

Device Modeling Report

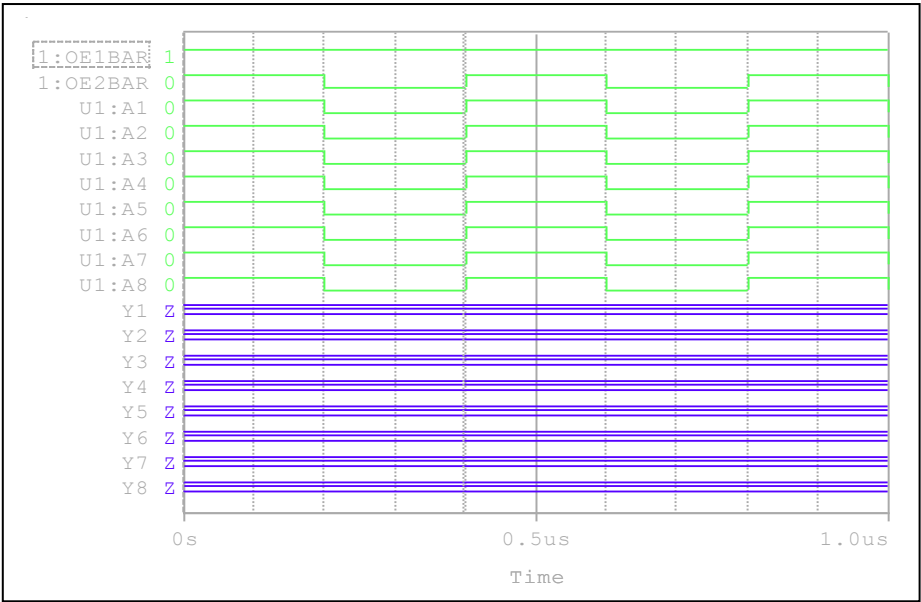
COMPONENTS : CMOS DIGITAL INTEGRATED CIRCUIT
PART NUMBER : TC74LCX541FT
MANUFACTURER : TOSHIBA



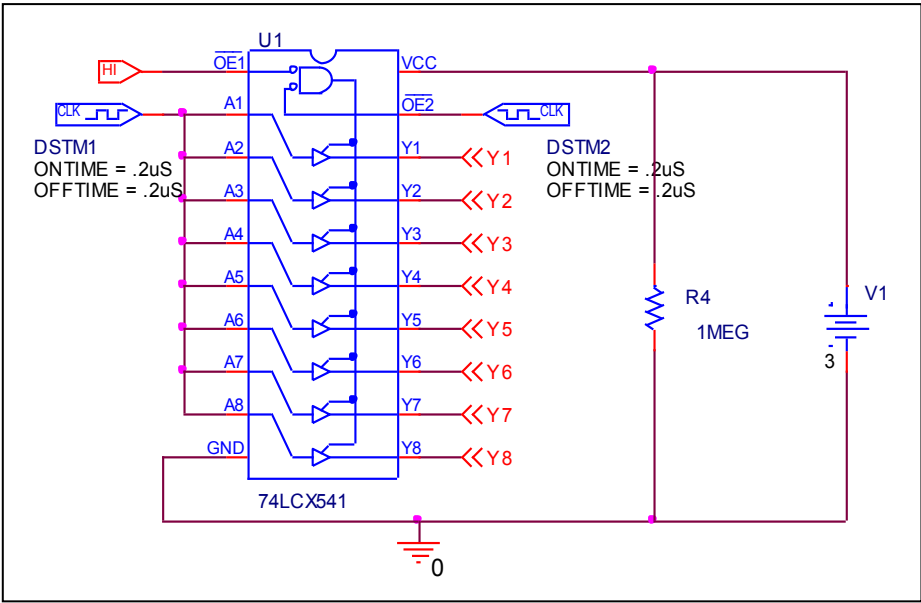
Bee Technologies Inc.

Truth Table

Circuit simulation result



Evaluation circuit

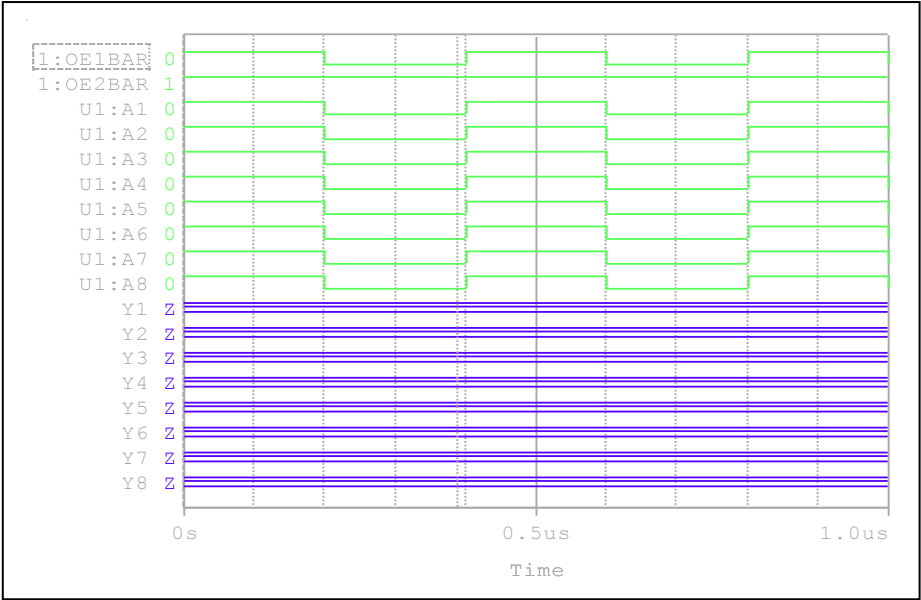


Comparison table

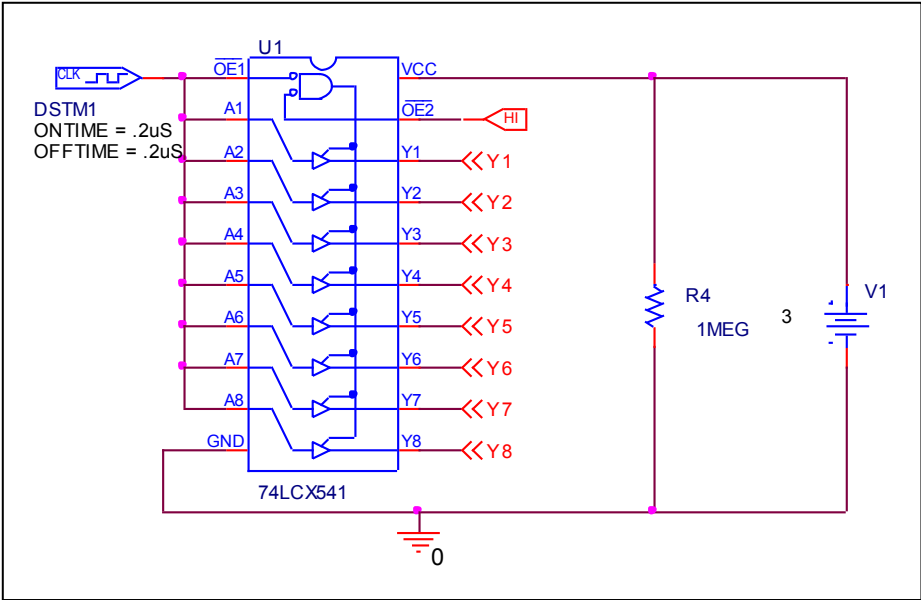
Input			Output		%Error
OE1	OE2	An	Yn (Measurement)	Yn (Simulation)	
H	X	X	Z	Z	0

Truth Table

Circuit simulation result



Evaluation circuit

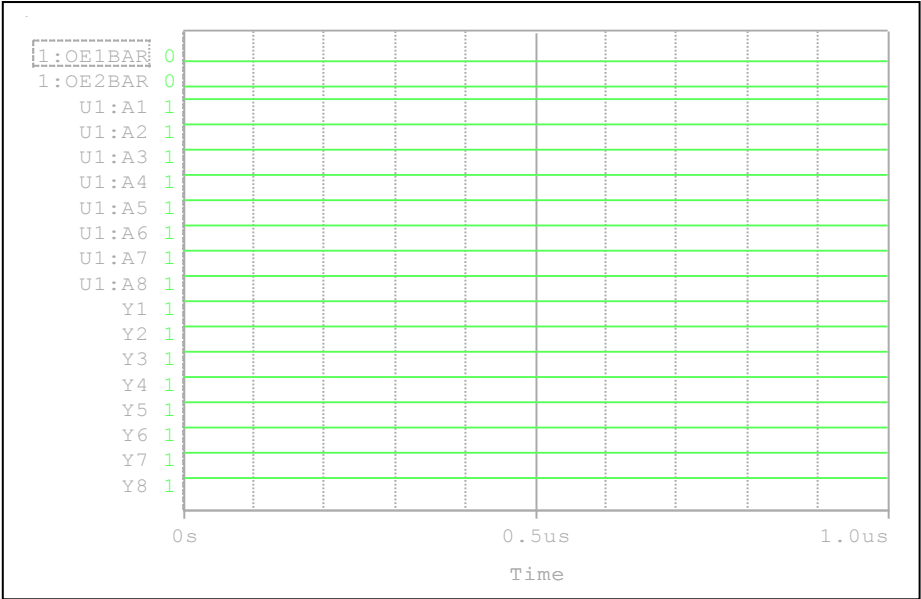


Comparison table

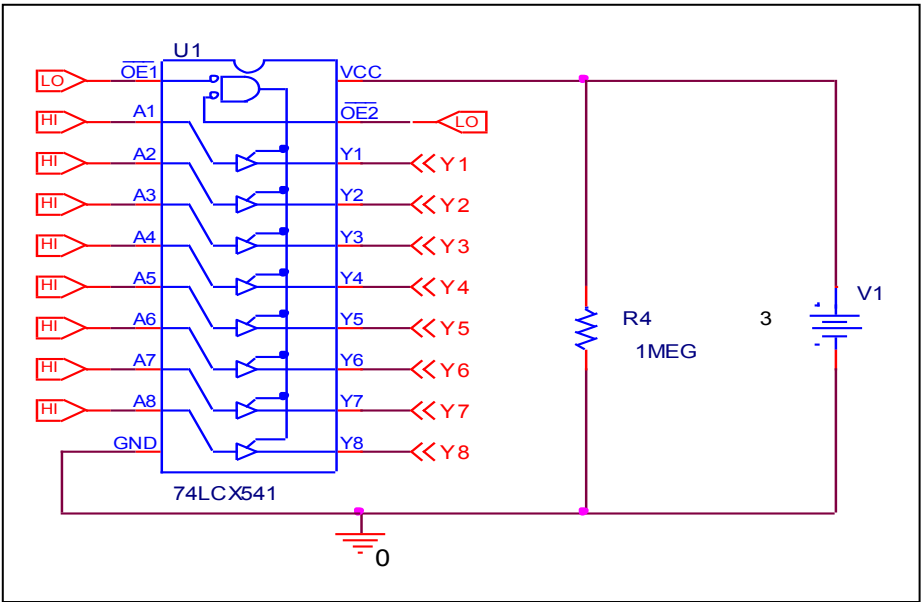
Input			Output		%Error
OE1	OE2	An	Yn (Measurement)	Yn (Simulation)	
X	H	X	Z	Z	0

Truth Table

Circuit simulation result



Evaluation circuit

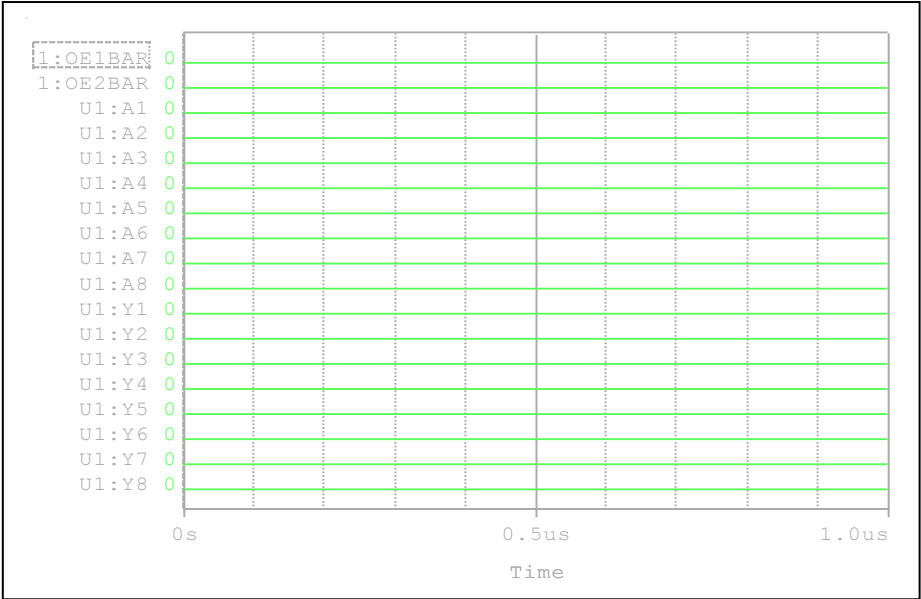


Comparison table

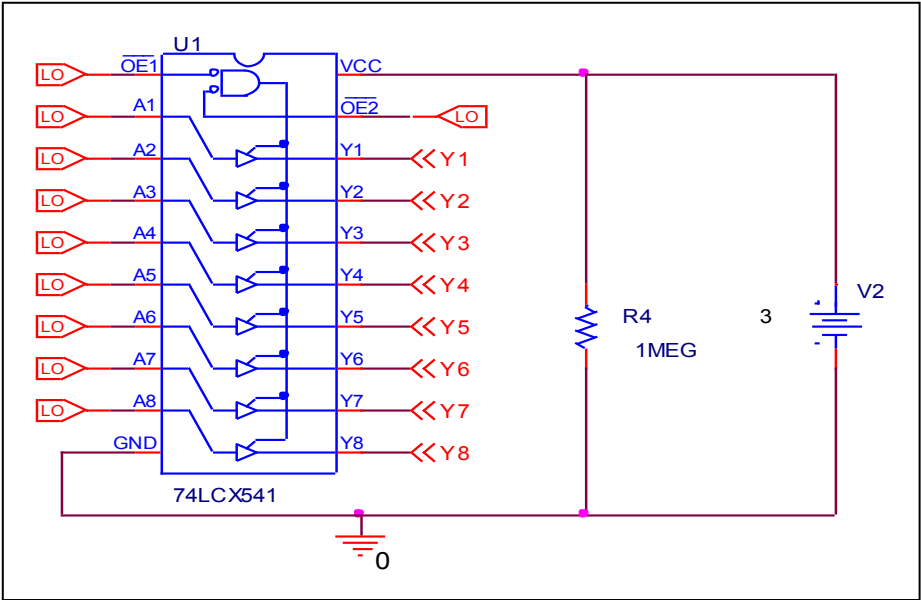
Input			Output		%Error
OE1	OE2	An	Yn (Measurement)	Yn (Simulation)	
L	L	H	H	H	0

Truth Table

Circuit simulation result



Evaluation circuit

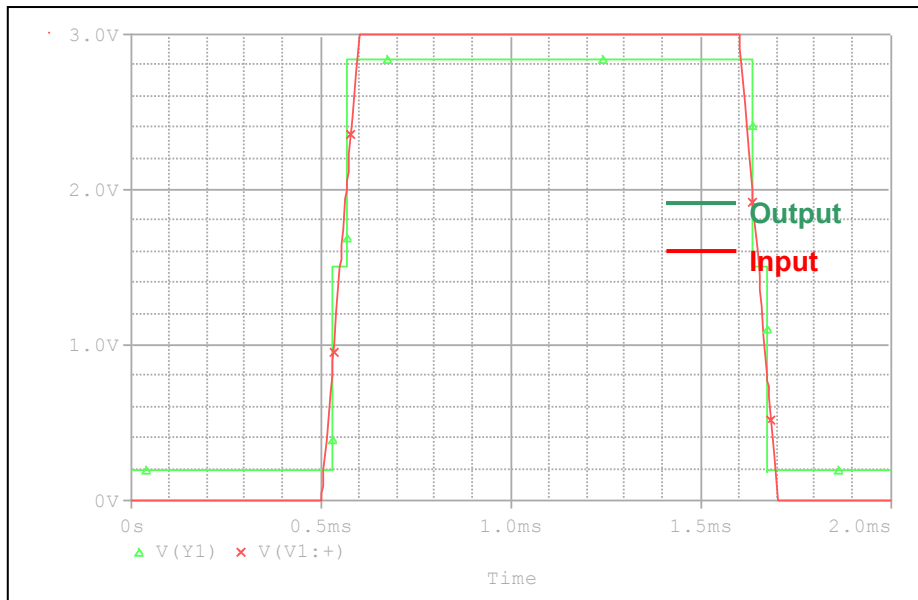


Comparison table

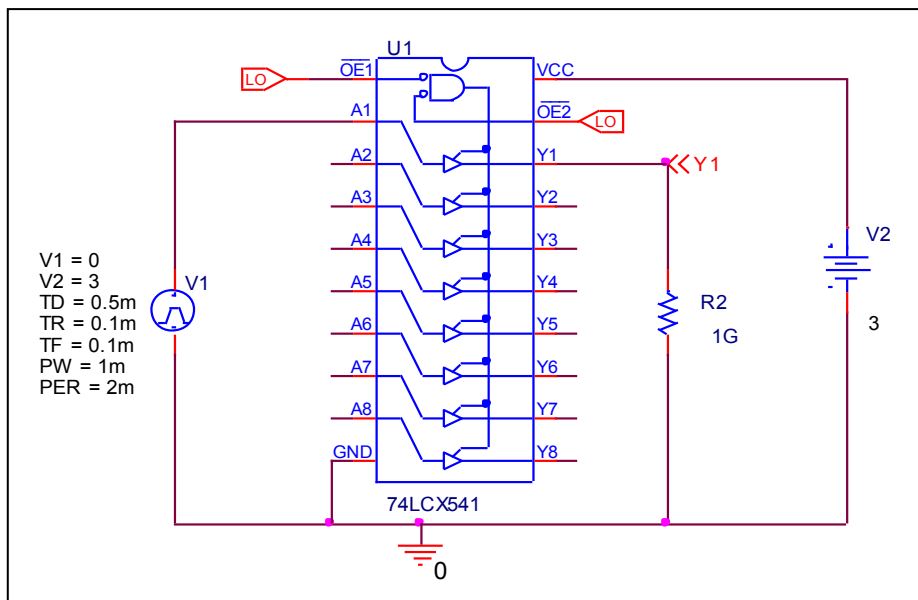
Input			Output		%Error
OE1	OE2	An	Yn (Measurement)	Yn (Simulation)	
L	L	L	L	L	0

High Level and Low Level Input Voltage

Circuit simulation result



Evaluation circuit

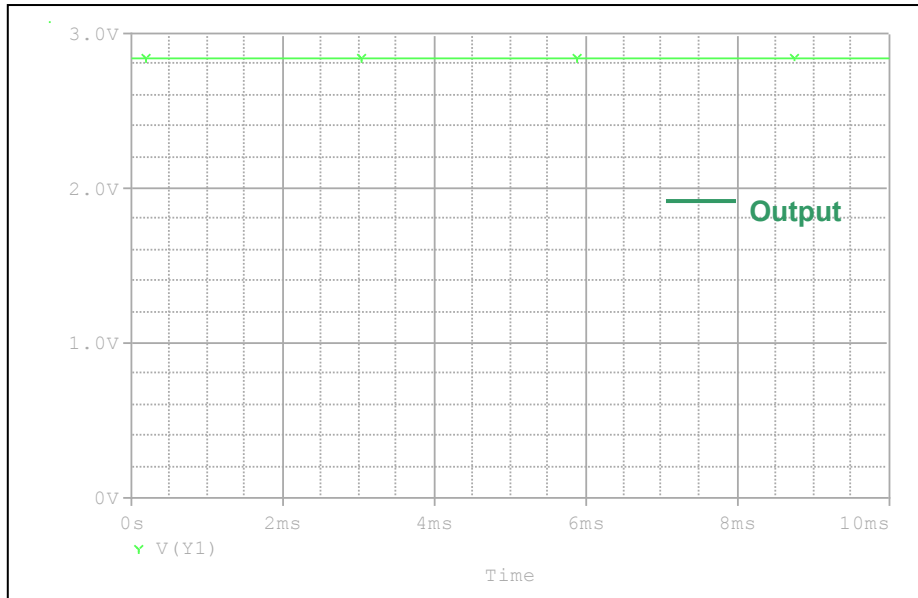


Comparison table

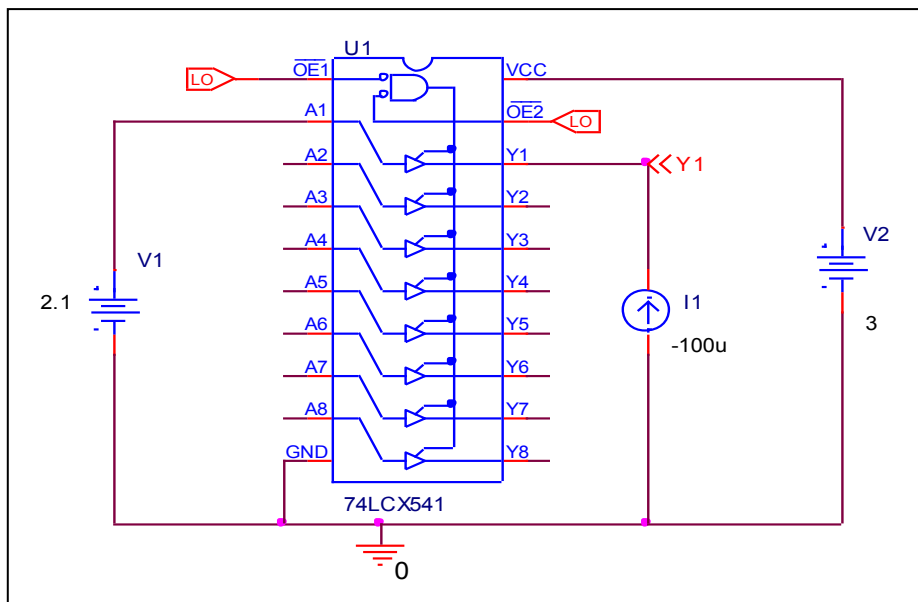
V_{CC} = 3V	Measurement	Simulation	%Error
V_{IH} (V)	2	2	0
V_{IL} (V)	0.8	0.799173	-0.103

High Level Output Voltage

Circuit simulation result



Evaluation circuit

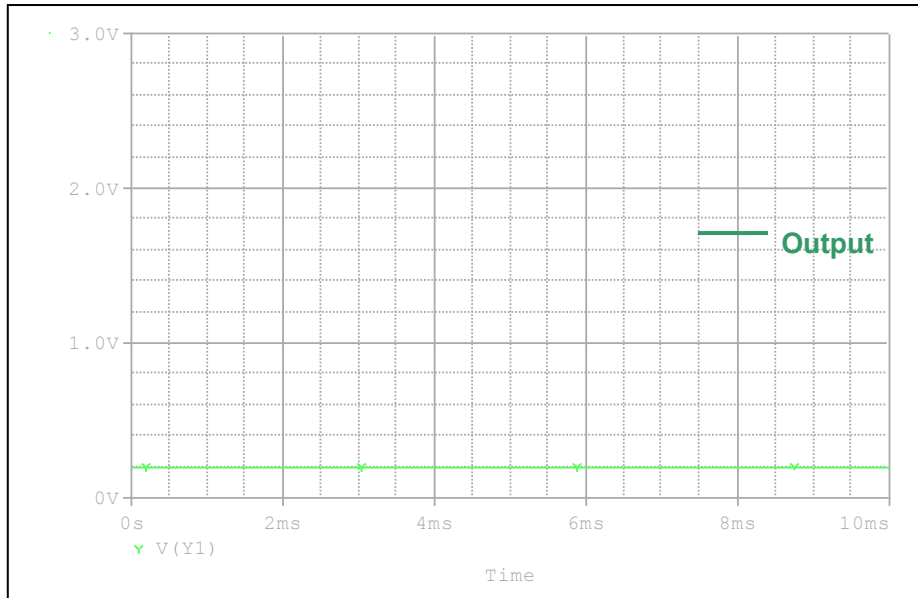


Comparison table

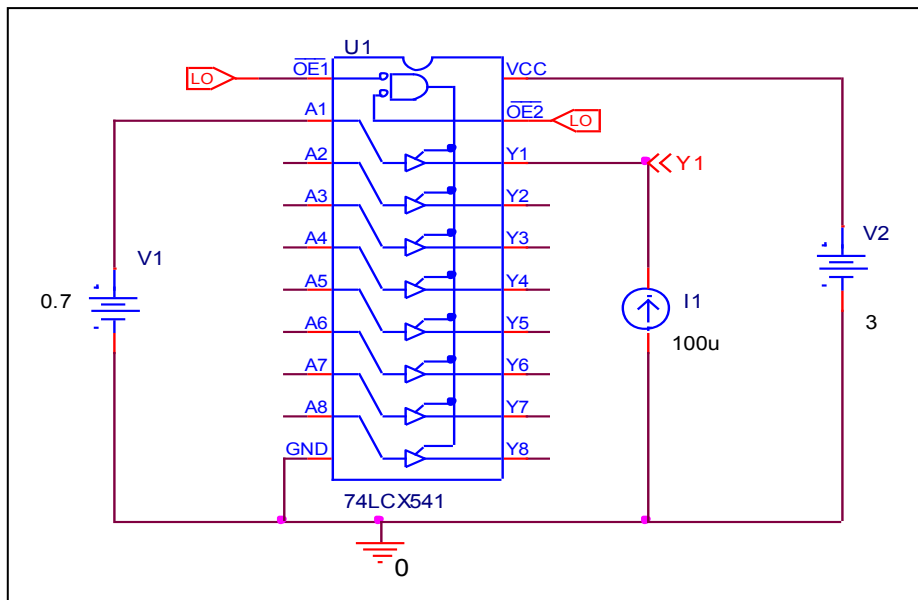
$V_{IN} = V_{IH}, V_{CC} = 3\text{ V}$	Measurement	Simulation	%Error
$\text{Min } V_{OH} = (V_{CC} - 0.2)\text{ V}$	2.8	2.8340	1.214

Low Level Output Voltage

Circuit simulation result



Evaluation circuit

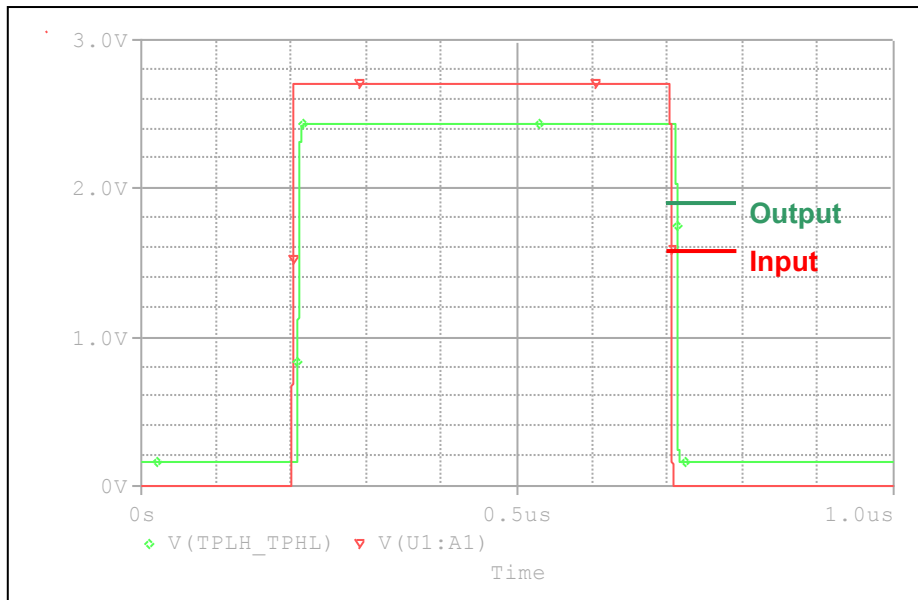


Comparison table

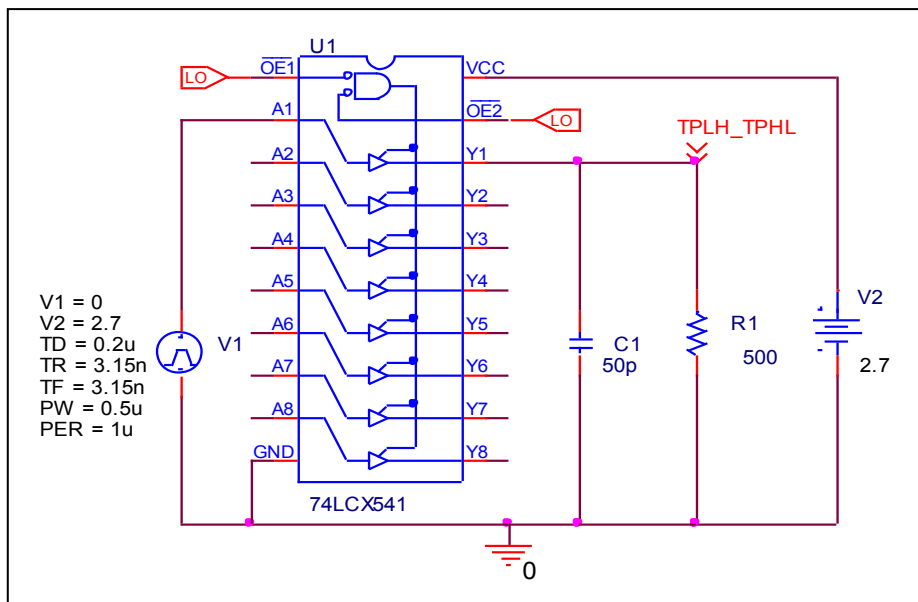
$V_{IN} = V_{IL}, V_{CC} = 3\text{ V}$	Measurement	Simulation	%Error
$V_{OL}\text{ (V)}$	0.2	0.191208	-4.396

Propagation Delay Time

Circuit simulation result



Evaluation circuit

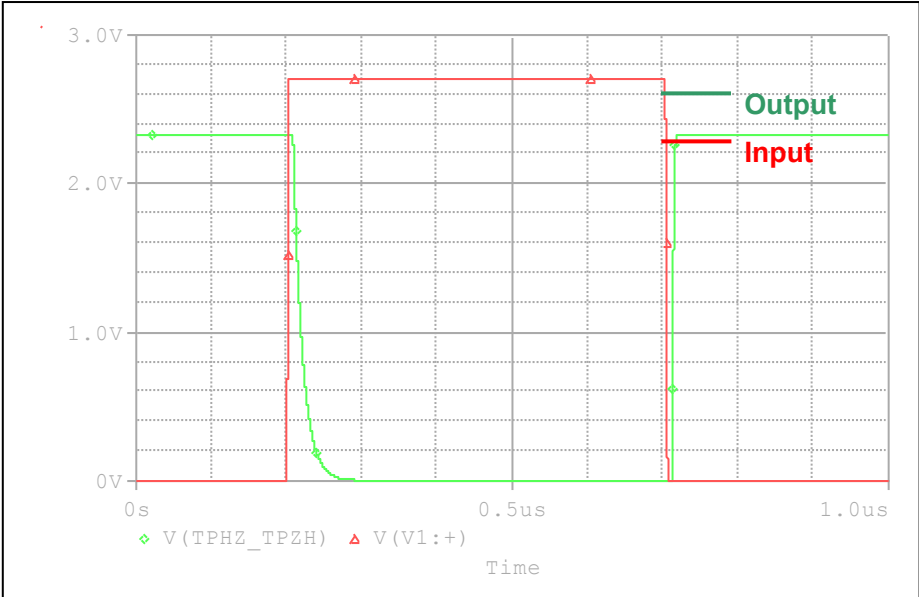


Comparison table $C_L = 50 \text{ pF}$, $R_L = 500 \Omega$

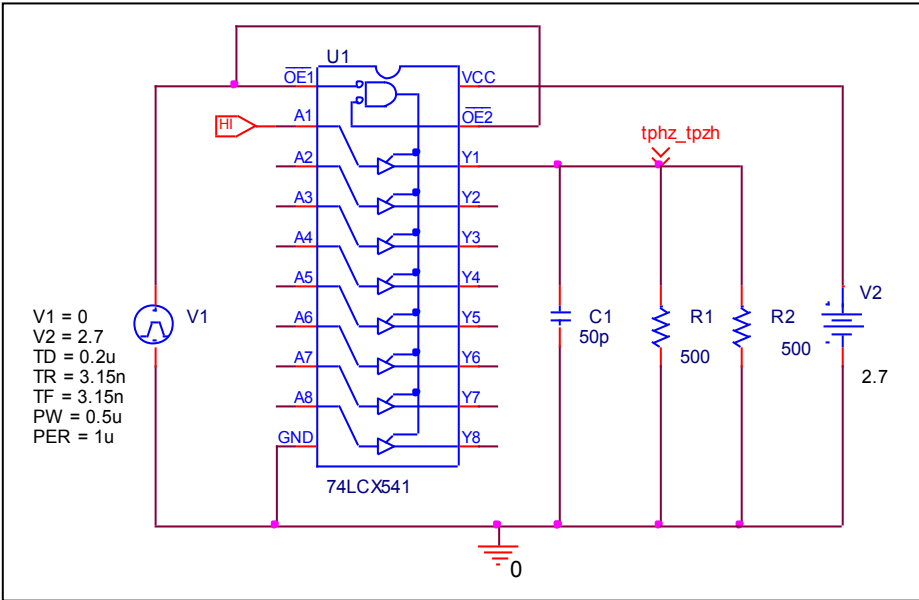
$V_{CC} = 2.7 \text{ V}$, $t_r=t_f = 2.5 \text{ ns}$	Measurement	Simulation	%Error
$t_{pLH} \text{ (ns)}$	7.5	7.4215	-1.047
$t_{pHL} \text{ (ns)}$	7.5	7.4696	-0.405

Output enable time, high impedance (off) to high output (t_{PZH})
Output disable time, high to high impedance (off) output (t_{PHZ})

Circuit simulation result



Evaluation circuit

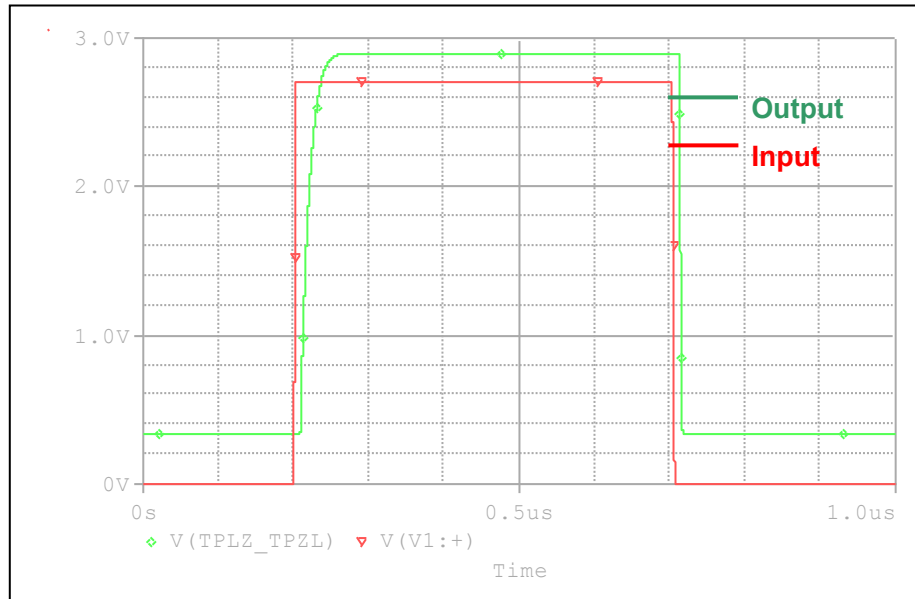


Comparison table $C_L = 50 \text{ pF}$, $R_L = 500 \Omega$

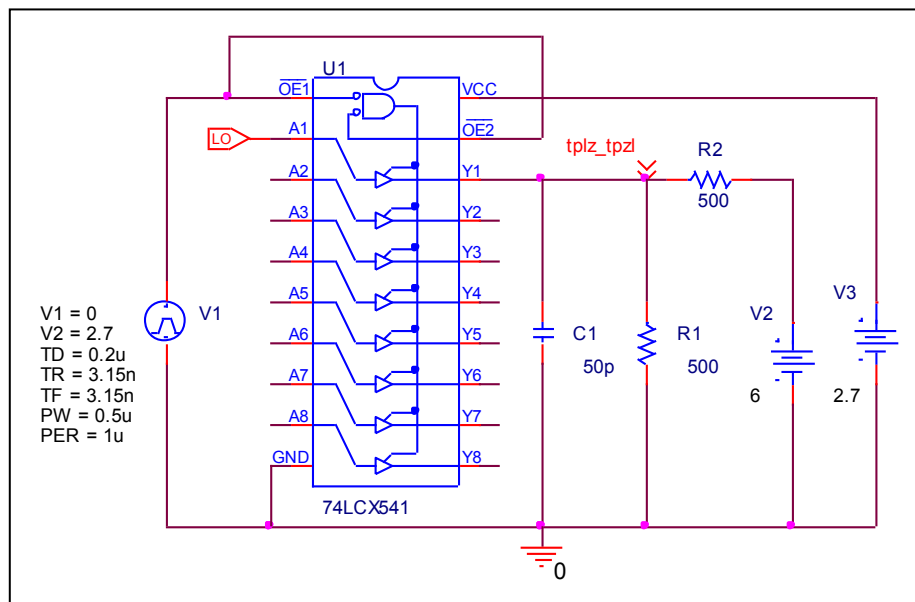
$V_{CC} = 2.7 \text{ V}$, $t_r=t_f = 2.5 \text{ ns}$	Measurement	Simulation	%Error
$t_{PHZ} \text{ (ns)}$	8.5	8.3687	-1.545
$t_{pZH} \text{ (ns)}$	9.5	9.4711	-0.304

Output enable time, high impedance (off) to low output (t_{pZL})
Output disable time, low to high impedance (off) output (t_{pLZ})

Circuit simulation result



Evaluation circuit



Comparison table $C_L = 50 \text{ pF}$, $R_L = 500 \Omega$

$V_{CC} = 2.7 \text{ V}$, $t_r=t_f = 2.5 \text{ ns}$	Measurement	Simulation	%Error
$t_{pLZ} \text{ (ns)}$	8.5	8.4395	-0.712
$t_{pZL} \text{ (ns)}$	9.5	9.583	0.874