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Design of Meta Material Dualband Pass Filter For Wlan

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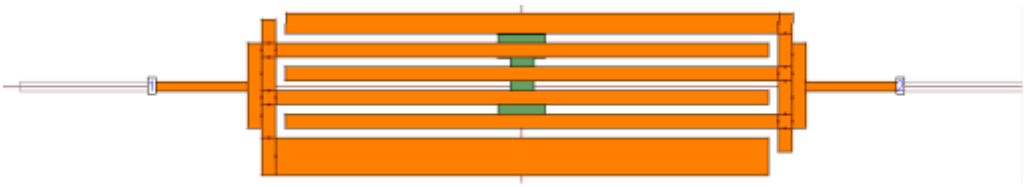
Abstract: *In this paper, We have designed a meta material dual band pass filter for WLAN . The coupled DGS resonators are considered the main block of proposed band pass filters. The proposed filter is designed using Rectangular loop size of 15.62mm*3.42mm for WLAN application .The Band pass filter has the operating frequency of 2.4GHZ and the performance is evaluated with the insertion loss of -6.9 dB and the return loss of -21.8 dB and the group delay of -13.6◦ . Also we have obtained the band width between 2.3 GHZ to 2.5 GHZ range. The Simulation results show that the proposed filter offers good insertion loss and return loss response The design filter is simulated using a method based electromagnetic simulator IE3D software .*
Keywords: *Band pass filter, mobile WLAN (Wireless local area network) , optimum distributed HPF (high pass filter), step impedance LPF (low pass filter).*

I. Introduction

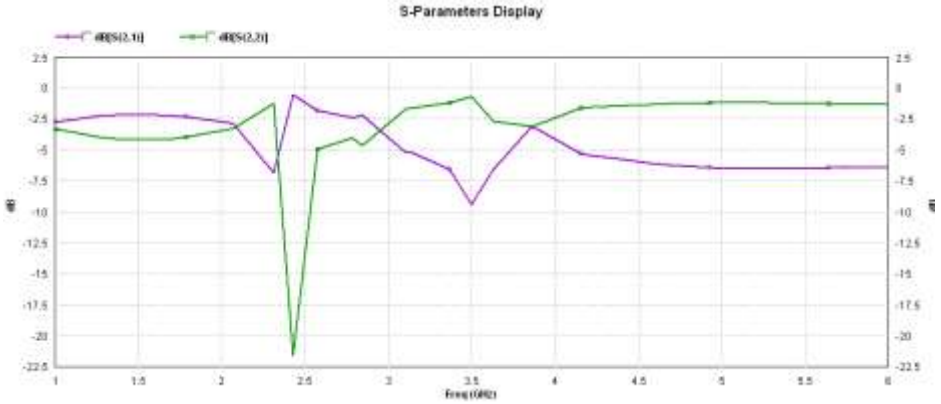
Communication means transfer of information from one place to another place in two ways by either human process or technical process. The technical process is broadly classified into two types wired and wireless communication. In wired communication, the information is transmitted along wires by means of electrical signals. For long distance, the wired communication is difficult because it needs plenty of wires. In wireless communication, the information is transmitted over a distance without help of wires, cables or any other forms of electrical conductors which use some form of energy to transmit the signal. In realization of such a system like WLAN we need a complete new transmitter and receiver. A band pass filter is an important component must be found in the transmitter or receiver. Band pass filter is a passive component. In designing the band pass filter, we are faced the questions, what is the maximal loss inside the pass region, and the minimal attenuation in the reject/stop regions, and how the filter characteristics must look like in transition regions. In the process to fulfill these requirements there are several strategies taken in realization of the filters, for example, the choice of waveguide technology for the filter is preferred in respect to the minimal transmission loss (insertion loss). This strategy is still used in satellite applications. The effort to fabricate waveguide filters prevents its application in huge amounts. As alternative, Meta material filter based on printed circuit board (PCB) offers the advantages easy and cheap in mass production with the disadvantages higher insertion losses and wide transition region. In this work we would like to give a way to conceive, design and fabricate band pass filter for the WLAN application at the frequency 2.4 GHz The filter is designed by combining and cascading the step impedance low pass filter (LPF) and the optimum distributed high pass filter (HPF), which gives a good solution for a WLAN performance. The design was properly calculated and design simulation was carried out using IE3D software to verify the performance. In this paper, all filters are designed using metal loaded DB-DGS. All filters show measured and simulated results in good agreement. So far no detailed work is reported for designing all filters such band pass filters with narrow/wide band, dual band and low pass filter by using same design configuration with same area.

II. The Filter Design And Simulation

This filter is constructed by proposed filter is designed using Rectangular loop size of 15.62mm*3.42mm for WLAN application . The coupled DGS resonators are considered the main block of proposed band pass filters. The Dual Band pass filter has the operating frequency of 2.4GHZ and the performance is evaluated with the insertion loss of -6.9 dB and the return loss of -21.8 dB and the GD of -13.6◦ . Also we have obtained the band width between 2.3 GHZ to 2.5 GHZ range. The Simulation results show that the proposed filter offers good insertion loss and return loss response The design filter is simulated using a method based electromagnetic simulator IE3D software. The designed using metal loaded DB-DGS. All filters show measured and simulated results in good agreement. So far no detailed work is reported for designing all filters such band pass filters with narrow/wide band, dual band and low pass filter by using same design configuration with same area.

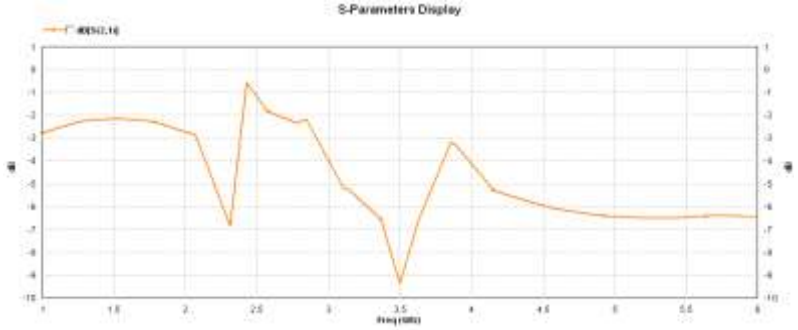


(a)Proposed band pass filter

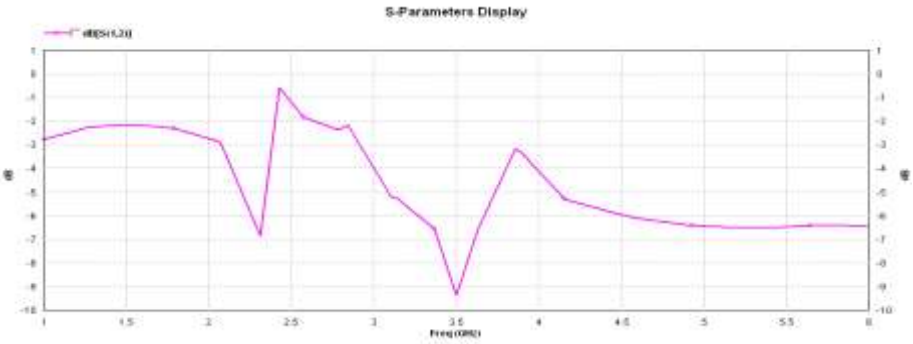


(b)Simulated S-parameter of proposed WLAN band pass filter

The simulated insertion loss and return loss are shows in fig (b) and the band pass filter shows a center frequency of 2.42GHz

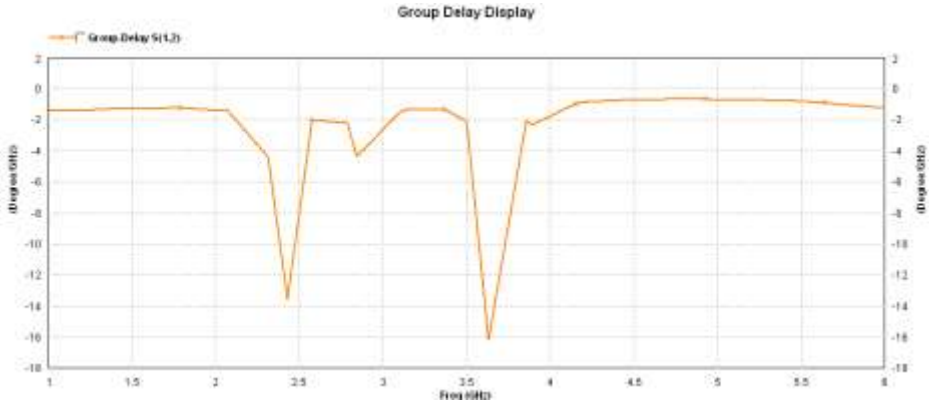


The simulated insertion loss of -6.9dB are shows in fig (c)



(d)

The simulated return loss of -21.8dB are shows in fig(d)



(e)

The simulated group delay of -31.6 degree are shows in fig(e)

PARAMETERS	DIMENSION
Feed lines length	15.6 mm
Feed lines width	3.42 mm
Sides of outer rectangular loop	15.64 mm
Gap between feed line and loop	0.3 mm
Sides of the inner rectangular	10 mm
Gap between 2 rectangular loops	0.5 mm
Thickness of the rectangular	0.5 mm

TABLE OF DIMENSION

III. Indentations And Equations

A. FOR RECTANGULAR LOOP:

The calculation of dielectric constant, capacitance and inductance for rectangular loop of the filter design was calculated by the following parameters,

PARAMETERS	**DIMENSION**
w	0.32mm
H=d	1.6mm
εe	2.98
Z_O	128.23 ohm.
C	$6.057*10^{-21}$F.
L	4.00838H.

IV. Conclusion

Thus we have designed the meta material dual band pass filter for WLAN range of frequency by reducing the size of 2.4 GHZ. The coupled DGS resonators are considered the main block of proposed band pass filters. From the simulation, the performance is evaluated with the insertion loss of -6.9dB and the return loss of -21.8 dB. Also we have obtained the band width between 2.3 GHZ to 2.5 GHZ range. The Simulation results have shown that the proposed filter offers good insertion loss and return loss response.

References

[1]. Ala'a I. Hashash1, Mohammed H. Bataineh1,2, Imran Ahmad2, Asem Sh. Al-Zoubi1, and Fauzi Elmegri1, 978-1-5090-4815-1/17/$31.00 ©2017 IEEE

[2]. Pragya Singha, Raghuvir Tomarb*, 2212-0173 © 2014 The Authors. Published by Elsevier Ltd.

[3]. Feng Wei1,2 ✉, Pei-Yuan Qin3, Y. Jay Guo3, Xiao WeiShi1,2 ,IET Microw. Antennas Propag., 2016, Vol. 10, Iss. 2, pp. 230–236 230 & The Institution of Engineering and Technology 2016

[4]. Liu, Ji-Chyun, et al. "**Compact dual-mode double square-loop resonators for WLAN and WiMAX tri-band filter design**." Progress In Electromagnetics Research C 38 (2013): 101-113.

[5]. Alaydrus, Mudrik. "**Designing Microstrip Bandpass Filter at 3.2 GHz**."International Journal on Electrical Engineering and Informatics 2.2 (2010): 71-83.

[6]. Liu, S-K., and F-Z. Zheng. "**A new compact tri-band bandpass filter using step impedance resonators with open stubs**." Journal of Electromagnetic Waves and Applications 26.1 (2012): 130-139

[7]. Tang, I-Tseng, et al. "**Compacted Band pass Filter Using Micro strip/Defected Ground Structure for WiMAX Applications**." 2008 International Symposium on Antenna and Propagation (ISAP'08), 2008.

[8]. Liu, Bo, and Yimin Zhao. "**Compact tri-band band pass filter for WLAN and WiMAX using tri-section stepped-impedance resonators**." Progress In Electromagnetic's Research Letters 45 (2014): 39-44.

[9]. "**Compacted Bandpass Filter Using Micro strip/DefectedGround Structure for WiMAX Applications**" I-Tseng Tang1, Ding-Bing Lin2, Chi-Min Li3, Wei-Chieh Chang4 and Chun-Hung Wu1 , Mar. 2007