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用于 5G 应用的优化带宽增强型宽频微带天线

Navneet Singh[1], Amit Jain[1], Dinesh Kumar Singh[2]
1 Shri Venkateshwara 大学工程技术学院 印度 北方邦 加杰劳拉 244236
2 DSMNR 大学信息技术系 印度 北方邦 勒克瑙 226017

摘　要：本文提出了一个单端口截断角和普通 T 形槽口加载的微带贴片天线，以提高带宽，可用于 5G 应用的中频段。这种天线的原型设计是通过在具有 50Ω微带线馈电的矩形贴片天线上加载截断角和 T 形槽口而获得的。在通过 Mentor Graphics IE3D 仿真软件对仿真结果进行研究后，在设计频率为 3GHz 的天线 1 至天线 5 中，优化后的天线 5 被选为拟议的天线。拟议的天线涵盖了 2.39 至 4.04GHz 的宽频带和 51.3%的分数带宽，一对共振频率的回波损耗分别为−23.38dB 和−29.65dB。

关键词：截断角；槽口；带宽；共振频率；回波损耗

Optimized bandwidth enhanced wideband microstrip antenna for 5G applications

Navneet Singh[1], Amit Jain[1], Dinesh Kumar Singh[2]
1School of Engineering & Technology, Shri Venkateshwara University, Gajraula, (UP), 244236, India
2Department of IT, DSMNR University, Lucknow, (UP), 226017, India

Abstract: In this article, a single port with truncated corner and common T-shaped notch loaded microstrip patch antenna for bandwidth enhancement is presented which is useable for mid band of 5G applications. The design of this prototyped antenna is obtained by loading truncated corner and T-shaped notch on rectangular patch antenna having 50 Ω microstrip line feed. The optimized antenna 5 is selected as proposed antenna at design frequency 3 GHz among antenna 1–antenna 5 after study of simulated results through Mentor Graphics IE3D simulation software. Proposed antenna covers a wide bandwidth from 2.39 to 4.04 GHz and fractional bandwidth of 51.3% with pair of resonance frequency having return loss of -23.38 dB and -29.65 dB respectively.

Keywords: truncated corner; notch; bandwidth; resonance frequency; return loss

一、引言

[2]

[3]

U L

[4,5]

5G H U

14% 30% [6,7]

5G 600-850MHz E

2.3-4.7GHz 24-40GHz 40% [8,9]

3GHz 5GHz

5G 3.1-3.55GHz 3.7-3.8GHz [10]

3.3-3.6GHz 3.4-3.8GHz[1] 5G

Mentor

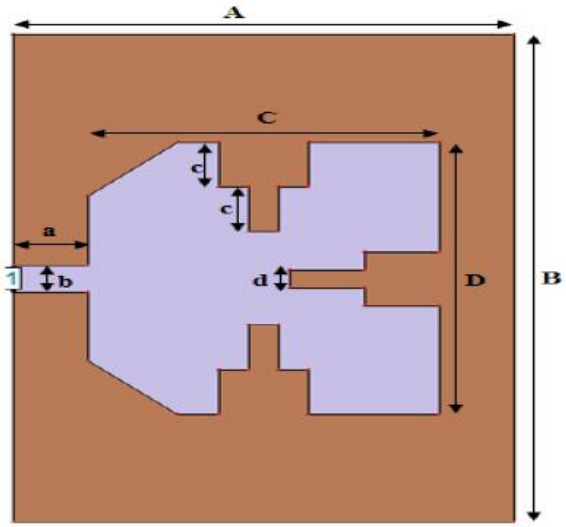
T U Graphics IE3D

二、对拟议结构的说明

1

4.4 1.6 0.01 FR4

[11]

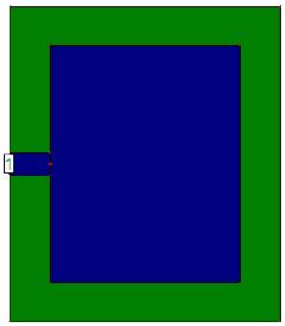


1.

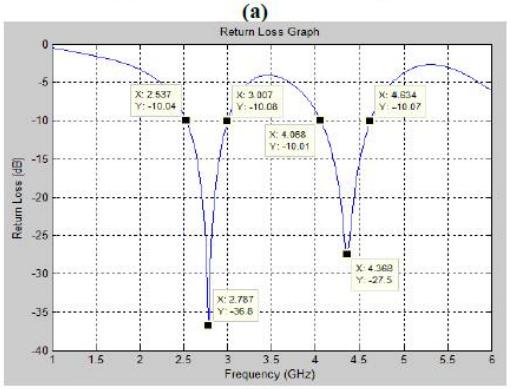
3GHz

23.4×30.4 mm^2 50Ω

5×3 mm^2 1



(a)



(b)

2.(a) ;(b)

No.		
1	A	33.4
2	B	54.4
3	C	23.4
4	D	30.4
5	a	5
6	b	3
7	c	5
8	d	2

1 T

3

三、设计步骤和模拟结果

23.4×30.4 mm^2 33.4×40.4 mm^2

5×3 mm^2 50Ω

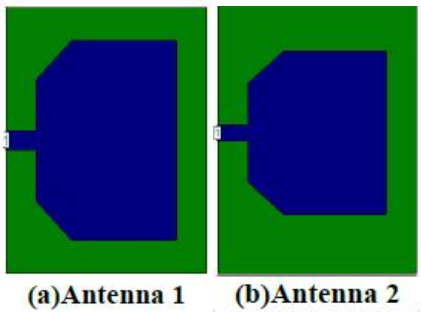
2 2 b

2.537GHz 3.007GHz

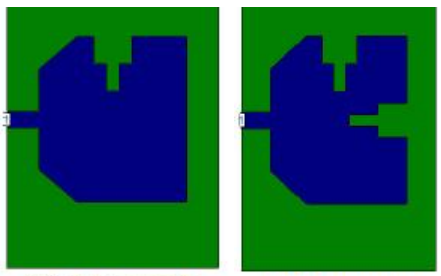
16.96% 4.068GHz 4.634GHz 13%

2.787GHz 4.368GHz

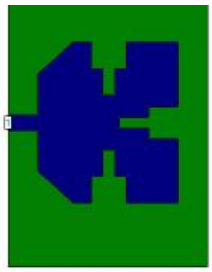
-36.8dB -27.5dB



(a)Antenna 1 (b)Antenna 2



(c)Antenna 3 (d)Antenna 4



(e)Antenna 5

3.

4(a)

1

6

6

4(b)

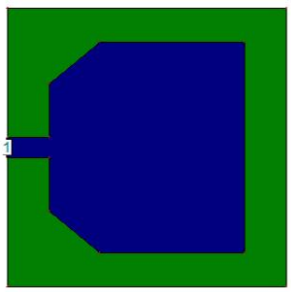
2.687GHz

3.152GHz 15.93% 4.218GHz 4.934GHz

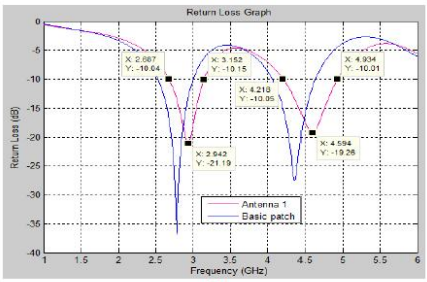
15.65%

2.942GHz 4.594GHz

-21.19dB -19.26dB



(a)



(b)

4.(a) 1 ;(b) 1

5(a)

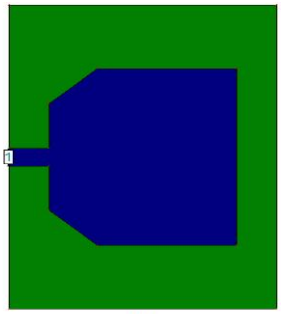
2

5(b) 1

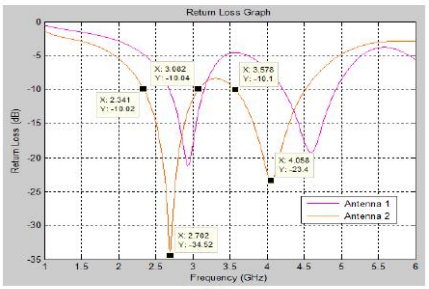
2.341GHz 3.082GHz 27.33% 3.578GHz 4.519GHz

23.32% 2.702GHz 4.058GHz

-34.52dB -23.4dB



(a)



(b)

5.(a) 2 ;(b) 2

6(a) 3

10 T

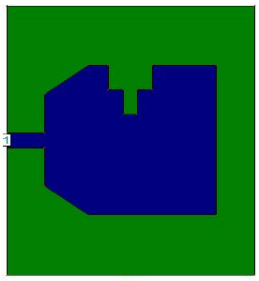
6(b)

2 2.341GHz 3.247GHz

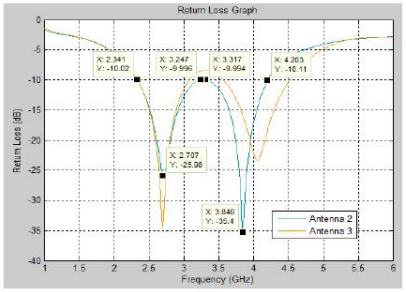
32.43% 3.317GHz 4.203GHz 23.56%

2.707GHz 3.848GHz

-25.98dB -35.4dB



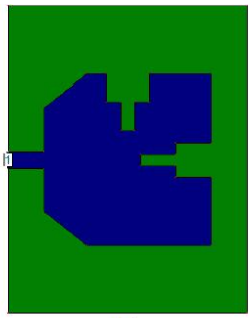
(a)



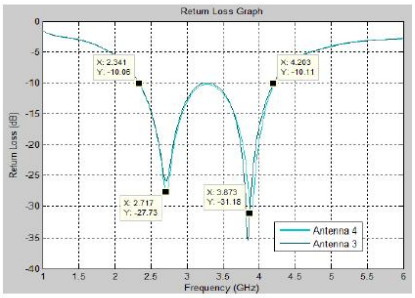
(b)

6.(a) 3 ;(b) 3

7(a) 4
T 10
7(b)
2.341 4.203GHz 56.9
2.717GHz
3.873GHz -27.73dB -31.18dB
-10dB



(a)



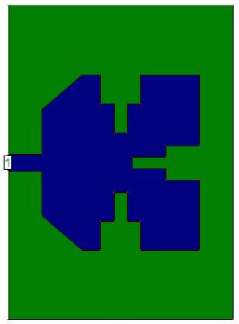
(b)

7.(a) 4 ;(b) 4

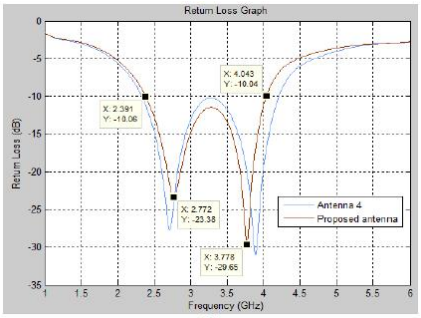
T

8(a)

8(b) S11
-10dB 2.391GHz 4.043GHz
51.3%
2.772GHz 3.778GHz -23.38dB
-29.65dB



(a)



(b)

8.(a) ;(b)

四、结论

5G 50Ω
T

T
51.3% 2.391GHz-4.043GHz
2.772GHz 3.778GHz -23.38dB
-29.65dB 5G
3GHz 5GHz
5G

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