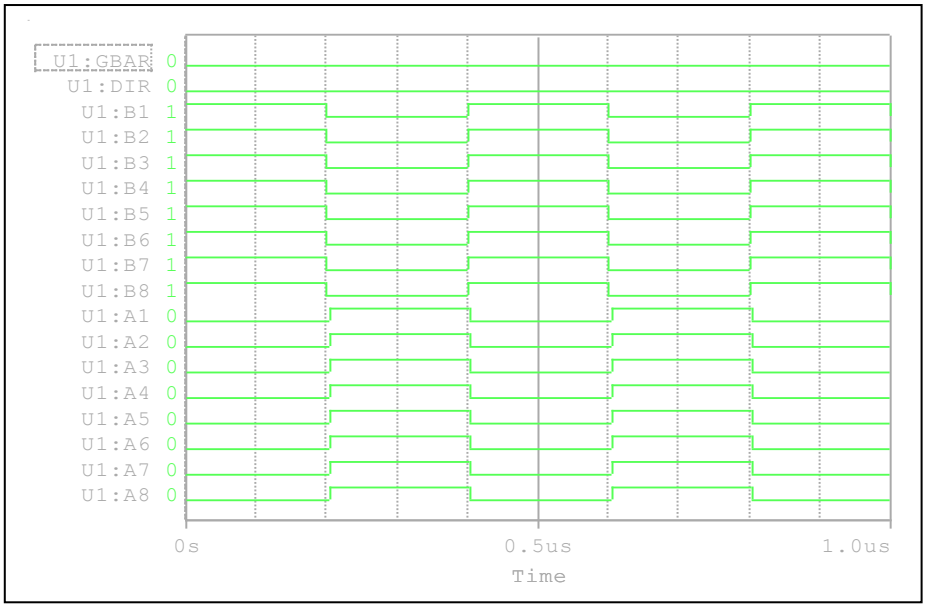
Device Modeling Report

COMPONENTS : CMOS DIGITAL INTEGRATED CIRCUIT
PART NUMBER : TC74AC640FW
MANUFACTURER : TOSHIBA

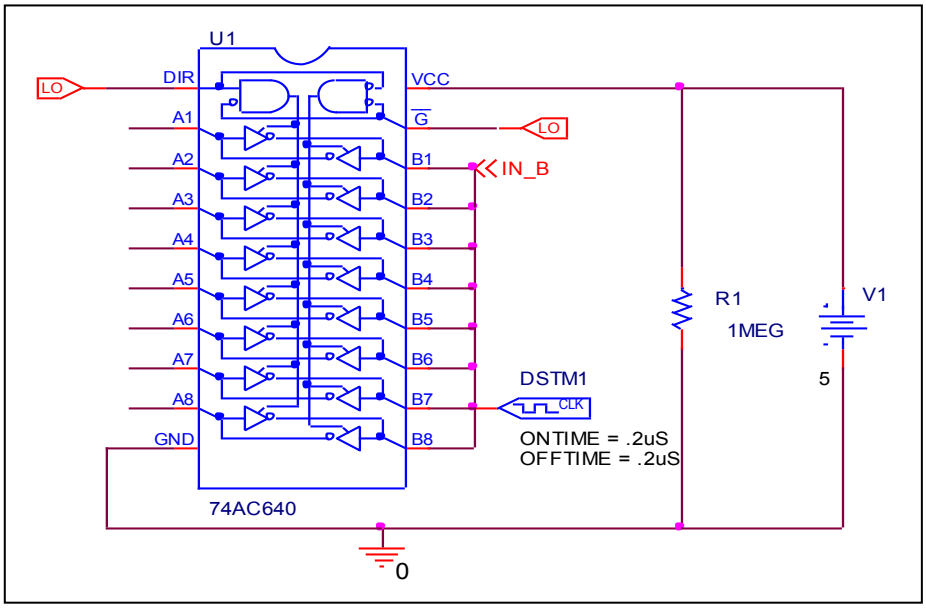
Bee Technologies Inc.

Truth Table

Circuit simulation result



Evaluation circuit

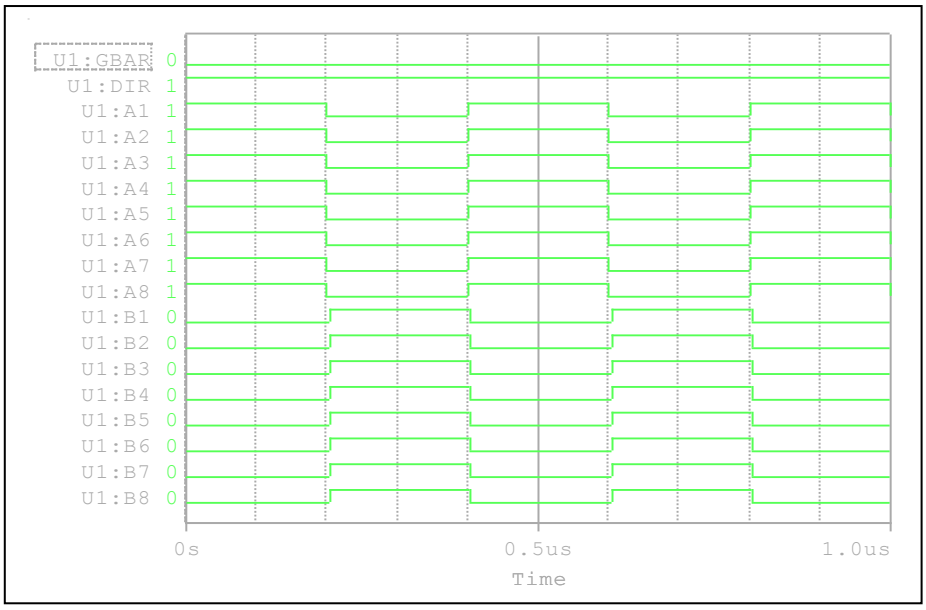


Comparison table **Function : A BUS = OUTPUT, B BUS = INPUT**

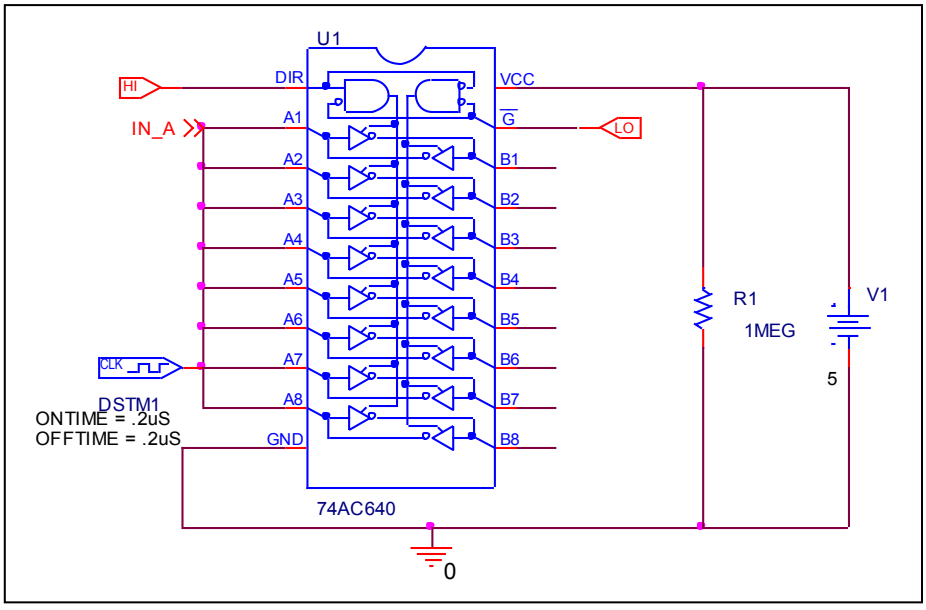
Input		Output		%Error
$\overline{G}$	DIR	Measurement	Simulation	
L	L	$A=\overline{B}$	$A=\overline{B}$	0

Truth Table

Circuit simulation result



Evaluation circuit

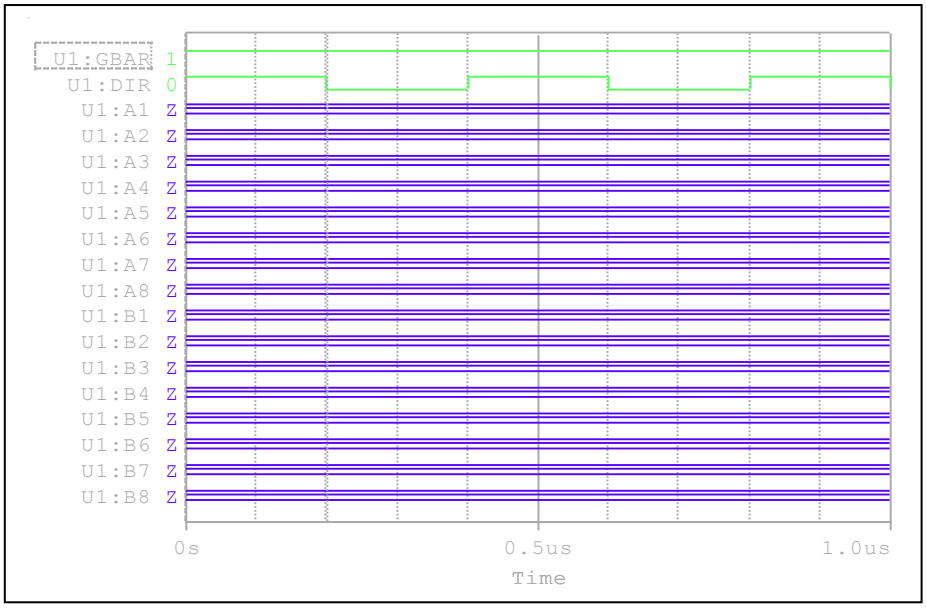


Comparison table **Function : A BUS = INPUT, B BUS = OUTPUT**

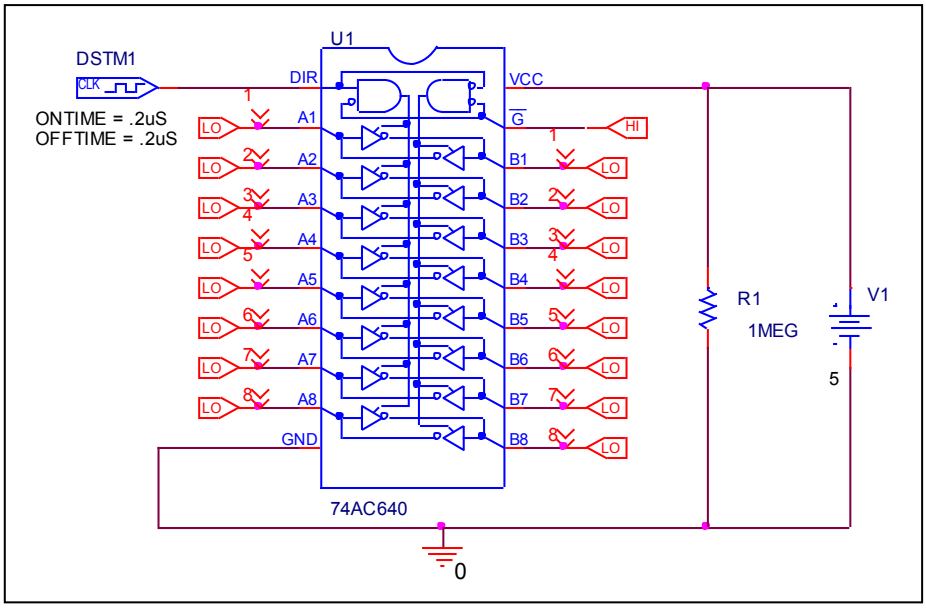
Input		Output		%Error
$\overline{G}$	DIR	Measurement	Simulation	
L	H	B= $\overline{A}$	B= $\overline{A}$	0

Truth Table

Circuit simulation result



Evaluation circuit

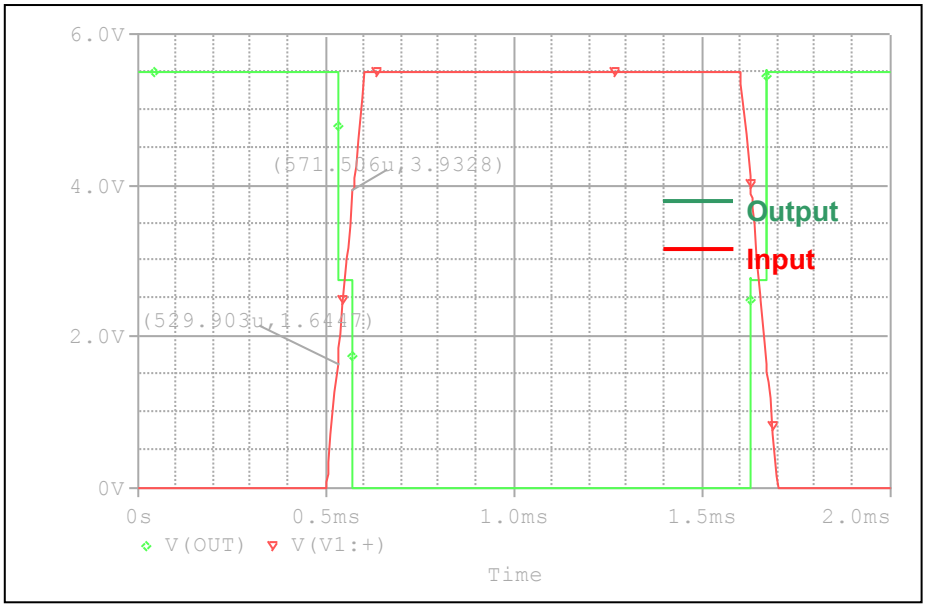


Comparison table **Function : A BUS and B BUS = HIGH IMPEDANCE**

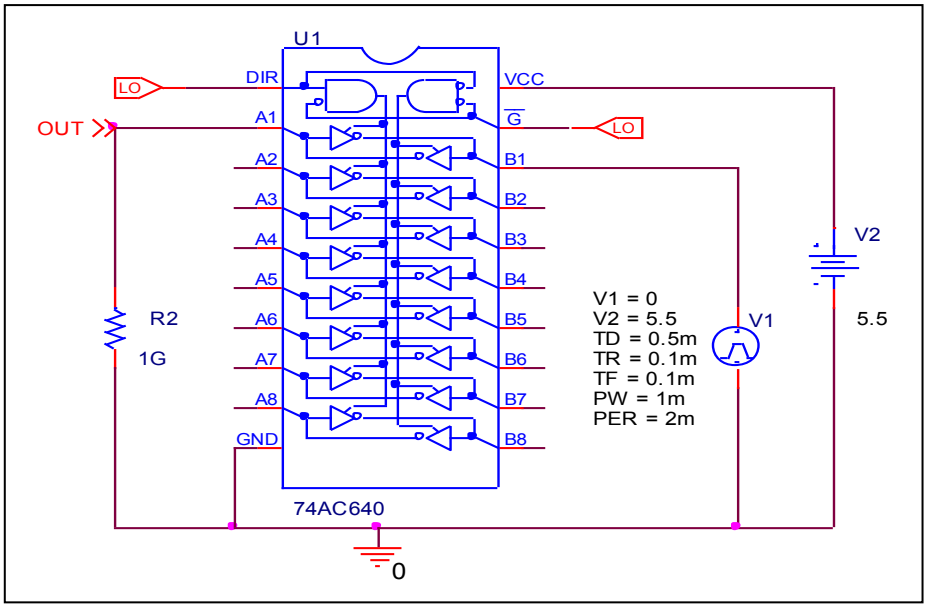
Input		Output		%Error
$\overline{G}$	DIR	Measurement	Simulation	
H	X	Z	Z	0

High Level and Low Level Input Voltage

Circuit simulation result



Evaluation circuit

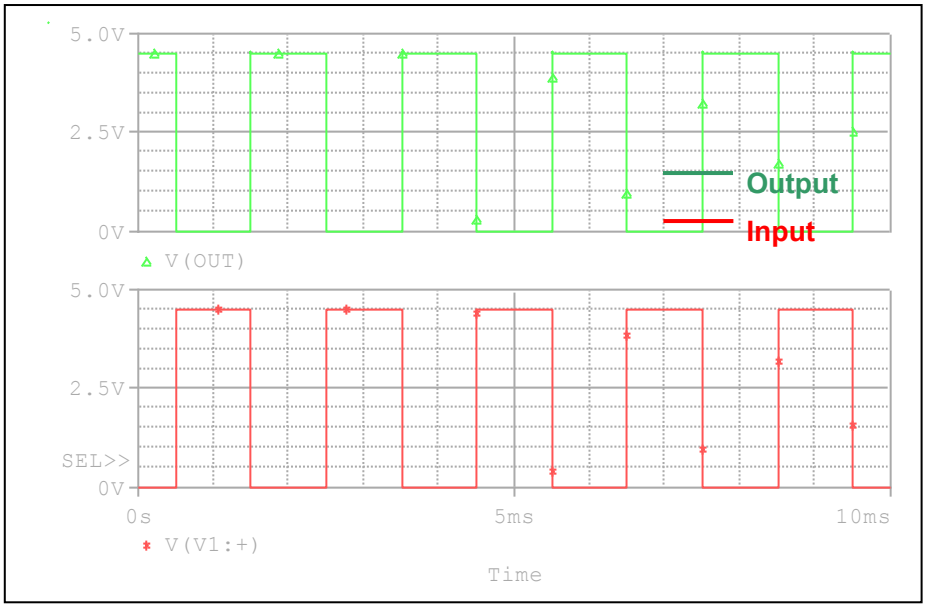


Comparison table

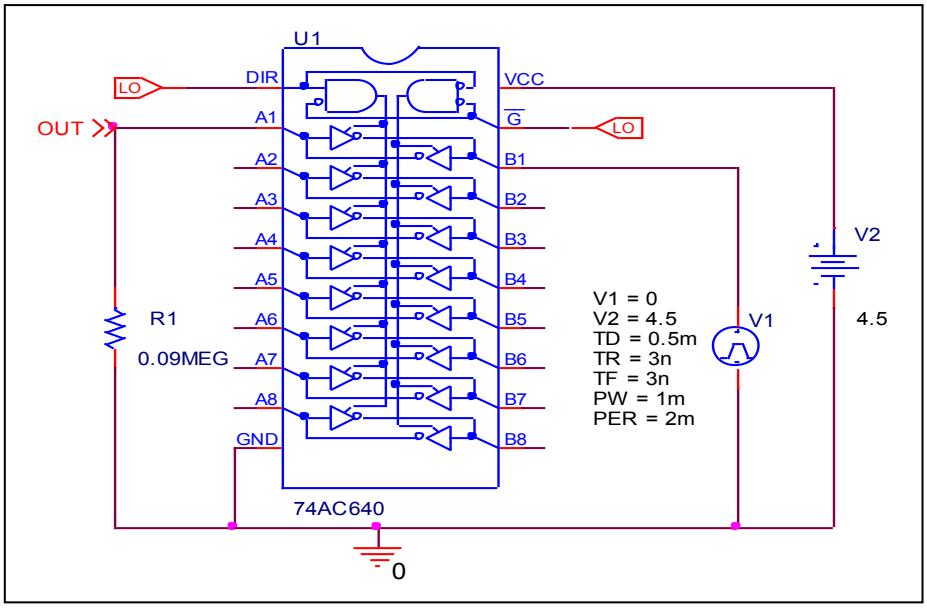
V_{CC} = 5.5V	Measurement	Simulation	%Error
V_{IH} (V)	3.85	3.9328	2.151
V_{IL} (V)	1.65	1.6447	-0.321

High Level and Low Level Output Voltage

Circuit simulation result



Evaluation circuit

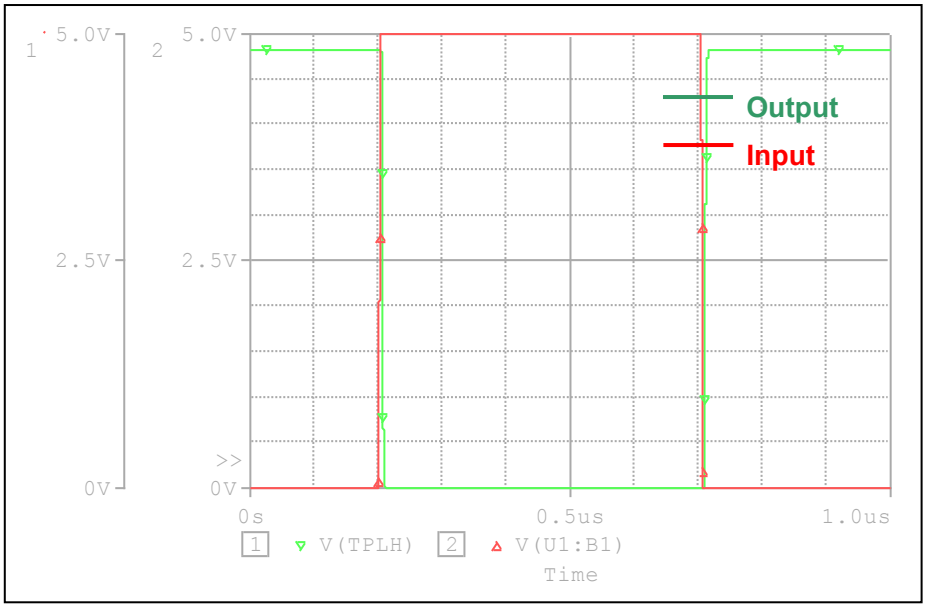


Comparison table

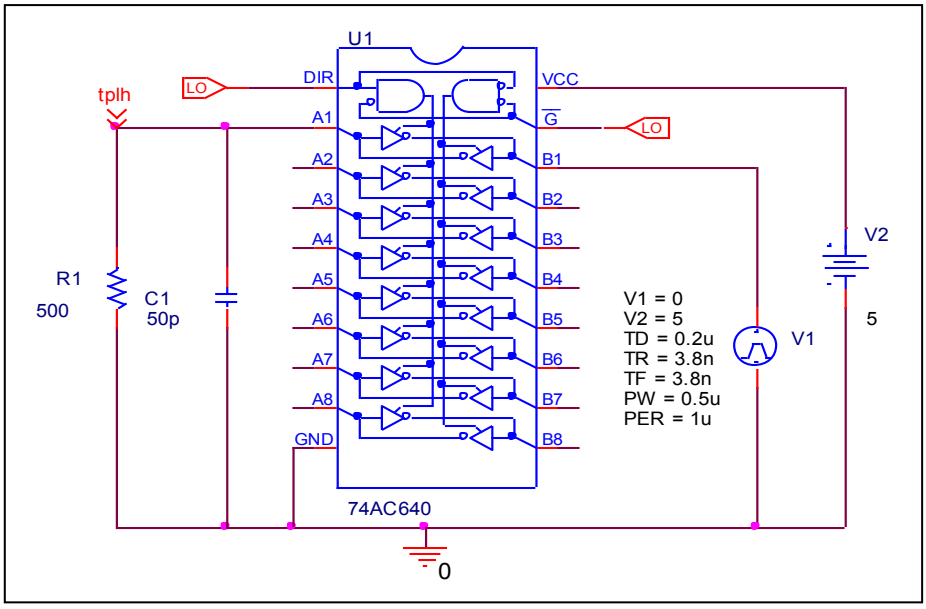
V_{CC} = 4.5V	Measurement	Simulation	%Error
V_{OH} (V)	4.5	4.499	-0.022
V_{OL} (V)	0	0	0

Propagation Delay Time

Circuit simulation result



Evaluation circuit

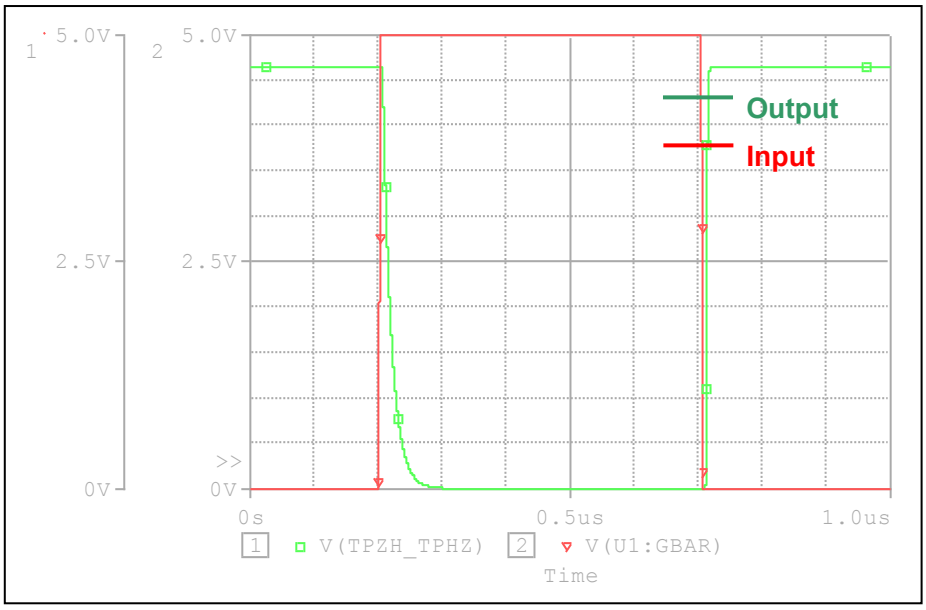


Comparison table C_L = 50 pF, R_L = 500 Ω

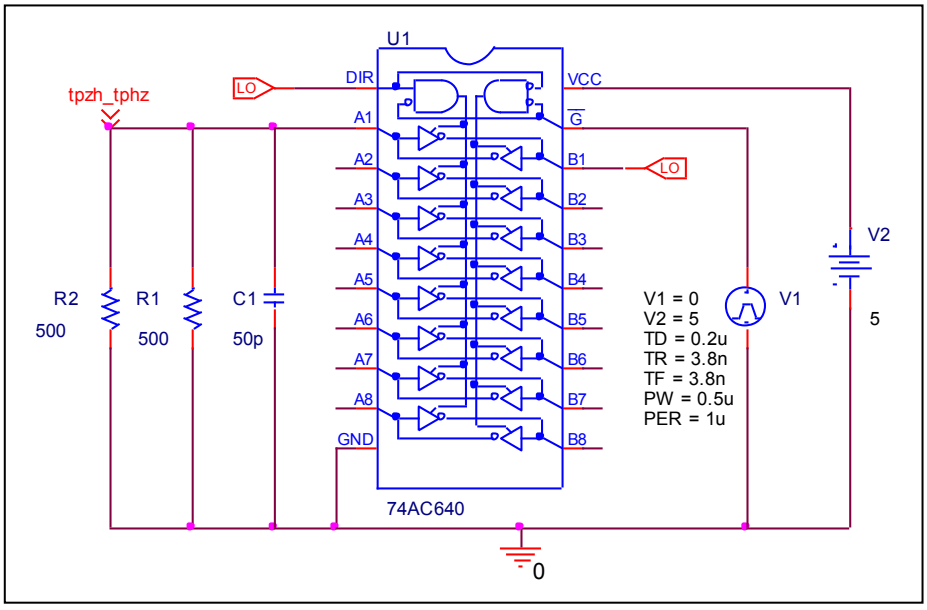
V_{CC} = 5 V, tr = tf = 3 ns	Measurement	Simulation	%Error
t_{PLH} (ns)	4.8	4.8079	0.165
t_{PHL} (ns)	4.8	4.8896	1.867

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

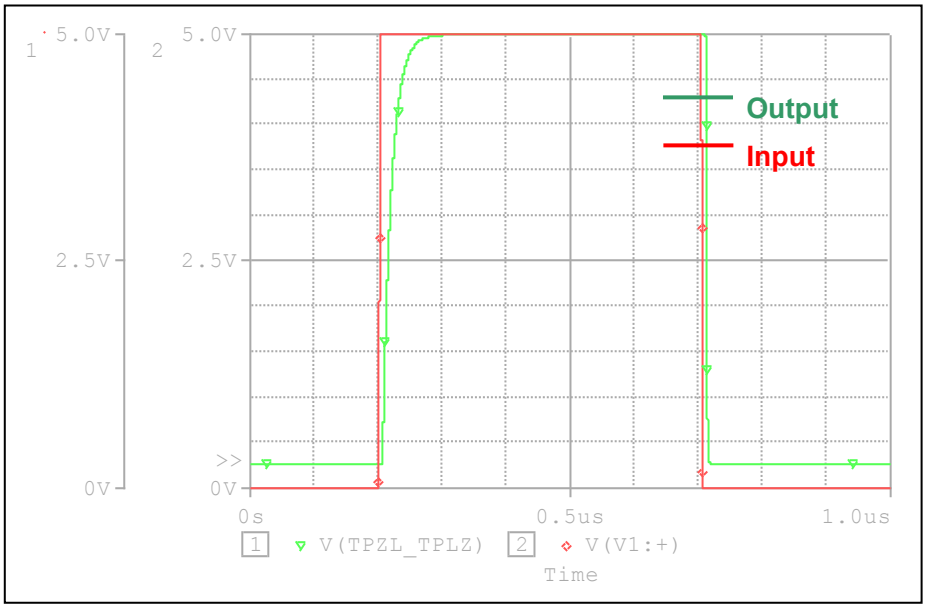


Comparison table C_L = 50 pF, R_L = 500 Ω

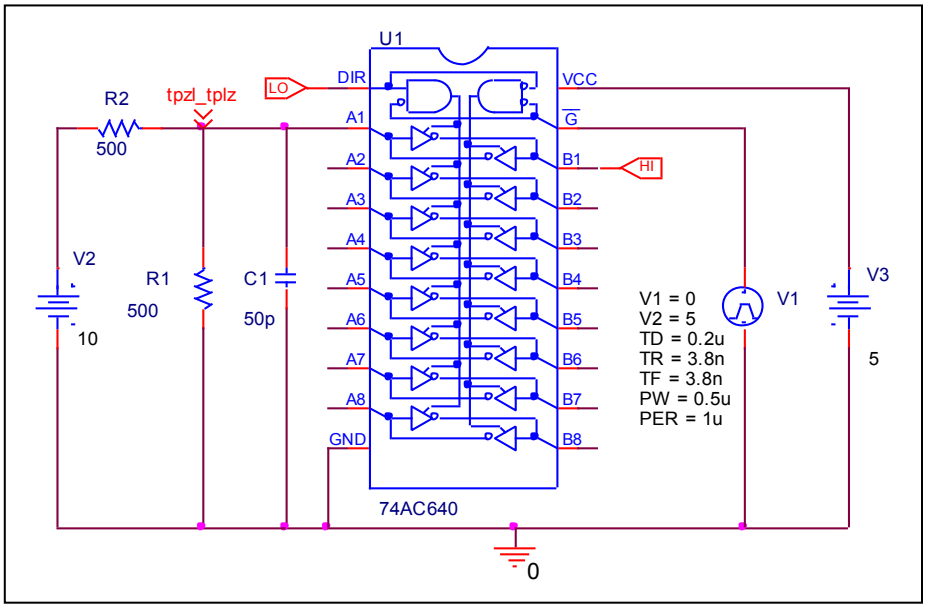
V_{CC} = 5 V, tr = tf = 3 ns	Measurement	Simulation	%Error
t_{PZH} (ns)	7.1	7.1864	1.217
t_{PHZ} (ns)	5.9	5.9627	1.063

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 pF, R_L = 500 Ω

V_{CC} = 5 V, tr = tf = 3 ns	Measurement	Simulation	%Error
t_{PZL} (ns)	7.1	7.1449	0.632
t_{PLZ} (ns)	5.9	5.9560	0.949