$\lambda/2$-resonator Bandpass filter

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Contents

Chapter 1

HFSS Simulation

1.1 Components

1. Metal: Copper
    - Conductivity: 58000000 Siemens/m
    - Relative Permittivity (ϵ_r): 1
2. Substrate: Rogers RO4003
    - Relative Permittivity (ϵ_r): 3.55
    - Dielectric Loss Tangent ($\tan\delta$): 0.0027

1.2 Design Criteria

- Frequency of Operation: 7.8 GHz

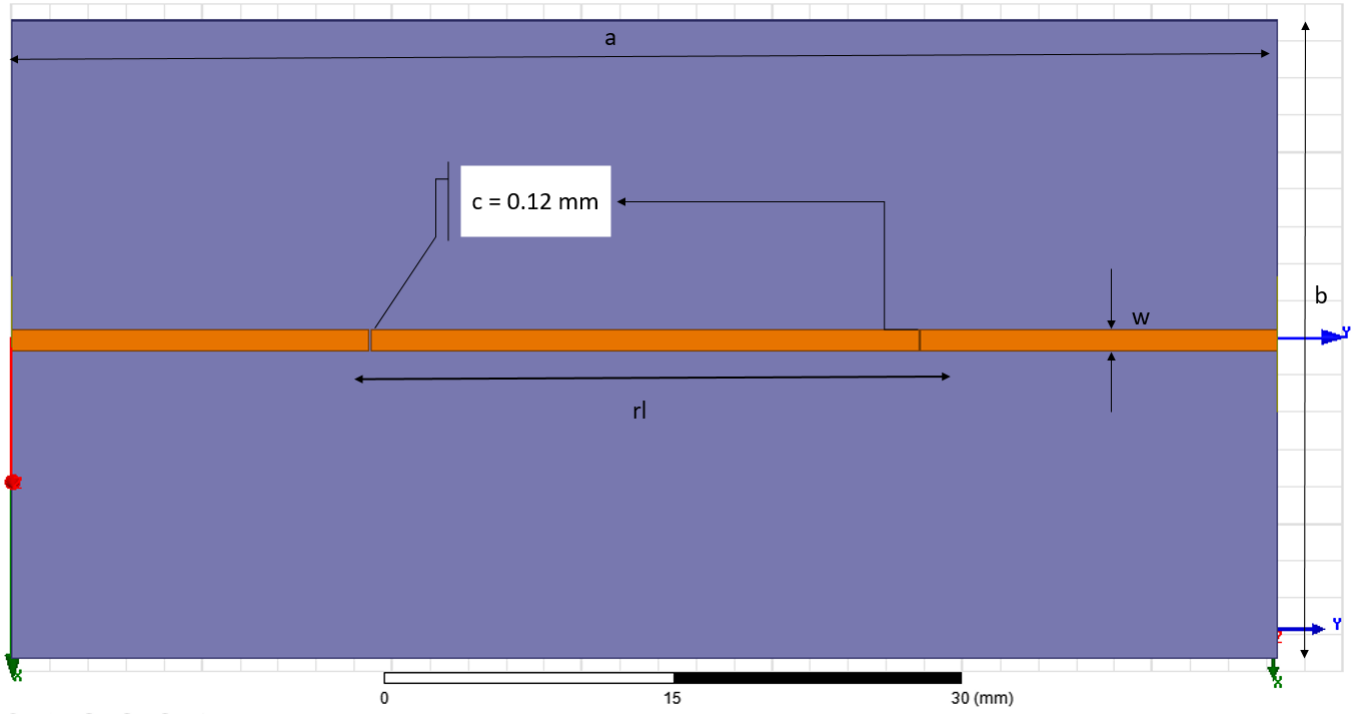

Figure 1.1: Layout of the Bandpass Filter

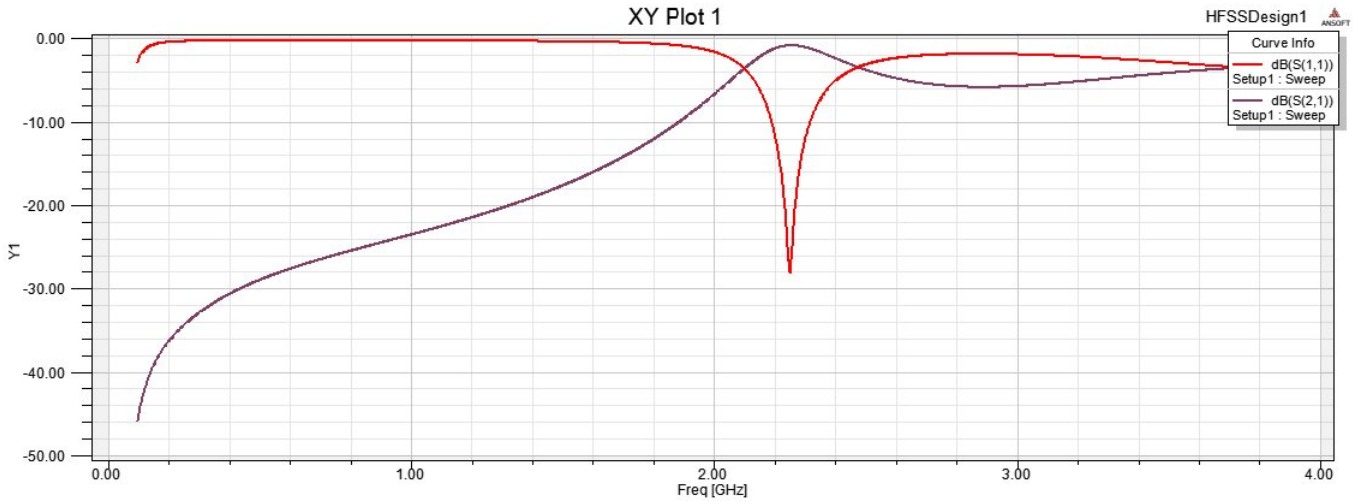

Figure 1.2: S_{11} and S_{21} parameters of the design

1.3 Design Specifications

- Width of substrate (a): 34.30 mm
- Length of substrate (b): 66.65 mm
- Height of substrate (h): 0.508 mm
- Metal Thickness (t): 0.017 mm
- Resonating Element Length (rl): 28.82 mm
- Microstrip Width (w): 1.1363 mm
- Coupling Gap (c): 0.12 mm

1.4 Conclusion

From Fig. 1.2, there is a small deviation from the center frequency 2.4 GHz.

The S_{21} parameter is nearly -0.1 dB since the passband ripple considered during the design was 0.1 dB. The design was carried out by referring to the book[1].

Bibliography

[1] Jia-Shen G Hong and Michael J Lancaster. *Microstrip filters for RF/microwave applications*. Vol. 167. John Wiley & Sons, 2004.