

Dual band Rectangular Patch Antenna with DGS for Satellite Communications

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Received: 18.10.20, Revised: 22.11.20, Accepted: 10.12.20

ABSTRACT

A Dual band rectangular patch antenna intended for the satellite communications with a working recurrence of 10.24GHz and 11.83GHz covering a data transfer capacity of 1.2GHz and 0.78GHz at the two working frequencies individually. Ground has been scratched with spaces in an occasional way which drove for the age of double band transmission capacity. Fire resistant Glass epoxy is substrate and a 50 ω persuade feed is utilized to energize the radio wire. Flawed Ground structure procedure has been actualized to accomplish the double band of activity. The general element of the antenna is 15mm \times 15mm \times 1.6mm. It is having double band covering the X band recurrence from 10.24GHz and 11.83GHz covering a data transfer capacity of 1.2GHz and 0.78GHz at the two working frequencies separately with an arrival misfortune esteem not exactly - 10dB for whole transmission capacity. Industrially accessible 3D test system Ansys HFSS programming has been utilized to structure the proposed antenna.

Keywords: Dual band, Defective Ground, X band.

Introduction

Prerequisite of the advanced correspondence frameworks includes the requirement of antenna having a reduced size with different frequency of activity is expanding step by step and is a testing case for originators to accomplish various reverberation in a conservative antenna along with keeping up the vital impedance data transfer capacity with out a decrease in gain value of the antenna. Basic requirement of Navic application is antenna minimization and it is a basic requirement with the goal conveyed effectively so as to be easy to be incorporated into any framework utilized for the navigational purposes.

A antenna shown in [1] have double reverberation has patch shorted with the ground utilizing a by means double reverberation yet it has been taken care of with a microstrip feed productivity on account of surface waves created by feed as both the feed line and the transmitting patch are on a similar surface. A antenna in [2] with two transmitting components set on a similar surface, the creators utilized two feeds to energize both patches for accomplishing double reverberation. In any case, this method requires two modules of transceivers which will influence the expense of framework and furthermore the size. A antenna in [3] with a slanting opening at the middle has been proposed to accomplish double reverberation however by including space in transmitting radiator the problem arises in the power distribution pattern, with the

introduction of the space in the radiator there will be a unequal distribution of currents in the radiator will indeed develop a power distribution pattern which is also not equally distributed.

In [4] a triangular-ring opening antenna took care of by coplanar waveguide with projected stub used for tuning and a ground at the base of the substrate for scaling down and it is discovered that the thunderous antenna can be essentially decreased as contrasted and CPW took care of customary ring-space reception apparatuses. A tale responsive impedance substrate for reception apparatus scaling down with improved transmission capacity execution is introduced in [5]. The techniques for scaling down spirals and different antenna utilizing dielectric stacking, counterfeit lumped loads, finished dielectrics and different methodologies is introduced in [6]. They accomplished scaling down absent a lot of contortion in addition and transmission capacity.

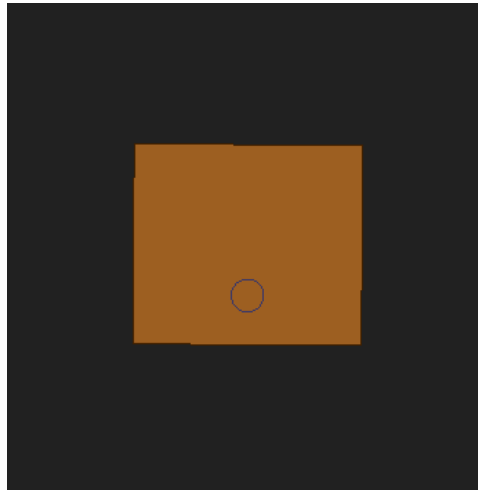
The scaling back strategy of antennas for handsets is introduced in [7]. The creators used an attractive antenna for the ISM band in P band frequency of 900MHz and at the frequency of 2GHz. Here a well known antenna for the mobile handsets, Planar Inverted-F Antenna was utilized for the examination. The impact of space stacking on microstrip antenna in [8]. The Koch island fractal and H-shape openings are acquainted with microstrip antenna and their impact on decrease of the thunderous antenna is resolved. Extra openings of increasingly complex

geometry are executed on the H-formed fix to additionally cut down its reverberation antenna.

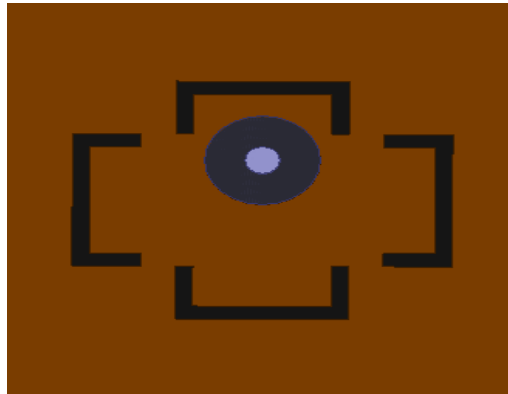
Proposed Antenna

A Dual band rectangular patch antenna intended for the satellite communications with a working recurrence of 10.24GHz and 11.83GHz covering a data transfer capacity of 1.2GHz and 0.78GHz at the two working frequencies individually. Ground has been scratched with spaces in an occasional way

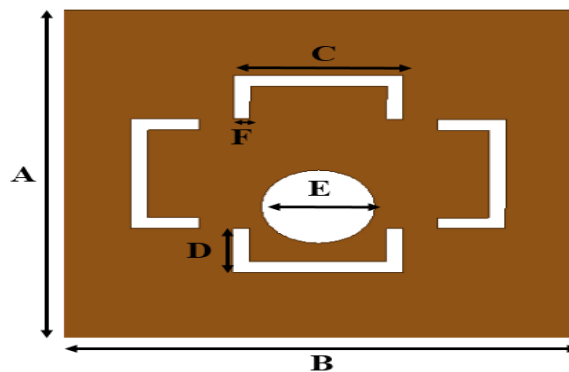
which drove for the age of double band transmission capacity. Fire resistant Glass epoxy is substrate and a 50 ω persuade feed is utilized to energize the radio wire. Flawed Ground structure procedure has been actualized to accomplish the double band of activity. The general element of the antenna is 15mm \times 15mm \times 1.6mm. The dimensions are given as A=15mm, B=15mm, C=5mm, D=2mm, E=3.35mm, F=0.5mm.



(a) Top View



(b) Bottom View



(c) Schematic Diagram

Fig.1: Proposed antenna

Results

Antenna performance parameters are demonstrated & examined utilizing the test system programming software. Which are utilized to check the exhibition of the antenna and are contemplated and introduced in this section. Figure 2 underneath is impedance coordinating plot, The picture delineates that

antenna is emanating at the two frequencies of 10.24GHz and 11.83GHz. We can likewise see that the loss at antenna arrival at the working frequency of 10.24GHz is -24dB and at 11.83GHz is -16.18dB. Which speaks about a decent matching and impedance coordinating at the necessary working frequency of the antenna.

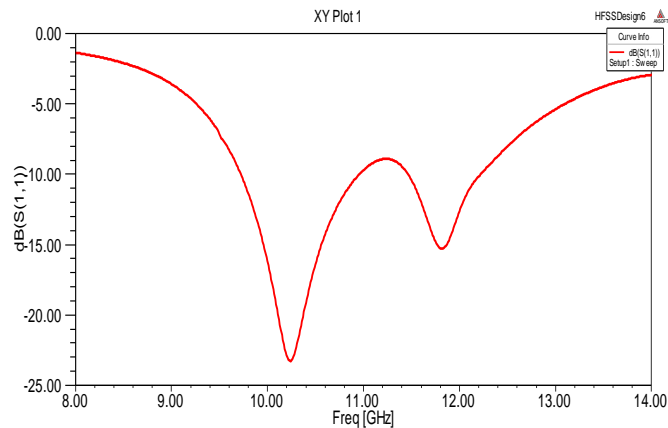


Fig.2: Return loss

Figure 3 underneath is VSWR plot, The picture portrays that the VSWR estimation is under 2dB at the two frequencies of 10.24GHz and 11.83GHz. We can likewise see that the VSWR at 10.24GHz is

1.44dB and at 11.83GHz is 1.21dB. Which speaks about a decent matching and impedance coordinating at the necessary working frequency of the antenna.

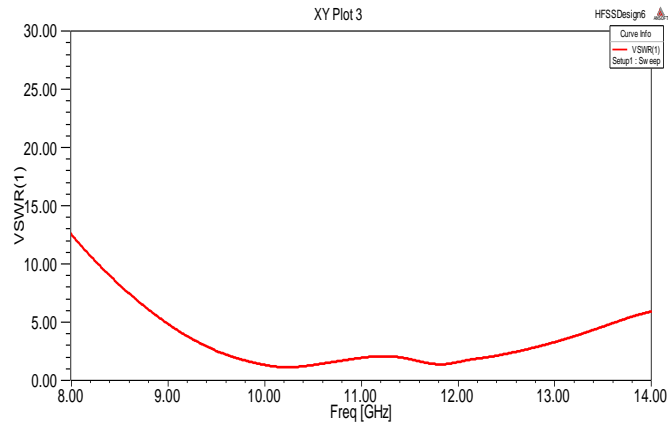


Fig.3: VSWR

Figures 4 and 5 underneath is gain plot at the two working frequencies of 10.24GHz and 11.83GHz, The picture delineates that the increase estimation of the antenna at the working frequency of 10.24GHz is 6.11dB and at 11.83GHz is 3.5dB. From the two gain

plots of the antenna a equal distribution of the power dissemination force at various edges with no inequalities is found and this is a fundamental requirement for satellite appliances.

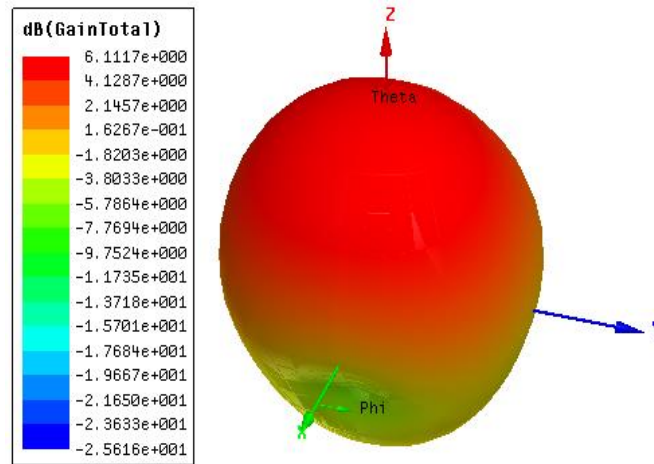


Fig.4: Gain at 10.24GHz

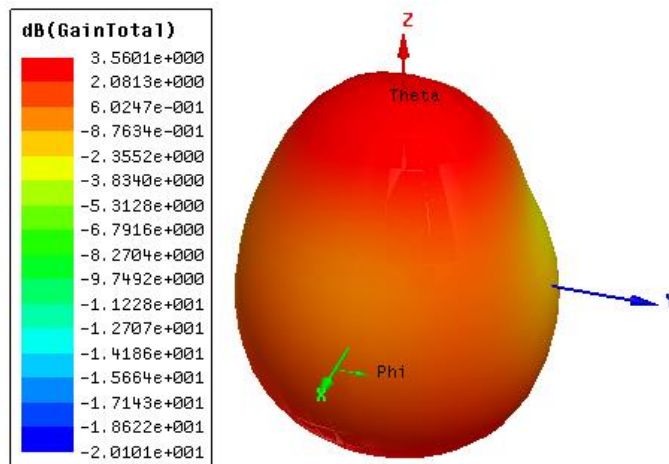
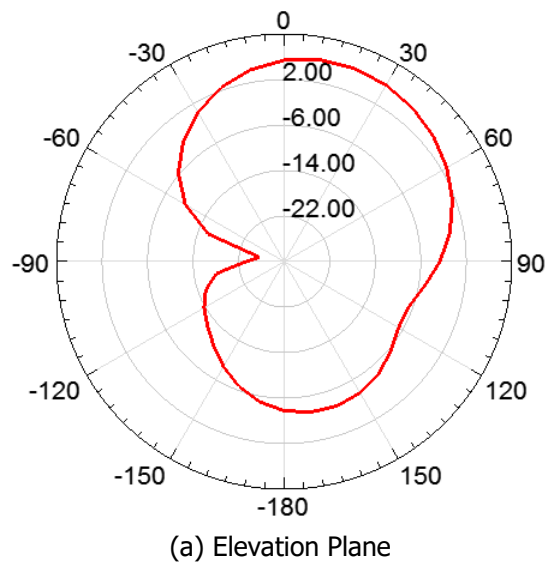
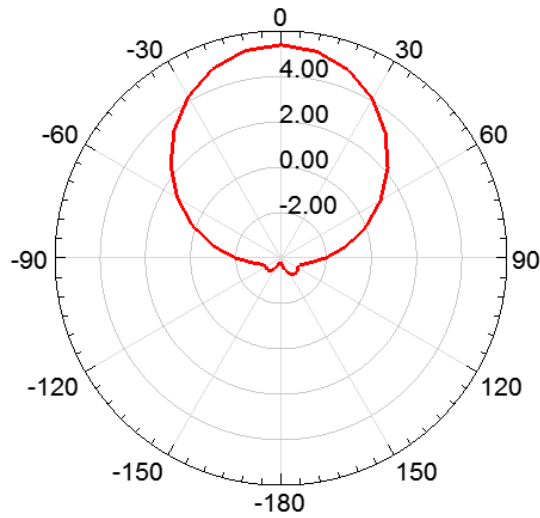


Fig.5: Gain at 11.83GHz

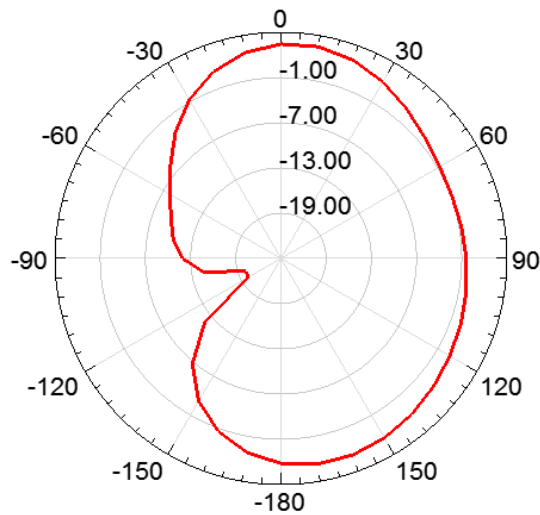


(a) Elevation Plane

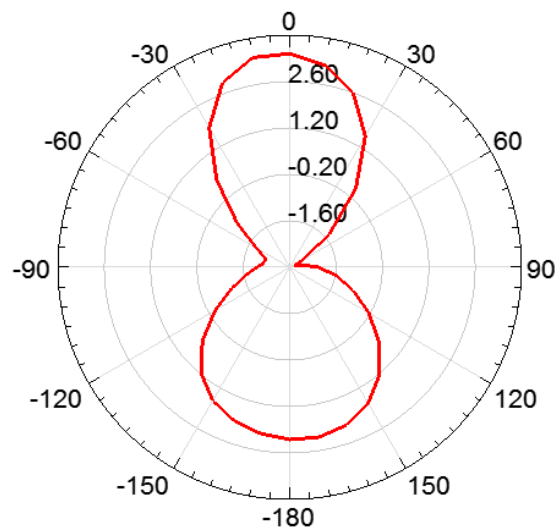


(b) Azimuthal Plane

Fig.7: Power Distribution Pattern at 10.24GHz



(a) Elevation Plane

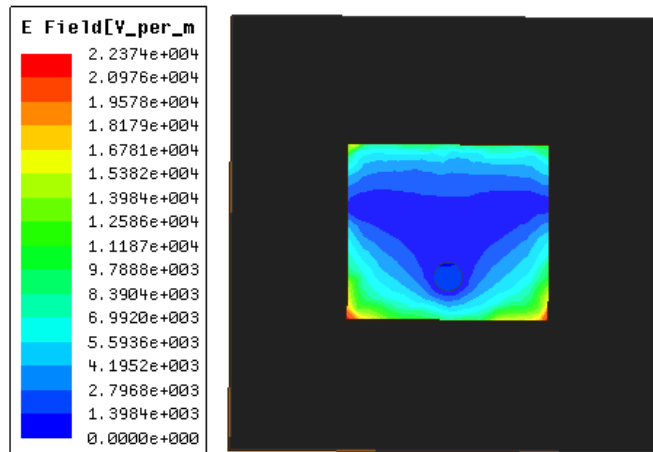


(b) Azimuthal Plane

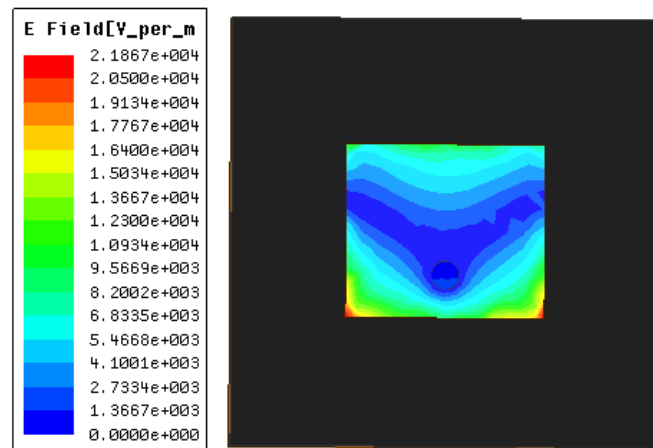
Fig.8: Power Distribution Pattern at 11.83GHz

Examples of power distribution patterns at the two working frequencies of 10.24GHz and 11.83GHz are appeared beneath in Figures 6 and 7. A equal distribution of currents in the radiator will indeed develop a power distribution pattern which is also equally distributed and this is a fundamental requirement for satellite appliances.

Figure 8 underneath shows the example of spreading of current field at the working frequency of 10.24GHz and 11.83GHz. The hub proportion esteem is 2.2V/m at both the frequencies which speaks to that the antenna is having proper spread of current fields at the working frequency.



(a) lower patch at 10.24GHz



(b) Upper patch at 11.83GHz

Fig.9: Expansion of Current field

Conclusion

A Dual band rectangular patch antenna intended for the satellite communications with a working recurrence of 10.24GHz and 11.83GHz covering a data transfer capacity of 1.2GHz and 0.78GHz at the two working frequencies individually. Ground has been scratched with spaces in an occasional way which drove for the age of double band transmission capacity. Fire resistant Glass epoxy is substrate and a 50 ω persuade feed is utilized to energize the radio wire. Flawed Ground structure procedure has been actualized to accomplish the double band of activity. The general element of the antenna is 15mm \times 15mm \times 1.6mm. It is having double band covering the X band recurrence from 10.24GHz and 11.83GHz covering a data transfer capacity of

1.2GHz and 0.78GHz at the two working frequencies separately with an arrival misfortune esteem not exactly - 10dB for whole transmission capacity. Industrially accessible 3D test system Ansys HFSS programming has been utilized to structure the proposed antenna.

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