

Device Modeling Report

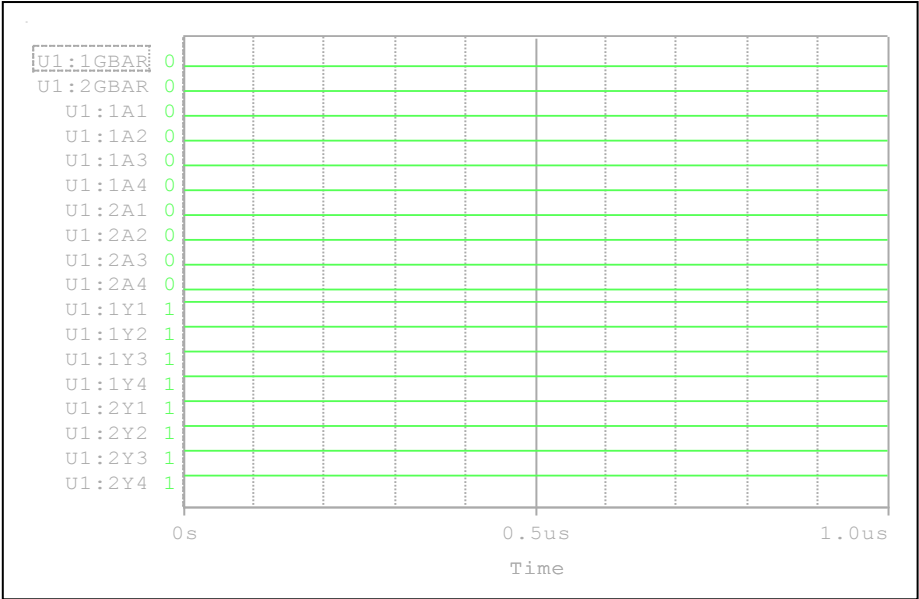
COMPONENTS : CMOS DIGITAL INTEGRATED CIRCUIT
PART NUMBER : TC74VHC240F
MANUFACTURER : TOSHIBA



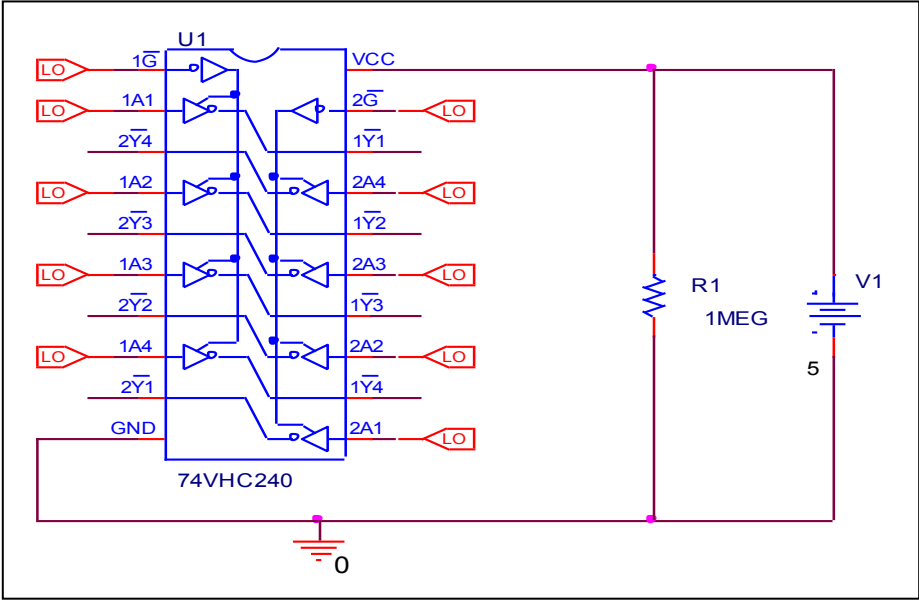
Bee Technologies Inc.

Truth Table

Circuit simulation result



Evaluation circuit

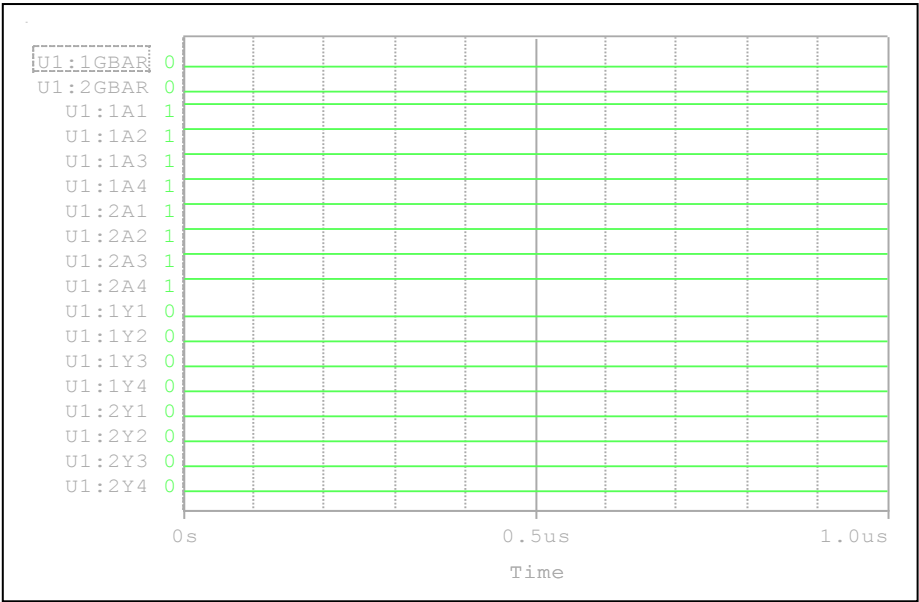


Comparison table

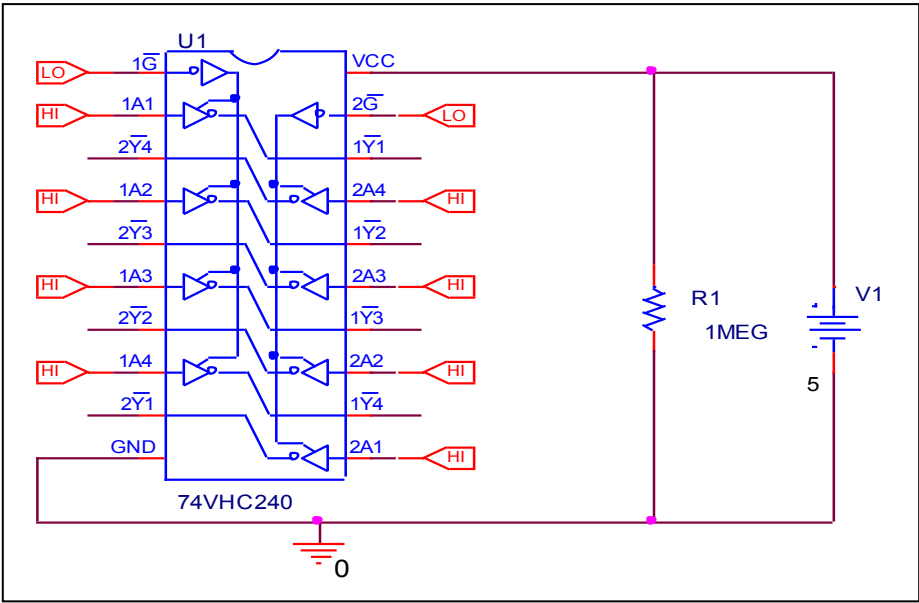
Input		Output		%Error
$\bar{G}$	An	$\bar{Y}_n$ (Measurement)	$\bar{Y}_n$ (Simulation)	
L	L	H	H	0

Truth Table

Circuit simulation result



Evaluation circuit

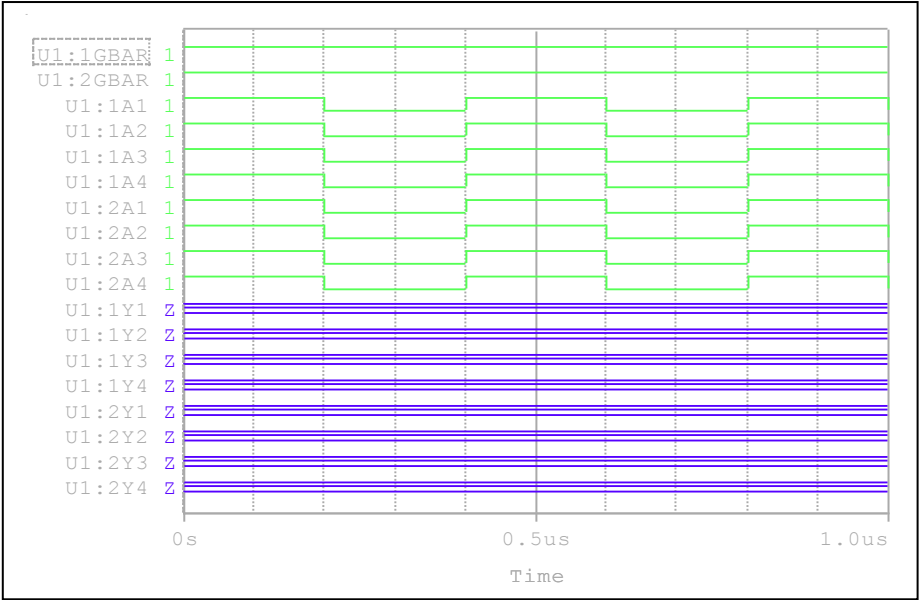


Comparison table

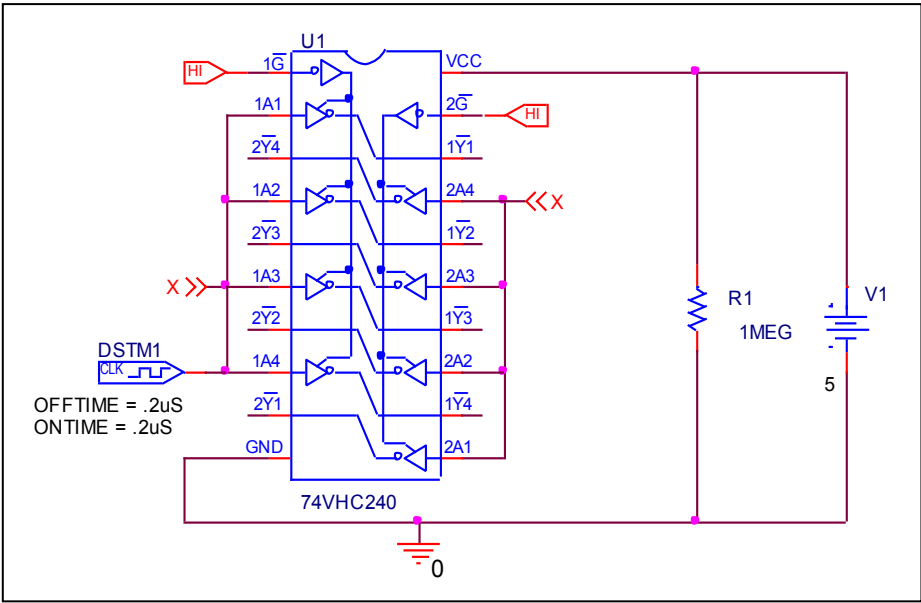
Input		Output		%Error
$\overline{G}$	An	$\overline{Y}_n$ (Measurement)	$\overline{Y}_n$ (Simulation)	
L	H	L	L	0

Truth Table

Circuit simulation result



Evaluation circuit

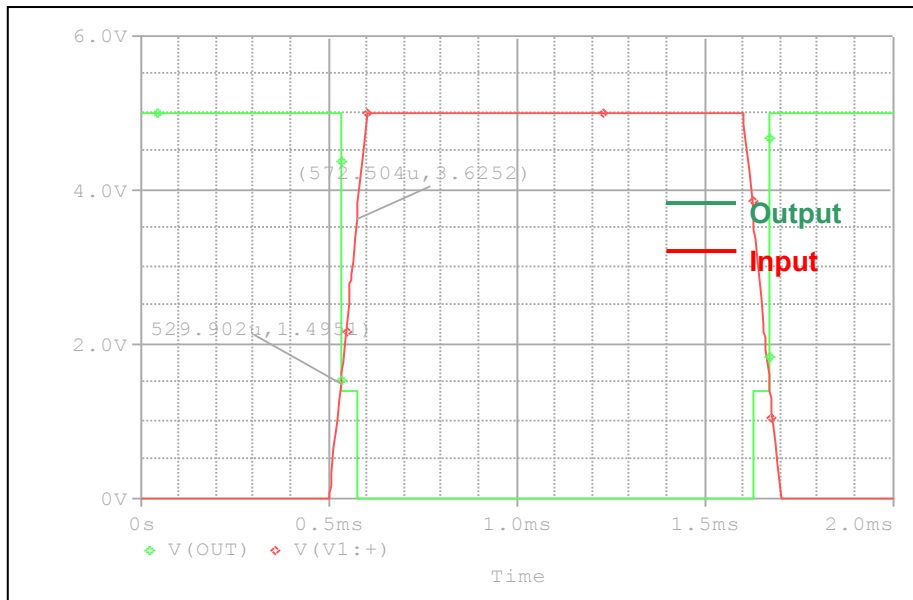


Comparison table

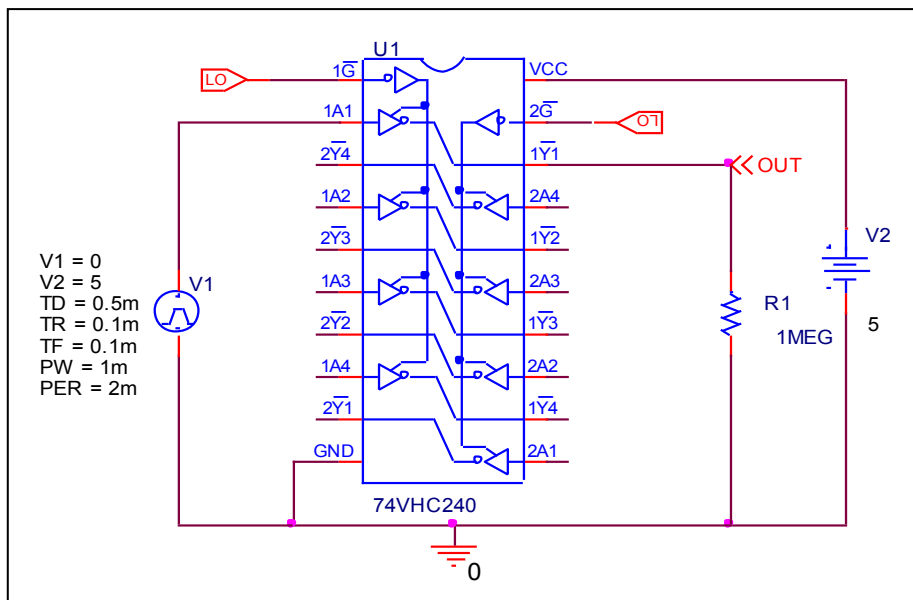
Input		Output		%Error
$\overline{G}$	A_n	$\overline{Y}_n$ (Measurement)	$\overline{Y}_n$ (Simulation)	
H	X	Z	Z	0

High Level and Low Level Input Voltage

Circuit simulation result



Evaluation circuit

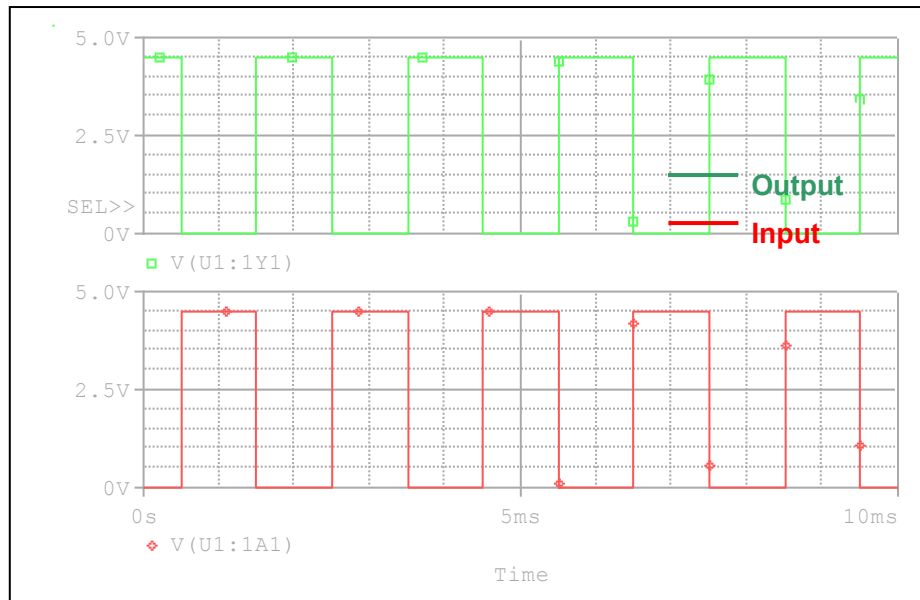


Comparison table

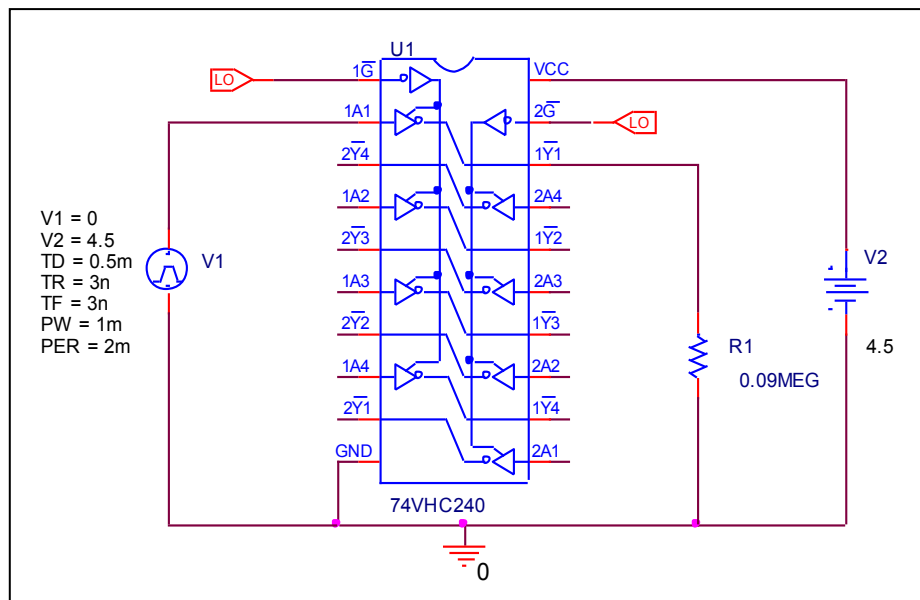
V_{CC} = 5 V	Measurement	Simulation	%Error
Min V_{IH} = (V_{CC}*0.7) V	3.5	3.6252	3.577
Min V_{IL} = (V_{CC}*0.3) V	1.5	1.4951	-0.327

High Level and Low Level Output Voltage

Circuit simulation result



Evaluation circuit

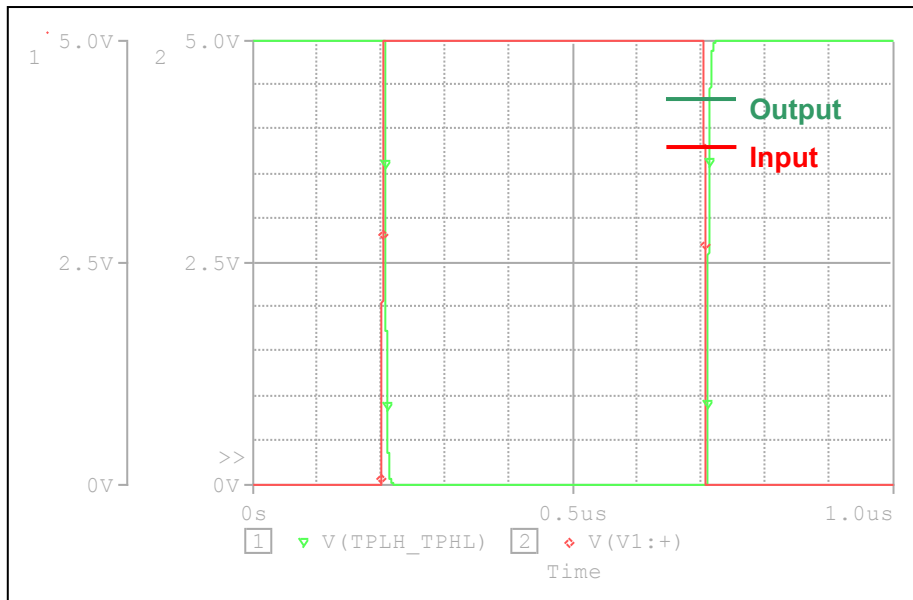


Comparison table

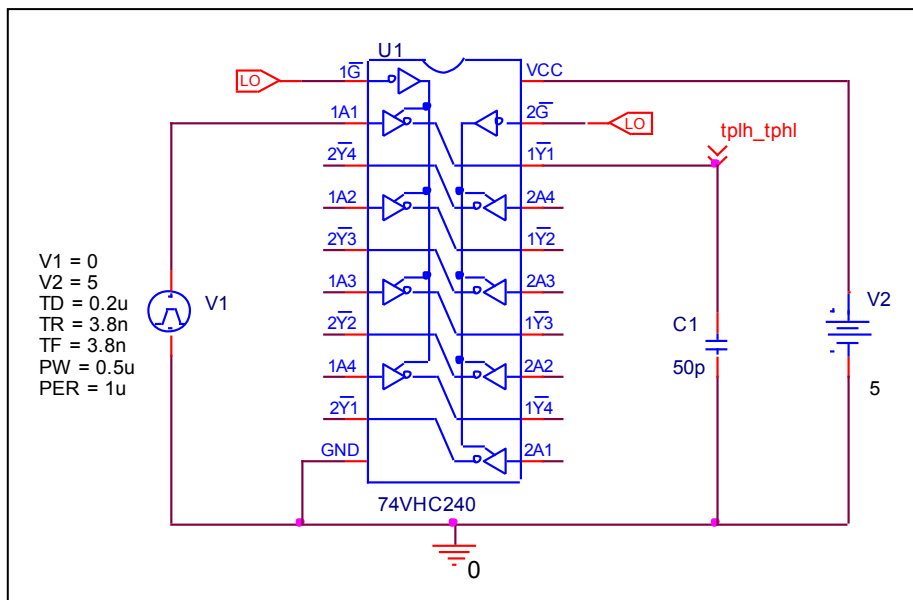
$V_{CC} = 4.5V$	Measurement	Simulation	%Error
$V_{OH} (V)$	4.5	4.4978	-0.049
$V_{OL} (V)$	0	0	0

Propagation Delay Time

Circuit simulation result



Evaluation circuit

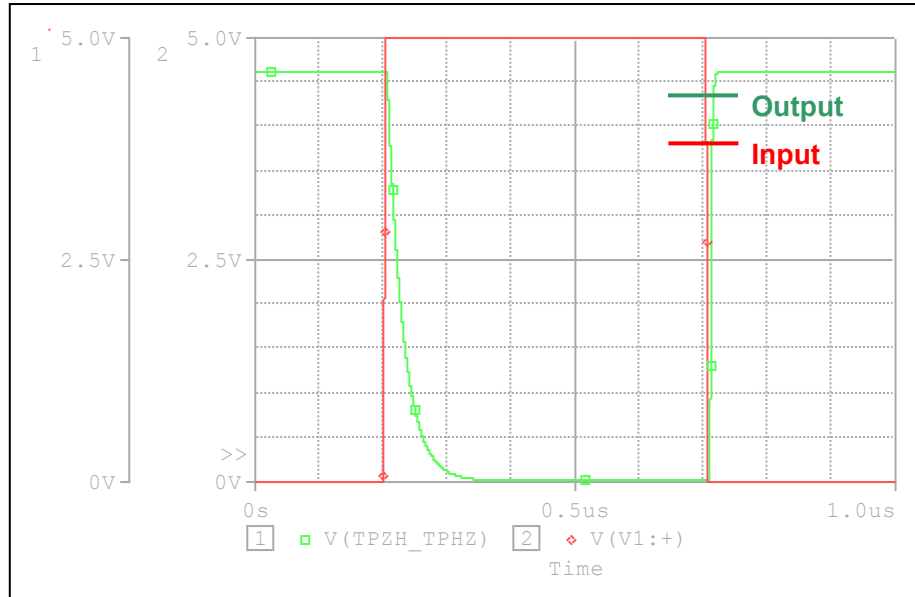


Comparison table $C_L = 50 \text{ pF}$

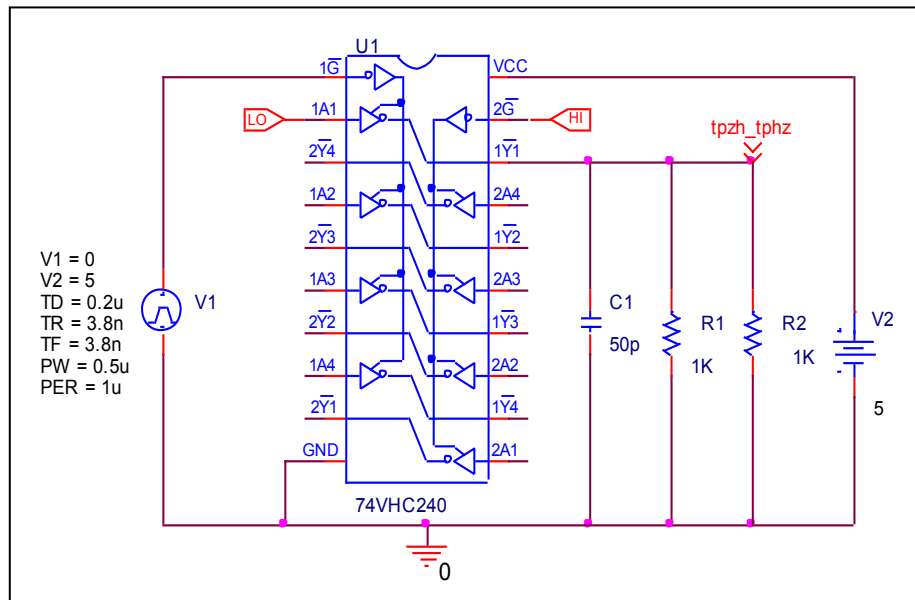
$V_{CC} = 5 \text{ V}$ $t_r = t_f = 3 \text{ ns}$	Measurement	Simulation	%Error
$t_{PLH} \text{ (ns)}$	5.1	5.1476	0.933
$t_{PHL} \text{ (ns)}$	5.1	5.1714	1.400

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

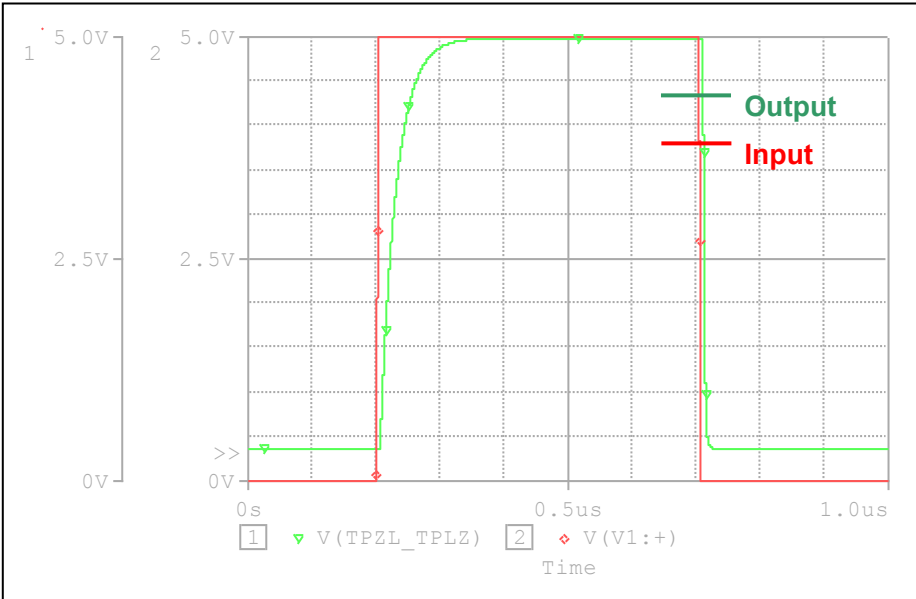


Comparison table $C_L = 50 \text{ pF}$, $R_L = 1 \text{ k}\Omega$

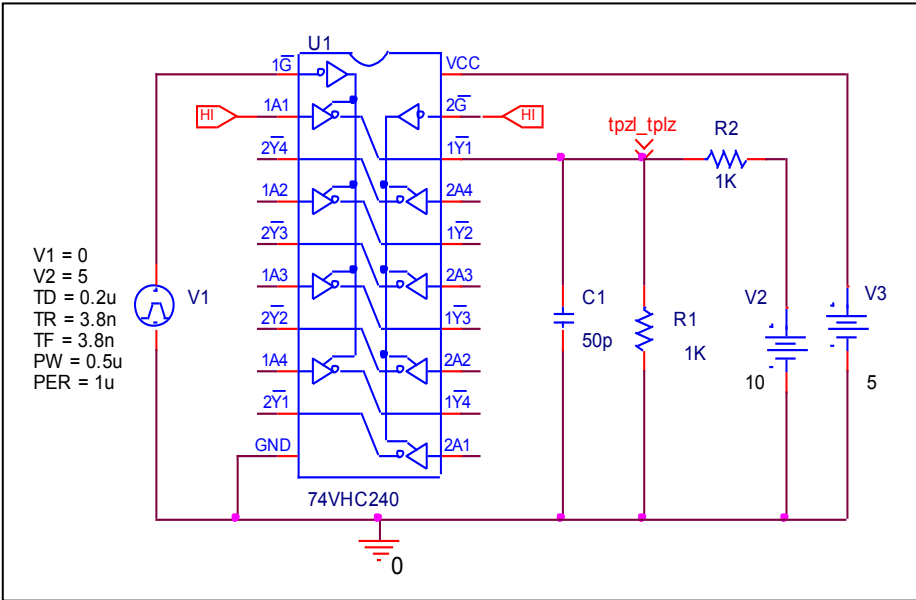
$V_{CC} = 5 \text{ V}$, $t_r = t_f = 3 \text{ ns}$	Measurement	Simulation	%Error
$t_{PZH} \text{ (ns)}$	6.2	6.2419	0.676
$t_{PHZ} \text{ (ns)}$	6.7	6.7540	0.806

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 $C_L = 50 \text{ pF}$, $R_L = 1 \text{ k}\Omega$

$V_{CC} = 5 \text{ V}$ $t_r = t_f = 3 \text{ ns}$	Measurement	Simulation	%Error
$t_{PZL} \text{ (ns)}$	6.2	6.2156	0.252
$t_{PLZ} \text{ (ns)}$	6.7	6.7531	0.793