



Microstrip Lowpass Filter at 12 GHz

Kenan Kazić

Department of Electrical and Electronics Engineering

Int. University of Sarajevo

Outline

- Introduction
- Design Steps
- Simulation Results
- Conclusion
- Acknowledgement
- References

Introduction

- In this paper a symmetric low pass filter that has cut off frequency at 12 GHz is designed and simulated.
- Featuring this design it consists of trial and error, with the conclusion that the best design consist of four high vertical stubs, two extended columns after and before ports and three wide stubs in central region.

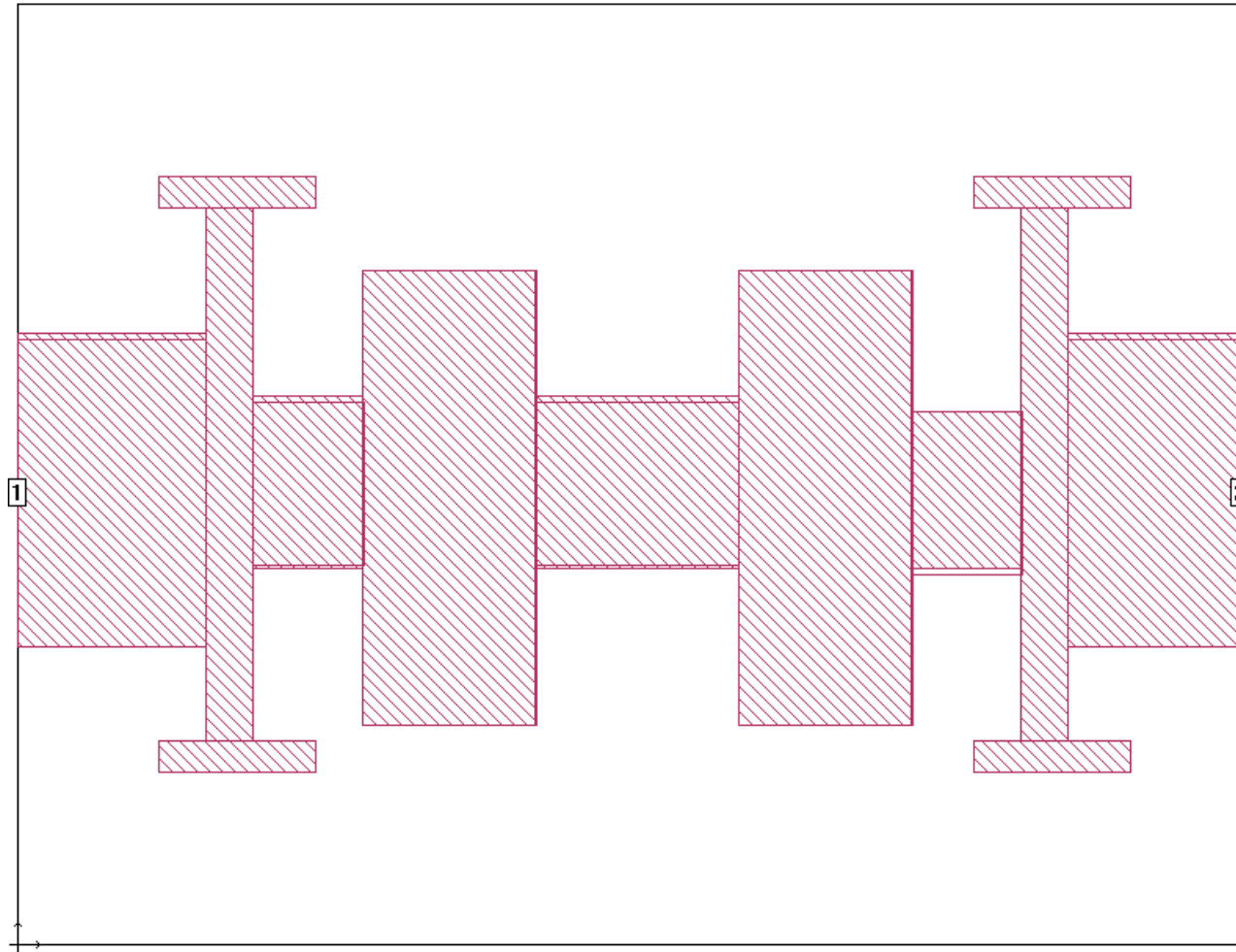
Introduction

- Filters play important role in electronics where they are used to eliminate frequencies on specific range bands.
 - During the process of analyzing we came to a conclusion for placing extra stubs on extended stubs after ports to further increase filtering capabilities and apply mirror effect.

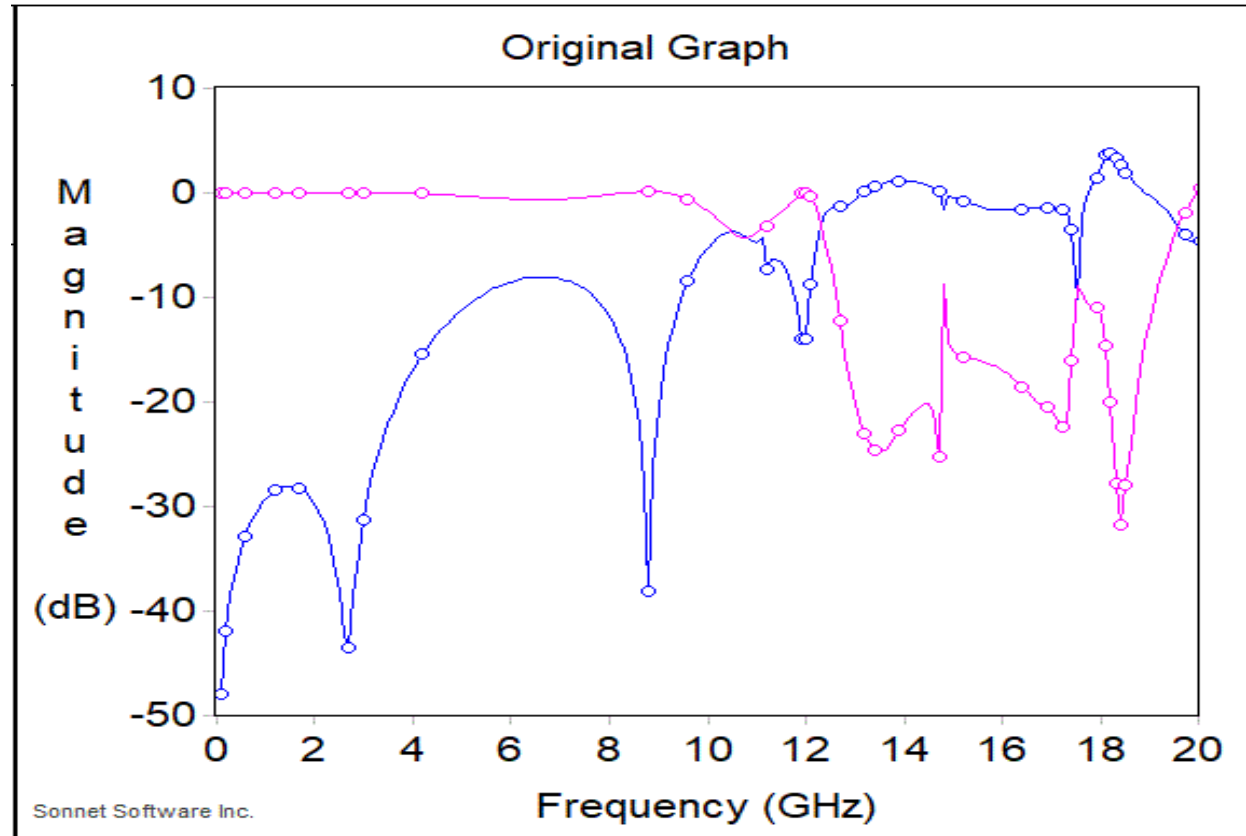
Design Steps

- The filter is simulated using RT/duroid 5880 substrate with parameters of dielectric constant $\epsilon_r = 2.2$, thickness $h=1.575$ mm and loss tangent $\text{Tan } \delta = 0.0009$.
- The passband covers bands from 0.1 to 2.5 GHz and from 4.5 to 12 GHz with an insertion loss between 0.1–12 [dB].

Design Steps



Simulation Results



Simulation Results

TABLE II- CHANGE IN ϵ_r

ϵ_r	S12 [dB]	S11 [dB]
2.2	-0.5059 GHz	-10.174 GHz
2.15	-0.0763 GHz	-13.637 GHz
2.1	-0.0129 GHz	-14.0493 GHz
2.25	-0.529 GHz	-8.512 GHz
2.3	-1.65 GHz	-4.7365 GHz

Simulation Results

TABLE III- CHANGE IN THICKNESS

THICKNESS	S12 [dB]	S11 [dB]
1.575 mm	-0.0129 GHz	-14.0493 GHz
1.570 mm	0.0112 GHz	-13.959 GHz
1.560 mm	0.00697 GHz	-13.770 GHz
1.580 mm	0.0143 GHz	-14.135 GHz
1.585 mm	0.0155 GHz	-14.2172 GHz

Conclusions

- Low pass filter is introduced after the microstrip bandpass filter.
- The final circuit constituted of MMR BPF and LC low pass filter has performances satisfying the specification.
- To remove the unwanted frequency bands from the microwave and radio frequency signals a band-stop filter (BSF) plays a very important role in wireless communication systems.
- The simulation results are final at this stage, thus I will proceed with my research and studies.

Acknowledgement

- Author would like to thank Prof. Dr. Taha Imeci from International University of Sarajevo (IUS), Electrical Engineering department for guidance in the project.

References

- [1] I. Mansour, H. Elhennawy, A.S.T. El-dein, “Design of Stepped Impedance Microstrip Low Pass Filter with DGS” International Journal of Engineering Research and Development, vol. 10, issue 7, pp. 58-67, July 2014
- [2] B. H. Ahmad, M. H. Mazlan, M. N. Husain, Z. Zakaira, N. A. Shairi, “Microstrip Filter Design Techniques: An Overview” ARPN Journal of Engineering and Applied Sciences, vol. 10, no. 2, pp. 901-907, February 2015
- [3] T. Fan, Y. Yao, “Design of 12-14.1 GHz Bandpass Filter with Stub Loaded” Journal of Engineering Research and Application, vol. 6, issue 6, pp. 31-33, June 2016

References

- [4] I. Mansour, H. Elhennawy, A.S.T. El-dein, “Design of Stepped Impedance Microstrip Low Pass Filter with DGS” International Journal of Engineering Research and Development, vol. 10, issue 7, pp. 58-67, July 2014
- [5] Sonnet Suites, version 17.52 Syracuse, New York

Thank you for your time!