8. DESIGN AND SIMULATION BRANCH LINE COUPLER

Aim: To Design and simulate branch line coupler using AWR software

Components : HFSS Circuit Design Software

Theory:

A branch-line coupler outputs from the coupled port 3 a fraction of the power presented at the input (pin 1). The remainder of the power is passed through to the output port (pin 2). At the center frequency the phase difference between the outputs is 90 degrees, with the coupled port representing the quadrature (Q) output and the output port representing the in-phase (I) output. The coupling coefficient specifies the ratio of the input power to the coupled power (P1/P3). Pin 4 represents the isolated port, and it is typically well isolated from the input port near the center frequency. The coupling coefficient must be positive and greater than 3 dB. Best results are obtained for tight couplings of 6 dB or better (C < 6 dB). Choosing the coupling parameter larger than 6 dB often causes width constraint violations to occur on the MTEE components, resulting inwarning messages during design and simulation. A coupling coefficient of 3 dB provides an equal power split between the two outputs.

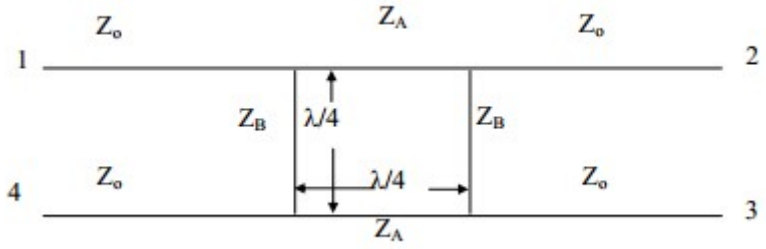


Fig. 1 Branch line coupler

PROCEDURE:

Please follow the procedure steps in experiment 7 to design the coupler layout in the HFSS

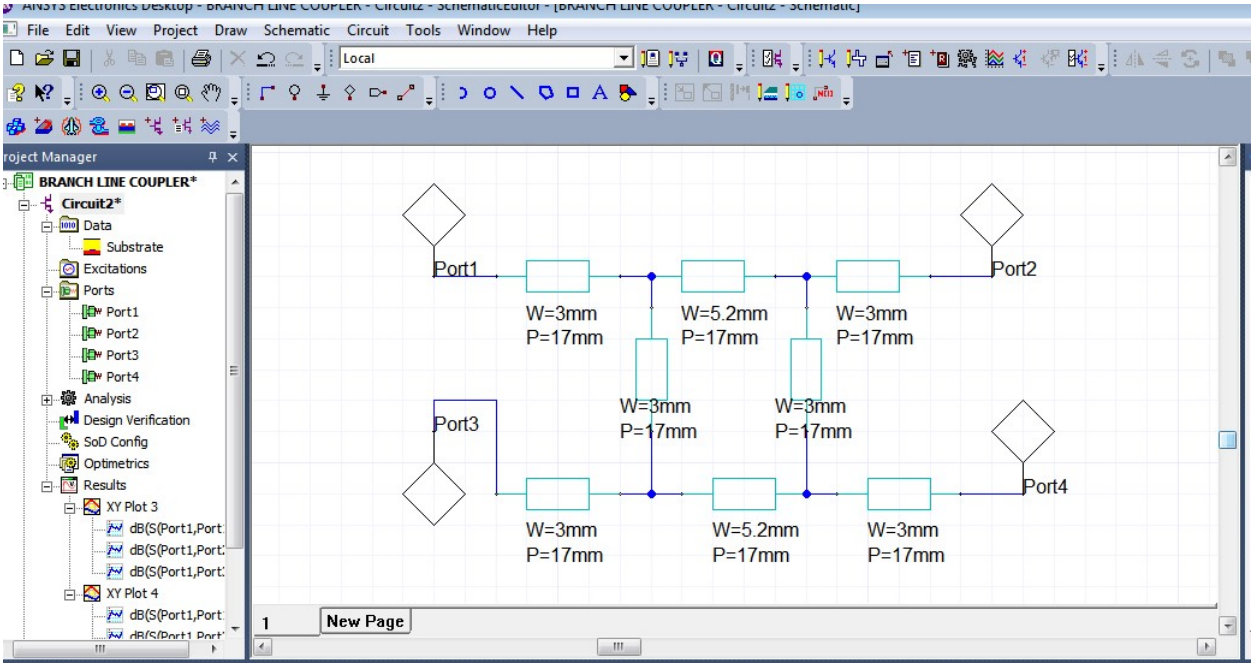


Fig. 1: Branch coupler layout in HFSS

Result:

The obtained characteristics of the simulated results of Branch line coupler is as shown in the Fig. 2. The results graph show that the branch line coupler is well matched and resonates at 2.4 GHz. The isolation and return loss characteristics are below 20 dB. The coupled power of 3db is obtained in the port 3.

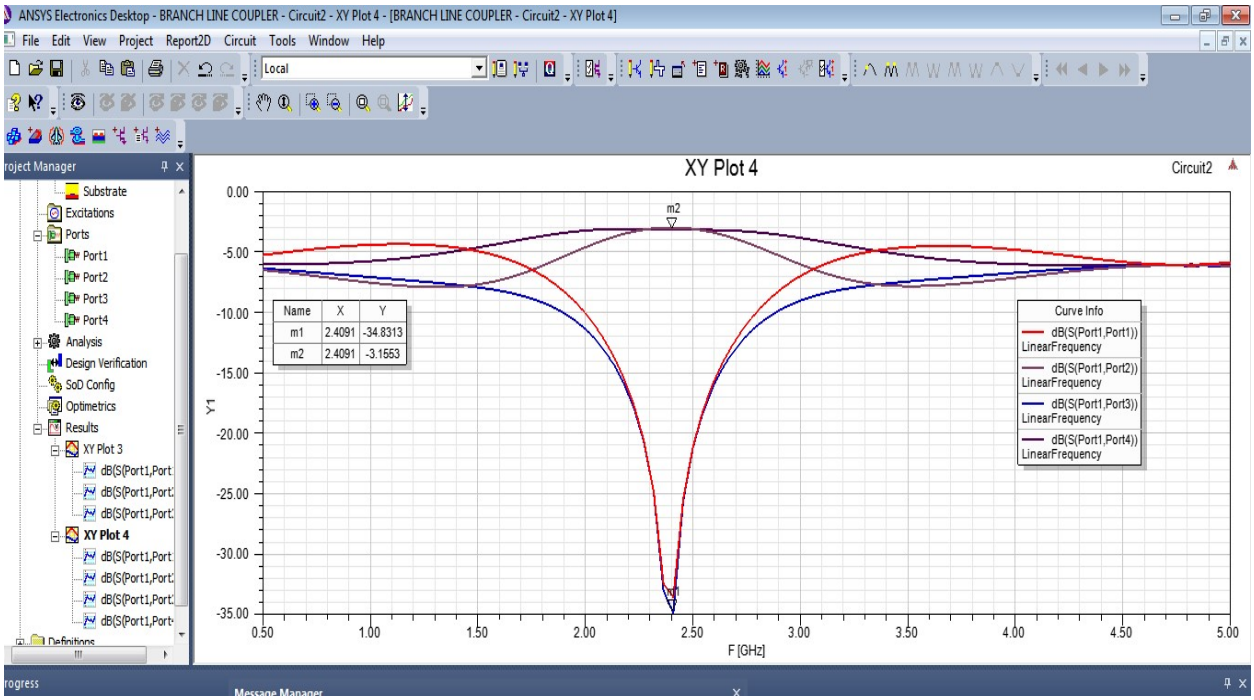
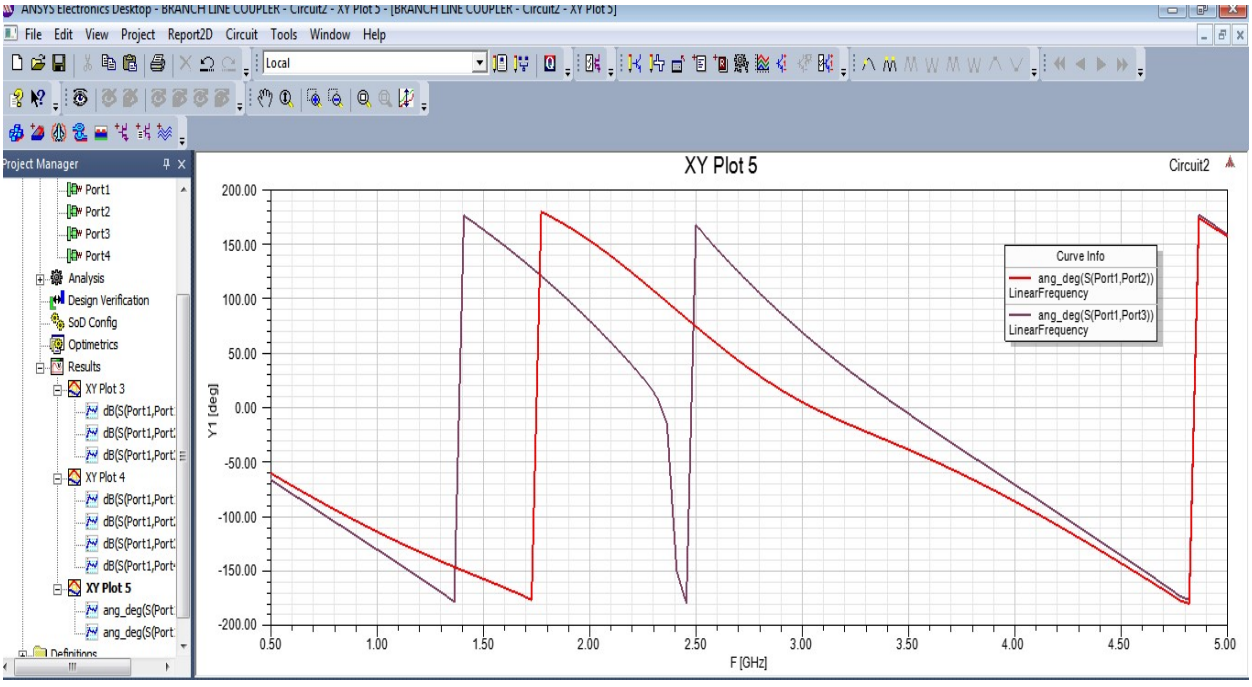


Fig. 2 : S-parameters of Branch line coupler.



Conclusion: Branch line is designed, developed and simulated using HFSS.