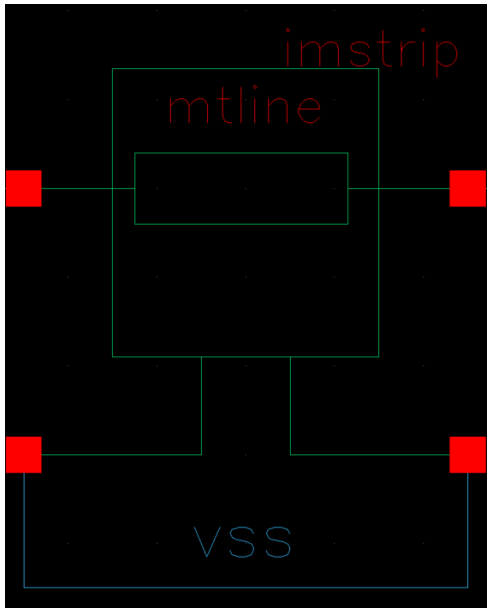
Lab (4)
TDR

MTLINE Settings



Mtline:

Library Name	analogLib
Cell Name	mtline
View Name	symbol
Instance Name	imstrip
CDF Parameter	Value
Num of lines (excluding ref	1
Model name	
Physical length	line_length M
Multiplicity factor	1
Max signal frequency	
Type of Input	FieldSolver
Generate noise?	no
Transmission line type	microstrip
Model type	wideband
Rel dielectic const of laye	dielectric_const
Dielectric layer thickness	dielectric_thickness
Signal line width	line_width
Signal line thickness	line_thickness
Signal line spacing	
Gnd Plane thickness	
Ground plane conductivity	
Signal line conductivity	

Display Cross-section

Line_length = 0.15 ➔ For 1ns travel time in transmission line (2ns back & forth)

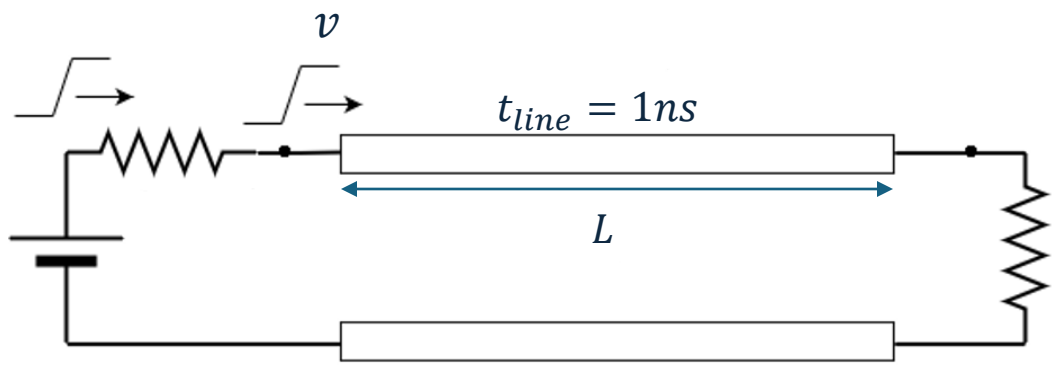
Dielectric_const = 4.8
Dielectric_thickness = 360u
Line_width = 625um
Line_thickness = 17.78u

} For Zo = 50 Ohms

Relationship between Length of transmission line & time taken for pulse to travel in the transmission line

$$Velocity\ (v) = \frac{Distance}{Time}$$

$$t_{reflection} = 2.t_{line}$$
$$= \frac{2L}{v} = \frac{2L}{{}^{c}/_{\sqrt{\varepsilon_r}}}$$



$\underline{For\ t_{line} = 1ns:}$

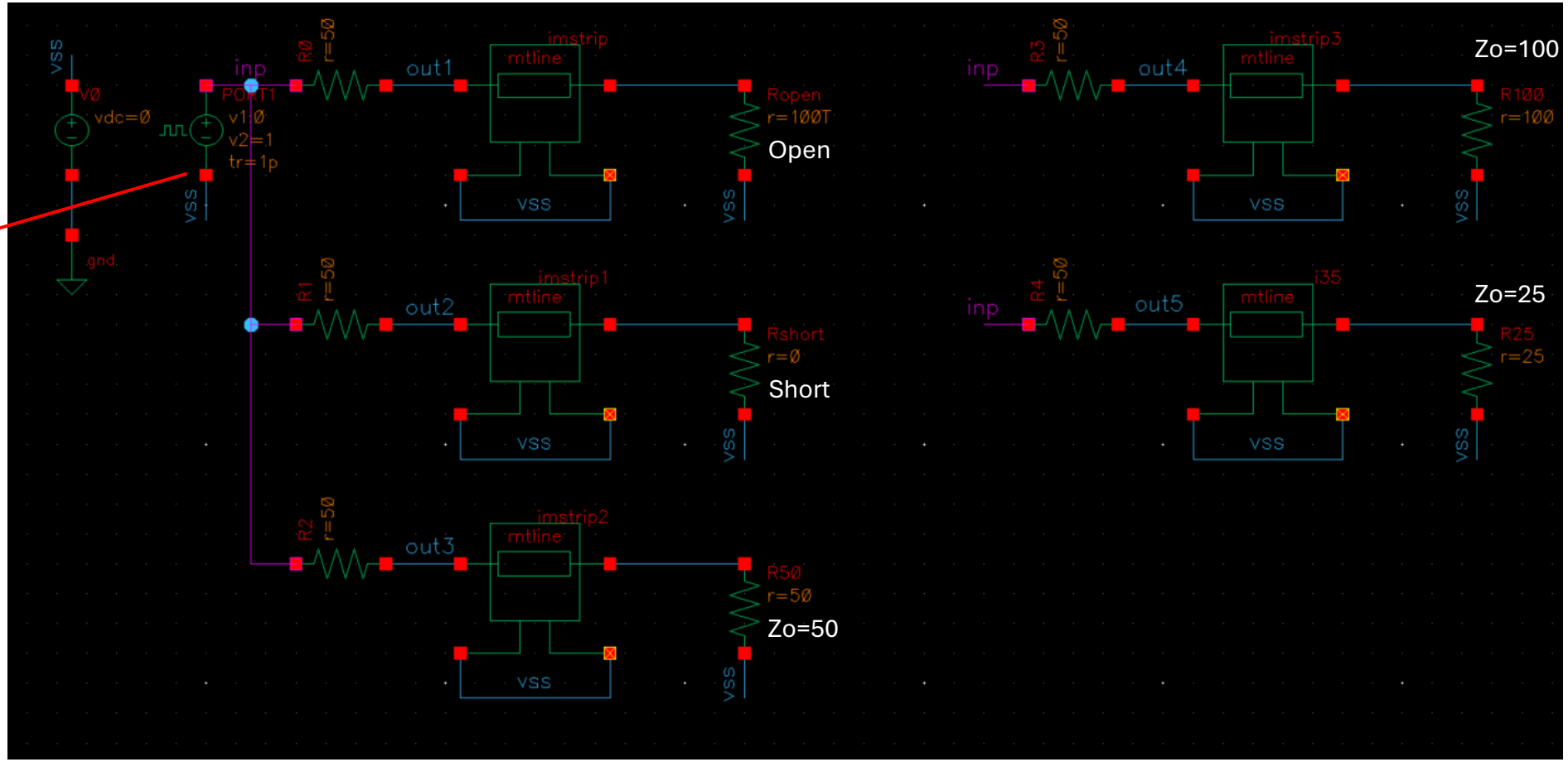
$$L = t_{line} \cdot {}^{c}/_{\sqrt{\varepsilon_r}}$$
$$= 10^{-9} \cdot {}^{3\ x\ 10^8}/_{\sqrt{4.8}}$$
$$L = 0.15\ m$$

(A) Resistive Loads

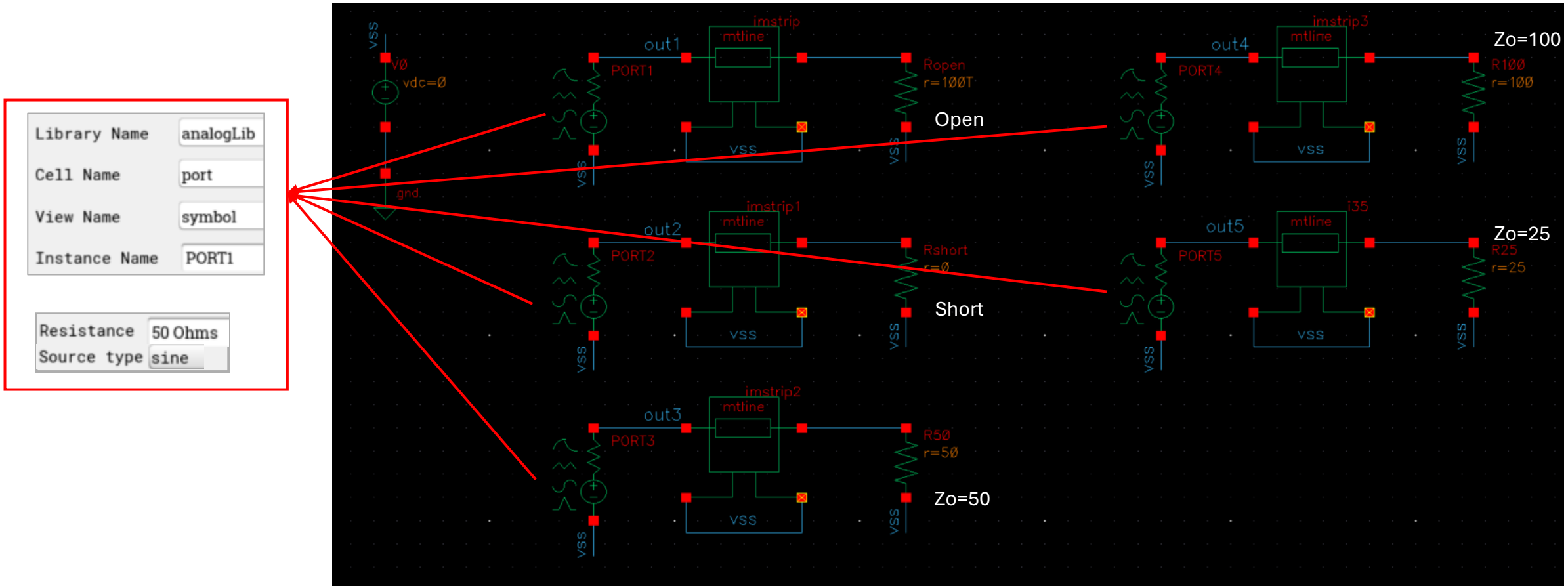
TB1: Transient

Library Name	analogLib
Cell Name	vpulse
View Name	symbol
Instance Name	PORT1

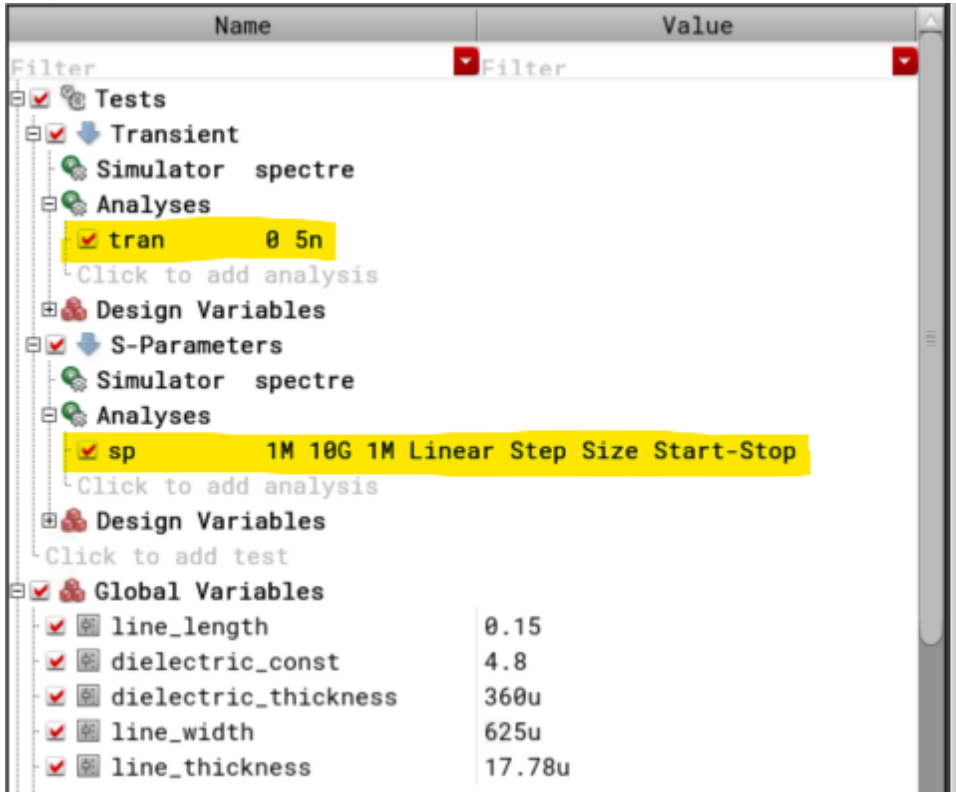
Voltage 1	0 V
Voltage 2	1 V
Period	10n s
Delay time	1n s
Rise time	1p s
Fall time	1p s
Pulse width	5n s

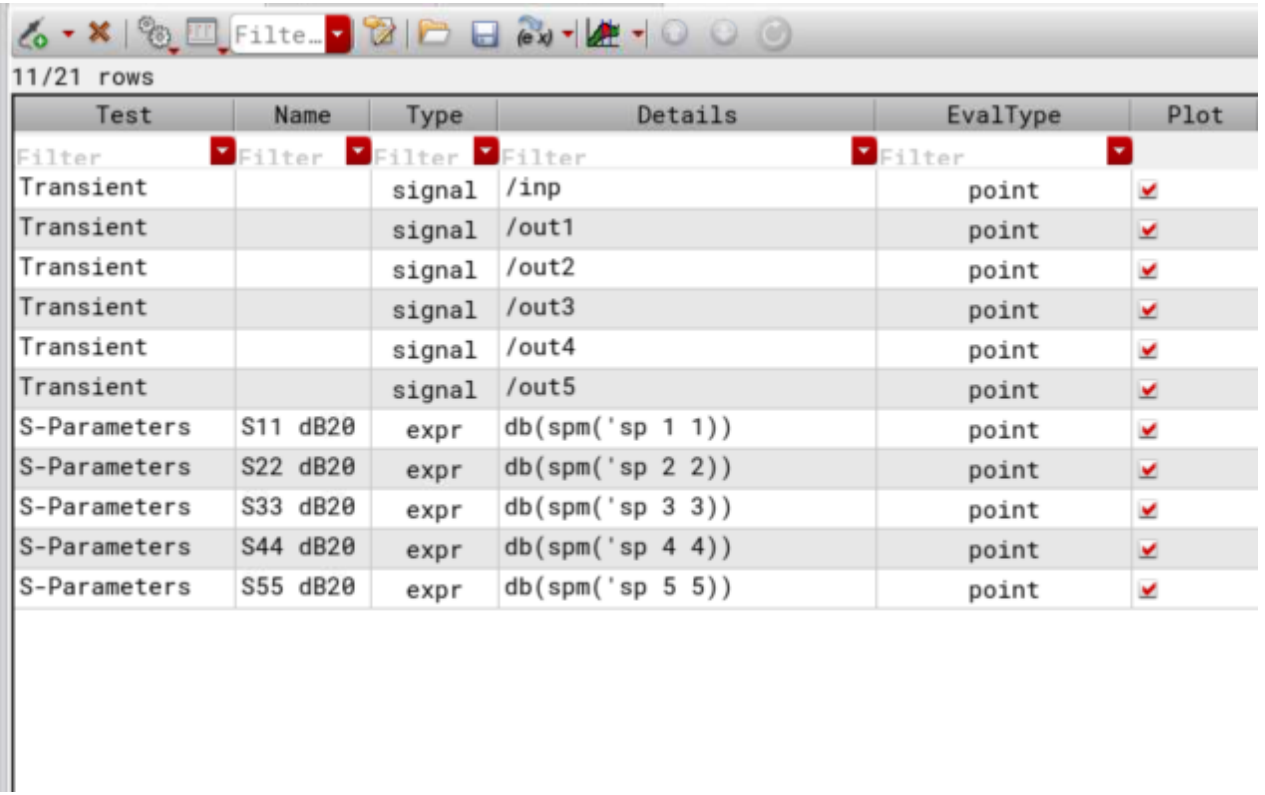


TB2: S-Parameters



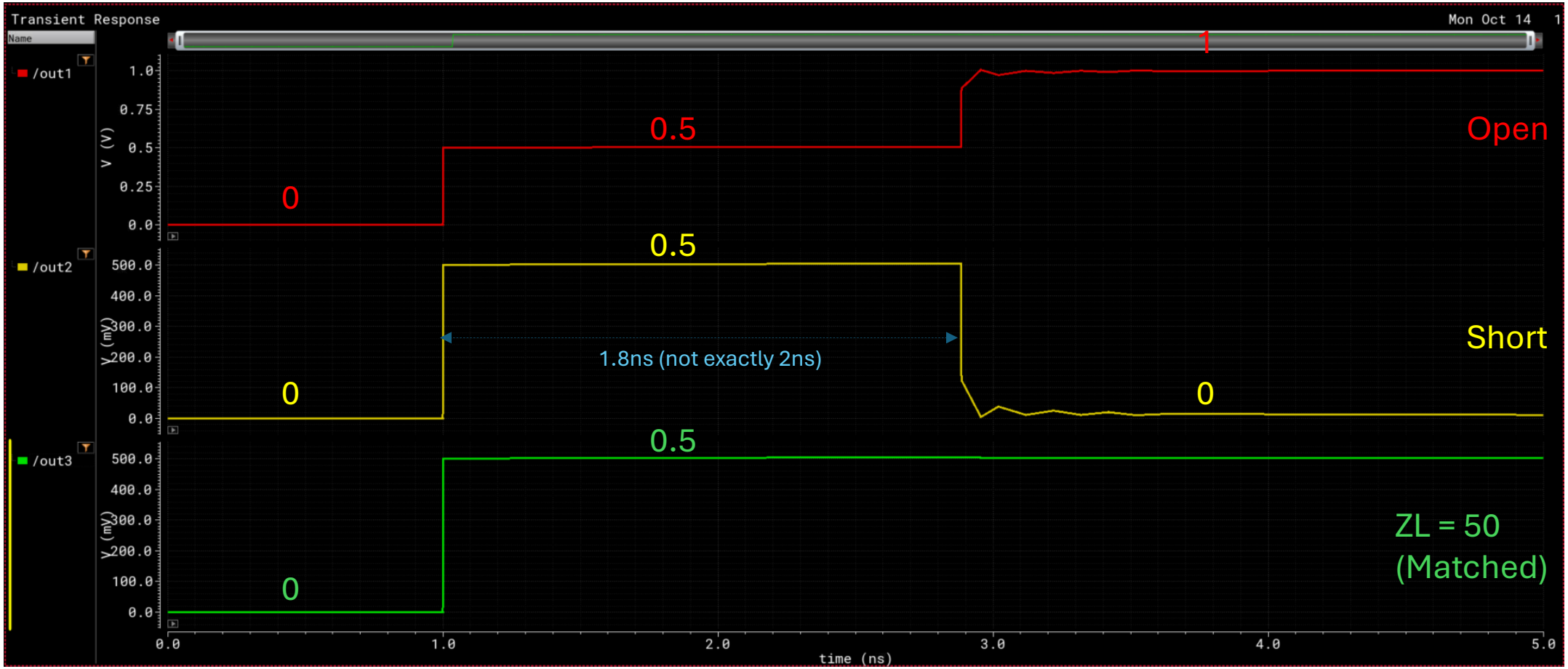
Analyses Setups





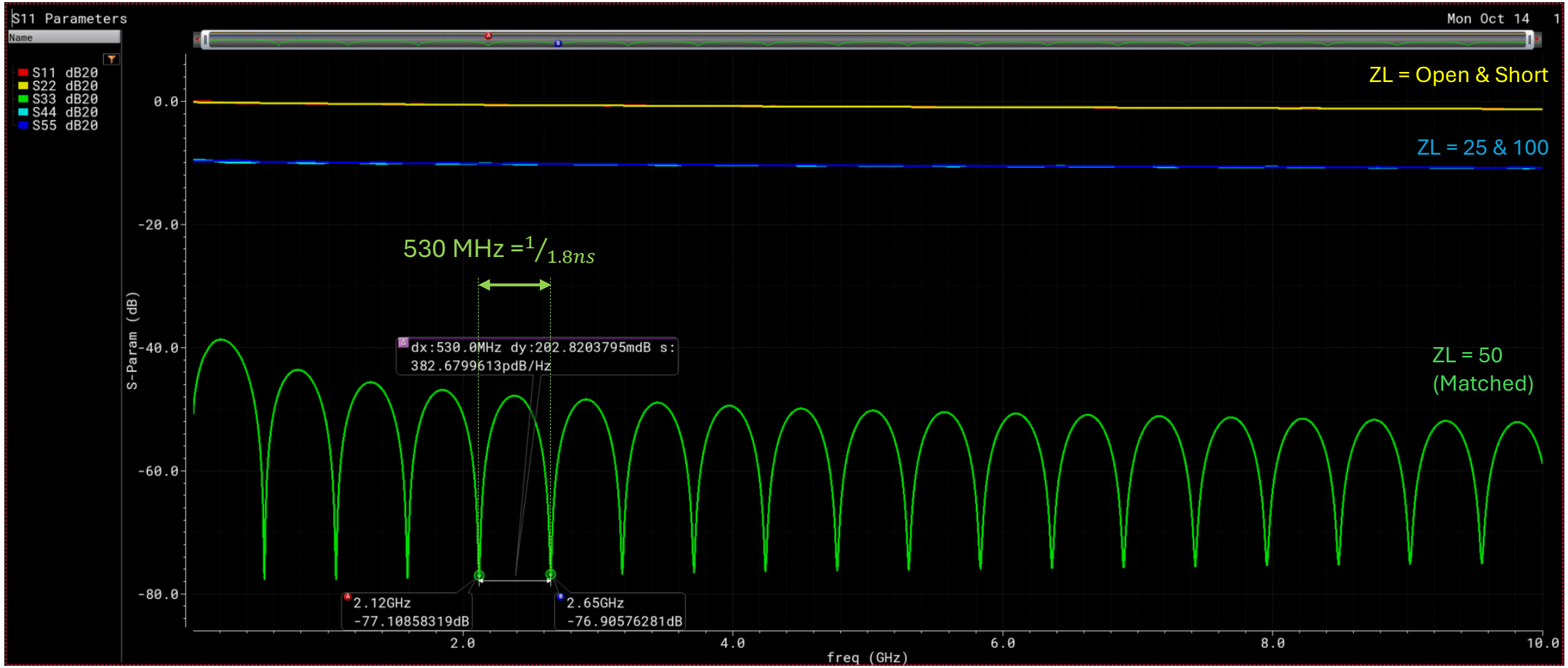
Test	Name	Type	Details	EvalType	Plot
Transient		signal	/inp	point	☑
Transient		signal	/out1	point	☑
Transient		signal	/out2	point	☑
Transient		signal	/out3	point	☑
Transient		signal	/out4	point	☑
Transient		signal	/out5	point	☑
S-Parameters	S11 dB20	expr	db(spm('sp 1 1))	point	☑
S-Parameters	S22 dB20	expr	db(spm('sp 2 2))	point	☑
S-Parameters	S33 dB20	expr	db(spm('sp 3 3))	point	☑
S-Parameters	S44 dB20	expr	db(spm('sp 4 4))	point	☑
S-Parameters	S55 dB20	expr	db(spm('sp 5 5))	point	☑

Results (Transient)

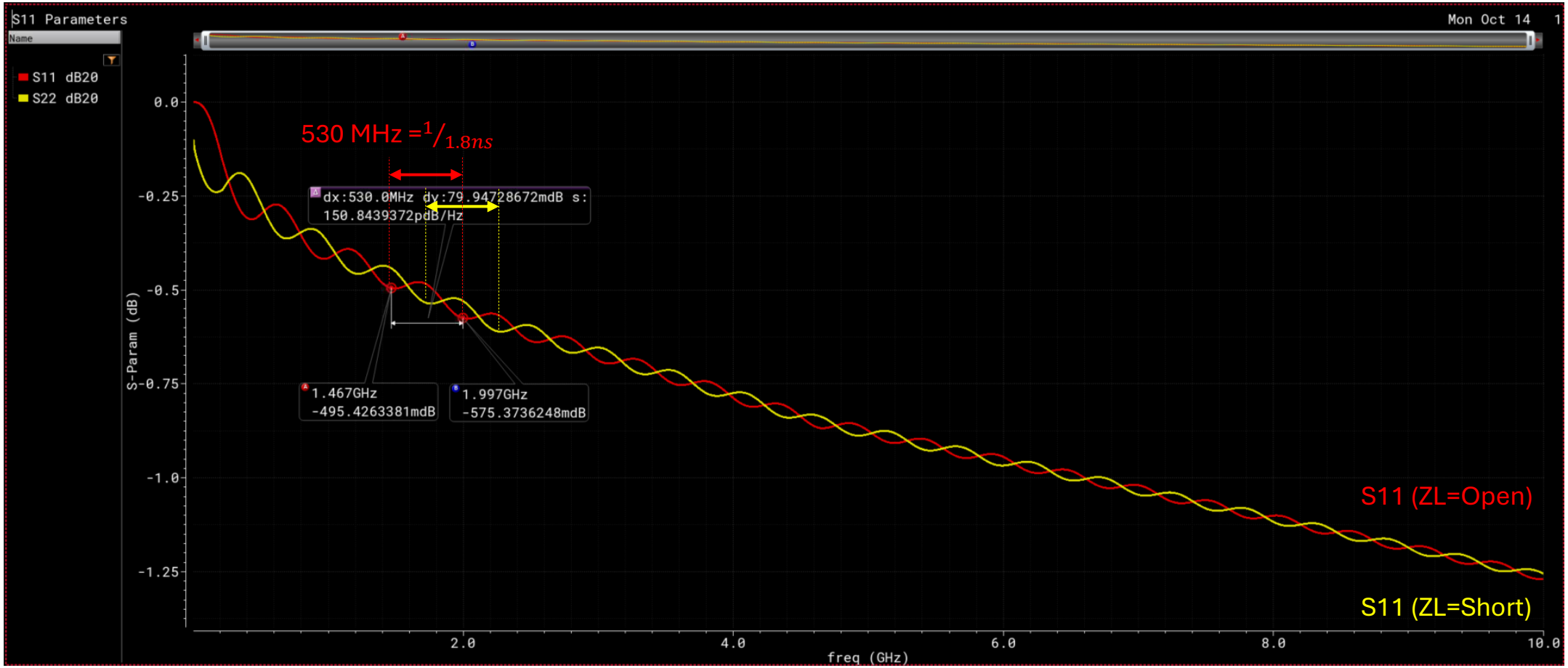


Results (Transient)

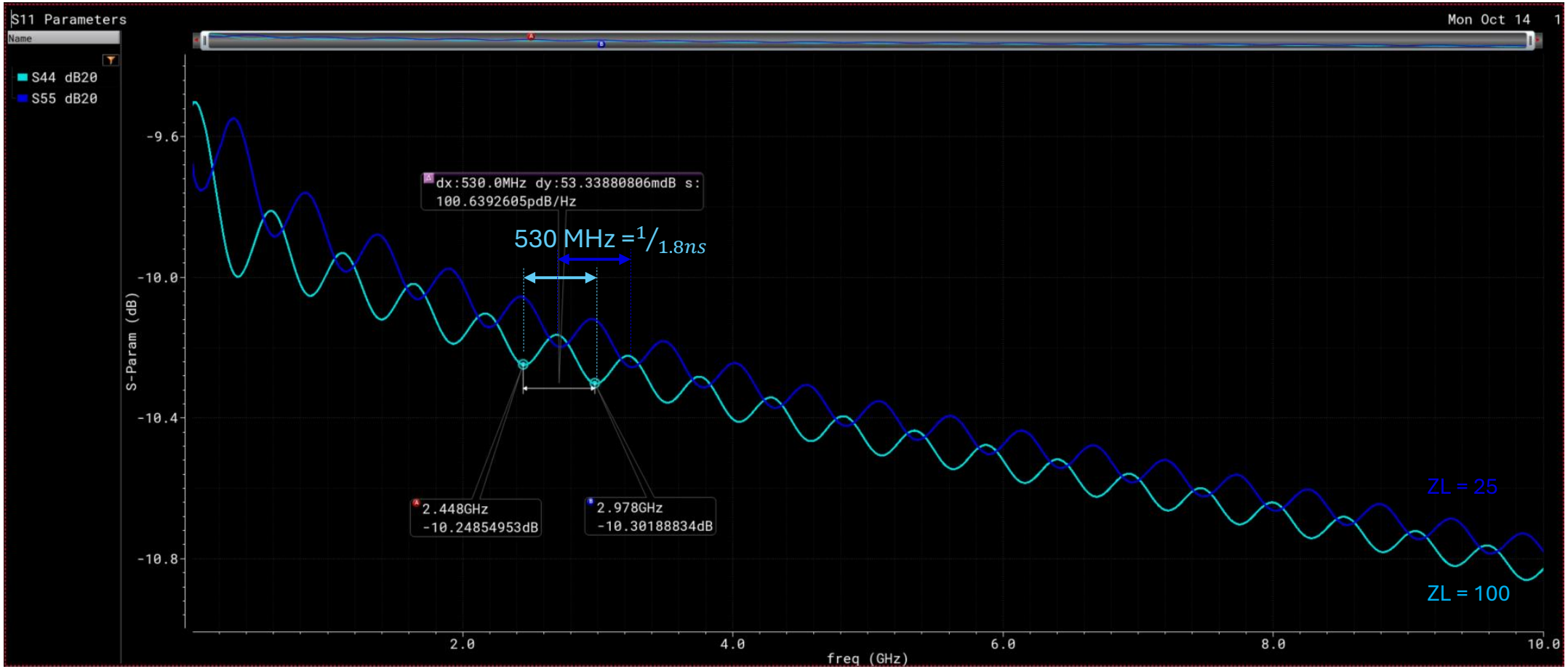
Results (S-Parameters) – S11



Results (S-Parameters) – S11



Results (S-Parameters) – S11

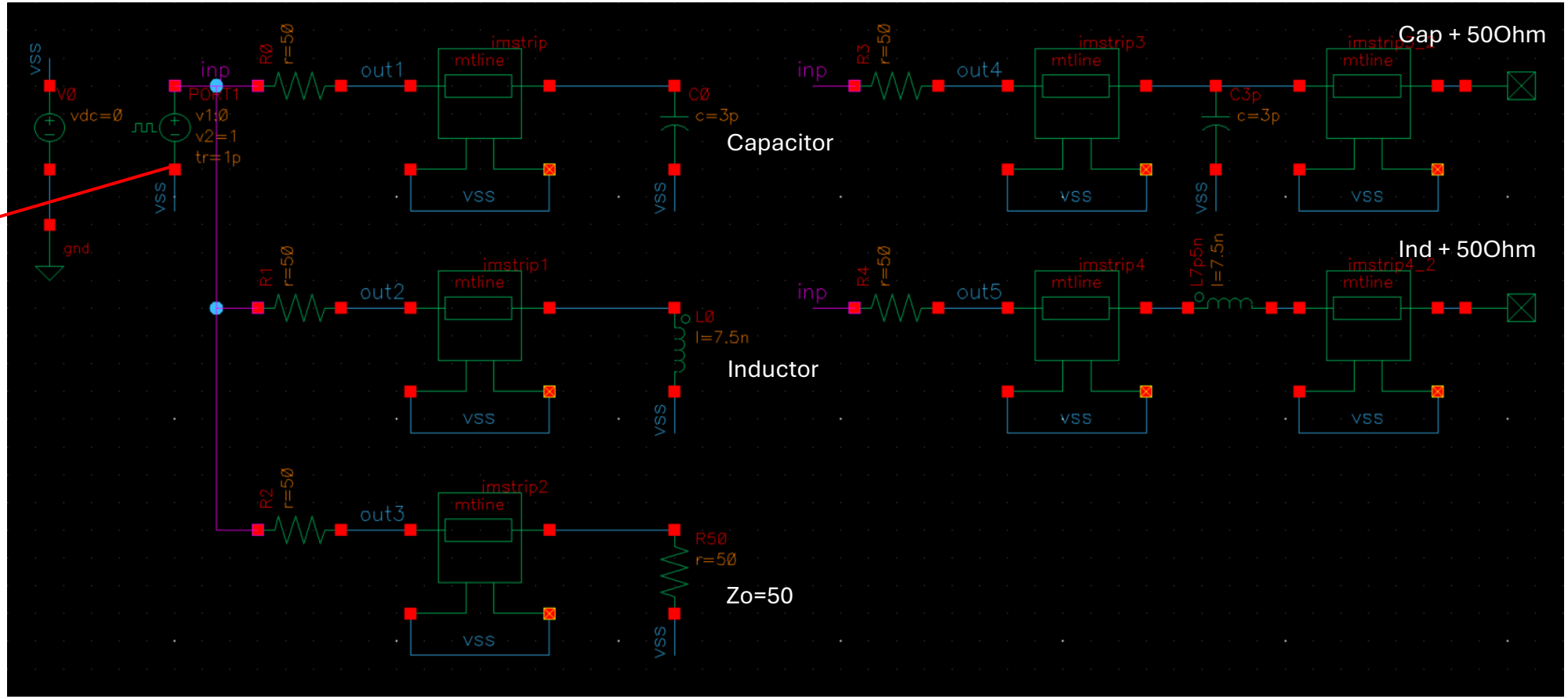


(B) Inductive & Capacitive Loads

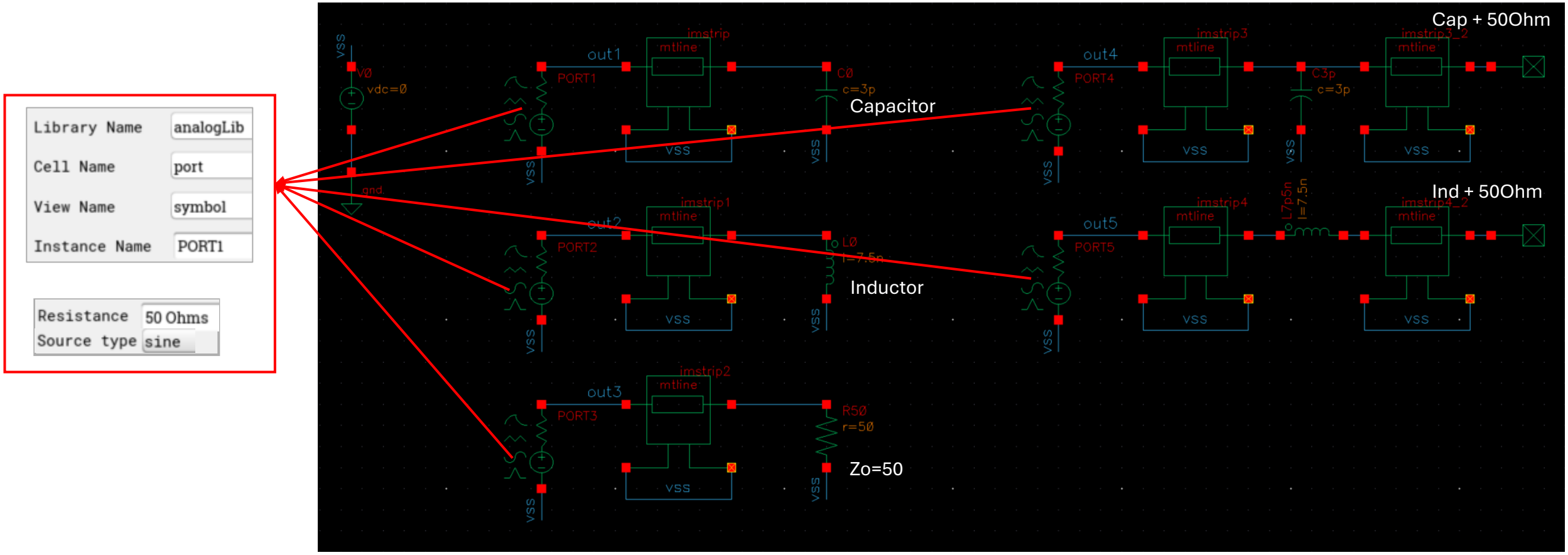
TB1: Transient

Library Name	analogLib
Cell Name	vpulse
View Name	symbol
Instance Name	PORT1

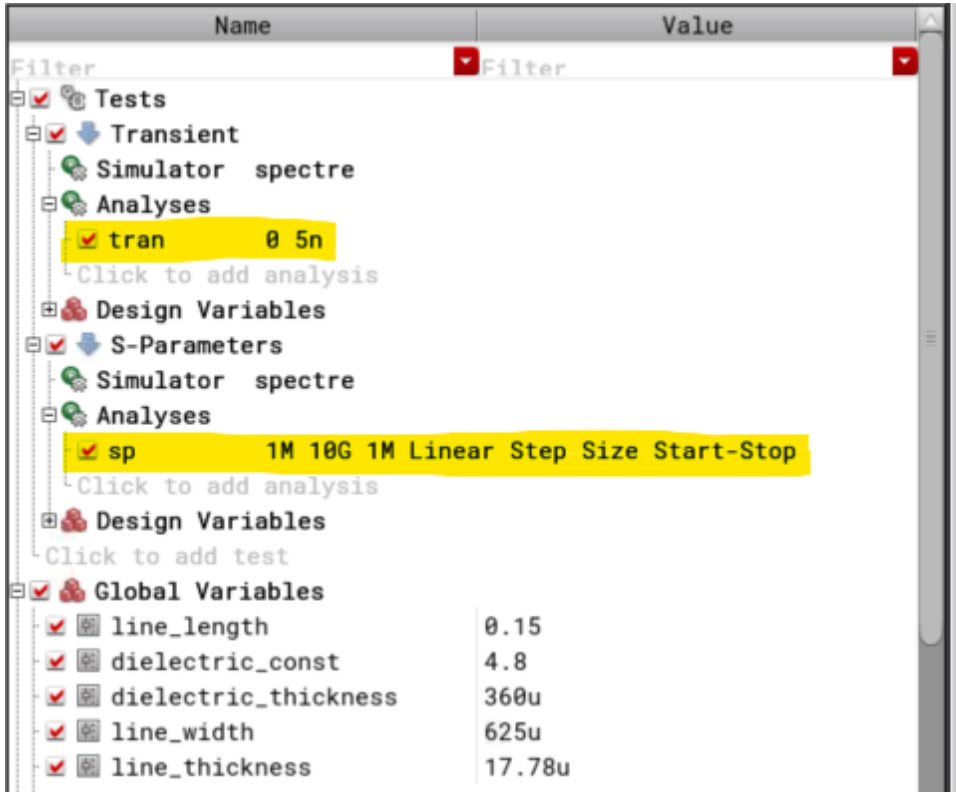
Voltage 1	0 V
Voltage 2	1 V
Period	10n s
Delay time	1n s
Rise time	1p s
Fall time	1p s
Pulse width	5n s

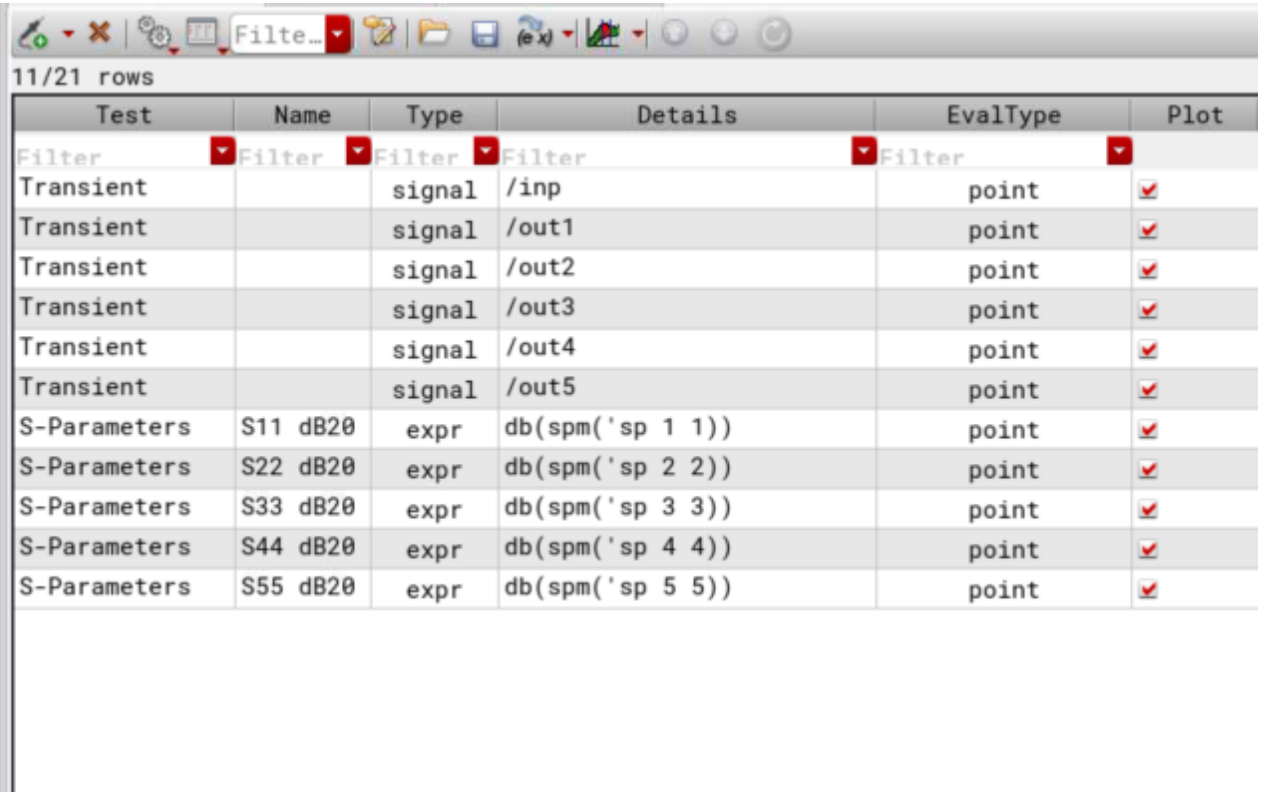


TB2: S-Parameters



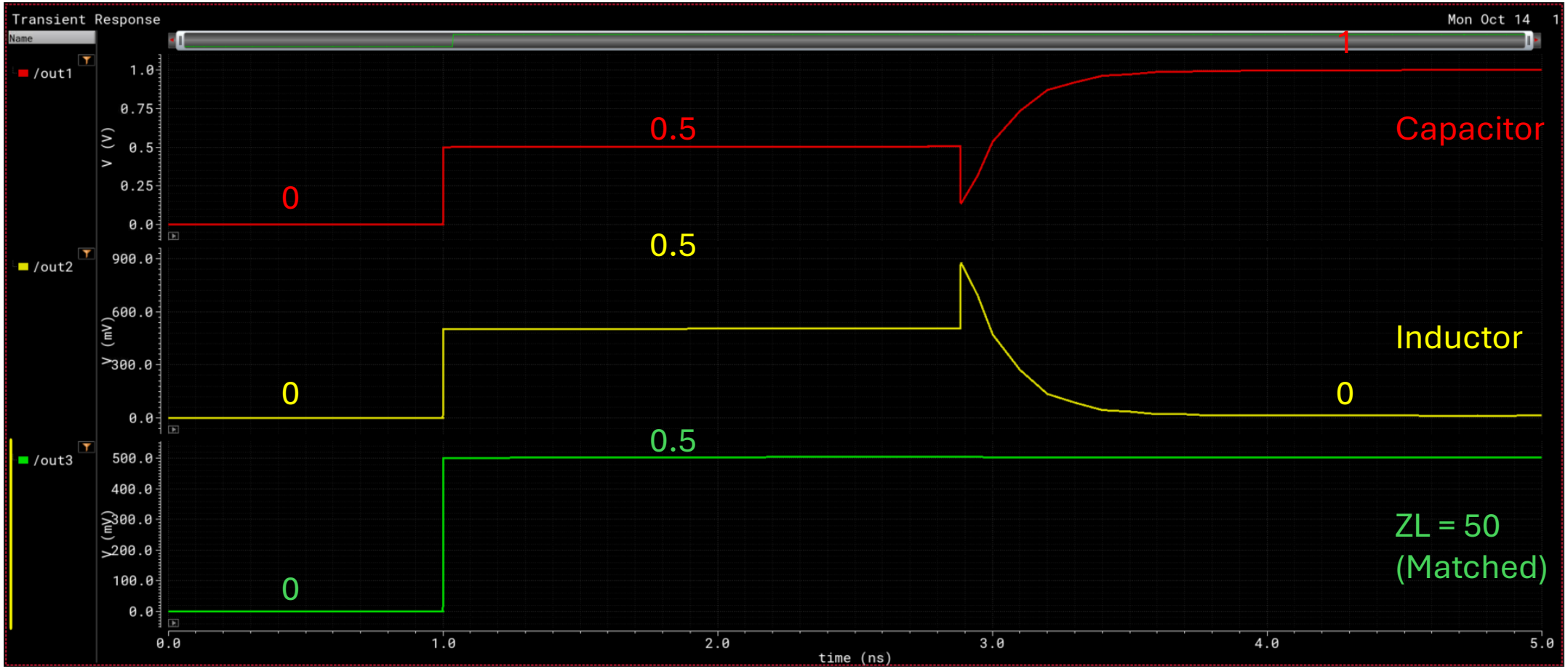
Analyses Setups



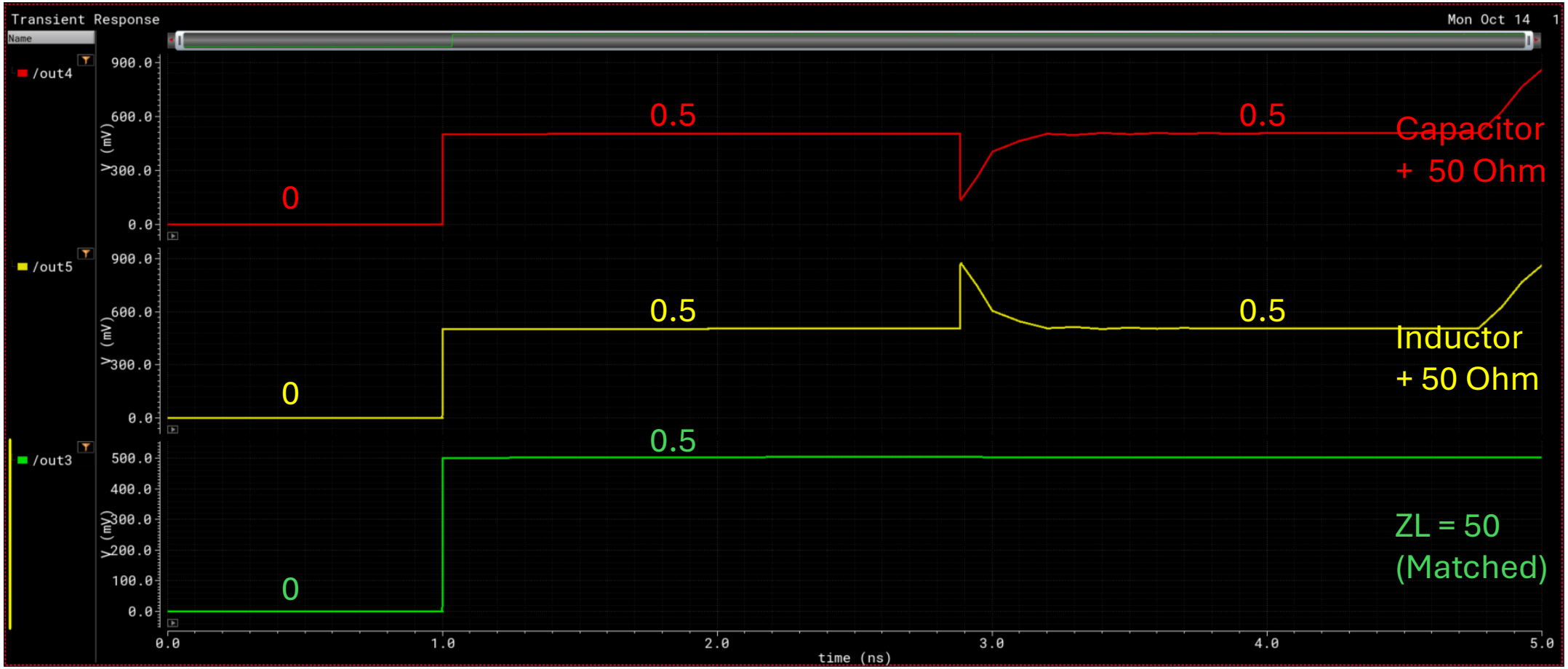


Test	Name	Type	Details	EvalType	Plot
Transient		signal	/inp	point	☑
Transient		signal	/out1	point	☑
Transient		signal	/out2	point	☑
Transient		signal	/out3	point	☑
Transient		signal	/out4	point	☑
Transient		signal	/out5	point	☑
S-Parameters	S11 dB20	expr	db(spm('sp 1 1))	point	☑
S-Parameters	S22 dB20	expr	db(spm('sp 2 2))	point	☑
S-Parameters	S33 dB20	expr	db(spm('sp 3 3))	point	☑
S-Parameters	S44 dB20	expr	db(spm('sp 4 4))	point	☑
S-Parameters	S55 dB20	expr	db(spm('sp 5 5))	point	☑

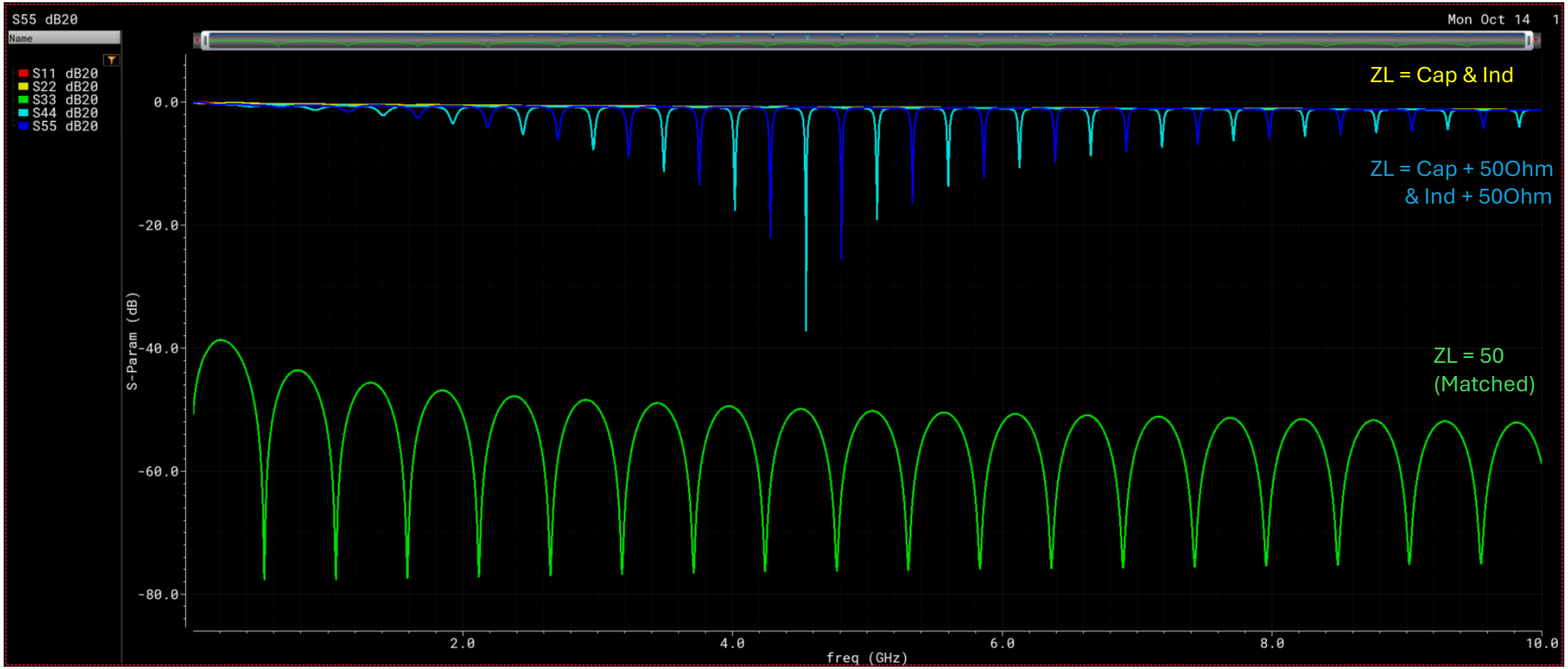
Results (Transient)



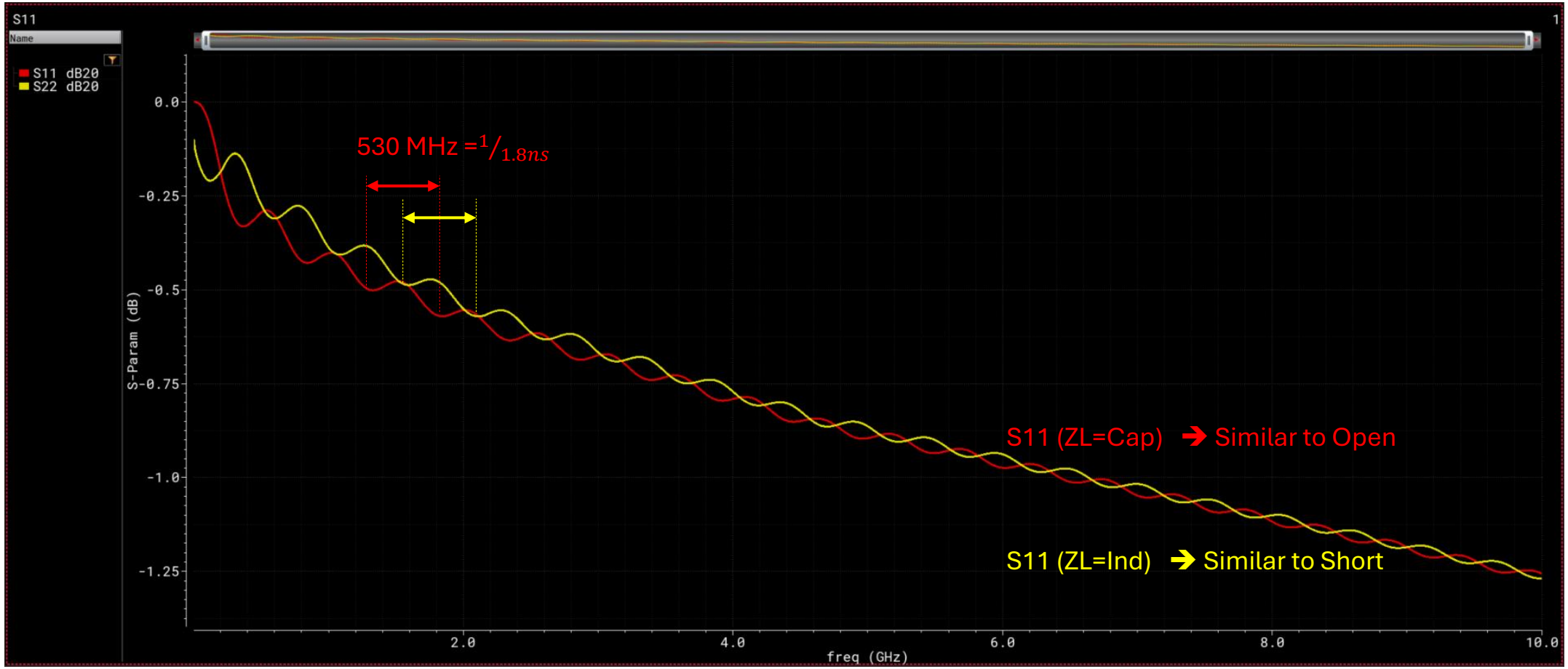
Results (Transient)



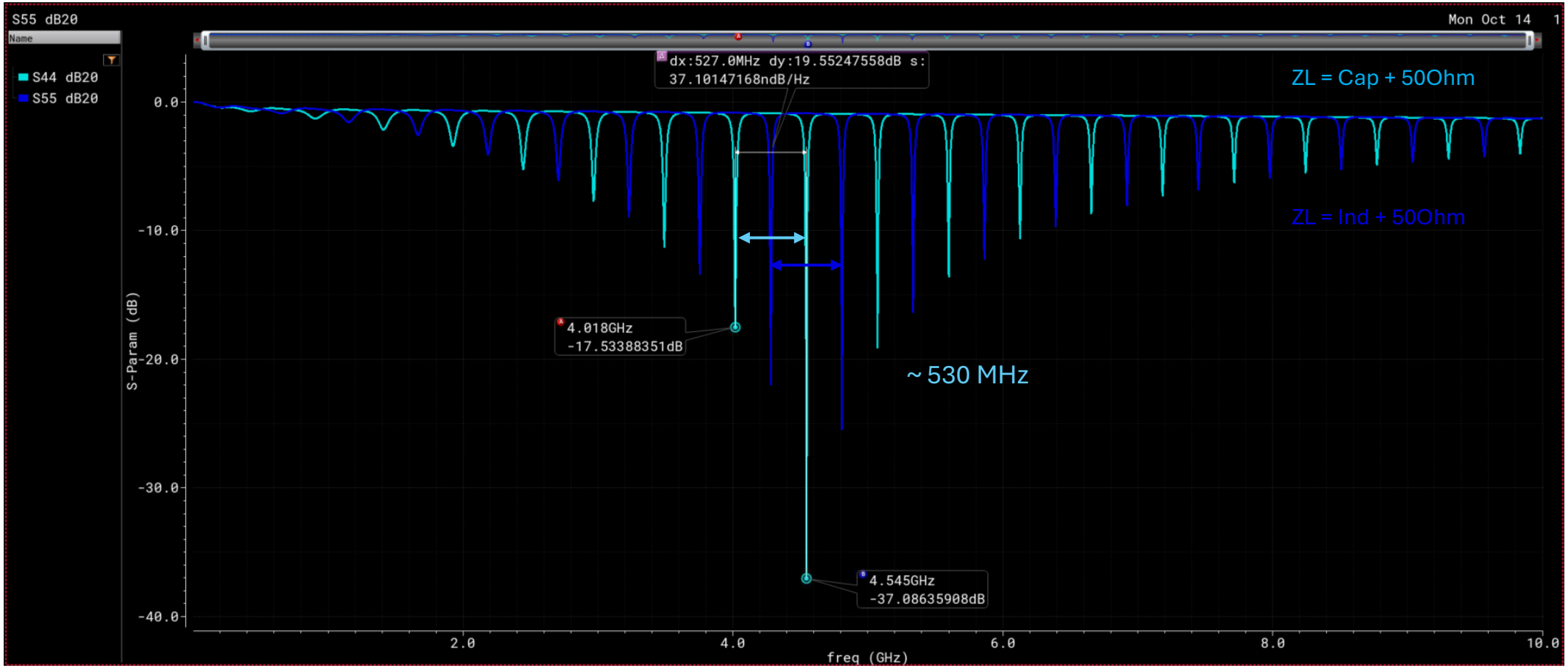
Results (S-Parameters) – S11



Results (S-Parameters) – S11



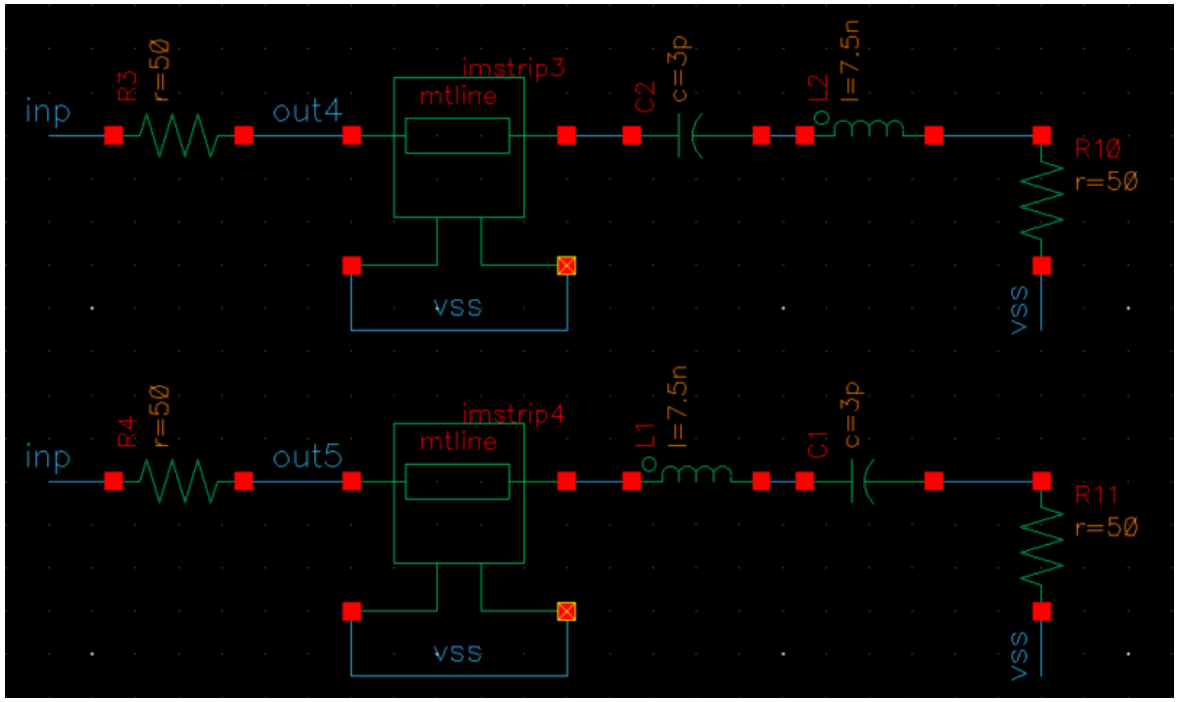
Results (S-Parameters) – S11



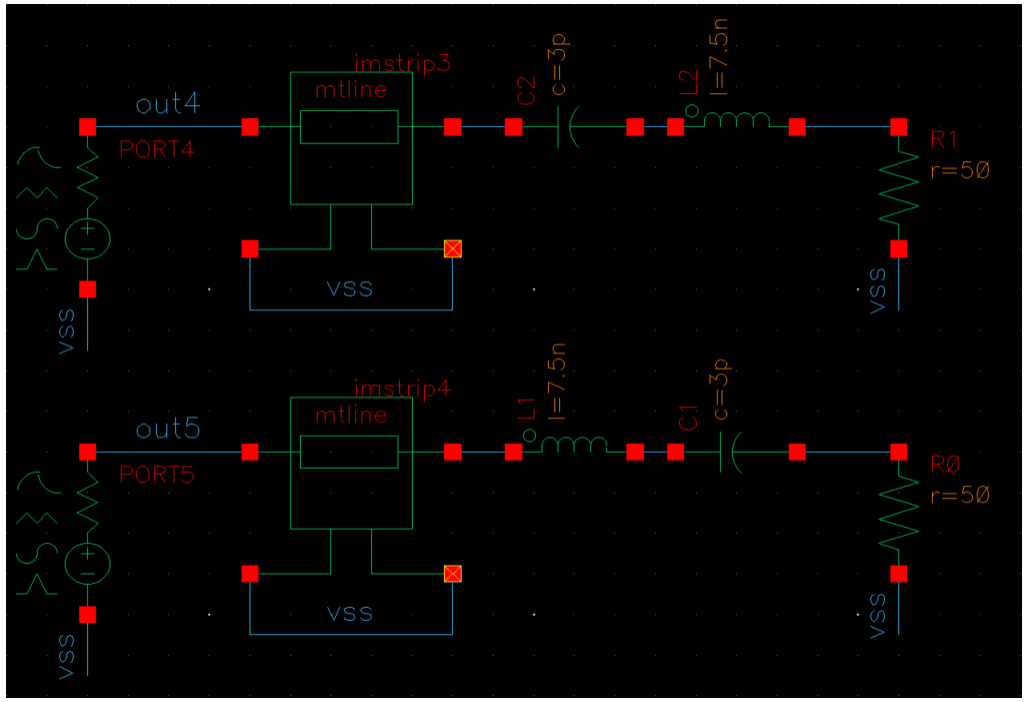
(C) LC Network Loads

[1] Series LC network

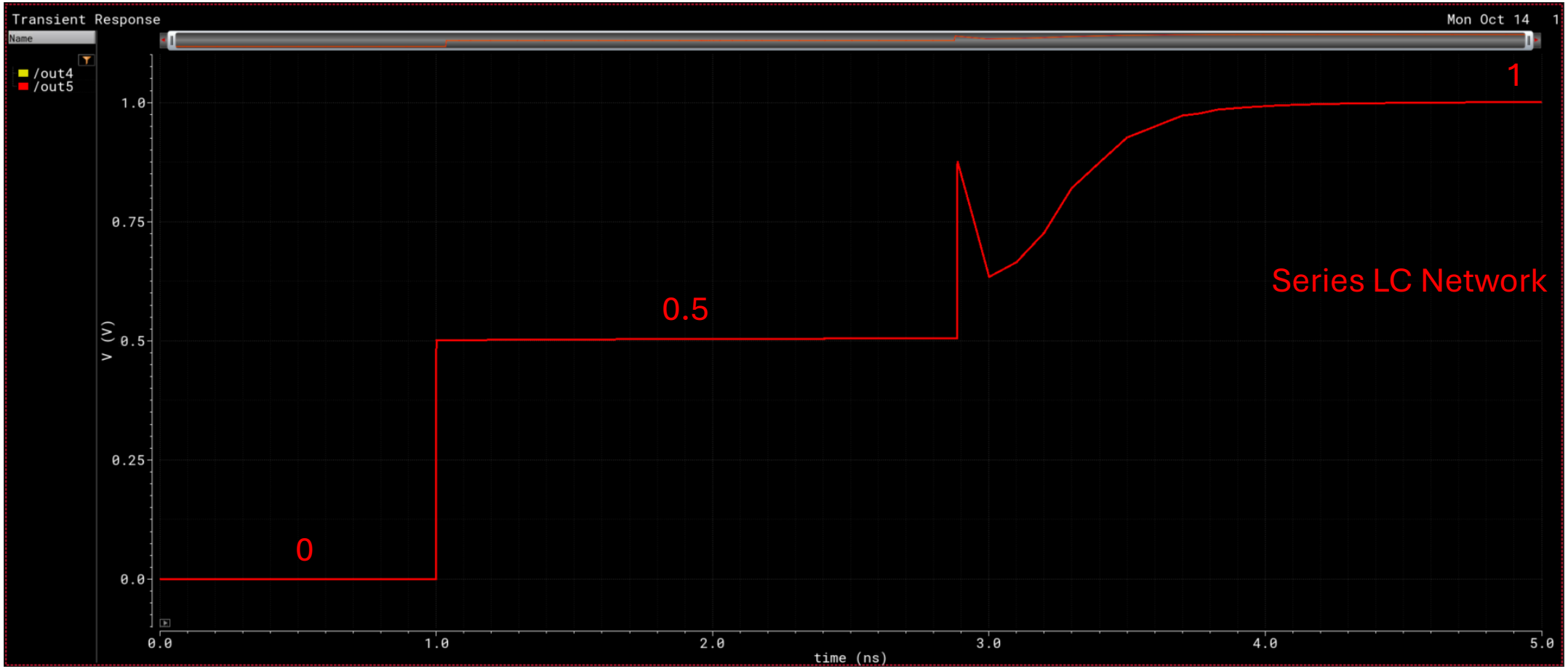
TB1: Transient



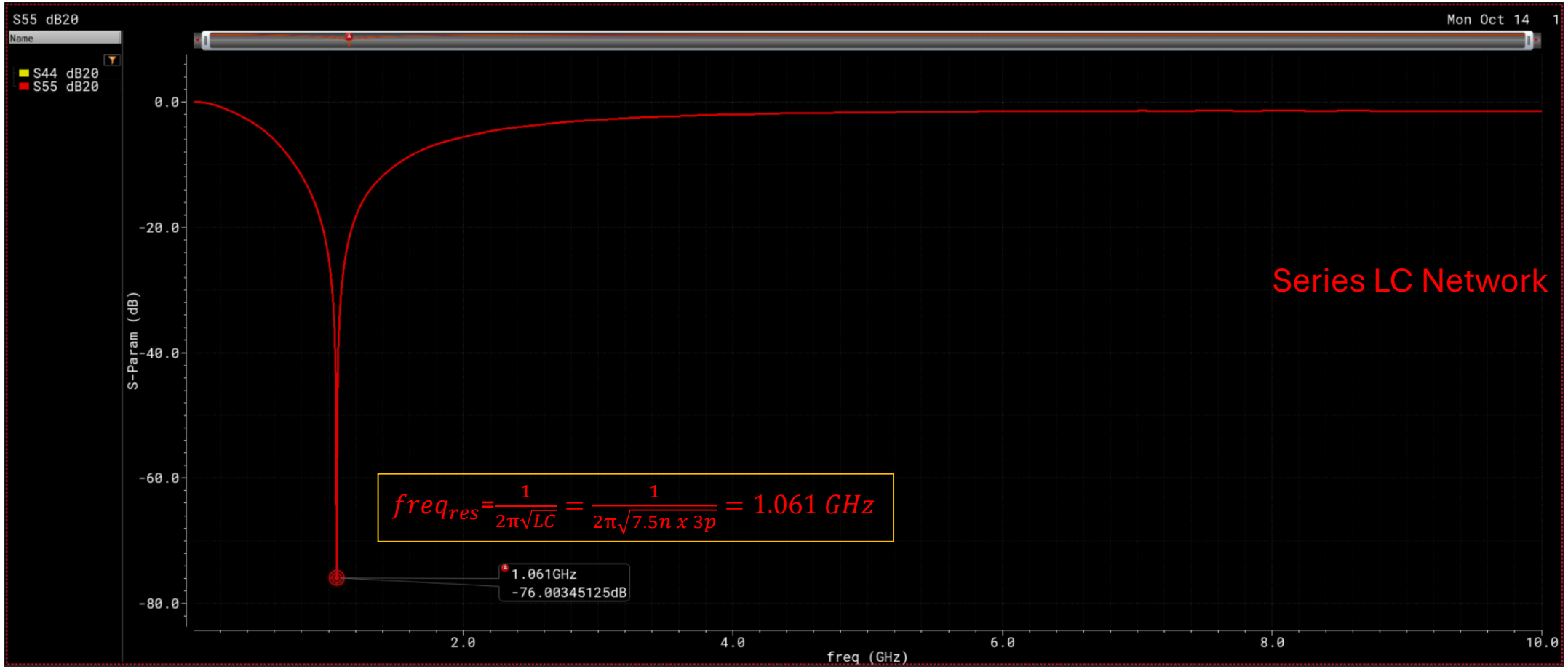
TB2: S-Parameters



Results (Transient)

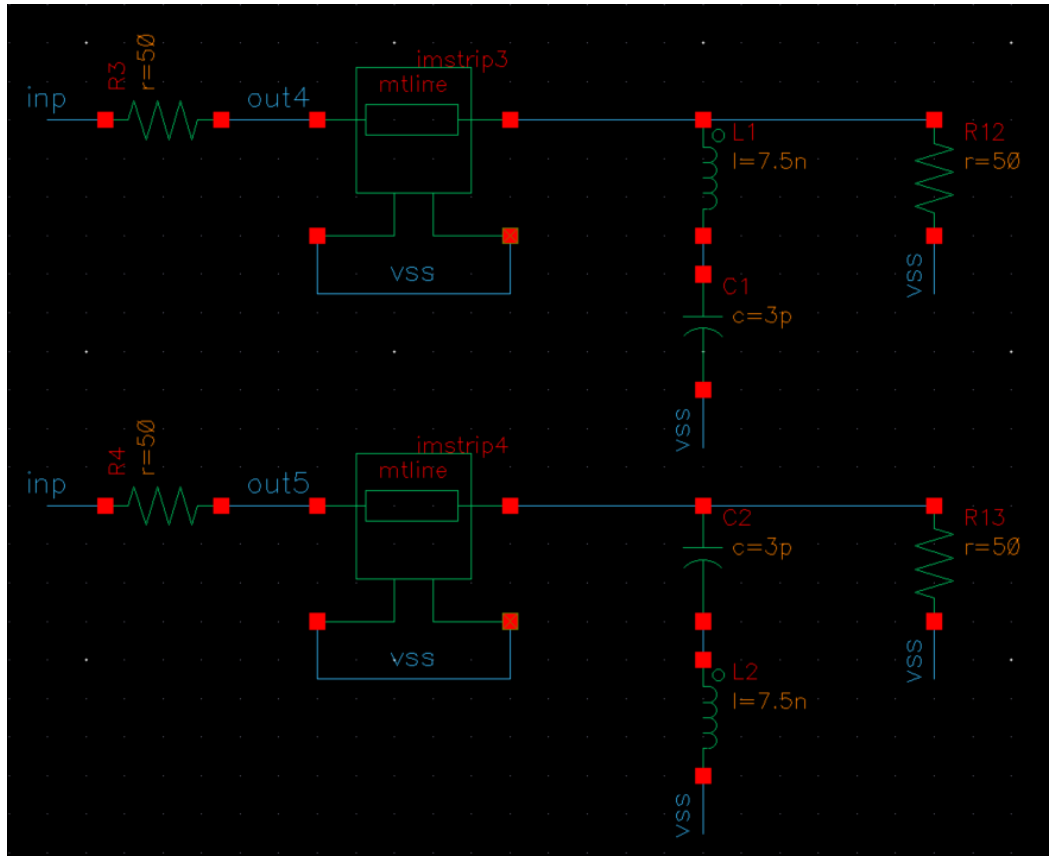


Results (S-Parameters) – S11

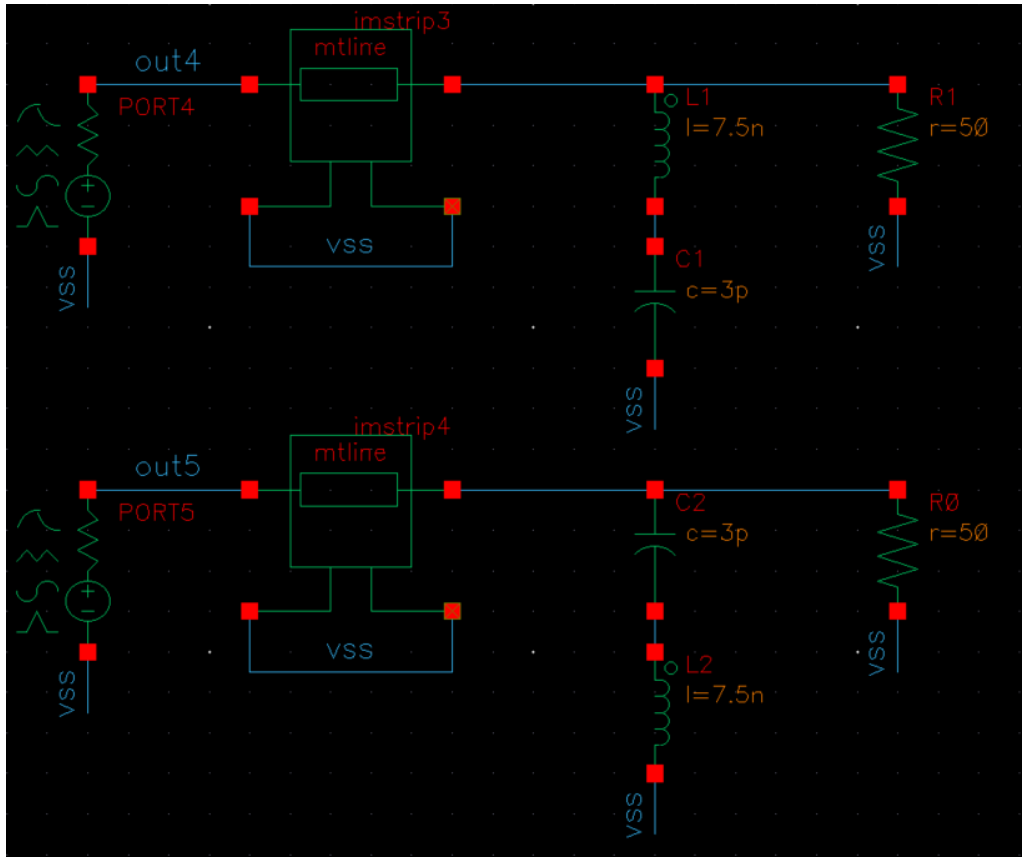


[2] Parallel LC network

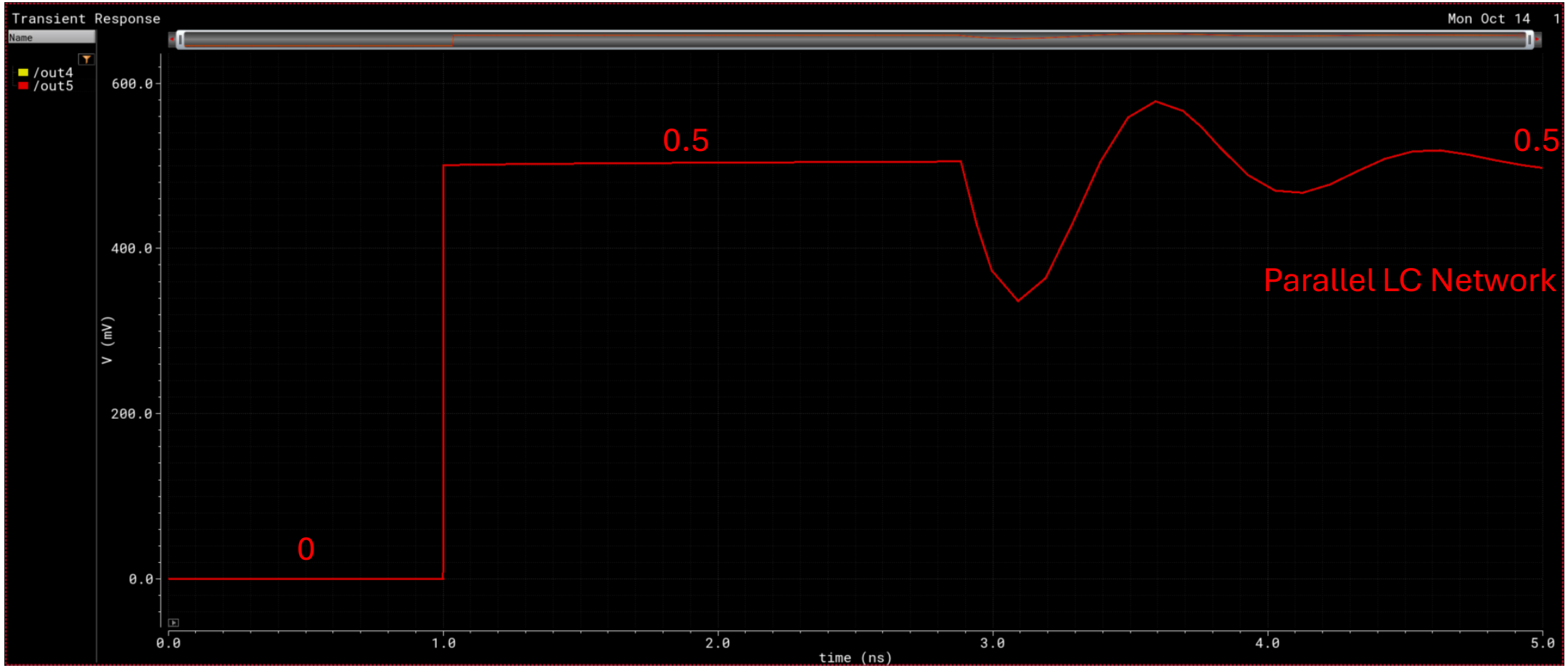
TB1: Transient



TB2: S-Parameters



Results (Transient)



Results (S-Parameters) – S11