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GAP COUPLED PATCH GSM BAESD MICROSTRIP ANTENNA

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ABSTRACT

This paper discusses wideband microstrip antenna configuration for GSM, WiFi& LTE applications. The proposed configuration consists of a gap coupled patch, a hexagonal slot on a driven patch & a defected ground plane. The line feeding has been used to energize the driven and parasitic patch. The antenna has been fabricated on a FR4 substrate with dielectric constant 4.4 and thickness 1.5 mm. The proposed wideband patch antenna covers frequencies from 281.4 MHz to 1.844 GHz with (-10dB return loss) bandwidth of 1.5626 GHz. The minimumreturn loss obtained is -73.5667 dB and VSWR is lies between 1 and 2. HFSS software provides an arena to design the microstrip antenna.

Keywords: *Wideband Microstrip Antenna , Defected Ground Plane, Gap Coupled Patch Antenna, Hexagonal Slot, GSM,LTE,WiFi*

I-INRODUCTION

Telecom sector moves towards advancement and novel designing of the antennas for better wireless communication. The advance antennas are small which can provide high bandwidth. Many type of high bandwidth antennas have been developed for different areas. Now a days, patch antennas like multi band or wide band antennas are used to covered different applications in the single antenna with good radiation characteristics. Some of the configurations used earlier are:- Triangular shaped monopole patch antenna to get multiband operation [1], A UWB monopole patch antenna for GSM / GPS /WLAN applications [2]. A slotted patch antenna for GSM, Bluetooth and GPS applications [3]. Fork-shaped slotted patch antenna to get tri band. [4]. Patch Antenna with Parasitic Elements to get broadband applications [5]. Directional patch antenna for wideband applications such as for Ground Penetrating Radar systems [6]. A notched patch antenna for portable wireless systems [7].In this paper, a gap coupled patch antenna with a hexagonalslot on a driven patch is proposed as shown in Fig. 1, 2 & 3. The proposed configuration is able to generate wide band for GSM, WiFi, LTE applications.

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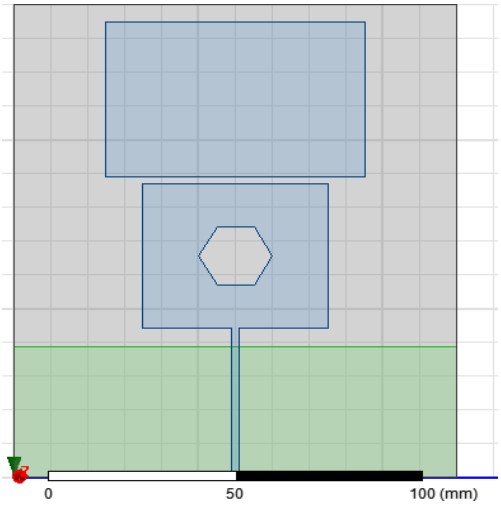

Fig. 1. Microstrip hexagonal slot

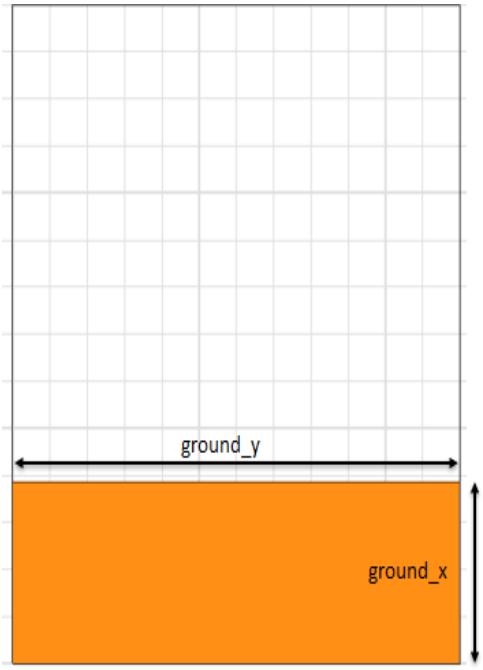

Fig. 2. Bottom of the Antenna

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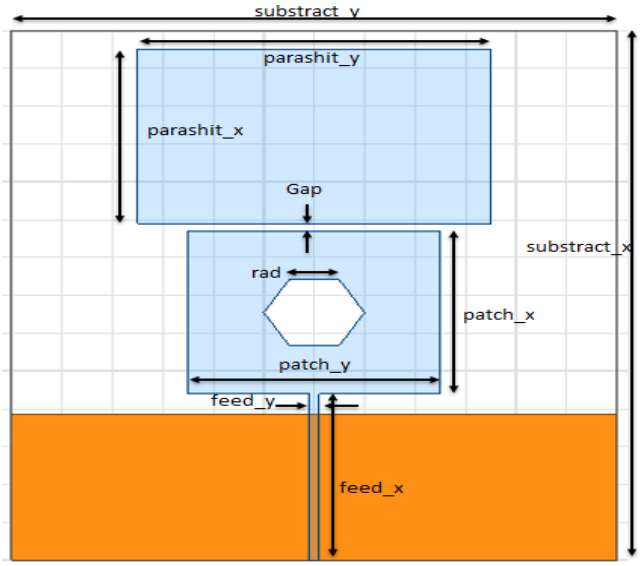

Fig. 3. Top of the Antenna

II ANTENNA DESIGN

The proposed antenna has been designed on a FR4 substrate with dielectric constant 4.4 and thickness 1.5 mm. The bottom of the substrate contains defected ground plane(i.e partial ground plane) and the top of the substrate contains the gap coupled patch with a hexagonal slot on a driven patch along with a plane parasitic patch as shown in Fig. 1,2 & 3. The driven patch has been excited by the line feeding. The different parameters of the antenna is shown in Table I.

TABLE I. PARAMETERS OF THE MICROSTRIP ANTENNA

Name	" Value"
Ground_x	38.75mm
Ground_y	120mm
Substract_y	120mm
Substract_x	140mm
Feed_x	44mm
Feed_y	2mm
Parashit_x	46mm
Parashit_y	70 mm
Patch_x	43mm
Patch_y	50
Gap	2mm
Rad	10 mm

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III RESULT AND DISCUSSION

The proposed design has been simulated in HFSS to get various simulated results like return loss, VSWR etc. Fig. 4 shows the return loss for different frequencies. The result shows a wideband behavior ranging from 281.4 MHz to 1.844 GHzwith minimum return loss obtained at 990 MHz is -73.5667 dB. The (-10dB return loss) bandwidth obtained is 1.5626 GHz. The VSWR for different frequencies is shown in Fig.5. The VSWR for frequencies 281.4 MHz, 990 MHz, 1.844 GHz are 1.92, 1.00 & 1.92 Fig. 6 shows 2d radiation pattern for frequencies 850 MHz, 900 MHz, 1.8 GHz. An omni direction and figured of eight radiation pattern are obtained for phi= 0 degree and 90 degree respectively. Fig. 7 shows 2d gain for frequencies 850 MHz, 900 MHz, 1.8 GHz. The radiation pattern & gain shown for frequencies 850 MHz, 900 MHz, 1.8 GHz are useful for GSM applications while the resonating frequencies ranging from 281.4 MHz to 1.844 GHz like 450 MHz, 700MHz, 800MHz, 900MHz, 1.5 GHz, 1.6 GHz and 1.7 GHz may also be useful for applications like Wifi, LTE etcrespectively.

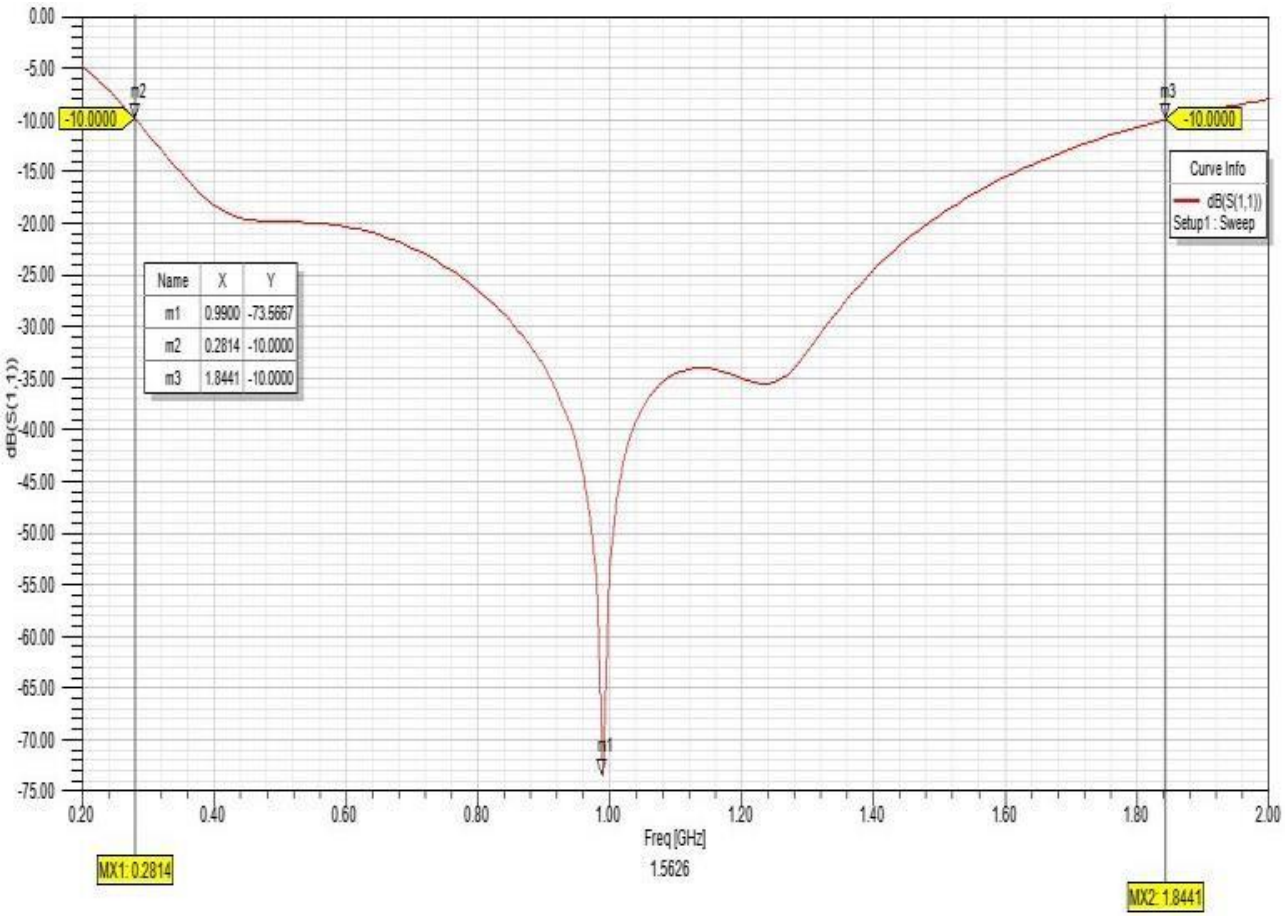

Fig. 4. Return loss vs frequency

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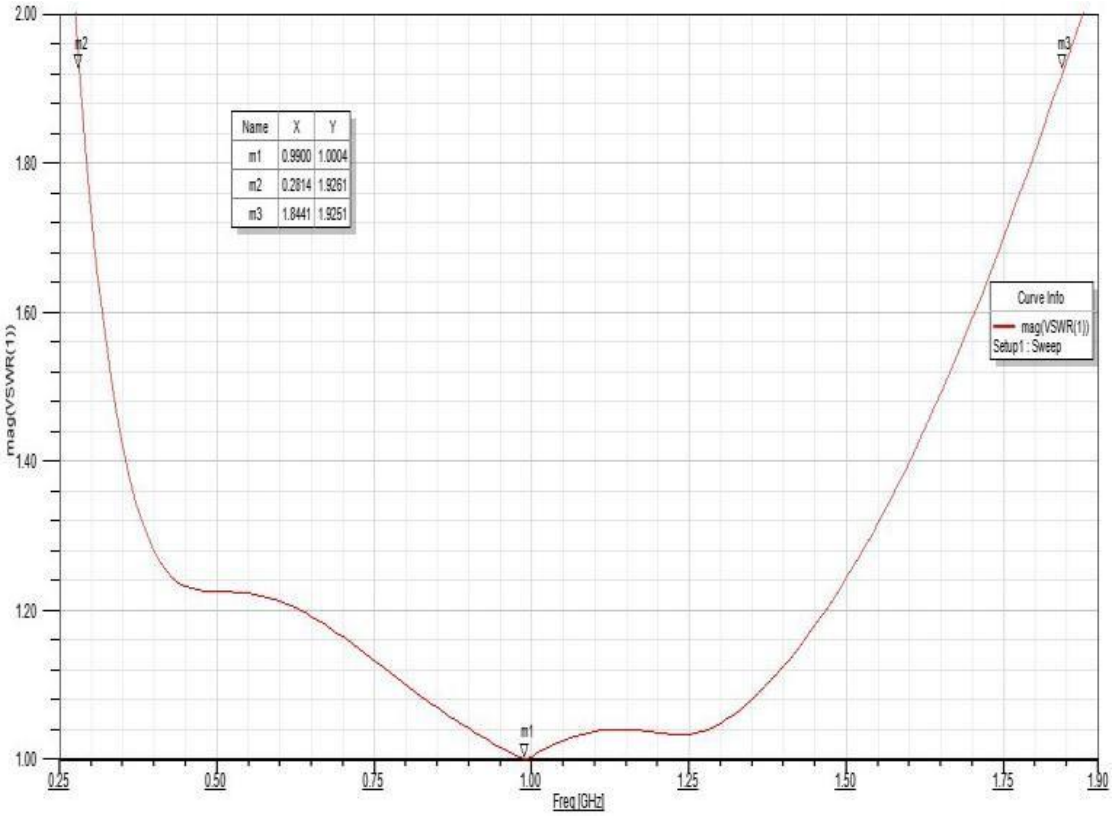
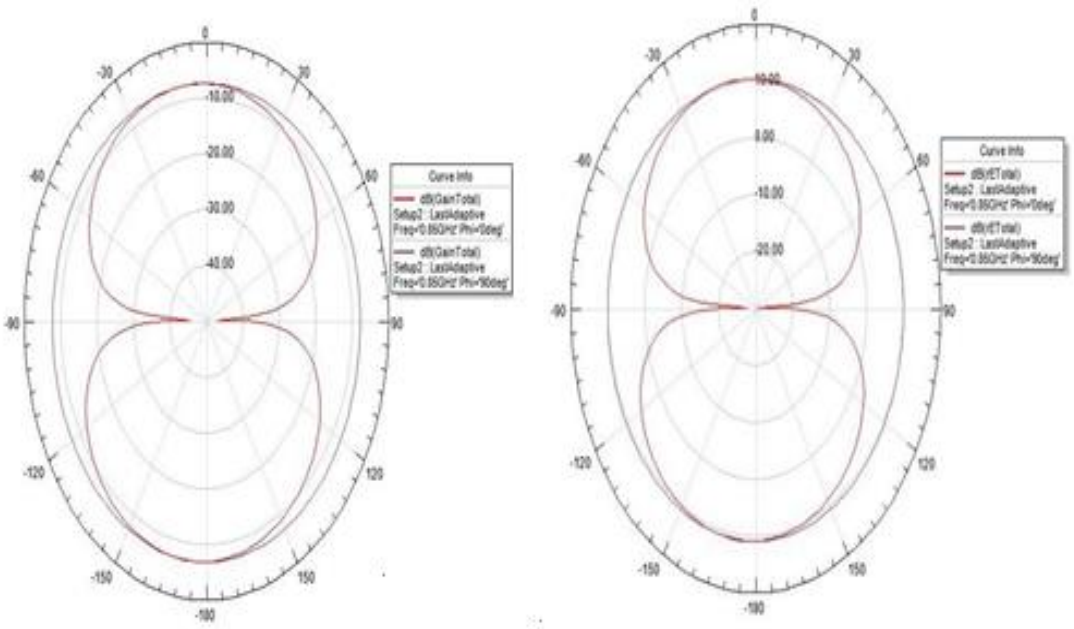


Fig. 5. VSWR vs frequency



(a) (a)

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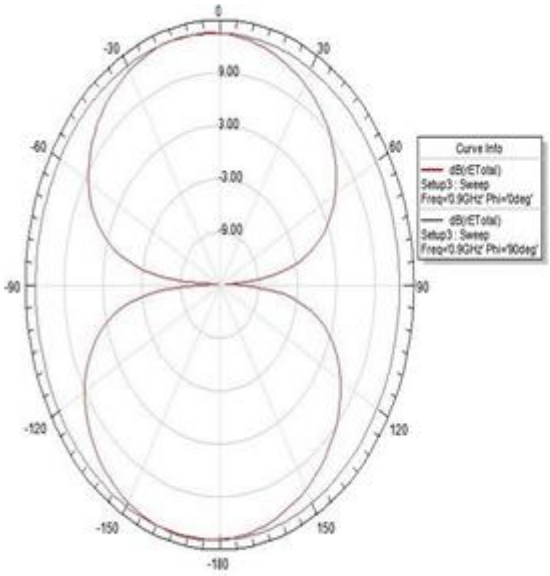
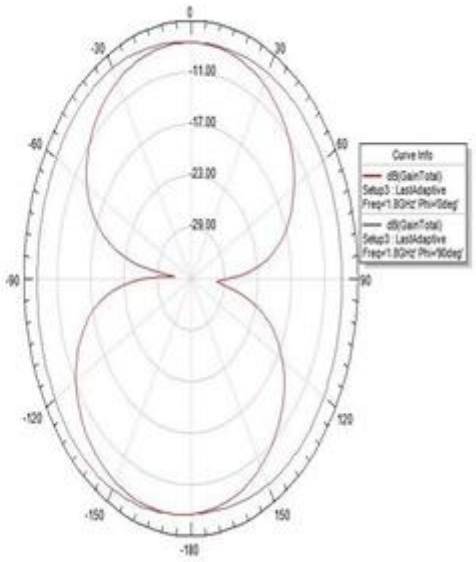
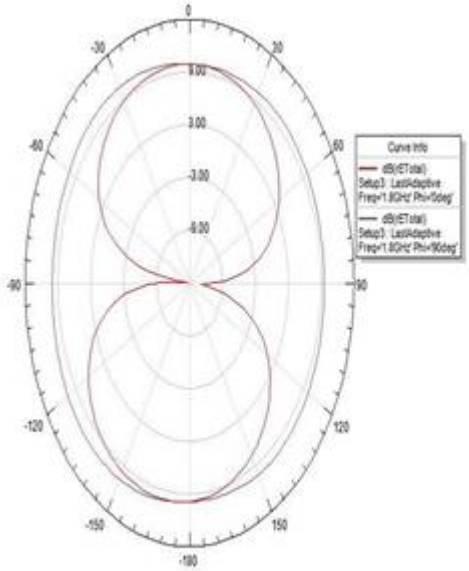


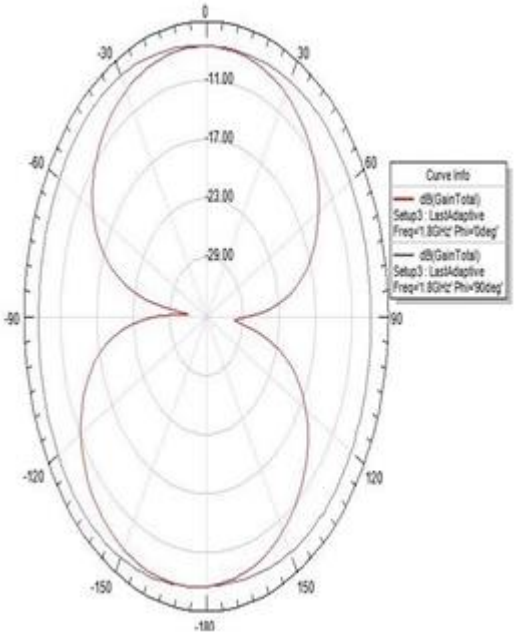
(b)



(b)



(c)



(c)

Fig. 6. Radiation pattern for frequencies (a) 850 MHz, (b) 900 MHz & (c) 1.8 GHz

Fig. 7. 2D gain for frequencies (a) 850 MHz, (b)900 MHz & (c) 1.8 GHz

IV CONCLUSION

A wideband microstrip antenna consisting of gap coupled patch with a hexagonal slot on a driven patch have been proposed. Resonating frequency ranging from 281.4 Mhz to1.88 Ghz having 1.566 Ghz bandwidth (-db return loss) have been obtained. The antenna obtain good radiation pattern for resonating frequencies like 850 Mhz, 90 Mhz, 1.8 Ghz etc. the proposed antenna may be used for GSM,LTE, WiFi like application.

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