



ECE 323 - Microwave Engineering Problem Set #7

Passive 3-port Microwave Devices

- [P1] Find the scattering coefficients of a matched non-ideal isolator, which has 20 dB isolation and 0.4 dB insertion loss.
- [P2] A three port circulator has an insertion loss of 1db, isolation of 30 dB, VSWR =1.5 when all ports are matched terminated. Find S matrix.
- [P3] **7.6** - Design a lossless T-junction divider with a $30\ \Omega$ source impedance to give a 3:1 power split. Design quarter-wave matching transformers to convert the impedances of the output lines to $30\ \Omega$. Determine the magnitude of the scattering parameters for this circuit, using a $30\ \Omega$ characteristic impedance.
- [P4] In a lossless H-plane Tee junction, an input power of 32 mW is fed into one of the collinear ports, i.e., port-1. Find the power delivered to the remaining ports when other ports are terminated in matched loads.
- [P5] **7.10** - Design a Wilkinson power divider with a power division ratio of $P_3/P_2 = 1/3$ and a source impedance of $50\ \Omega$.