LTCC Based L-Band Bandpass Filters for Communication Devices

➔ Determining Specifications
- Centre frequency
- Bandwidth
- Insertion Loss
- Return Loss

➔ Determining Topology
- Coupled resonator
- Inter-digital filter
- Hairpin filter
- Stepped Impedance filter
- Piezoelectric tuned filter

➔ Designing in Matlab
- Signal processing
- Filter design tools

➔ Simulating filter in CST Design Suite (Microwave)

➔ I plan to design 3 filters using above parameters, then see results of each simulation and select the best/most efficient one.

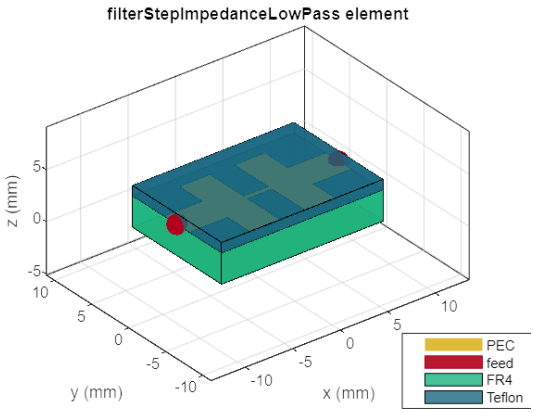
Selected filters: hairpin, stepped impedance and inter-digital.

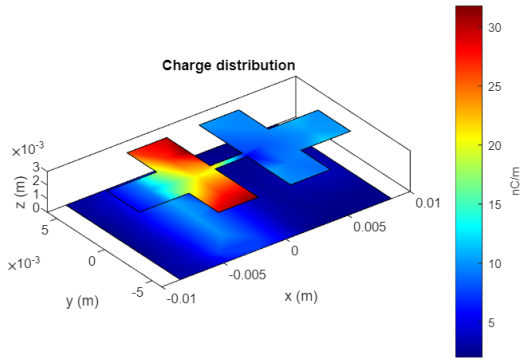
Stepped Impedance Filter

Specifications:-

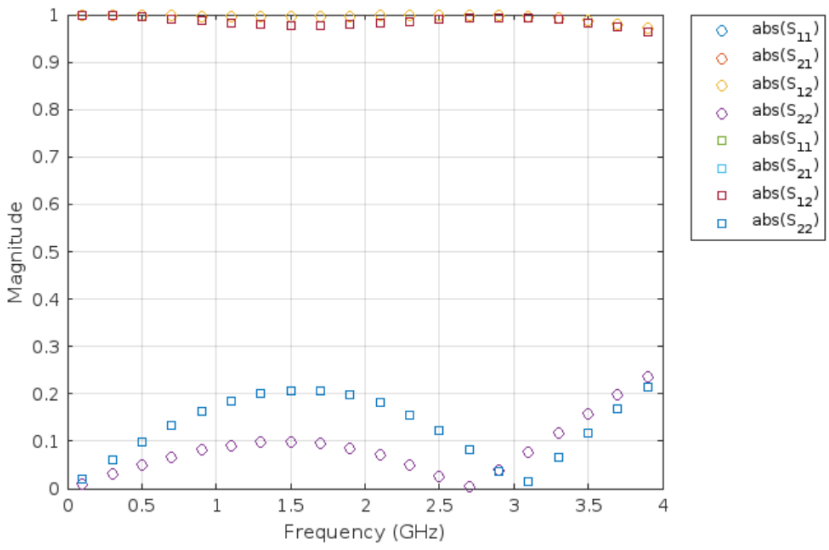
- Centre frequency(f_o): 2.65 GHz
- 3dB bandwidth(B): 50 MHz
- Number of stages(N): 3
- Characteristic impedance(Z_o): ~50 Ohms

Design:-





Response Plot (freq, amplitude):-

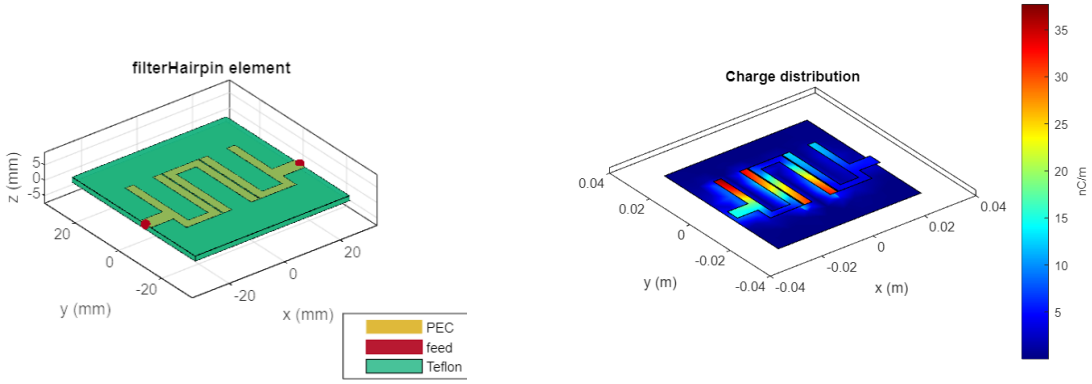


Hairpin Filter

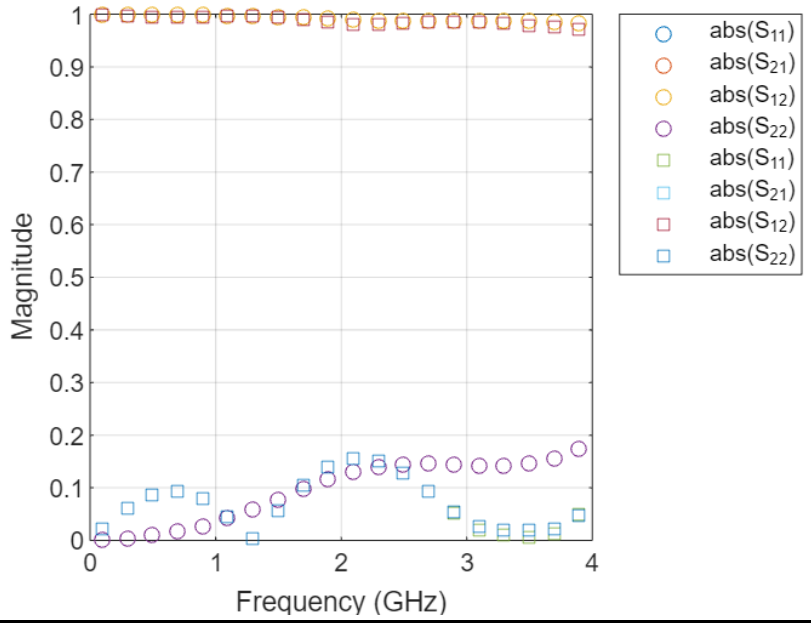
Specifications:-

- Centre frequency(f_o): 1.25 GHz
- 3dB bandwidth(B): 50 MHz
- Number of stages(N): 3
- Characteristic impedance(Z_o): ~50 Ohms

Design:-



Response Plot (freq, amplitude):-

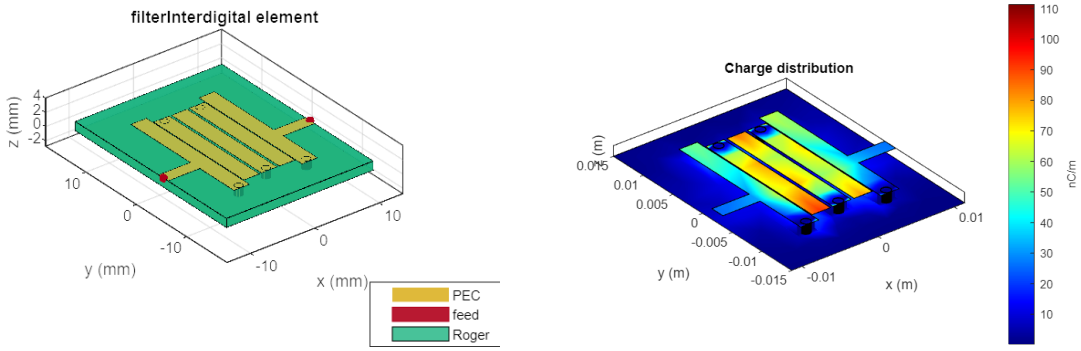


Inter-digital Filter

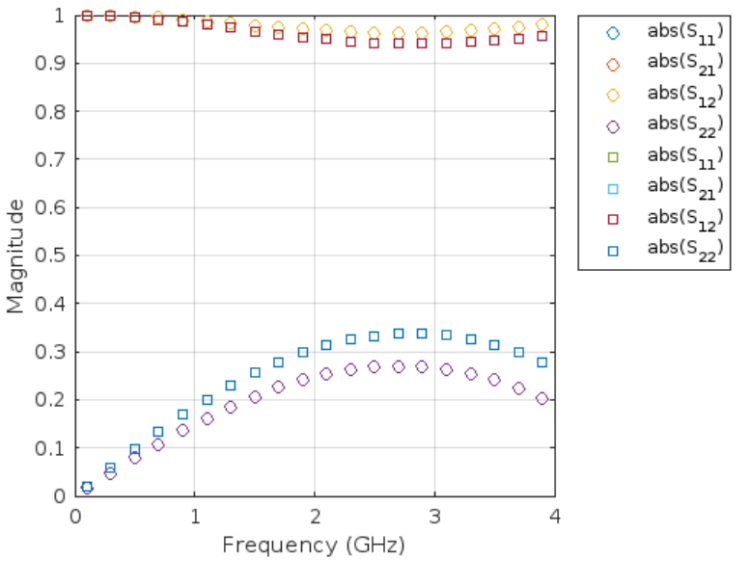
Specifications:-

- Centre frequency(f_o): >4 GHz
- 3dB bandwidth(B): 50 MHz
- Number of stages(N): 5
- Characteristic impedance(Z_o): ~50 Ohms

Design:-



Response Plot (freq, amplitude):-



Conclusion

By simulating above 3 designs we find that the best suited filter for L-Band Microwave is the Hairpin filter, as it has a centre frequency of 1.25 GHz hence we use this design to construct and simulate in CST Studio.