

# Bandwidth Enhancement for Patch Antenna Using PBG Slot Structure for 5, 6 and 9 GHz Applications

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**ABSTRACT** — A design strategy using Photonic Band Gap (PBG) structure on ground plane to achieve wider bandwidth for patch antenna is presented. It is found that, the impedance bandwidth has improved from 3.72% to 31.9% at centre frequency 9 GHz after adding PBG on the ground plane. The antenna has multi band operations at 5, 6 and 9 GHz. E-Plane and H-plane radiation pattern is

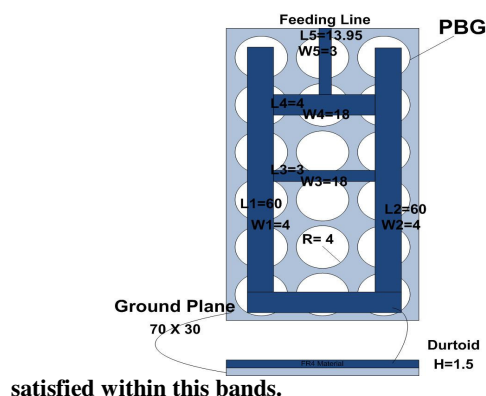


Fig. 1. Geometry and dimensions of the antenna.

Table 1. Comparison between bandwidth with and without PBG on the ground plane.

Frequency band	Bandwidth without PBG	Bandwidth with PBG
5 GHz	2.76%	5.5%
6 GHz	0%	5.9%
9 GHz	3.72%	31.95%

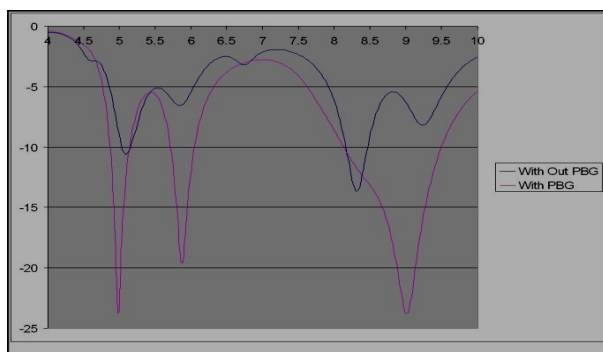


Fig. 2. The return loss for the antenna with and without PBG.

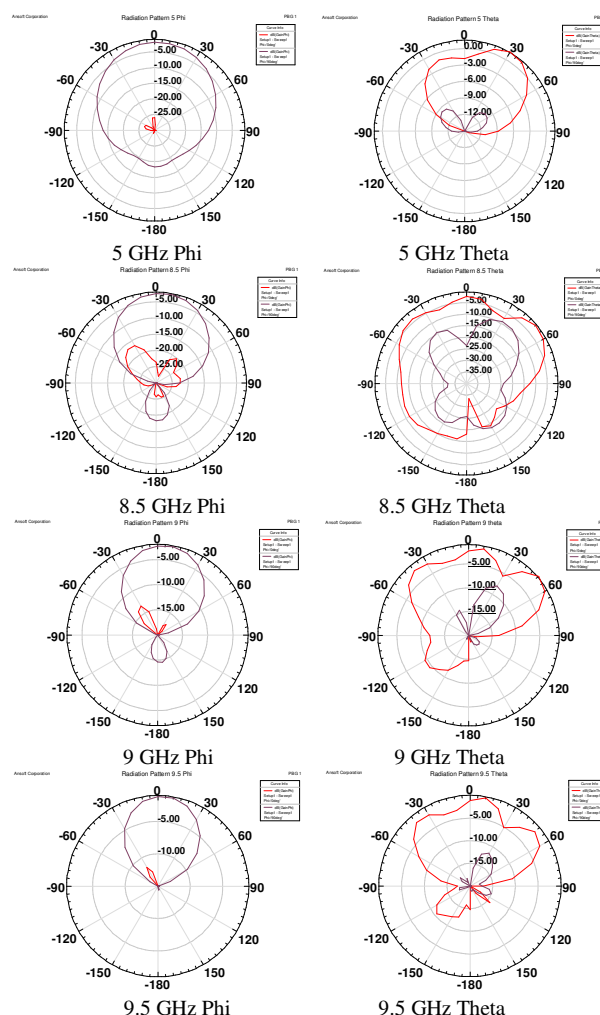


Fig. 3. E-plane and H-plane radiation pattern for the antenna

## III. CONCLUSION

A PBG structure in ground plane is shown to improve the impedance bandwidth from 3.72% to 31.9% comparing to a conventional patch antenna. The overall size for the antenna is 70 X 30 mm. The radiation patterns at 5, 8.5, 9 and 9.5 GHz have been provided. This antenna can be used in various wireless communication systems.