電磁波與天線導論HW10

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1

(a)

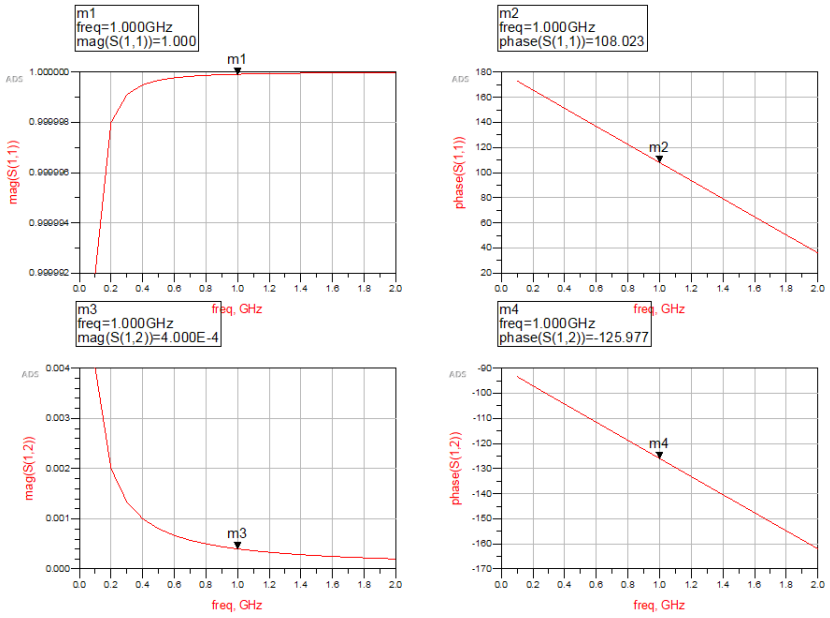
$$matrix \quad for \quad Y : \begin{bmatrix} 1 & 0 \\ Y & 1 \end{bmatrix}$$

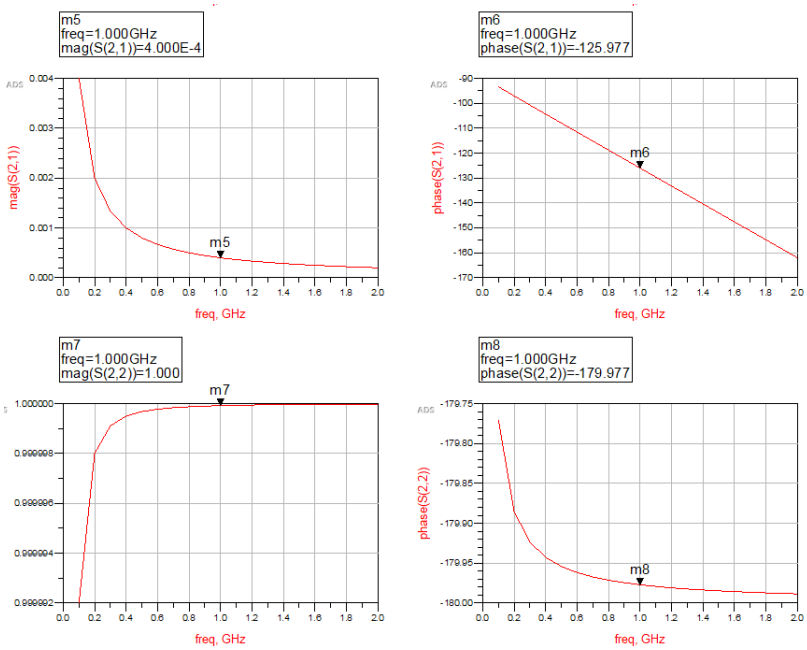
$$assume \quad \beta = 1$$

$$matrix \quad for \quad transmission \quad line : \begin{bmatrix} cos\beta l & jZ_0 sin\beta l \\ jY_0 sin\beta l & cos\beta l \end{bmatrix}$$

$$ABCD \quad matrix : \begin{bmatrix} 1 & 0 \\ Y & 1 \end{bmatrix} \begin{bmatrix} cos\beta l & jZ_0 sin\beta l \\ jY_0 sin\beta l & cos\beta l \end{bmatrix} = \begin{bmatrix} -2938.117 & j29.389 \\ j80.913 & 0.809 \end{bmatrix} - < ans >$$

(b)





$$A = \frac{(1+S_{11})(1-S_{22})+S_{12}S_{21}}{2S_{21}} = -2938.117 - j0.00016 - < ans >$$

$$B = Z_0\frac{(1+S_{11})(1+S_{22})-S_{12}S_{21}}{2S_{21}} = 0.00587 + j29.4940 - < ans >$$

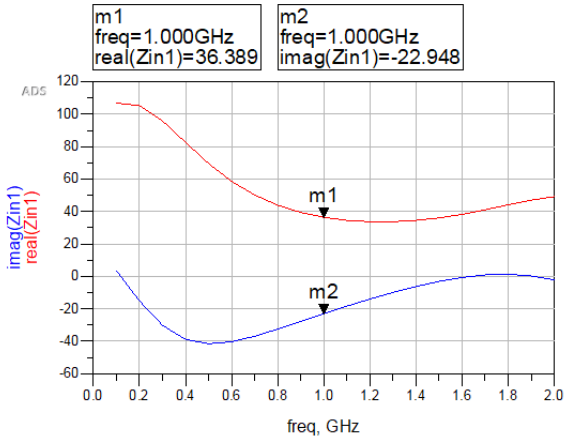
$$C = \frac{(1-S_{11})(1-S_{22})-S_{12}S_{21}}{2Z_0S_{21}} = 0.000002 + j80.9135 - < ans >$$

$$D = \frac{(1-S_{11})(1+S_{22})+S_{12}S_{21}}{2S_{21}} = 0.8119 - j0.00016 - < ans >$$

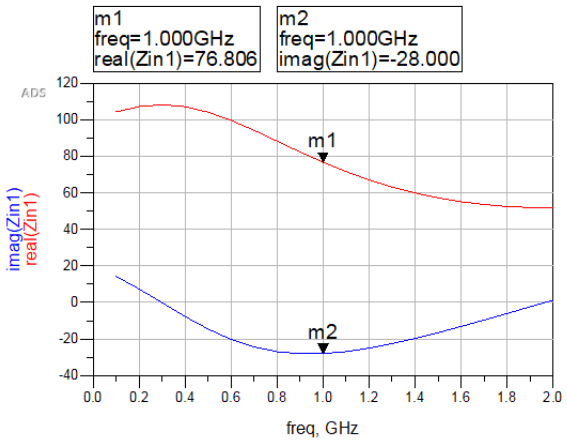
2

(a)

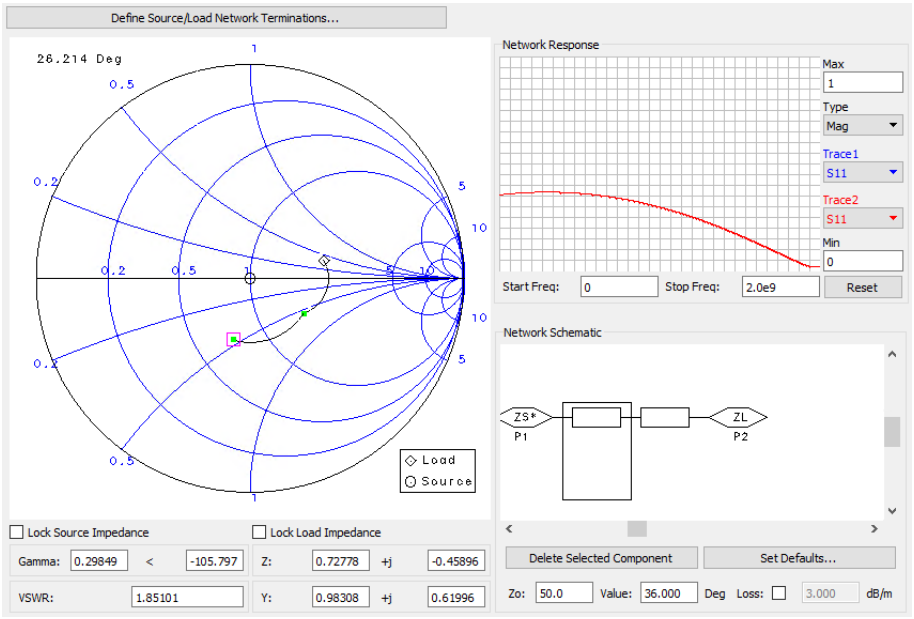
Z_{in}

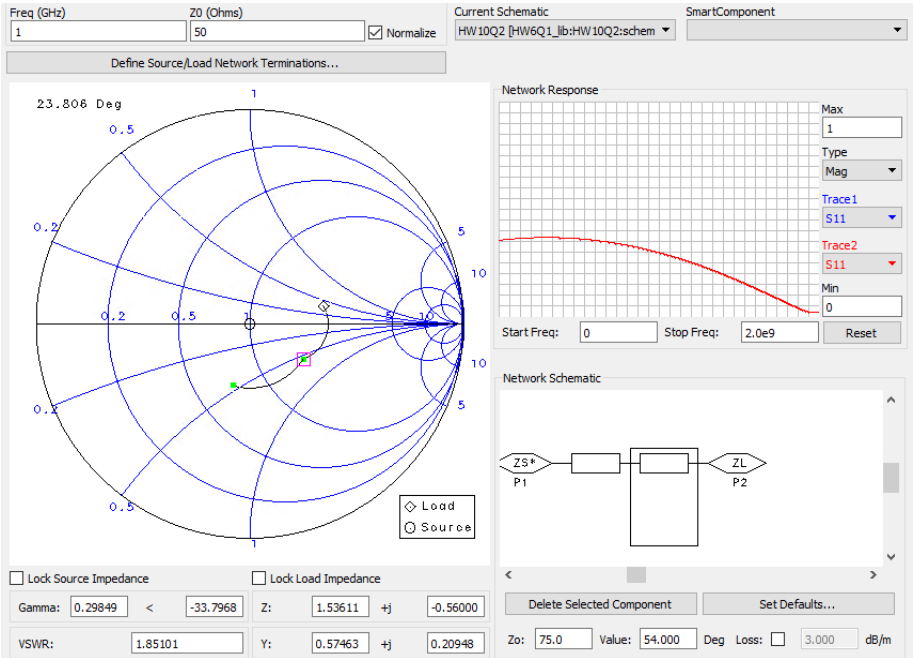


Z_1



(b)





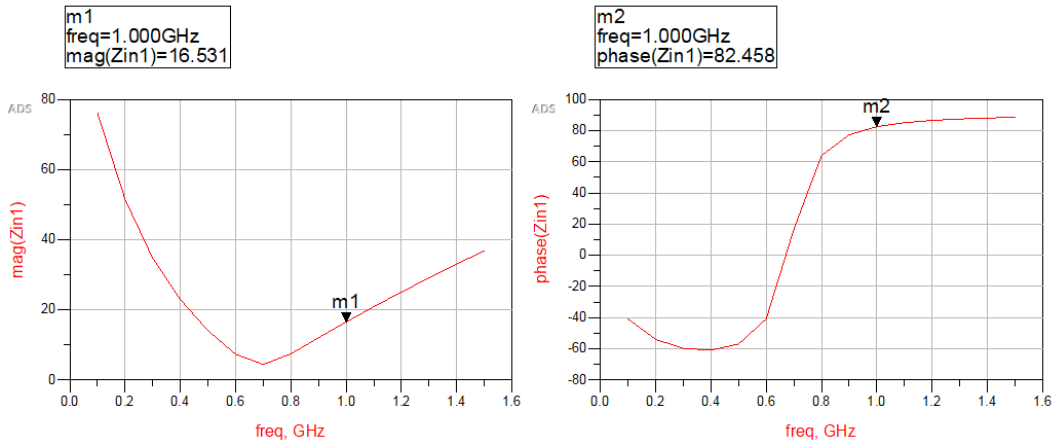
$$Z_{in} = (0.72778 - j0.45896) * 50 = 36.3889 - j22.948 - < ans >$$

$$Z_1 = (1.53611 - j0.56) * 50 = 76.8055 - j28 - < ans >$$

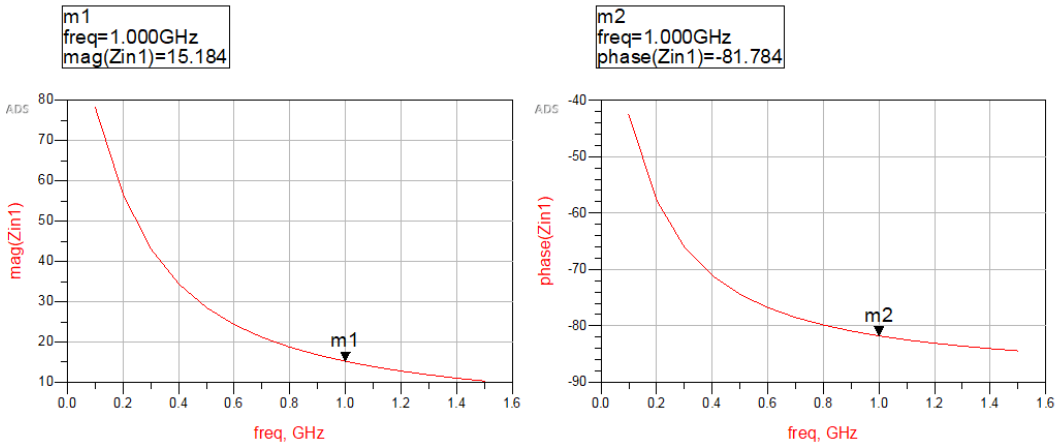
3

(a)

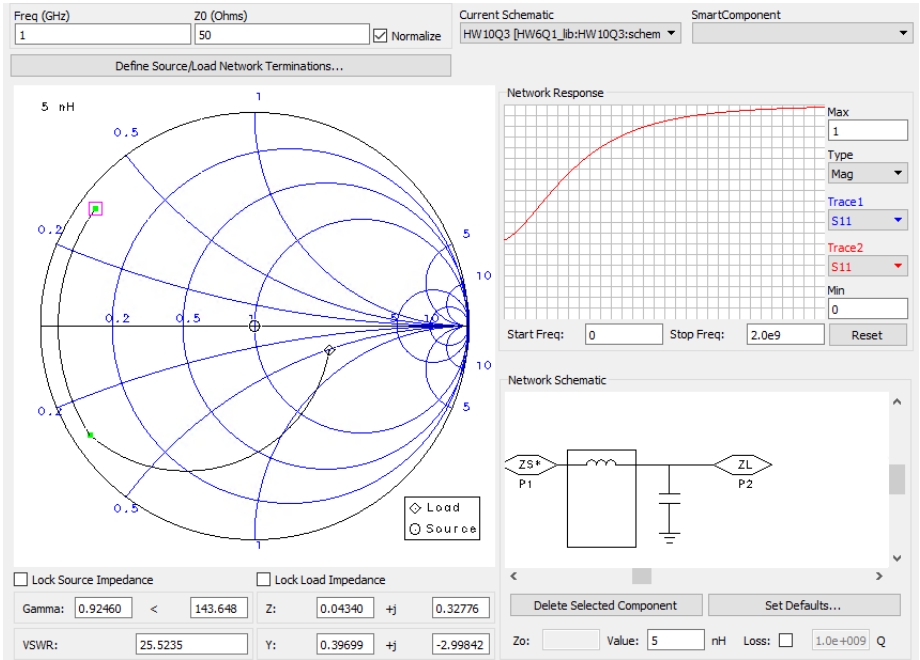
Z_{in}

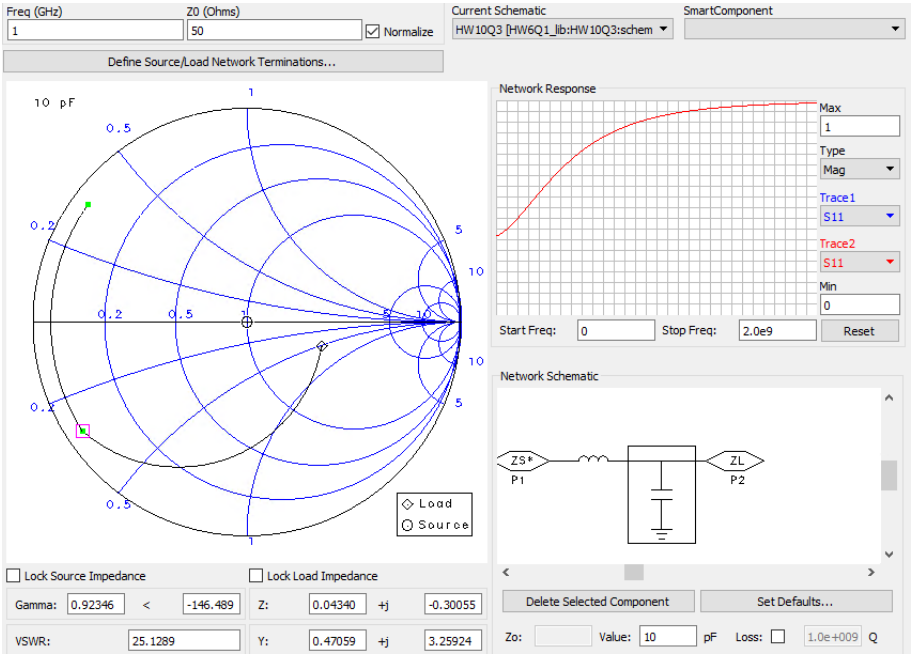

m1
freq=1.000GHz
mag(Zin1)=16.531
m2
freq=1.000GHz
phase(Zin1)=82.458
mag(Zin1)
phase(Zin1)
freq, GHz
freq, GHz

Z_1


m1
freq=1.000GHz
mag(Zin1)=15.184
m2
freq=1.000GHz
phase(Zin1)=-81.784
mag(Zin1)
phase(Zin1)
freq, GHz
freq, GHz

(b)


Freq (GHz)
Z0 (Ohms)
Normalize
Current Schematic
SmartComponent
Define Source/Load Network Terminations...
Network Response
Max
Type
Trace1
Trace2
Min
Start Freq:
Stop Freq:
Reset
Network Schematic
Load
Source
Lock Source Impedance
Lock Load Impedance
Gamma:
VSWR:
Delete Selected Component
Set Defaults...
Value:
Loss:



$$Z_{in} = 50 * (0.04340 + j0.32776) = 16.531e^{j82.458^\circ} - < ans >$$

$$Z_1 = 50 * (0.0434 - j0.30055) = 15.184e^{-j81.784^\circ} - < ans >$$