFA) [1] are widely used in mobile phones and consist of a rectangular patch element located above a ground plane with a short circuiting plate and a feeding mechanism for the planer element. Conventional PIFA design normally offers only 3-8 % bandwidth. The bandwidth can be increased by reducing the ground plane size and through the use of various feeding methods or stacked patches [2]. Recently, some of these methods include using passive elements [3]. However in order to minimise production cost, it may be useful to simply use available PCB etching methods or to mould the antenna out of metal plates. Combining the various known methods of enhancing the bandwidth of a PIFA, this paper presents some modification to the conventional design to obtain an antenna with 62% bandwidth at SWR < 3. The antenna elements may be etched from copper film and supported by Rohacell above an FR4 substrate. The dimensions of the antenna are 170mm (Length) x 60mm (Width) x 31 mm (Height). The ground plane covers the entire length of the FR4 substrate and when required, could accommodate other electronics components (e.g. a Low noise amplifier). Fig. 1 shows the geometry of the proposed antenna.

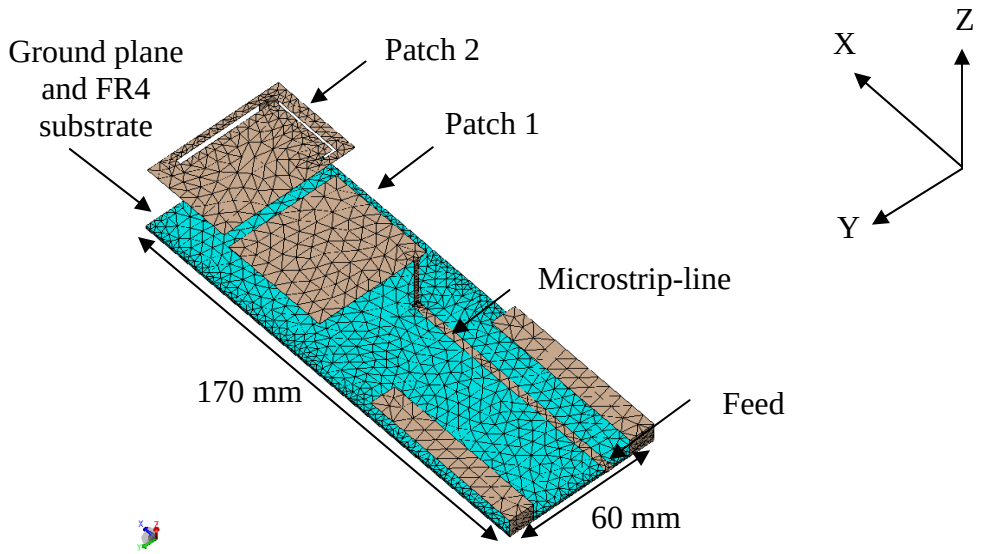


Fig.1 Geometry of proposed antenna

Summary

The antenna shown in Fig. 1 is simulated using a Method of Moments based simulation package. Fig. 2 shows a comparison of the measured and simulated return loss. Measured return loss shows the antenna having a VSWR of 1:3 from 450 MHz to 900 MHz. The simulated performance shows better performance and wider bandwidth (i.e. SWR <2). The discrepancy may be due to manufacturing tolerance and differences in the dielectric properties of the substrate supporting the antenna elements. Fig. 3(a) shows the radiation pattern of the antenna at various frequency points in the XZ plane. It provides azimuth coverage with slightly more gain towards the Z direction. A horizontally polarised transmitting signal was used to illuminate the antenna. The peak gain throughout the operational frequency band of the antenna is shown in Fig. 3(b). A more detailed description of the antenna design and it performances will be described in the full paper.

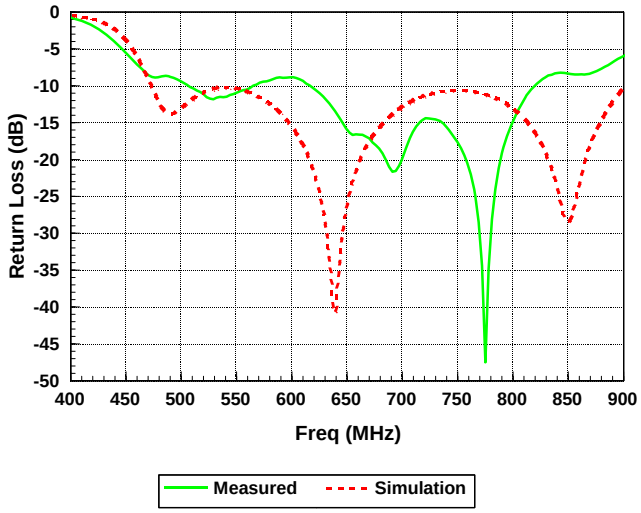
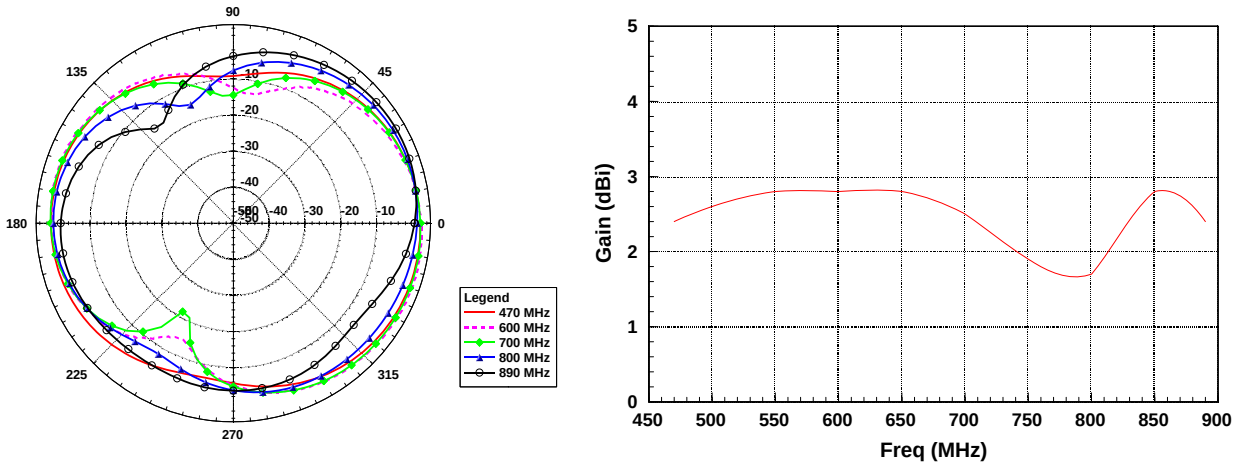


Fig. 2 Return loss of antenna



(a) (b)

Fig. 3 (a) Radiation patterns (b) Peak gain vs Frequency of antenna in the XZ plane.

References

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