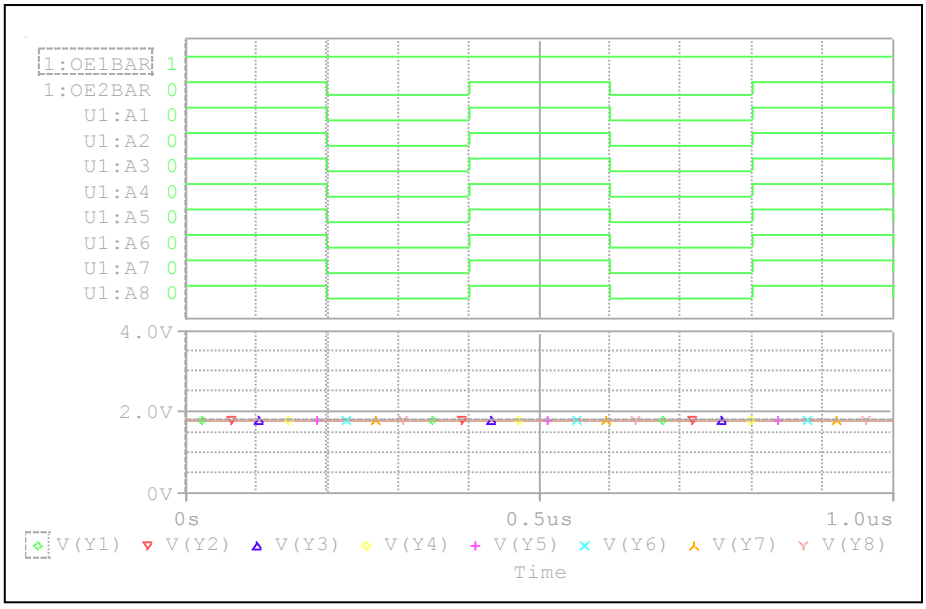
Device Modeling Report

COMPONENTS : CMOS DIGITAL INTEGRATED CIRCUIT
PART NUMBER : TC74VCX541FT
MANUFACTURER : TOSHIBA

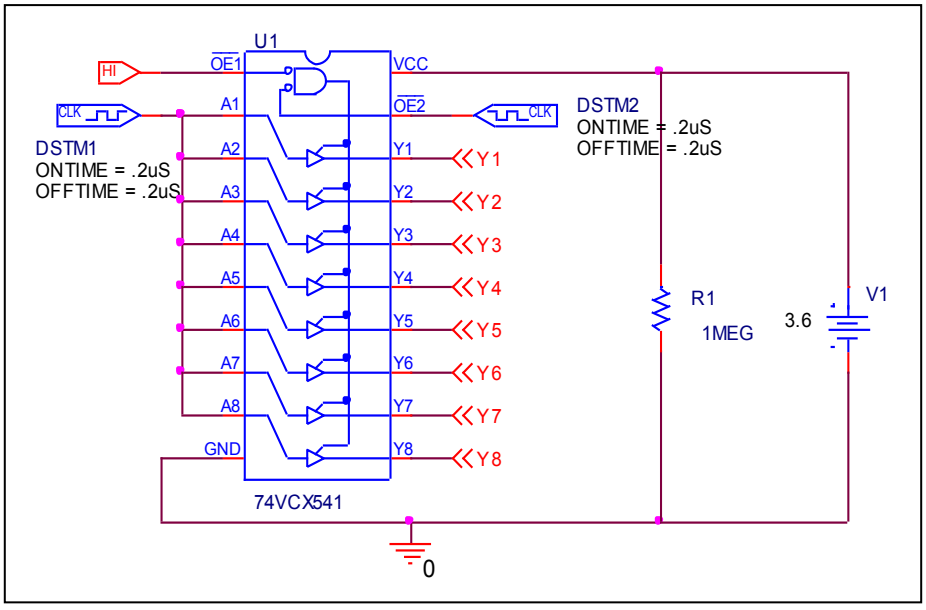
Bee Technologies Inc.

Truth Table

Circuit simulation result



Evaluation circuit

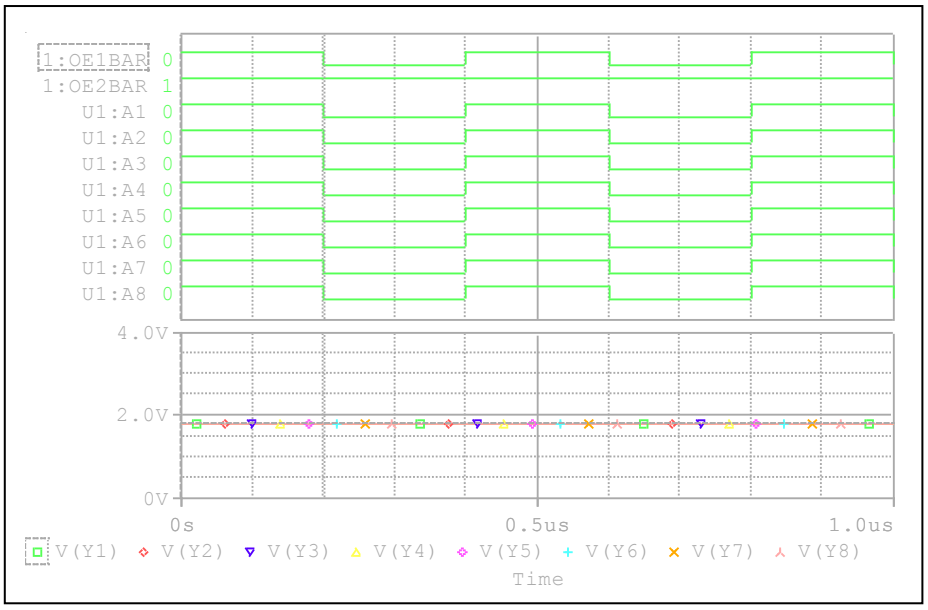


Comparison table

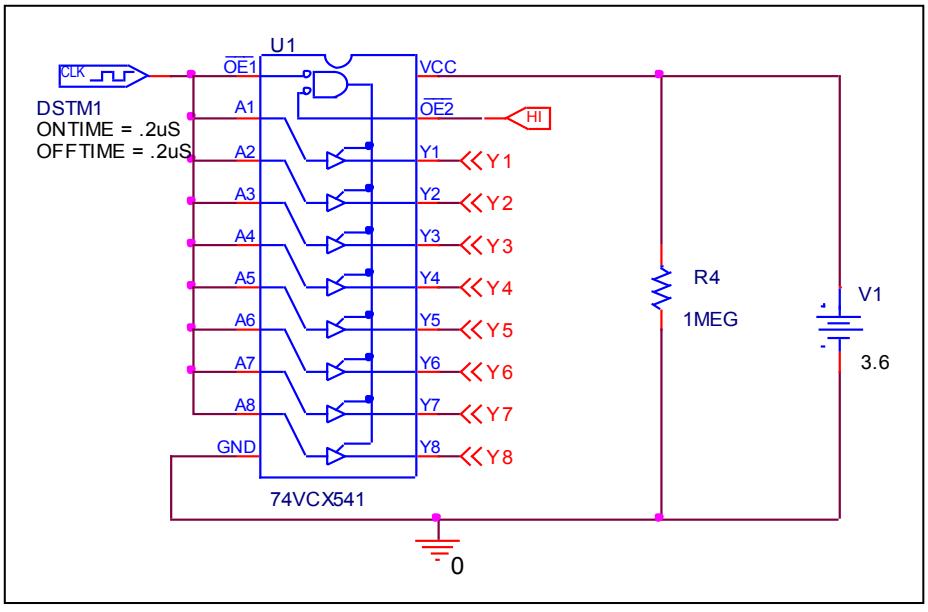
Input			Output		%Error
$\overline{OE1}$	$\overline{OE2}$	An	Yn (Measurement)	Yn (Simulation)	
H	X	X	Z	Z	0

Truth Table

Circuit simulation result



Evaluation circuit

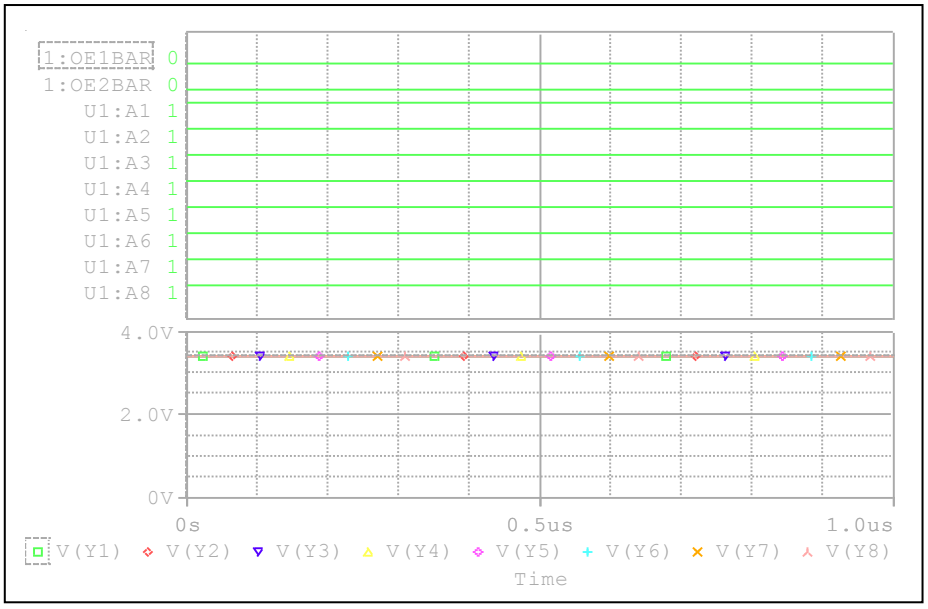


Comparison table

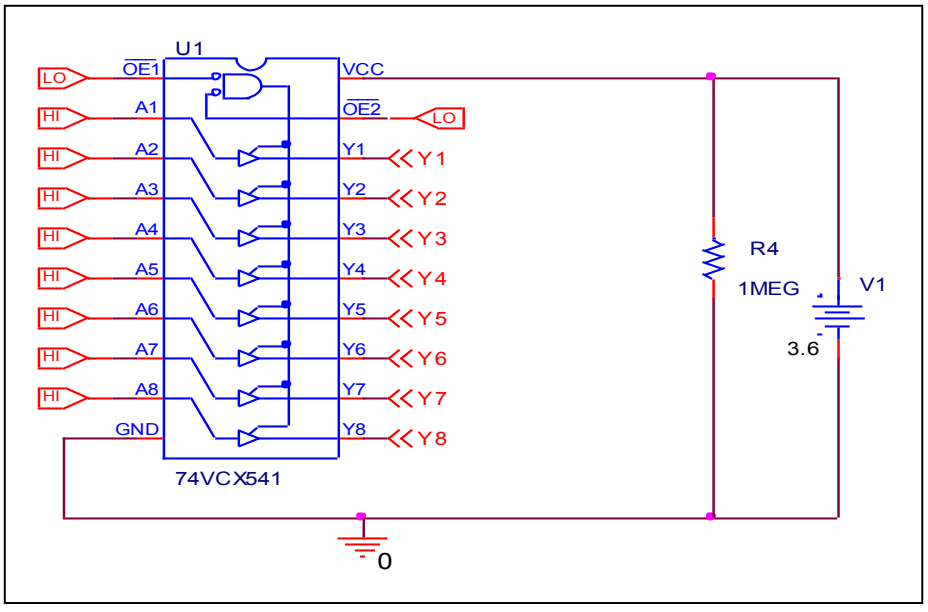
Input			Output		%Error
$\overline{OE1}$	$\overline{OE2}$	An	Yn (Measurement)	Yn (Simulation)	
X	H	X	Z	Z	0

Truth Table

Circuit simulation result



Evaluation circuit

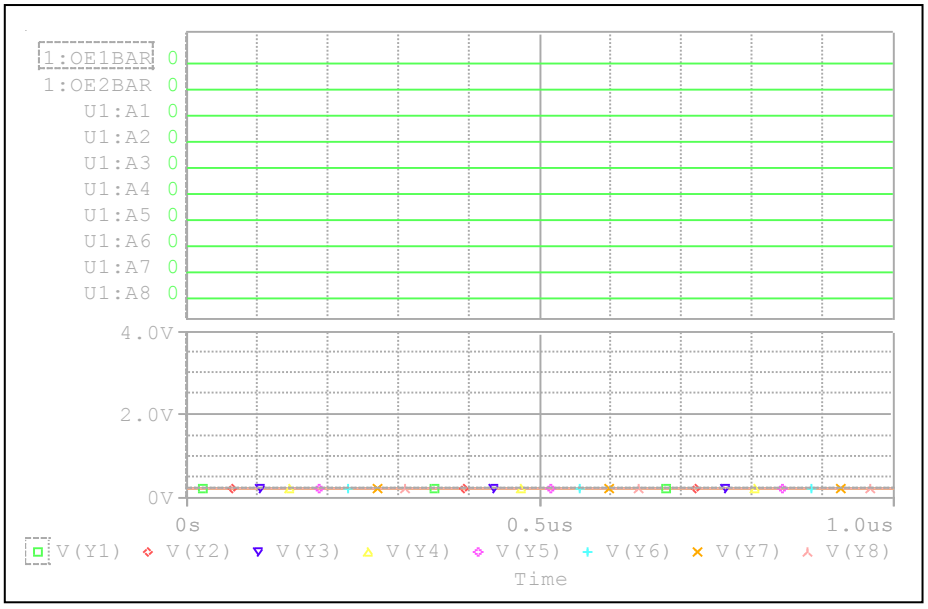


Comparison table

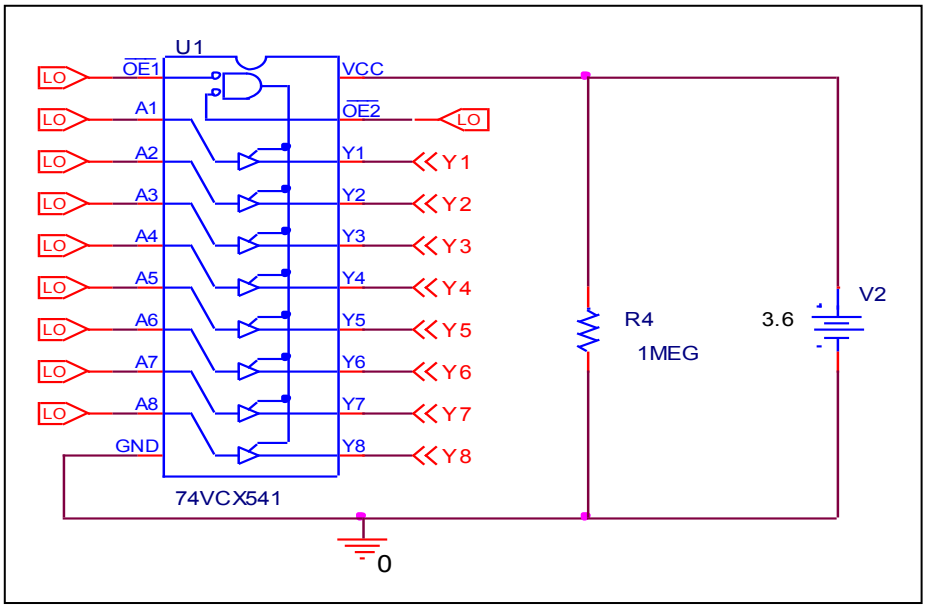
Input			Output		%Error
$\overline{OE1}$	$\overline{OE2}$	An	Yn (Measurement)	Yn (Simulation)	
L	L	H	H	H	0

Truth Table

Circuit simulation result



Evaluation circuit

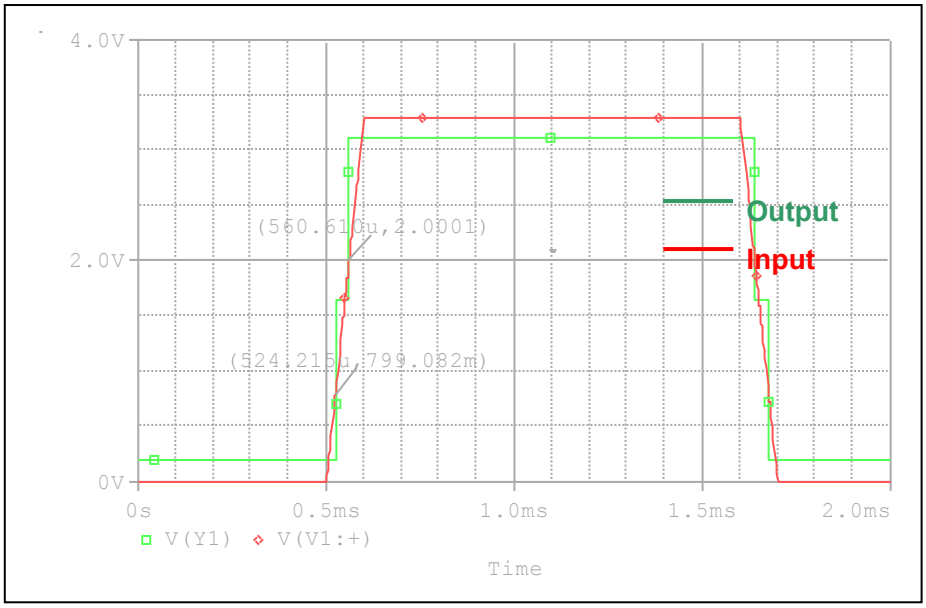


Comparison table

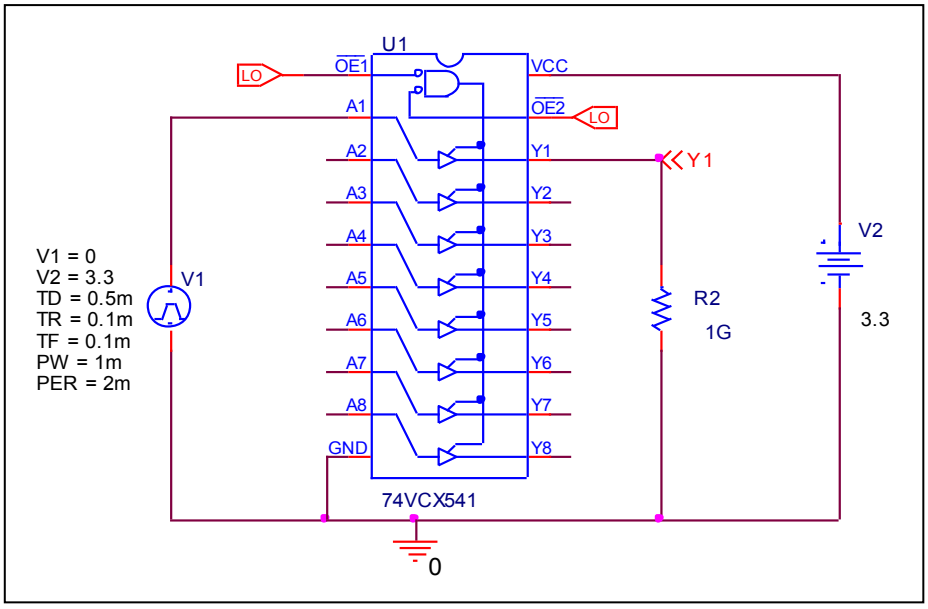
Input			Output		%Error
$\overline{OE1}$	$\overline{OE2}$	An	Yn (Measurement)	Yn (Simulation)	
L	L	L	L	L	0

High Level and Low Level Input Voltage (2.7 V < V_{CC} ≤ 3.6 V)

Circuit simulation result



Evaluation circuit

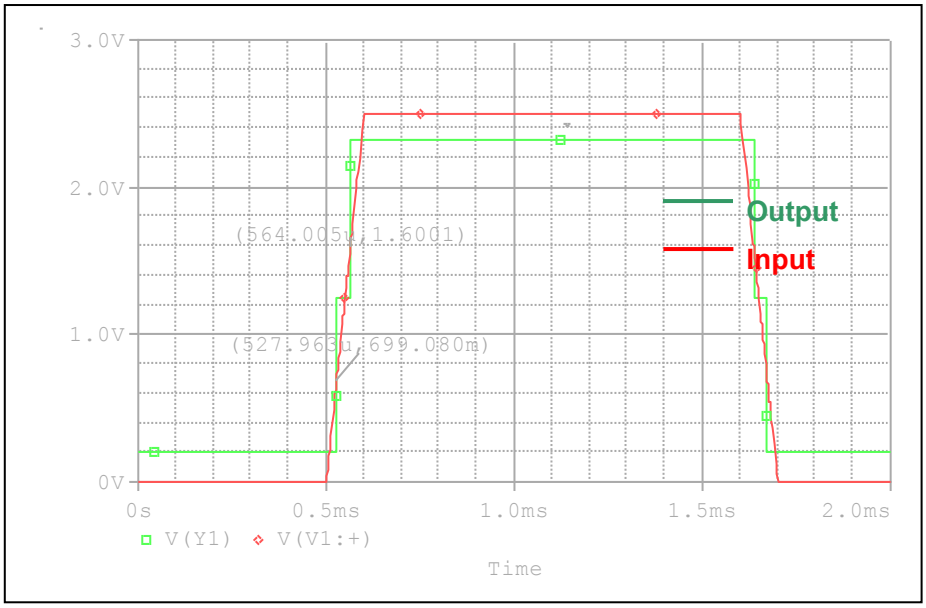


Comparison table

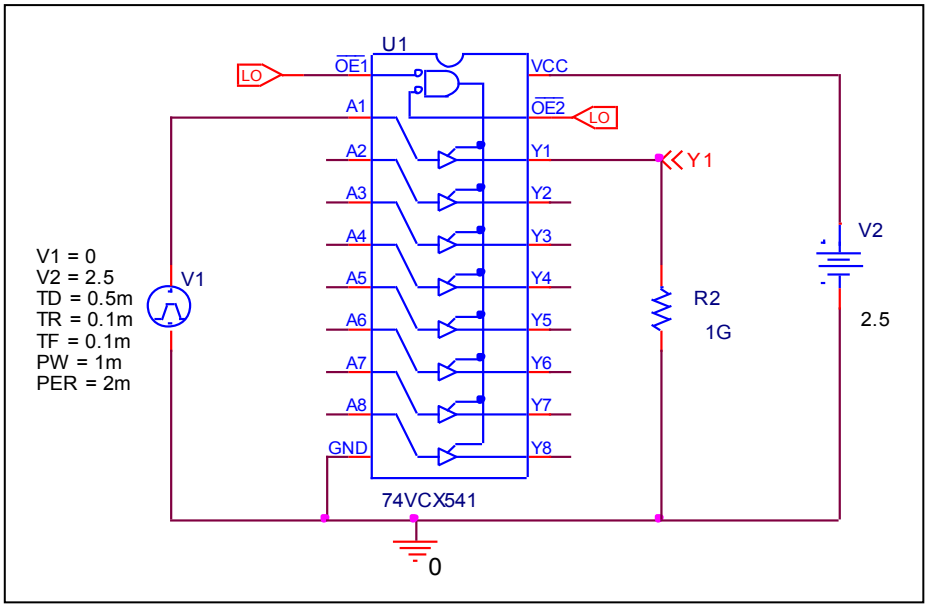
V_{CC} = 3.3 V	Measurement	Simulation	%Error
V_{IH} (V)	2	2.0001	0.005
V_{IL} (V)	0.8	0.799082	-0.115

High Level and Low Level Input Voltage (2.3 V ≤ V_{CC} ≤ 2.7 V)

Circuit simulation result



Evaluation circuit

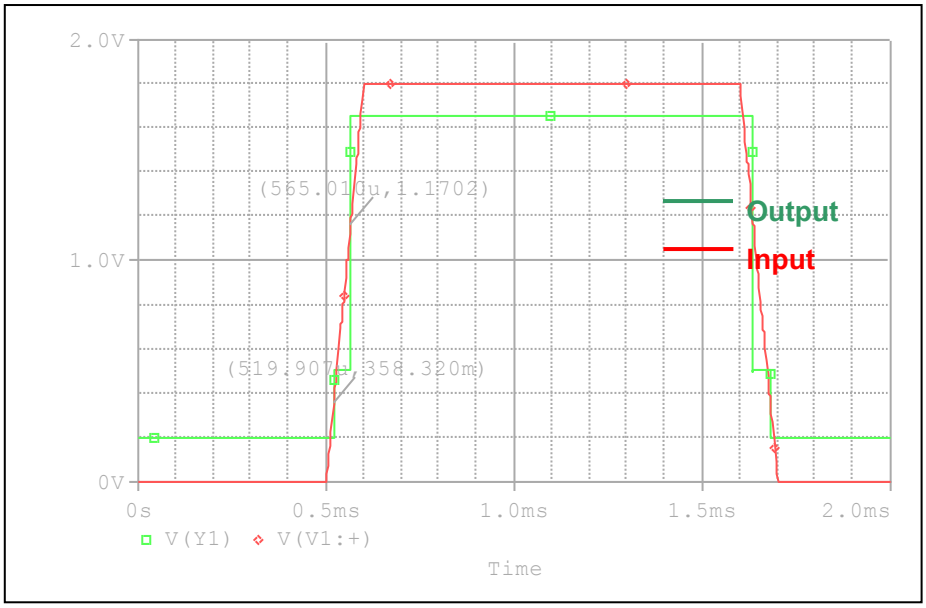


Comparison table

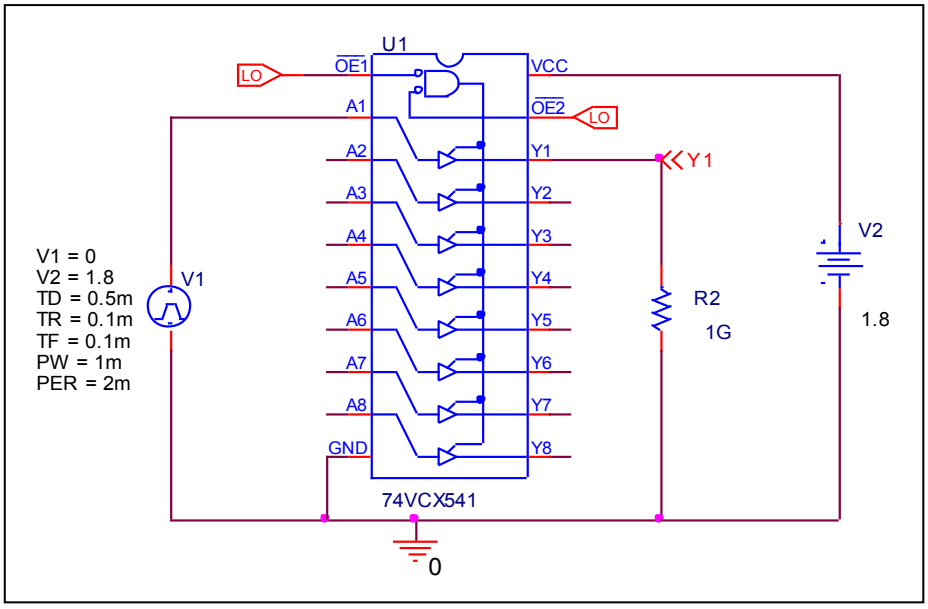
V_{CC} = 2.5 V	Measurement	Simulation	%Error
V_{IH} (V)	1.6	1.6001	0.006
V_{IL} (V)	0.7	0.699080	-0.131

High Level and Low Level Input Voltage (1.65 V ≤ V_{CC} < 2.3 V)

Circuit simulation result



Evaluation circuit

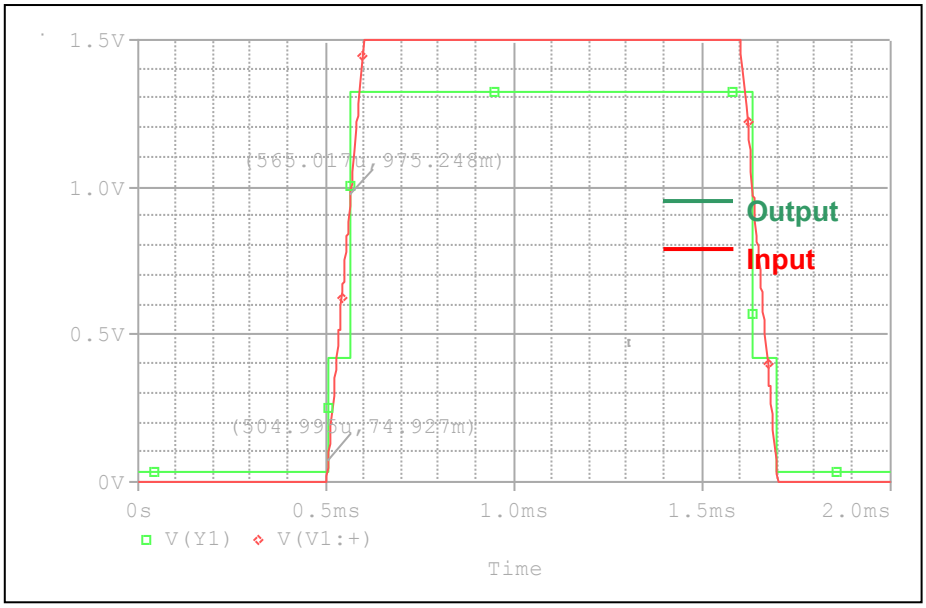


Comparison table

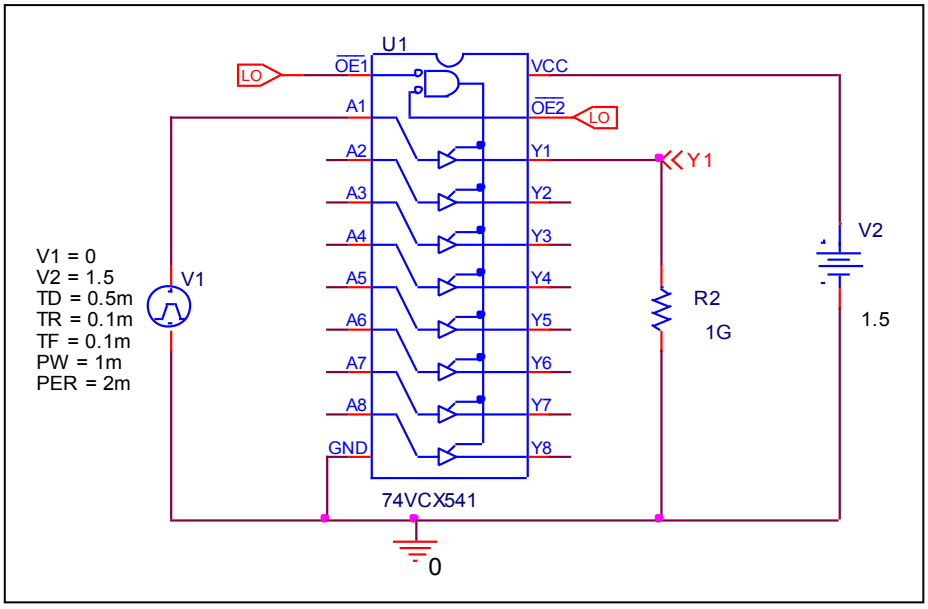
V_{CC} = 1.8 V	Measurement	Simulation	%Error
Min V_{IH} = (V_{CC}*0.65) (V)	1.17	1.1702	0.017
Max V_{IL} = (V_{CC}*0.2) (V)	0.36	0.358320	-0.467

High Level and Low Level Input Voltage (1.4 V ≤ V_{CC} < 1.65 V)

Circuit simulation result



Evaluation circuit

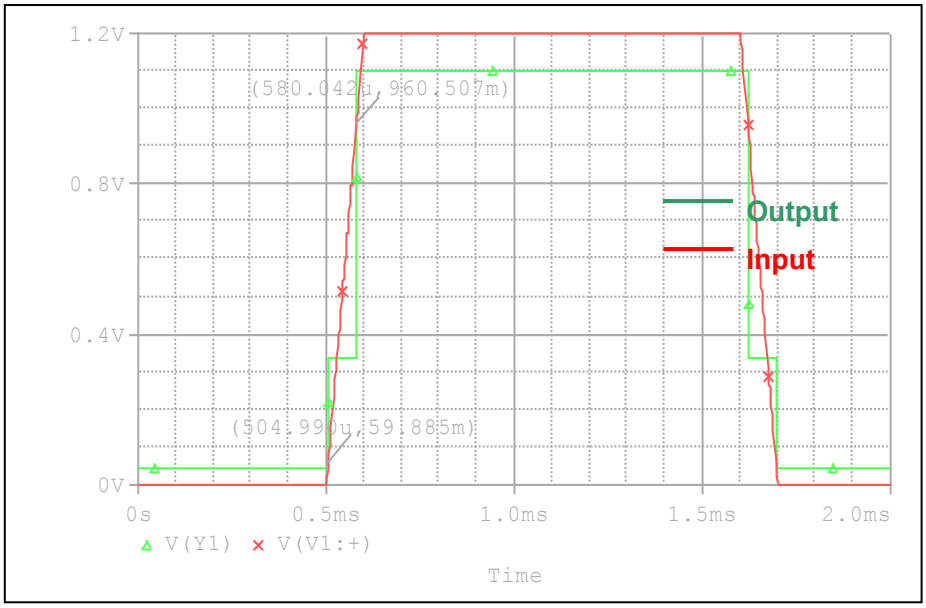


Comparison table

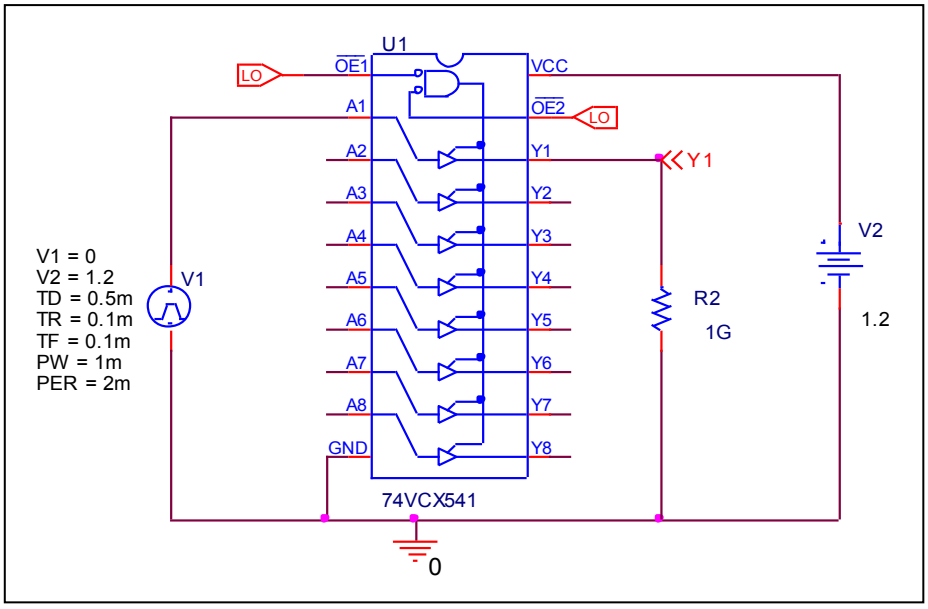
V_{CC} = 1.5 V	Measurement	Simulation	%Error
Min V_{IH} = (V_{CC}*0.65) (V)	0.975	0.975248	0.025
Max V_{IL} = (V_{CC}*0.05) (V)	0.075	0.074927	-0.097

High Level and Low Level Input Voltage (1.2 V ≤ V_{CC} < 1.4 V)

Circuit simulation result



Evaluation circuit

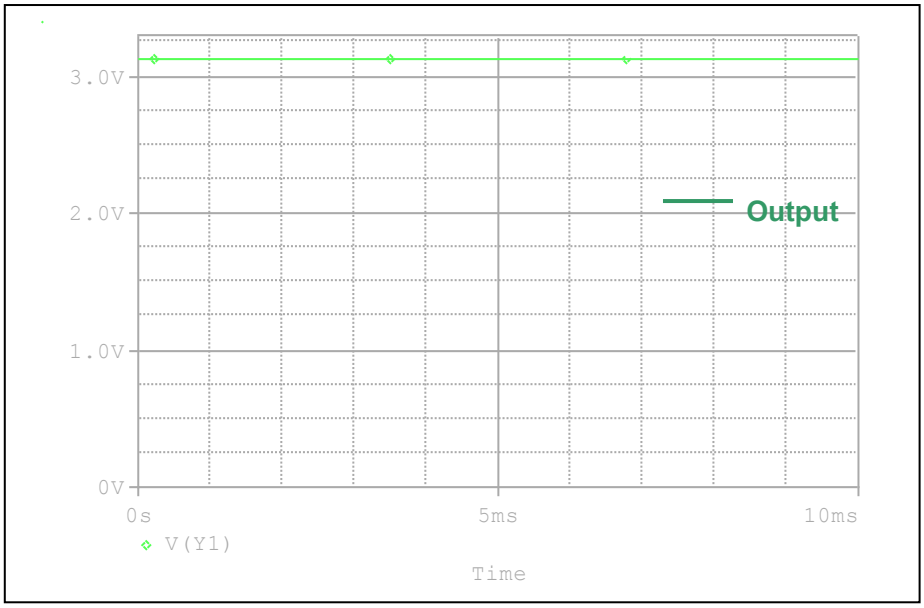


Comparison table

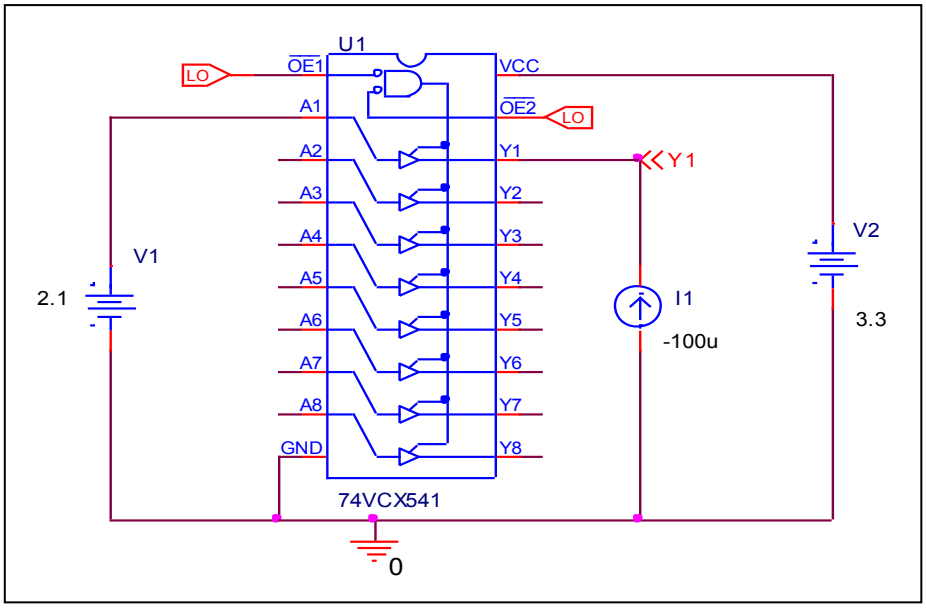
V_{CC} = 1.2 V	Measurement	Simulation	%Error
Min V_{IH} = (V_{CC}*0.8) (V)	0.96	0.960507	0.053
Max V_{IL} = (V_{CC}*0.05) (V)	0.06	0.059885	-0.192

High Level Output Voltage (2.7 V < V_{CC} ≤ 3.6 V)

Circuit simulation result



Evaluation circuit

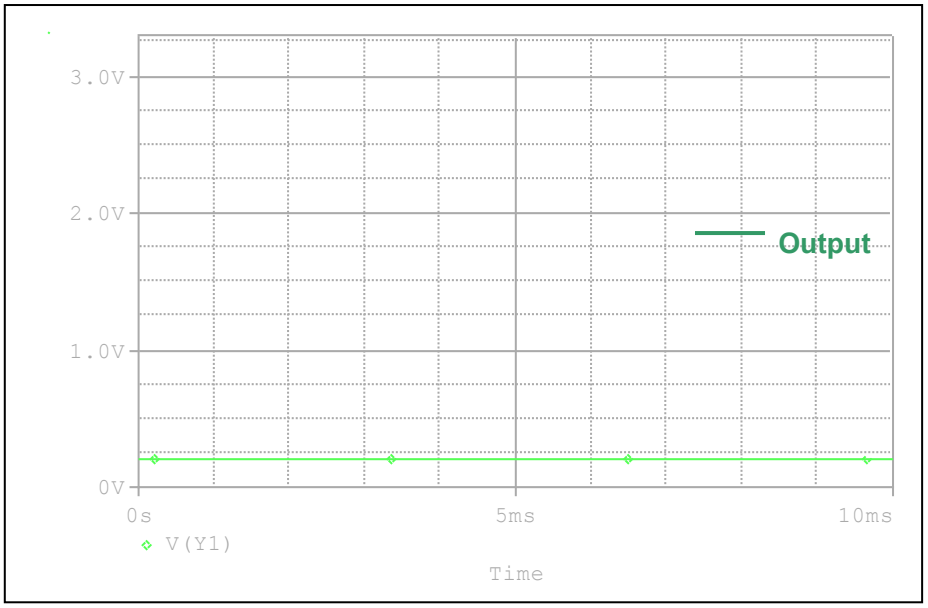


Comparison table

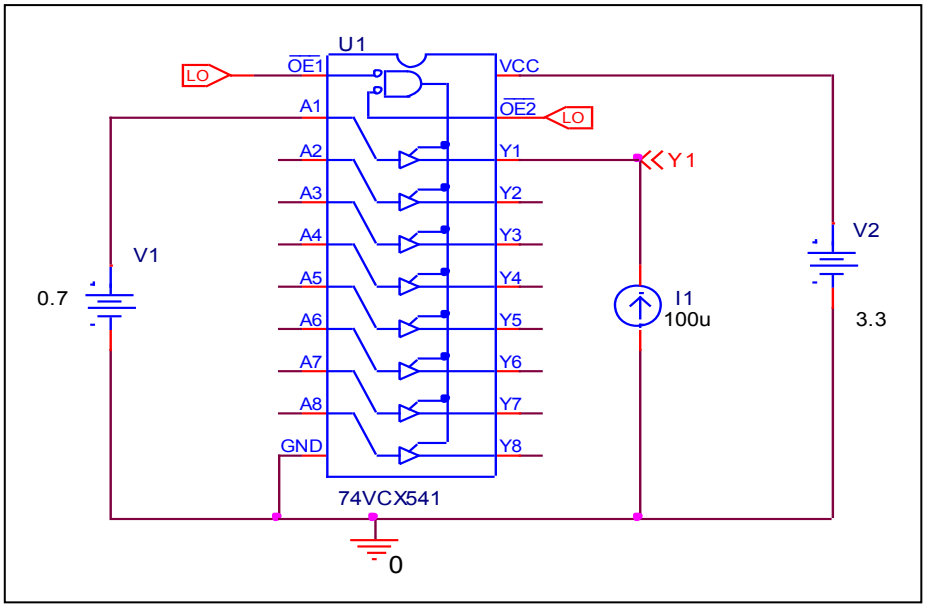
$V_{IN} = V_{IH}$, V_{CC} = 3.3 V	Measurement	Simulation	%Error
Min V_{OH} = (V_{CC} - 0.2) V	3.1	3.1176	0.568

Low Level Output Voltage (2.7 V < V_{CC} ≤ 3.6 V)

Circuit simulation result



Evaluation circuit

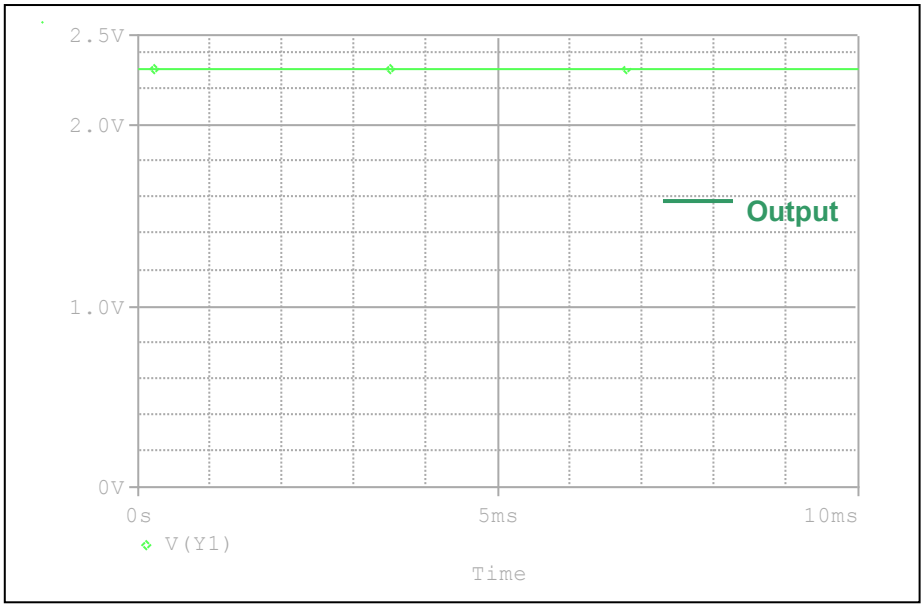


Comparison table

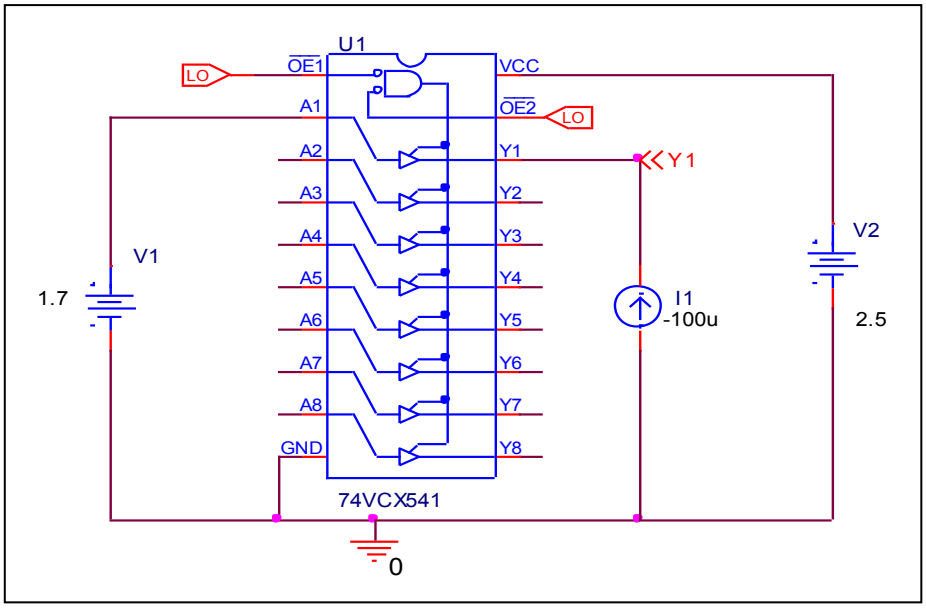
$V_{IN} = V_{IL}$, V_{CC} = 3.3 V	Measurement	Simulation	%Error
V_{OL} (V)	0.2	0.208970	4.485

High Level Output Voltage (2.3 V ≤ V_{CC} ≤ 2.7 V)

Circuit simulation result



Evaluation circuit

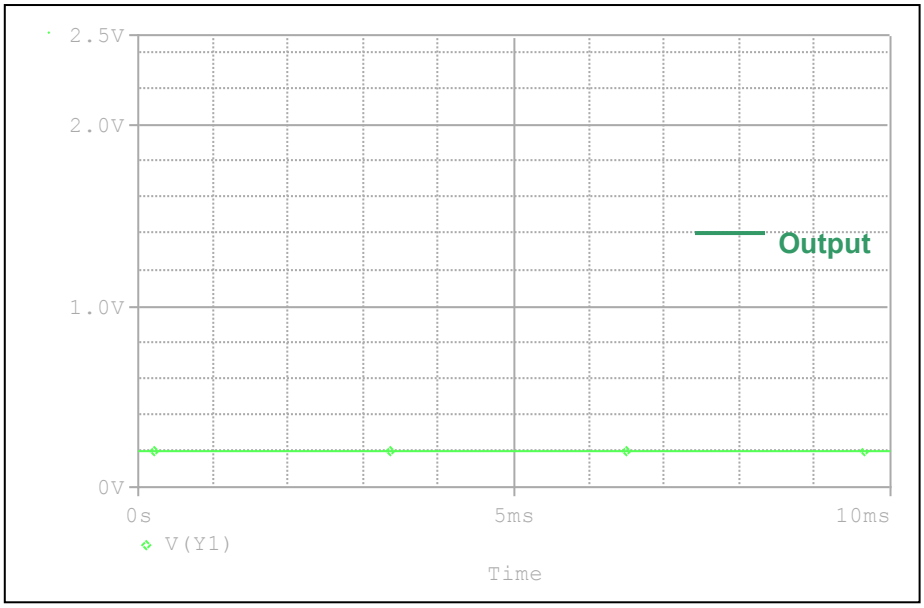


Comparison table

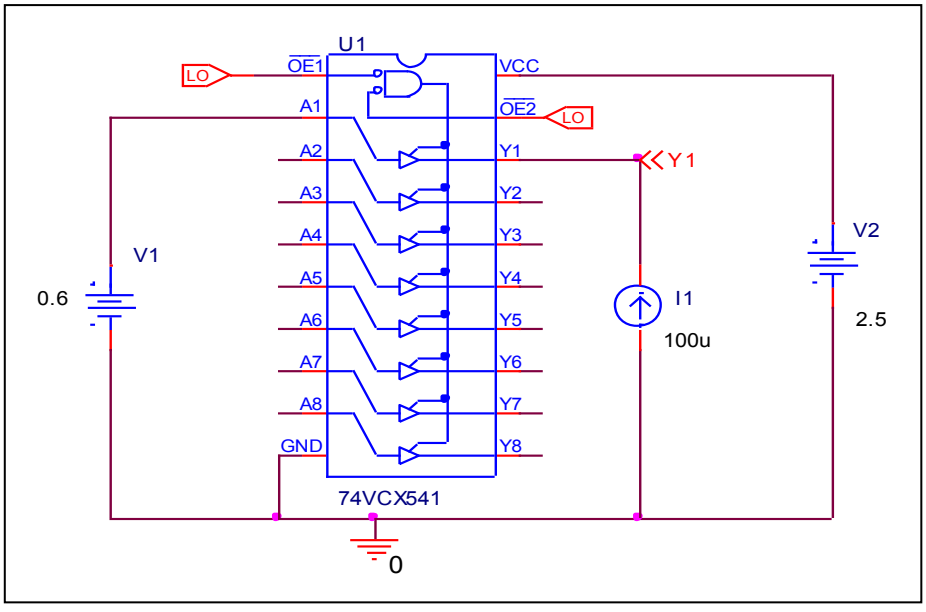
$V_{IN} = V_{IH}$, V_{CC} = 2.5 V	Measurement	Simulation	%Error
Min V_{OH} = (V_{CC} - 0.2) V	2.3	2.3156	0.678

Low Level Output Voltage (2.3 V ≤ V_{CC} ≤ 2.7 V)

Circuit simulation result



Evaluation circuit

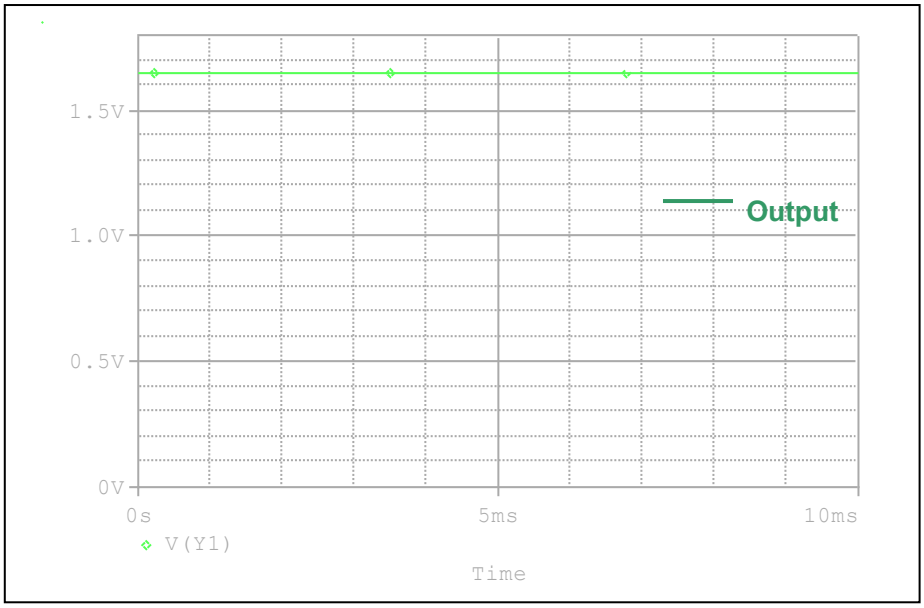


Comparison table

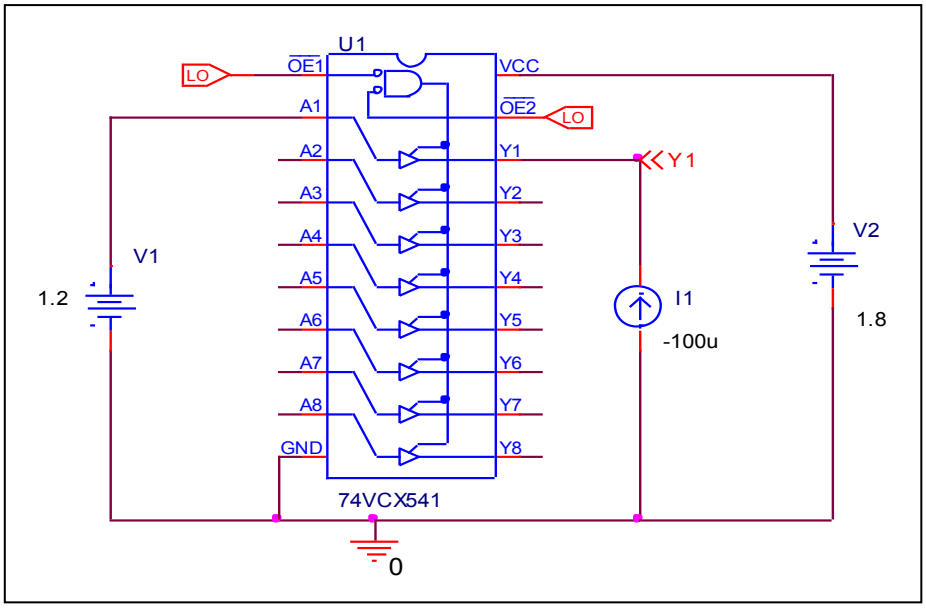
$V_{IN} = V_{IL}$, V_{CC} = 2.5 V	Measurement	Simulation	%Error
V_{OL} (V)	0.2	0.204492	2.246

High Level Output Voltage (1.65 V ≤ V_{CC} < 2.3 V)

Circuit simulation result



Evaluation circuit

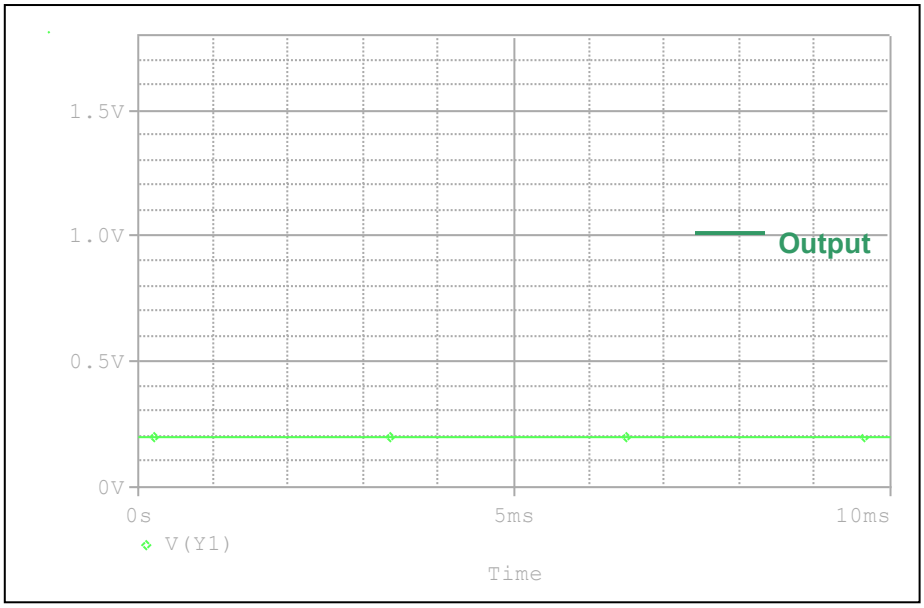


Comparison table

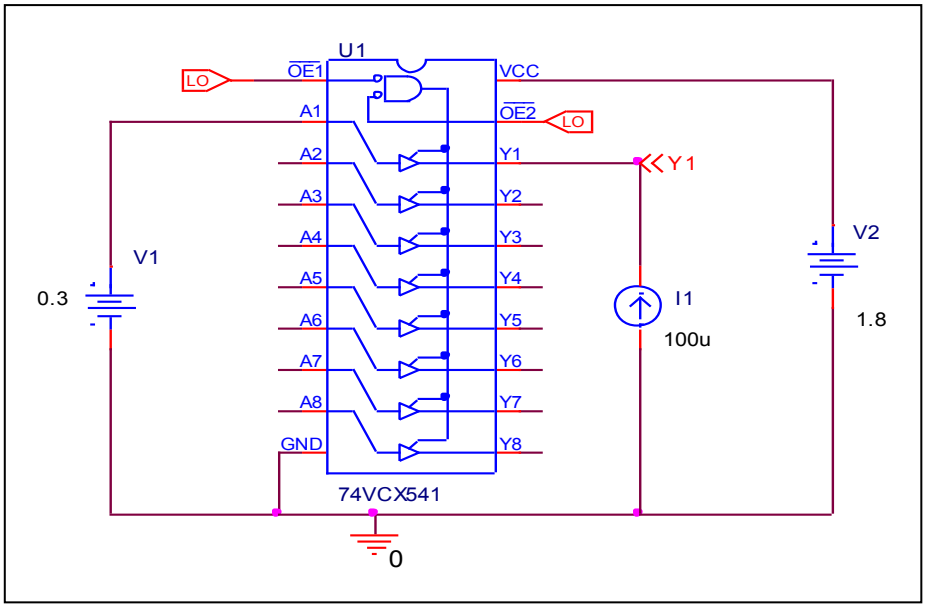
$V_{IN} = V_{IH}$, V_{CC} = 1.8 V	Measurement	Simulation	%Error
Min V_{OH} = (V_{CC} - 0.2) V	1.6	1.6487	3.044

Low Level Output Voltage (1.65 V ≤ V_{CC} < 2.3 V)

Circuit simulation result



Evaluation circuit

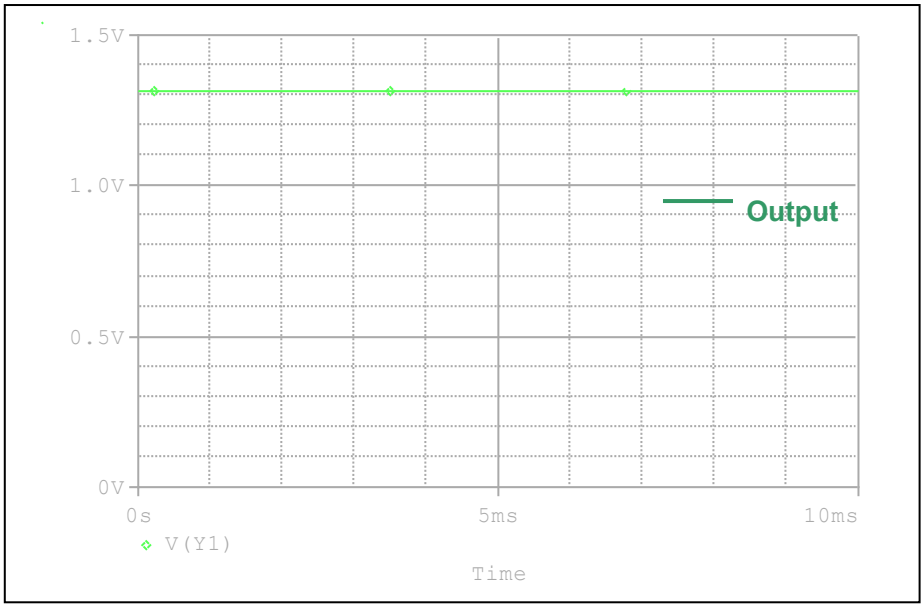


Comparison table

$V_{IN} = V_{IL}$, V_{CC} = 1.8 V	Measurement	Simulation	%Error
V_{OL} (V)	0.2	0.198	-1

High Level Output Voltage (1.4 V ≤ V_{CC} < 1.65 V)

Circuit simulation result



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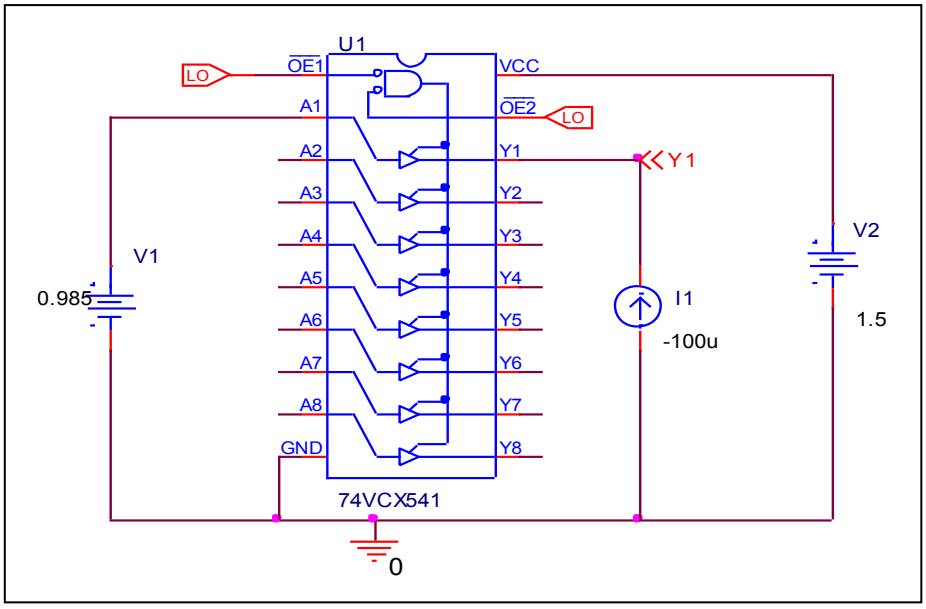
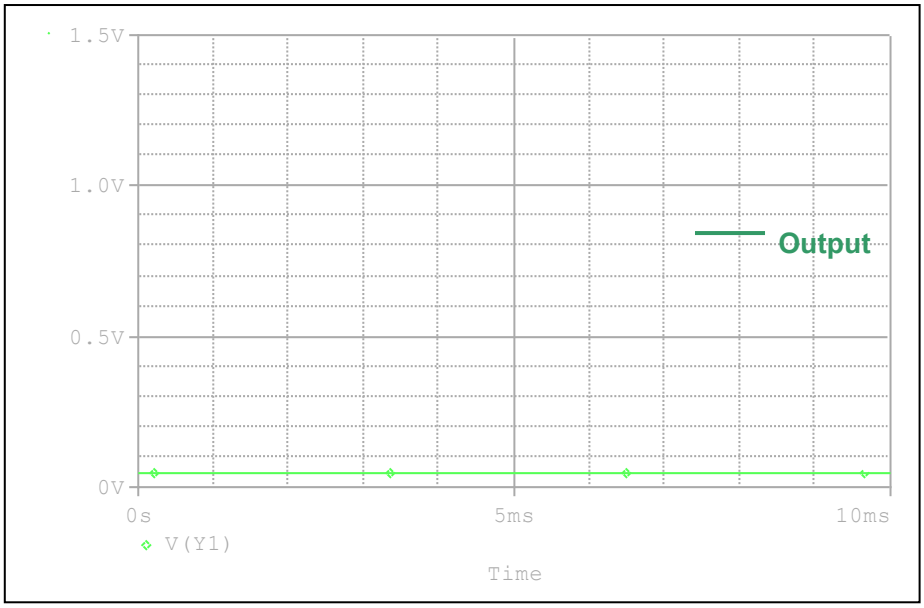


Comparison table

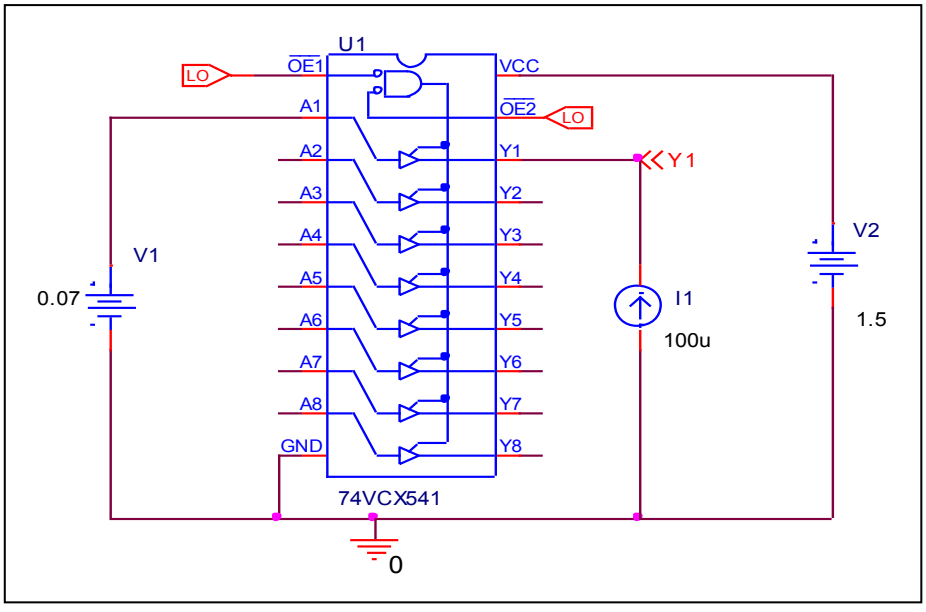
$V_{IN} = V_{IH}$, V_{CC} = 1.5 V	Measurement	Simulation	%Error
Min V_{OH} = (V_{CC} - 0.2) V	1.3	1.3148	1.138

Low Level Output Voltage (1.4 V ≤ V_{CC} < 1.65 V)

Circuit simulation result



Evaluation circuit

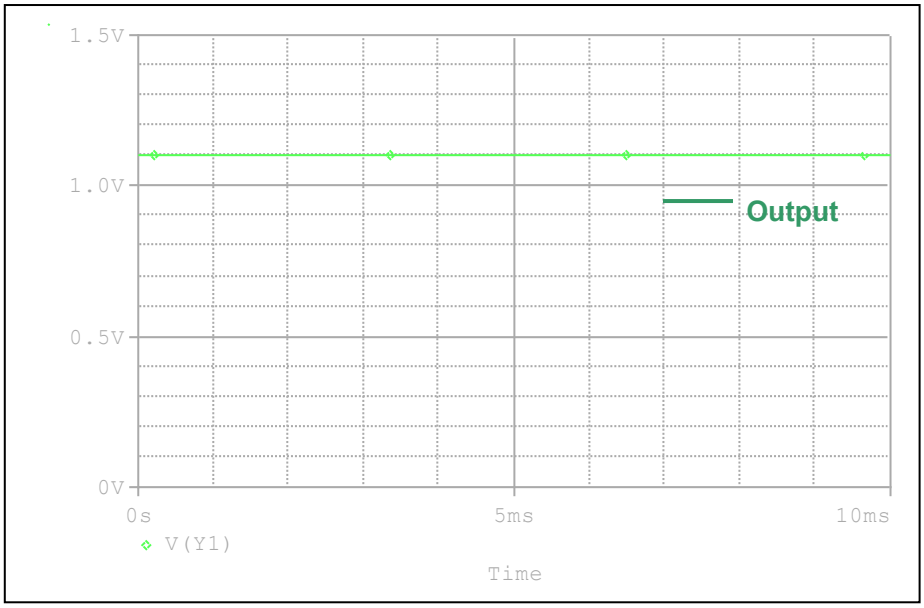


Comparison table

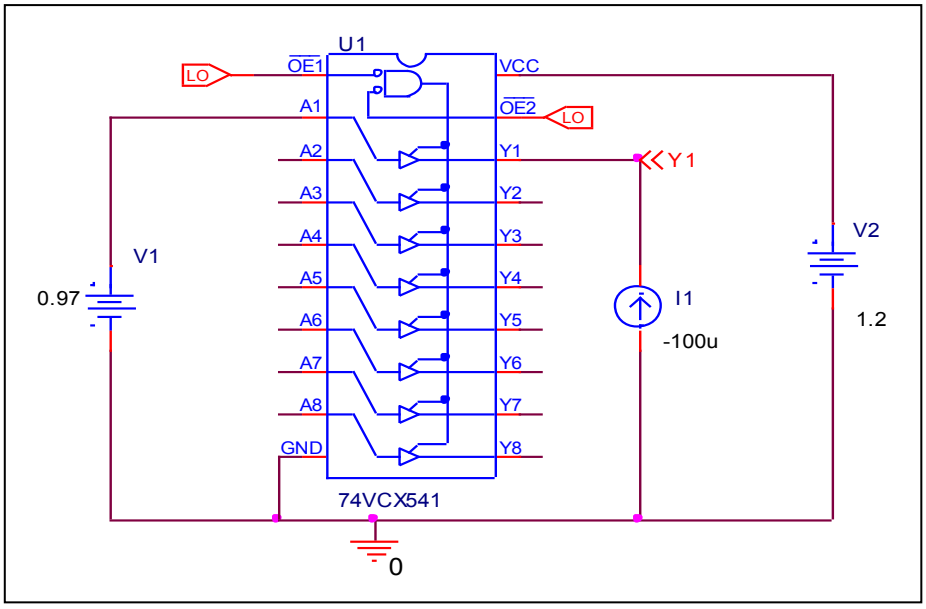
V_{IN} = V_{IL}, V_{CC} = 1.5 V	Measurement	Simulation	%Error
V_{OL} (V)	0.05	0.04786	-4.28

High Level Output Voltage (1.2 V ≤ V_{CC} < 1.4 V)

Circuit simulation result



Evaluation circuit

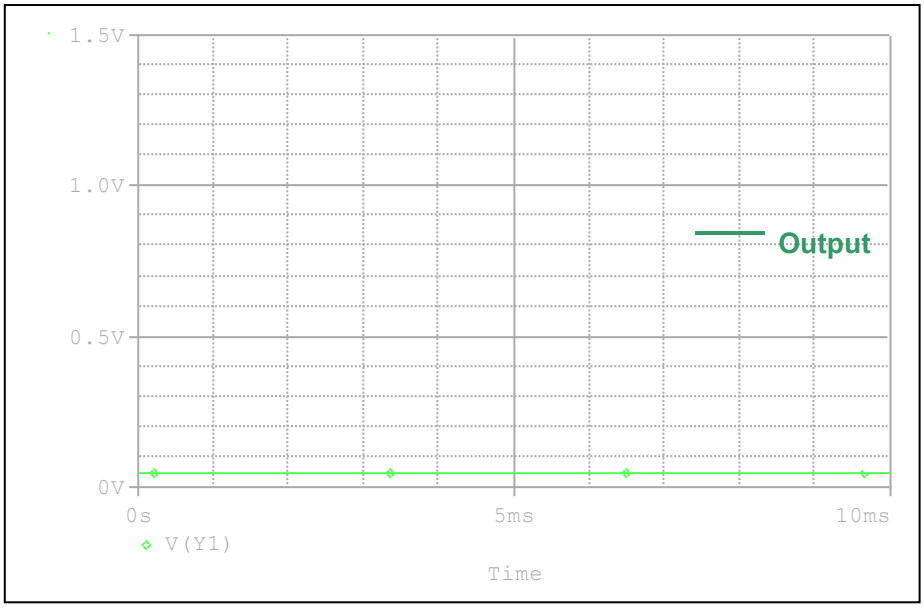


Comparison table

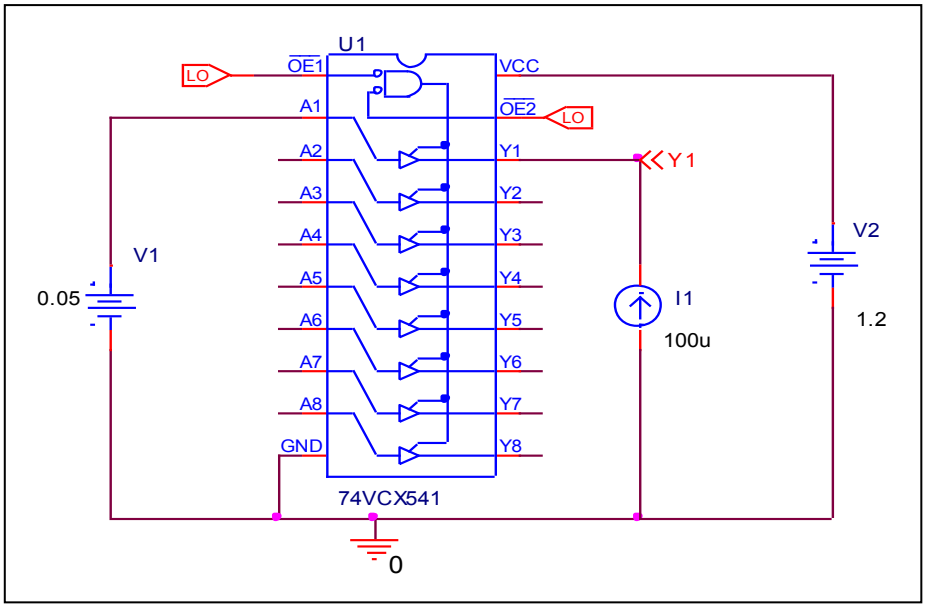
$V_{IN} = V_{IH}$, V_{CC} = 1.2 V	Measurement	Simulation	%Error
Min V_{OH} = (V_{CC} - 0.1) V	1.1	1.1007	0.064

Low Level Output Voltage (1.2 V ≤ V_{CC} < 1.4 V)

Circuit simulation result



Evaluation circuit

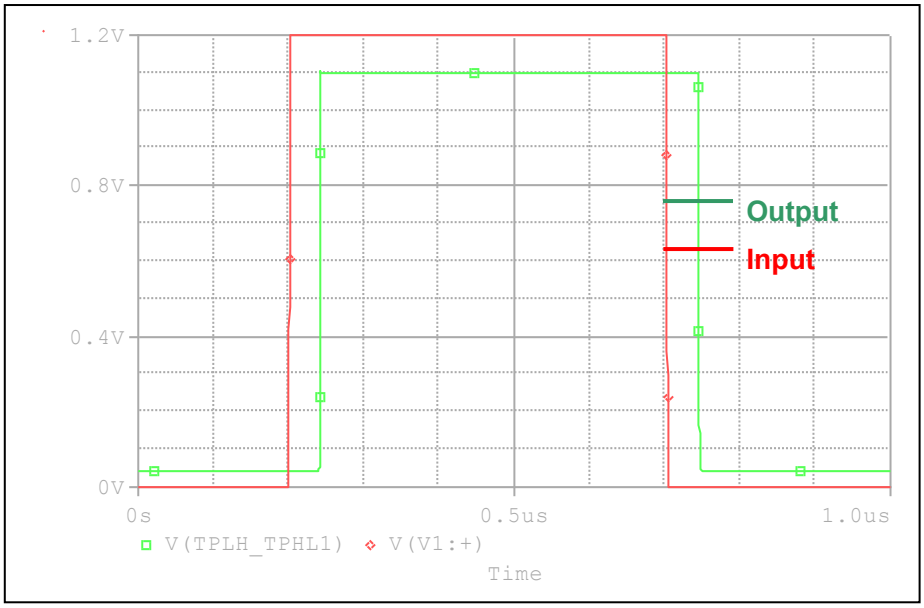


Comparison table

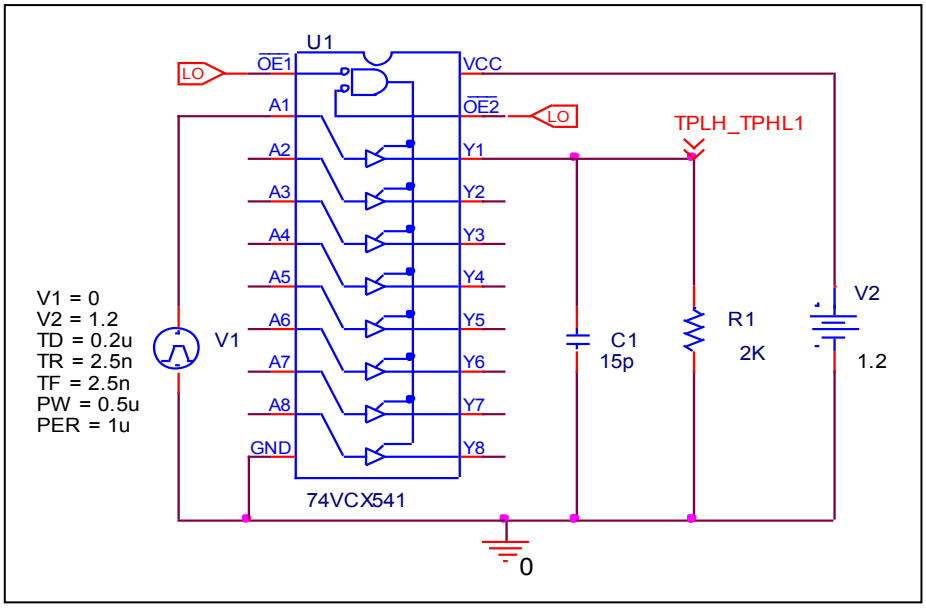
$V_{IN} = V_{IL}$, V_{CC} = 1.2 V	Measurement	Simulation	%Error
V_{OL} (V)	0.05	0.048797	-2.406

Propagation Delay Time (V_{CC} = 1.2 V)

Circuit simulation result



Evaluation circuit

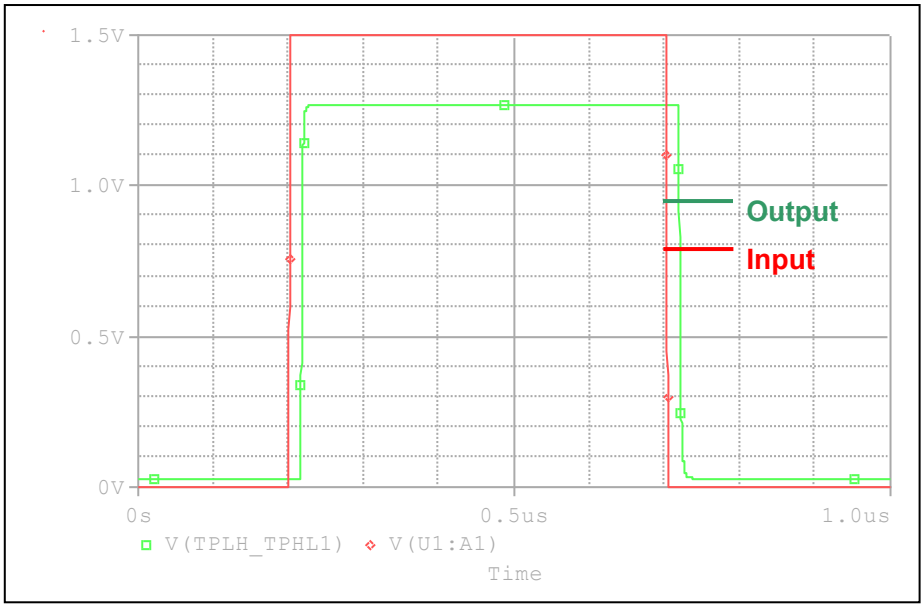


Comparison table **C_L = 15 pF, R_L = 2 KΩ**

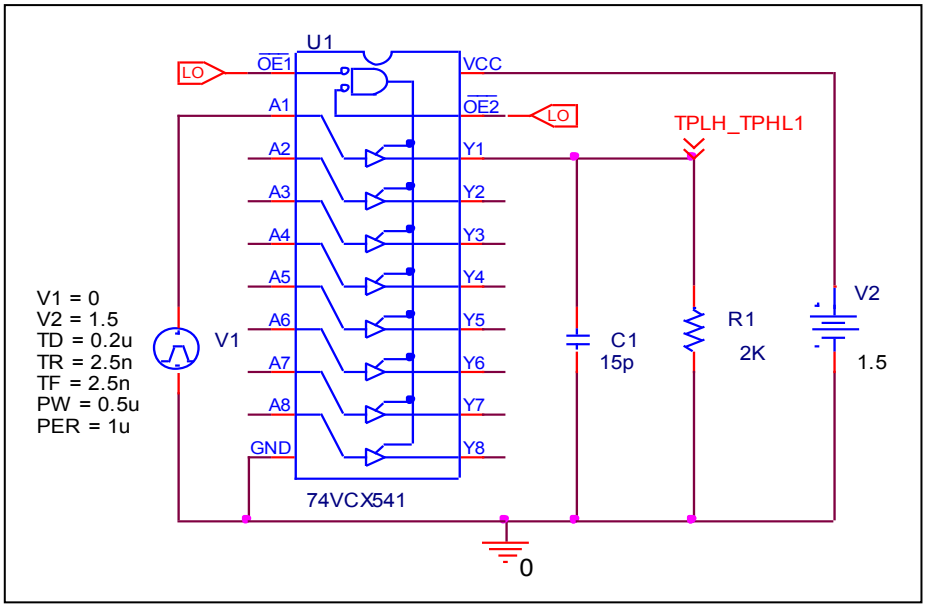
V_{CC} = 1.2 V, t_r=t_f= 2 ns	Measurement	Simulation	%Error
t_{pLH} (ns)	42	41.610	-0.929
t_{pHL} (ns)	42	41.525	-1.131

Propagation Delay Time (V_{CC} = 1.5 V)

Circuit simulation result



Evaluation circuit

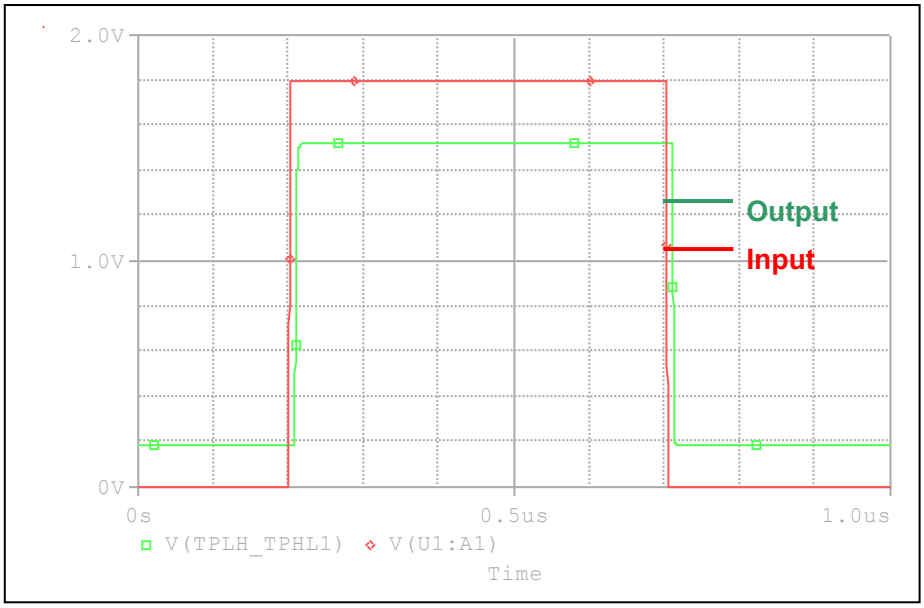


Comparison table **C_L = 15 pF, R_L = 2 KΩ**

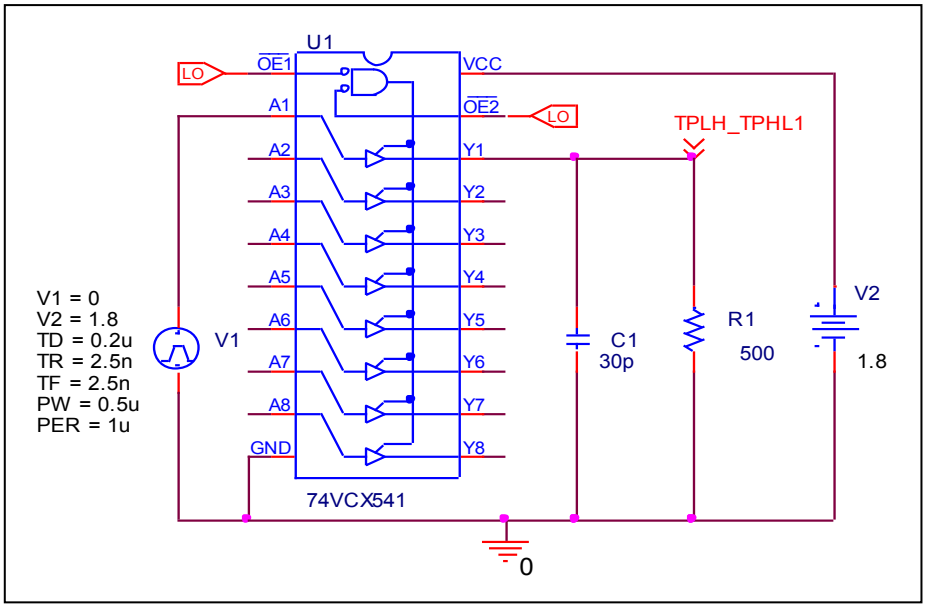
V_{CC} = 1.5 V, t_r=t_f= 2 ns	Measurement	Simulation	%Error
t_{pLH} (ns)	16.8	16.598	-1.202
t_{pHL} (ns)	16.8	16.569	-1.375

Propagation Delay Time (V_{CC} = 1.8 V)

Circuit simulation result



Evaluation circuit

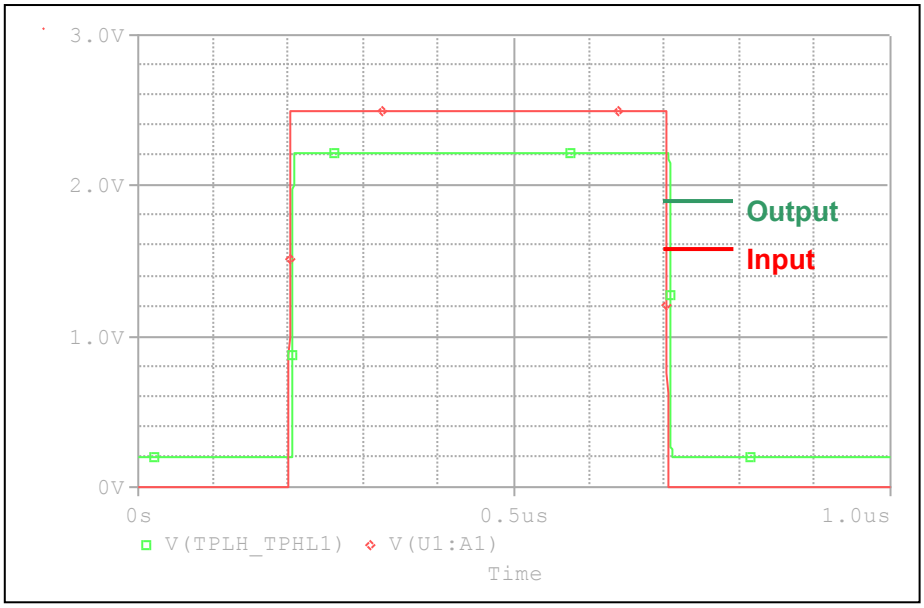


Comparison table **C_L = 30 pF, R_L = 500 Ω**

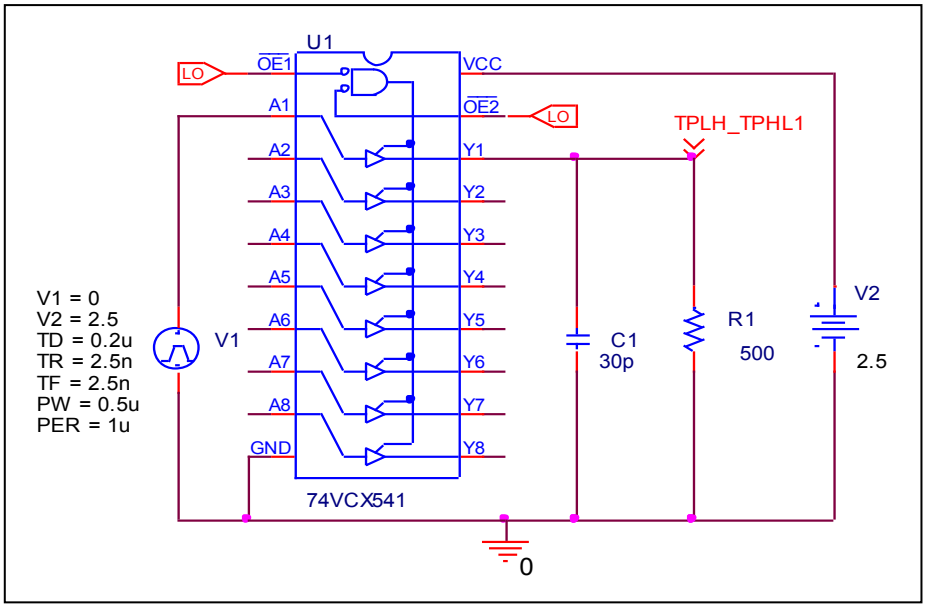
V_{CC} = 1.8 V, t_r=t_f= 2 ns	Measurement	Simulation	%Error
t_{pLH} (ns)	8.4	8.3236	-0.910
t_{pHL} (ns)	8.4	8.3543	-0.544

Propagation Delay Time (V_{CC} = 2.5 V)

Circuit simulation result



Evaluation circuit

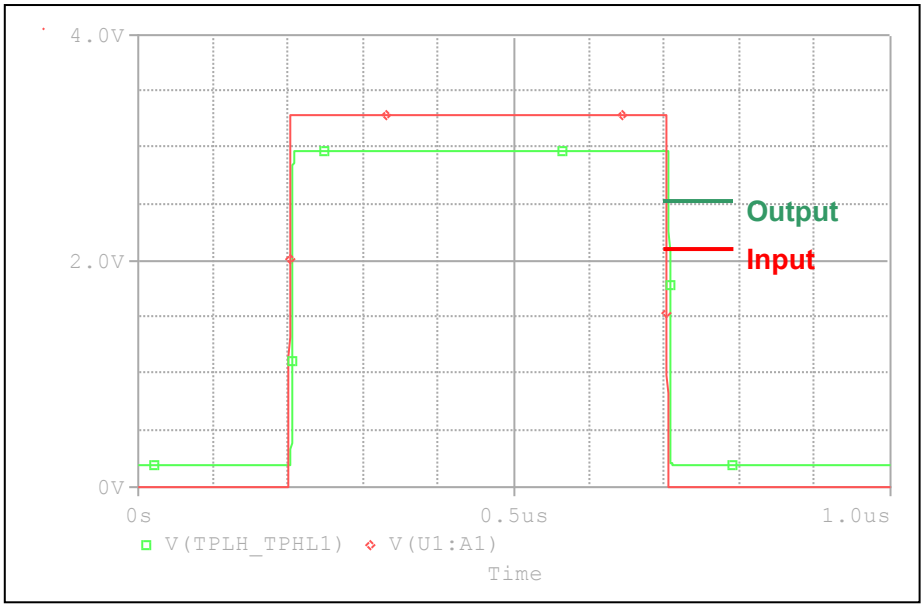


Comparison table **C_L = 30 pF, R_L = 500 Ω**

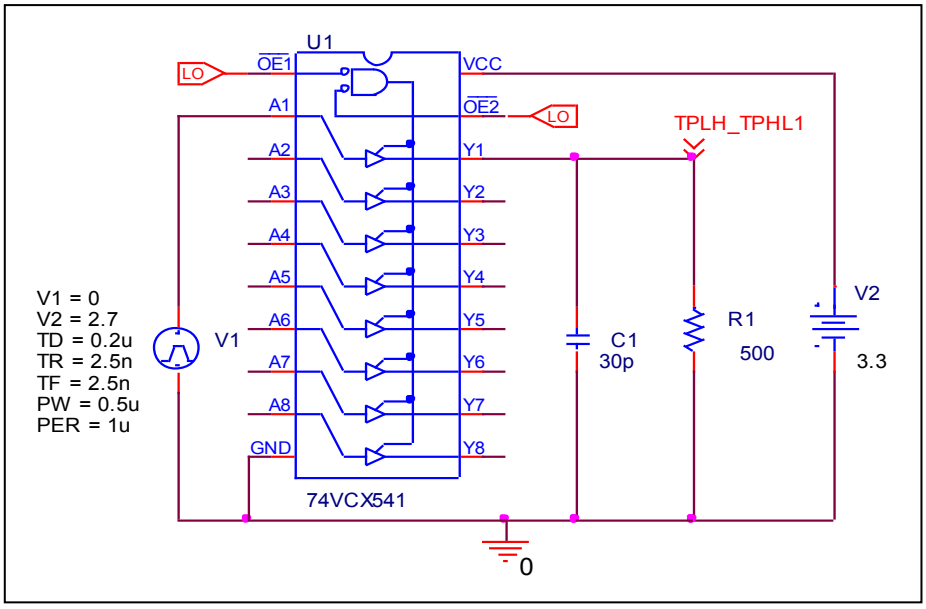
V_{CC} = 2.5 t_r=t_f= 2 ns	Measurement	Simulation	%Error
t_{pLH} (ns)	4.2	4.1770	-0.548
t_{pHL} (ns)	4.2	4.1515	-1.155

Propagation Delay Time (V_{CC} = 3.3)

Circuit simulation result



Evaluation circuit

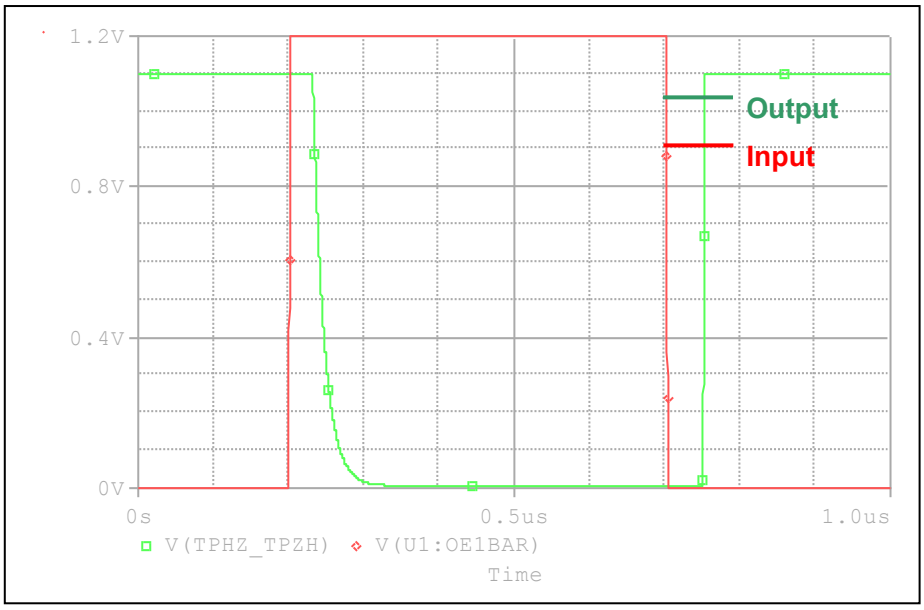


Comparison table **C_L = 30 pF, R_L = 500 Ω**

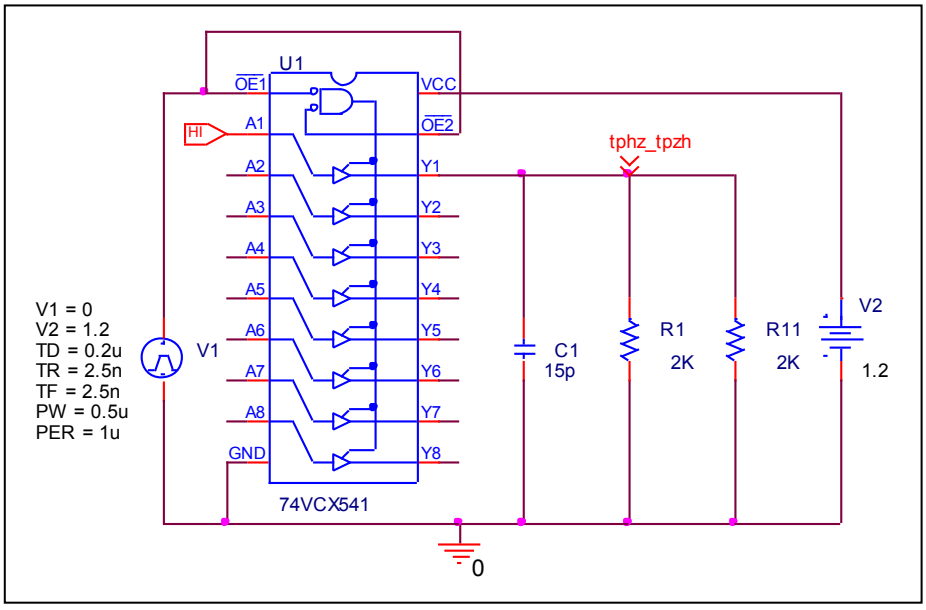
V_{CC} = 3.3 t_r=t_f= 2 ns	Measurement	Simulation	%Error
t_{pLH} (ns)	3.5	3.4562	-1.251
t_{pHL} (ns)	3.5	3.4942	-0.166

Output enable time(t_{PZH}) and Output disable time(t_{PHZ}) (V_{CC} = 1.2)

Circuit simulation result



Evaluation circuit

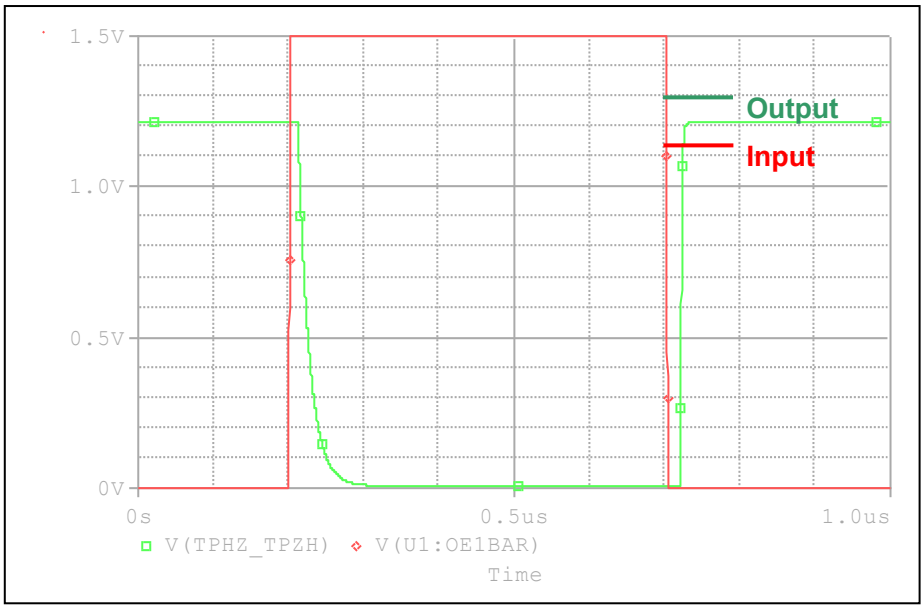


Comparison table C_L = 15 pF, R_L = 2 kΩ

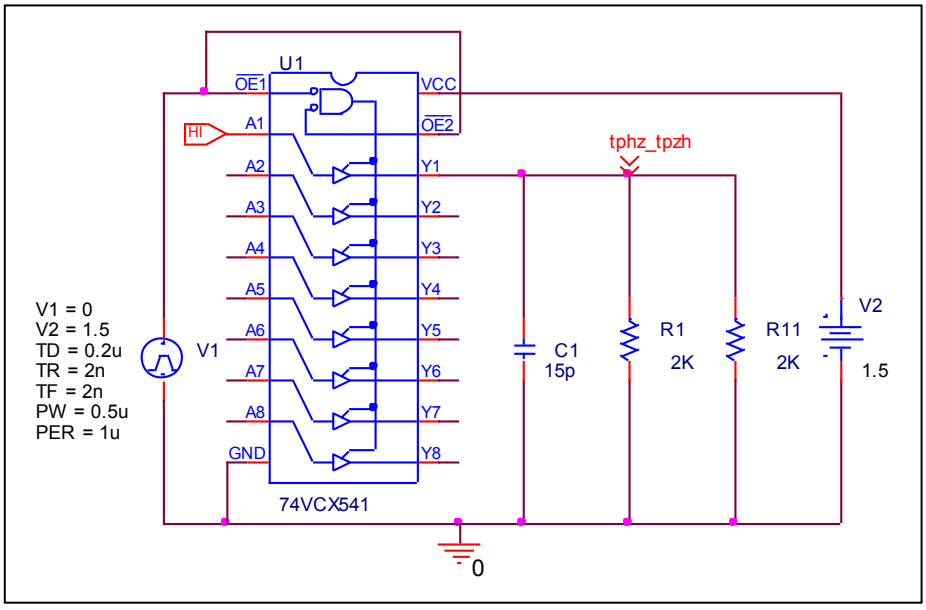
V_{CC} =1.2 V, t_r=t_f= 2 ns	Measurement	Simulation	%Error
t_{PHZ} (ns)	32.5	32.388	-0.345
t_{pZH} (ns)	49	48.915	-0.173

Output enable time(t_{PZH}) and Output disable time(t_{PHZ}) (V_{CC} = 1.5)

Circuit simulation result



Evaluation circuit

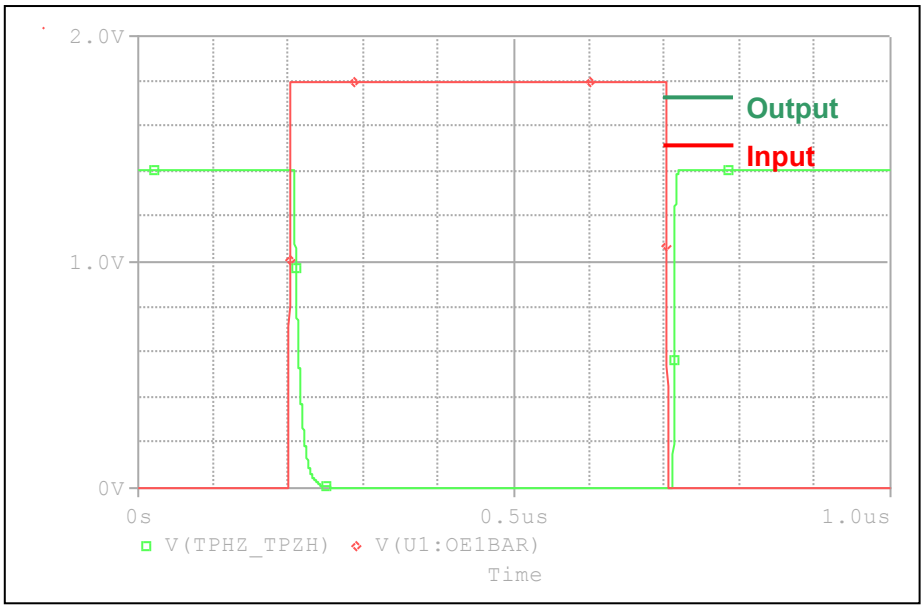


Comparison table C_L = 15 pF, R_L = 2 kΩ

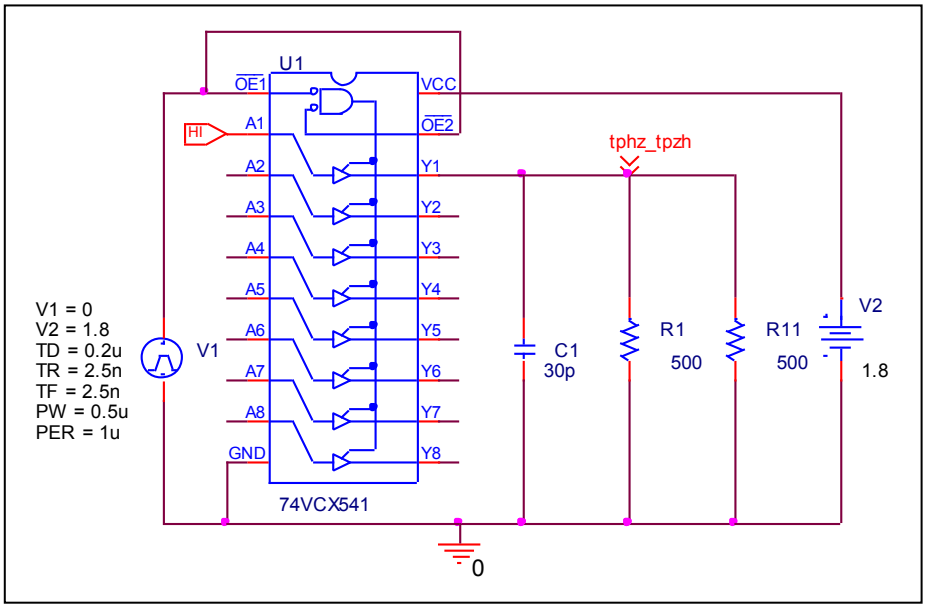
V_{CC} =1.5 V, t_r=t_f= 2 ns	Measurement	Simulation	%Error
t_{PHZ} (ns)	13	12.644	-2.738
t_{pZH} (ns)	19.6	19.470	-0.663

Output enable time(t_{PZH}) and Output disable time(t_{PHZ}) (V_{CC} = 1.8)

Circuit simulation result



Evaluation circuit

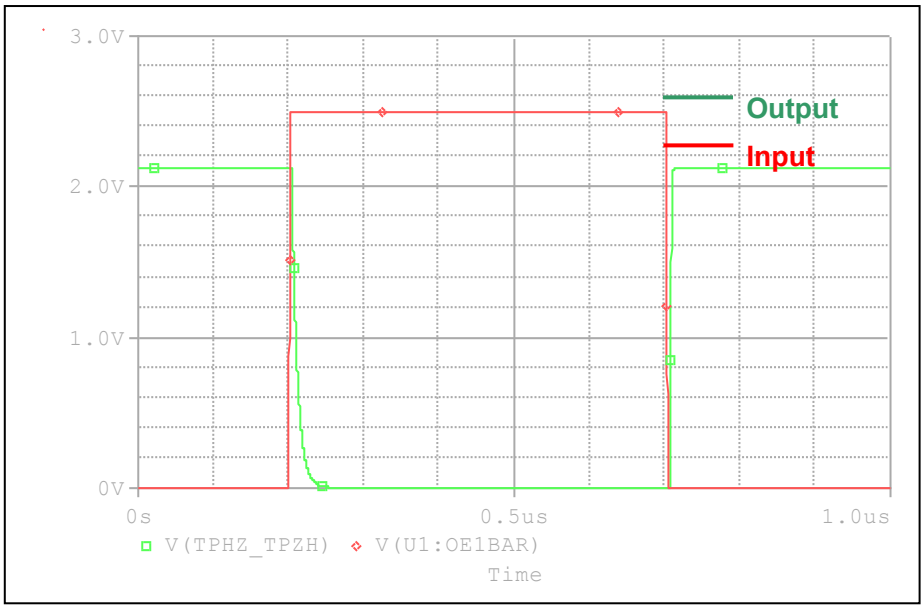


Comparison table C_L = 30 pF, R_L = 500 Ω

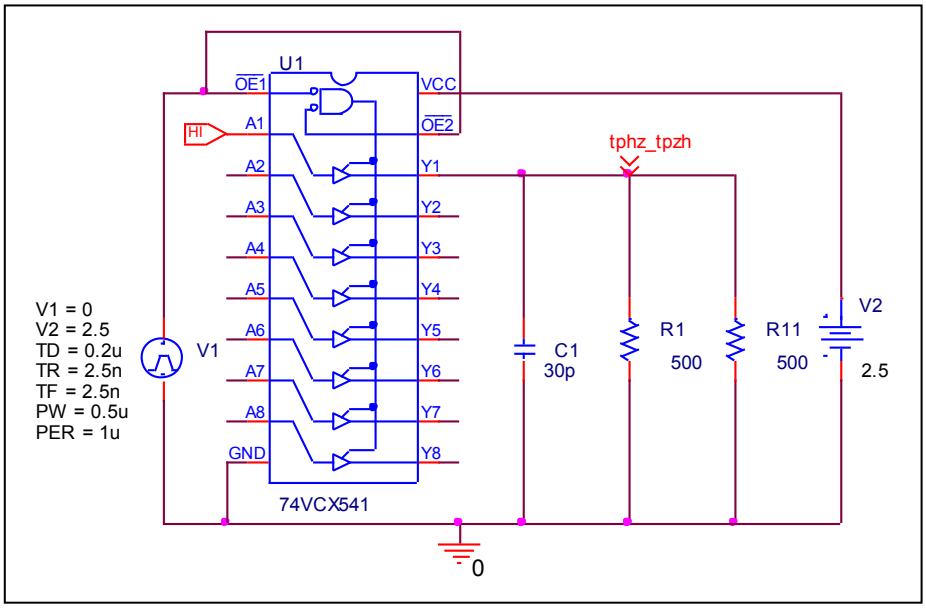
V_{CC} =1.8 V, t_r=t_f= 2 ns	Measurement	Simulation	%Error
t_{PHZ} (ns)	6.5	6.5114	0.175
t_{pZH} (ns)	9.8	9.822	0.224

Output enable time(t_{PZH}) and Output disable time(t_{PHZ}) (V_{CC} = 2.5)

Circuit simulation result



Evaluation circuit

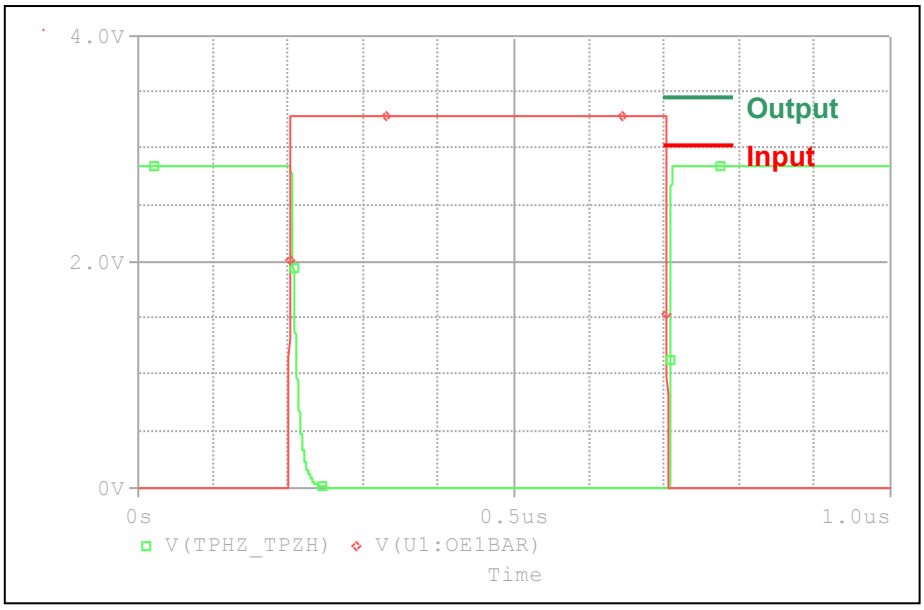


Comparison table C_L = 30 pF, R_L = 500 Ω

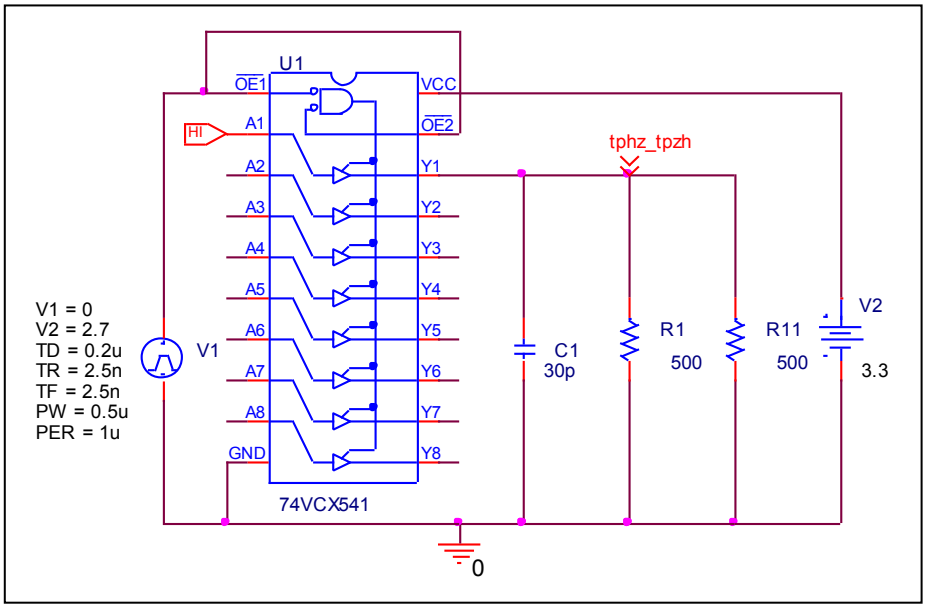
V_{CC} =2.5 V, t_r=t_f= 2 ns	Measurement	Simulation	%Error
t_{PHZ} (ns)	3.6	3.5953	-0.131
t_{pZH} (ns)	5.5	5.4812	-0.342

Output enable time(t_{PZH}) and Output disable time(t_{PHZ}) (V_{CC} = 3.3)

Circuit simulation result



Evaluation circuit

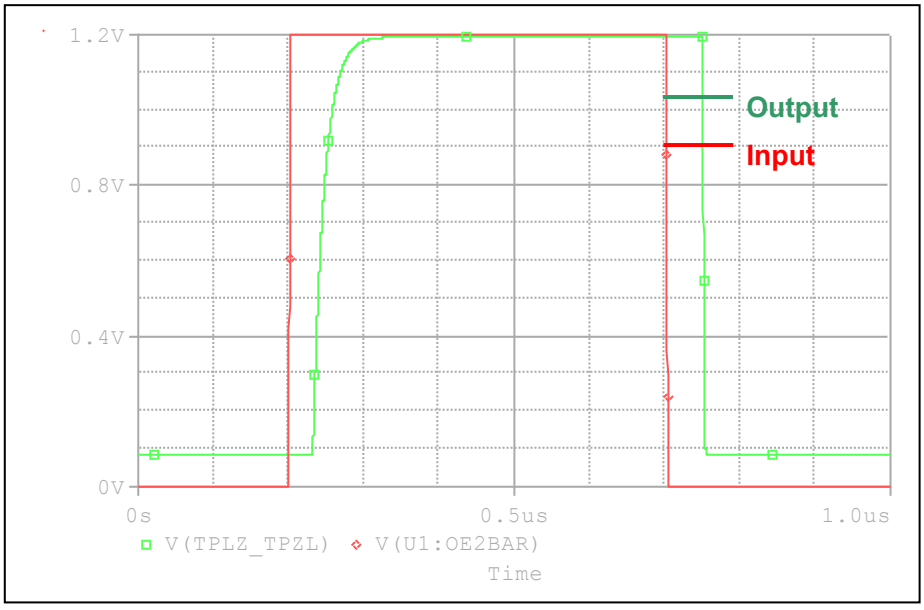


Comparison table C_L = 30 pF, R_L = 500 Ω

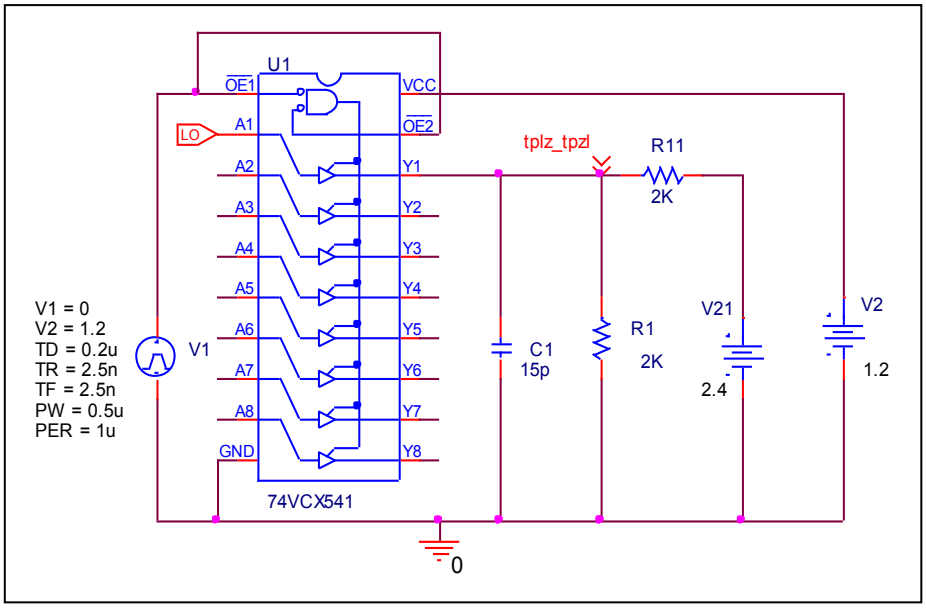
V_{CC} = 3.3 V, t_r=t_f= 2 ns	Measurement	Simulation	%Error
t_{PHZ} (ns)	3.3	3.2497	-1.524
t_{pZH} (ns)	4.5	4.4300	-1.556

Output enable time (t_{PZL}) and Output disable time (t_{PLZ}) (V_{CC} = 1.2)

Circuit simulation result



Evaluation circuit

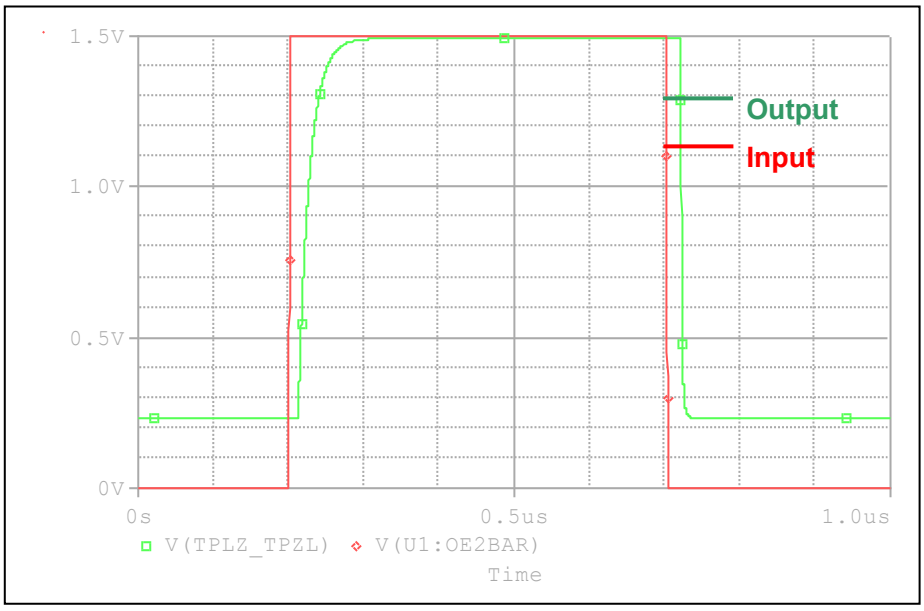


Comparison table **C_L = 15 pF, R_L = 2 kΩ**

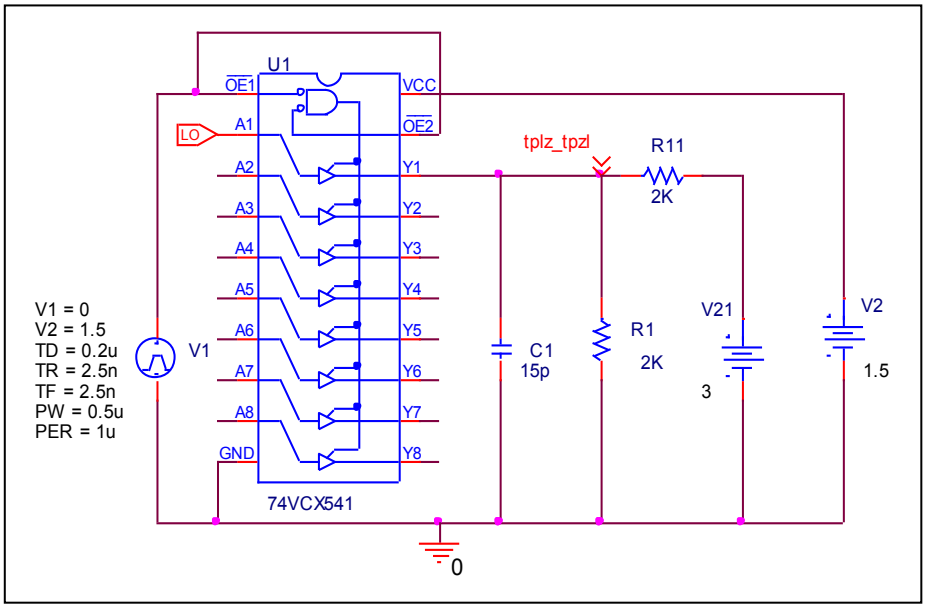
V_{CC} =1.2 V, t_r=t_f= 2 ns	Measurement	Simulation	%Error
t_{PLZ} (ns)	32.5	32.435	-0.200
t_{pZL} (ns)	49	48.087	-1.863

Output enable time (t_{PZL}) and Output disable time (t_{PLZ}) (V_{CC} = 1.5)

Circuit simulation result



Evaluation circuit

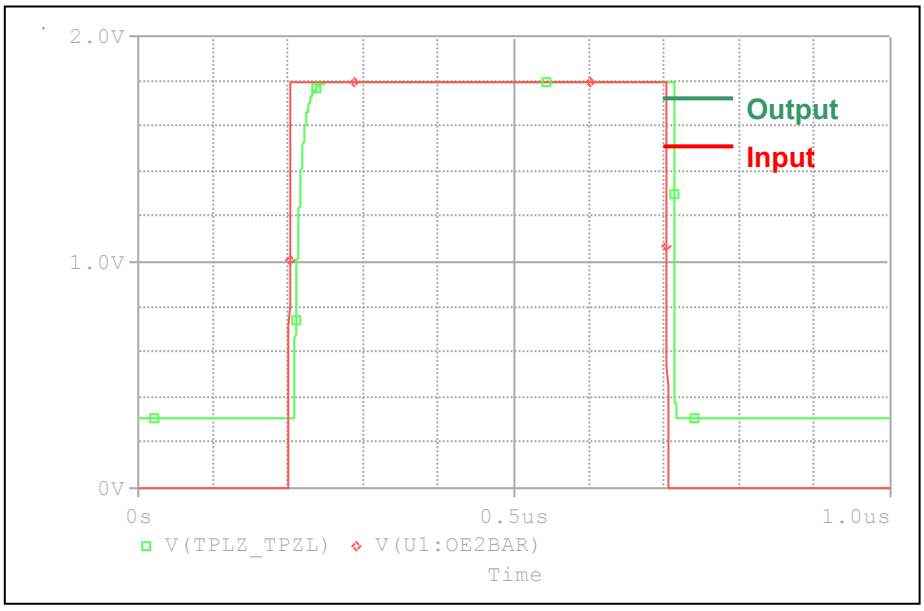


Comparison table **C_L = 15 pF, R_L = 2 kΩ**

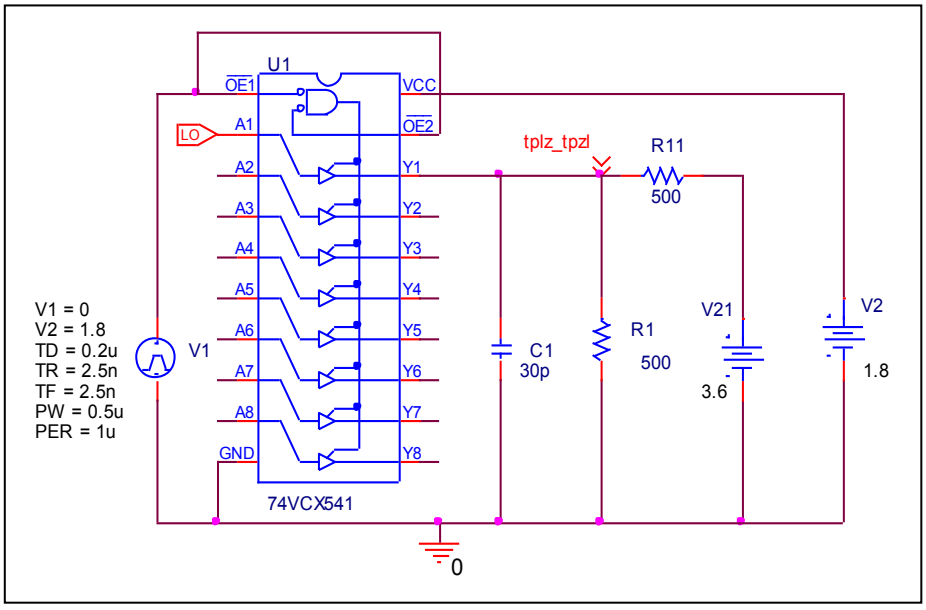
V_{CC} =1.5 V, t_r=t_f= 2 ns	Measurement	Simulation	%Error
t_{PLZ} (ns)	13	12.727	-2.100
t_{pZL} (ns)	19.6	19.289	-1.587

Output enable time (t_{PZL}) and Output disable time (t_{PLZ}) (V_{CC} = 1.8)

Circuit simulation result



Evaluation circuit

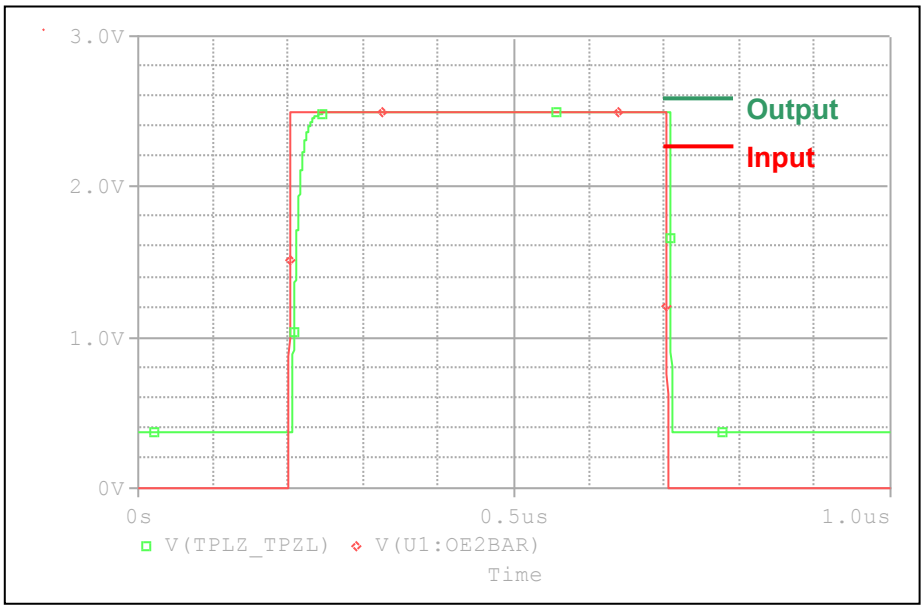


Comparison table C_L = 30 pF, R_L = 500 Ω

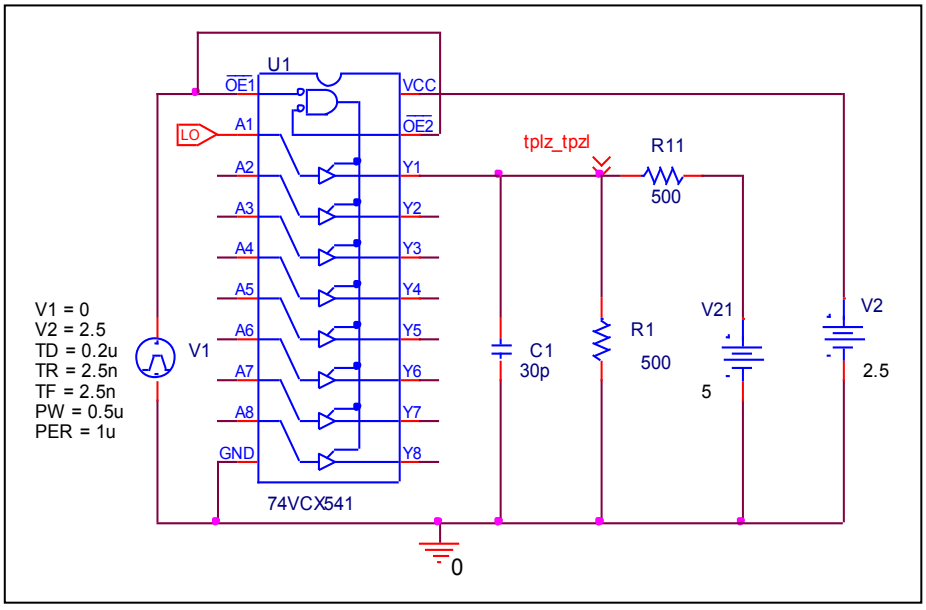
V_{CC} =1.8 V, t_r=t_f= 2 ns	Measurement	Simulation	%Error
t_{PLZ} (ns)	6.5	6.3361	-2.522
t_{pZL} (ns)	9.8	9.752	-0.490

Output enable time (t_{PZL}) and Output disable time (t_{PLZ}) (V_{CC} = 2.5)

Circuit simulation result



Evaluation circuit

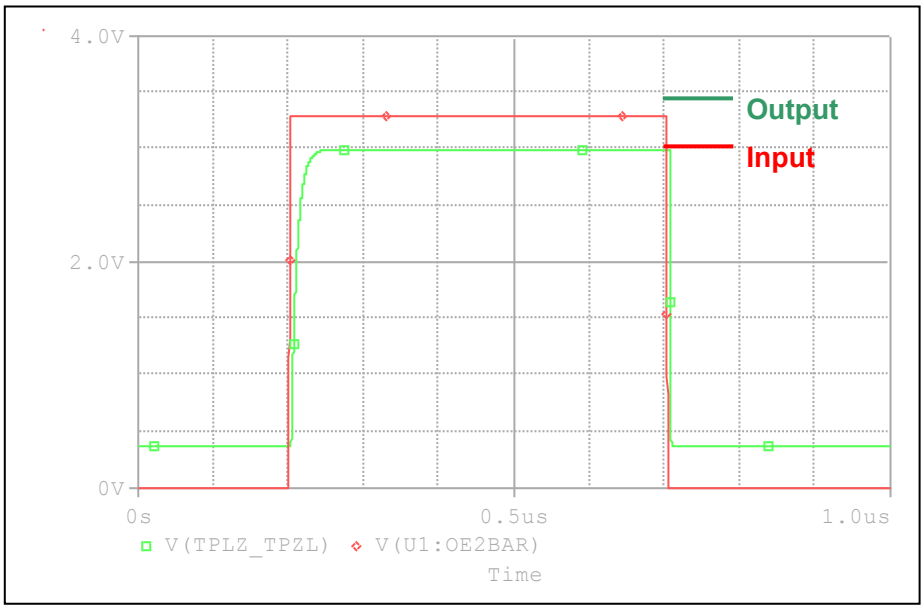


Comparison table C_L = 30 pF, R_L = 500 Ω

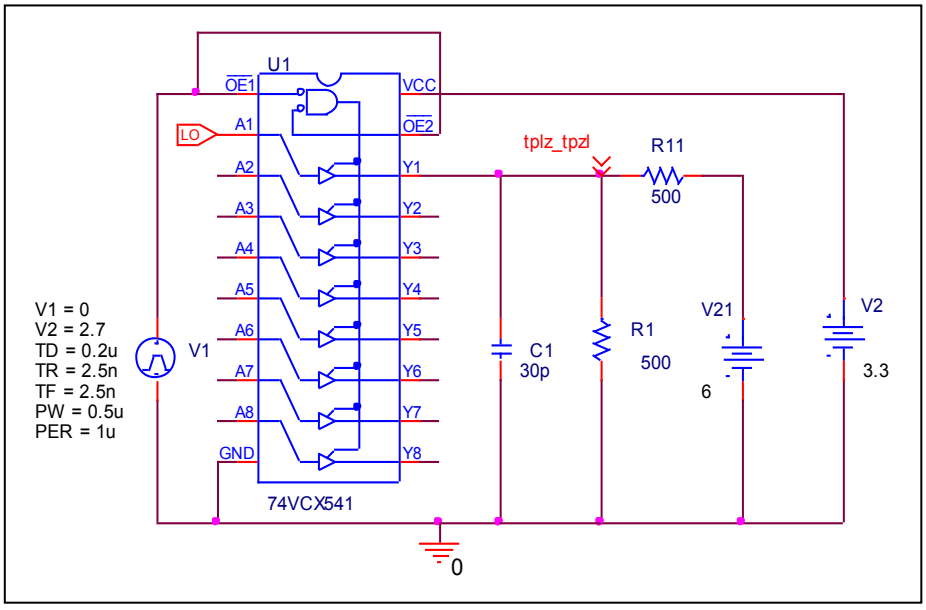
V_{CC} = 2.5 V, t_r=t_f= 2 ns	Measurement	Simulation	%Error
t_{PLZ} (ns)	3.6	3.5918	-0.228
t_{pZL} (ns)	5.5	5.4286	-1.298

Output enable time (t_{PZL}) and Output disable time (t_{PLZ}) (V_{CC} = 3.3)

Circuit simulation result



Evaluation circuit



Comparison table C_L = 30 pF, R_L = 500 Ω

V_{CC} = 3.3 V, t_r=t_f= 2 ns	Measurement	Simulation	%Error
t_{PLZ} (ns)	3.3	3.2149	-2.579
t_{pZL} (ns)	4.5	4.4791	-0.464