

Device Modeling Report

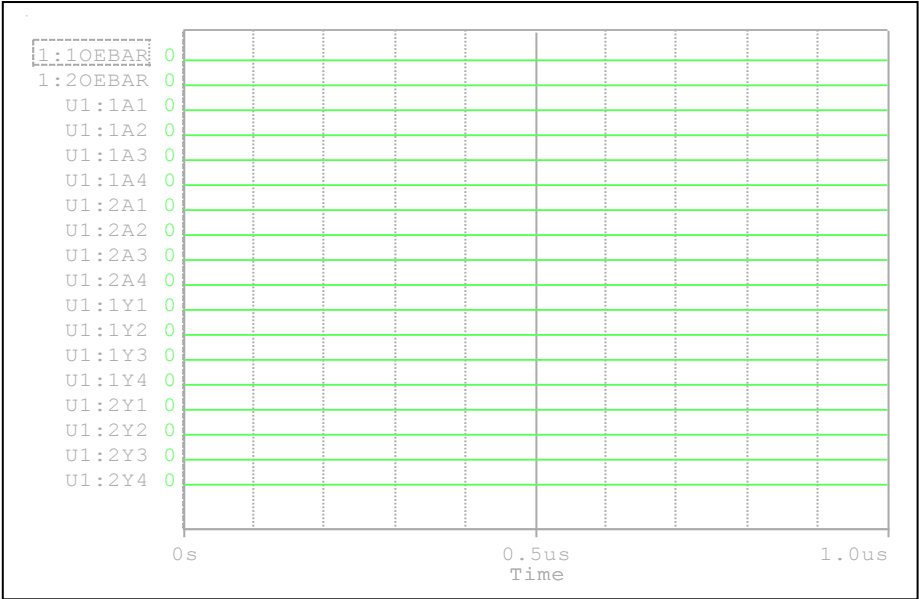
COMPONENTS : CMOS DIGITAL INTEGRATED CIRCUIT
PART NUMBER : TC74LCX244F
MANUFACTURER : TOSHIBA



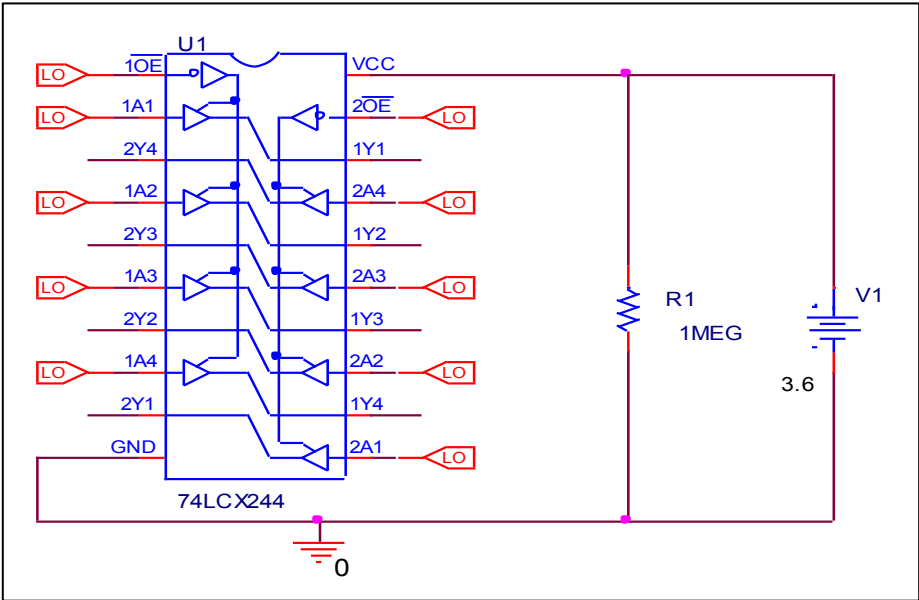
Bee Technologies Inc.

Truth Table

Circuit simulation result



Evaluation circuit

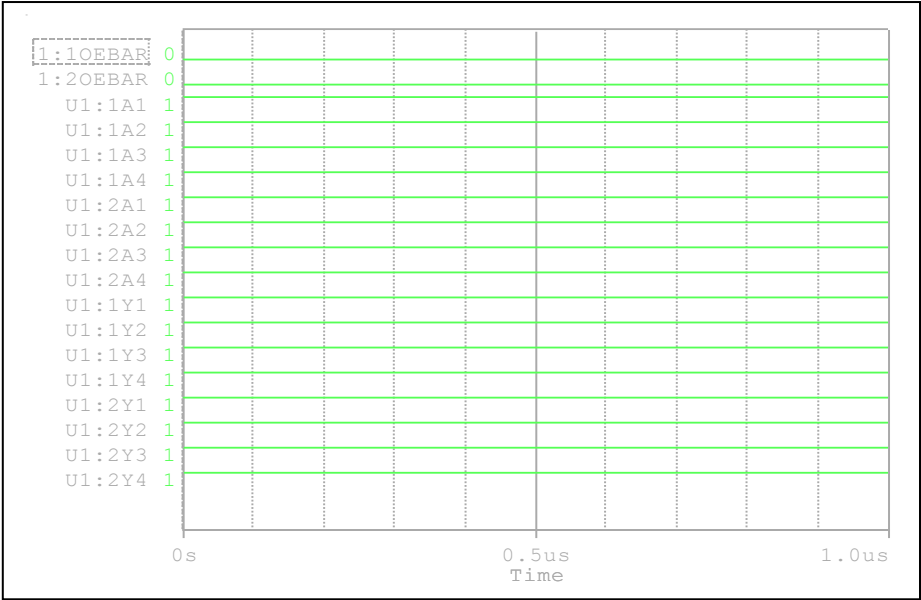


Comparison table

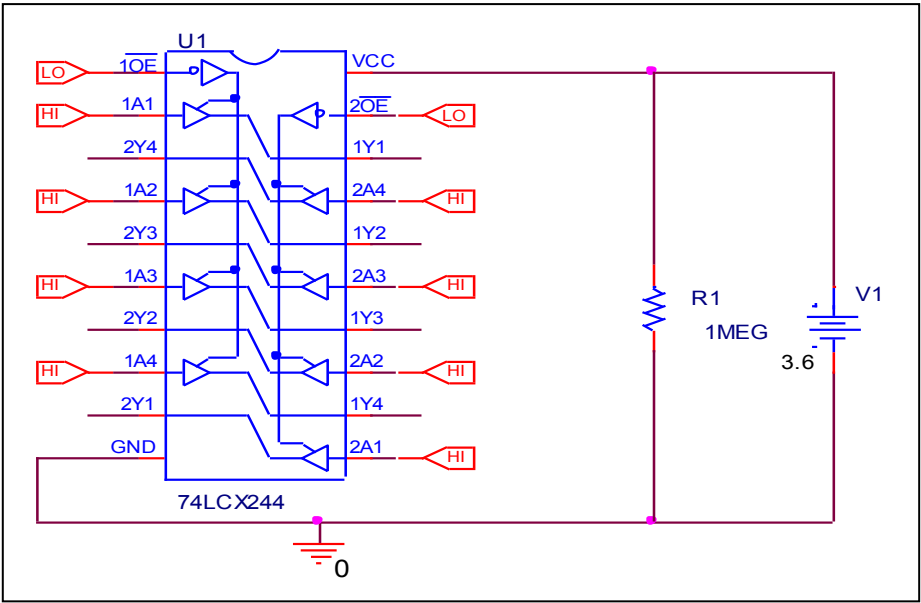
Input		Output		%Error
$\overline{\text{G}}$	A_n	Y_n (Measurement)	Y_n (Simulation)	
L	L	L	L	0

Truth Table

Circuit simulation result



Evaluation circuit

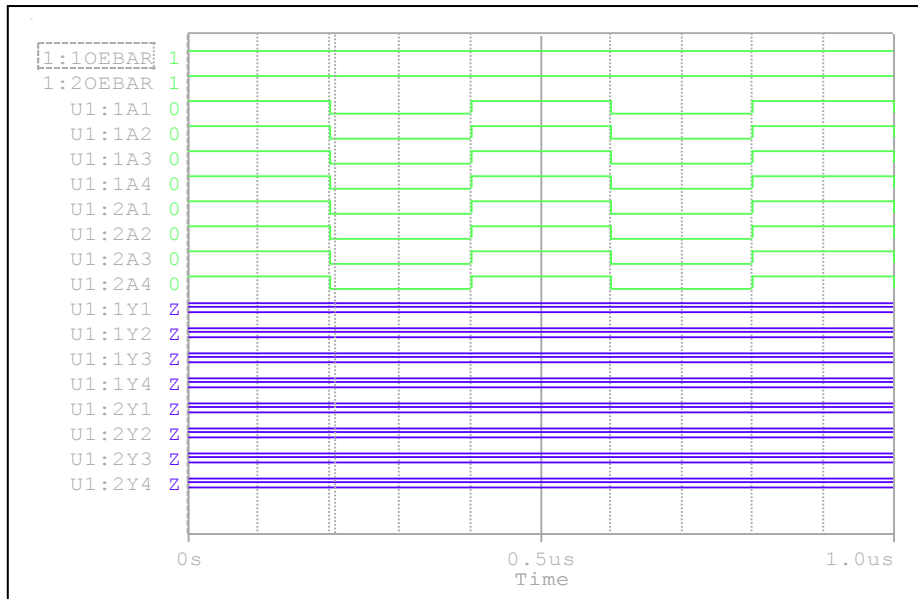


Comparison table

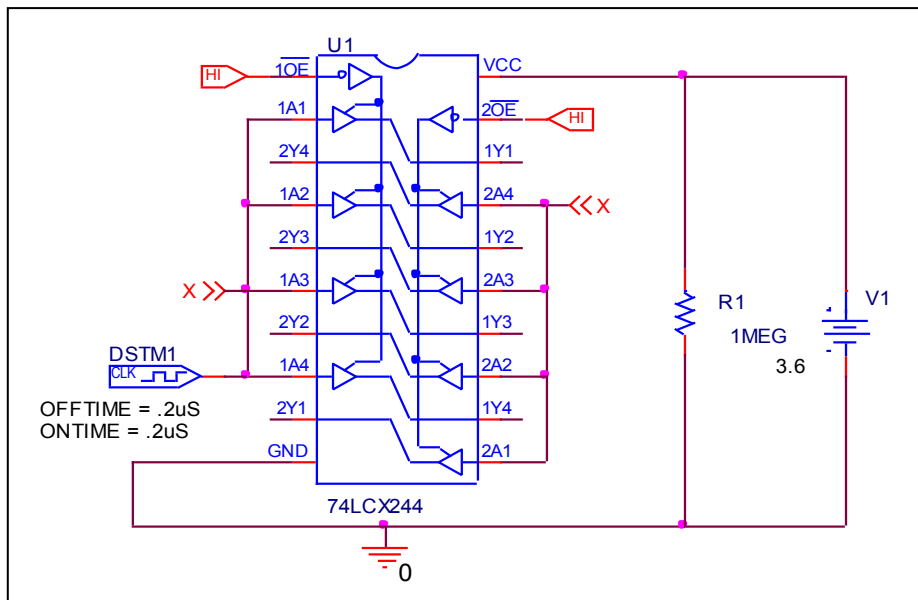
Input		Output		%Error
$\overline{\text{G}}$	A _n	Y _n (Measurement)	Y _n (Simulation)	
L	H	H	H	0

Truth Table

Circuit simulation result



Evaluation circuit

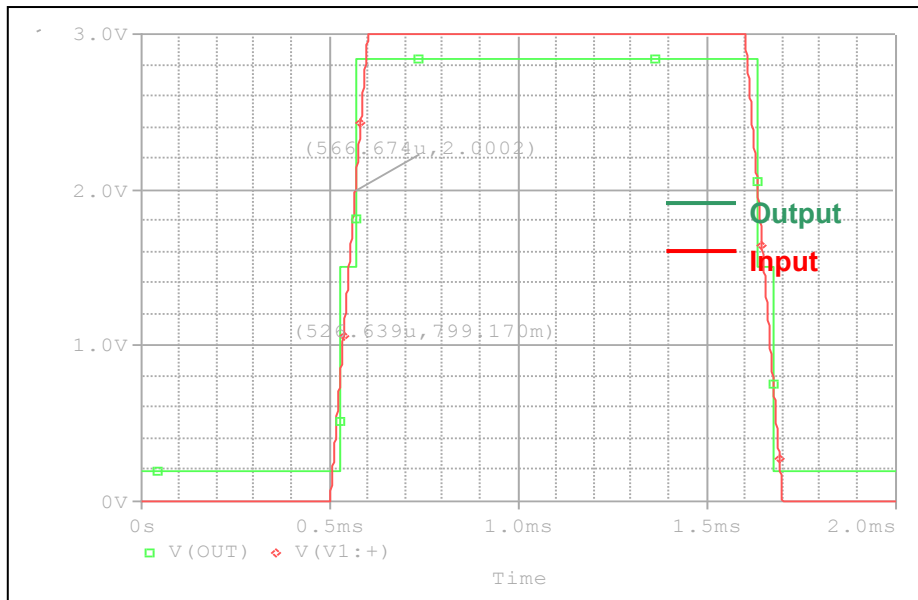


Comparison table

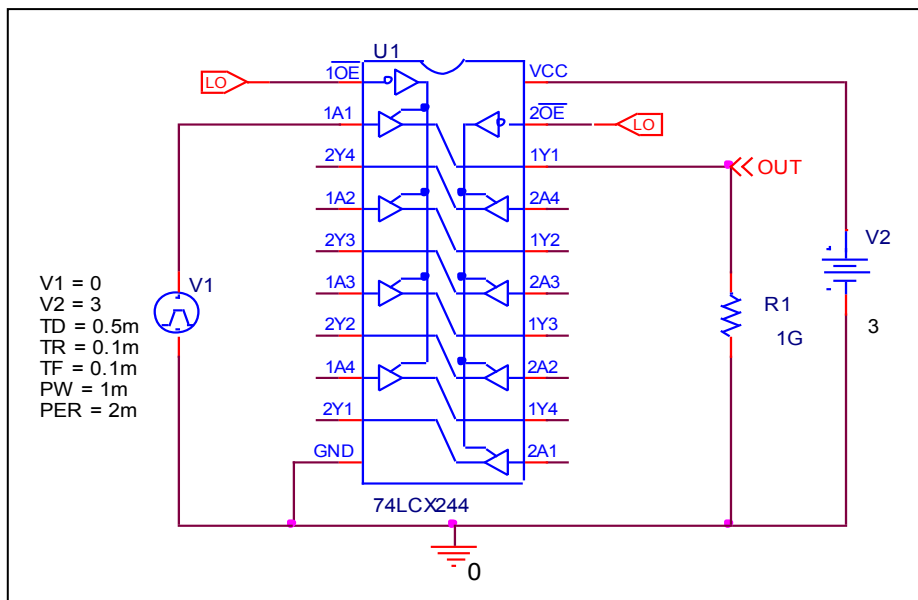
Input		Output		%Error
$\bar{G}$	A_n	Y_n (Measurement)	Y_n (Simulation)	
H	X	Z	Z	0

High Level and Low Level Input Voltage

Circuit simulation result



Evaluation circuit

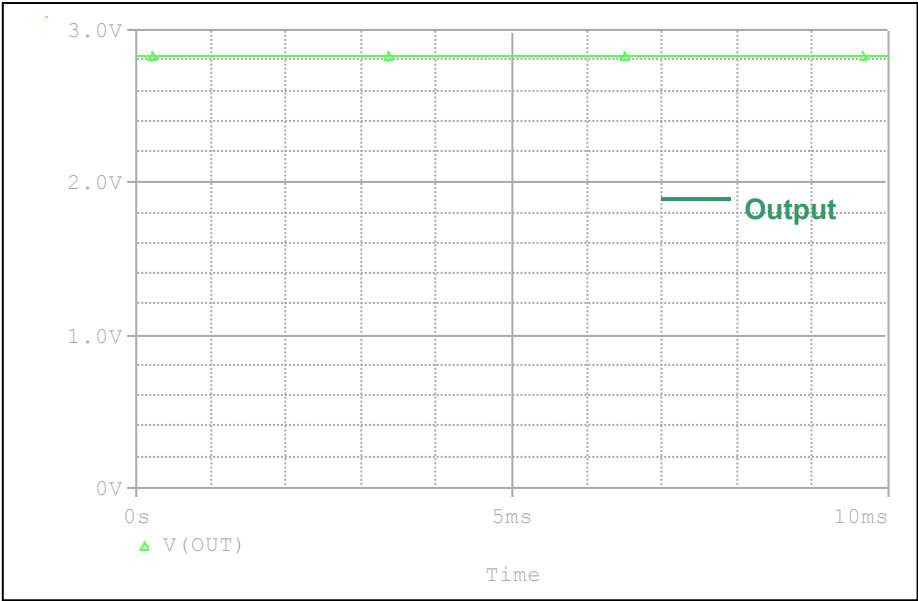


Comparison table

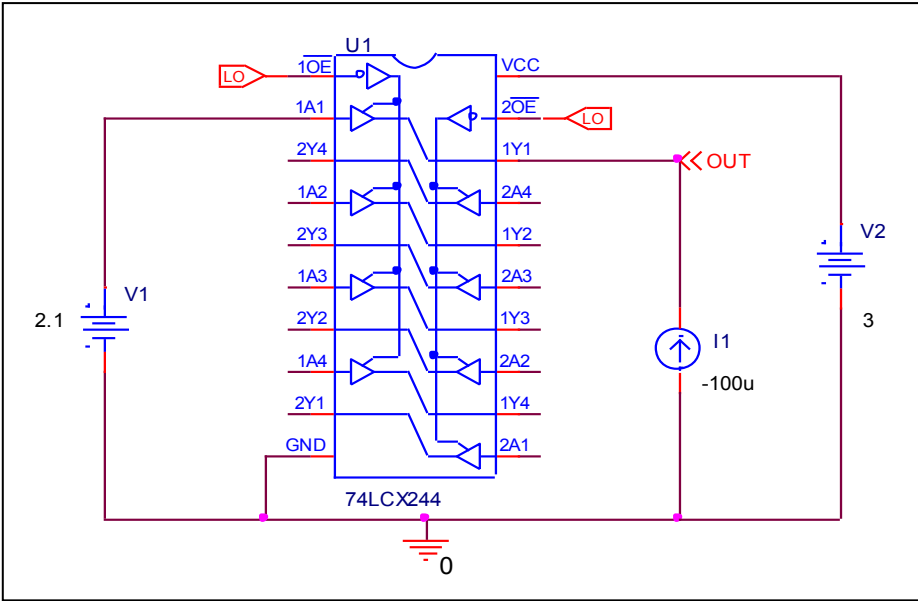
V _{CC} = 5V	Measurement	Simulation	%Error
V _{IH} (V)	2	2	0
V _{IL} (V)	0.8	0.799170	-0.104

High Level Output Voltage

Circuit simulation result



Evaluation circuit

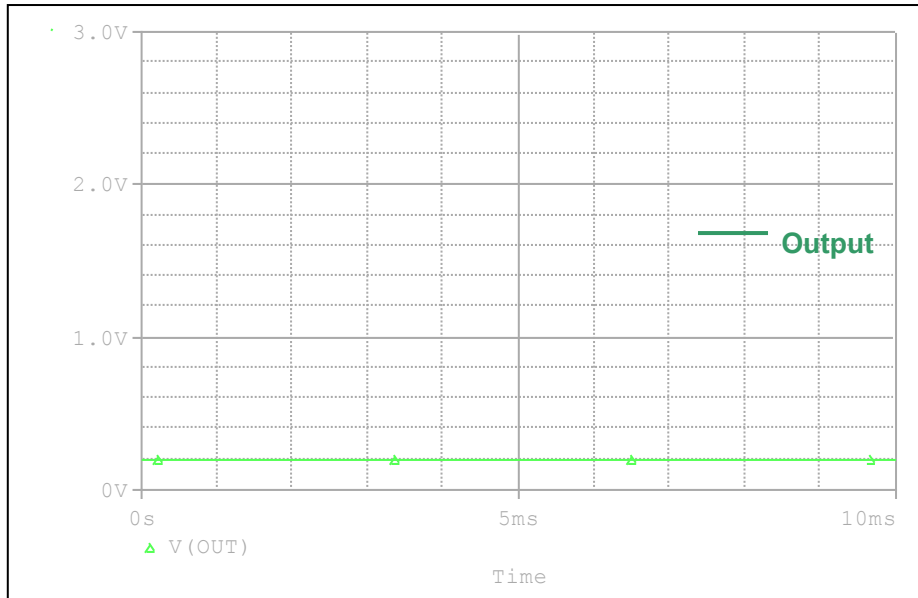


Comparison table

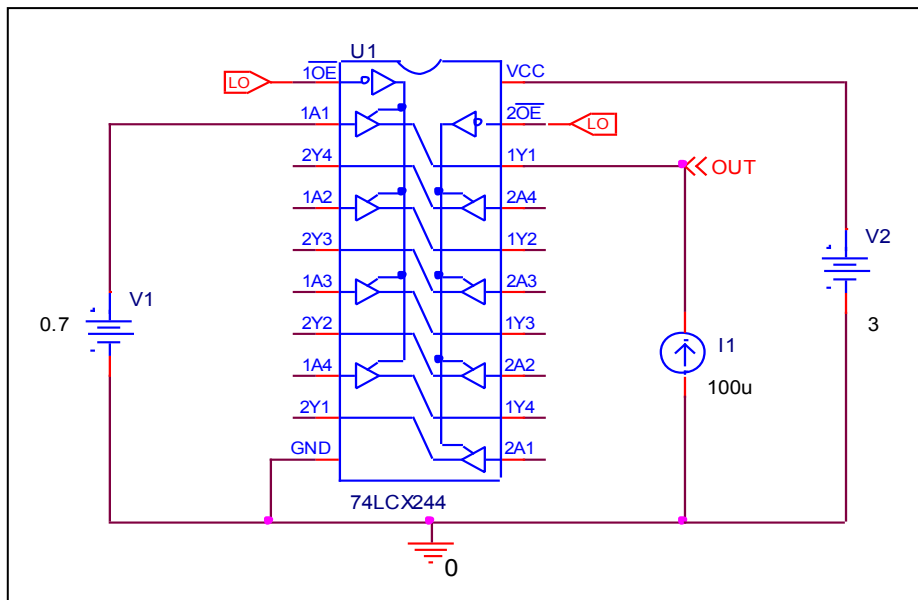
$V_{IN} = V_{IH}, V_{CC} = 3\text{ V}$	Measurement	Simulation	%Error
Min $V_{OH} = (V_{CC} - 0.2)\text{ V}$	2.8	2.8340	1.214

Low Level Output Voltage

Circuit simulation result



Evaluation circuit

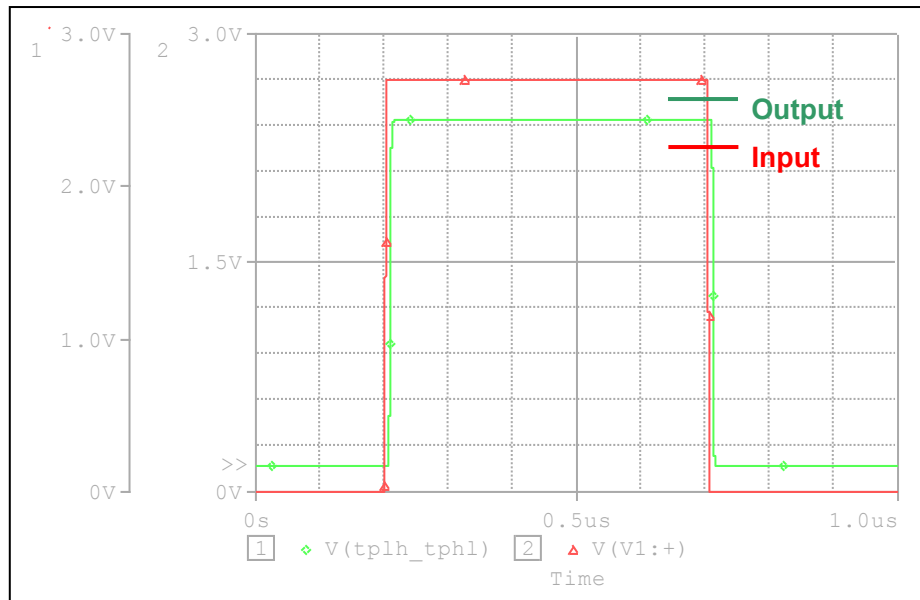


Comparison table

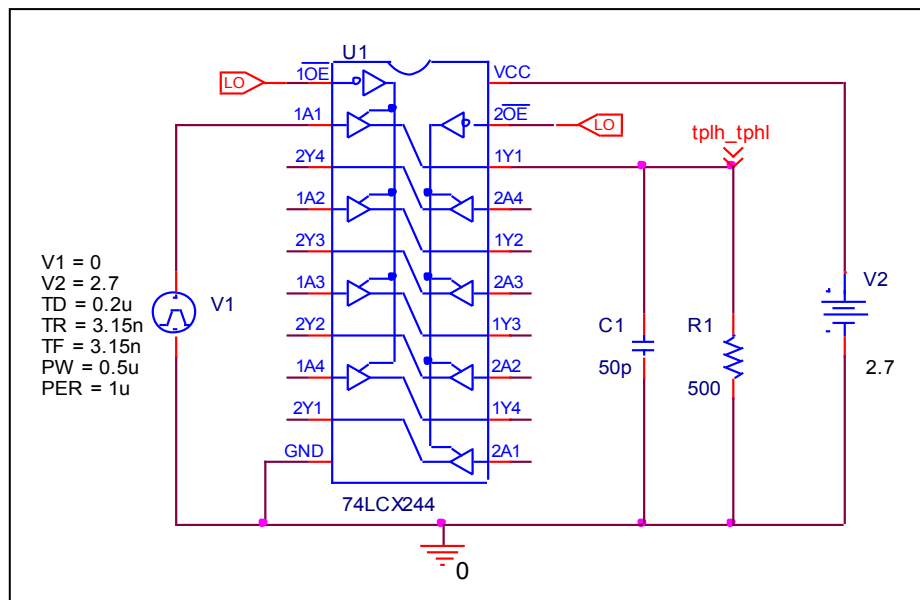
$V_{IN} = V_{IL}, V_{CC} = 3\text{ V}$	Measurement	Simulation	%Error
$V_{OL}\text{ (V)}$	0.2	0.191208	-4.396

Propagation Delay Time

Circuit simulation result



Evaluation circuit

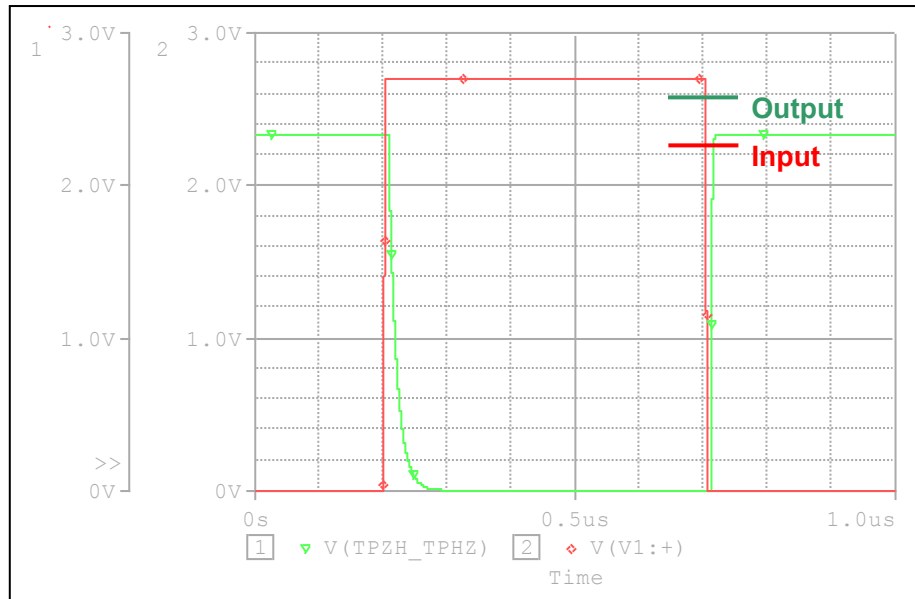


Comparison table $C_L = 50 \text{ pF}$, $R_L = 500 \Omega$

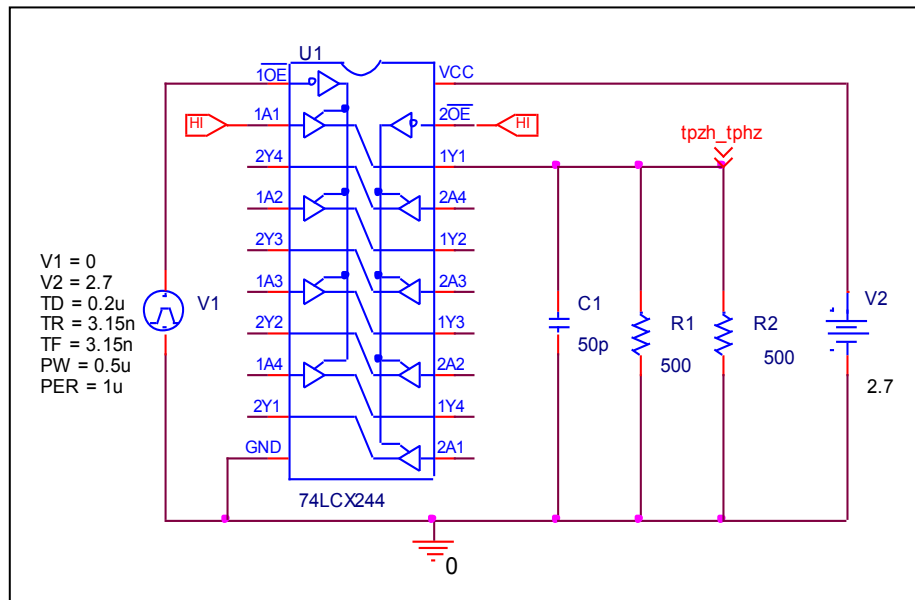
$V_{CC} = 2.7 \text{ V}$, $t_r = t_f = 2.5 \text{ ns}$	Measurement	Simulation	%Error
$t_{PLH} \text{ (ns)}$	7.5	7.4214	-1.048
$t_{PHL} \text{ (ns)}$	7.5	7.4696	-0.405

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

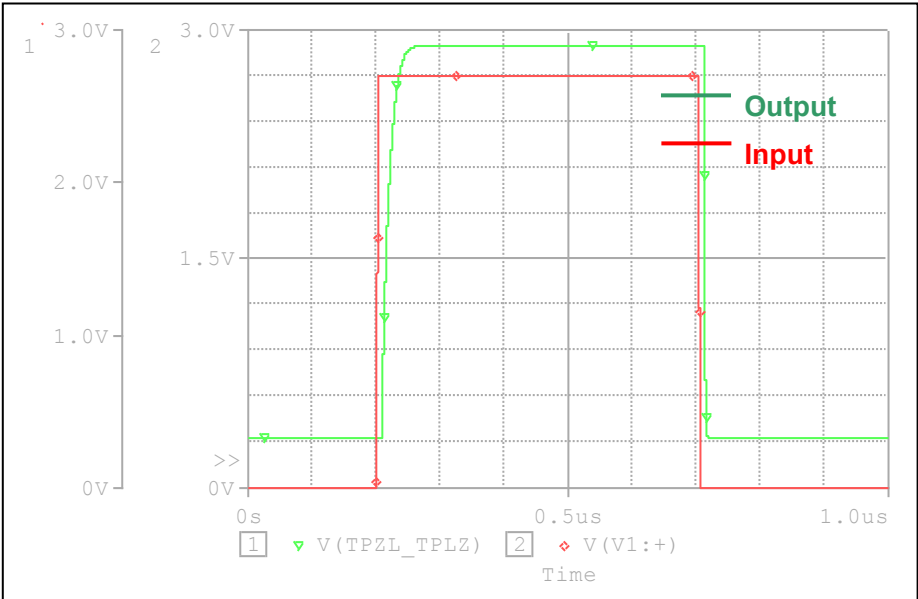


Comparison table $C_L = 50 \text{ pF}$, $R_L = 500 \Omega$

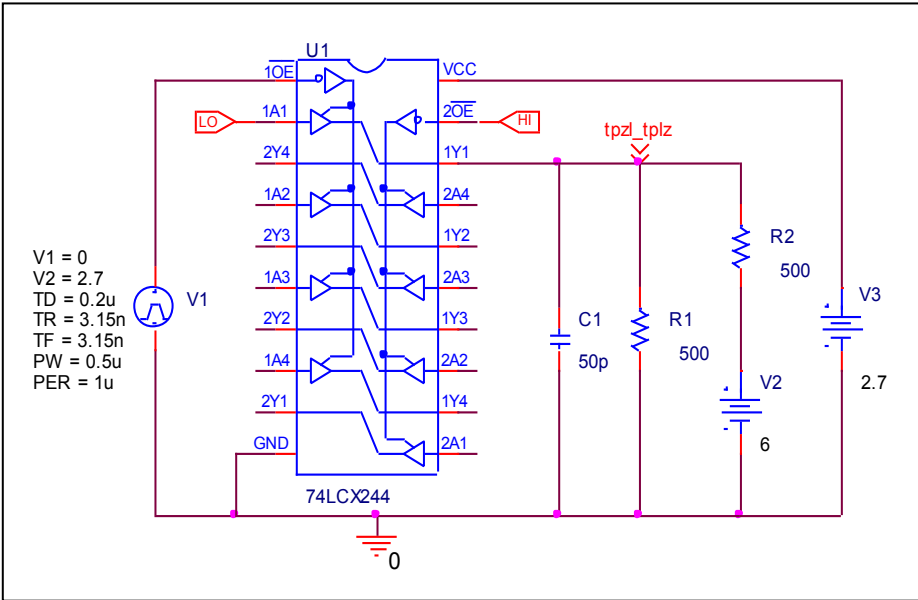
$V_{CC} = 2.7 \text{ V}$, $t_r=t_f = 2.5 \text{ ns}$	Measurement	Simulation	%Error
$t_{PZH} \text{ (ns)}$	9	8.9765	-0.261
$t_{PHZ} \text{ (ns)}$	8	7.9671	-0.411

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

$V_{CC} = 2.7 \text{ V}$, $t_r = t_f = 2.5 \text{ ns}$	Measurement	Simulation	%Error
$t_{PZL} \text{ (ns)}$	9	8.8887	-1.237
$t_{PLZ} \text{ (ns)}$	8	7.9379	-0.776