

Device Modeling Report

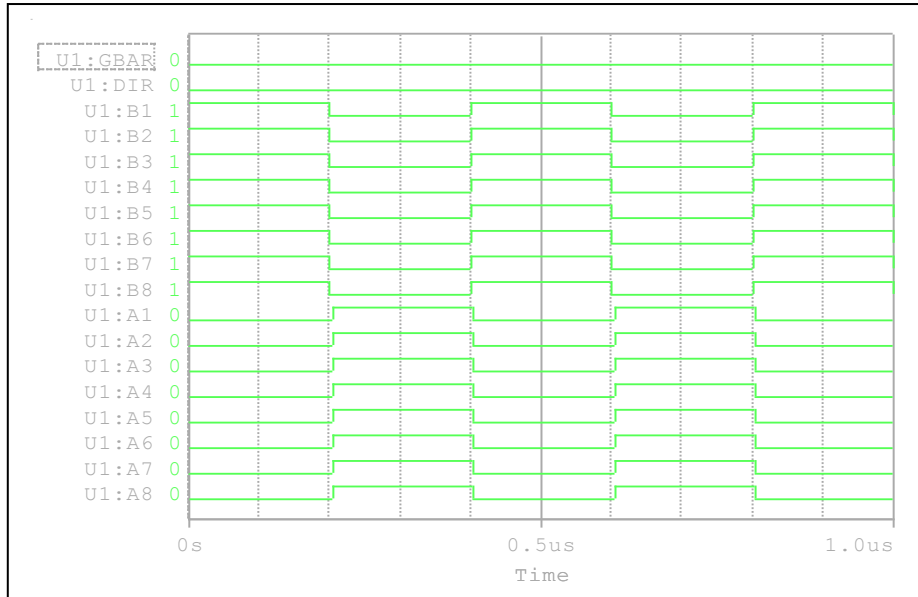
COMPONENTS : CMOS DIGITAL INTEGRATED CIRCUIT
PART NUMBER : TC74AC640F
MANUFACTURER : TOSHIBA



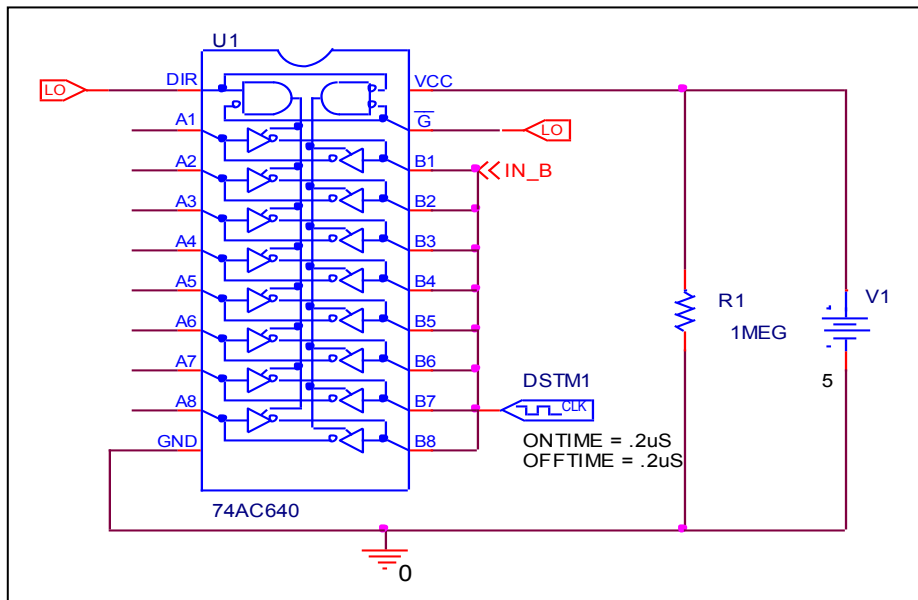
Bee Technologies Inc.

Truth Table

Circuit simulation result



Evaluation circuit



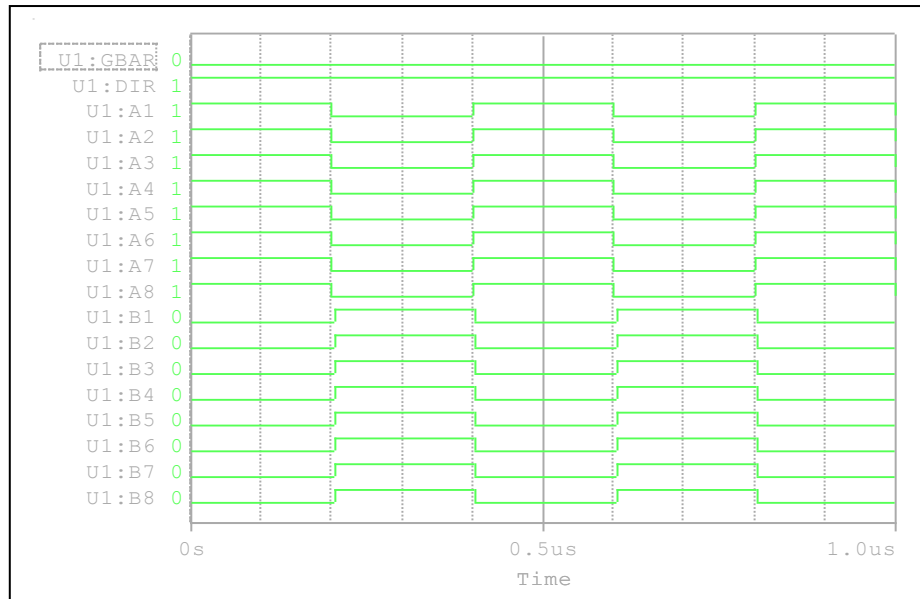
Comparison table

Function : A BUS = OUTPUT, B BUS = INPUT

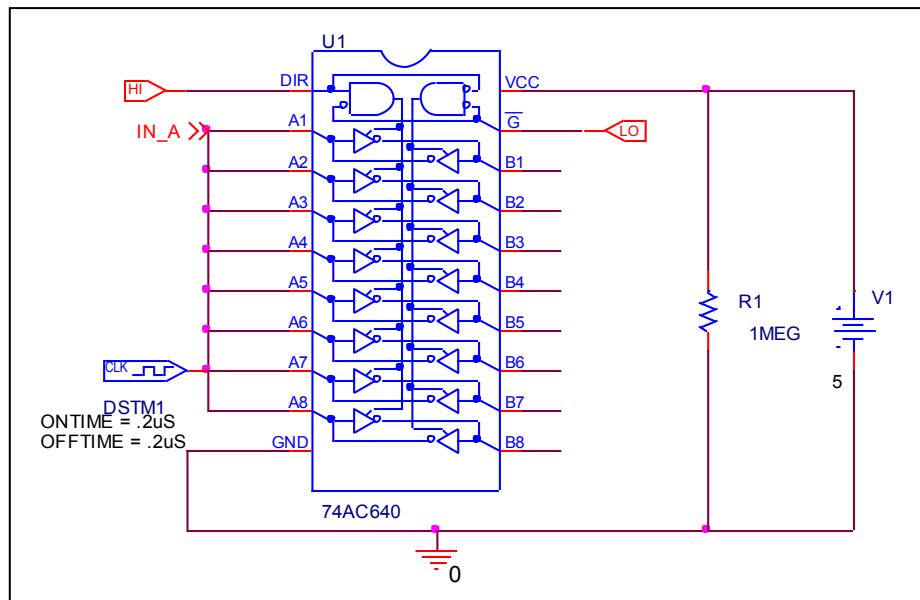
Input		Output		%Error
$\overline{G}$	DIR	Measurement	Simulation	
L	L	$A = \overline{B}$	$A = \overline{B}$	0

Truth Table

Circuit simulation result



Evaluation circuit

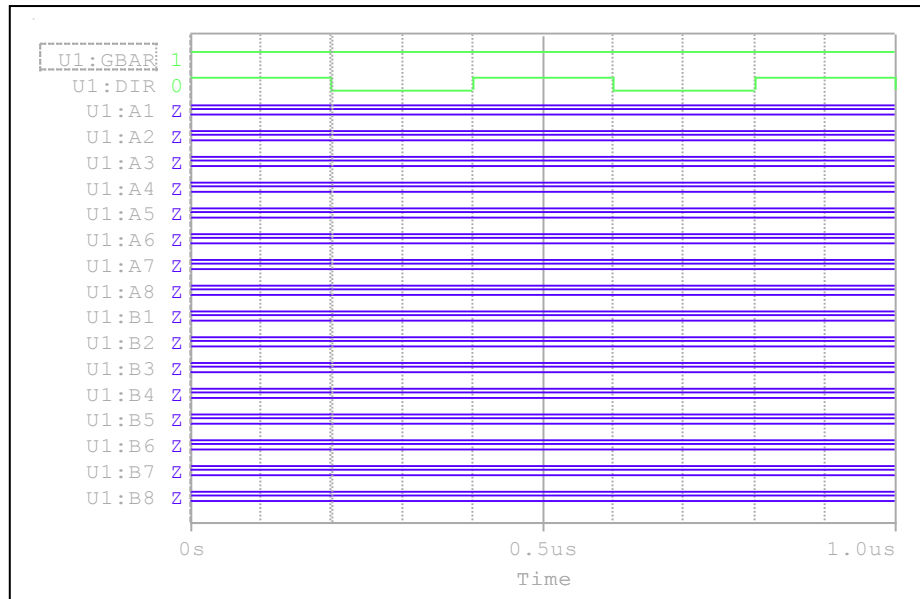


Comparison table Function : A BUS = INPUT, B BUS = OUTPUT

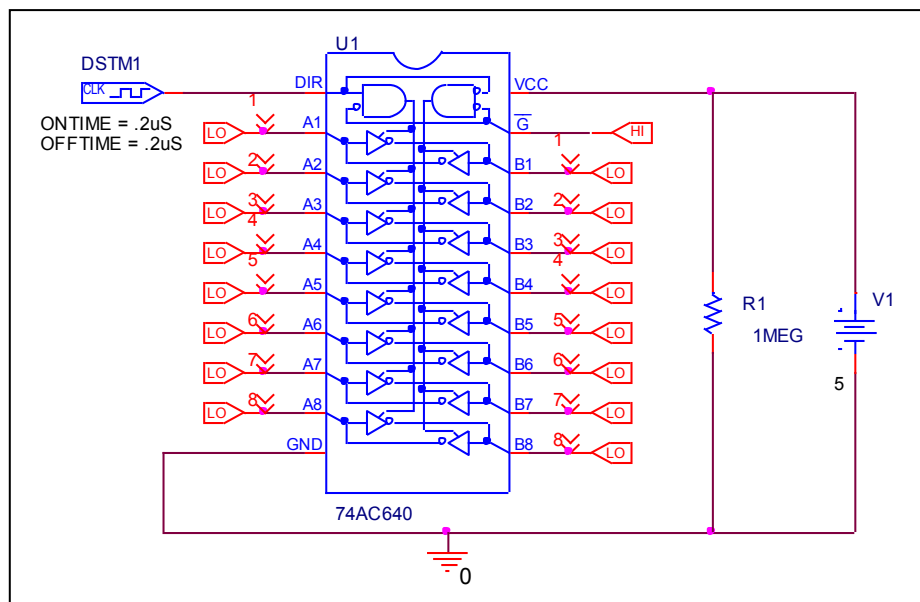
Input		Output		%Error
$\overline{G}$	DIR	Measurement	Simulation	
L	H	$B = \overline{A}$	$B = \overline{A}$	0

Truth Table

Circuit simulation result



Evaluation circuit



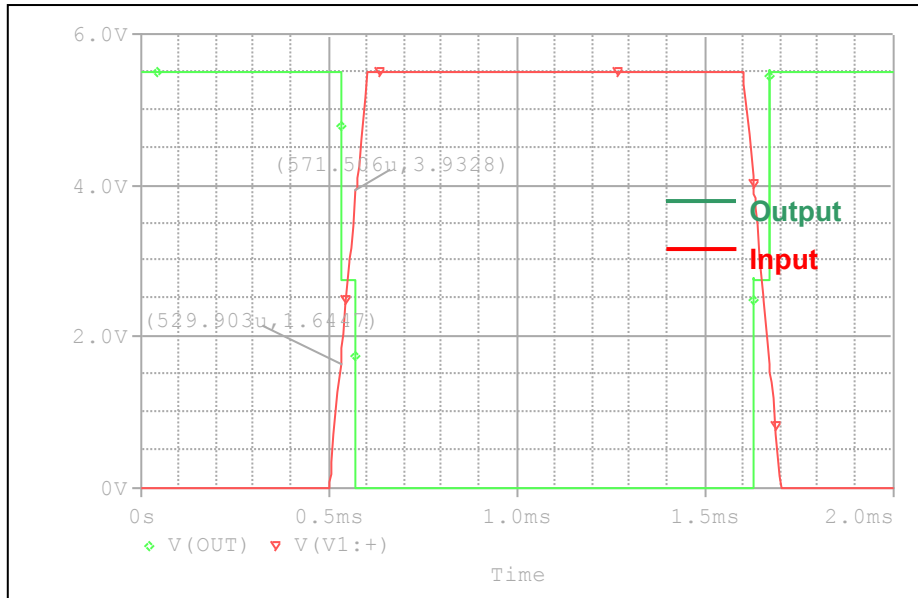
Comparison table

Function : A BUS and B BUS = HIGH IMPEDANCE

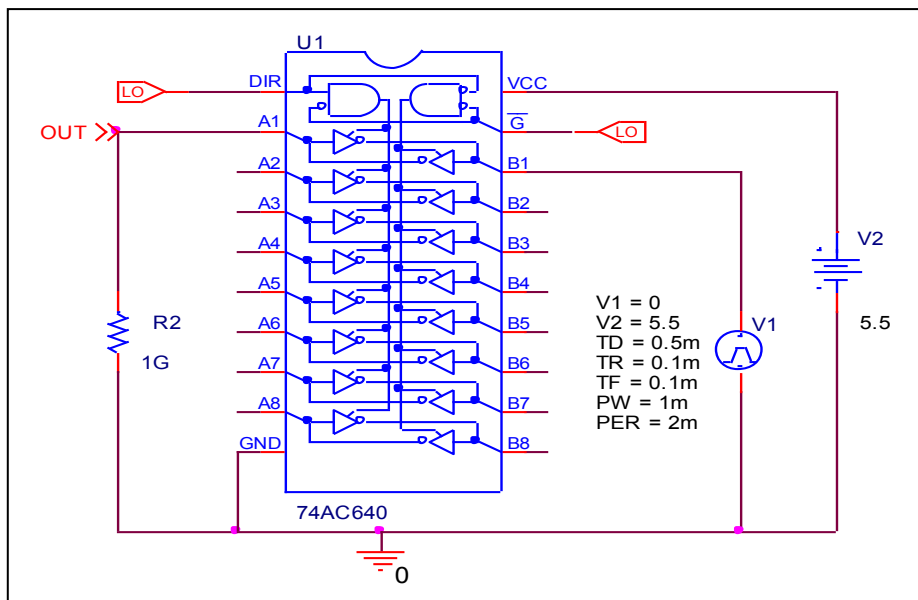
Input		Output		%Error
$\overline{G}$	DIR	Measurement	Simulation	
H	X	Z	Z	0

High Level and Low Level Input Voltage

Circuit simulation result



Evaluation circuit

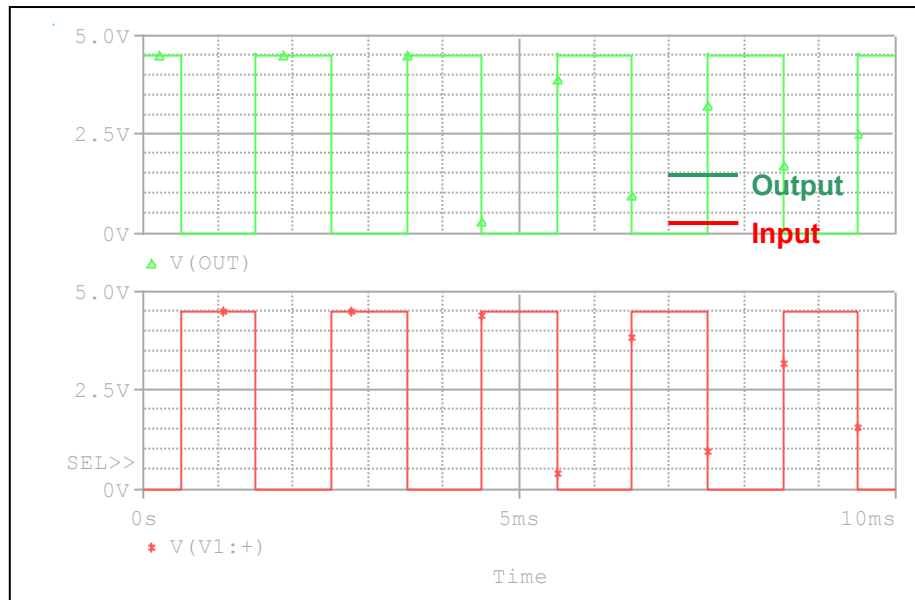


Comparison table

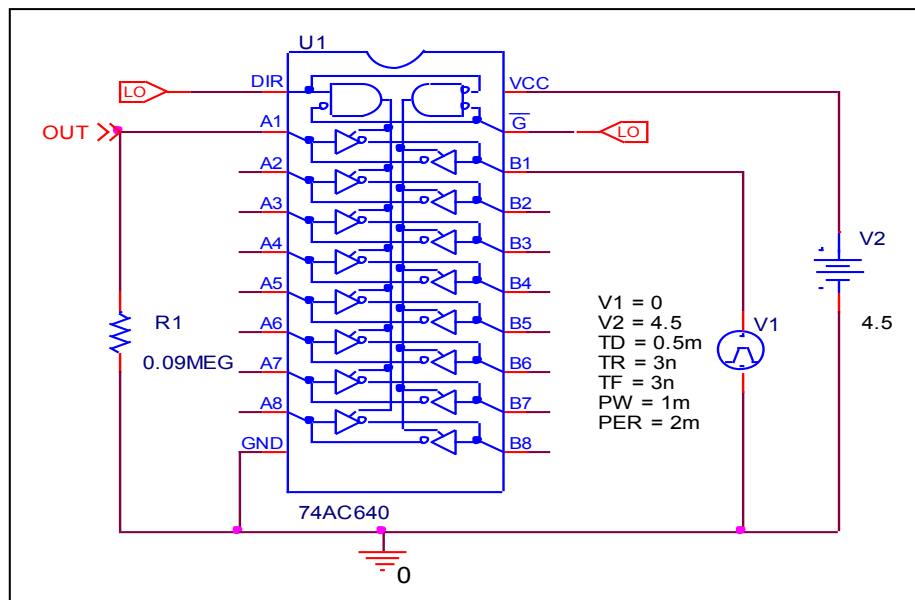
V _{CC} = 5.5V	Measurement	Simulation	%Error
V _{IH} (V)	3.85	3.9328	2.151
V _{IL} (V)	1.65	1.6447	-0.321

High Level and Low Level Output Voltage

Circuit simulation result



Evaluation circuit

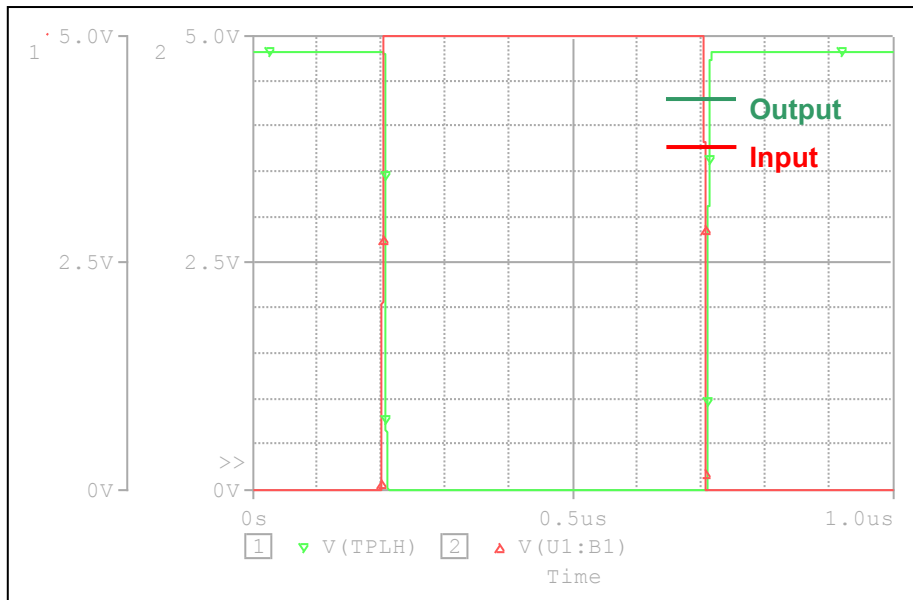


Comparison table

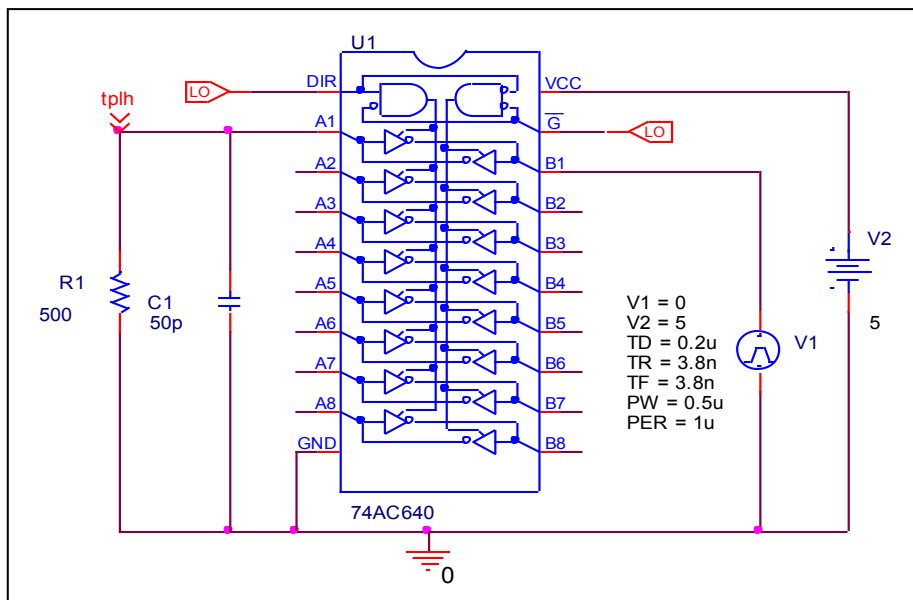
$V_{CC} = 4.5V$	Measurement	Simulation	%Error
$V_{OH} (V)$	4.5	4.499	-0.022
$V_{OL} (V)$	0	0	0

Propagation Delay Time

Circuit simulation result



Evaluation circuit

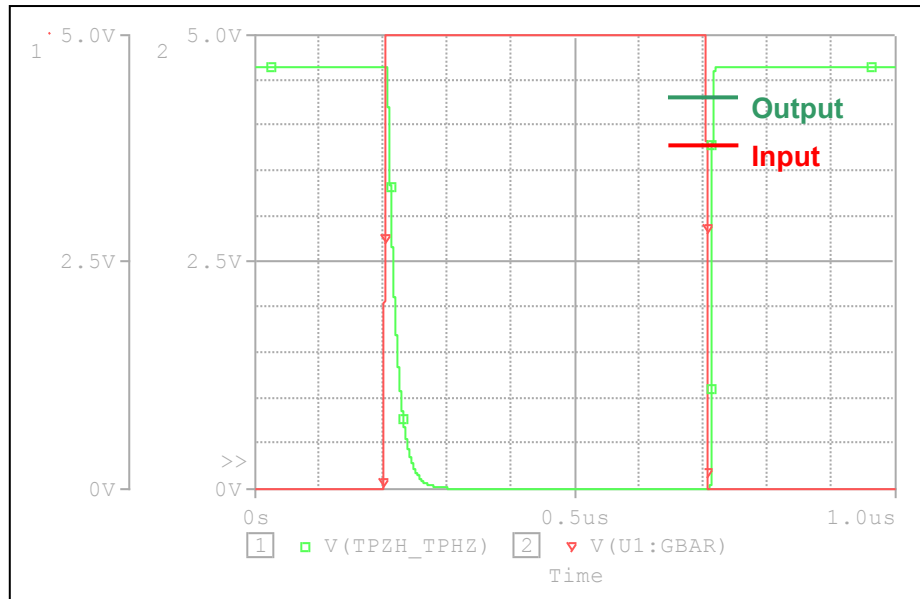


Comparison table $C_L = 50 \text{ pF}$, $R_L = 500 \Omega$

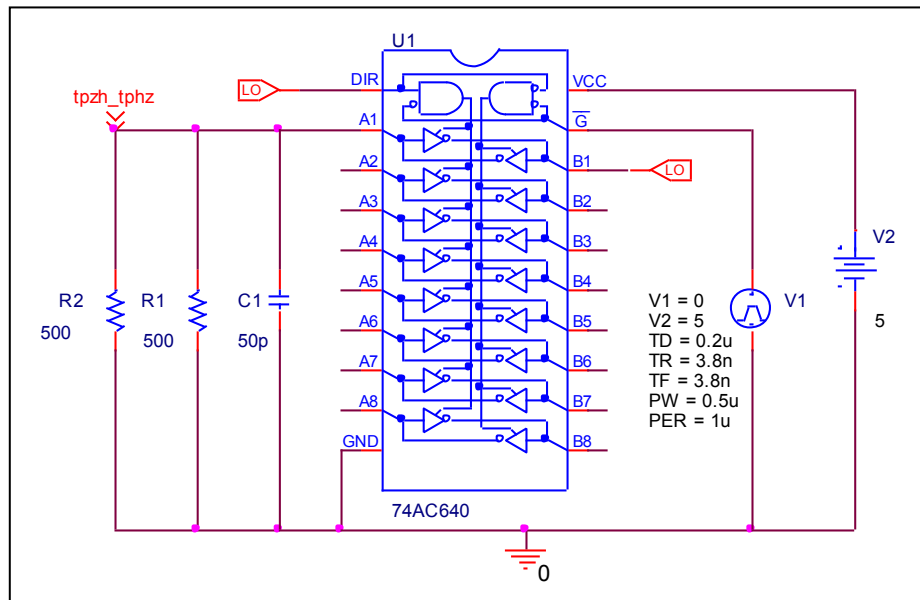
$V_{CC} = 5 \text{ V}$, $t_r = t_f = 3 \text{ ns}$	Measurement	Simulation	%Error
$t_{PLH} \text{ (ns)}$	4.8	4.8079	0.165
$t_{PHL} \text{ (ns)}$	4.8	4.8896	1.867

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

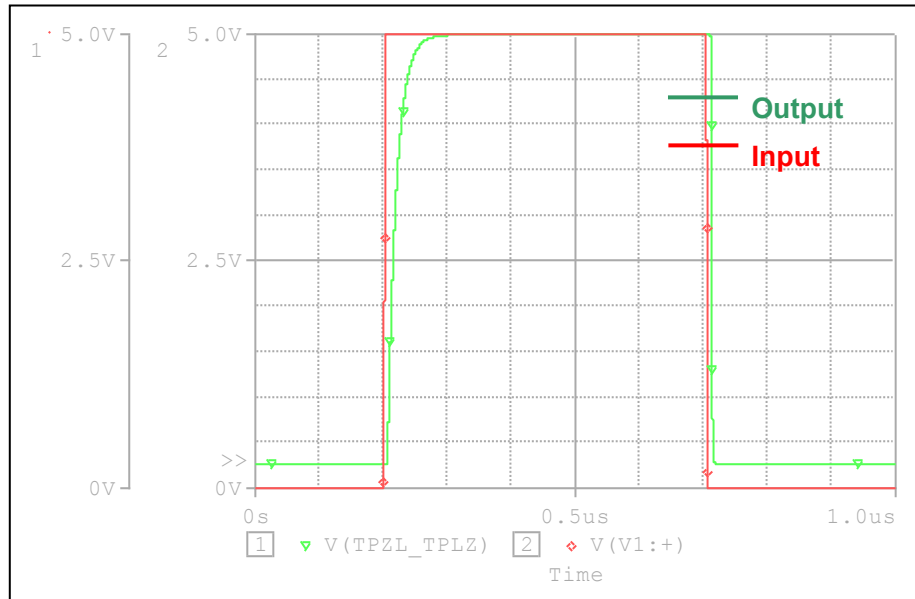


Comparison table $C_L = 50 \text{ pF}$, $R_L = 500 \Omega$

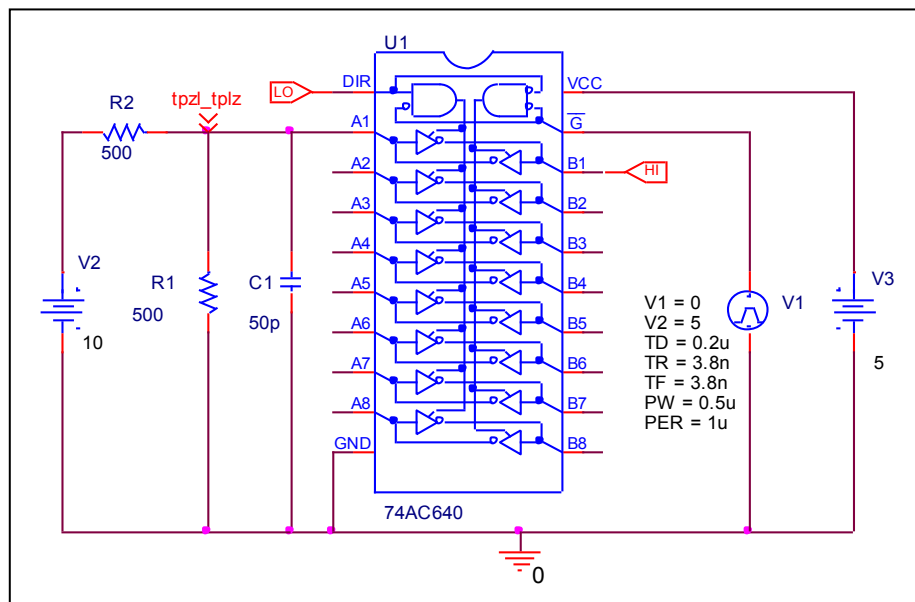
$V_{CC} = 5 \text{ V}$, $t_r = t_f = 3 \text{ ns}$	Measurement	Simulation	%Error
$t_{PZH} \text{ (ns)}$	7.1	7.1864	1.217
$t_{PHZ} \text{ (ns)}$	5.9	5.9627	1.063

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

$V_{CC} = 5 \text{ V}$, $t_r = t_f = 3 \text{ ns}$	Measurement	Simulation	%Error
$t_{PZL} \text{ (ns)}$	7.1	7.1449	0.632
$t_{PLZ} \text{ (ns)}$	5.9	5.9560	0.949