Design of a Band Stop Filter (BSF) using Single stub:

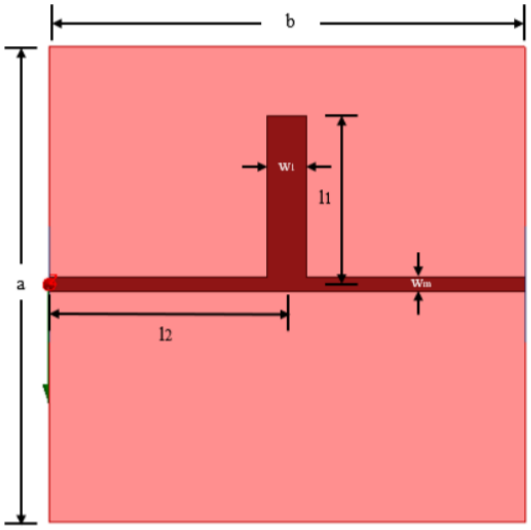

Fig 3. Layout of Single Stub BSF

The layout of the BSF using a Single Open Shunt Stub is shown in fig 3. The problem is to design the BSF using Microstrip line technology using ADS.

- **Components:**
  - Metal: **Copper**
    - Conductivity: 58000000 Siemens/m
    - Relative Permittivity (εr): 1
  - Substrate: **Rogers RO4003C**
    - Relative Permittivity (εr): 3.55
    - Dielectric Loss Tangent ($tan\delta$): 0.0027

- **Design Specifications:**
  - Substrate Thickness = 0.508mm
  - Metal Thickness = 0.017mm
  - L1 = 5.494mm
  - W1 = 3.016mm
  - L2 = 3.197mm
  - Wm = 1.136mm

➢ **Design Criteria:**

Operating Frequency: 7.8 GHz

➢ **Schematic of BSF:**

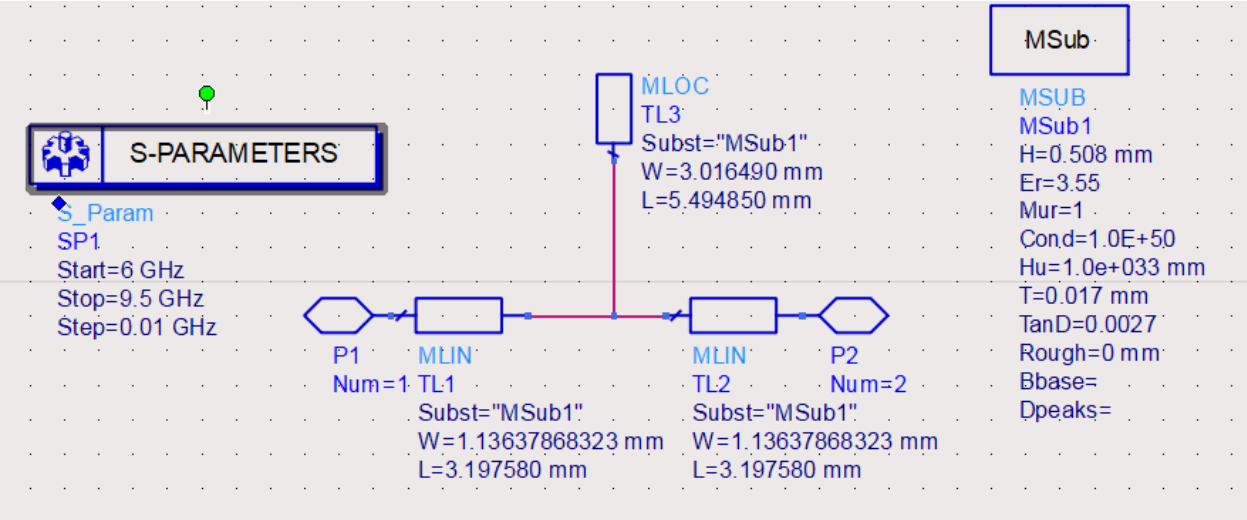

Fig 4. Schematic of Single Stub BSF

➢ **Momentum Layout:**

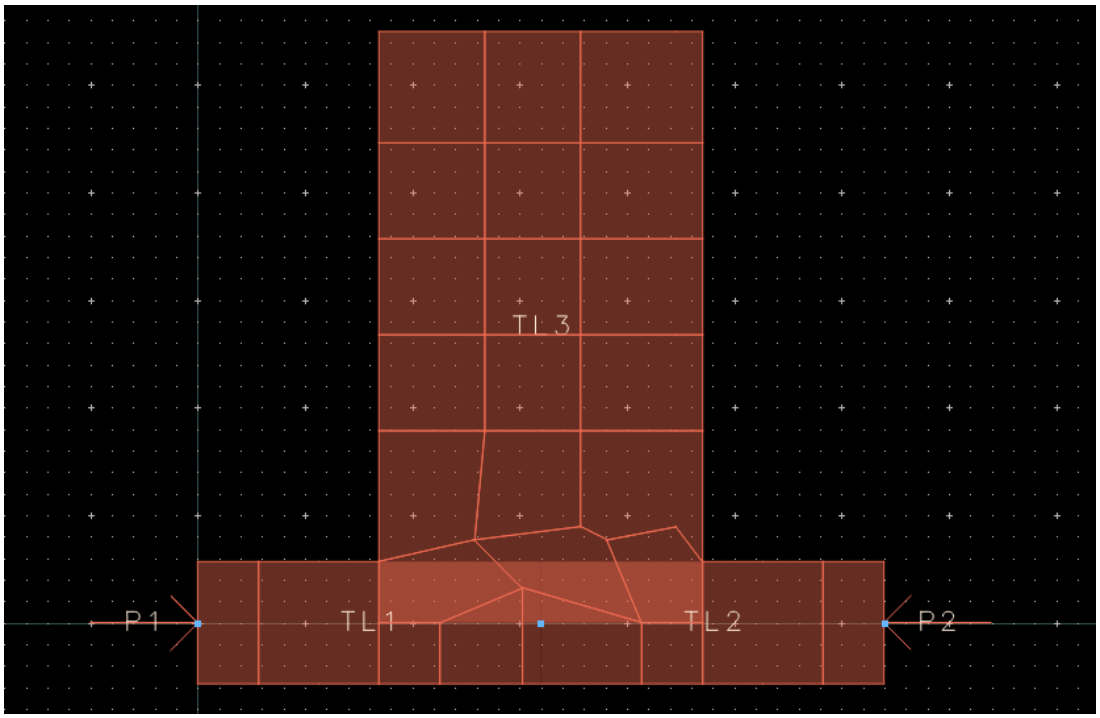

Fig 5. Layout of Single Shunt Open Stub BSF.

- **Momentum 3D Layout**

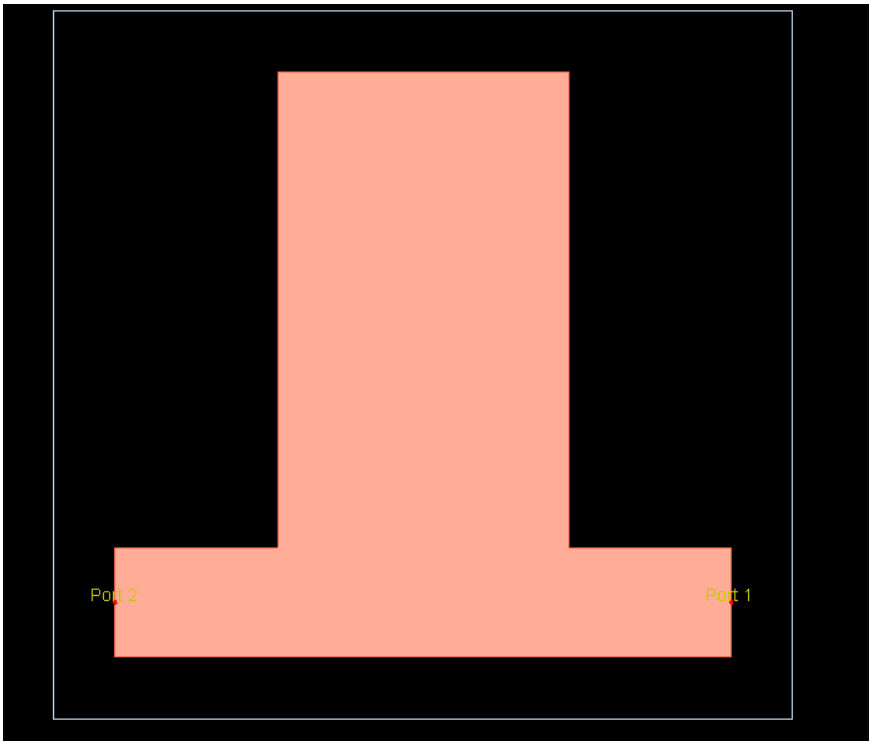

Fig 5. Momentum Layout of BSF

- **Substrate Diagram of ADS:**

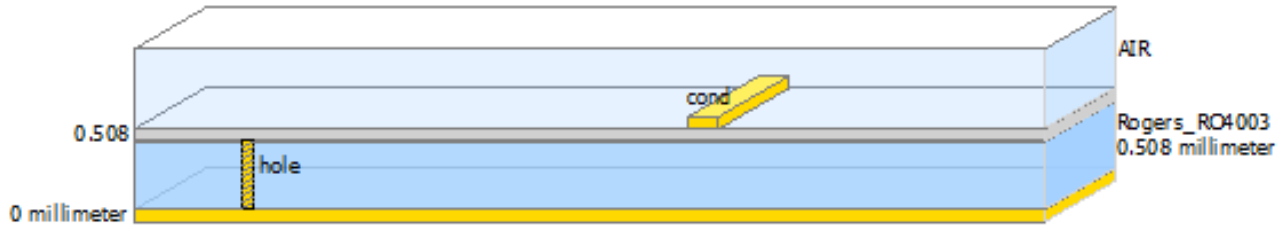

Fig 6. Diagram of the substrate (Dielectric constant 3.55, Rogers_RO4003C, Freq 7.8 GHz)

Results

Magnitude plot of S11 and S21 parameters

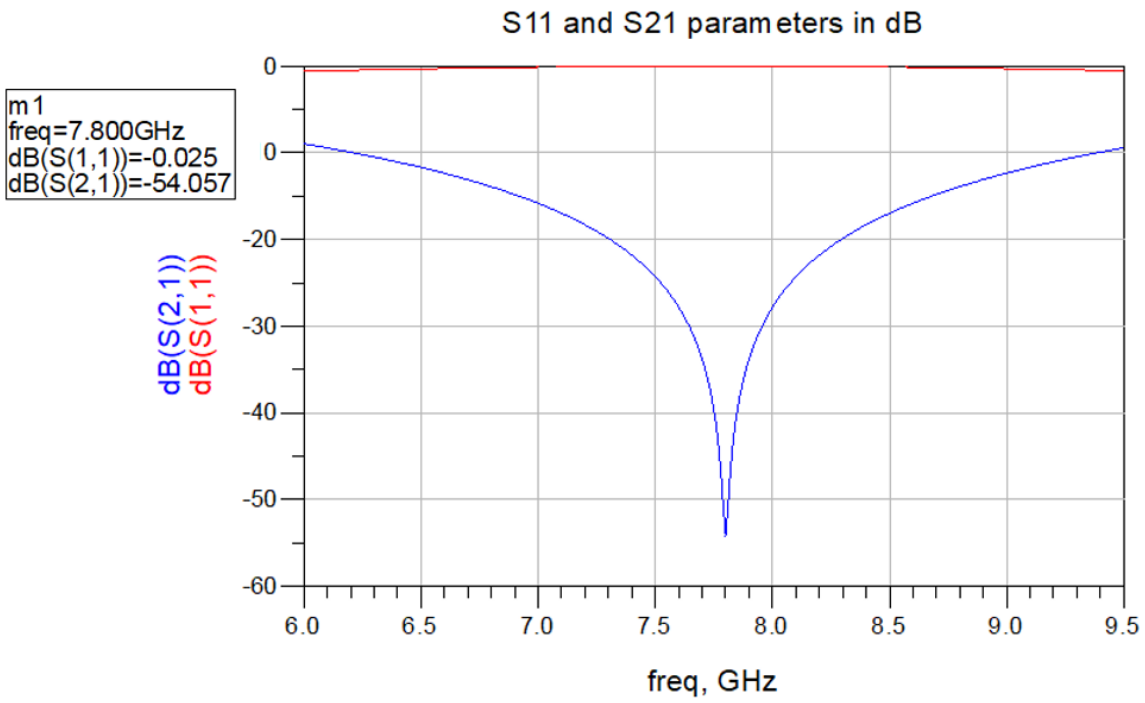

Fig 7. Magnitude plots of S11 and S21 parameters.

Calculations

- The characteristics impedance of the shunt open stub line is kept as 25Ω.
- The electric length of the open stub is kept as 90 degree which implies its length is equal to the quarter of the operating wavelength.

Conclusion:

- We successfully used ADS to design a BSF using single open stub with microstrip line at the center frequency of 7.8 GHz
- The dip of -54.057 dB for the S21 parameter is a clear indication that the signal is not passed at the respective frequency.
- By using a shunt open stub at electric length of 90 degree we manage to make the input impedance towards the source size to be infinite for the frequency of 7.8 GHz.