

Design of Tri Band and Dual Band Antenna Using Meta Cell

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ABSTRACT- A $15 \times 20 \times 1.6$ mm³ a novel T shape patch Antenna inspired by unit cell is investigated by changing position of meta cell. The proposed antennas have dual band (3.53-5.3GHz) and tri band (3.1-3.2GHz, 4.9-5.56GHz, 6.22-6.76GHz) nature operating at S, C band Applications .Here we observed the designed antenna has $S_{11} < -10$ dB and gain was positive at operating bands.

KEYWORDS- E Field, Patch, Metamaterial, S11.

I. INTRODUCTION

In present day to day life the usage of communication devices increased randomly so automatically the multiband Antenna requirements also increases [1]. This multiband nature can be achieved by Fractal [2-4],DGS[5-6],Slots[7] but the size of antenna was large this can be overcome by using unit cell techniques[8-11]. The unit cell was an Artificial Structure designed by using HFSS Tool[12].

II. ANTENNA ATRUCTURE

A. Design 1

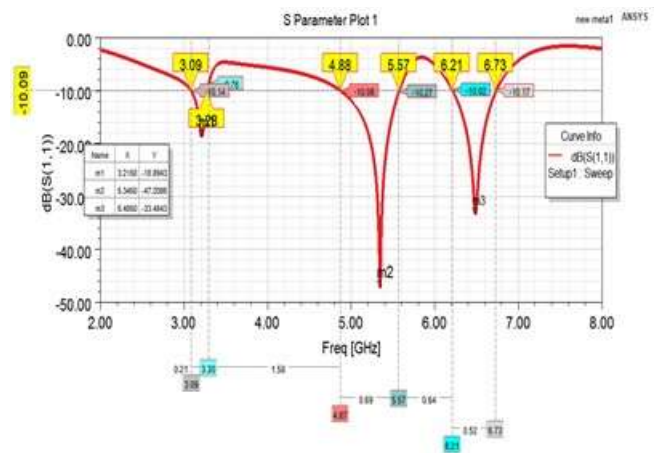
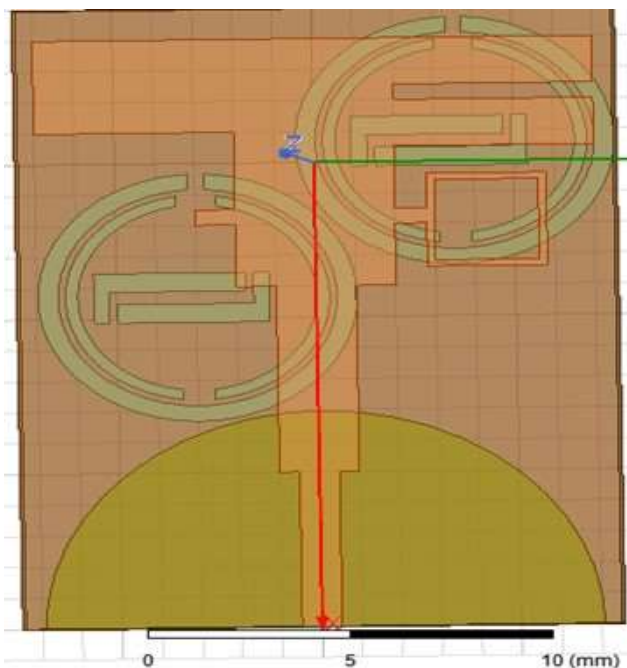
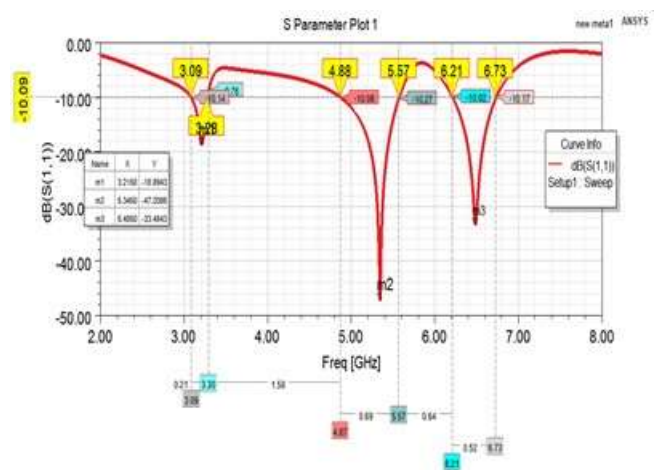


Figure 1: S11 Vs Frequency of Design1

Design 1, a 14mmx3mm dimension micro strip was excited width feed line and square type ring was attached to reduce VSWR.

In fig 1, the operating range of Design 1 was 3.09-3.78GHz,4.88-5.57GHz,6.21-6.73GHz.we got minimum s11 at 5.34GHz.



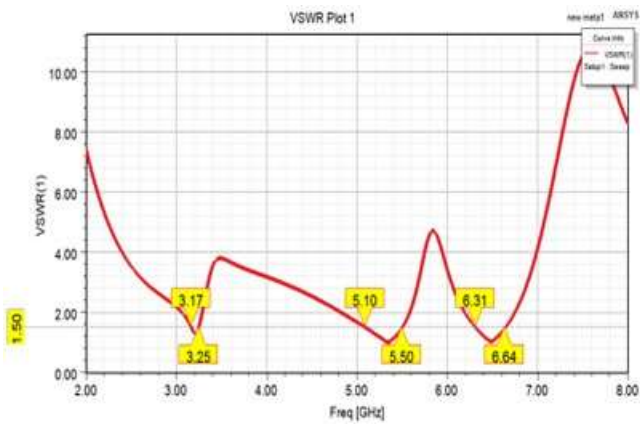


Figure 2: VSWR vs F

In Fig 2 the proposed antenna was less than 1.5 VSWR value.

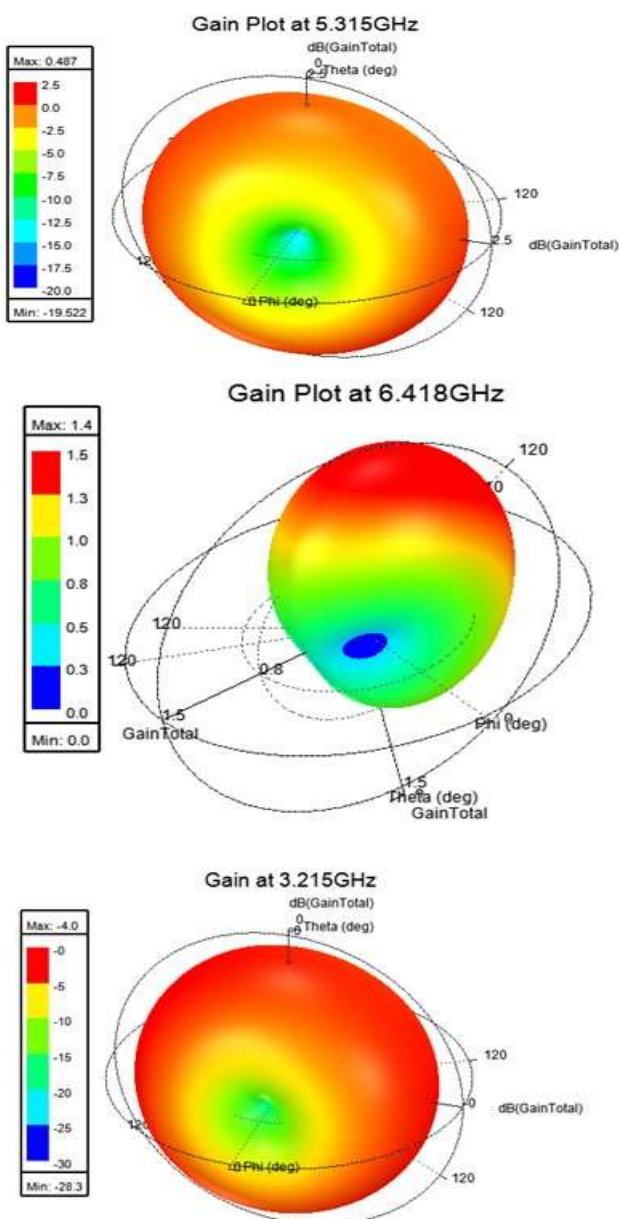


Figure 3: Radiation plot

The specified design has positive gain at 5.315GHz and 6.418 GHz. At 3.215GHz the antenna behaves as isotropic

radiator shown in Fig 3.

B. Design 2

Here single unit cell was placed at center of radiator. The bottom side of Antenna we placed semicircular shape ground to reduce S11.

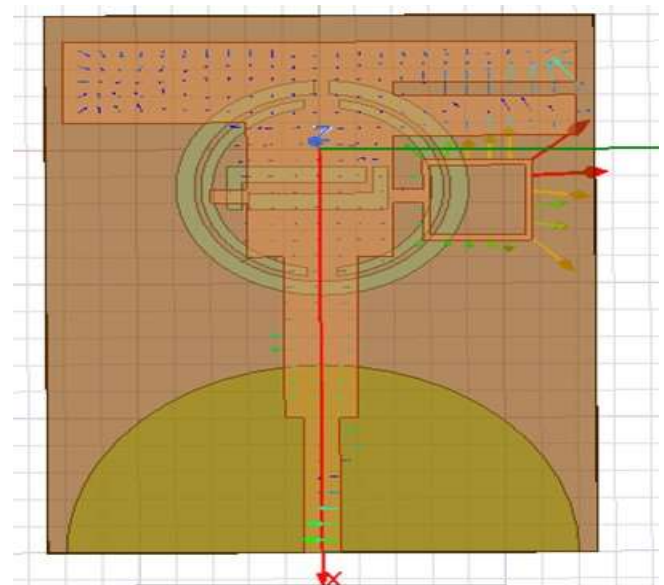


Figure 4: Design 2

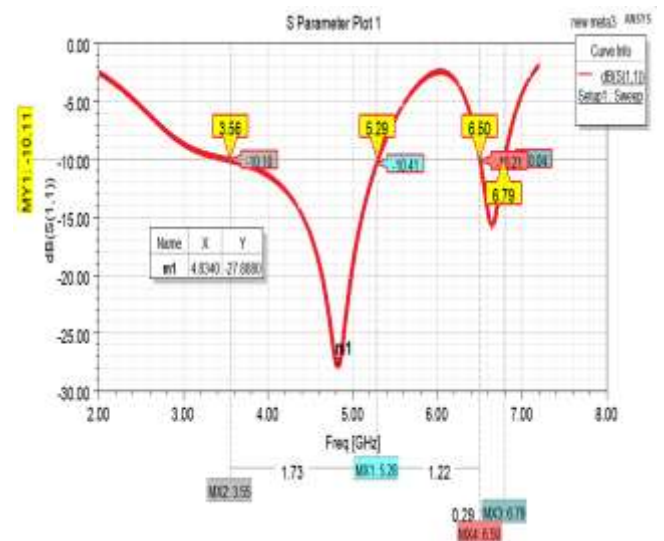


Figure 5: S11 vs F

In Second design we got wide band in C region from 3.56GHz-5.29GHz with lowest S11 of -27.88 shown in fig 4.

From fig 5, in operating range of antenna we got vswr <1.06.at 4.8 GHz it was nearly 1.

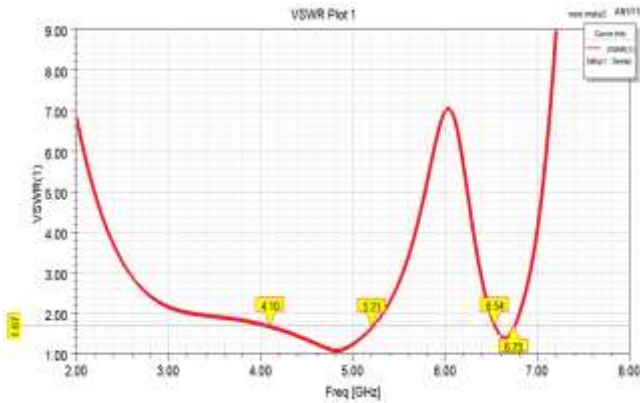


Figure 6: VSWR vs F

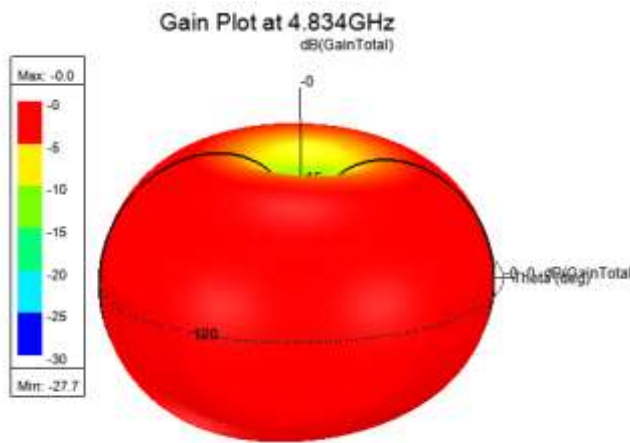


Figure 7: RP

At 4.384 GHz the antenna got equal radiation in all directions shown in fig 6.

Table 1: Parameters of proposed structures

S. No.	Design 1(at 4.83GHz)	Design 2(at 4.83GHz)
Peak Directivity	1.287	0.932822
Peak Gain	1.11	0.892991
Radiation Efficiency	0.87	0.957300

III. CONCLUSION

From this work we can generate dual and tri band operating frequencies using novel meta structure with dimensions 8mmX8mm.by introducing meta at bottom we reduced size of patch. By using 2 Meta we got triple band and with one meta dual band. The designs suitable for C band.

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