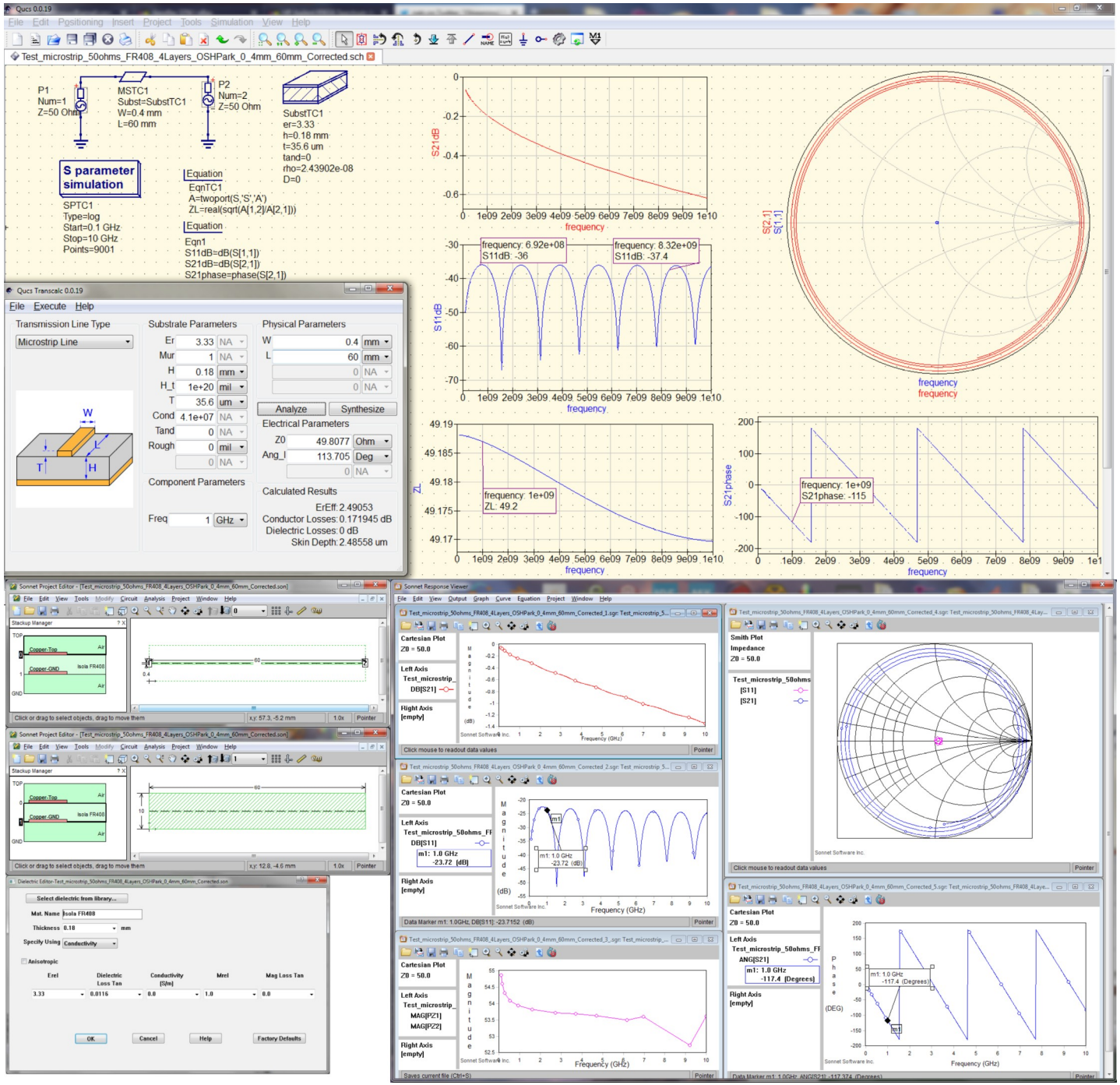
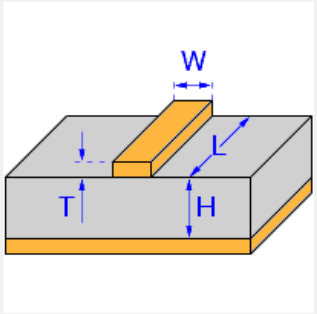

Qucs 0.0.19
Test_microstrip_50ohms_FR408_4Layers_OSHPark_0_4mm_60mm_Corrected.sch
P1
Num=1
Z=50 Ohm
MSTC1
Subst=SubstTC1
W=0.4 mm
L=60 mm
P2
Num=2
Z=50 Ohm
SubstTC1
er=3.33
h=0.18 mm
t=35.6 um
tand=0
rho=2.43902e-08
D=0
S parameter simulation
SPTC1
Type=log
Start=0.1 GHz
Stop=10 GHz
Points=9001
Equation
EqnTC1
A=twoport(S,'S','A')
ZL=real(sqrt(A[1,2]/A[2,1]))
Equation
Eqn1
S11dB=dB(S[1,1])
S21dB=dB(S[2,1])
S21phase=phase(S[2,1])
S21dB
frequency
S11dB
frequency: 6.92e+08
S11dB: -36
frequency: 8.32e+09
S11dB: -37.4
S[2,1]
S[1,1]
frequency
frequency
ZL
frequency: 1e+09
ZL: 49.2
S21phase
frequency: 1e+09
S21phase: -115
Qucs Transcalc 0.0.19
File Execute Help
Transmission Line Type
Microstrip Line
Substrate Parameters
Er 3.33
Mur 1
H 0.18 mm
H_t 1e+20 mil
T 35.6 um
Cond 4.1e+07
Tand 0
Rough 0 mil
Physical Parameters
W 0.4 mm
L 60 mm
Analyze
Synthesize
Electrical Parameters
Z0 49.8077 Ohm
Ang_l 113.705 Deg
Component Parameters
Freq 1 GHz
Calculated Results
ErEff 2.49053
Conductor Losses: 0.171945 dB
Dielectric Losses: 0 dB
Skin Depth: 2.48558 um
Sonnet Project Editor - [Test_microstrip_50ohms_FR408_4Layers_OSHPark_0_4mm_60mm_Corrected.son]
Stackup Manager
Copper-Top
Copper-GND
Isola FR408
Air
Sonnet Response Viewer
Cartesian Plot
Z0 = 50.0
Smith Plot
Impedance
Z0 = 50.0
Dielectric Editor-Test_microstrip_50ohms_FR408_4Layers_OSHPark_0_4mm_60mm_Corrected.son
Select dielectric from library...
Mat. Name Isola FR408
Thickness 0.18 mm
Specify Using Conductivity
Anisotropic
Erel
Dielectric Loss Tan
Conductivity (S/m)
Mrel
Mag Loss Tan
OK
Cancel
Help
Factory Defaults

Qucs Transcalc 0.0.19

File Execute Help

Transmission Line Type

Microstrip Line



Substrate Parameters

Er	3.33	NA
Mur	1	NA
H	0.18	mm
H_t	1e+20	mil
T	35.6	um
Cond	4.1e+07	NA
Tand	0	NA
Rough	0	mil
	0	NA

Component Parameters

Freq 1 GHz

Physical Parameters

W	0.4	mm
L	60	mm
	0	NA
	0	NA

Analyze Synthesize

Electrical Parameters

Z0	49.8077	Ohm
Ang_l	113.705	Deg
	0	NA

Calculated Results

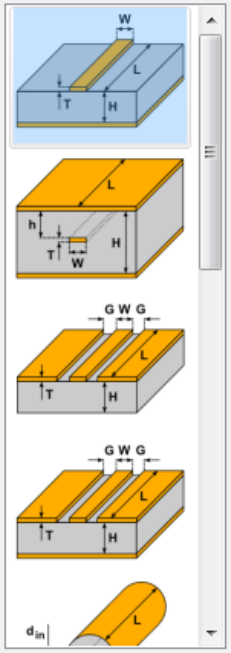
ErEff: 2.49053
Conductor Losses: 0.171945 dB
Dielectric Losses: 0 dB
Skin Depth: 2.48558 um

Values are consistent.

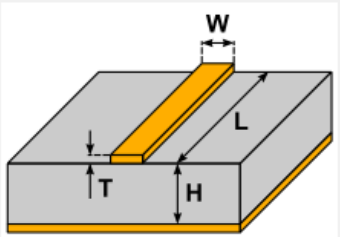
QucsStudio Transmission Line Calculator 2.5.7

File Help

Choice



Microstrip Line



Properties

ε_r	3.33	
tan δ	2e-2	
Resistivity	1.72e-8	
μ_r,c	0.999994	
Roughness	0.1	μm
T	35.6	μm
H	0.18	mm

Parameters

Frequency 1 GHz

Dimensions

W	0.4	mm
L	60	mm

RF Properties

Z0	49.1869	ohms
Angle	115.14	degree

Results

Skin Depth: 2.0873 µm
ε_r,eff: 2.55378
Conductor Losses: 0.146514 dB
Dielectric Losses: 0.151752 dB
Radiation Losses: 0.00032496 dB
Single-Mode Range: 0 Hz ... 174 GHz

Copy Component to Clipboard

Copy to Clipboard inclusive Circuit