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Survey on various design of microchip patch antenna

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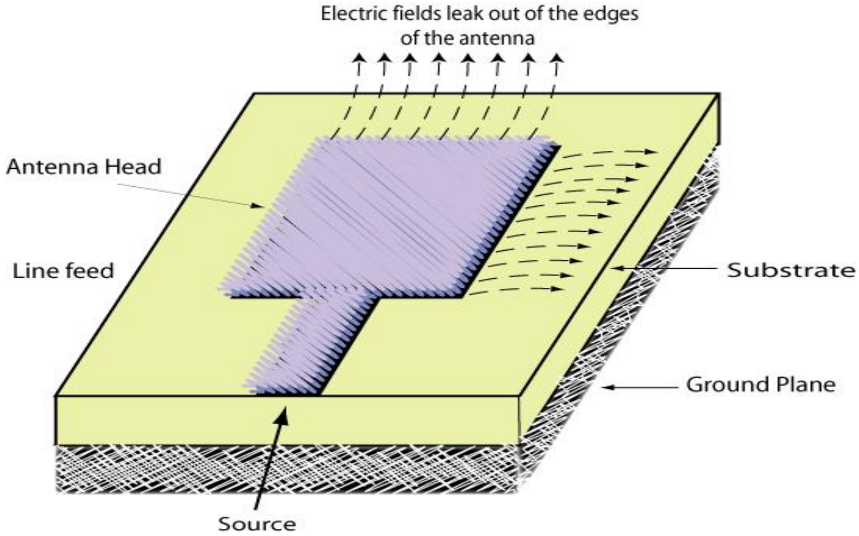
ABSTRACT-*Due to fast advancement in wireless communication technology, use of small size antenna has rapidly increased. Not only the size of the antenna its cost, performance, ease of installation everything have been taken care while designing the antenna. To meet this entire requirement micro-strip antenna is proposed. Nowadays microstrip antennas are used in many places such as aircrafts, spacecraft's, satellite and missile applications. In this paper, we discuss the microstrip antenna, types of microstrip antenna, various substrates used for designing the antenna and the literature survey which we have done.*

Key words: *Microstrip patch antenna (MPA), Microstrip slot antenna (MSA), printed dipole antenna (PDA)*

I. INTRODUCTION:

Antenna is a transducer designed to transmit or receive electromagnetic waves. Microstrip antenna has several advantages over conventional antenna. It consists of a radiating patch on one side of dielectric substrate and has a ground plane on other side. Microstrip antennas are used for many commercial purposes due to their light weight and low cost. The recent demands of compact wireless devices propel the demand of pattern reconfigurable antennas. Reconfigurable microstrip antenna provides numerous application and offer more versatility as compared to conventional antennas which offer one function in a single antenna. They can provide diversity function in operating frequency, radiation pattern and polarization to mobile communications. The main disadvantages of microstrip patch antenna radiation performance including narrow bandwidth. Various techniques have been included to overcome these disadvantages.



Comparisons of microstrip patch antenna, microstrip slot antenna and printed dipole antenna:

S.NO	CHARACTERISTICS	MPA	MSA	PDA
1	Profile	Thin	Thin	Thin
2	Fabrication	Very easy	Easy	Easy
3	Polarization	Both linear and circular	Both linear and circular	Linear
4	Dual frequency operation	Possible	Possible	Possible
5	Shape flexibility	Any shape	Mostly rectangular and circular	Rectangle and triangle
6	Spurious Radiation	Exists	Exists	Exists
7	Bandwidth	2-50%	5-30%	-30%

MPA-Microstrip patch antenna

MSA-Microstrip slot antenna

PDA-Printed dipole antenna

FEEDING TECHIQUE:

Microstrip patch antenna can be fed by a variety of methods. These methods can be classified into two categories-contacting and non-contacting. In the contacting method, the RF power is fed directly to the radiating patch using a connecting element such as a microstrip line. In the non-contacting method, electromagnetic field coupling is done to transfer power between the microstrip line and the radiating patch. There are four most popular technique used here they are i) Microstrip line ii) Coaxial line iii) aperture coupling iv) proximity coupling. Microstrip patch antennas have radiating element on one side of a dielectric substrate and thus may be fed by any of this four technique. Matching is usually required between the fed line and the antenna input impedances.

MICROSTRIP LINE FEED:

Microstrip line fed is conducting strip, usually of much smaller width compared to patch. It is easy to fabricate, simple to match by controlling the inset position. If we increases the thickness of the substrate surface waves and spurious fed radiation increases. And its bandwidth is very limited. The purpose of the inset cut in the patch is to match the impedance of the fed line to the patch, without the need for any additional matching element. This is achieved by properly controlling the inset position.

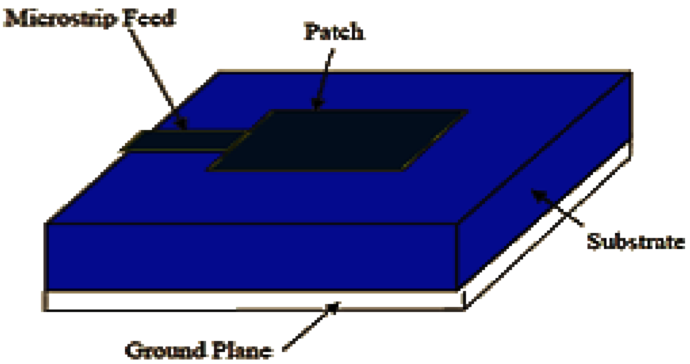


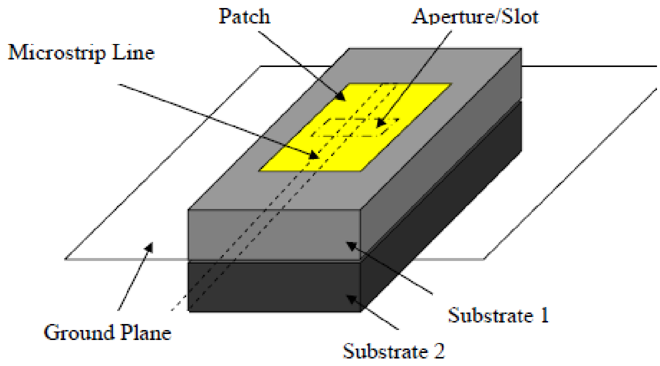
Figure Microstrip Line Feed

COAXIAL FEED:

It is a common technique used for feeding microstrip patch antenna. Inner conductor of the coaxial connector extends through the dielectric and is soldered to the radiating patch, while the outer conductor is connected to the ground plane. The advantage of this type of feeding scheme is that the fed can be placed at any desired location inside the patch in order to match its input impedance. Its major disadvantage is that it provide narrow bandwidth and is difficult to model since a hole has to be drilled in the substrate and the connector protrudes outside the ground plane, thus not making it completely planar for thick substrates.

APERTURE COUPLE FEED:

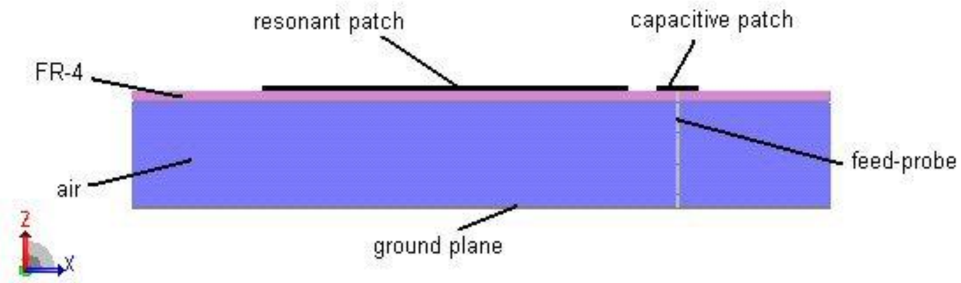
Coupling between the patch and the feed line is made through a slot or an aperture in the ground plane. In this technique transmission line is shielded from the antenna by a conducting plane with a hole to transmit energy to antenna as shown in fig.



The upper substrate can be made with a lower permittivity to produce loosely bound fringing fields, yielding better radiation. The lower substrate can be independently made with a high value of permittivity for tightly coupled fields that don't produce spurious radiation. The disadvantage of this method is increased difficulty in fabrication.

PROXIMITYCOUPLE FEED:

This type of feed technique is also called as the electromagnetic coupling scheme. It has the largest bandwidth, has low spurious radiation. Fabrication of proximity coupling is very difficult. Length of feeding substrate and width to length ratio of patch is used to control the match. Its coupling mechanism is capacitive in nature.



ANALYSIS OF SUBSTRATES USED FOR ANTENNA DESIGN:

Material	Symbol	RDC ε_R	TDC +/-	DF tan δ	TC of ε_R(ppm/ C)	MD (gr/cc)	SH (J/g/°C)	TC W/m°C	CTE PPM/°C x/y/z
Bakelite		4.8							22/28/173
Rogers Duroid 5870	PTFE/ Random glass	2.33	0.02	0,0012	-129	2.2	0.96	0.26	31/48/237
Rogers Duroid 5880	PTFE/ Random glass	2.2	0.02	0.0012	-129	2.2	0.96	0.26	31/48/237
Rogers Duroid 6002	PTFE/ Random glass	2.94	0.04	0.0012	0	2.1	0.93	0.44	16/16/24
Rogers Duroid 6006	PTFE/ Random glass	6	0.15	0.0027	-350	2.7	0.97	0.48	38/42/24

Rogers Duroid 6010	PTFE/ Random glass	10.2-10.8	0.25	0.0023	-390	2.9	1	0.41	24/24/24
FR-4	glass/ epoxy	4.8		0.022				0.16	FR-4
Polyethylene		2.25							
Polyflon CuFlon	PTFE	2.1		.00045					12.9
Polyflon PolyGuide	Polyolefin	2.32		0.0005					108
Polyflon Norclad	thermoplastic	2.55		0.0011					53
Polyflon Clad Ultem	thermoplastic	3.05		0.003		1.27			56
PTFE	PTFE	2.1		0.0002		2.1	0.96	0.2	
Rexolite No. 1422		2.55							
Rogers R/flex 3700	Thermally stable thermoplastic	2.0		0.002					8
Rogers RO3003	PTFE ceramic	3	0.04	0.0013	13	2.1	0.93	0.5	17/17/24
Rogers RO3006	PTFE ceramic	6.15	0.15	0.0025	-169	2.6	0.93	0.61	17/17/24
Rogers RO3010	PTFE ceramic	10.2	0.3	0.0035	-295	3	0.93	0.66	17/17/24
Rogers RO3203	PTFE ceramic	3.02							
Rogers RO3210	PTFE ceramic	10.2							
Rogers RO4003	Thermoset plastic ceramic glass	3.38	0.05	0.0027	40	1.79		0.64	11/14/46
Rogers RO4350B	Thermoset plastic ceramic glass	3.48	0.05	0.004	50	1.86		0.62	14/16/50
Rogers RO4403	Thermoset plastic ceramic glass	3.17							
Teflon		2.1		0.0001		2.13-2.22			
Rogers TMM 3	ceramic/ thermos	3.27	0.032	0.002	37	1.78	0.87	0.7	15/15/23
Rogers TMM 4	ceramic/ thermoset plastic	4.5	0.045	0.002	0	2.07	0.83	0.7	16/16/21
Rogers TMM 6	ceramic/ thermoset	6	0.08	0.0023	-11	2.37	0.78	0.72	18/18/26
Rogers TMM 10	ceramic/ thermoset	9.2	0.23	0.0022	-38	2.77	0.74	0.76	21/21/20
Rogers TMM 10i	ceramic/ thermoset	9.8	0.245	0.002	-43	2.77	0.72	0.76	19/19/20
Ultralam 2000	glass reinforced	2.24-2.6	-.04	0.0019	-100				9.5/9.5/120

LITERATURE SURVEY

1. FREQUENCY RECONFIGURABLE MICRO PATCH-SLOT ANTENNA WITH DIRECTIONAL RADIATION PATTERN

In this author designed antenna with reflector at the back of an antenna. In this paper microstrip patch antenna and microstrip slot antenna were presented, where the slot antenna is positioned at the ground plane underneath the patch. This antenna is capable of reconfigure up to six different frequencies band from 1.75GHz to 3.5GHz. In this frequencies three different frequency produced by microstrip slot antenna and other three different frequencies is produced by microstrip patch antenna with bidirectional radiation pattern. Here the substrate used is Taconic RF35 with a permittivity of thickness 3.04. The patch of the antenna is designed to operate at4.13GHz. Here, inset feed is used to match the impedance between the patch and for analysis technique transmission line method is used.

2. CIRCULAR POLARIZATION WIDEBAND E-SHAPED PATCH ANTENNA FOR WIRELESS APPLICATIONS

In this paper, polarization switching is presented for reconfigurable wideband E-shaped patch antenna. This design consists of two slots which are switched on and off using pin diode. And, two antennas allowing switching either between linear and circular polarization or between two circular polarizations are demonstrated. This microstrip antenna operates at 2.45GHz frequencies. Antenna is constructed on grounded two layers of dielectric sheet (air and FR4), and a vertical probe connected from ground to the upper patch. The substrate FR4 with relative dielectric constant of 4.2, thickness of h=10mm, and loss tangent=0.02.

3. PATCH ANTENNA FREQUENCY RECONFIGURABLE LOW-PROFILE CIRCULAR MONOPOLAR

Here, antenna comprises of a centre-fed circular patch surrounded by four sector-shaped patches. Eight varactor diode are introduced to bridge the gap between the circular patch and the sector shaped patches. By changing the reverse bias voltage of the varactor diodes, the antenna can be switched in the operating frequency. Here the measured efficiency rises from about 45% to about 85% as the operating frequency increases from 1.64GHz to 2.12GHz. The antenna is printed on a 6.34mm thickness Rogers dielectric (ε_R =2.33) which is realized by stacking two 3.17mm thickness substrates and removing the middle two copper layer. To understand how the dimension of the antenna affects the performance, a parametric study was performed. The operating frequency tuning range from 1.64GHz to 2.12GHz by changing the reverse bias voltage of the varactor diode from 0V to 20V. Stable monopole like radiation patterns are achieved at all operating frequencies.

4. FREQUENCY RECONFIGURABLE MICROSTRIP PATCH ANTENNA WITH CIRCULAR POLARIZATION

A simple design of circularly-polarize microstrip antennas with frequency agilityis described. With a coaxial probe, two orthogonal resonant modes of the square patch antenna are simultaneously excited. Here only one DC voltage is required to vary the circular polarization operating frequency, and experimental results indicate that the circular polarization frequency can be switched between 1.97GHz and 2.53GHz. Antenna structure is based on a probe-fed microstrip patch antenna with capacitive loadings. A square radiating patch with a side length of 32mm is fabricated an FR4 substrate of thickness of 0.4mm and relative permittivity 4.4. The copper foil of other substrates with thickness 1.6mm serves as the ground plane. Measured results demonstrate that by controlling one dc voltage, the prototype can perform frequency switching from 1.97GHz to 2.53GHz. Moreover, within the bandwidth, the prototype has a return loss of less than 10db, an axial ratio of lower than 3d, gain variations of about 3db, and stable broad side radiation pattern.

5. RECONFIGURABLE TX/RX ANTENNA SYSTEMS LOADED BY ANISOTROPIC CONDUCTIVE CARBON FIBER COMPOSITE MATERIALS

Here, potential use of reinforced continuous carbon fiber composite (RCCFC) material to build reconfigurable TX/RX communication systems. The frequency agile characteristic is obtained by the rotation of the antennas on the ground plane which is made of anisotropic RCCFC material. Probe-fed rectangular microstrip patch antennas are fabricated and the reconfigurable characteristics are investigated both numerically and experimentally. RT/Duroid 5880 substrate with thickness of h=1.5mm is used to fabricate the antenna. In many wireless and sensor applications, the antennas are used and deployed over a horizontal plane so that the normal vectors of ground planes of antenna are parallel. In this case, the TX/RX performance over a horizontal plane becomes important. In modern, aircraft and automobiles, fuselage is mainly made of composite material, especially RCCFC. The frequency of operation of a probe-fed patch antenna can be reconfigurable by rotating the patch around the probe, operating over an anisotropic ground plane made of RCCFC composite. The RCCFC ground acts as a mode filter, allowing radiating modes with a current distribution component parallel to the fiber direction to the excited by suppressing modes with current flows perpendicular to the fiber direction. In this only three frequency of operation is changed and the polarization of the radiated field does not change.

6. POLARIZATION RECONFIGURABLE OMNIDIRECTIONAL ANTENNA COMBINING DIPOLE AND LOOP RADIATORS

The omnidirectional circular polarization waves can be generated in the azimuthal plane by adopting two metal probe act as the dipole and printed spoke-like metal strips fabricated on two substrates act as the loop. 48-pin diodes placed on the two substrates to atter the current direction of the loop which makes the antenna polarization reconfigurable. The polarization states of this antenna can be switched between left-hand circular polarization (LHCP) and right-hand circular polarization (RHCP). The feeding type used is microstrip line fed. This antenna is designed for the frequency of 1.575GHz for GPS system. The polarization state of this antenna depends on the direction of the RF current in the loop at initial time. Antenna is designed with the use of Rogers/duroid 5870 substrate (h=1.57mm, permittivity=2.3) pin-diode of type BAR50-02V.

7. EFFECTS OF DIELECTRIC PERMITTIVITY ON RADIATION CHARACTERISTICS OF CO-AXIALLY FEED RECTANGULAR PATCH ANTENNA

In this paper author discuss about various dielectric materials and its effects on radiation characteristics of rectangular patch antenna such as resonance frequency, bandwidth, gain, return loss, input impedance, radiation pattern and current distributions are investigated. And the dielectric material selected here having zero loss tangent. Here there is only small space between radiating element and ground plane main power is radiated towards broad size co-axial probe feed is used,here outer conductor is connected to ground plane and the inner conductor of co-axial connector is extends through dielectric and soldered to patch. Inner conductor of co-axial cable transfers the power from strip line to microstrip antenna from slot in the ground plane. Here different substrates used to compare the return loss.

8. EFFECTS OF ANTENNA DESIGN PARAMETERS ON THE CHARACTERISTICS OF A TERAHERTZ COPLANAR STRIPLINE DIPOLE ANTENNA

This paper presents the antenna design parameters dependency on the impedance and radiation characteristics of a terahertz coplanar stripline dipole antenna. This antenna response is numerically investigated by applying a semi-infinite substrate and by generating a constant voltage source to drive signal on the antenna. In this way one can analyse the antenna characteristics without the photoconductive material response and the substrate lens geometrically effects antenna consists of centre-dipole connected to long bias has a travelling wave characteristics supporting a standing wave of current. The travelling wave behaviour produces stable antenna input impedances and minimal changes in the antenna radiation patterns. Gas substrate is used where this substrate was approximated with a semi-infinite greens function layer. The centre dipole is designed to resonate at around 1.0THz. The length of the centre dipole is increased so that the antenna becomes more distinct at low frequencies. By further increasing the centre dipole length could lower the cut off frequency and thus produce better impedance bandwidth.

9. ENHANCING THE BANDWIDTH OF A MICROSTRIP PATCH ANTENNA USING SLOTS SHAPED PATCH

In this three different geometry shapes U,E and H are developed from a rectangular patch of the width (w) =32mm and length (L) =24mm. the E-shaped patch antenna has the highest bandwidth followed by U-shape patch antenna and H-shape patch antenna. The substrate used here is alumina 96% with the dielectric constant of 9.4 and loss tangent of 4.0e-4. Parameter's used in this antenna design is i)frequency of operation-2GHz ii) height of substrate=2mm iii) dielectric constant=9.4 iv) width of patch=32mm v) length of the patch(L)=24mm vi) loss tangent=4.0e-4. This antenna is used for the WLAN. This antenna is to operate in the frequency range from 1GHz to 3GHz. The dielectric constant is kept high in order to get a reduced antenna size.

10. DESIGN OF COMPACT MICROSTRIP ANTENNA USING CERAMIC SUBSTRATE

Here, the proposed idea is to model the microstrip antenna with new material for substrate having very high dielectric constant. The basic idea of this paper is to get the desired functioning of microstrip patch antenna with less size with respect to height and width of the substrate as well as the patch with the use of ceramic substrate. The substrate used in this design is belongs to ceramic family which is named by forsterite. By using this ceramic family substrate efficient and concise antenna is designed. It gave the effect on the radiations and bandwidth of the antenna. This substrate (forsterite) has the dielectric constant 6.2. this substrate has low microwave loss, good insulation at high temperatures, and as smooth surface. This ceramic substrate has high coefficient of thermal expansion, it bonds easily with metals and glass. Its resonant frequency is equals to 1.80GHz with the help of this substrate the dimensions of the antenna are greatly reduced. The bandwidth efficiency and directivity of this suggested model is also enhanced at low cost. Moreover, due to such a high dielectric constant material reduces the robustness and mechanical stability of the antenna.

11. A FREQUENCY RECONFIGURABLE STACKED PATCH MICROSTRIP ANTENNA WITH APERTURE COUPLER TECHNIQUE

This antenna is capable to accommodate at S/X band separately by using the same antenna. Two patches at different substrates are activated sequentially by changing modes at the feed line to achieve frequency reconfigurability. Operating frequency of this antenna is 2GHz to 8GHz. Antenna was based on a design of stacked patch microstrip patch antenna with aperture coupler technique. This antenna was composed of three layer of substrates, which are substrate1 and substrate2 by using Rogers/duroid 5880 materials with a dielectric constant, r=2.2, thickness h=0.78mm and tangent loss=0.0009 is used and FR4 material is used as substrate3 with a dielectric constant r=4.7, thickness h=1.6mm and tangent loss=0.0009 is used. According to the simulation results the FRSPMA can operate at the two states either ON state or OFF state. During the ON state, this antenna basically operates at s-band frequency which is at 2.16GHz with return loss is 34.01db. The gain obtained is 5.773db which is higher during the OFF state compared to ON state. The bandwidth during ON state is narrow width 92.9MHz. However, the bandwidth during OFF state can be considered large bandwidth width 247.7MHz. This antenna can cover large area during both states with the angular width (3db) 147.1 and 142.2 respectively.

12. PATCHANTENNA DESIGN ANALYSIS FOR WIRELESS COMMUNICATION

A simulation of sixteen (hexadecimal) faced microstrip patch antenna design using slot on the edge is discussed here. Here probe fed model is used. The simulated results of the antenna achieve the radiation parameters such as s-parameter radiation pattern and VSWR. In s-parameter. The parameter value reaches less than -10dB for the resonant frequencies 0.9GHz, 0.87GHz to 0.90GHz and VSWR value is obtained as less than 2 for that same frequency. This antenna will be useful for 900MHz band in wireless communication application.

13. RECTANGULAR MICROSTRIP PATCH ANTENNA USING CO-AXIAL PROBE FEEDING TECNIQUE TO OPERATE IN S-BAND

Here, the design of antenna is based on rectangular microstrip antenna. Its operating frequency is from 2GHz to 2.5GHz. Substrate used here is Flame Retardant 4 with the thickness of 1.6mm and its dielectric constant is approximately 4.4 and fed type used here is probe-fed. The return loss of the antenna obtained is -23dB at the centre frequency of 2.25GHz. From this, it indicates that the 9.61% of power is reflected and 90.84% of power is transmitted. The bandwidth obtained from the return loss result is 2% which signifies 46MHz. A perfectly matched antenna would have a VSWR of 1:1. This indicates how much power is reflected back or transferred into a cable. VSWR obtained from this antenna design is 1.13dB which is approximately equals to 1.1:1. This indicates that the level of mismatch is not very high.

14. FREQUENCYRECONFIGURABLE MICROSTRIP CIRCULAR PATCH ANTENNA FOR WIRELESS DEVICES

Here, frequency reconfigurable circular antenna design is proposed. In this, antenna a circular patch antenna with circular slot using two pin diode at the centre frequency 10 GHz was designed and simulated frequency reconfiguration is achieved in the frequency range of 9.69-10.2GHz. Thesubstrate used is FR-4 with its permittivity of 4.54 and thickness of 1.6mm. The dimensions of the microstrip circular patch element were calculated at the centre frequency of 10GHz by conventional design procedure. Here, electromagnetic simulation software was used to simulate the proposed structure. Frequency reconfigurations were achieved for three different cases.Case i) when both diodes was in off-states Case ii) when one-diode is in on-state Case iii) when both diode is on on-state. In first case, the return loss is -14.84dB at the resonant frequency of 9.69GHz. In second case, the return loss is -11.87dB at the resonant frequency of 9.83GHz.Whereas in third case, the return loss is -13.84dB at the resonant frequency of 10.18GHz.

15. DESIGN OF FREQUENCY RECONFIGURABLE MICROSTRIP PATCH ANTENNA

In this design, rectangular patch antenna with slots at the centre frequency 10GHz that can be reconfigured in the frequency range 10-10.5GHz. Reconfiguration is done by switching the diodes into on/off condition. Substrate used here is FR-4 with their permittivity of 4.54and its thickness is 1.50mm. slots and switches are also used here in order to achieve both the frequency and polarization reconfigurability. Specially here three different polarization states have been achieved: righthand, lefthand, linear and circular polarization. This reconfigurable antenna can further be modified by using RF-MEMS switches for fast switching process. As mentioned in previous paper here also those three modes have been specified. In first case, the return loss is -13dB at the resonant frequency of 10.5GHz. In second case, the return loss is -19dB at the resonant frequency of 10.3GHz.Whereas in third case, the return loss is -42dB at the resonant frequency of 10.2GHz.

16. RECONFIGURABLE MICROCHIP PATCH ANTENNA USING MEMS TECHNOLOGY

Here, the design of reconfigurable microchip patch antenna is based on MEMS technology. Operating frequency is in the range of 5-8GHz for the application of wireless communication has been designed. MEMS based switch is inserted in the patch to control its configuration patch antenna using switchable slots shows different resonant features with different states of the switch. Here, capacitive type MEMS switch is used. Fed line width is 1.5564mm and fed-line length is 2.456mm.in this design return loss of -10dB is obtained and VSWR lie in the range of 1-2 which is achieved for all frequencies. Resonant frequency of 6GHz was designed. Different operating frequency of 5.38, 5.68, 5.75GHz were obtained using RF MEMS switch.

17. DESIGN AND SIMULATION OF MICROSTRIP PATCH ARRAY ANTENNA FOR WIRELESS COMMUNICATION AT 2.4GHZ

Here, rectangular microstrip patch array antenna at 2.4GHz for wireless communications that provides a radiation pattern along a wide angle of bean and achieves a gain of 11.6db. In this, author designed an array of rectangular patch antenna of the centre frequency 2.4GHz sweeping between 1.2-3.6GHz. And the substrate used here is Rogers/duroid 5880 for analysing the antenna transmission line model is used. The fed type used here is edge type feeding. The performance parameters were achieved with gain 12db and beam width 40degree in E-plane and 26 degrees in H-plane for patch array antenna.

18. DESIGN OF COMPACT MULTIBAND MICROSTRIP PATCH ANTENNAS

In this design, antenna for important wireless applications which lie in the band starting from 900MHz to 5.5GHz which includes the GSM (880-960) GPS (1568-1592 MHz) ,DCS (1710-1880MHz), and PCS(1850-1990MHz), UMTS(1920-2170MHz), IEEE 802.11 b/g(2400-2484) and WLAN IEEE802.11a bands (5.15-5.35GHz,5.725-5.825GHz). In this design different type of antenna such as i) rectangular fractal antenna ii) multi-standard patch antenna iii) circularly polarized microstrip patch antenna iv) E-shape and U-shape v) multi-standard patch antenna. Gain and directivity is calculated for each antenna. This antenna will cover the wide band operation and can be applied to multiband wireless communication system due to its small size and low fabrication cost. Antenna gain and radiation pattern are acceptable at almost all bands of operation.

19. 2.45GHz MICROSTRIPPATCH ANTENNA WITH DEFECTED GROUND STRUCTURE FOR BLUETOOTH

In this paper, author analysed rectangular patch antenna with DGS (Defected Ground Structure) for wireless application. Their antenna design simulated at 2.45GHz frequency. And their feeding technique is done by quarter transformer feeding. This feeding is mostly used for impedance matching. Here, they used rectangular patch antenna. This patch antenna dimension is 15mmx18mm using the dielectric substrate having permittivity 3.2 and thickness is 0.762mm. The dimension of quarter transformer feed which is used for a rectangular patch antenna of the resonant frequency 5GHz are length 9.5mm and width 0.56mm and feed line width is 1.83mm which results in a good match with 50ohm.

20. AN ELECTRONICALLY RECONFIGURABLE MICROSTRIP ANTENNA WITH SWITCHABLE SLOTS FOR POLARIZATION DIVERSITY

In this paper, electronically reconfigurable microstrip antenna for both circular and linear polarization switching was presented. The prototype fabricated on a substrate of dielectric constant with permittivity of 4.4 and height(h) of 1.6 is fed by a proximity feed fabricated using the same substrate. By controlling the bias voltage of two pin-diodes, the polarization of the antenna can be switched between three states. Two states for linear polarization and one state for circular polarization. The fundamental resonant modes of the unslotted cross shaped patch are at 1.8GHz and 2.4GHz with orthogonal polarization. The properselection of slot size modifies the horizontal and vertical length of the patch equally so that two resonant frequencies are lowered to 1.12GHz and 1.44GHz. This antenna achieves a cross-polar level better than -10dB in linear polarization and 1.18%in circular polarization. This antenna is compact and simple because it uses only few active and passive components and it requires less area to occupy the patch. Frequency and polarization diversity in this design provides some potential application for wireless communication.

CONCLUSION:

Theoretical survey on microstrip patch antenna has done in this paper. While designing the antenna the things which we have to consider is substrate which we are going to use, feeding type, dielectric constant of the substrate and its height and width. When we use the substrate from the ceramic family it gives the low microwave loss and also good insulation at high temperature. Particular microstrip patch antenna can be designed for specific applications. And it is believed that, this small size antenna will continue to benefit the human race for future years.

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