Inverter

Doing analysis at TEMP = 25.000000 and TNOM = 27.000000

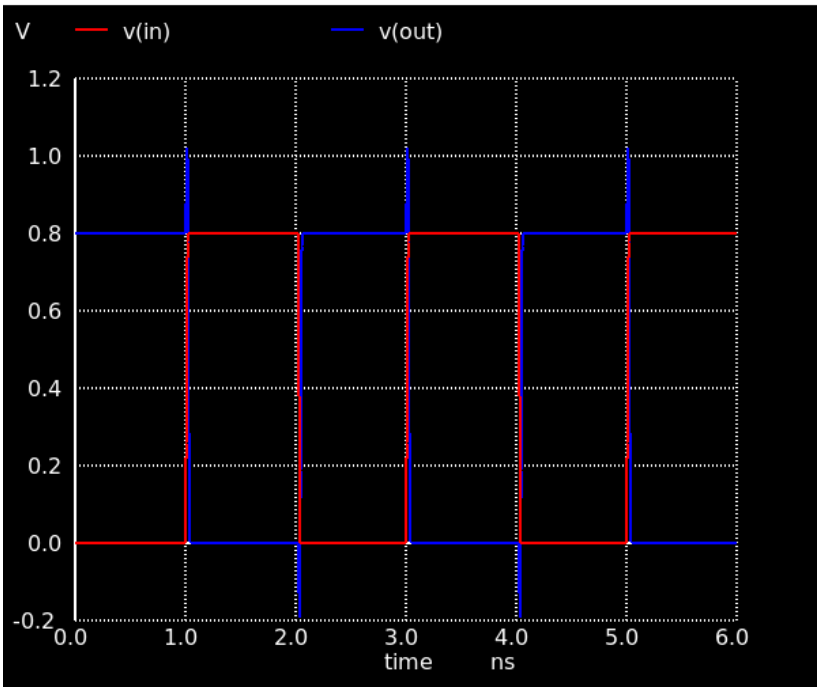
Warning: vin: no DC value, transient time 0 value used

Initial Transient Solution

Node	Voltage
vdd	0.8
in	0
out	0.8
vin#branch	8.53243e-12
vdd#branch	-2.34897e-11

Reference value : 5.67650e-09
No. of Data Rows : 6038
Doing analysis at TEMP = 25.000000 and TNOM = 27.000000

tplh = 1.675702e-11 targ= 2.046757e-09 trig= 2.030000e-09
tphl = 1.846314e-11 targ= 1.028463e-09 trig= 1.010000e-09
tplh_ps = 1.675702e+01
tphl_ps = 1.846314e+01



Circuit:

Doing analysis at TEMP = -40.000000 and TNOM = 27.000000

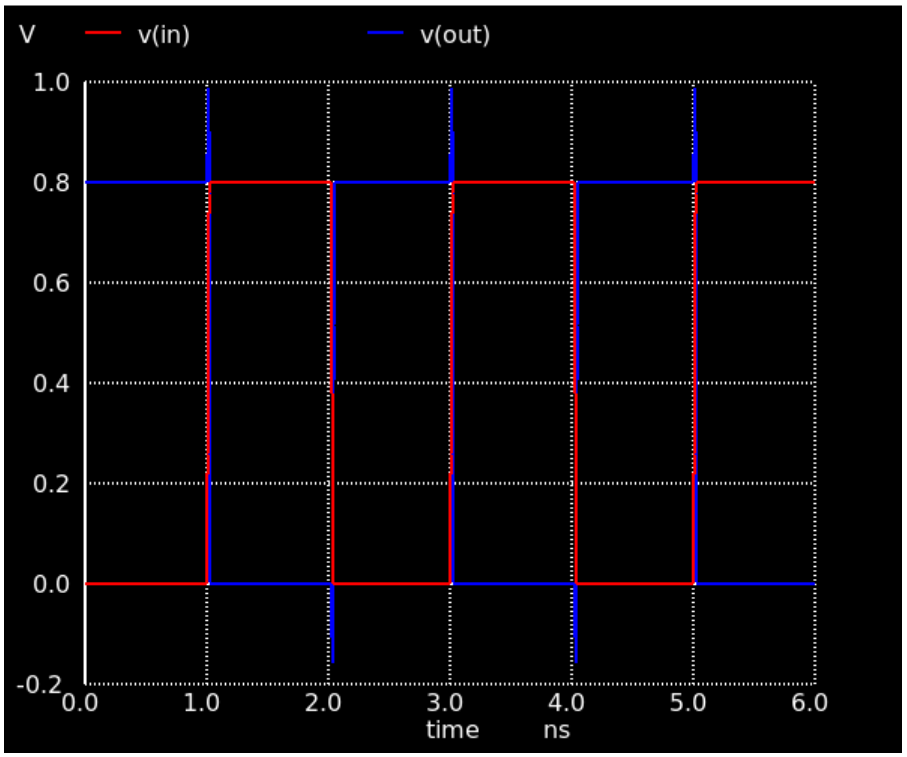
Warning: vin: no DC value, transient time 0 value used

Initial Transient Solution

Node	Voltage
vdd	0.8
in	0
out	0.8
vin#branch	8.04842e-12
vdd#branch	-9.42088e-12

Reference value : 4.83050e-09
No. of Data Rows : 6038
Doing analysis at TEMP = -40.000000 and TNOM = 27.000000

Warning: vin: no DC value, transient time 0 value used
tplh = 1.242956e-11 targ= 2.042430e-09 trig= 2.030000e-09
tphl = 1.365751e-11 targ= 1.023658e-09 trig= 1.010000e-09
tplh_ps = 1.242956e+01
tphl_ps = 1.365751e+01



Doing analysis at TEMP = 110.000000 and TNOM = 27.000000

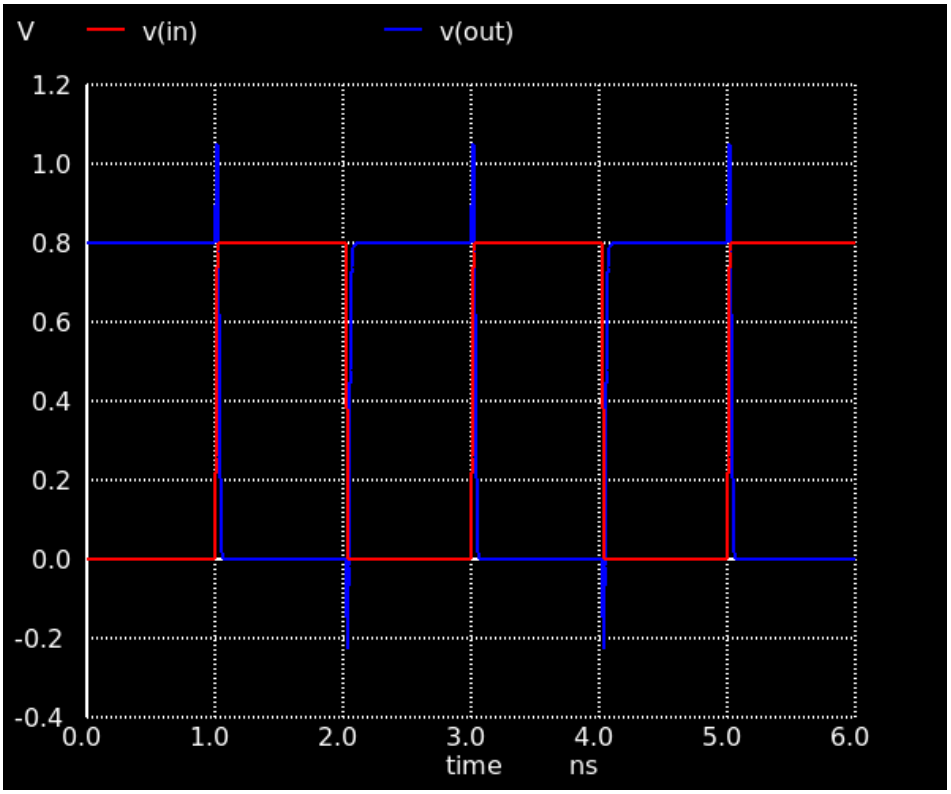
Warning: vin: no DC value, transient time 0 value used

Initial Transient Solution

Node	Voltage
vdd	0.8
in	0
out	0.8
vin#branch	9.10625e-12
vdd#branch	-2.54575e-10

Reference value : 4.91250e-09
No. of Data Rows : 6038
Doing analysis at TEMP = 110.000000 and TNOM = 27.000000

Warning: vin: no DC value, transient time 0 value used
tplh = 2.407749e-11 targ= 2.054077e-09 trig= 2.030000e-09
tphl = 2.657441e-11 targ= 1.036574e-09 trig= 1.010000e-09
tplh_ps = 2.407749e+01
tphl_ps = 2.657441e+01



NAND2

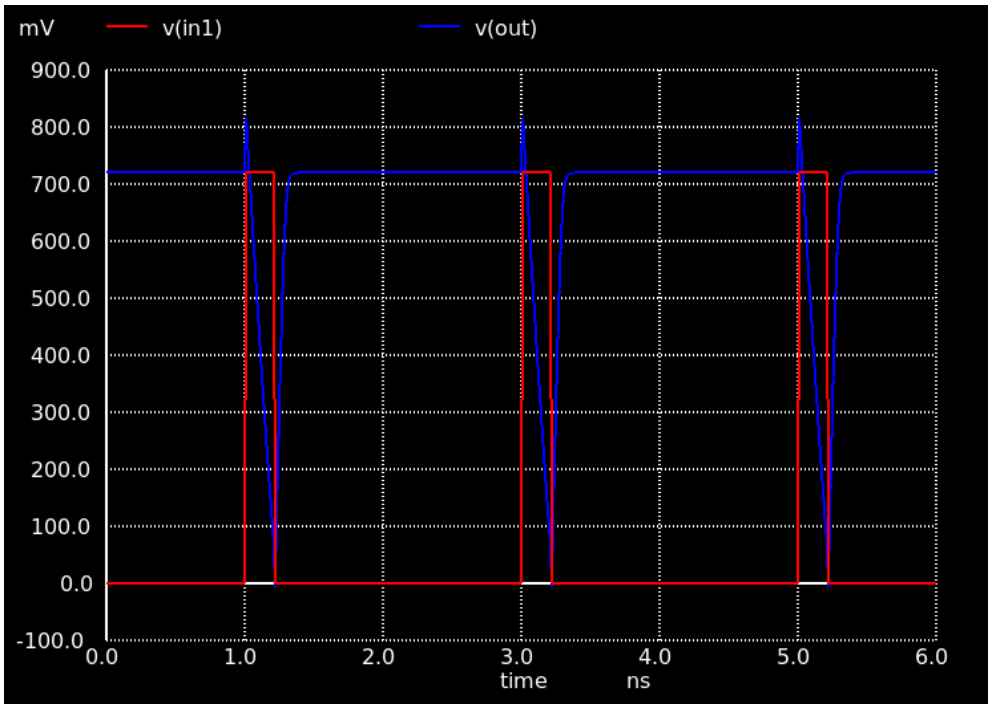
VDD 0.72 V | Cload 5fF

Initial Transient Solution

Node	Voltage
vdd	0.72
in1	0
in2	0.72
out	0.72
n1	1.859e-08
vin2#branch	-3.8273e-12
vin1#branch	3.91845e-12
vdd#branch	-1.79678e-11

Reference value : 4.50550e-09
No. of Data Rows : 6044
Doing analysis at TEMP = 27.000000 and TNOM = 27.000000

tphl_in1 = 1.207319e-10 targ= 1.125732e-09 trig= 1.005000e-09
tplh_in1 = 4.037380e-11 targ= 1.255374e-09 trig= 1.215000e-09
tphl_in1_ps = 1.207319e+02
tplh_in1_ps = 4.037380e+01



VDD 0.8V | C = 5 fF

Circuit:

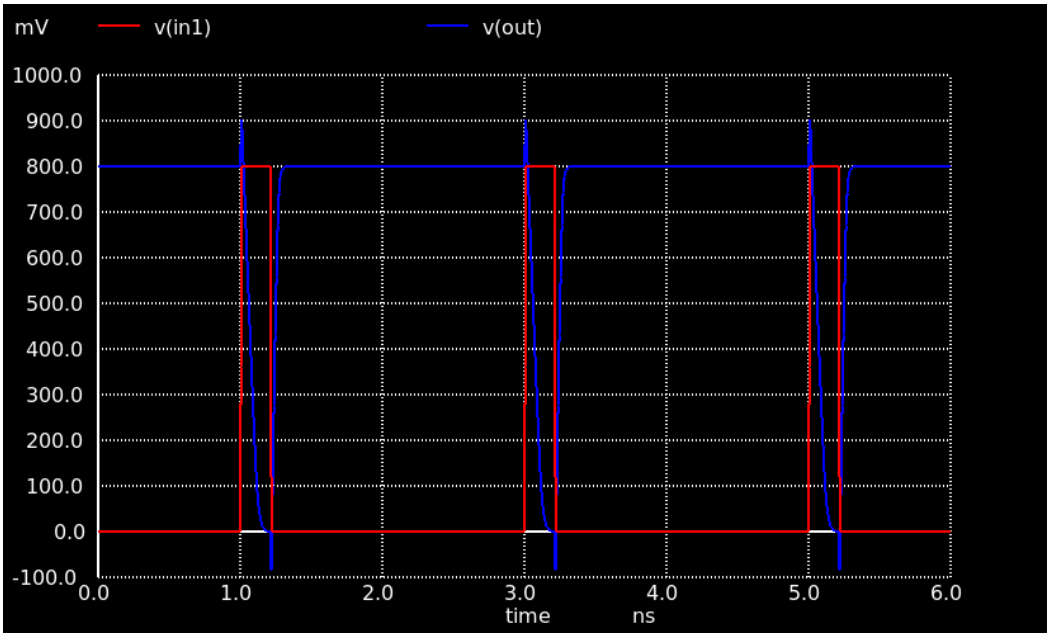
Doing analysis at TEMP = 27.000000 and TNOM = 27.000000

Initial Transient Solution

Node	Voltage
vdd	0.8
in1	0
in2	0.8
out	0.8
n1	1.6761e-08
vin2#branch	-1.00853e-11
vin1#branch	8.54681e-12
vdd#branch	-2.47342e-11

Reference value : 2.98050e-09
No. of Data Rows : 6044
Doing analysis at TEMP = 27.000000 and TNOM = 27.000000

tphl_in1 = 6.832509e-11 targ= 1.073325e-09 trig= 1.005000e-09
tplh_in1 = 2.941615e-11 targ= 1.244416e-09 trig= 1.215000e-09
tphl_in1_ps = 6.832509e+01
tplh_in1_ps = 2.941615e+01



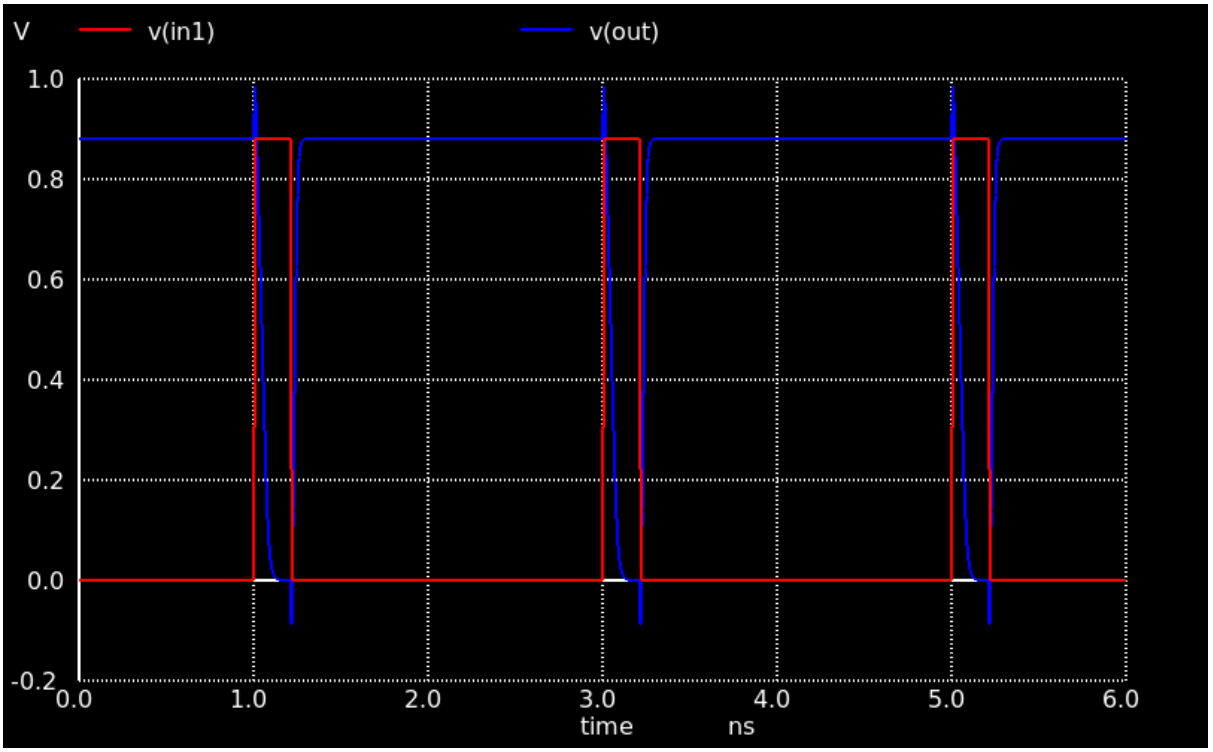
VDD 0.88V | Cload 5fF

Initial Transient Solution

Node	Voltage
vdd	0.88
in1	0
in2	0.88
out	0.88
n1	1.84657e-08
vin2#branch	-2.14625e-11
vin1#branch	1.59791e-11
vdd#branch	-3.46228e-11

Reference value : 2.98750e-09
No. of Data Rows : 6044
Doing analysis at TEMP = 27.000000 and TNOM = 27.000000

Warning: vin1: no DC value, transient time 0 value used
tphl_in1 = 4.703450e-11 targ= 1.052034e-09 trig= 1.005000e-09
tplh_in1 = 2.189480e-11 targ= 1.236895e-09 trig= 1.215000e-09
tphl_in1_ps = 4.703450e+01
tplh_in1_ps = 2.189480e+01



NAND2 | Batch mode

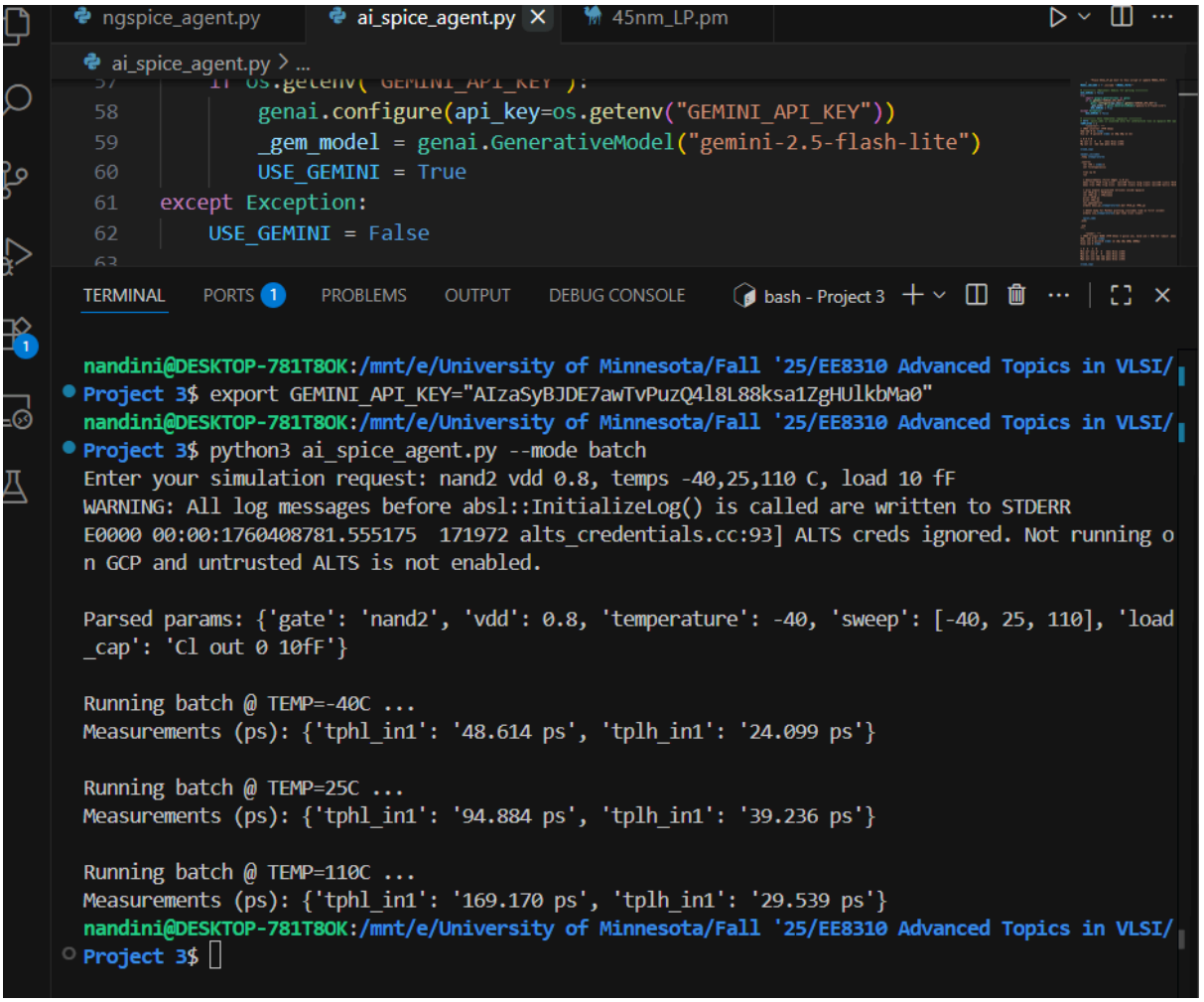
Enter your simulation request: nand2 vdd 0.8, temps -40,25,110 C, load 10 fF
WARNING: All log messages before absl::InitializeLog() is called are written to STDERR
E0000 00:00:1760408781.555175 171972 alts_credentials.cc:93] ALTS creds ignored. Not running on GCP and untrusted ALTS is not enabled.

Parsed params: {'gate': 'nand2', 'vdd': 0.8, 'temperature': -40, 'sweep': [-40, 25, 110], 'load_cap': 'Cl out 0 10fF'}

Running batch @ TEMP=-40C ...
Measurements (ps): {'tphl_in1': '48.614 ps', 'tplh_in1': '24.099 ps'}

Running batch @ TEMP=25C ...
Measurements (ps): {'tphl_in1': '94.884 ps', 'tplh_in1': '39.236 ps'}

Running batch @ TEMP=110C ...
Measurements (ps): {'tphl_in1': '169.170 ps', 'tplh_in1': '29.539 ps'}



Nandini Kumawat
Assignment 3 - Results

INVERTER Sweeping Capacitance

Project 3$ python3 ai_spice_agent.py --mode batch
Enter your simulation request: inverter vdd 0.8 V, temp 25 C, load 5-50 fF step 5 fF
WARNING: All log messages before absl::InitializeLog() is called are written to STDERR
E0000 00:00:1760410434.589810 184691 alts_credentials.cc:93] ALTS creds ignored. Not running on GCP and untrusted ALTS is not enabled.

Parsed params: {'gate': 'inverter', 'vdd': 0.8, 'temperature': 5, 'sweep': [5, 10, 15, 20, 25, 30, 35, 40, 45, 50], 'load_cap': 'Cl out 0 5-50 fF', 'loads_list': ['5fF', '10fF', '15fF', '20fF', '25fF', '30fF', '35fF', '40fF', '45fF', '50fF']}

Running batch @ TEMP=5C, Cload=5fF ...
Measurements (ps): {'tplh': '25.737 ps', 'tphl': '29.052 ps'}

Running batch @ TEMP=5C, Cload=10fF ...
Measurements (ps): {'tplh': '35.678 ps', 'tphl': '40.493 ps'}

Running batch @ TEMP=5C, Cload=15fF ...
Measurements (ps): {'tplh': '45.521 ps', 'tphl': '51.787 ps'}

Running batch @ TEMP=5C, Cload=20fF ...
Measurements (ps): {'tplh': '55.331 ps', 'tphl': '63.028 ps'}

Running batch @ TEMP=5C, Cload=25fF ...
Measurements (ps): {'tplh': '65.123 ps', 'tphl': '74.243 ps'}

Running batch @ TEMP=5C, Cload=30fF ...
Measurements (ps): {'tplh': '74.906 ps', 'tphl': '85.446 ps'}

Running batch @ TEMP=5C, Cload=35fF ...
Measurements (ps): {'tplh': '84.683 ps', 'tphl': '96.640 ps'}

Running batch @ TEMP=5C, Cload=40fF ...
Measurements (ps): {'tplh': '94.457 ps', 'tphl': '107.829 ps'}

Running batch @ TEMP=5C, Cload=45fF ...
Measurements (ps): {'tplh': '104.228 ps', 'tphl': '119.014 ps'}

Running batch @ TEMP=5C, Cload=50fF ...
Measurements (ps): {'tplh': '113.998 ps', 'tphl': '130.197 ps'}

Running batch @ TEMP=10C, Cload=5fF ...
Measurements (ps): {'tplh': '26.538 ps', 'tphl': '29.908 ps'}

Running batch @ TEMP=10C, Cload=10fF ...

Measurements (ps): {'tplh': '36.902 ps', 'tphl': '41.781 ps'}

Running batch @ TEMP=10C, Cload=15fF ...
Measurements (ps): {'tplh': '47.164 ps', 'tphl': '53.502 ps'}

Running batch @ TEMP=10C, Cload=20fF ...
Measurements (ps): {'tplh': '57.390 ps', 'tphl': '65.170 ps'}

Running batch @ TEMP=10C, Cload=25fF ...
Measurements (ps): {'tplh': '67.600 ps', 'tphl': '76.812 ps'}

Running batch @ TEMP=10C, Cload=30fF ...
Measurements (ps): {'tplh': '77.800 ps', 'tphl': '88.441 ps'}

Running batch @ TEMP=10C, Cload=35fF ...
Measurements (ps): {'tplh': '87.994 ps', 'tphl': '100.061 ps'}

Running batch @ TEMP=10C, Cload=40fF ...
Measurements (ps): {'tplh': '98.185 ps', 'tphl': '111.676 ps'}

Running batch @ TEMP=10C, Cload=45fF ...
Measurements (ps): {'tplh': '108.373 ps', 'tphl': '123.287 ps'}

Running batch @ TEMP=10C, Cload=50fF ...
Measurements (ps): {'tplh': '118.559 ps', 'tphl': '134.896 ps'}

Running batch @ TEMP=15C, Cload=5fF ...
Measurements (ps): {'tplh': '27.356 ps', 'tphl': '30.779 ps'}

Running batch @ TEMP=15C, Cload=10fF ...
Measurements (ps): {'tplh': '38.148 ps', 'tphl': '43.092 ps'}

Running batch @ TEMP=15C, Cload=15fF ...
Measurements (ps): {'tplh': '48.836 ps', 'tphl': '55.249 ps'}

Running batch @ TEMP=15C, Cload=20fF ...
Measurements (ps): {'tplh': '59.487 ps', 'tphl': '67.351 ps'}

Running batch @ TEMP=15C, Cload=25fF ...
Measurements (ps): {'tplh': '70.121 ps', 'tphl': '79.427 ps'}

Running batch @ TEMP=15C, Cload=30fF ...
Measurements (ps): {'tplh': '80.746 ps', 'tphl': '91.490 ps'}

Running batch @ TEMP=15C, Cload=35fF ...
Measurements (ps): {'tplh': '91.364 ps', 'tphl': '103.544 ps'}

Running batch @ TEMP=15C, Cload=40fF ...

Measurements (ps): {'tplh': '101.980 ps', 'tphl': '115.593 ps'}

Running batch @ TEMP=15C, Cload=45fF ...
Measurements (ps): {'tplh': '112.592 ps', 'tphl': '127.638 ps'}

Running batch @ TEMP=15C, Cload=50fF ...
Measurements (ps): {'tplh': '123.202 ps', 'tphl': '139.681 ps'}

Running batch @ TEMP=20C, Cload=5fF ...
Measurements (ps): {'tplh': '28.188 ps', 'tphl': '31.666 ps'}

Running batch @ TEMP=20C, Cload=10fF ...
Measurements (ps): {'tplh': '39.415 ps', 'tphl': '44.425 ps'}

Running batch @ TEMP=20C, Cload=15fF ...
Measurements (ps): {'tplh': '50.536 ps', 'tphl': '57.026 ps'}

Running batch @ TEMP=20C, Cload=20fF ...
Measurements (ps): {'tplh': '61.620 ps', 'tphl': '69.569 ps'}

Running batch @ TEMP=20C, Cload=25fF ...
Measurements (ps): {'tplh': '72.686 ps', 'tphl': '82.088 ps'}

Running batch @ TEMP=20C, Cload=30fF ...
Measurements (ps): {'tplh': '83.742 ps', 'tphl': '94.592 ps'}

Running batch @ TEMP=20C, Cload=35fF ...
Measurements (ps): {'tplh': '94.792 ps', 'tphl': '107.088 ps'}

Running batch @ TEMP=20C, Cload=40fF ...
Measurements (ps): {'tplh': '105.839 ps', 'tphl': '119.578 ps'}

Running batch @ TEMP=20C, Cload=45fF ...
Measurements (ps): {'tplh': '116.883 ps', 'tphl': '132.064 ps'}

Running batch @ TEMP=20C, Cload=50fF ...
Measurements (ps): {'tplh': '127.925 ps', 'tphl': '144.548 ps'}

Running batch @ TEMP=25C, Cload=5fF ...
Measurements (ps): {'tplh': '29.034 ps', 'tphl': '32.567 ps'}

Running batch @ TEMP=25C, Cload=10fF ...
Measurements (ps): {'tplh': '40.704 ps', 'tphl': '45.781 ps'}

Running batch @ TEMP=25C, Cload=15fF ...
Measurements (ps): {'tplh': '52.265 ps', 'tphl': '58.831 ps'}

Running batch @ TEMP=25C, Cload=20fF ...

Measurements (ps): {'tplh': '63.788 ps', 'tphl': '71.825 ps'}

Running batch @ TEMP=25C, Cload=25fF ...
Measurements (ps): {'tplh': '75.293 ps', 'tphl': '84.792 ps'}

Running batch @ TEMP=25C, Cload=30fF ...
Measurements (ps): {'tplh': '86.788 ps', 'tphl': '97.745 ps'}

Running batch @ TEMP=25C, Cload=35fF ...
Measurements (ps): {'tplh': '98.277 ps', 'tphl': '110.689 ps'}

Running batch @ TEMP=25C, Cload=40fF ...
Measurements (ps): {'tplh': '109.762 ps', 'tphl': '123.628 ps'}

Running batch @ TEMP=25C, Cload=45fF ...
Measurements (ps): {'tplh': '121.244 ps', 'tphl': '136.563 ps'}

Running batch @ TEMP=25C, Cload=50fF ...
Measurements (ps): {'tplh': '132.725 ps', 'tphl': '149.495 ps'}

Running batch @ TEMP=30C, Cload=5fF ...
Measurements (ps): {'tplh': '29.893 ps', 'tphl': '33.483 ps'}

Running batch @ TEMP=30C, Cload=10fF ...
Measurements (ps): {'tplh': '42.014 ps', 'tphl': '47.158 ps'}

Running batch @ TEMP=30C, Cload=15fF ...
Measurements (ps): {'tplh': '54.022 ps', 'tphl': '60.666 ps'}

Running batch @ TEMP=30C, Cload=20fF ...
Measurements (ps): {'tplh': '65.991 ps', 'tphl': '74.116 ps'}

Running batch @ TEMP=30C, Cload=25fF ...
Measurements (ps): {'tplh': '77.941 ps', 'tphl': '87.539 ps'}

Running batch @ TEMP=30C, Cload=30fF ...
Measurements (ps): {'tplh': '89.882 ps', 'tphl': '100.948 ps'}

Running batch @ TEMP=30C, Cload=35fF ...
Measurements (ps): {'tplh': '101.817 ps', 'tphl': '114.348 ps'}

Running batch @ TEMP=30C, Cload=40fF ...
Measurements (ps): {'tplh': '113.747 ps', 'tphl': '127.743 ps'}

Running batch @ TEMP=30C, Cload=45fF ...
Measurements (ps): {'tplh': '125.675 ps', 'tphl': '141.133 ps'}

Running batch @ TEMP=30C, Cload=50fF ...

Measurements (ps): {'tplh': '137.601 ps', 'tphl': '154.521 ps'}

Running batch @ TEMP=35C, Cload=5fF ...
Measurements (ps): {'tplh': '30.766 ps', 'tphl': '34.413 ps'}

Running batch @ TEMP=35C, Cload=10fF ...
Measurements (ps): {'tplh': '43.343 ps', 'tphl': '48.555 ps'}

Running batch @ TEMP=35C, Cload=15fF ...
Measurements (ps): {'tplh': '55.806 ps', 'tphl': '62.528 ps'}

Running batch @ TEMP=35C, Cload=20fF ...
Measurements (ps): {'tplh': '68.227 ps', 'tphl': '76.441 ps'}

Running batch @ TEMP=35C, Cload=25fF ...
Measurements (ps): {'tplh': '80.631 ps', 'tphl': '90.328 ps'}

Running batch @ TEMP=35C, Cload=30fF ...
Measurements (ps): {'tplh': '93.024 ps', 'tphl': '104.200 ps'}

Running batch @ TEMP=35C, Cload=35fF ...
Measurements (ps): {'tplh': '105.411 ps', 'tphl': '118.062 ps'}

Running batch @ TEMP=35C, Cload=40fF ...
Measurements (ps): {'tplh': '117.794 ps', 'tphl': '131.919 ps'}

Running batch @ TEMP=35C, Cload=45fF ...
Measurements (ps): {'tplh': '130.174 ps', 'tphl': '145.773 ps'}

Running batch @ TEMP=35C, Cload=50fF ...
Measurements (ps): {'tplh': '142.552 ps', 'tphl': '159.623 ps'}

Running batch @ TEMP=40C, Cload=5fF ...
Measurements (ps): {'tplh': '31.652 ps', 'tphl': '35.357 ps'}

Running batch @ TEMP=40C, Cload=10fF ...
Measurements (ps): {'tplh': '44.693 ps', 'tphl': '49.975 ps'}

Running batch @ TEMP=40C, Cload=15fF ...
Measurements (ps): {'tplh': '57.616 ps', 'tphl': '64.418 ps'}

Running batch @ TEMP=40C, Cload=20fF ...
Measurements (ps): {'tplh': '70.497 ps', 'tphl': '78.802 ps'}

Running batch @ TEMP=40C, Cload=25fF ...
Measurements (ps): {'tplh': '83.360 ps', 'tphl': '93.158 ps'}

Running batch @ TEMP=40C, Cload=30fF ...

Measurements (ps): {'tplh': '96.213 ps', 'tphl': '107.499 ps'}

Running batch @ TEMP=40C, Cload=35fF ...
Measurements (ps): {'tplh': '109.059 ps', 'tphl': '121.831 ps'}

Running batch @ TEMP=40C, Cload=40fF ...
Measurements (ps): {'tplh': '121.901 ps', 'tphl': '136.157 ps'}

Running batch @ TEMP=40C, Cload=45fF ...
Measurements (ps): {'tplh': '134.740 ps', 'tphl': '150.479 ps'}

Running batch @ TEMP=40C, Cload=50fF ...
Measurements (ps): {'tplh': '147.577 ps', 'tphl': '164.799 ps'}

Running batch @ TEMP=45C, Cload=5fF ...
Measurements (ps): {'tplh': '32.551 ps', 'tphl': '36.315 ps'}

Running batch @ TEMP=45C, Cload=10fF ...
Measurements (ps): {'tplh': '46.063 ps', 'tphl': '51.413 ps'}

Running batch @ TEMP=45C, Cload=15fF ...
Measurements (ps): {'tplh': '59.453 ps', 'tphl': '66.334 ps'}

Running batch @ TEMP=45C, Cload=20fF ...
Measurements (ps): {'tplh': '72.801 ps', 'tphl': '81.195 ps'}

Running batch @ TEMP=45C, Cload=25fF ...
Measurements (ps): {'tplh': '86.129 ps', 'tphl': '96.027 ps'}

Running batch @ TEMP=45C, Cload=30fF ...
Measurements (ps): {'tplh': '99.447 ps', 'tphl': '110.844 ps'}

Running batch @ TEMP=45C, Cload=35fF ...
Measurements (ps): {'tplh': '112.759 ps', 'tphl': '125.652 ps'}

Running batch @ TEMP=45C, Cload=40fF ...
Measurements (ps): {'tplh': '126.067 ps', 'tphl': '140.454 ps'}

Running batch @ TEMP=45C, Cload=45fF ...
Measurements (ps): {'tplh': '139.371 ps', 'tphl': '155.252 ps'}

Running batch @ TEMP=45C, Cload=50fF ...
Measurements (ps): {'tplh': '152.674 ps', 'tphl': '170.048 ps'}

Running batch @ TEMP=50C, Cload=5fF ...
Measurements (ps): {'tplh': '33.464 ps', 'tphl': '37.286 ps'}

Running batch @ TEMP=50C, Cload=10fF ...

Measurements (ps): {'tplh': '47.452 ps', 'tphl': '52.872 ps'}

Running batch @ TEMP=50C, Cload=15fF ...
Measurements (ps): {'tplh': '61.316 ps', 'tphl': '68.277 ps'}

Running batch @ TEMP=50C, Cload=20fF ...
Measurements (ps): {'tplh': '75.137 ps', 'tphl': '83.620 ps'}

Running batch @ TEMP=50C, Cload=25fF ...
Measurements (ps): {'tplh': '88.938 ps', 'tphl': '98.935 ps'}

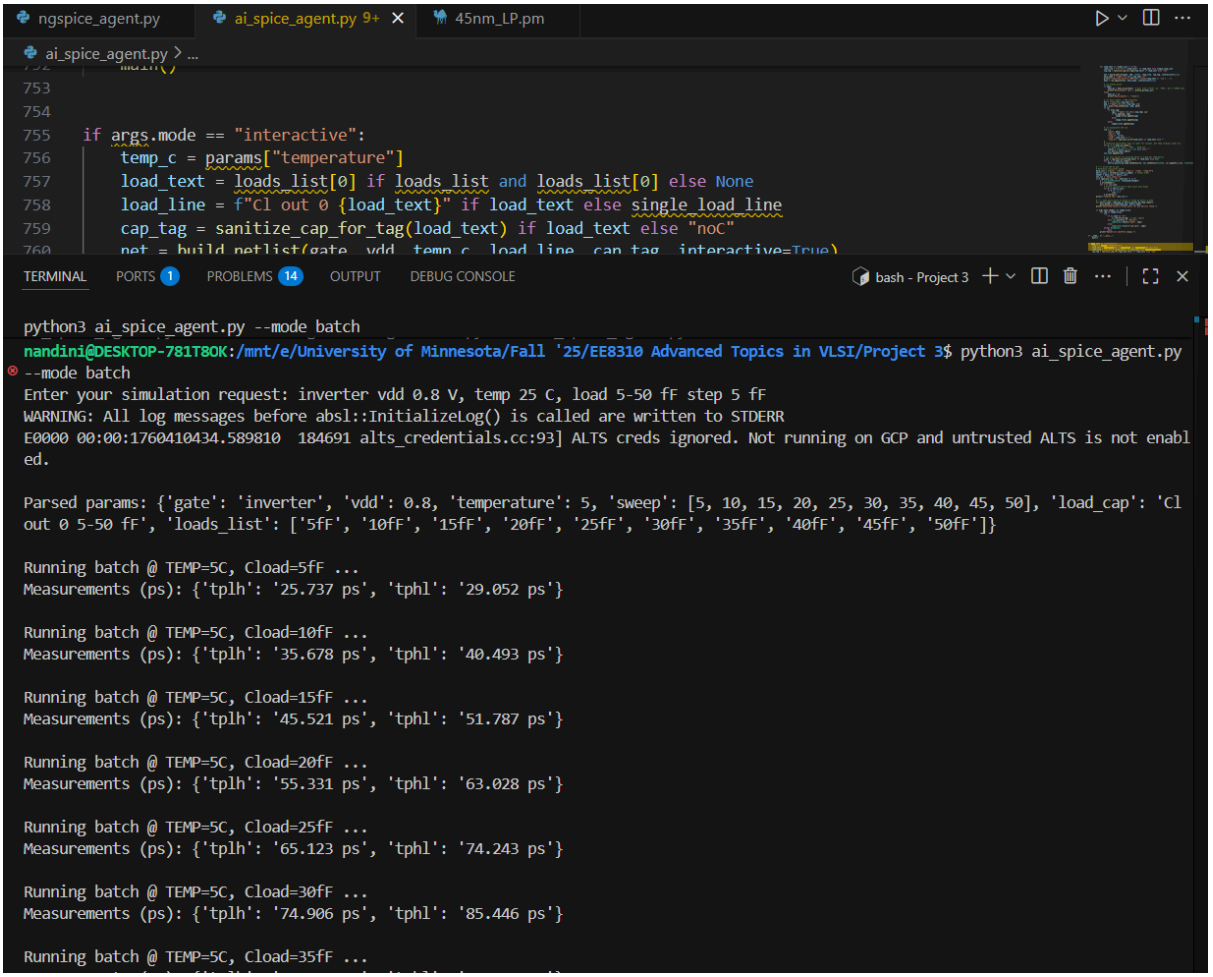
Running batch @ TEMP=50C, Cload=30fF ...
Measurements (ps): {'tplh': '102.728 ps', 'tphl': '114.235 ps'}

Running batch @ TEMP=50C, Cload=35fF ...
Measurements (ps): {'tplh': '116.511 ps', 'tphl': '129.525 ps'}

Running batch @ TEMP=50C, Cload=40fF ...
Measurements (ps): {'tplh': '130.291 ps', 'tphl': '144.810 ps'}

Running batch @ TEMP=50C, Cload=45fF ...
Measurements (ps): {'tplh': '144.068 ps', 'tphl': '160.090 ps'}

Running batch @ TEMP=50C, Cload=50fF ...
Measurements (ps): {'tplh': '157.842 ps', 'tphl': '175.367 ps'}



These values were dumped in a .csv file.