ECEN452: ULTRA HIGH FREQUENCY TECHNIQUE
LAB07
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INGREDIENTS:

Design Frequency = 2.45GHz
Dielectric Constant = 4.1
Substrate = FR4
Characteristic Impedance of the line = 50 ohm
Thickness of the substrate = 62mil = 1.5748 mm

CALCULATION:

Width of Conductor = 3.13134 mm
Quarter Wave Length = 17.2279 mm
Effective Dielectric Constant (Relative) = 3.15736

BACKGROUND:

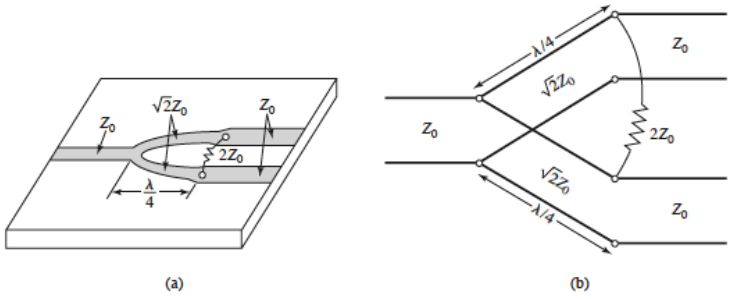


FIGURE 7.8 The Wilkinson power divider. (a) An equal-split Wilkinson power divider in microstrip line form. (b) Equivalent transmission line circuit.

Figure

The lossless T junction divider cannot have the condition being matched at all ports. In addition, it cannot have isolation between the output ports. However, what we can do here with this Wilkinson Power Divider is that we can make it to be matched at all ports by adding a resistor and to be lossy instead of being lossless so that isolation condition can also be met.

PLOT:

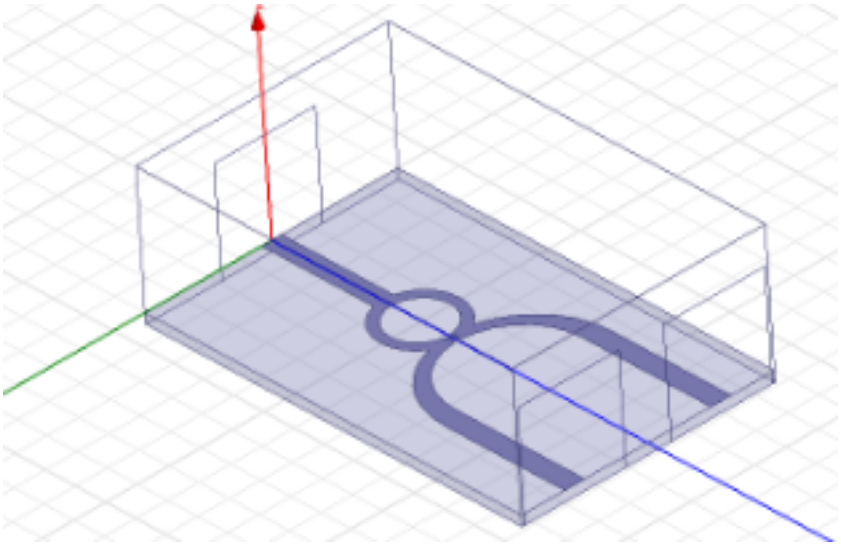
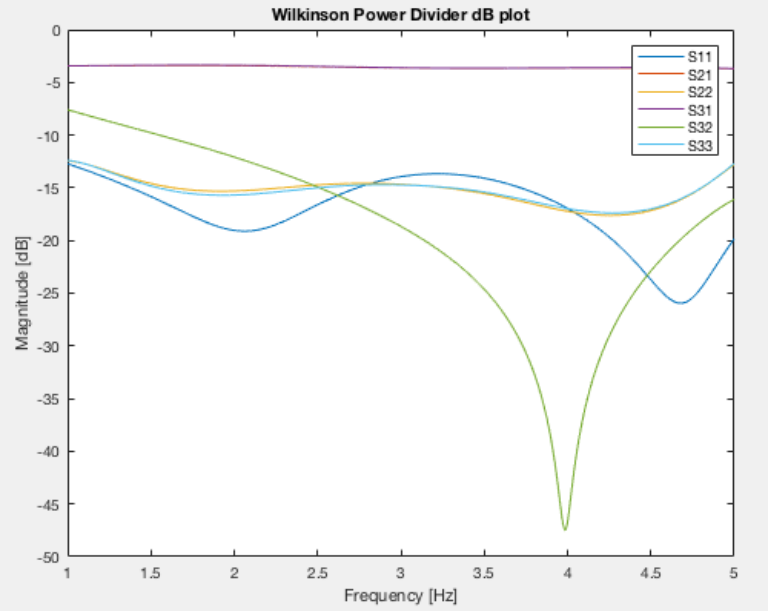


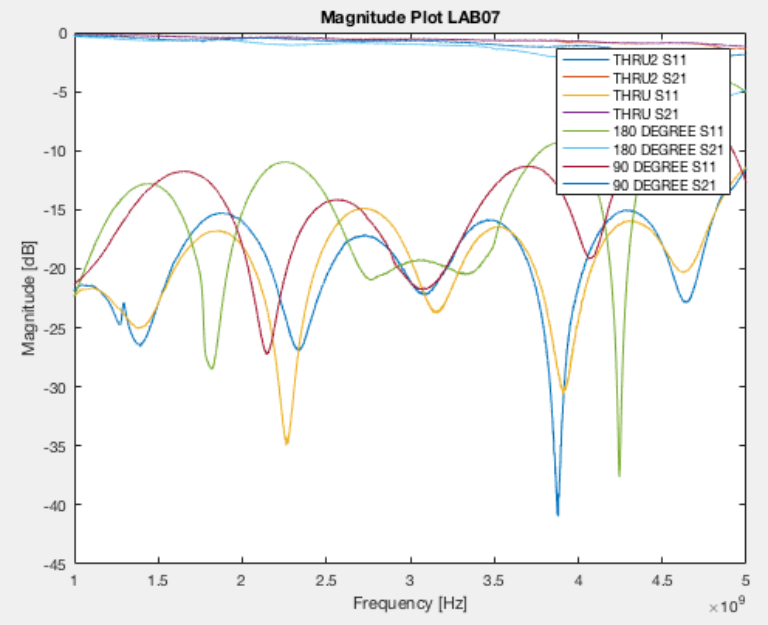
Figure. HFSS Design



Figure

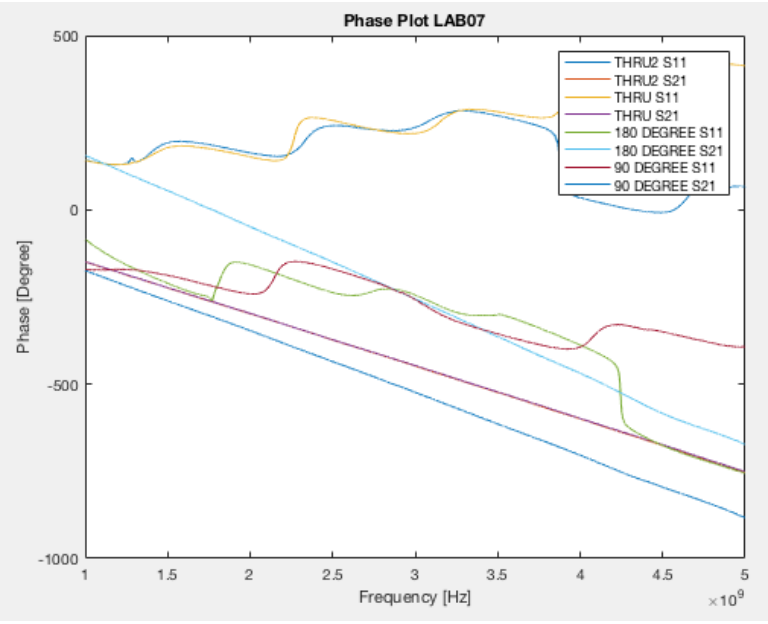
As you can see power transmission from port 1 to 3 is about -3dB which is what we expect. The same for the power transmission from port 1 to 2.

LAB MEASUREMENT:



Figure

We see matching condition can be different by varying the network conditions. For example, around 3.9GHz, 'thru2' port 1 is well matched. For 180degree phase at port 1 is well matched around 4.3 GHz.



Figure