

# All-Silicon Meeting

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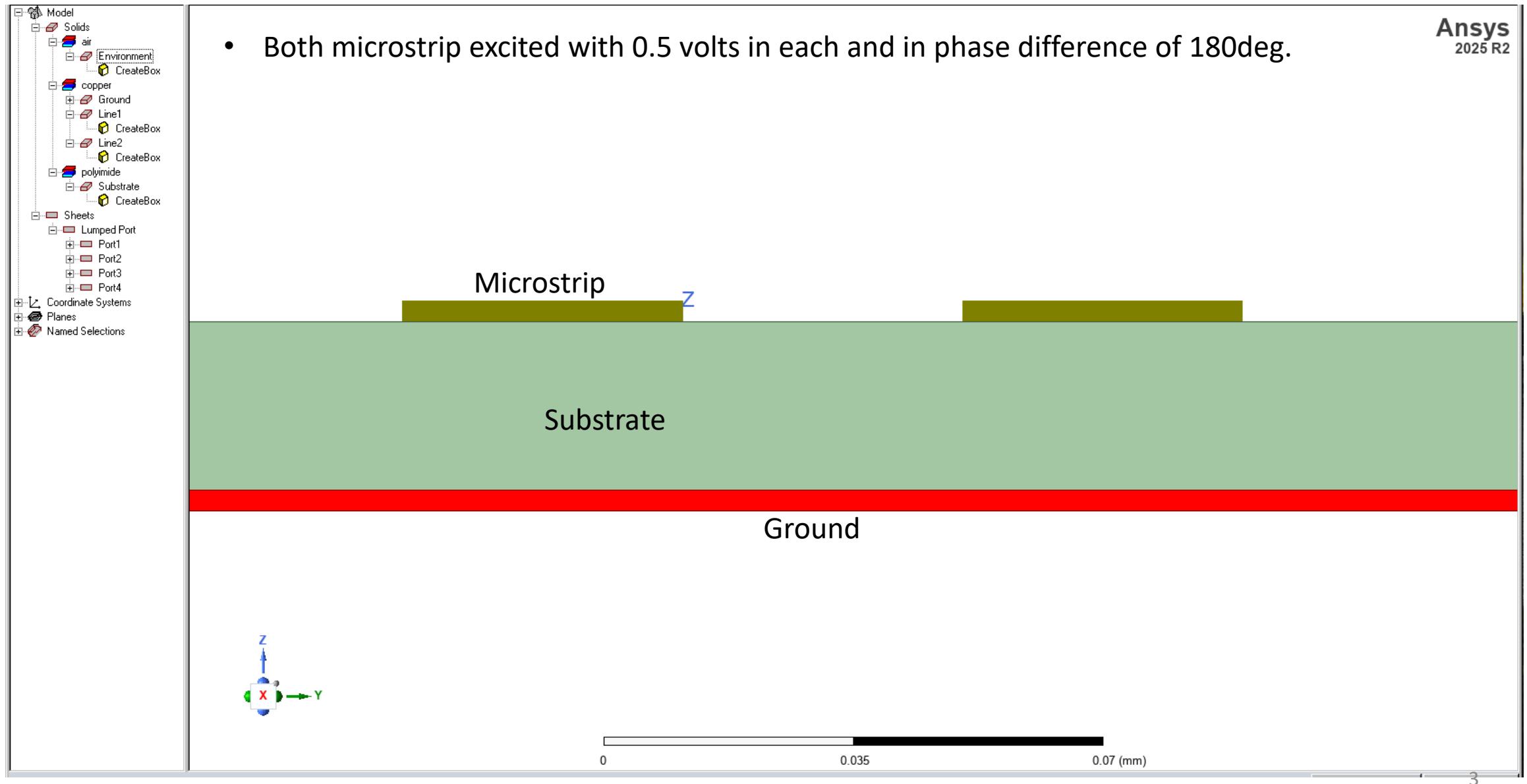
# Ansys (HFSS) Simulations of Differential Line



Microstrip Width : 40 $\mu$ m  
Microstrip length : 10mm  
Microstrip Height : 3 $\mu$ m  
Separation : 40 $\mu$ m

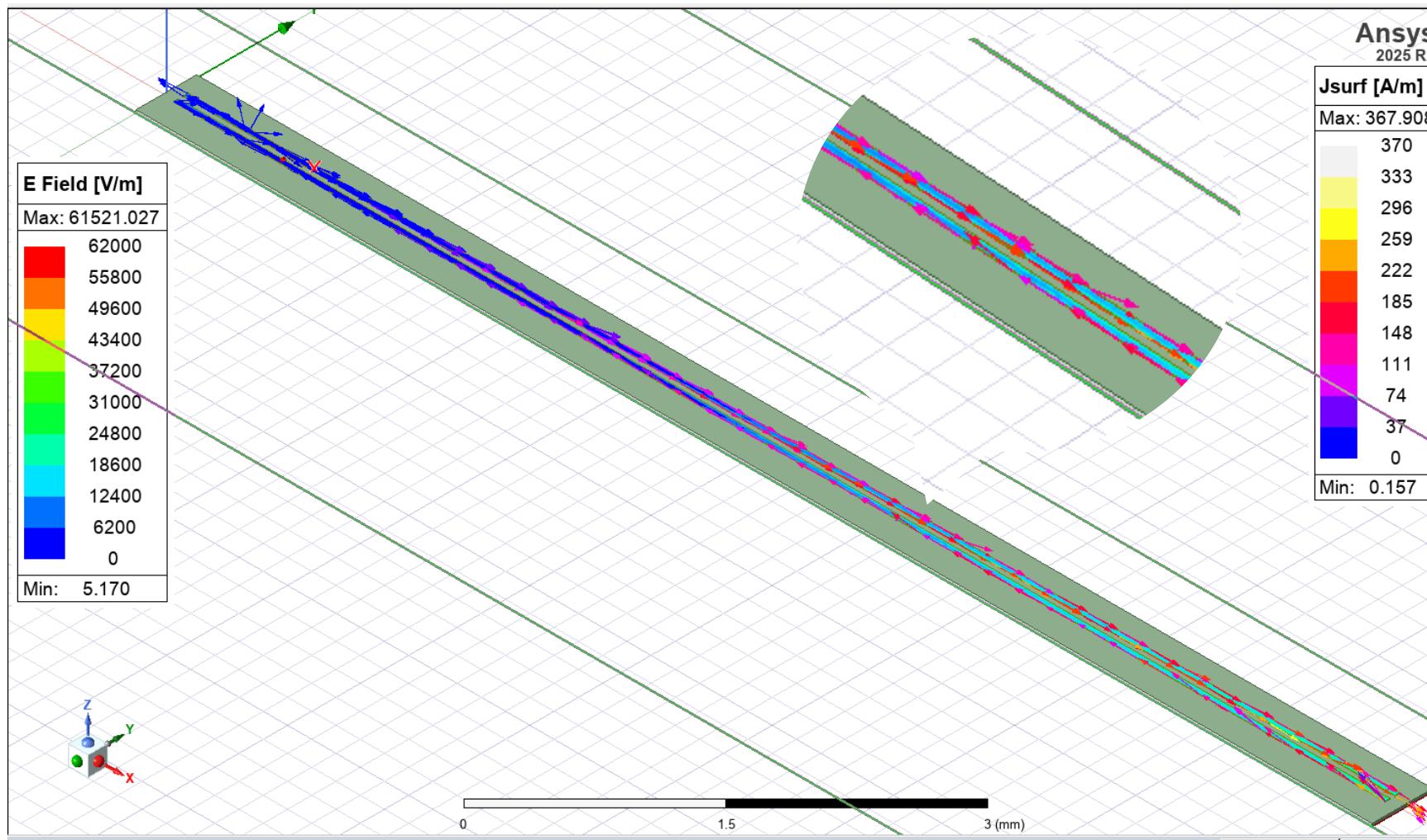
Substrate Height : 24 $\mu$ m  
Differential mode Impedance : 100.07 $\Omega$   
Common mode Impedance : 55.4 $\Omega$   
Dielectric Constant : 3.5

# Ansys (HFSS) Simulations of Differential Line

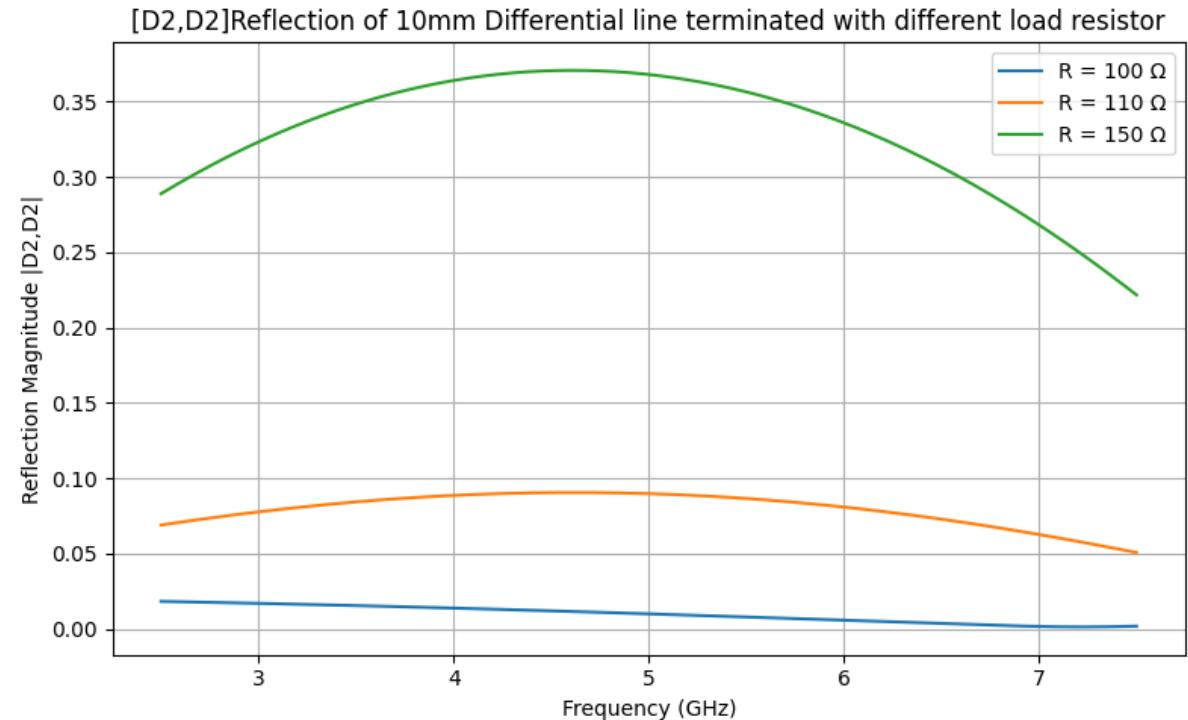
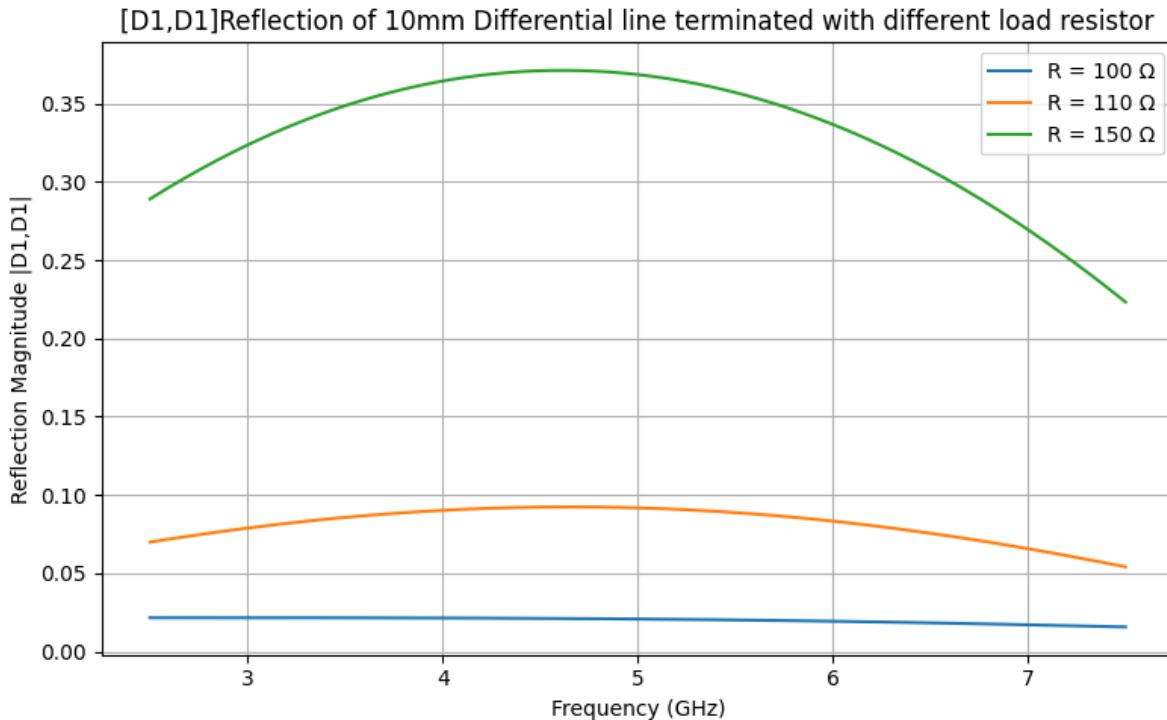


# Results of Ansys (HFSS) Simulations of Differential Line

- As our both lines are at the 180deg out of phase in compare to each other, it could be visualize by surface current density.

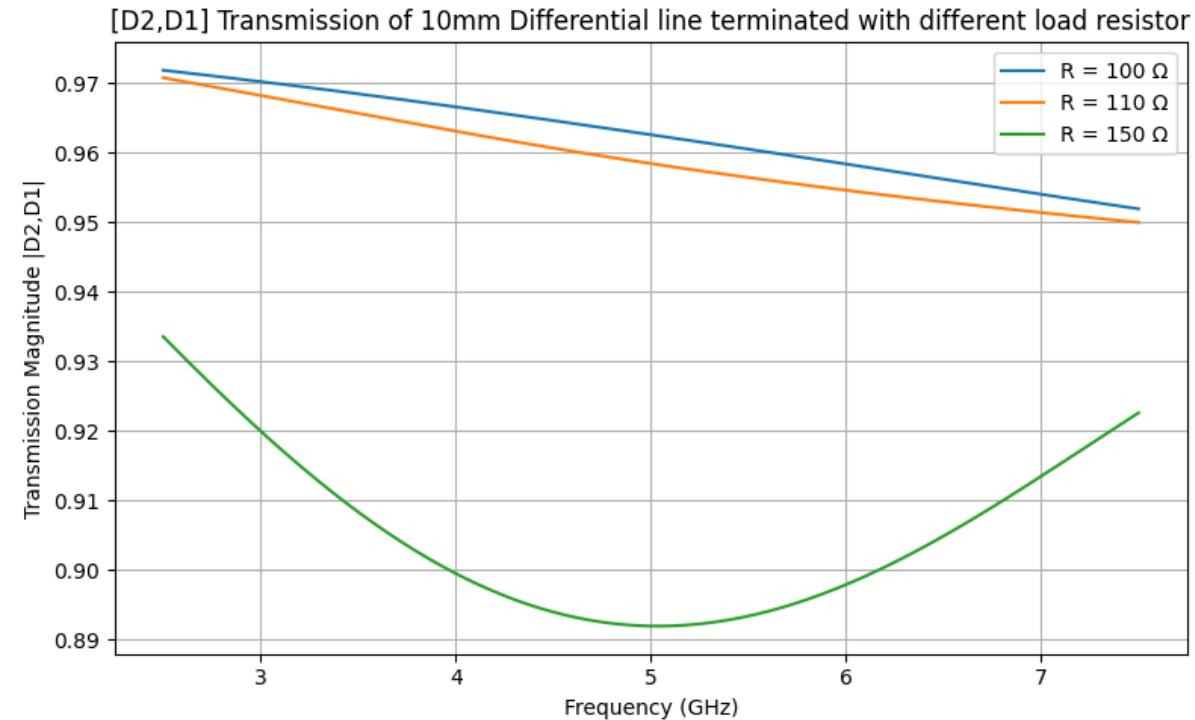
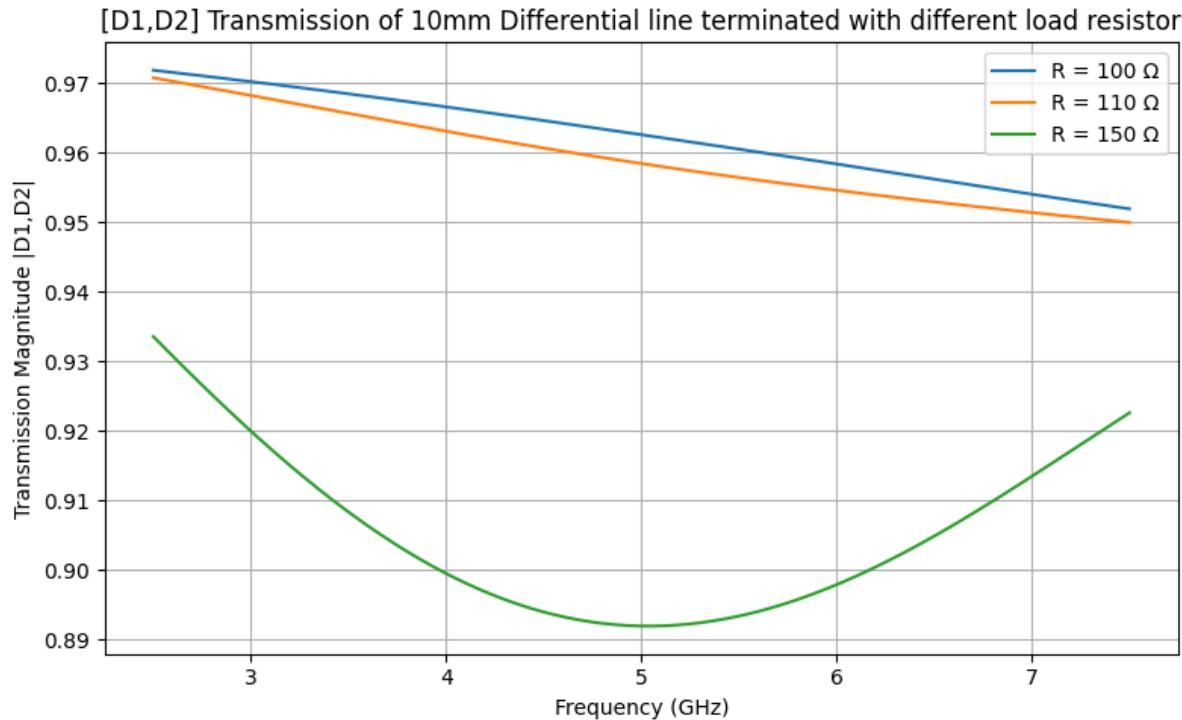


# Results of Ansys (HFSS) Simulations of Differential Line



- [D1,D1] : It quantifies how much of a differential-mode signal injected into differential port D1 is reflected back to the same differential port.
- Here both lines are excited with 0.5V in each and phase difference of 180deg.
- Error in S-parameters are <1% was set in simulation.
- As we change the load resistor, S-parameter change accordingly.
- Higher mismatch of load resistor results into higher reflections of input signal.

# Results of Ansys (HFSS) Simulations of Differential Line

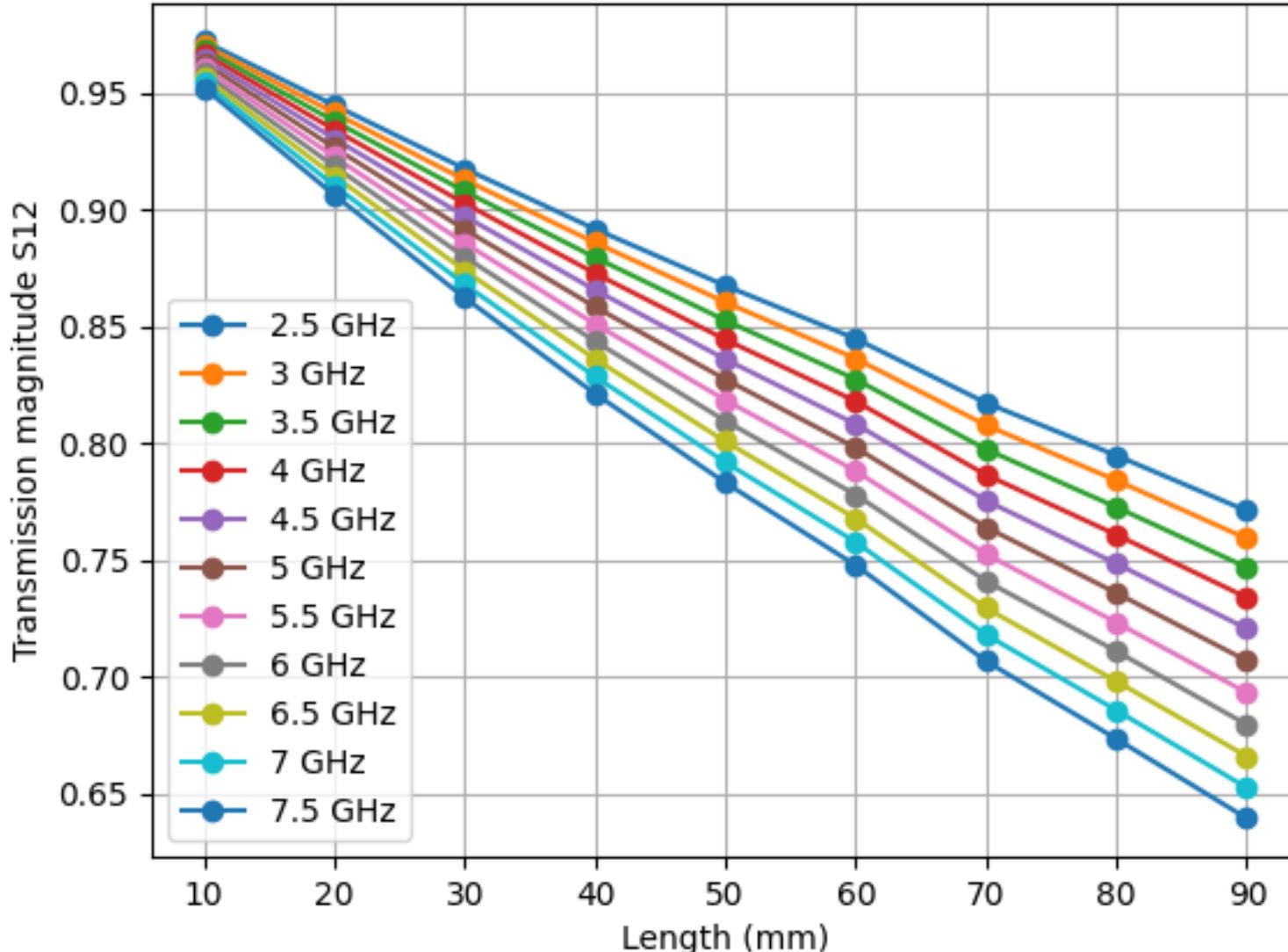


- [D1, D2]: It quantifies how much of a differential-mode signal injected into differential port D1 is transmitted to differential port D2.
- Higher load mismatch results in reduced transmission rate and increased reflections of the input signal.

# Results of Ansys (HFSS) Simulations of Differential Line

## Study of Transmission rate as a function of length

Transmission rate vs Length



- Frequency range is set to 2.5GHz to 7.5GHz.
- Length of differential line varies from 10mm to 90mm.
- All other parameters for all this lengths are fixed.
- Such as input voltage(0.5V), input impedance( $100.07\Omega$ ) and load resistance( $100\Omega$ ).
- It is observed that with increasing length Transmission rate is decreasing.
- Possible reasons are :
  1. Frequency-Dependent Conductor Loss
  2. Dielectric Loss in the Substrate
  3. Radiation and Coupling Loss