iJRASET
International Journal For Research in Applied Science and Engineering Technology

# INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

**Volume:** 5 **Issue:** VII **Month of publication:** July 2017

**DOI:**

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
*ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor:6.887*
*Volume 5 Issue VIII, July 2017- Available at www.ijraset.com*

# Monopole Antenna with Modified Ground Plane for Enhancing Bandwidth and Size Reduction

Bharath Raj M[1], Dr Jagadeesha. S[2] , Madhusudhana. K[3] , Amith K Jain[4]
[1,2,3,4]*Department of Electronics & Communication, SDMIT, UJIRE, VTU, Karnataka, India*

***Abstract*: *Monopole antennas play a very important role in today's wireless communications in terms of size, gain , multiband operation which helps in many useful applications . In our proposed work it has been observed that antenna with simple monopole antenna having the patch dimensions (7×11) mm2 and a ground plane dimensions of (16×4) mm2 will have the resonating frequency of 4.185 GHZ and a bandwidth of 60.4 % . With slight modification in patch and ground plane same antenna can be used with resonating frequency of 3.9 GHZ and a wide band width of 80.48% .It has been observed that monopole antennas are small in size . The simulation of antenna is carried out by using IE3D and practical measurement done by Vector Network Analyzer(VNA).***

***Keywords: Monopole , Bandwidth and size reduction***

## I. INTRODUCTION

In recent year, with the continuous growth of Ultra-wideband UWB wireless communication technologies, design and manufacturing of low cost microwave components are among most critical issues in communication systems.UWB technology can be widely used in ground penetrating radars , and other military applications.UWB with good radiation pattern and impedance matching are becoming highly desired both in industry academia [1]. The increasing demand for wireless communication services spurs on the need for antennas cable of operating at a broad frequency range . Planer monopole antennas are good candidates owing to there wide impedance band width , omni directional radiation pattern, compact and simple structure, low cost and ease of construction [1]. Resonant slots embedded in wideband planner monopole antennas have focused much attention lately , due to the fact that the insertion of the narrow band slot has proved to produce a frequency –notch feature in the antenna response . It is accomplished by inserting a narrow band resonant slot in the antenna planner geometry and by properly adjusting its length in order to make it resonant at the desired filtering frequency [3].

planner monopole antenna has become the choice of antenna for UWB radios due to its attractive merits, such as the ultra-wideband characteristic, near Omni directional radiation feasasibility of the miniaturization and applicability of this miniaturized beveled monopole antenna in UWB radios [4]. Monopole antenna, which is basically a printed micro strip antenna with etched ground plane for multiband applications. Printed monopole antennas are less fragile, planer and can be integrated with the integrated circuits unlike monopole antennas which have non planer or protruded structures above the ground plan [5].

## II. ANTENNA DESIGN

The geometrical configuration of the proposed wide band printed monopole antenna is shown in Figure 1. The optimized geometry of proposed monopole patch antenna with its dimension (7×11) mm2 printed on the top of the dielectric substrate with thickness 1.6 mm and relative dielectric constant of 4.4 they are mounted on ground plane of dimension(16 × 4) mm2 . To achieve good wide band for of the proposed antenna, the separation 'D' between the rectangular patch and the truncated ground plan is used . The dimension of the slot (Ws ×Ls) embedded in B final stage the truncated ground plan and the feed gap distance 'D' important parameters in determining the sensitivity of impedance matching.

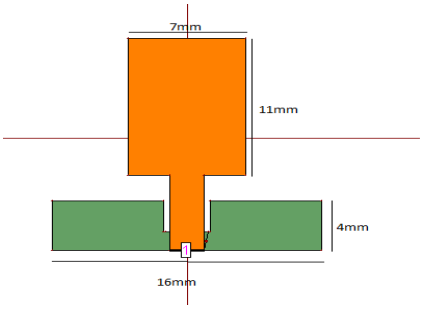
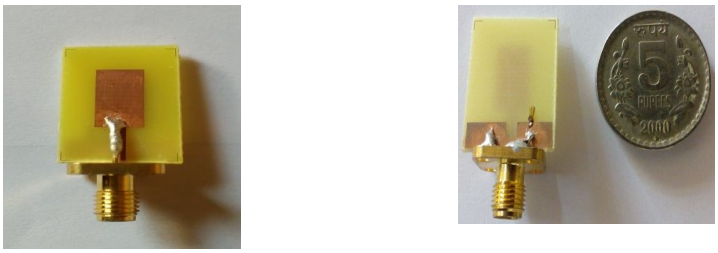


Fig 1. Simulated monopole antenna

The three essential parameters for the design of a rectangular monopole patch antenna are
Frequency of operation f0 : The resonant frequency of the antenna must be selected according to our applications. We use the resonating frequency as 7.2GHZ for our design. This frequency is range is used for UWB wireless applications. Dielectric constant of the substrate (Ɛr): Glass Epoxy is used in our design with dielectric constant of 4.4.Height of the dielectric substrate (h): Height of the dielectric substrate controls the bandwidth. The value of h used in our design is 1.6 mm.The practical implemented mono-pole antenna is shown in fig 2.



a)Top view b) Bottom view

Fig 2 : Practical Monopole antenna

Modified monopole simulated antenna shown in fig 3 .The top and bottom view of the practical implemented antenna as shown in fig. 4

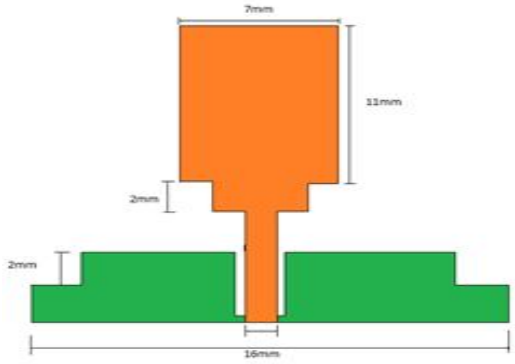
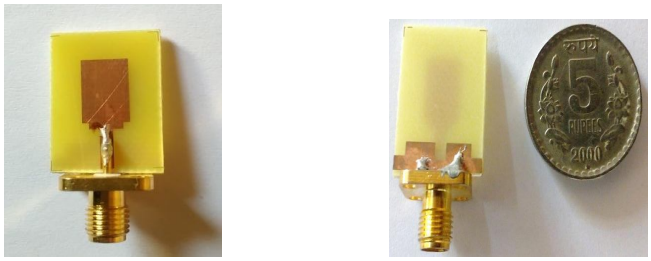



Fig 3. Simulated modified monopole antenna



a)Top view b)Bottom view

Fig 4 Practical modified monopole

## III.RESULTS

Fig 5 and Fig 7 shows the simulated return loss versus frequency of the monopole antenna with and without modification of the patch.Fig.6 and Fig.8 shows the practical return loss of the mono pole antenna with and without modification of radiating patch.

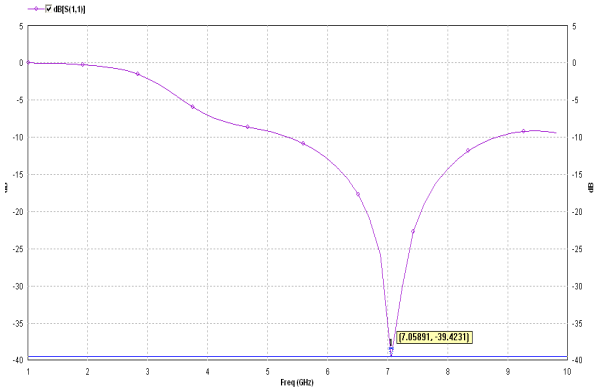



Fig.5: simulated return loss of the base mono pole antenna

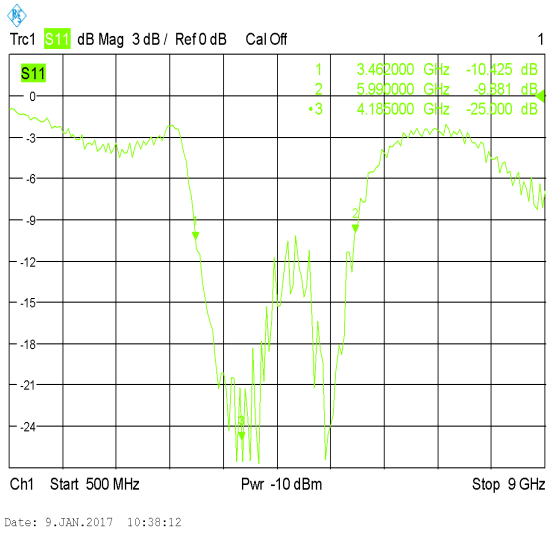



Fig.6:Practical return loss of the Base mono- pole antenna

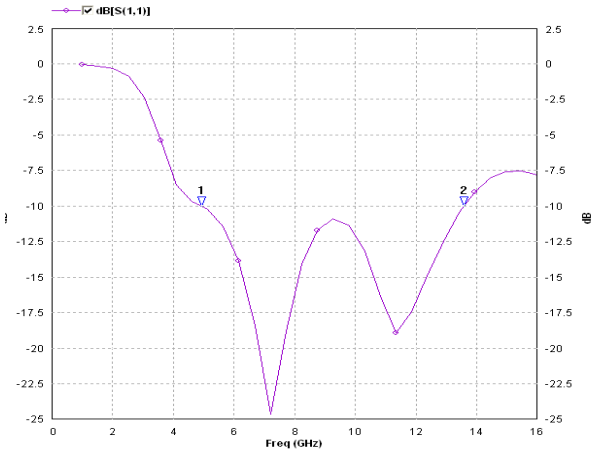



Fig 7:Simulated Return loss of the modified monopole antenna

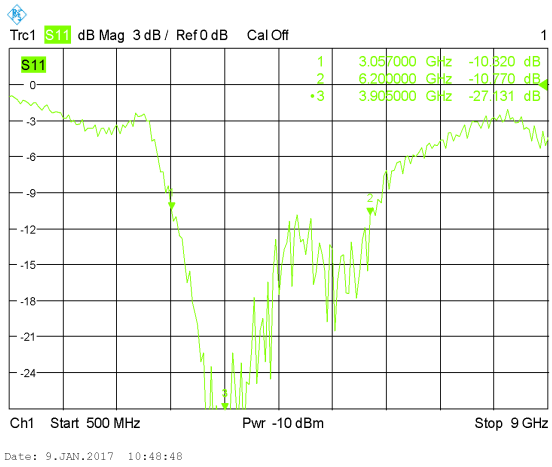



Fig 8 : Practical Return loss of the modified Mono pole antenna

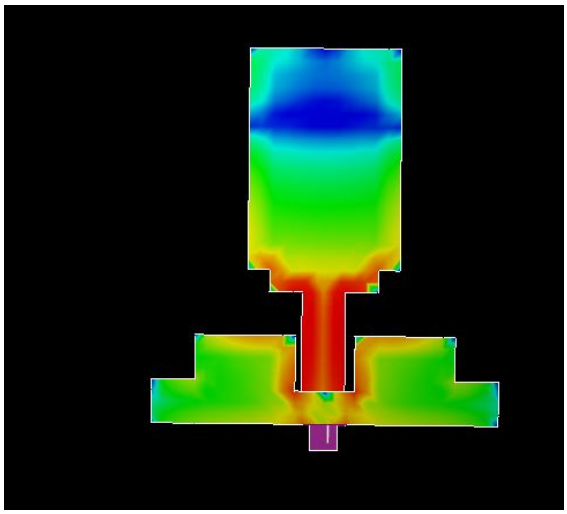


Fig 9: Current distribution

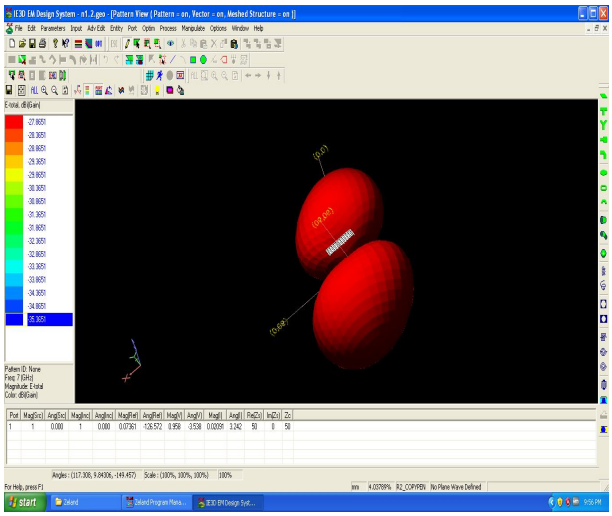
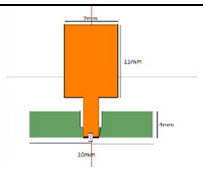
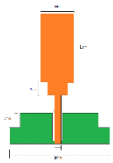


Fig 10 : Radiation pattern

| Prototype | Frequency in GHz | | Band width in MHz | | Return loss in dB | |
|---|---|---|---|---|---|---|
| | Simulated | Practical | Simulated | Practical | Simulated | Practical |
|  | 7.05 | 4.185 | 2371 | 2528 | -39.42 | -25 |
|  | 7.02 | 3.905 | 2889 | 3143 | -24.08 | -27.13 |

## REFERENCES

[1] G.M Yng R .H Jin G. B Xiao , C. vittorio, V.G. Harris and N .X sun, Ultra wide band (UWB) Antenna with Multiresonant Split Ring Loops" IEEE Trans on Antenna and Propagation . Vol 57 , N0 1, (2009), 256- 260.

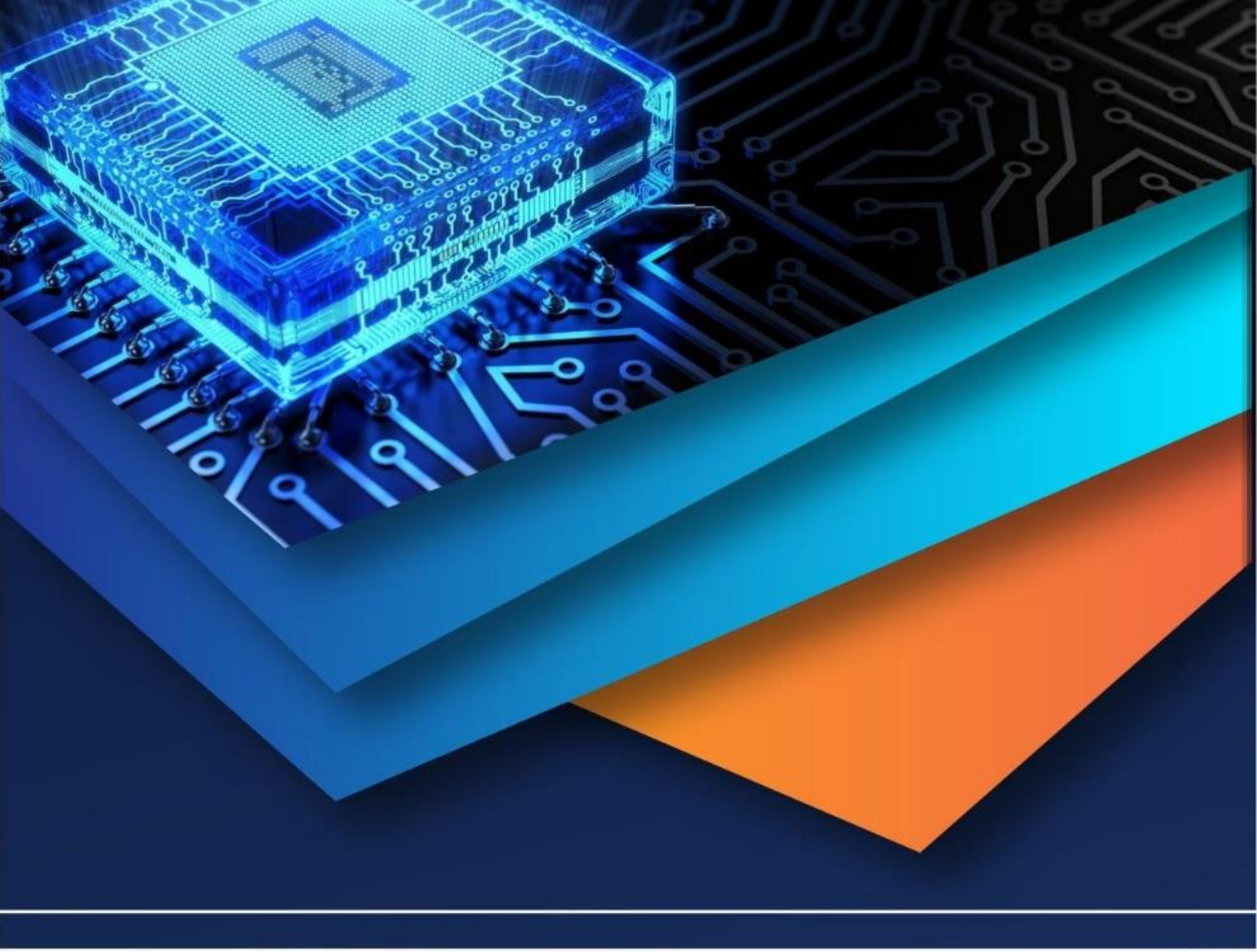
[2] E. Antonino –Daviu, M. Cabido Fabries, M . Ferrando- Batller and A Vallero – Noueria wide band Double fed planner Monopole Antennas, Electronics Letters Vol . 39, No. 23 (2003)

[3] Eva Antonino –Daviu, Marta C abedo-Fabries, Miguel Ferrando-Bataller and Vicent Miquel Rodrigo penarracha Model Analysis and Design of Band Notched UWB planner Monopole Antennas IEEE Trans On Antenna and propogation Vol. 58 No 5, (2010) 1457-1467

[4] Mei sun, Yue ping Zhang, and Yilong Lu, Miniaturization of planner Monopole Antenna for Ultra- Wide band Radios ,IEEE Transaction on antennas and propogation , Vo. 58, No. 7,(2010) 2420-2425

[5] Rakesh Singh Kshetrimayum, printed Monopolle Antennas for Multiband Applications , International Journal of Microwave and Optical Technology, Vol . 3 , No, 4 (2008)

[6] Design and analysis of Microstrip patch Antenna arrays – Ahemed Fatthi Alsager.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

# INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY