

Microwave Engineering Practices

Lab Instructor: Dr. WU Guang

Lab Timing: Thursday (10:00 — 12:00)

Experiment: 3

Part-1: Impedance Matching using LC Network

Part-2: Double Stub Impedance Transformer



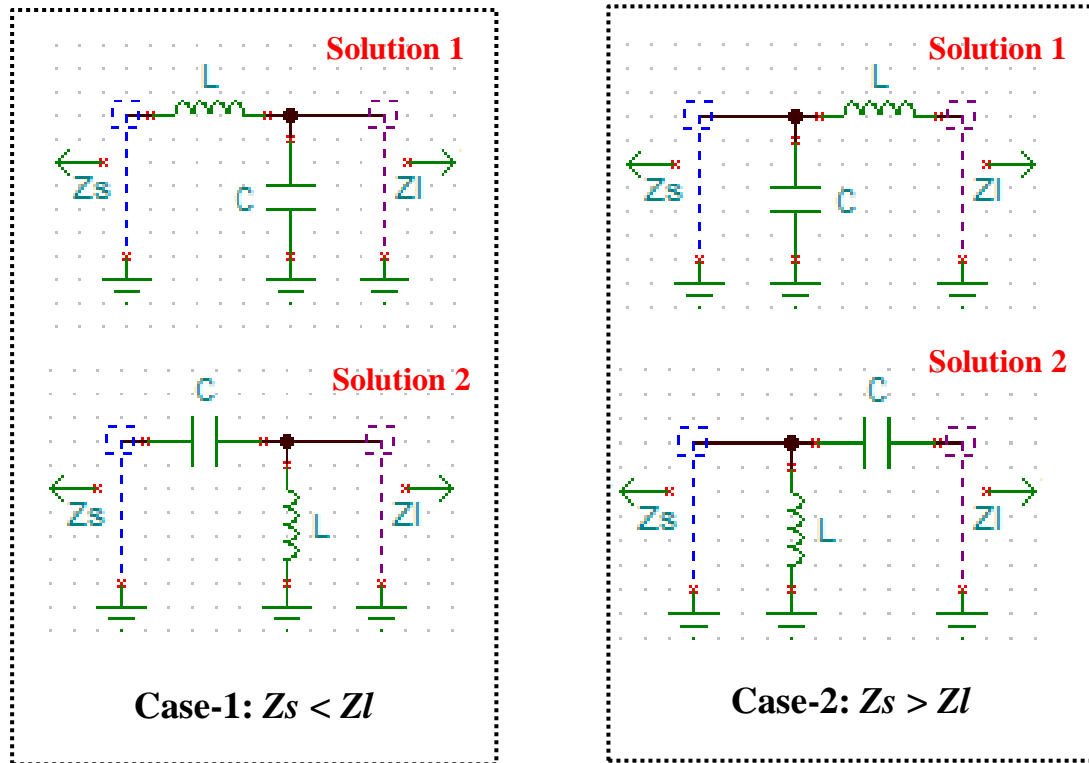
Southern University of Science and Technology, Shenzhen, P.R. China

Task-1:

Design of Impedance Matching using LC Network

Design L -section matching networks to match a load impedance of Z_L to a source impedance of Z_S at a frequency of 2 GHz. Advanced Design System 15.01 software can be used to perform the simulation. Design solutions 1 and 2.

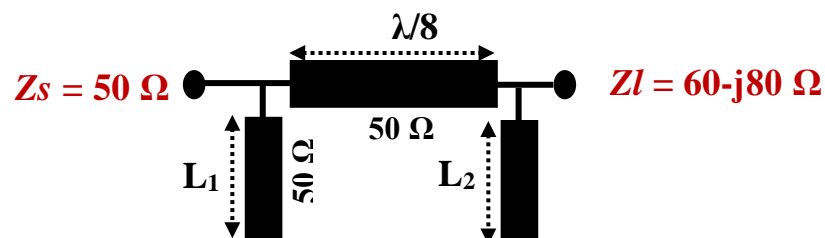
- (a) **Case-1:** $Z_L = 200 - j100 \Omega$ and $Z_S = 100 \Omega$
(b) **Case-2:** $Z_L = 50 \Omega$ and $Z_S = 100 + j80 \Omega$



Task-2

Design of Double Stub Impedance Transformer

Design a double-stub shunt tuner to match a load impedance $Z_L = 60 - j80 \Omega$ to a source impedance of $Z_S = 50 \Omega$ line. The stubs are to be open-circuited stubs and are spaced $\lambda/8$ apart. The match frequency is 2 GHz, plot the reflection coefficient magnitude versus frequency from 1 to 3 GHz. Advanced Design System 15.01 software can be used to perform the simulation. Design all possible solutions.



Substrate Properties:

Substrate			Conductor	
Dielectric constant	Substrate thickness	Loss tangent	Copper thickness	Conductivity
2.33	0.787 mm	0.0012	0.017 mm	5.8×10^7

Procedure:

1. Calculate the electrical lengths L_1 and L_2 using Smith chart utility based on the load and source impedances.
2. Calculate the physical dimensions using **Lincalc** of ADS.
3. Design the schematic on the ADS workspace following the above.
4. Define substrate properties (consider same substrate as used earlier) and add frequency sweep as given.
5. Setup and run simulation.
6. Display the simulation data.

HA#4

Design impedance transformers to match a source of $50\ \Omega$ to a load of $110\ \Omega$ at a frequency of 2 GHz (see the attached paper). Plot the simulated S-parameters.