A Triple Band Monopole Antenna for GSM/ WI-Max/ WLAN/ X-Band and Satellite Applications

P Pardhasaradhi, G Kesava Sai, D Pavan Teja, B Ganesh

Abstract: ***A compacted Triple Band Monopole antenna is propounded in this paper for multiband applications. The suggestedantenna is designed with dimensions of 25x40 mm^2 on a FR-4 material. The proposed antenna has applications in thebands 1.30-3.75 (GSM,Bluetooth,WLAN)/ 6.87-8.6 (FSS)/ 11.9-14.3 GHz (X-Band applications) and has a VSWR less than 1.2***

Keywords:Monopole antenna, compact , Triple band , WLAN , Wi-MAX.

I. INTRODUCION:

Present timeswireless communicationmethods, multiband antenna has been assuming an imperative job for wireless assistance requirements.Wi-MAX and W-LANhave been generally connected in cell phones, for example, handheld PCs and insightful telephones. These two methods have been generally perceived as a reasonable, practical, and rapid information availability arrangement, empowering client versatility. Practically speaking, IEEE 802.11 WLAN guidelines comprise of 2.4-GHz (2.4– 2.484 GHz), 5.2-GHz (5.15– 5.35 GHz), and 5.8-GHz (5.725– 5.875 GHz) recurrence groups. WiMAX models comprise of 3.5-GHz (3.3– 3.6 GHz) and 5.5-GHz (5.25– 5.85 GHz) recurrence groups. With the quick progression ofcutting-edge remote communication premise, antenna layout has swung to focus on wide multiband and moment direct structures that can be anything besides hard to fabricate. To conform to the jumbled and varying WLAN and WiMAX conditions, a multiband antenna plans has quite recently been proposed.
This paper contains a triple band monopole antenna has which can be used for multiband applications. The patch structures is responsible for the generation of the triple bands. The thorough design procedure of the propound antenna is with merits of wide-ranging triple bandwidths, omnidirectional radiation patterns and the satisfactory peak antenna gains are conferred below.

2.Design and Analysis

The submitted antenna is having circular patch which is slotted and is having hexagonal shaped slot in the first inner circle and is having circle of lower radius in the hexagonal slot structure. The evolution of the patch is shown in the figure 1.

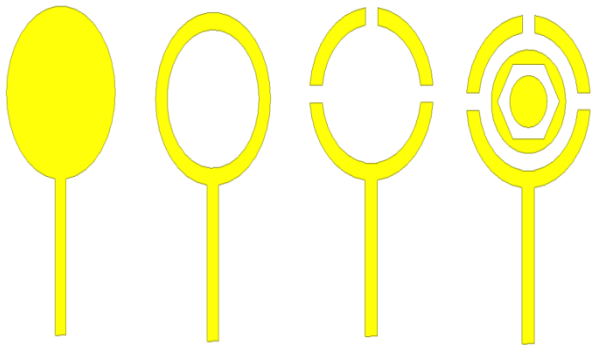


Figure1. Structural Evolution of Patch

The suggestedantenna has measurementsof 40*25 mm2is devisedon the FR-4material of width1.6mm with di-electric constant(Ɛr=4.4)loss tangent(δ=0.02).The excitation was provided with feed line of 50Ω. The simulation was done by using HFSS simulator. The ground we considered in this article is the partial ground. The proposed antenna has design has been shown in the figure 3.

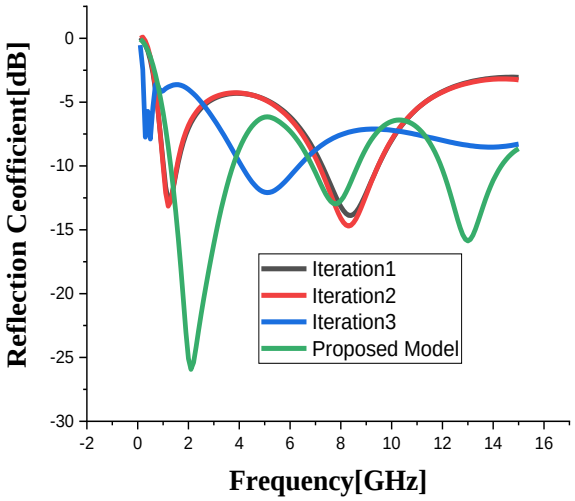
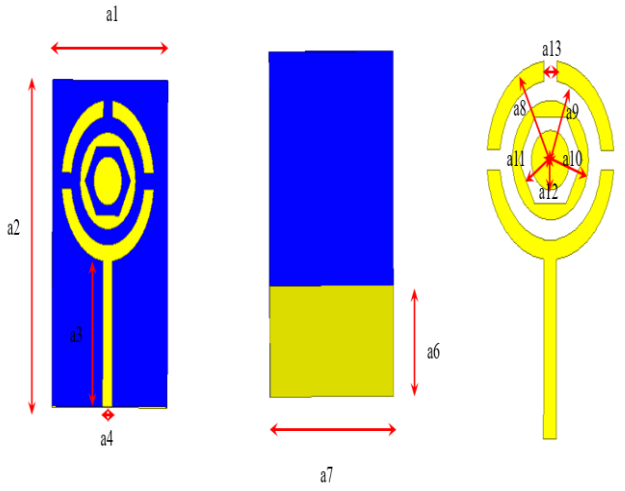


Figure2. S11 Results of the Patch Iterations.

Revised Manuscript Received on May 06, 2019
P Pardhasaradhi, Dept of E.C.E, K.L.E.F, Guntur, India.
G Kesava Sai, Dept of E.C.E, K.L.E.F, Guntur, India.
D Pavan Teja, Dept of E.C.E, K.L.E.F, Guntur, India.
B Ganesh, Dept of E.C.E, K.L.E.F, Guntur, India.



a)

b) c)

Figure3. Structure of Proposed Antenna a)FrontView b)RearView c)Patch Structure

Table1.Values for the Design

Parameter	Value(mm)
a1	25
a2	40
a3	18
a4	2
a6	13
a7	25
a8	10
a9	8
a10	6
a11	5
a12	3
a13	2

II. Results:

The propound antenna has a reflection coefficient of -25.92dB at 2.4GHz , -12.97dB at 7.8GHz and -15.82dB at 13GHz frequency in the bands 1.3-3.75/6.87-8.66/11.94-14.32 GHz respectively.

3.1Reflection Coefficient

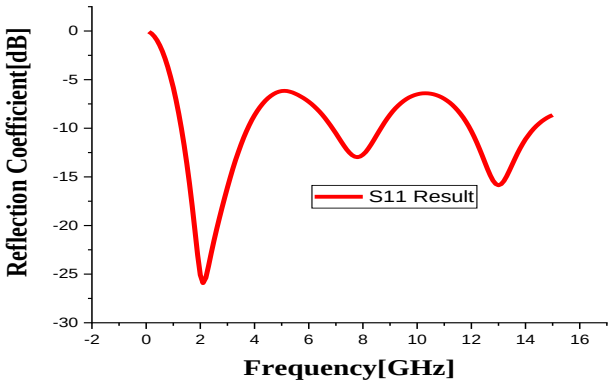


Figure4.Reflection Coefficient of the proposed antenna

3.2VSWR

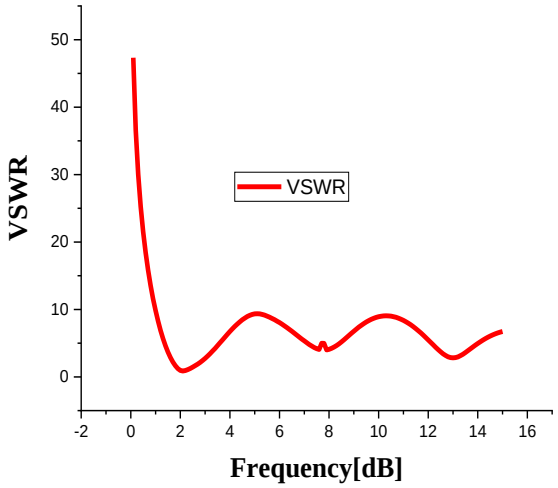


Figure5.VSWR Result of the proposed antenna

3.3 Peak Gain

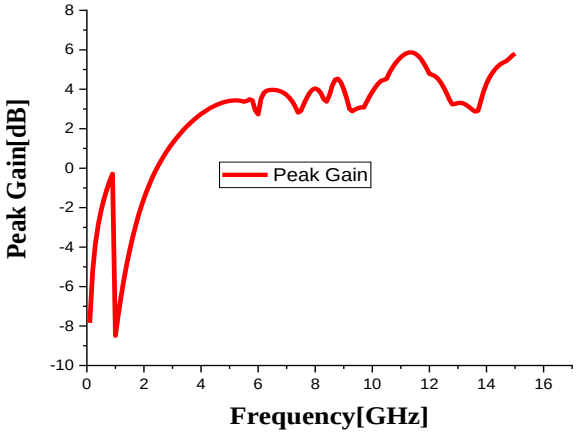
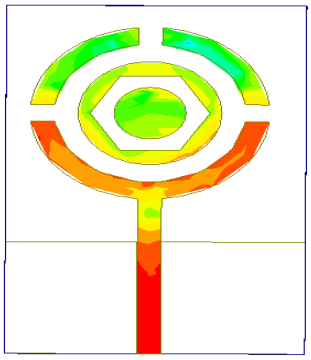
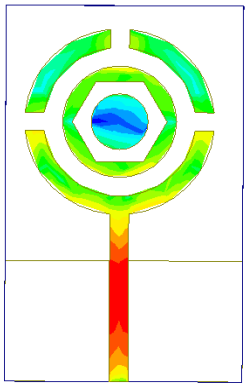
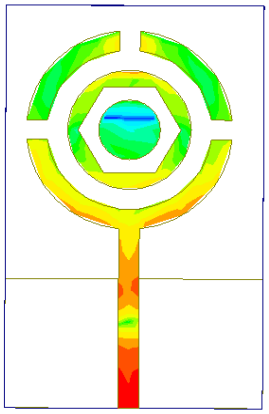
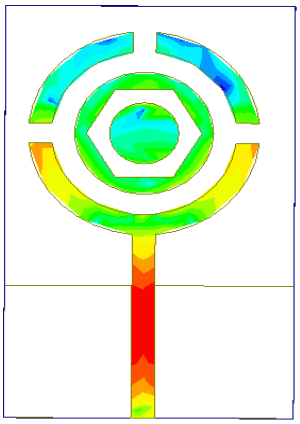


Figure6. Peak Gain of the antenna.

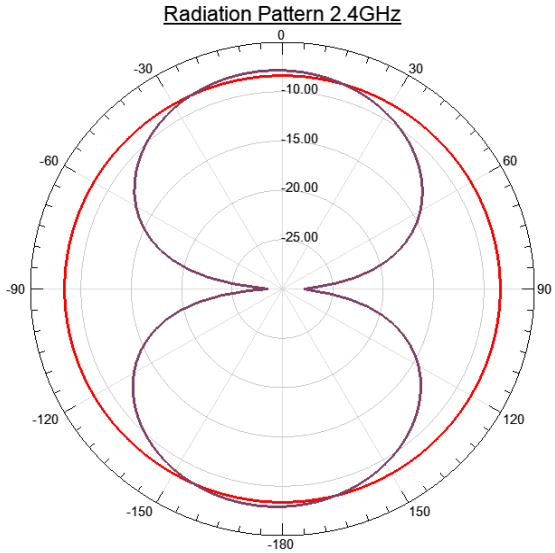
3.4Electric field distributions

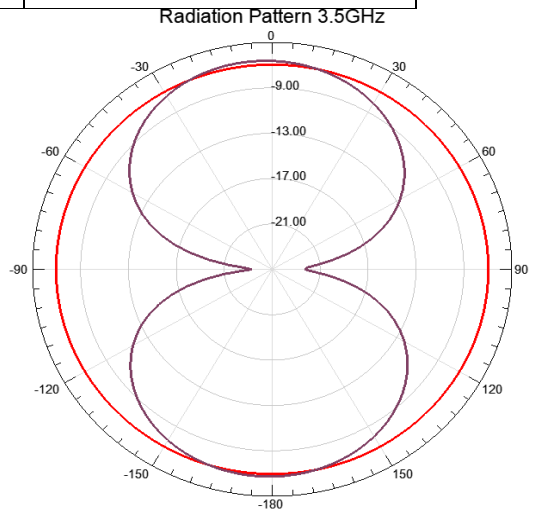
Here are the Electric field distributions of the Patch of the propound antenna at 2.45GHz&3.5GHz frequencies at phase 0 and 90 degree

Table2. Electric field distributions of the patch.

	Phase 0	Phase 90
Freq 2.45		
Freq 3.5		

3.5Radiation Patterns





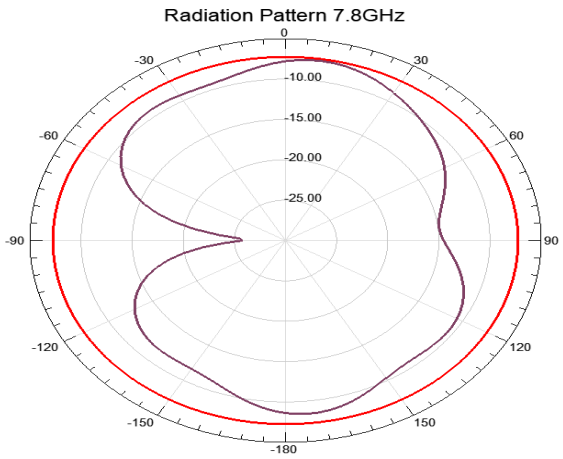


Figure5. Radiation Patterns

III. CONCLUSION:

The monopole antenna for multiband applications provided with GSM/Bluetooth/WLAN/Wi-MAX/Satellite Services and X-band presented. The base patch antenna works in the triple bands. To further increase the bands and the s11 of the antenna, we can include CSRR in partial ground structure.

REFERENCES

1. Luan YC, Zhang FS, Xu Y, Liang WL, Wang Y. Compact triple-band monopole antenna with a wide-slot ground for WLAN/WIMAX applications. In2013 International Workshop on Microwave and Millimeter Wave Circuits and System Technology 2013 Oct 24 (pp. 127-130). IEEE.
2. Ekrami H, Jam S. A compact triple-band dual-element MIMO antenna with high port-to-port isolation for wireless applications. AEU-International Journal of Electronics and Communications. 2018 Nov 1;96:219-27.
3. Kunwar A, Gautam AK, Rambabu K. Design of a compact U-shaped slot triple band antenna for WLAN/WiMAX applications. AEU-International Journal of Electronics and Communications. 2017 Jan 1;71:82-8.
4. Yadav A, Agrawal S, Yadav RP. SRR and S-shape slot loaded triple band notched UWB antenna. AEU-International Journal of Electronics and Communications. 2017 Sep 1;79:192-8.
5. Wang Z, Liu J, Yin Y. Triple band-notched UWB antenna using novel asymmetrical resonators. AEU-International Journal of Electronics and Communications. 2016 Dec 1;70(12):1630-6.
6. Deshmukh, Amit A., et al. "Triple Band E-shaped Microstrip Antenna." *Procedia Computer Science* 93 (2016): 67-73..
7. Khattak MI, Khan MI, Najam AI, Saleem M, Shafi M. A planar UWB antenna with tripple notched bands. In2017 9th International Conference on Computational Intelligence and Communication Networks (CICN) 2017 Sep 16 (pp. 1-5). IEEE.
8. Dang L, Lei ZY, Xie YJ, Ning GL, Fan J. A compact microstrip slot triple-band antenna for WLAN/WiMAX applications. IEEE Antennas and Wireless Propagation Letters. 2010;9:1178-81.