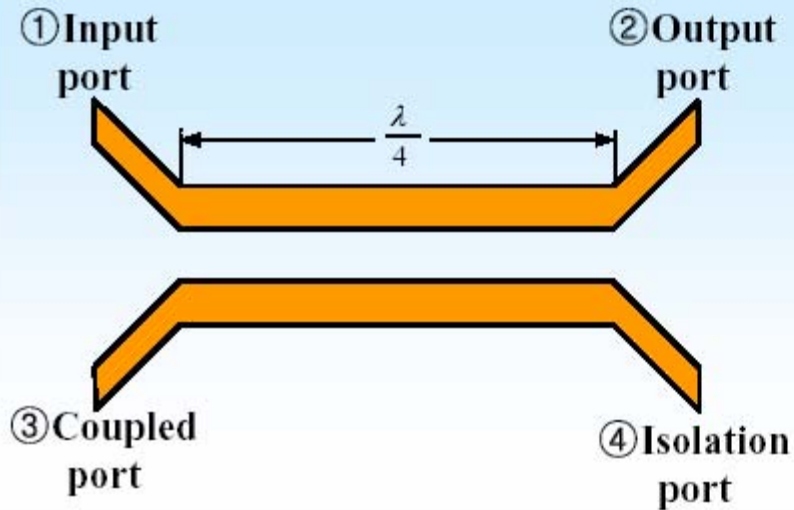


Directional Coupler Circuit Design & Analysis using Microwave Office

By: Manjunatha Reddy.H.V
Manjunatha_hv@rediffmail.com

Directional Coupler

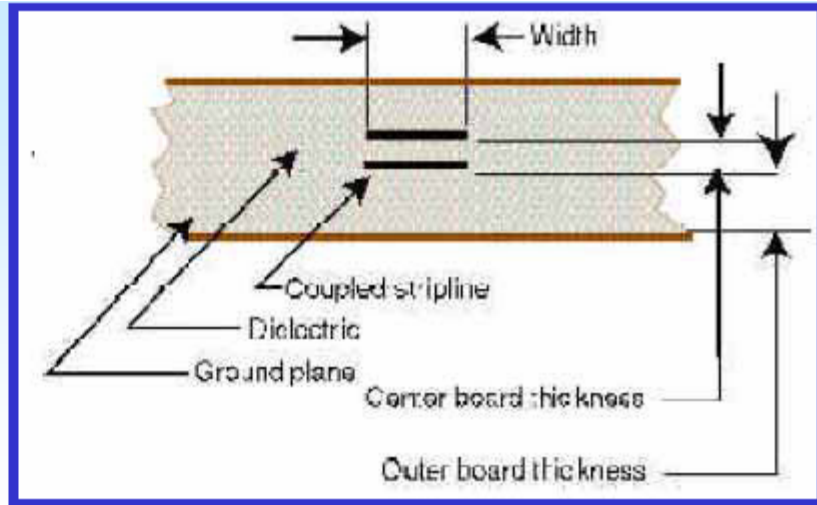


$$\begin{array}{ll} V_1 = V & \frac{V_3}{V_1} = C \\ \frac{V_2}{V_1} = -j\sqrt{1-C^2} & \frac{V_4}{V_1} = 0 \end{array}$$

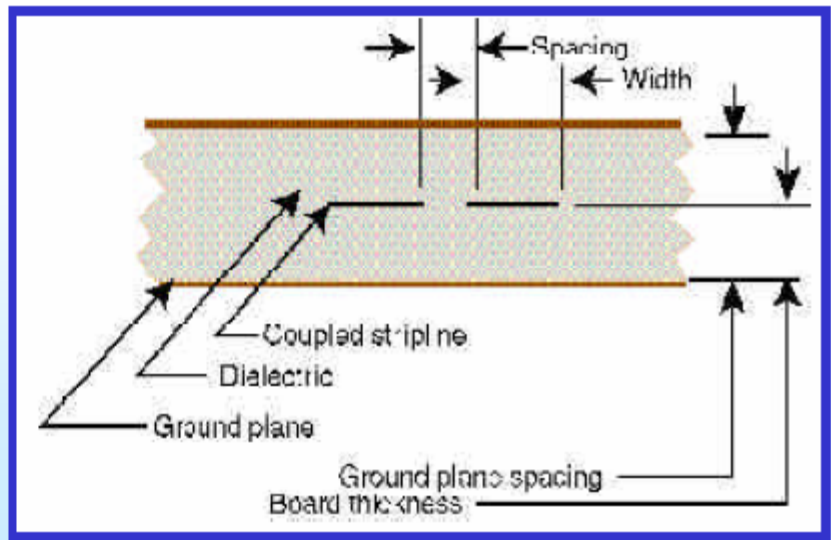
- Insertion loss
- Coupling
- Directivity

Directional Coupler

Broadside-Coupled line



Edge-Coupled line

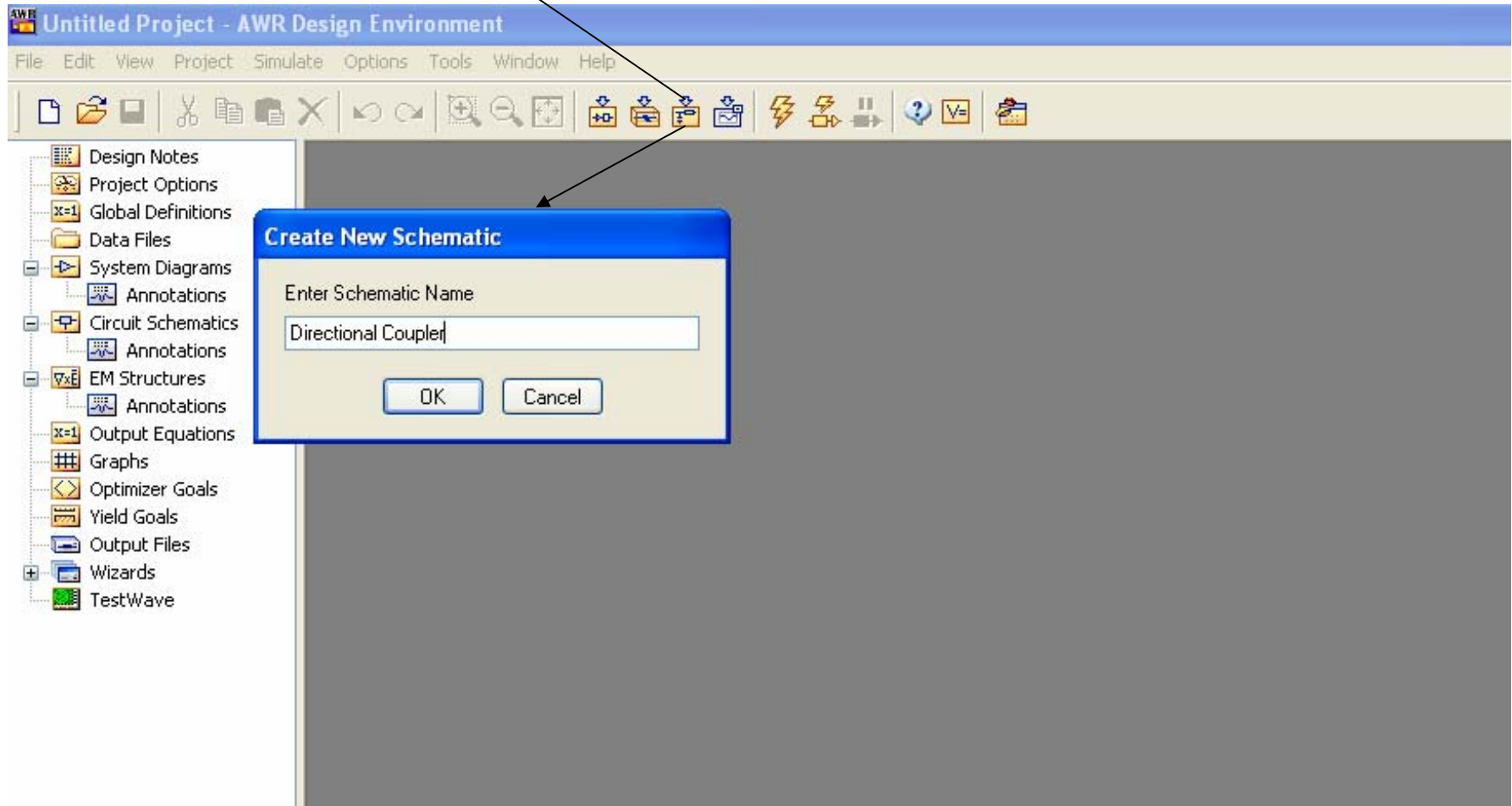


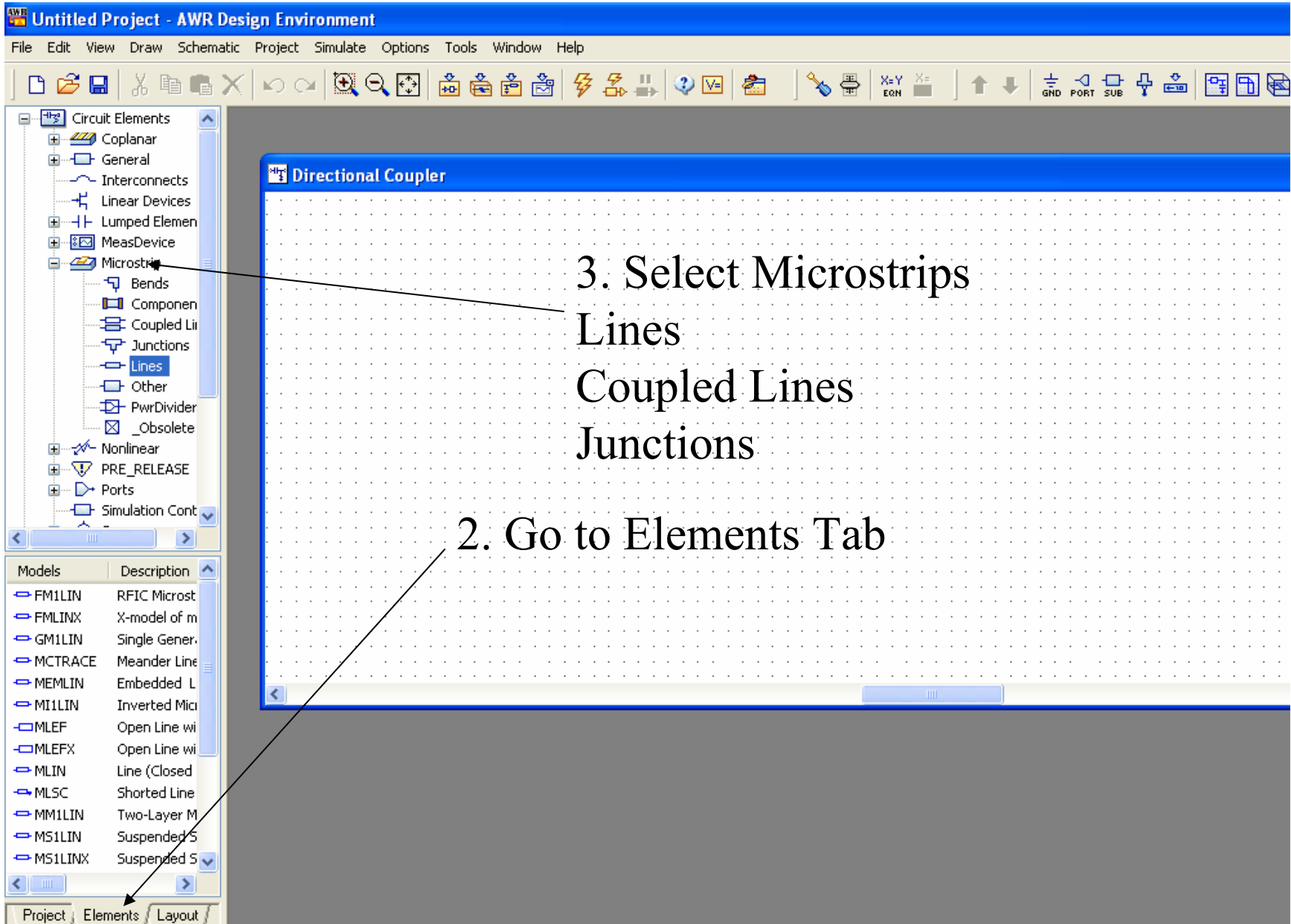
Directional Coupler

Example 1:

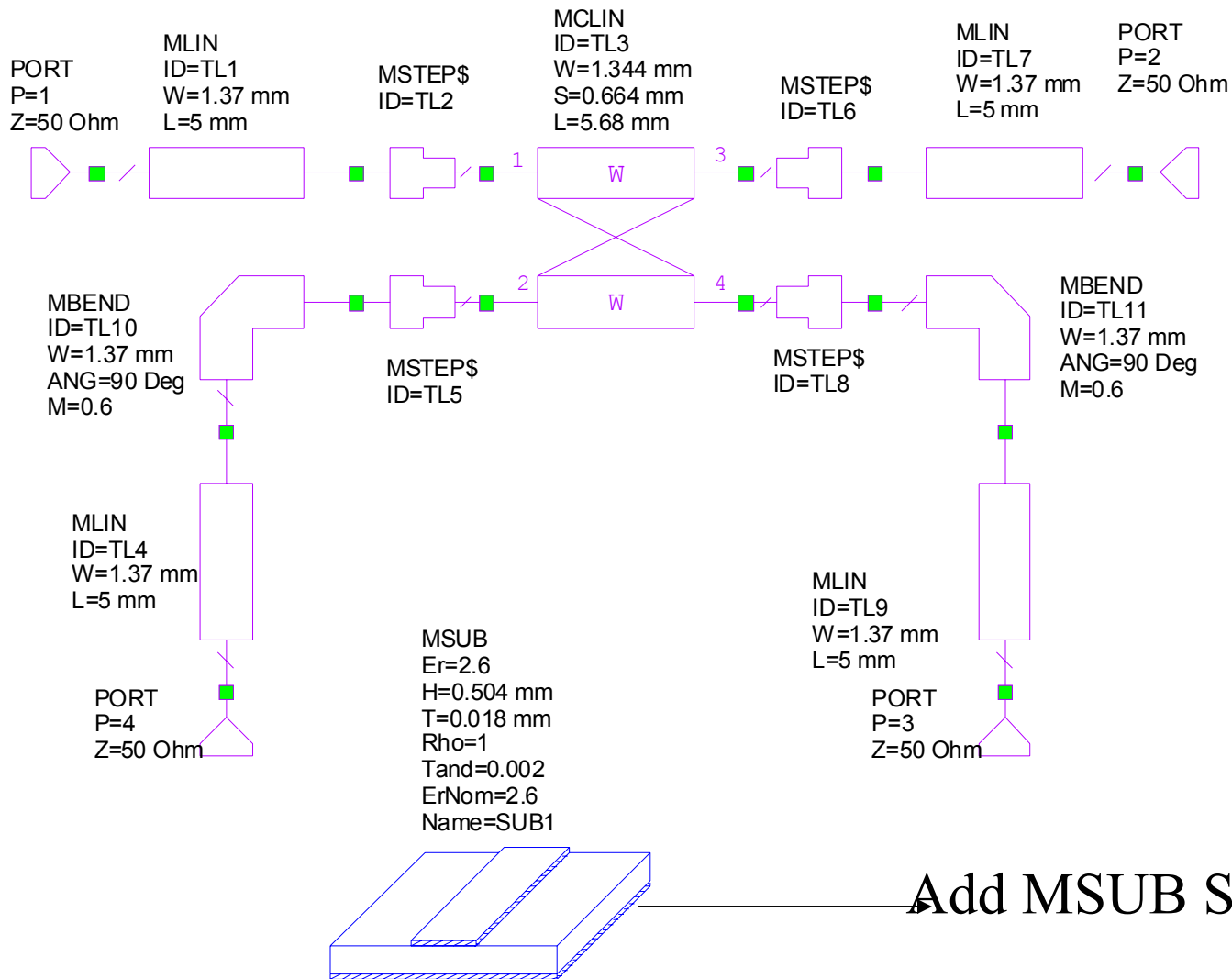
Design a 20dB coupled line coupler in microstrip, characteristic impedance of 50 Ohm, and a center frequency of 9GHz. Plot the coupling and directivity from 5 to 13GHz.

1. Create New Schematic Shown Below

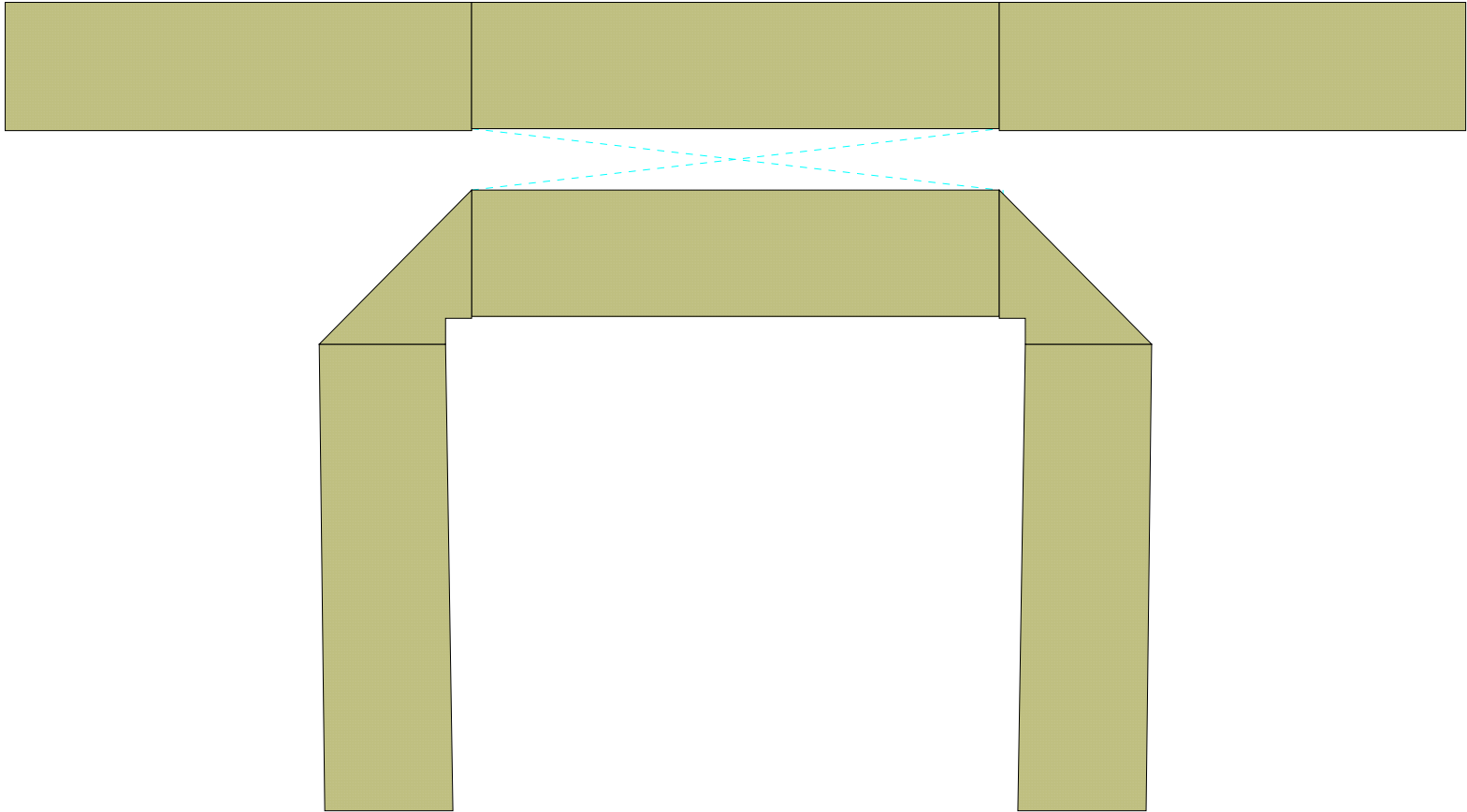




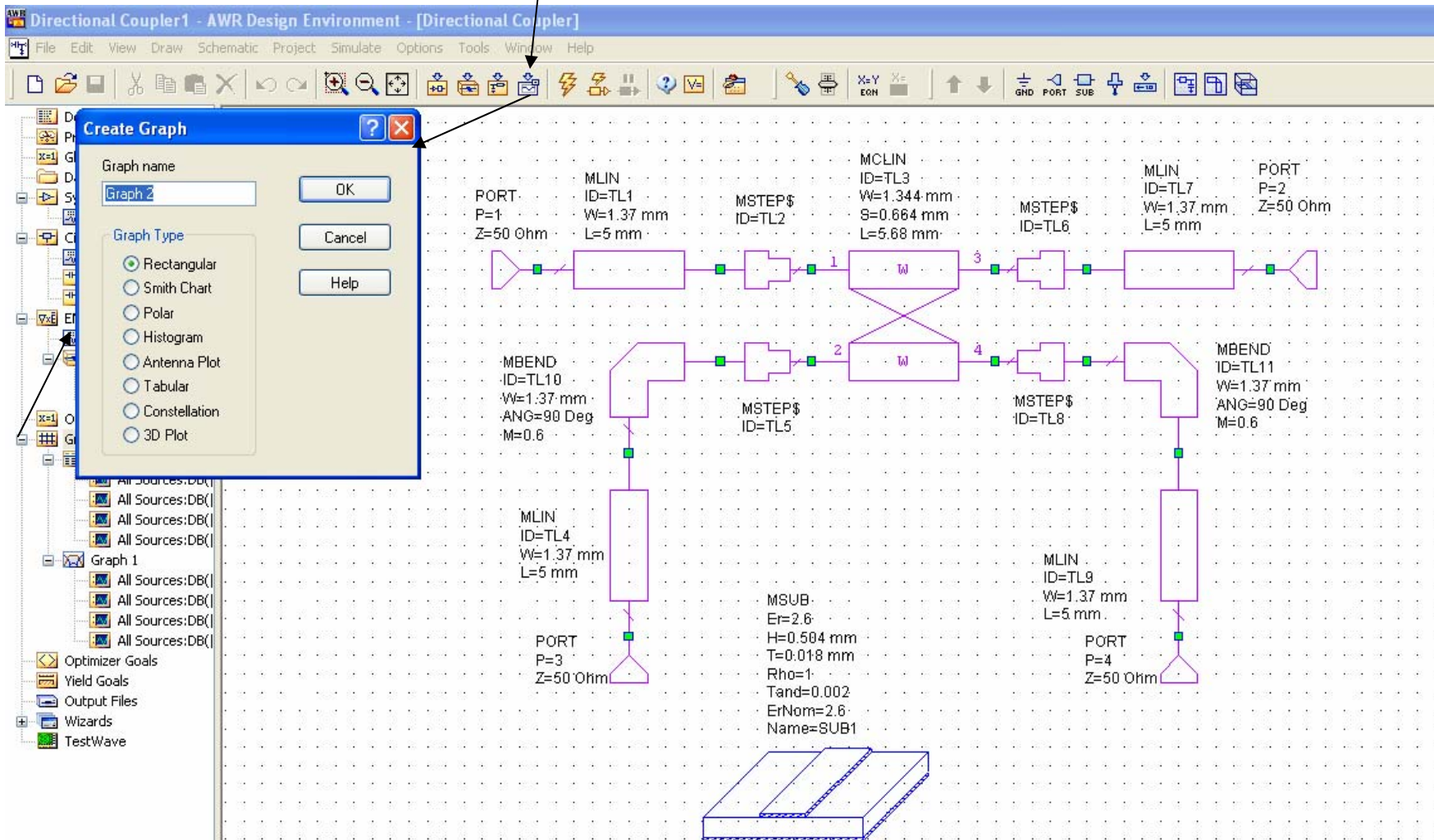
Complete Directional Coupler Schematic



View the complete Layout of Directional Coupler Layout

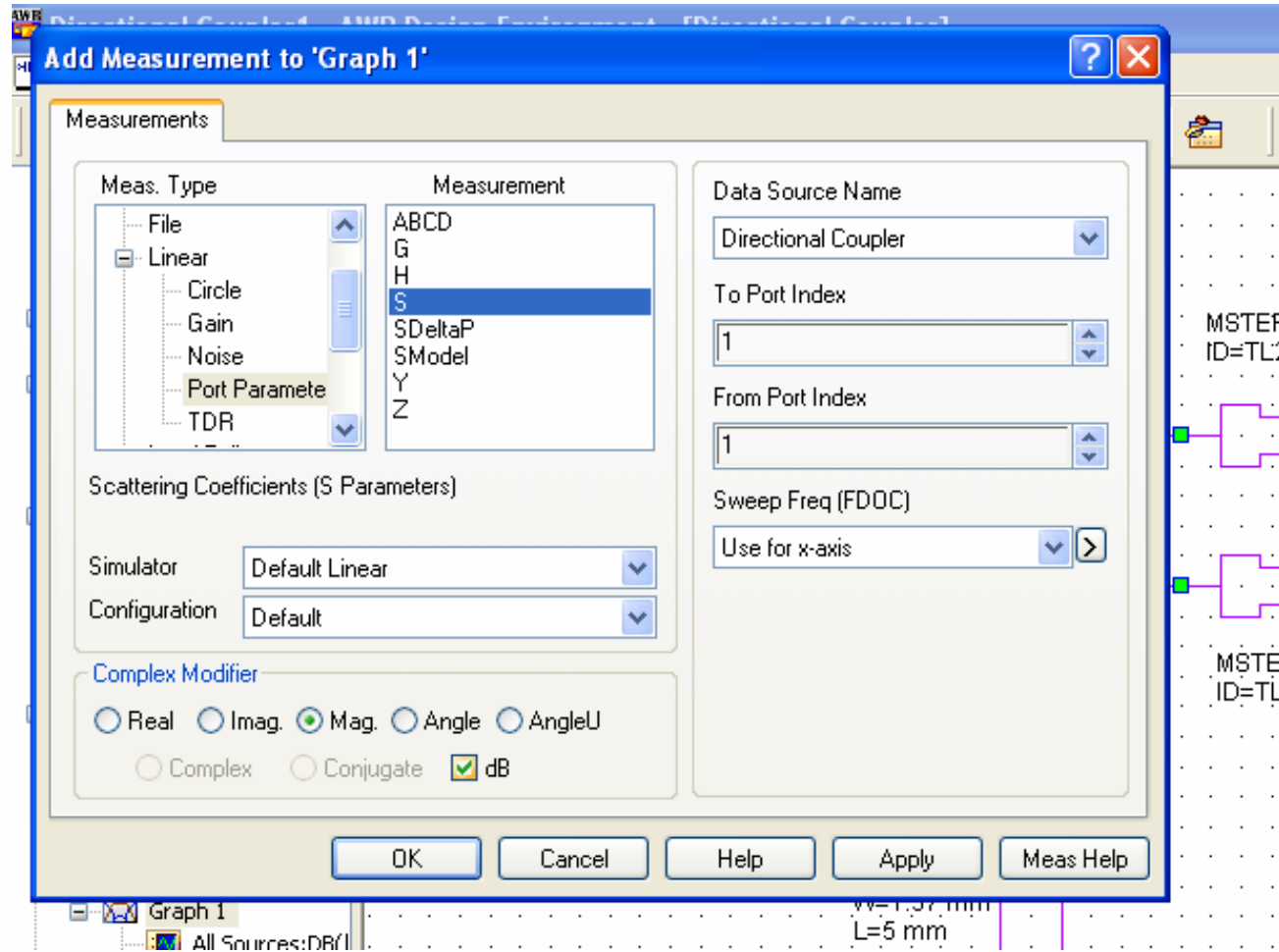
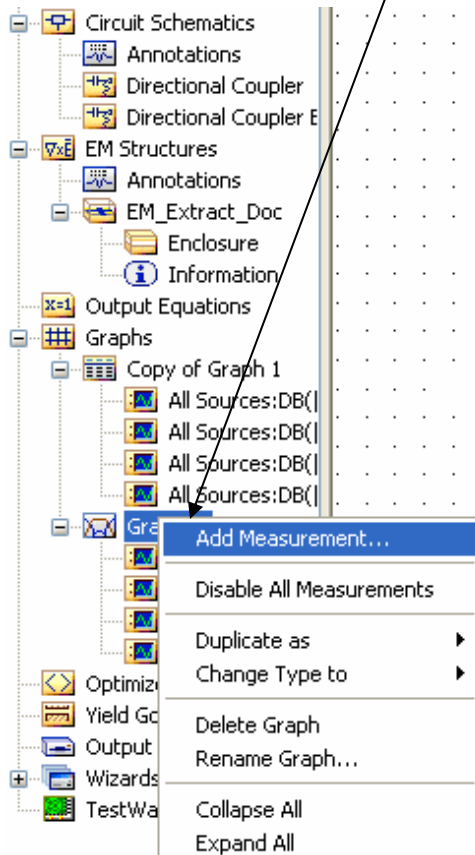


Add Graph



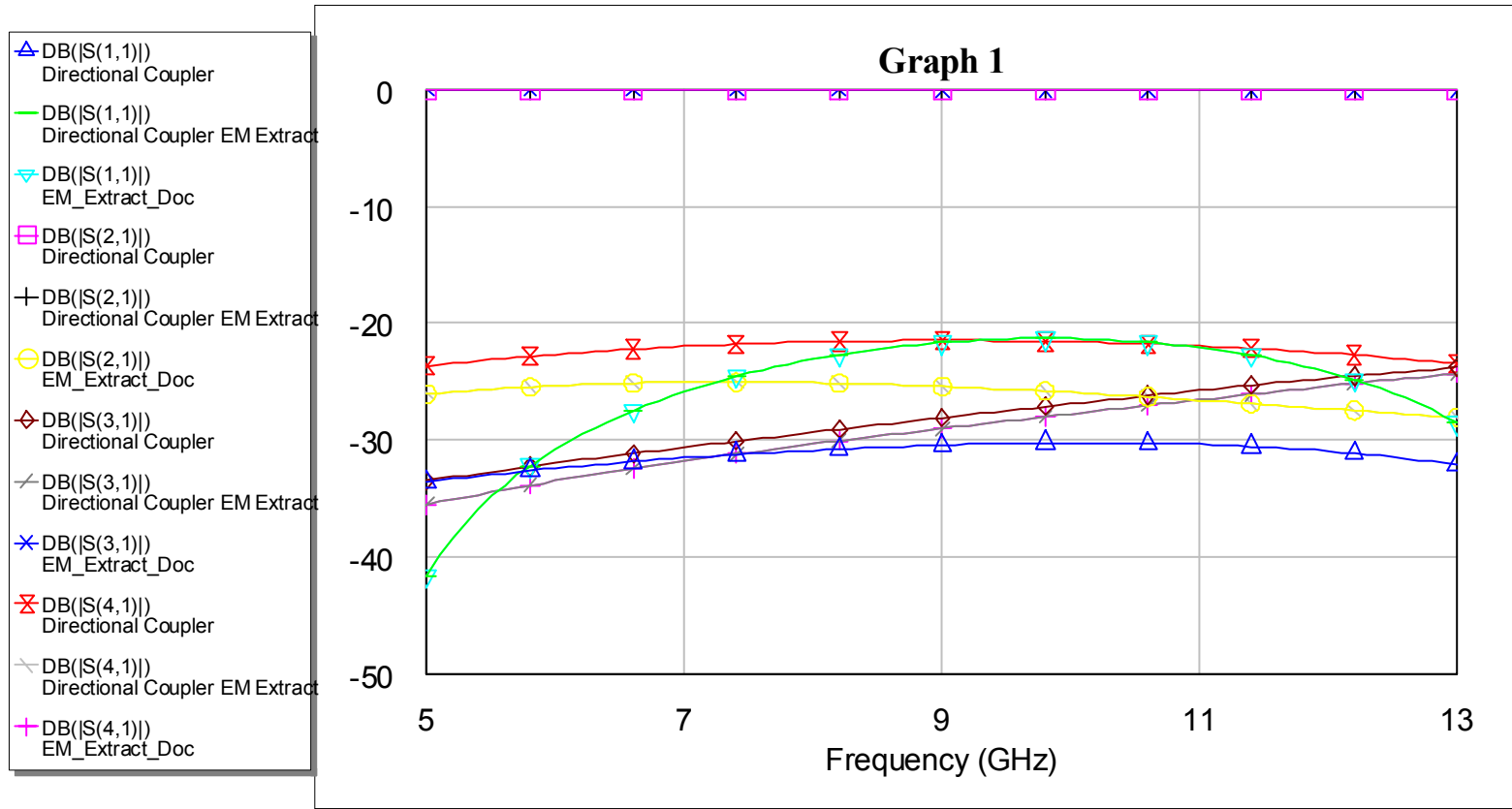
Right click & select add Measurement

Then Choose S11, then Apply, S21 etc



Directional Coupler Simulation Response

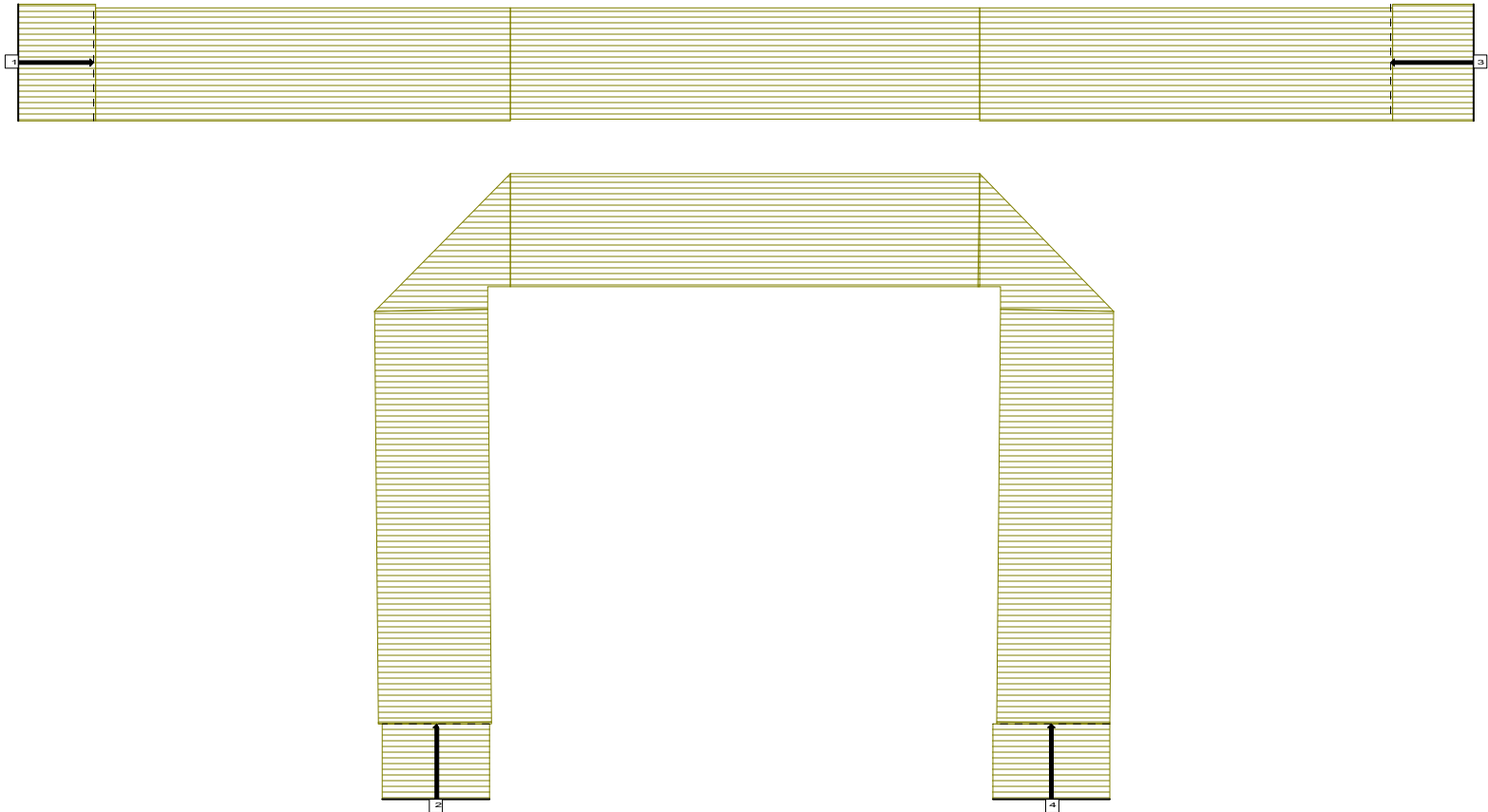
Simulate the design for 5 to 13 GHz in steps of 0.1



Then Simulate

The Directional Coupler using EMSight

For Final EM Simulation

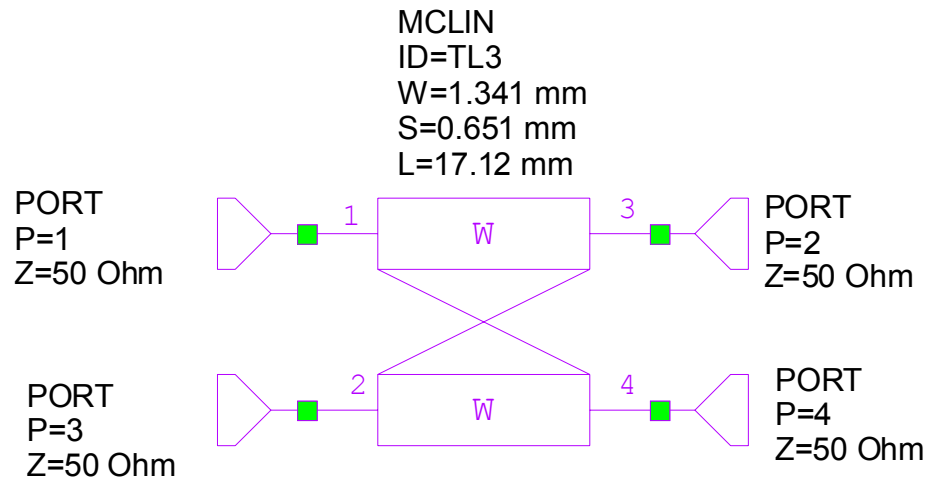


Directional Coupler

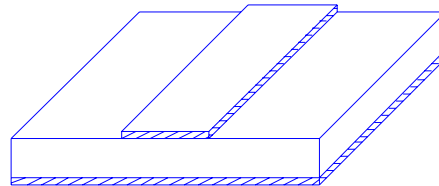
Example 2:

Design a 20dB coupled line coupler in microstrip, characteristic impedance of 50 Ohm, and a center frequency of 3GHz. Plot the coupling and directivity from 1 to 5GHz.

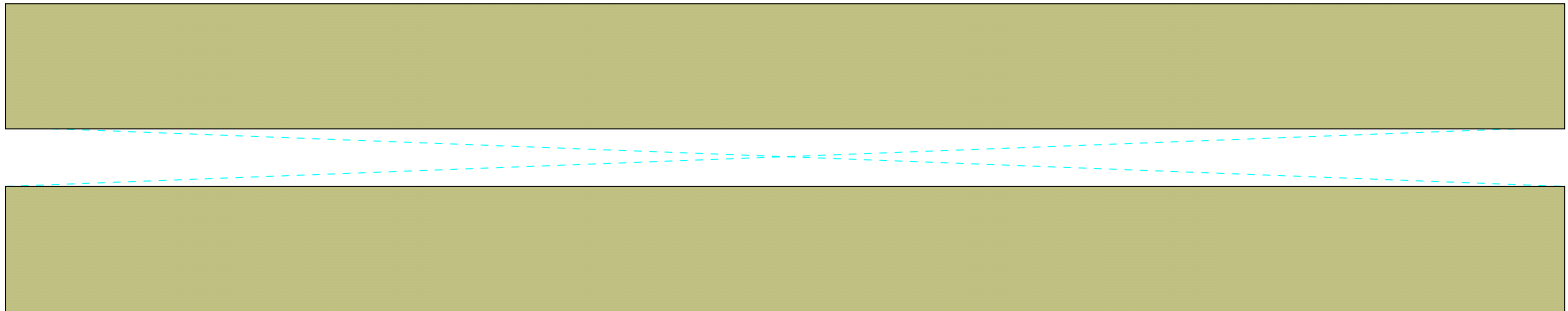
Directional Coupler Schematic



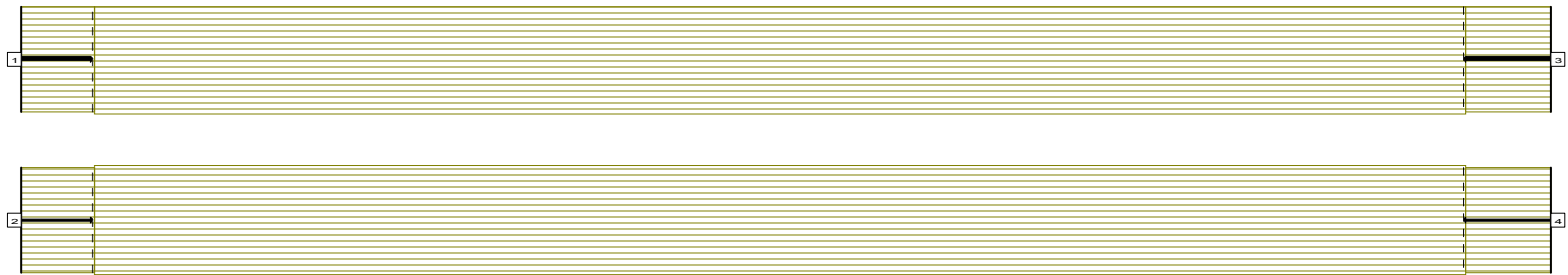
MSUB
Er=2.6
H=0.504 mm
T=0.018 mm
Rho=1
Tand=0.002
ErNom=2.6
Name=SUB1



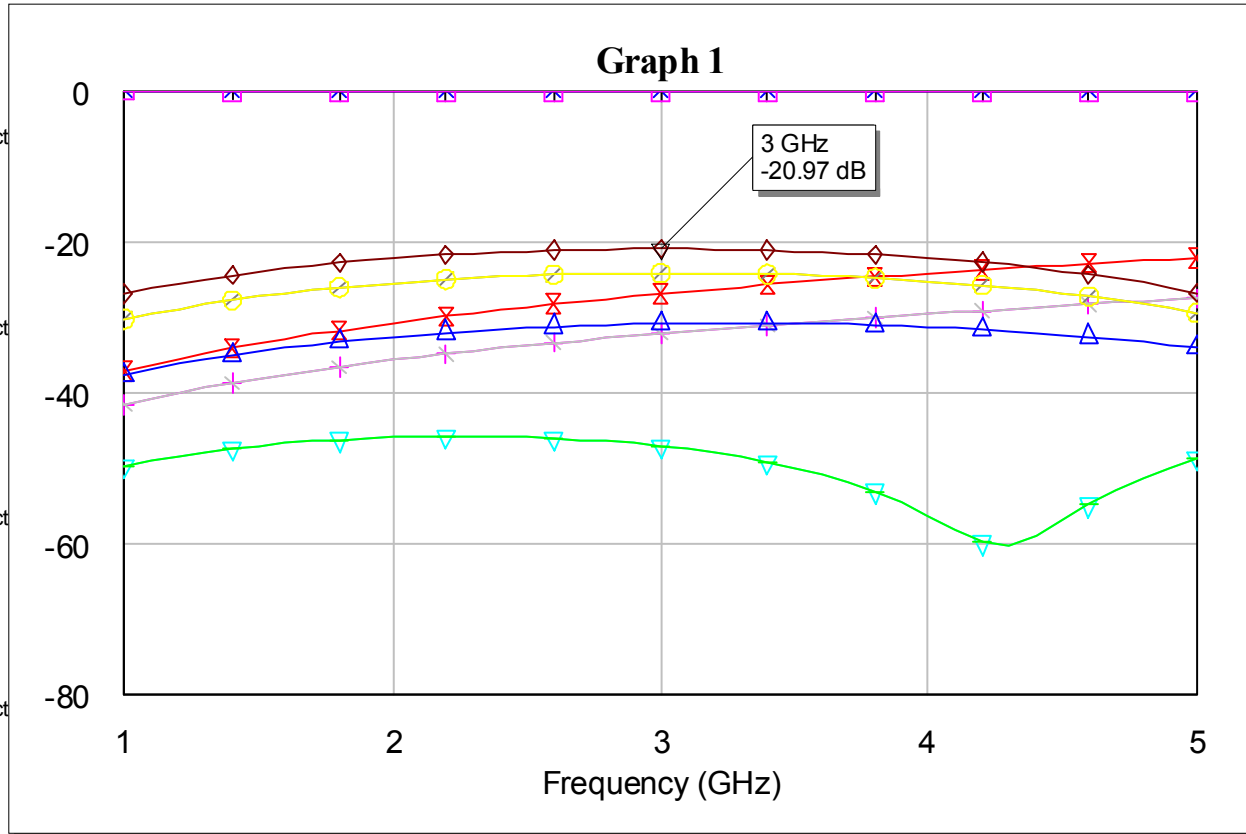
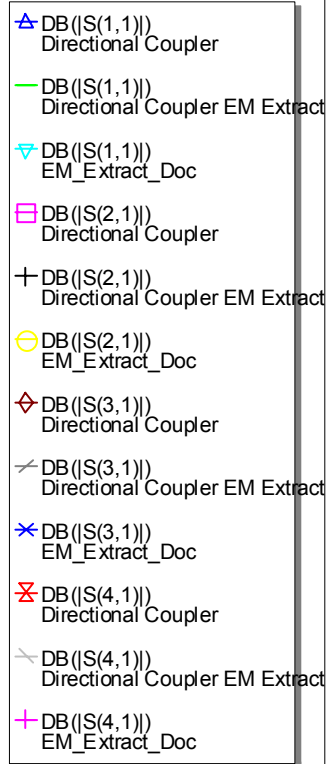
Directional Coupler Layout



Directional Coupler EM Structure



Directional Coupler Simulation Response



Directional Coupler Hands on Example

Example 3:

Design a 10dB coupled line coupler in microstrip, characteristic impedance of 50 Ohm, and a center frequency of 12GHz. Plot the coupling and directivity from 10 to 14GHz.