

電工實驗 5

第一次實驗

預報

Date: 2024/09/24

Class: 電機四全英班

Group: Group 9

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I. TXLINE 參數設定

A. 40 Ohm:

The screenshot shows the TXLINE 2003 - Microstrip software interface. The top menu bar includes Microstrip, Stripline, CPW, CPW Ground, Round Coaxial, Slotline, Coupled MSLine, and Coupled Stripline. The Material Parameters section shows Dielectric: GaAs, Conductor: Copper, Dielectric Constant: 4.7, Conductivity: 5.88E+07 S/m, and Loss Tangent: 0.02. The Electrical Characteristics section shows Impedance: 40 Ohms, Frequency: 1.5 GHz, Electrical Length: 239.642 deg, Phase Constant: 3423.46 deg/m, Effective Diel. Const.: 3.6123, and Loss: 5.40605 dB/m. The Physical Characteristic section shows Physical Length (L): 70 mm, Width (w): 2.04411 mm, Height (H): 0.8 mm, and Thickness (T): 0.035 mm. A diagram on the right shows a cross-section of a microstrip line with width W, height H, and thickness T.

Material Parameters	Value
Dielectric	GaAs
Conductor	Copper
Dielectric Constant	4.7
Conductivity	5.88E+07 S/m
Loss Tangent	0.02

Electrical Characteristics	Value
Impedance	40 Ohms
Frequency	1.5 GHz
Electrical Length	239.642 deg
Phase Constant	3423.46 deg/m
Effective Diel. Const.	3.6123
Loss	5.40605 dB/m

Physical Characteristic	Value
Physical Length (L)	70 mm
Width (w)	2.04411 mm
Height (H)	0.8 mm
Thickness (T)	0.035 mm

結論: $W = 2.04411\text{mm}$

B. 20 Ohm:

The screenshot shows the TXLINE 2003 - Microstrip software interface. The top menu bar includes Microstrip, Stripline, CPW, CPW Ground, Round Coaxial, Slotline, Coupled MSLine, and Coupled Stripline. The Material Parameters section shows Dielectric: GaAs, Conductor: Copper, Dielectric Constant: 4.7, Conductivity: 5.88E+07 S/m, and Loss Tangent: 0.02. The Electrical Characteristics section shows Impedance: 20 Ohms, Frequency: 1.5 GHz, Electrical Length: 251.5825 deg, Phase Constant: 3594.03 deg/m, Effective Diel. Const.: 3.98124, and Loss: 5.77152 dB/m. The Physical Characteristic section shows Physical Length (L): 70 mm, Width (w): 5.30929 mm, Height (H): 0.8 mm, and Thickness (T): 0.035 mm. A diagram on the right shows a cross-section of a microstrip line with width W, height H, and thickness T.

Material Parameters	Value
Dielectric	GaAs
Conductor	Copper
Dielectric Constant	4.7
Conductivity	5.88E+07 S/m
Loss Tangent	0.02

Electrical Characteristics	Value
Impedance	20 Ohms
Frequency	1.5 GHz
Electrical Length	251.5825 deg
Phase Constant	3594.03 deg/m
Effective Diel. Const.	3.98124
Loss	5.77152 dB/m

Physical Characteristic	Value
Physical Length (L)	70 mm
Width (w)	5.30929 mm
Height (H)	0.8 mm
Thickness (T)	0.035 mm

結論: $W = 5.30929\text{mm}$

II. Libra 的 code

A. 40 Ohm 開路

```
DIM
FREQ    GHZ
RES     OH
LNG     MM
ANG     DEG
IND     NH
CAP     PF

CKT
MSUB    ER=4.7  H=0.8  T=0.035  RHO=0  RGH=0
TAND    TAND=0.02
MLIN    1      2      W=2.04411  L=70

DEF1P   1      EXP1

FREQ
SWEEP   0      4      0.01

OUT
EXP1    DB[S11] GR1
EXP1    MAG[z1] GR2

GRID
RANGE   0      4      0.01
GR1     -2     0.5    0.01
GR2     -100   1500   100
```

B. 40Ohm 短路

```
DIM
FREQ    GHZ
RES     OH
LNG     MM
ANG     DEG
IND     NH
CAP     PF

CKT
MSUB    ER=4.7  H=0.8  T=0.035  RHO=0  RGH=0
TAND    TAND=0.02
MLIN    1      2      W=2.04411  L=70
RES     2      0      R=0
DEF1P   1      EXP1

FREQ
SWEEP   0      4      0.01

OUT
EXP1    DB[S11] GR1
EXP1    MAG[z1] GR2

GRID
RANGE   0      4      0.01
GR1     -2     0.5    0.01
GR2     -100   1500   100
```

C. 20Ohm 開路

```

DIM
FREQ      GHZ
RES       OH
LNG       MM
ANG       DEG
IND       NH
CAP       PF

CKT
MSUB      ER=4.7  H=0.8  T=0.035  RHO=0  RGH=0
TAND      TAND=0.02
MLIN      1      2      W=2.04411  L=70
RES       2      0      R=0
DEF1P     1      EXP1

FREQ
SWEEP     0      4      0.01

OUT
EXP1      DB[S11]  GR1
EXP1      MAG[z1]  GR2

GRID
RANGE     0      4      0.01
GR1       -2     0.5    0.01
GR2       -100   1500   100

```

D. 20Ohm 短路

```

DIM
FREQ      GHZ
RES       OH
LNG       MM
ANG       DEG
IND       NH
CAP       PF

CKT
MSUB      ER=4.7  H=0.8  T=0.035  RHO=0  RGH=0
TAND      TAND=0.02
MLIN      1      2      W=5.30929  L=70
RES       2      0      R=0
DEF1P     1      EXP1

FREQ
SWEEP     0      4      0.01

OUT
EXP1      DB[S11]  GR1
EXP1      MAG[z1]  GR2

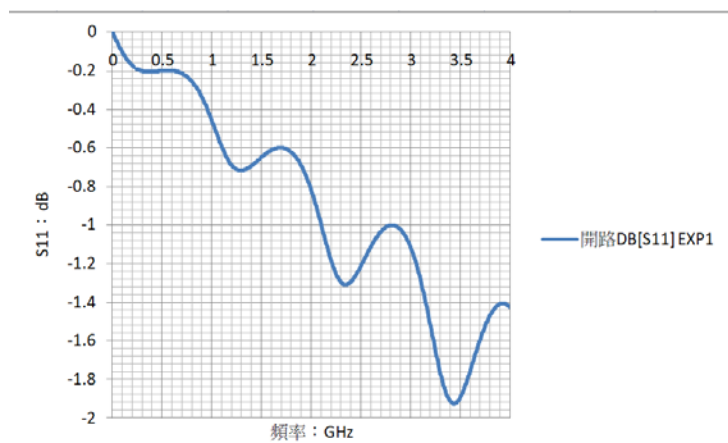
GRID
RANGE     0      4      0.01
GR1       -2     0.5    0.01
GR2       -100   1500   100

```

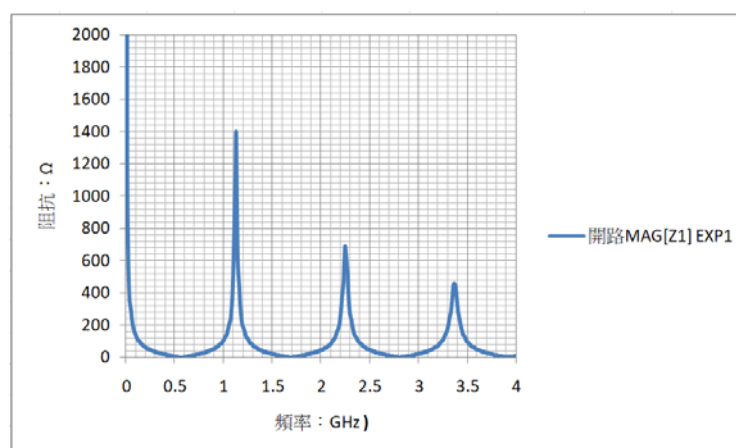
III. 模擬結果

A. 40Ohm 開路

1. S11

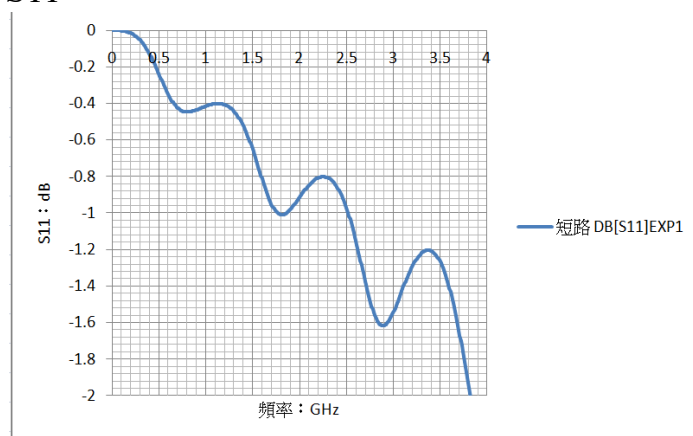


2. Z1

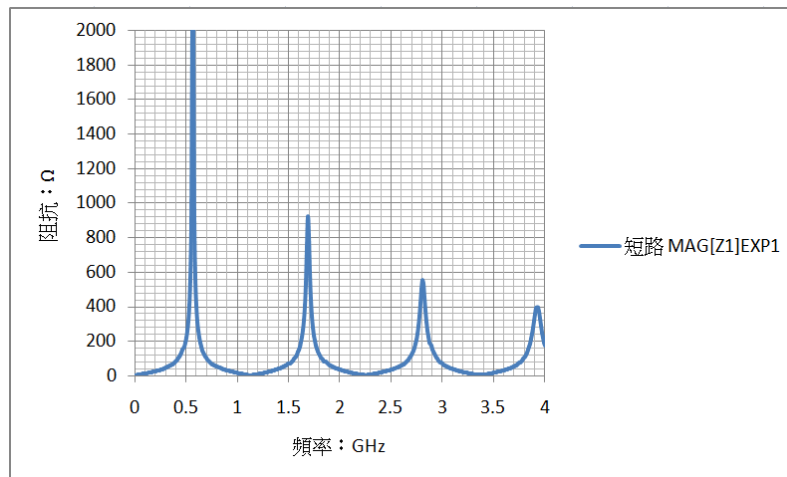


B. 40Ohm 短路

1. S11

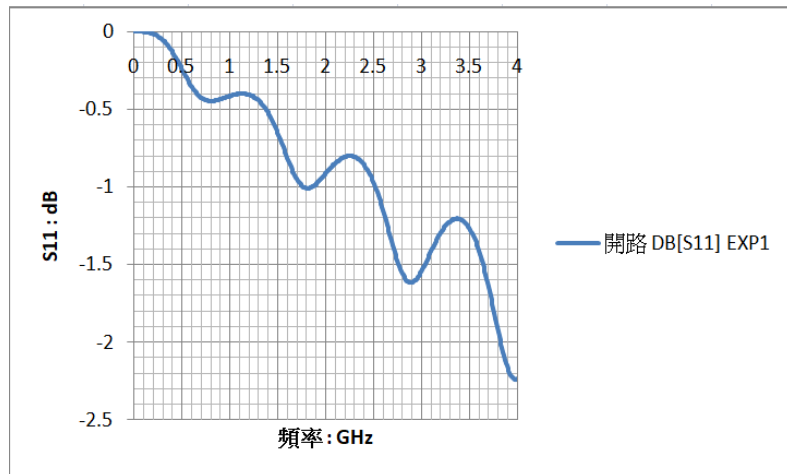


2. Z1

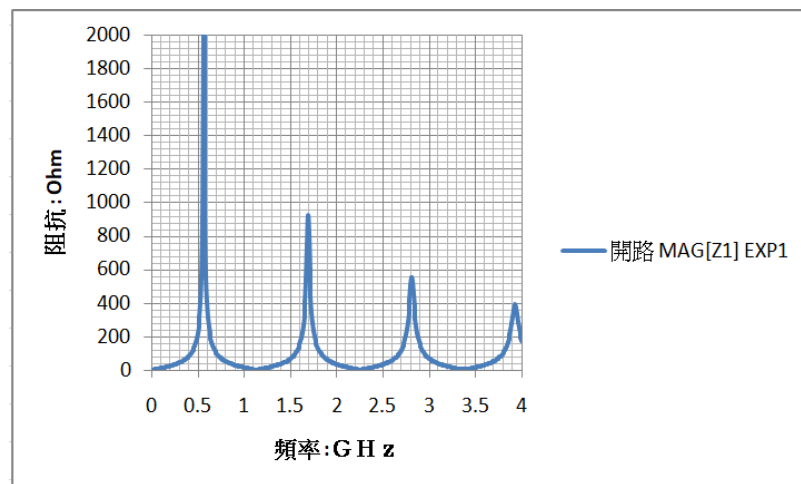


C. 20Ohm 開路

1. S11

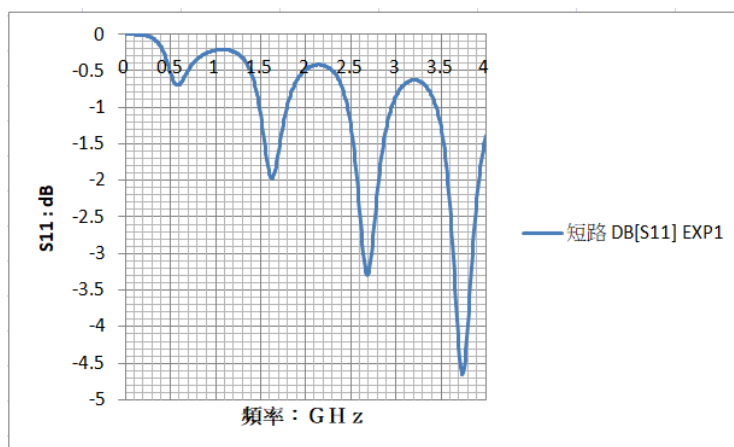


2. Z1



D. 20Ohm 短路

1. S11



2. Z1

