

Device Modeling Report

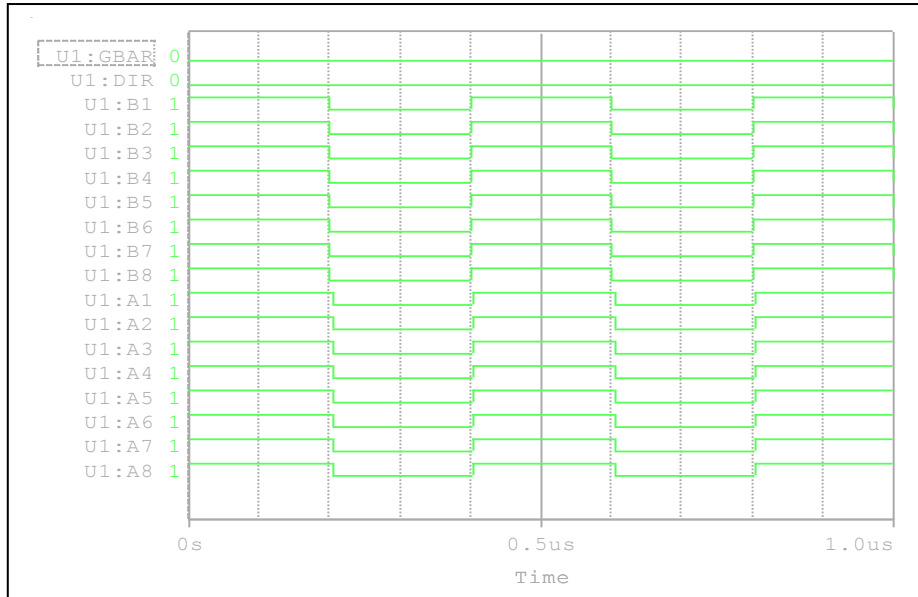
COMPONENTS : CMOS DIGITAL INTEGRATED CIRCUIT
PART NUMBER : TC74VHCT245AFT
MANUFACTURER : TOSHIBA



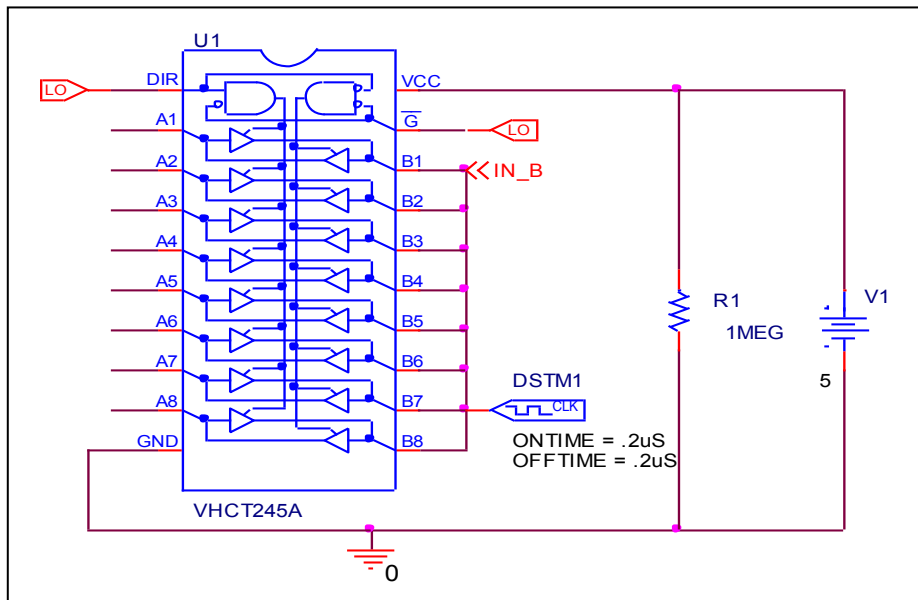
Bee Technologies Inc.

Truth Table

Circuit simulation result



Evaluation circuit



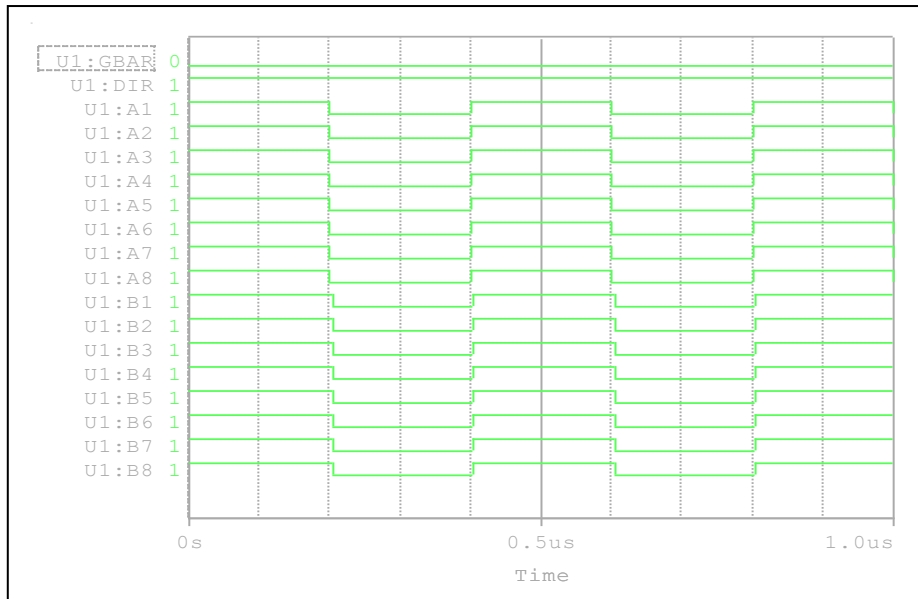
Comparison table

Function : A BUS = OUTPUT, B BUS = INPUT

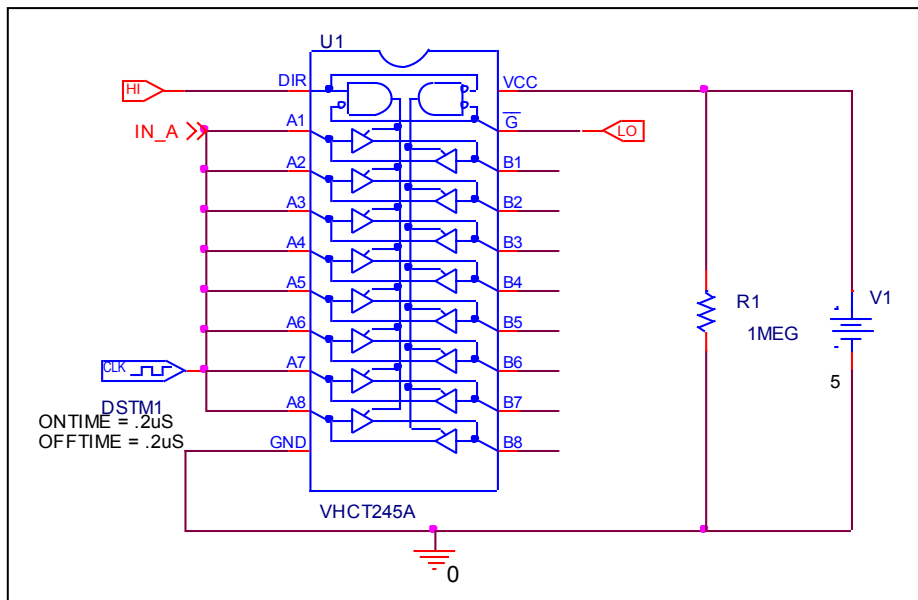
Input		Output		%Error
$\overline{G}$	DIR	Measurement	Simulation	
L	L	A=B	A=B	0

Truth Table

Circuit simulation result



Evaluation circuit



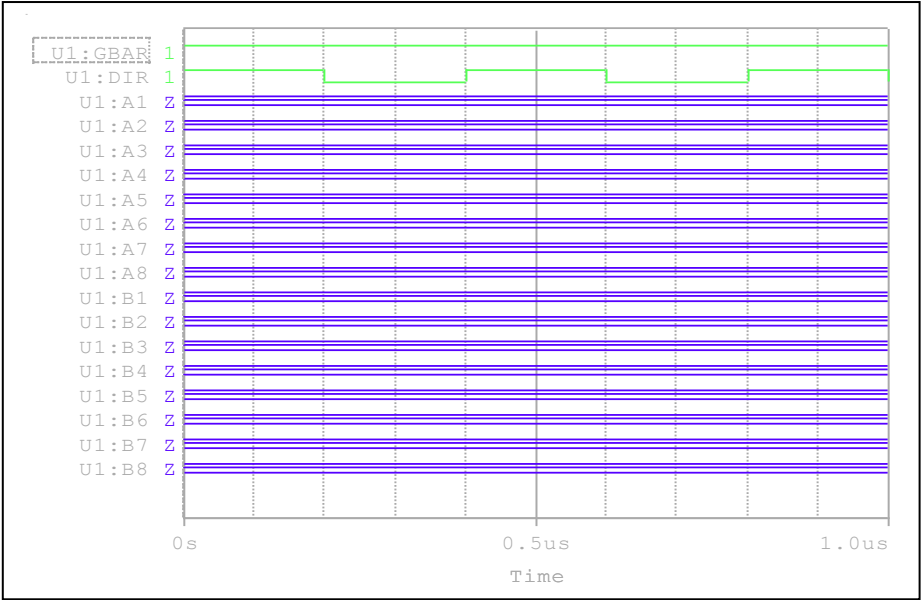
Comparison table

Function : A BUS = INPUT, B BUS = OUTPUT

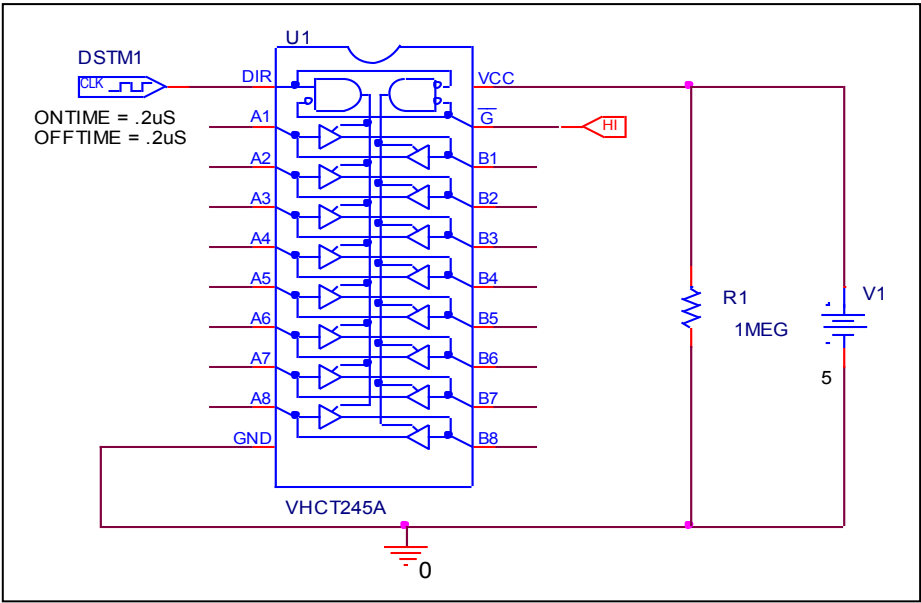
Input		Output		%Error
$\overline{G}$	DIR	Measurement	Simulation	
L	H	B=A	B=A	0

Truth Table

Circuit simulation result



Evaluation circuit



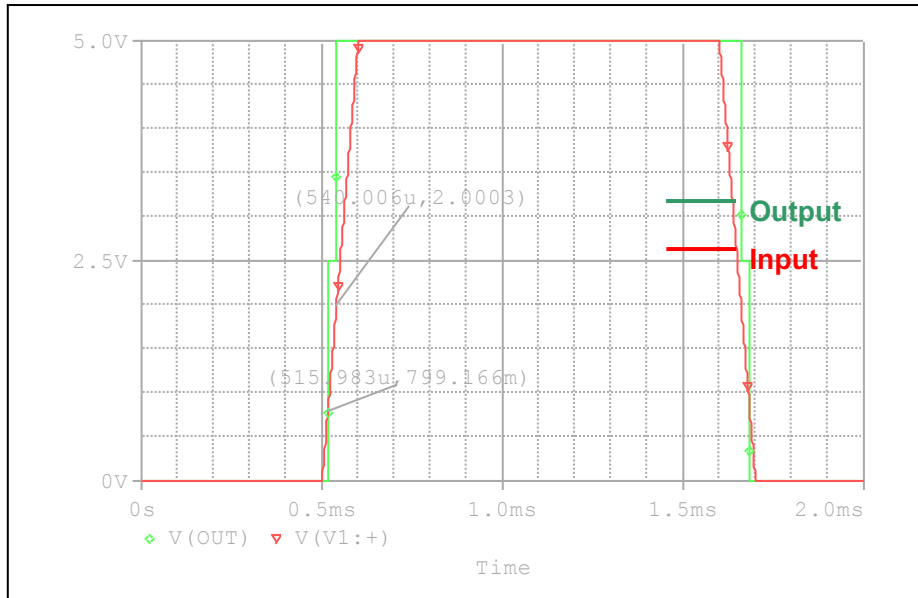
Comparison table

Function : A BUS and B BUS = HIGH IMPEDANCE

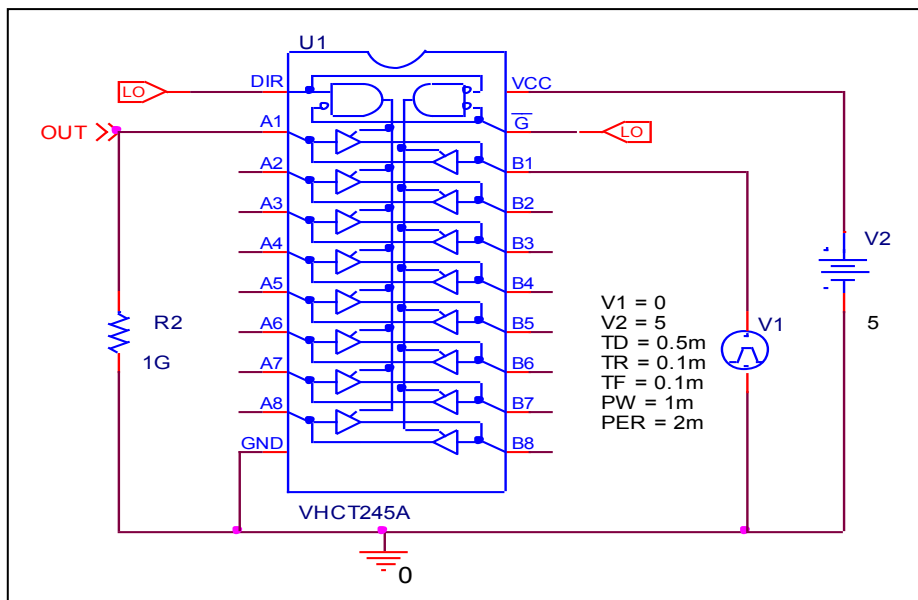
Input		Output		%Error
$\overline{G}$	DIR	Measurement	Simulation	
H	X	Z	Z	0

High Level and Low Level Input Voltage

Circuit simulation result



Evaluation circuit

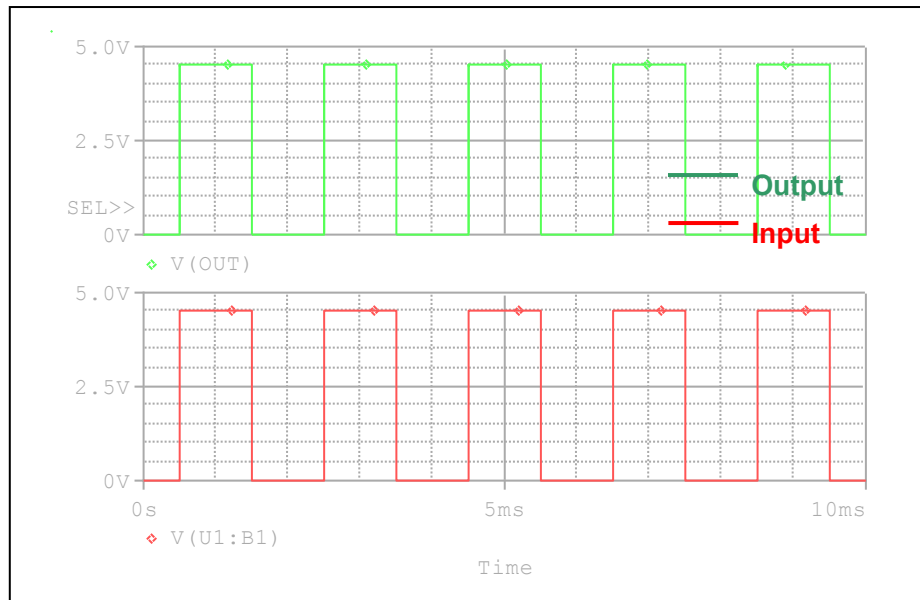


Comparison table

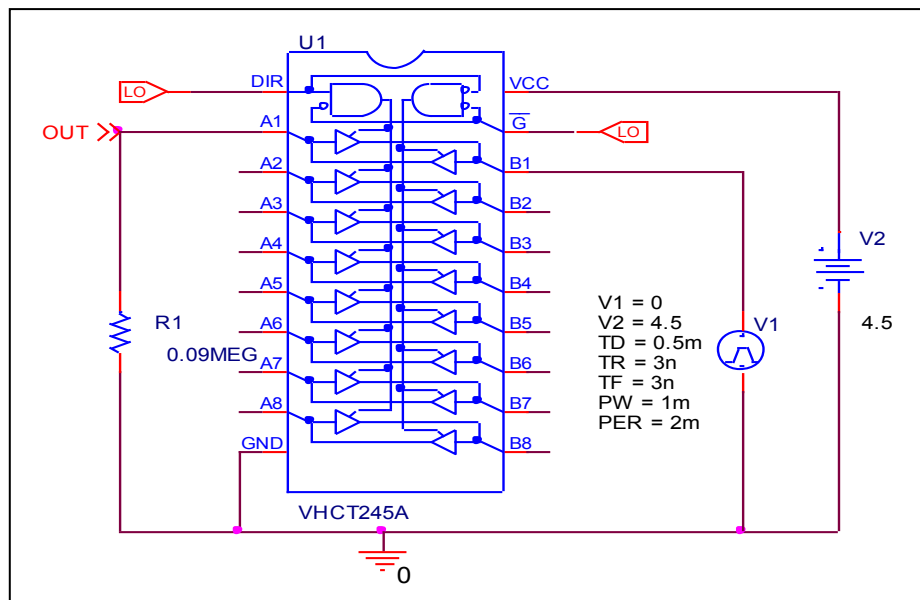
V _{CC} = 5V	Measurement	Simulation	%Error
V _{IH} (V)	2	2	0
V _{IL} (V)	0.8	0.799166	-0.104

High Level and Low Level Output Voltage

Circuit simulation result



Evaluation circuit

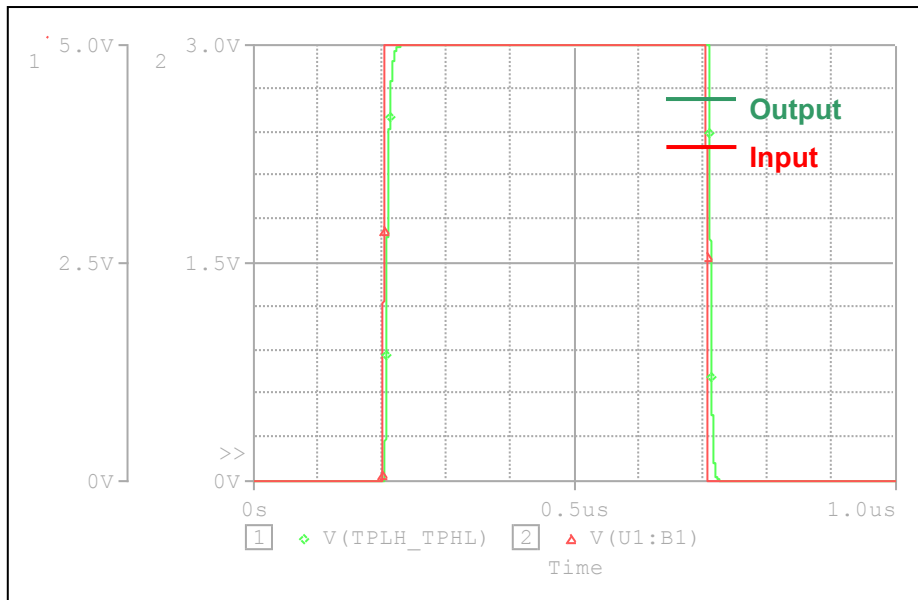


Comparison table

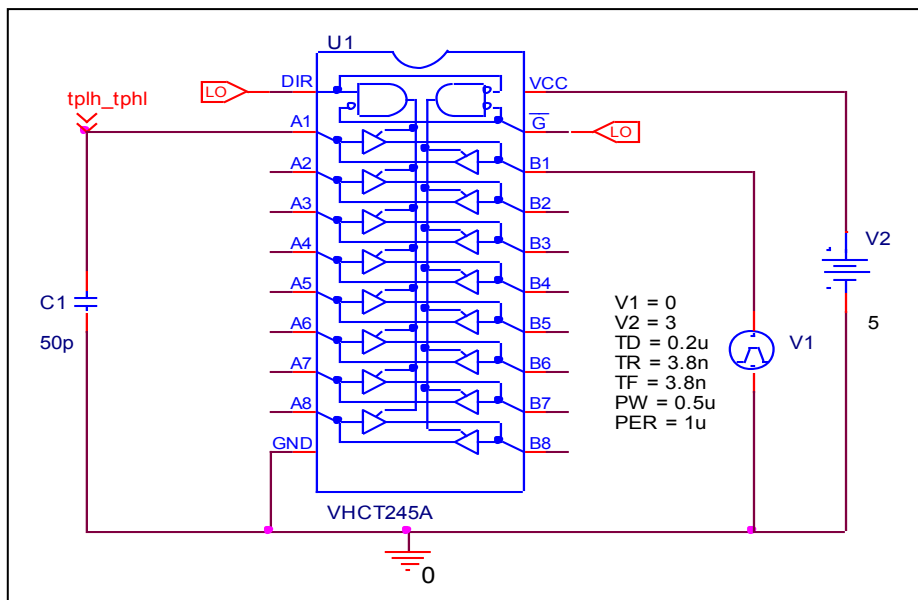
$V_{CC} = 4.5V$	Measurement	Simulation	%Error
$V_{OH} (V)$	4.5	4.4966	-0.076
$V_{OL} (V)$	0	0	0

Propagation Delay Time

Circuit simulation result



Evaluation circuit

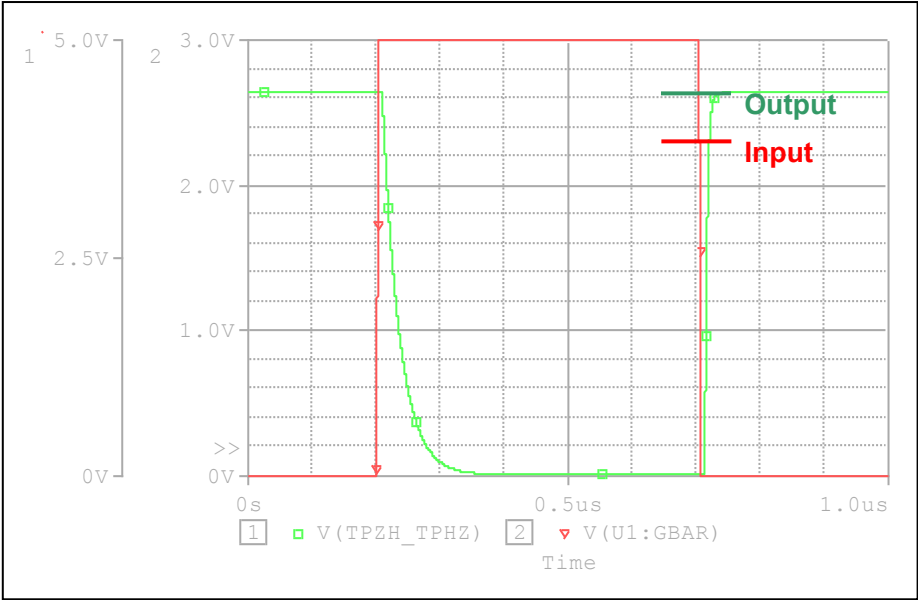


Comparison table $C_L = 50 \text{ pF}$

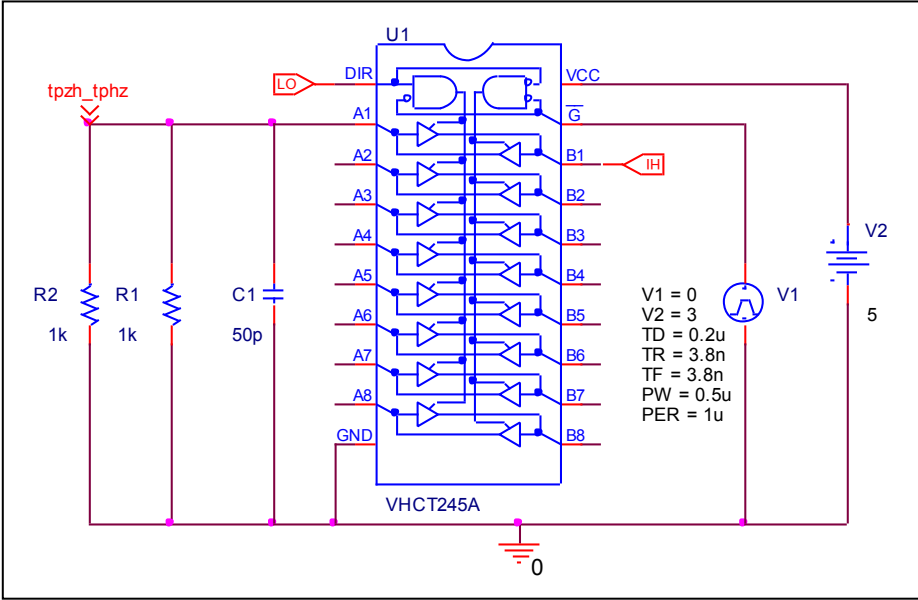
$V_{CC} = 5 \text{ V}$, $t_r = t_f = 3 \text{ ns}$	Measurement	Simulation	%Error
$t_{PLH} \text{ (ns)}$	5.4	5.4249	0.461
$t_{PHL} \text{ (ns)}$	5.4	5.4871	1.613

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



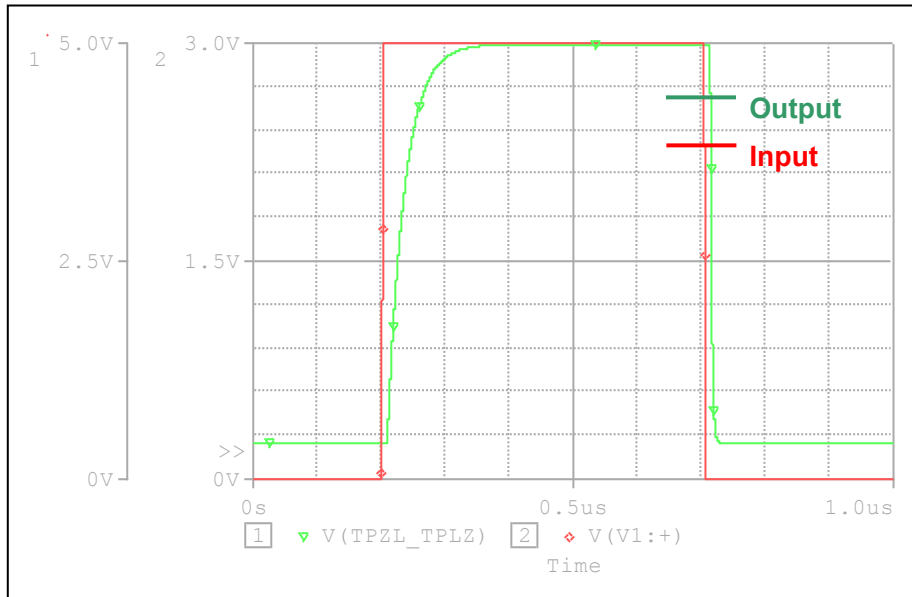
Evaluation circuit



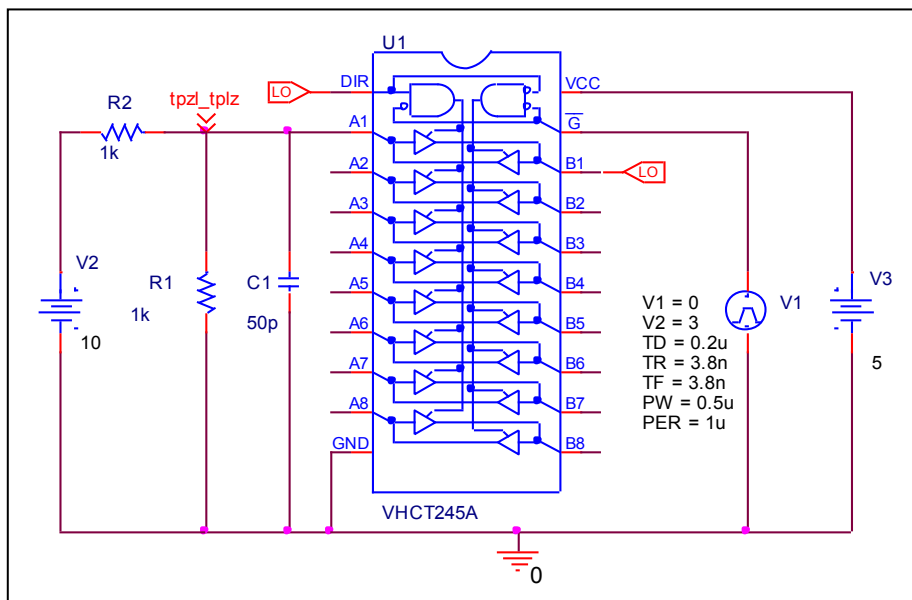
Comparison table $C_L = 50 \text{ pF}$, $R_L = 1 \text{ k}\Omega$

$V_{CC} = 5 \text{ V}$, $t_r = t_f = 3 \text{ ns}$	Measurement	Simulation	%Error
$t_{PZH} \text{ (ns)}$	9.9	9.986	0.869
$t_{PHZ} \text{ (ns)}$	10.1	10.243	1.416

Circuit simulation result



Evaluation circuit



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

V_{CC} = 5 V, t_r = t_f = 3 ns	Measurement	Simulation	%Error
t_{PZL} (ns)	9.9	9.946	0.465
t_{PLZ} (ns)	10.1	10.238	1.366