7. MICROSTRIP POWER DIVIDER

Aim: 1. To design and simulation of a T-juction power divider for equal and unequal power divisions.

2. To determine the scattering parameters of T-juction power divider.

Equipment required: HFSS Circuit Design

Specifications:

Characteristic impedance	Z_0 =
Operating frequency	f =
Substrate thickness	H =
Metal thickness	T =
Dielectric constant	ε_r =
Loss tangent	L =

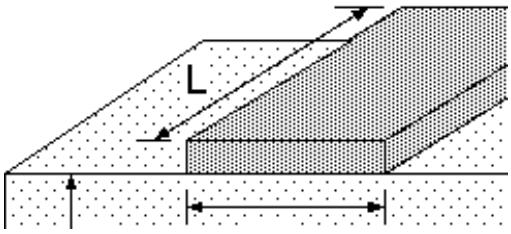
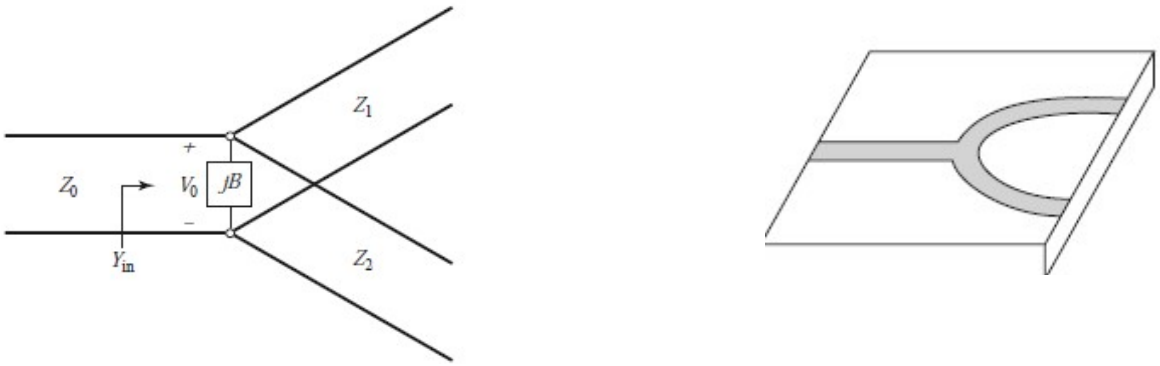


Figure (1)

Theory: The power divider is generally designed using microstrip lines as shown in figure 2 and can be made with any number of ports with equal or unequal power divisions.

Figure (2)



$$Y_{in} = jB + \frac{1}{Z_1} + \frac{1}{Z_2} = \frac{1}{Z_0}.$$

Design Equations: (from 2:1 equal power division)

$$P_{in} = \frac{1}{2}\frac{V_0^2}{Z_0},$$

while the output powers are

$$P_1 = \frac{1}{2}\frac{V_0^2}{Z_1} = \frac{1}{3}P_{in},$$

$$P_2 = \frac{1}{2}\frac{V_0^2}{Z_2} = \frac{2}{3}P_{in}.$$

Design of Microstrip Power divider in HFSS Circuit Design:

Note: Follow the procedure steps in 7 experiment to set the layout.

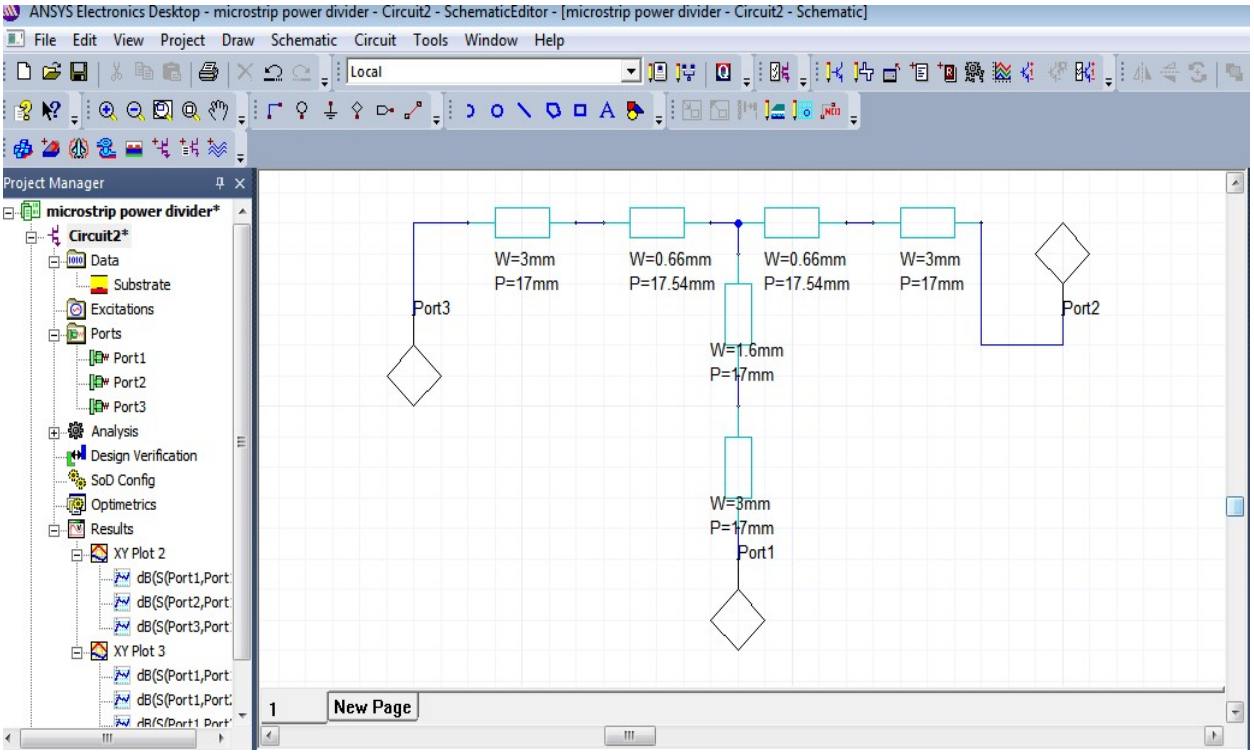


Fig. 1: Power divider layout in HFSS

Sample Observations: For equal power division, sample results of a power divider shown below

$\boldsymbol{Z_0}$ = 50 Ω, $\boldsymbol{f}$ = 2.4 GHz , $\boldsymbol{H}$ = 1.6 mm, T = 0.036 mm, $\boldsymbol{\varepsilon_r}$ = 4.4 , L = 0.001

Model graph:

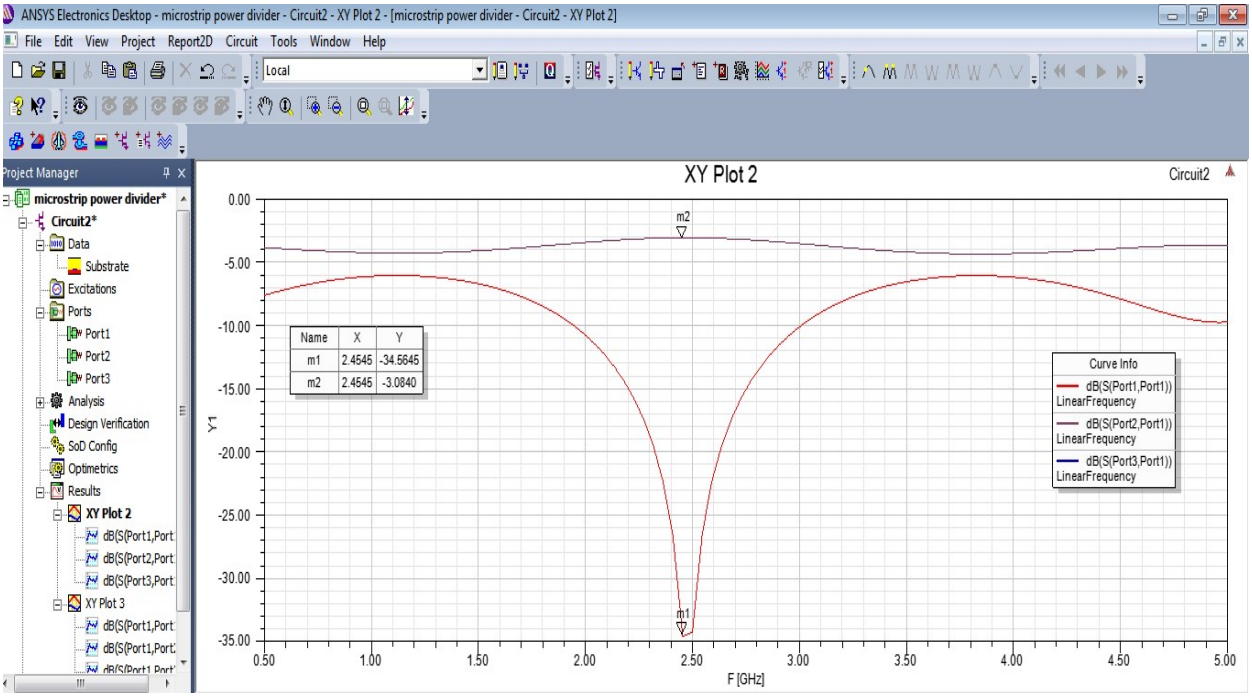


Figure 2: S-parameters of Power divider

Practical Observations:

Frequency	S_{11}	S_{21}	S_{31}	S_{32}

Conclusions:

The power is equally split in the both arms