EEL 6936; RF & MICROWAVE CIRCUITS II

CAD EXERCISE #1 (Due 2/5/03)

ANALYSIS OF LUMPED ELEMENT MATCHING CIRCUITS

The purpose of this exercise is to provide an opportunity to become familiar with the frequency response of a matching network. Example 2.4.2 from Gonzalez "*Microwave Transistor Amplifiers*" will be used. Familiarity with the material in Prof. Weller's procedure *ADS Basics* is a prerequisite. The file is on the course web page: p01-010904.pdf

PART 1. Simulation Procedure, Design A.

1. Refer to Figure 2.4.8(c), page 120 of Gonzalez. Construct a schematic for the load ($Z_L = 10 + j10$). See Figure 1.

2. Simulate Z_L and Γ_L to obtain the results shown in Figure 2 and Figure 3.

3. Construct a second schematic for the matched load design A, Gonzalez Figure 2.4.8(c), as shown in Figure 4. You may use a multiple DUT schematic if you wish. See Weller procedure *Simulation of Multiple DUT's Using ADS*: p02-000926.pdf.

4. Simulate the input impedance (Z_{IN}) and input reflection coefficient (Γ_{IN}) to obtain the results shown in Figure 5, Figure 6 and Figure 7.

5. Simulate the power absorbed to obtain the results shown in Figure 8.
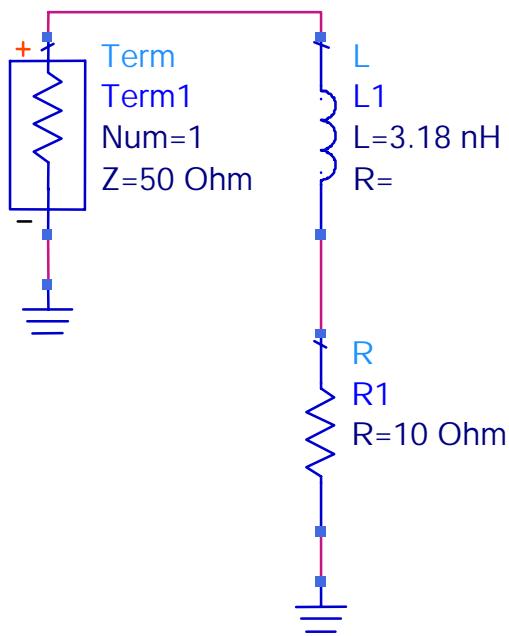
PART 2. Simulation Procedure, Design B.

1. Repeat the Part 1 procedure steps 3, 4, and 5 for design B, Figure 2.4.9(c). It is not necessary to repeat the load simulation, steps 1 and 2.

PART 3. Write-up.

1. Submit printed copies of your schematics and simulation results. Your name should be included on each page.

2. Compare and contrast the simulation results for Part 1 with Part 2.

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Term
Term1
Num=1
Z=50 Ohm

L
L1
L=3.18 nH
R=

R
R1
R=10 Ohm

S PARAMETERS

S_Param
SP3
Start=0.1 GHz
Stop=1.0 GHz
Step=0.2 GHz

Meas Eqn
Zin
zin1
our_zin=zin(S11,PortZ1)

CLASS EXHIBIT

Figure 1. Schematic Diagram for Z_L Simulation.
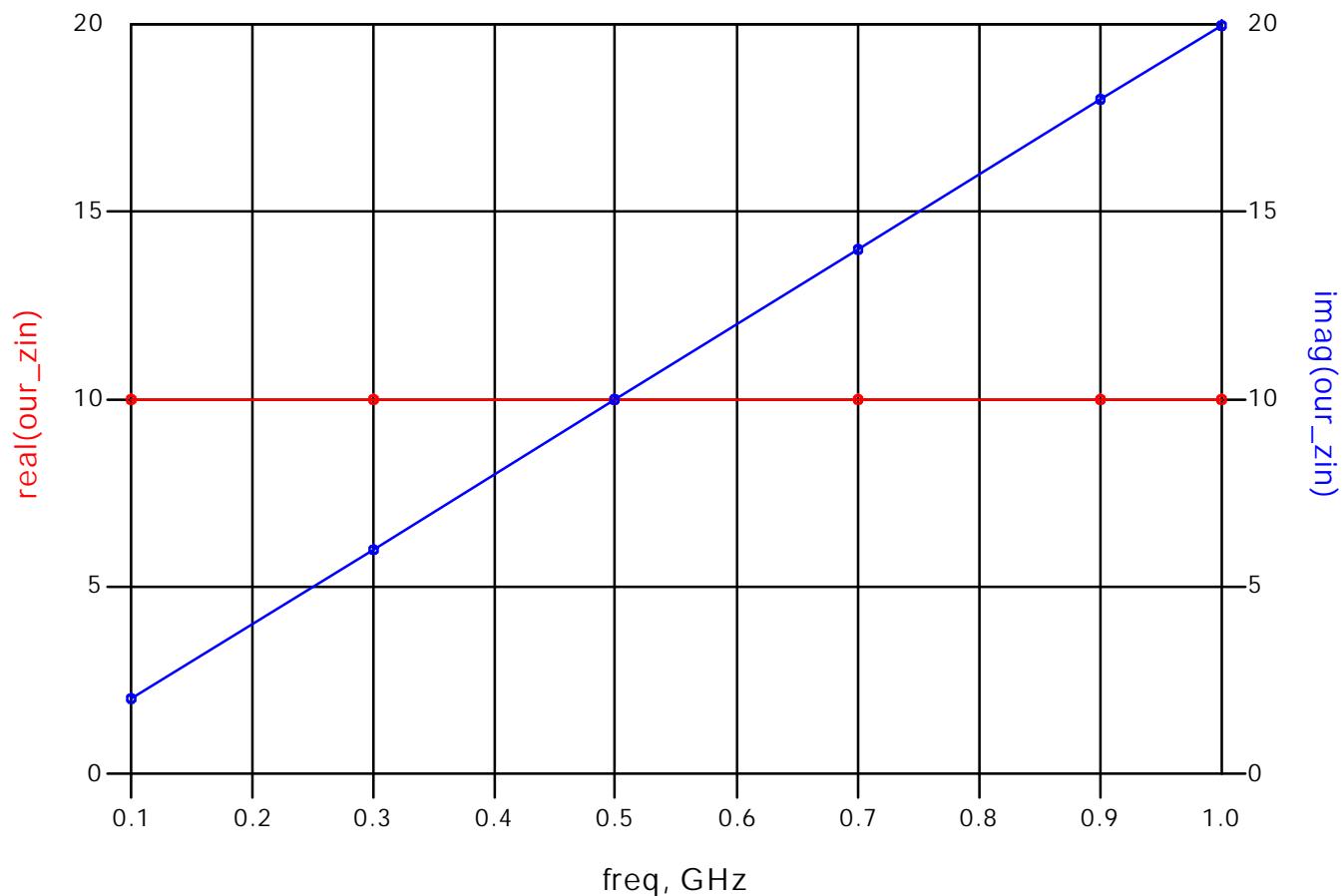
CLASS EXHIBIT

Figure 2. Frequency Response for Z_L.

CLASS EXHIBIT

S(1,1)

freq (100.0MHz to 1.000GHz)
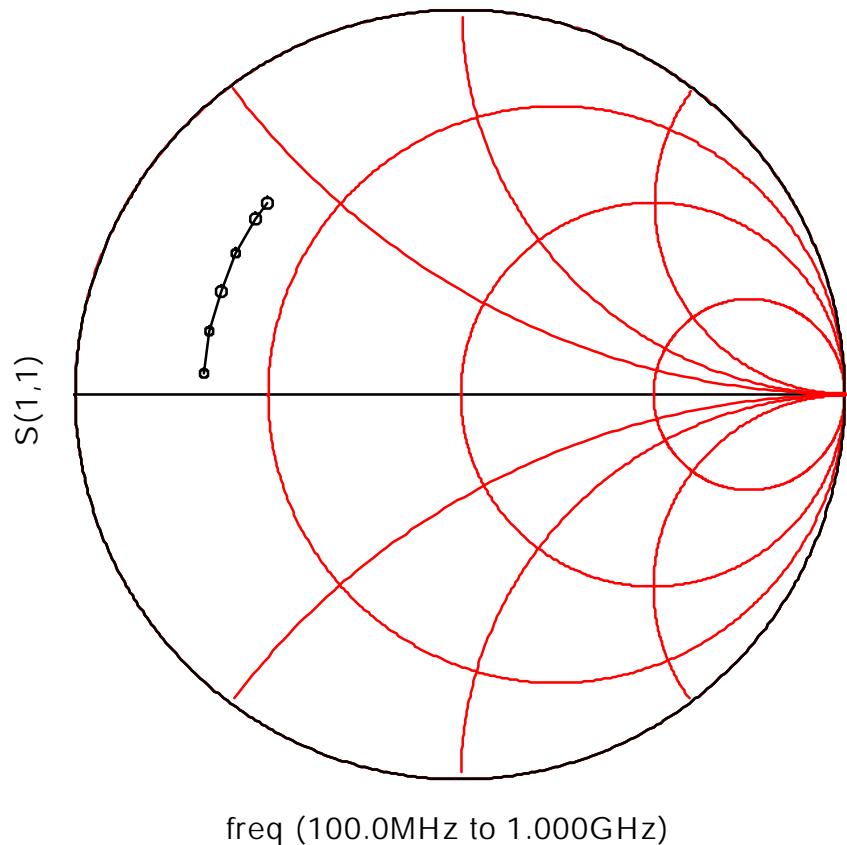
Figure 3. Frequency Response for Γ_L.

Term
Term1
Num=1
Z=50 Ohm

C
C1
C=12.73 pF

L
L2
L=3.18 nH
R=

L
L1
L=3.18 nH
R=

R
R1
R=10 Ohm

S PARAMETERS

S_Param
SP3
Start=0.1 GHz
Stop=1.0 GHz
Step=0.001 GHz

Zin
zin1
our_zin=zin(S11,PortZ1)

MeasEqn
meas1
pload=1-(abs(S11))**2
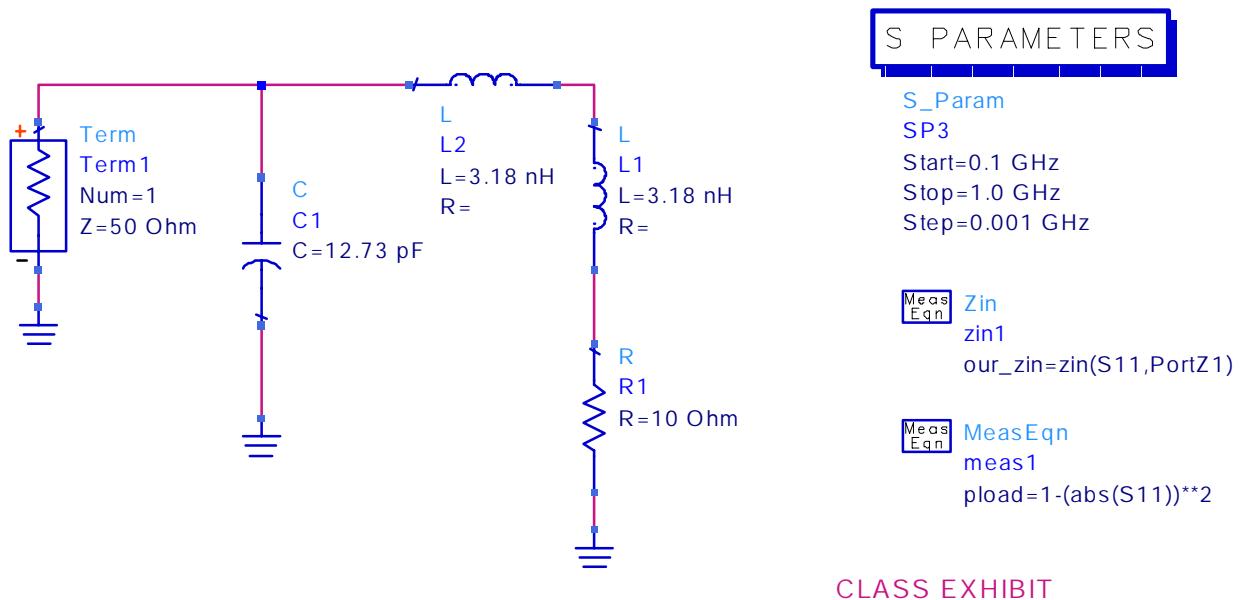
CLASS EXHIBIT

Figure 4. Schematic Diagram for Matching Network Simulation.
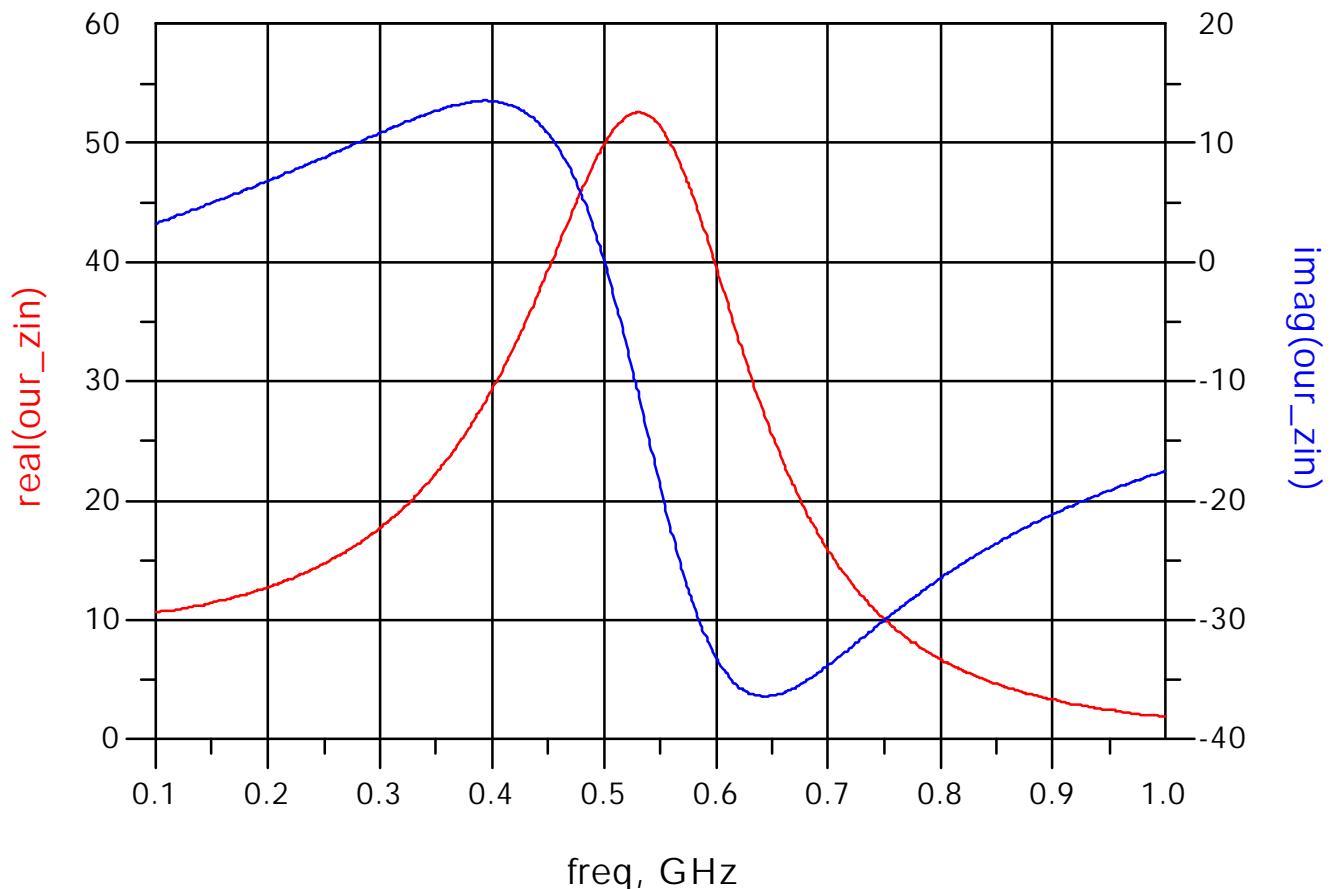
CLASS EXHIBIT

Figure 5. Frequency Response for Z_{IN}.
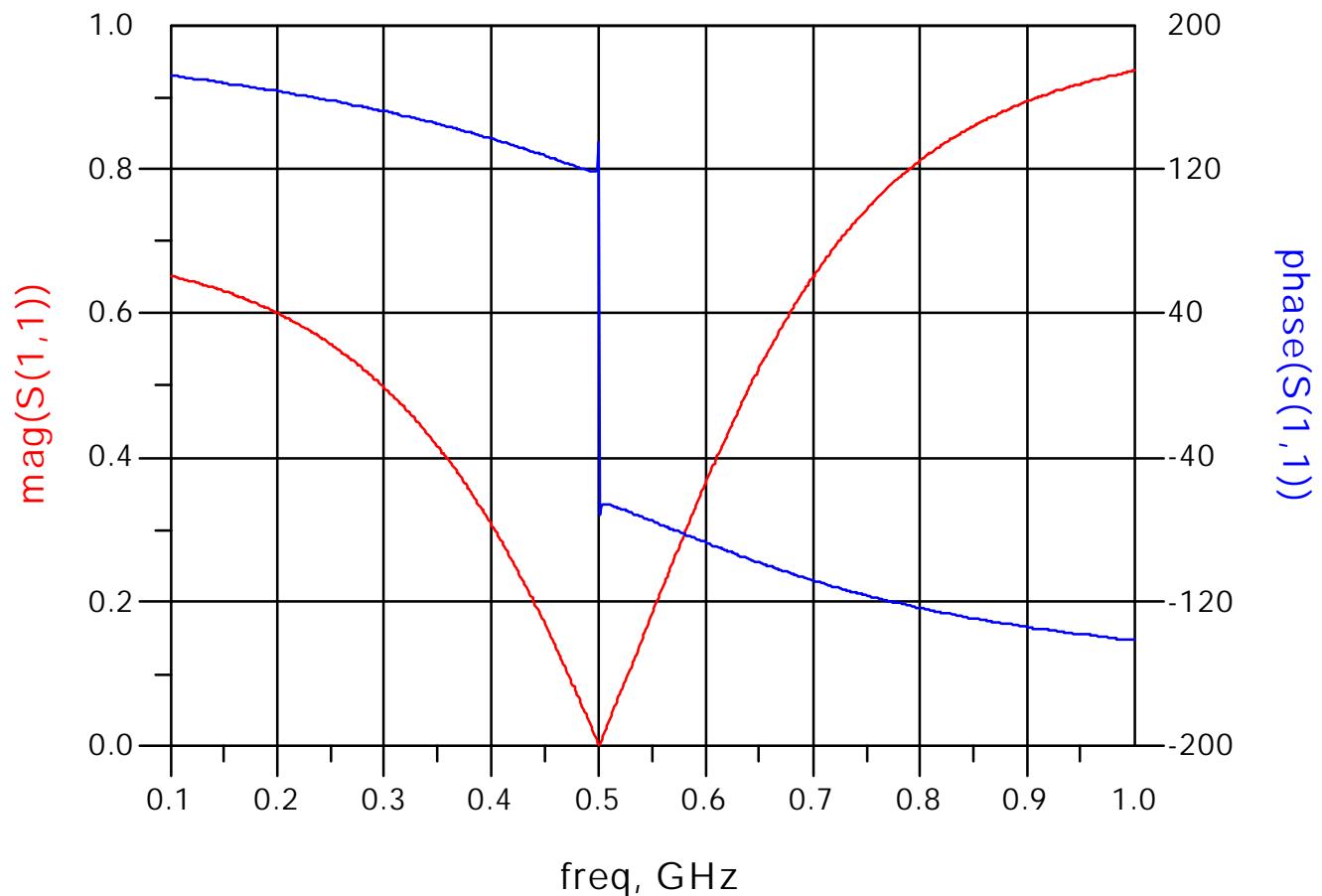
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Figure 6. Frequency Response for Γ_{IN}.

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S(1,1)

freq (100.0MHz to 1.000GHz)
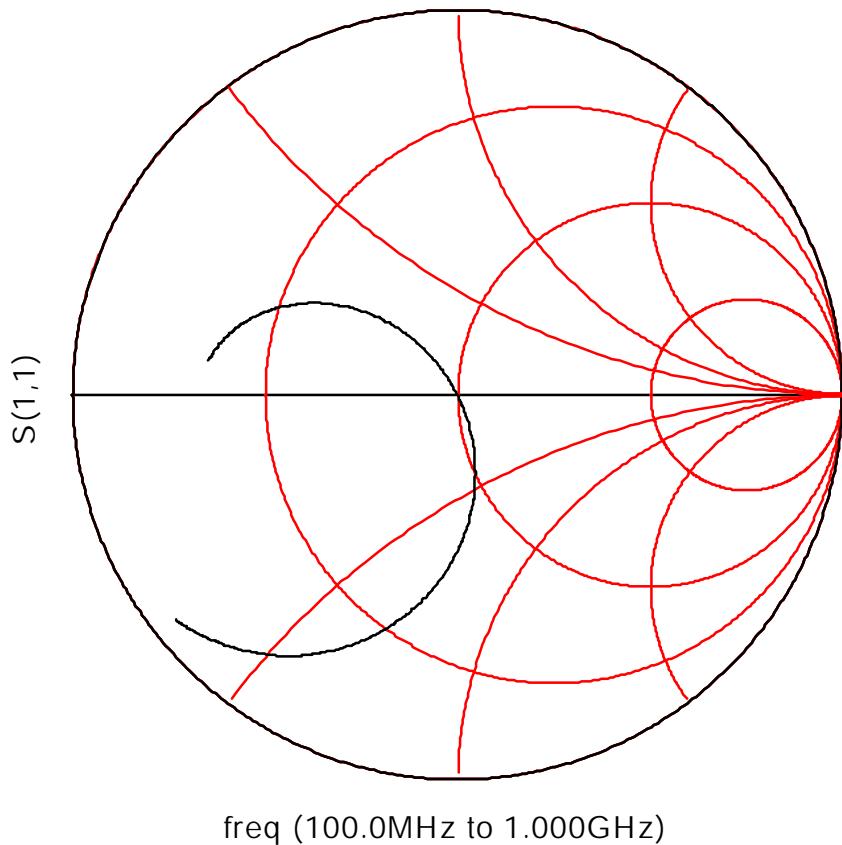
Figure 7. Frequency Response for Γ_{IN}.

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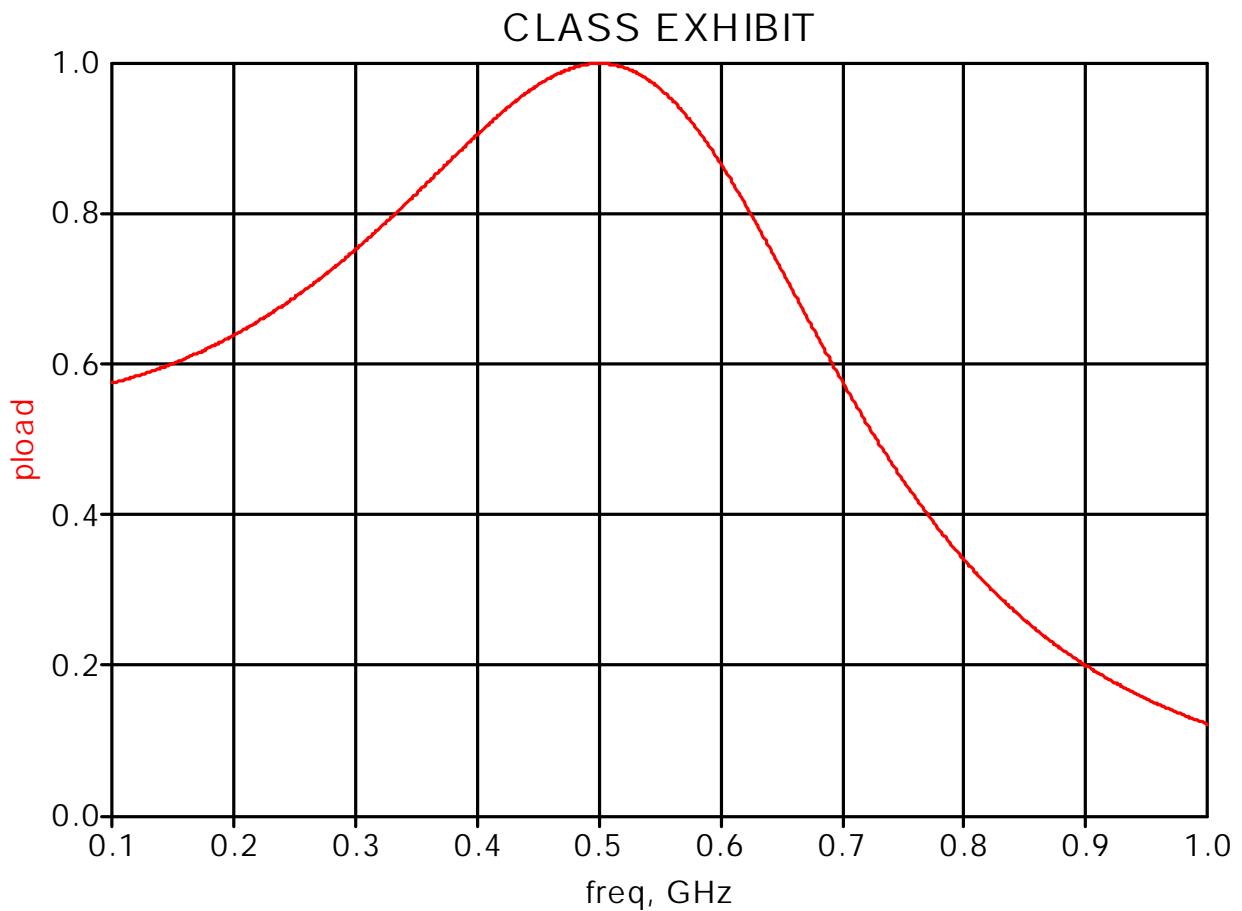
Figure 8. Frequency Response for Power Absorbed By Z_L.