N.Ponrohini et al. al. International Journal of Recent Research Aspects ISSN: 2349-7688, Special Issue: Conscientious Computing Technologies, April 2018, pp. 937-939

Design of Dual-Band Band Pass Filter Using CSRR

N.Ponrohini[1], C.Meenakshi[2], S.Muthukrishnaveni[3], Dr.T.Senthil[4]

[1,2,3] UG Students, Dept Of ECE, Kalasalingam Academy of Research and Education, Virudhunagar, India.
[4] Associate Professor, Dept Of ECE, Kalasalingam Academy of Research and Education, Virudhunagar, India

Abstract: - A Filter block has been highly attention due to its highly importance in wireless communication systems. High consonant level regularly organizations with the execution of the filter block. The utilization of both low-pass or band-stop channel and the progression impedance lines techniques to lessen the deceptive qualities of the channel are not a pragmatic arrangements since that includes greater intricacy and huge in measure. In this paper, a solitary unit cell of a corresponding split ring resonator composed on the ground plane of the ordinary five shaft bandpass channel has been proposed and considered as more functional technique to energize the second bandpass recurrence band and to take care of the essential channel issue as far as third request symphonious trademark concealment (3fo). The last structure has been mimicked utilizing the CST Microwave Studio. The yields appeared and furthermore return misfortune upgrade is clear through the blend between the corresponding split ring resonators and band pass channel. Different focal points no many-sided quality includes and low in powerful cost.

Keywords: Dual Band; BPF; CSRR; third harmonic reduction, cst microwave studio.

INTRODUCTION

As of late, among numerous electromagnetic subjects, ring resonators have turned into the focal point of consideration specialists. That intrigue is a result of its tremendous military and its common applications. The split ring resonator is utilized as a part of colossal applications to enhance concealment, selectivity and scale down attributes for some, RF/Microwave gadgets.

A band-pass channel (in like manner band pass filter, BPF) is a device that passes frequencies inside a particular range and rejects (debilitates) frequencies outside that range. A bandpass flag is a flag containing a band of frequencies not contiguous zero recurrence, for example, a flag that leaves a bandpass channel.

A split-ring resonator (SRR) is a structure fabricated using to metamaterials. The motivation is to deliver the coveted attractive helplessness (attractive reaction) in different sorts of metamaterials up to 200 terahertz. These media make the vital solid attractive coupling to a connected electromagnetic field, not generally accessible in traditional materials.

RELATED WORK

In this written work, among these RF/Microwave devices, RF/Microwave microstrip band pass channel (BPF) is joined with part ring resonator unit cell. A considerable bit of the proposed articles use split ring resonators (SRR) and correlative split ring resonators (CSRR) as an imperative part in different sorts of metamaterial circuit layout [1-3]. S.S. Karthikeyan and Rakhesh Singh Kshetrimayum used CSRR to wipe out the second symphonious response of the BPF via cutting the CSRR on the permeability ground plane of the BPF structure [4]. The out-off-band and the bogus repeat of the BPF were improved and discarded independently by combined the CSRR with short circuited stub of the Chebyshev BPF [5]. The expulsion of prevalent neighborhood (HiPerLAN) deterrent in the BPF goes by organizing the BPF with CSRR is proposed by [6]. The unwanted remote neighborhood (WLAN) repeat band is indented by using the part ring resonator deserted on ground plane of BPF in [7]. Counterfeit repeat disguise and level expulsion through joining CSRR with the customary BPF structure was proficient by [8]. Besides, a normal Chebyshev BPF was used and indicates low trademark parameters to the extent second symphonious and return incident [9]. In any case, all the proposed earlier articles have shown change in the second consonant or indented either HiPerLAN or WLAN of BPF extend repeat band. CSRR sketched out on the ground plane is proposed and considered as a more proper technique to deal with imperative channel issues; third demand consonant trademark disguise (3fo), return mishap change and moreover influence a minute to band pass repeat band [10,11] at 1.4 GHz for capable remote intensifier structure application. Through the blend between a lone unit cell of CSRR with a conventional divert brought about ,no change in BPF measure and no multifaceted nature.

PROPOSED WORK

In this paper, three critical execution parameters of microwave band pass channel: roll-off, return loss and phase linearity are enhanced by joining the single unit cell of a CSRR with a customary channel with no change in BPF

estimate with less intricacy. BPF is outlined on the parameters list appeared in Table (1). The BPF frequency range is 8-12GHz covering X - band of IEEE microwave recurrence band. A comparable impedance of the sustain line is equivalent to 50ω. The BPF structure is planned on (fr-4) substrate with dielectric consistent of Ɛ = 10.2 and thickness (t) equivalent to 0.508 mm.

Table (1) The Parameters list:

Parameter List

Name	Expression	Value
t_c	.035	.035
wf	.1*30	3
b	.75*30	22.5
t_s	0.508	0.508
a	30	30
<new parameter>		

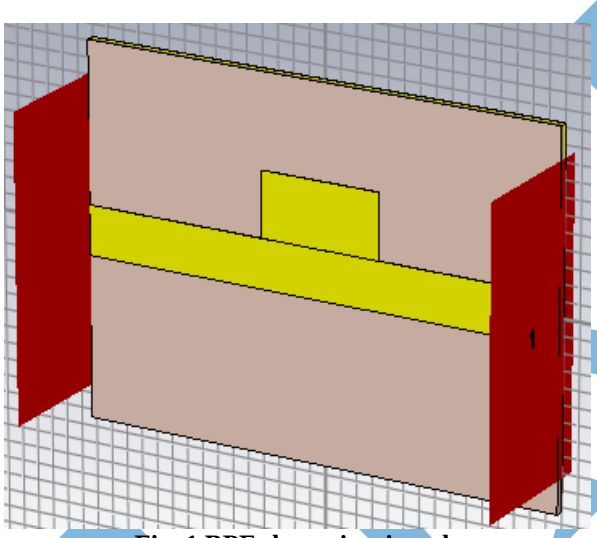

Fig. 1.BPF short circuit stub

A CSRR is ideal for microstrip development as it is generally invigorated by a center point time fluctuating electric field. The CSRR bear on as resonators which are molded by parallel mix of L and C, the LC deafening tank is electromagnetically coupled to the host line. The proportionate circuit model of CSRR stacked transmission line and its vital estimations of the inductors capacitors can be discovered.

The microwave and RF reenactment programming bundle Computer Simulation Technology (CST) is utilized to separate the first aftereffects of the ordinary BPF and to reproduce the mix of BPF with CSRR. The S-parameters of the new structure BPF in light of CSRR utilizing CST programming are plotted against the X - band recurrence extend.

SIMULATION RESULTS

CST test system has been utilized to acquire the S-parameters of BPF which speak to the reflection and the insertion loss of the conventional channel as a component of frequency that is appeared in Fig2. As the CSRR is reciprocal network $S_{ii}= S_{jj}$ and $S_{ij} = S_{ji}$ .This property is reflected in Fig2.

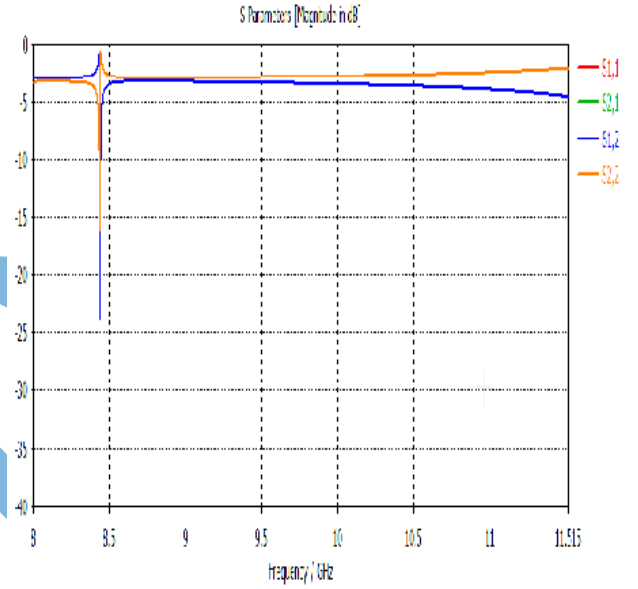

Fig.2 S-Parameters for band pass filter using CST.

Dielectric constant ϵr increases, as the applied electric flux density increases, as shown in Fig.3. Materials with high dielectric constants are helpful in the fabrication of high-esteem capacitors. This change the selection of band pass filter range according to change in capacitance.

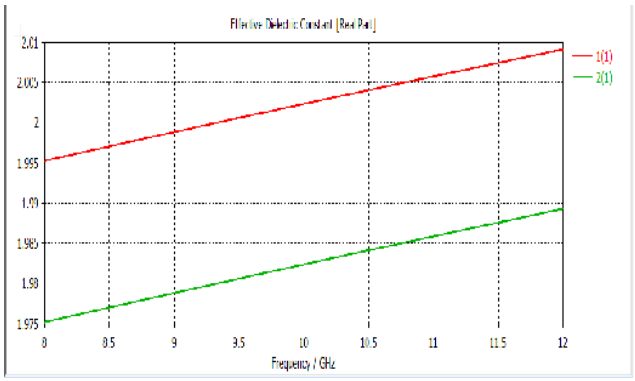

Fig. 3. Effective Electric Field in Band Pass Filter using CST Studio

Group delay is characterized as the rate of progress of transmission stage edge regarding recurrence. The Group delay is extricated from S-Parameters, unless the system is

an ideal estimation of an immaculate transmission line, there will be varieties over recurrence. Inside a little measure of data transfer capacity aggregate postponement is about steady showed up in Fig.4.

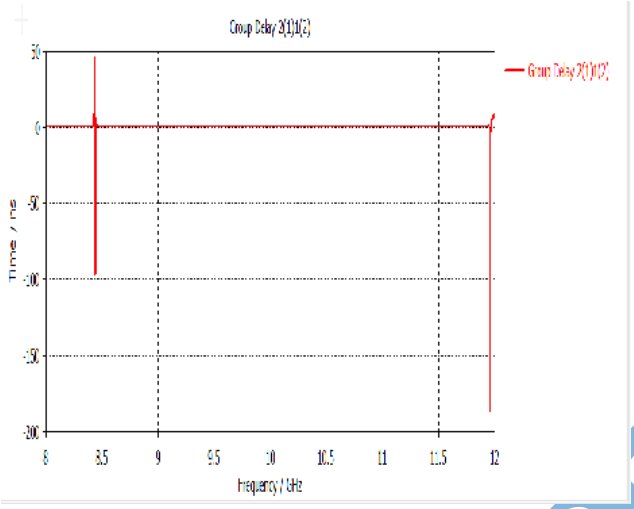

Fig. 4. Group delay in Band Pass Filter Using CST Studio

Results picked up were better than the consequences of regular BPF. It can be seen from the results that, the third consonant false had been smothered more than 10dB while it was available in the regular BPF reaction. This is due to the high coupling of the best possible area of the unit cell. Additionally, the second low bandpass recurrence band of expert remote amplifier framework (PWMS) also accomplished.

V.CONCLUSION

In this paper, the inclusion and the arrival misfortune transmission attributes of the band-pass channel has been examined. The impact of corresponding split ring resonators piece in the ground of the band-pass channel structure has been recommended. The third symphonious deceptive was stifled more than 10dB. 15 dB of return misfortune and the second recurrence band of the expert remote amplifier framework (PWMS) are accomplished contrasting with the customary structure because of two critical reasons; the great coordinating between the reverberation frequencies of both the CSRR unit cell and BPF structure, and a higher coupling through the CSRR in the suitable area. At long last, the proposed structure shows no expansion in estimate and with less multifaceted nature in the structure.

VI. ACKNOWLEDGEMENT

The authors would like to thank our Head of the department and Project coordinator for allowing us to use the CST STUDIO SUITE (2017) Software in our department, Kalasalingam Academy of Research and Education. We also like to thank our guide for giving valuable suggestions and support for our project.

VII.REFERENCES

[1] D.R. Smith, W.J. Padilla, D.C. Vier, S.C. Nemat-Nasser, and S.Schultz, Composite zedium with simultaneously negative permeability and permittivity, Phys Rev Lett 84 (2000), 4184–4187.
[2] G.V. Eleftheriades and K.G. Balmain (Eds.), Negative refraction metamaterials: Fundamental principles and applications, Wiley, New Jersey, 2005.
[3] Catherine A. Allen, Kevin M. K. H. Leong, Tatsuo Itoh, "Design of Ring Resonator Mode Spacing and Bandwidth using the Phase Response of Composite Right/Left Handed Transmission Lines," IEEE MTT International Microwave Symposium, 2005.
[4] S.S. Karthikeyan and Rakhesh Singh Kshetrimayum, "Performance Enhancement of Microstrip Bandpass Filter using CSSRR", International Conference on Advances in Computing, Control, and Telecommunication Technologies, 2009.
[5] J. Bonache, F. Martin, J. Garcia-Garcia I. Gil, and R. Marques,"Ultra Wide Band Pass Filters (UWBPF) Based on Complementary Split Ring Resonators", Microwave and optical technology letters, Vol. 46, No. 3, August 5 2005.
[6] J.-S. Hong and M.J. Lancaster, Microstrip filters for RF/Microwave applications, Wiley, New York, 2011.
[7] Abid Ali and Zhirun Hu," Metamaterial Resonator Based Wave Propagation Notch for Ultrawideband Filter Applications", IEEE Antennas and Wireless Propagation Letters, Vol. 7, 2008.
[8] Li, Z.-J. Li, C.-H. Liang and B. Wu,"UWB bandpass filter with notched band using DSRR", Electronic Letters, 13th May 2010, Vol.46, No. 10.
[9] Abid Ali and Zhirun Hu," Negative Permittivity Metamaterial for Microwave Circuit Applications", International Conference, London, IEEE Xplore, 2009.
[10] M. A. Alqaisy, J. K. Ali, C. K. Chakrabarty, and G. C. Hock, "Design of a compact dual-mode dual-band microstrip bandpass filter based on semi-fractal CSRR," in Progress In Electromagnetics Research Symposium Proceedings, Stockholm, Sweden, 2013, vol. 699.
[11] M. Alqaisy, C. Chakrabraty, J. Ali, and A. R. H. Alhawari, "A miniature fractal-based dual-mode dual- band microstrip bandpass filter design", International Journal of Microwave and Wireless Technologies.

