

Device Modeling Report

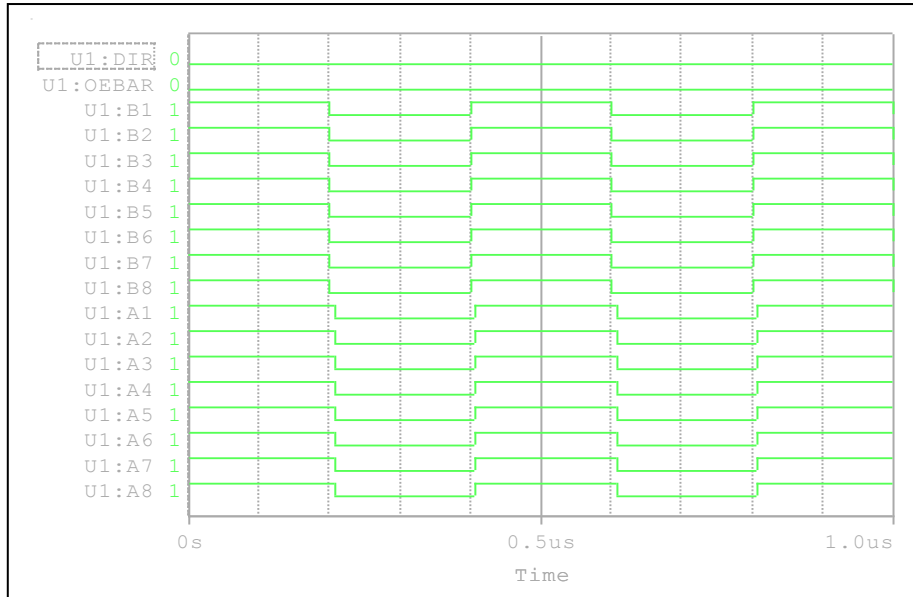
COMPONENTS : CMOS DIGITAL INTEGRATED CIRCUIT
PART NUMBER : TC74LCX245F
MANUFACTURER : TOSHIBA



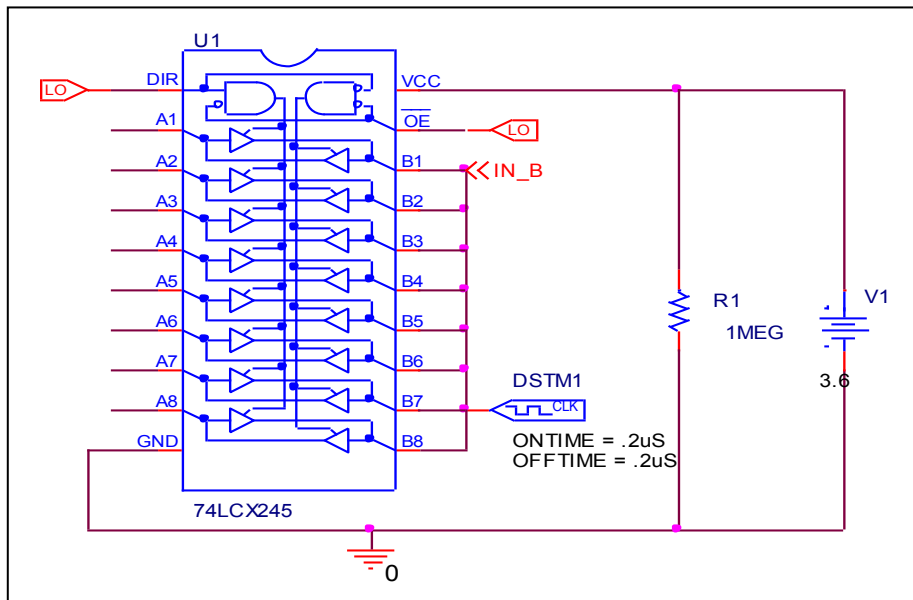
Bee Technologies Inc.

Truth Table

Circuit simulation result



Evaluation circuit



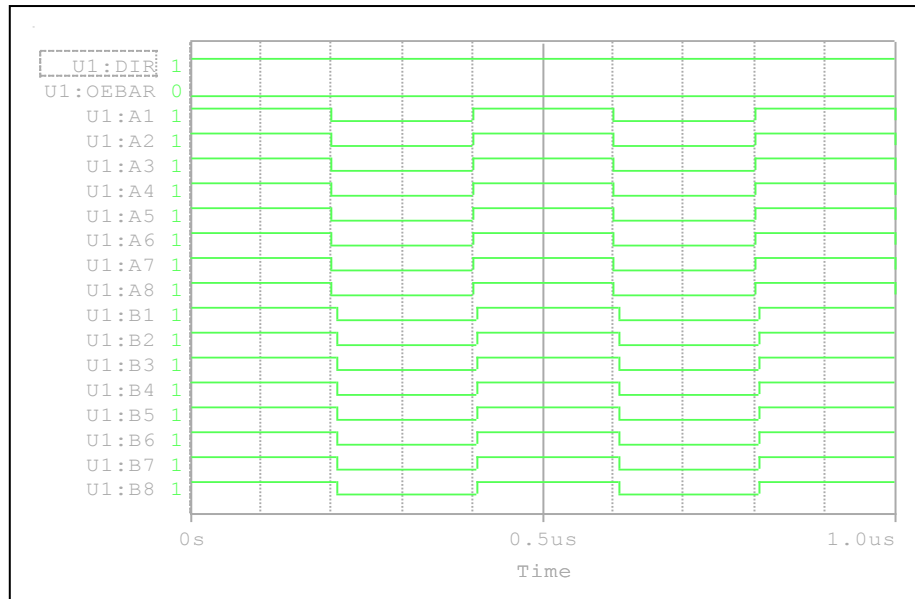
Comparison table

Function : A BUS = OUTPUT, B BUS = INPUT

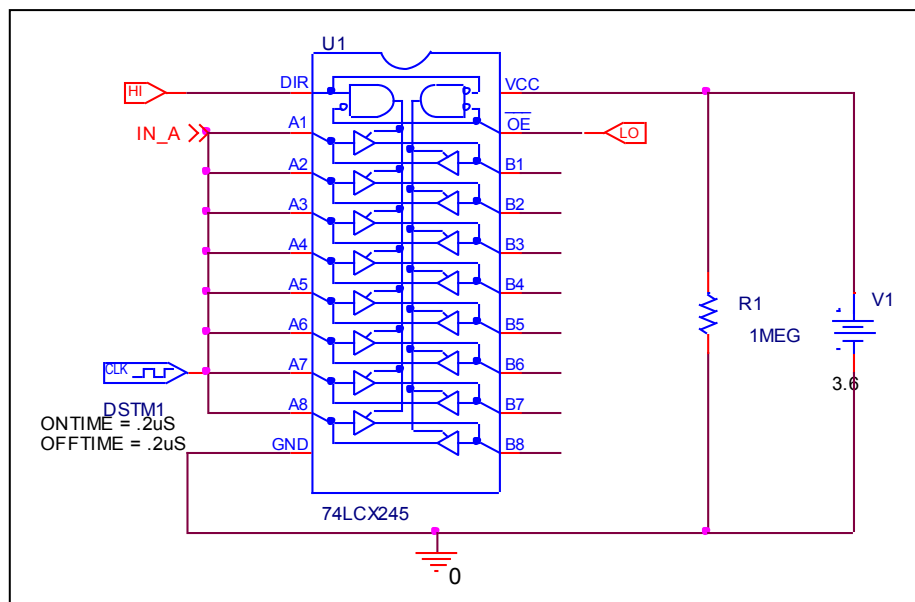
Input		Output		%Error
OE	DIR	Measurement	Simulation	
L	L	A=B	A=B	0

Truth Table

Circuit simulation result



Evaluation circuit



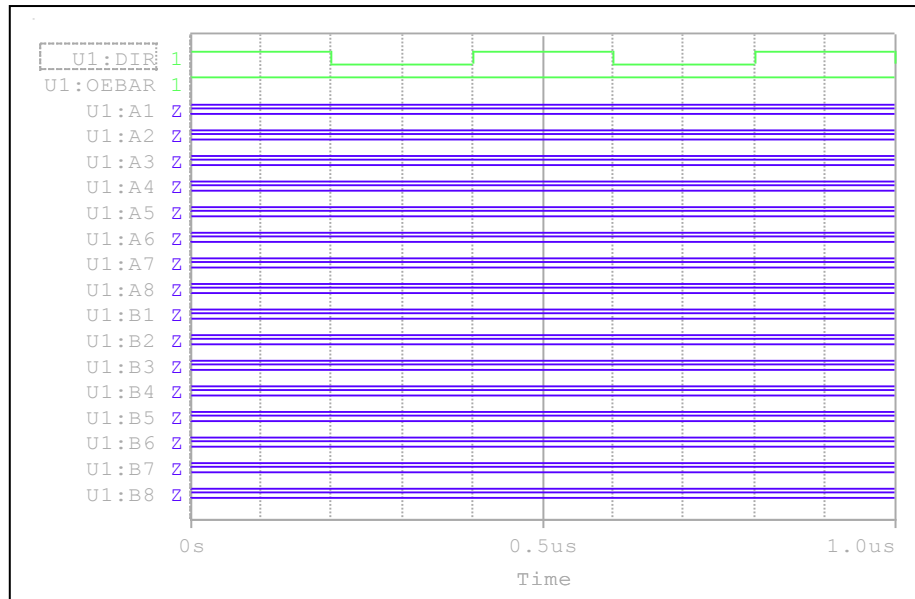
Comparison table

Function : A BUS = INPUT, B BUS = OUTPUT

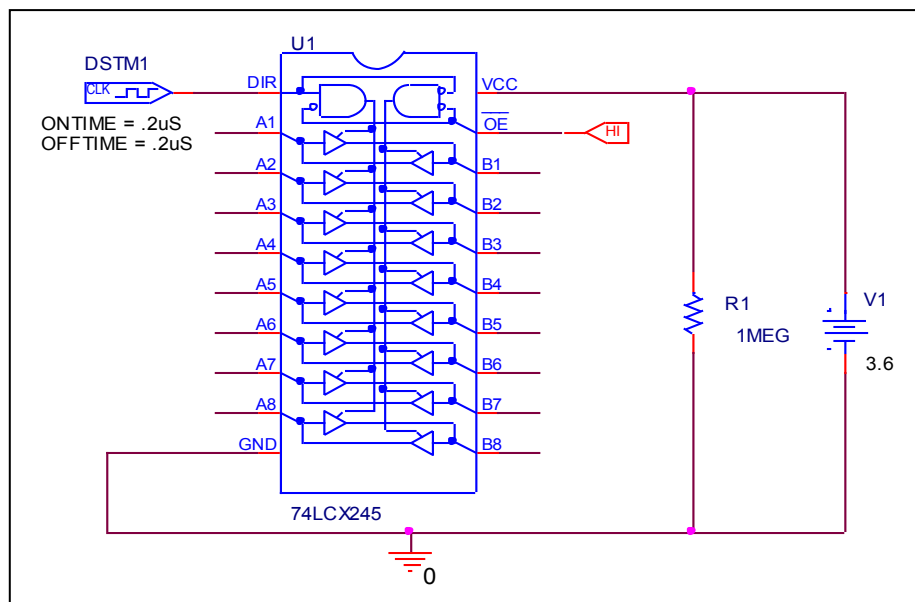
Input		Output		%Error
OE	DIR	Measurement	Simulation	
L	H	B=A	B=A	0

Truth Table

Circuit simulation result



Evaluation circuit



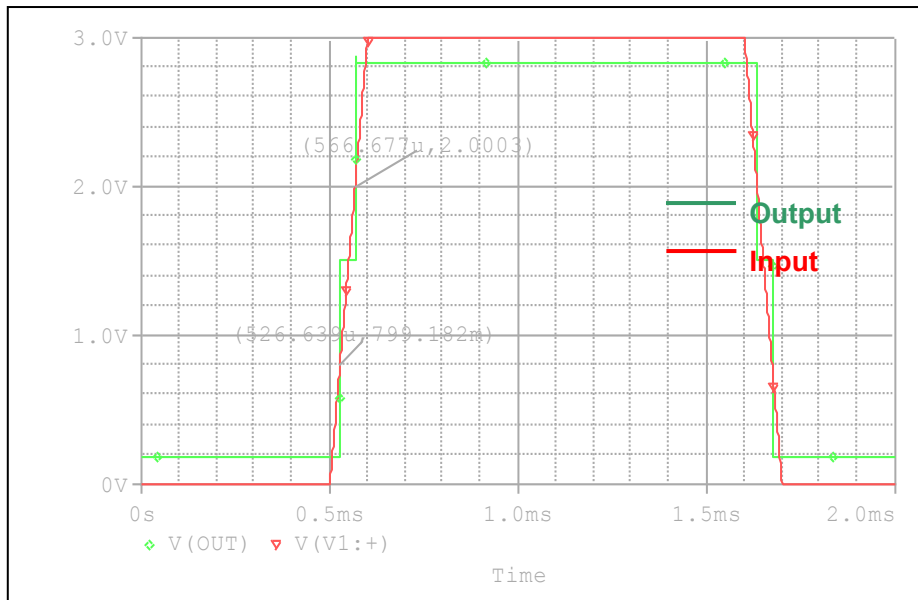
Comparison table

Function : A BUS and B BUS = HIGH IMPEDANCE

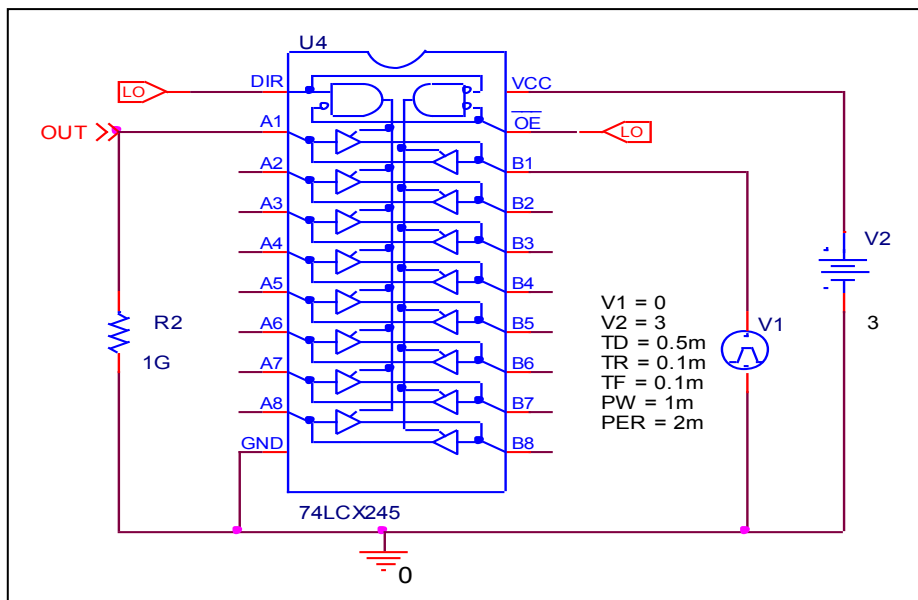
Input		Output		%Error
OE	DIR	Measurement	Simulation	
H	X	Z	Z	0

High Level and Low Level Input Voltage

Circuit simulation result



Evaluation circuit

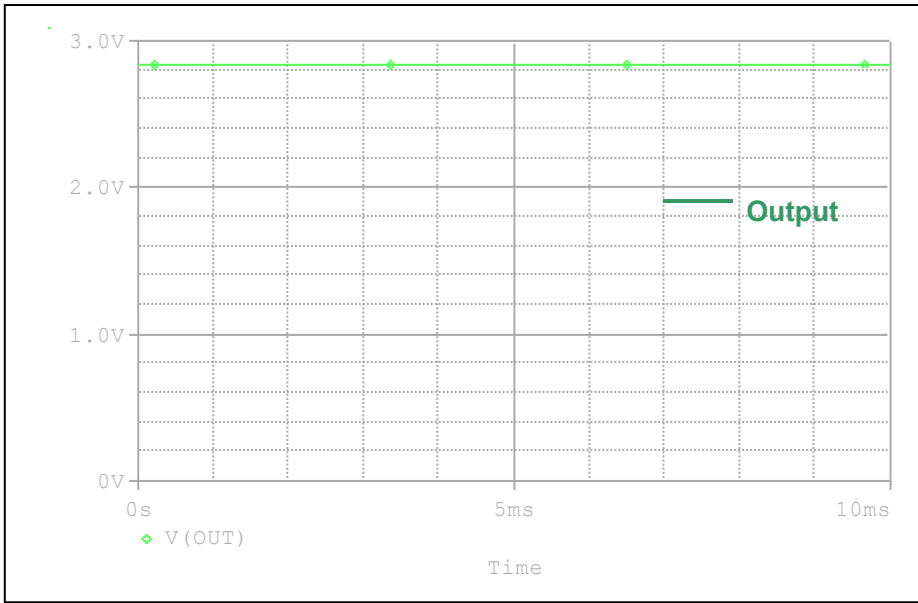


Comparison table

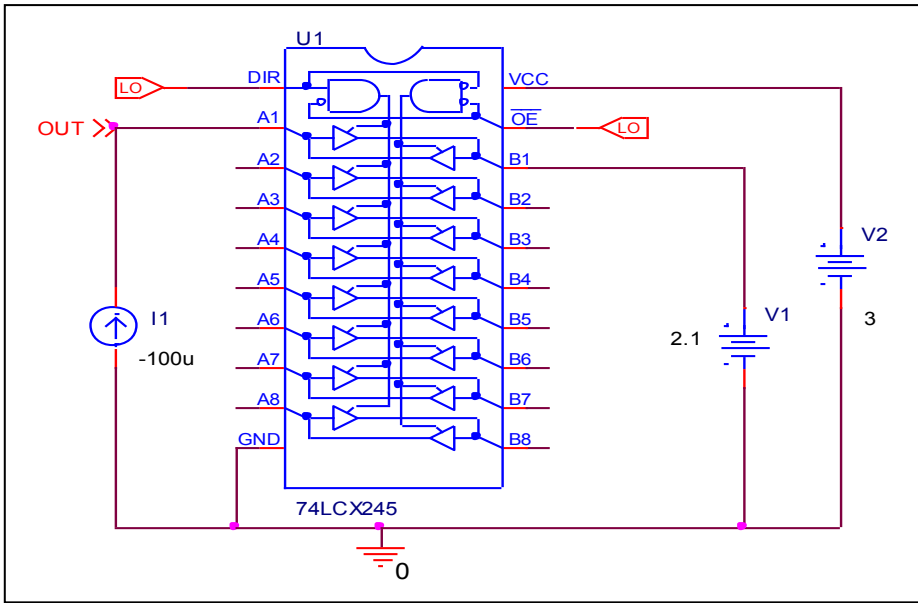
$V_{CC} = 3.3 \text{ V}$	Measurement	Simulation	%Error
$V_{IH} \text{ (V)}$	2	2	0
$V_{IL} \text{ (V)}$	0.8	0.799182	-0.102

High Level Output Voltage

Circuit simulation result



Evaluation circuit

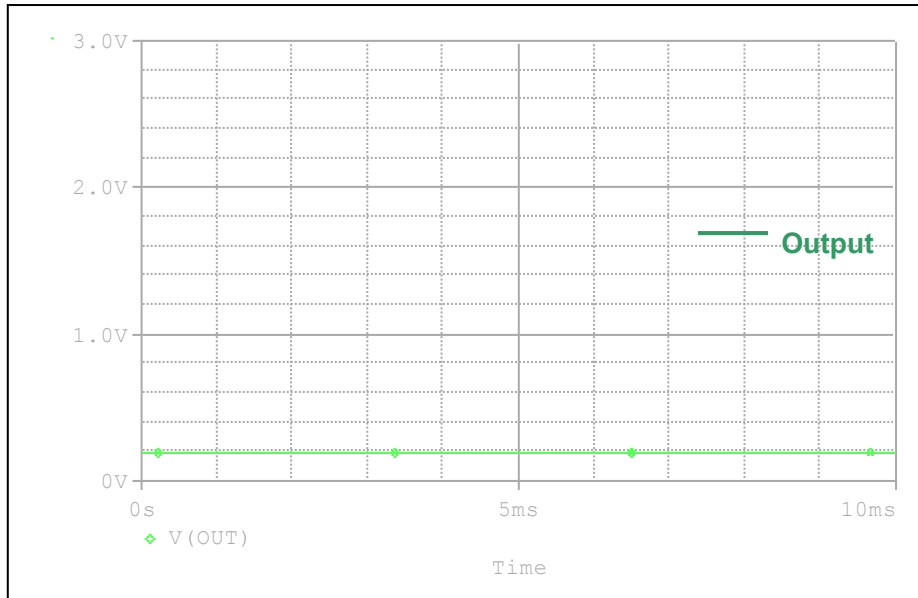


Comparison table

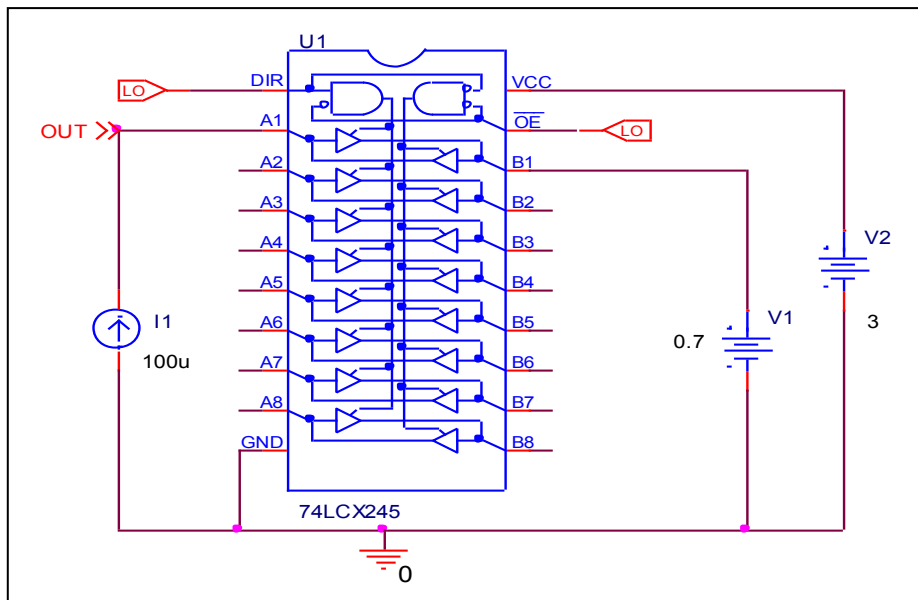
$V_{IN} = V_{IH}, V_{CC} = 3\text{ V}$	Measurement	Simulation	%Error
$\text{Min } V_{OH} = (V_{CC} - 0.2)\text{ V}$	2.8	2.8331	1.182

Low Level Output Voltage

Circuit simulation result



Evaluation circuit

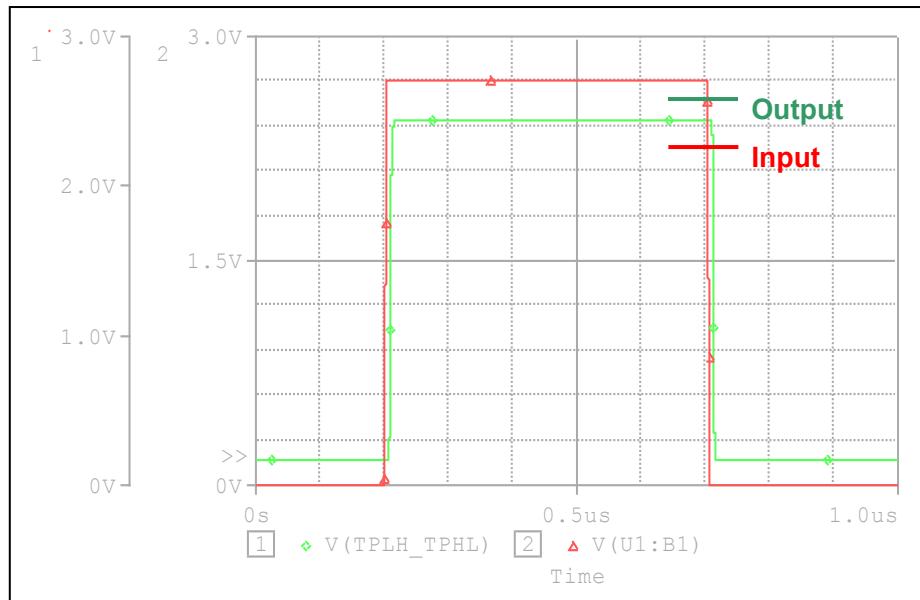


Comparison table

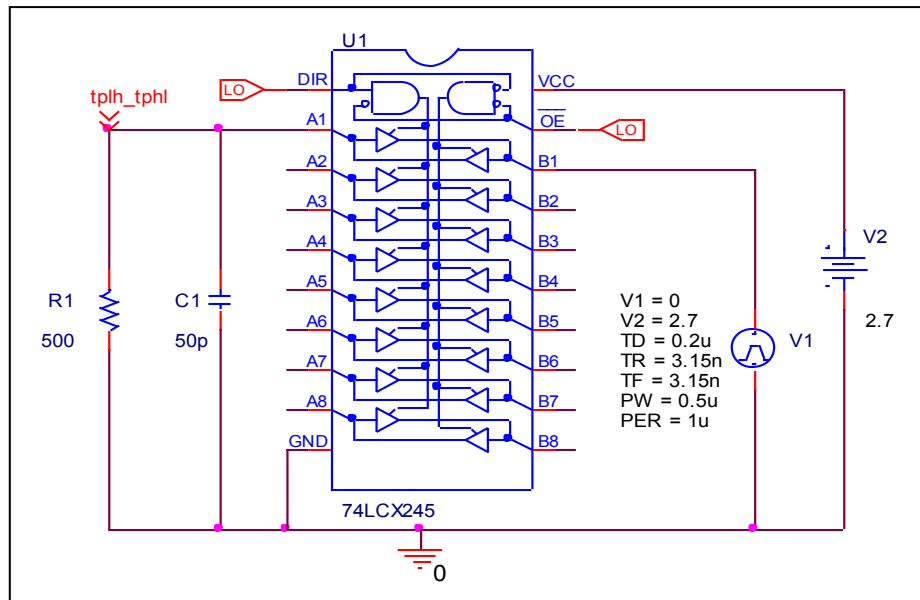
$V_{IN} = V_{IL}, V_{CC} = 3V$	Measurement	Simulation	%Error
$V_{OL} (V)$	0.2	0.191208	-4.396

Propagation Delay Time

Circuit simulation result



Evaluation circuit

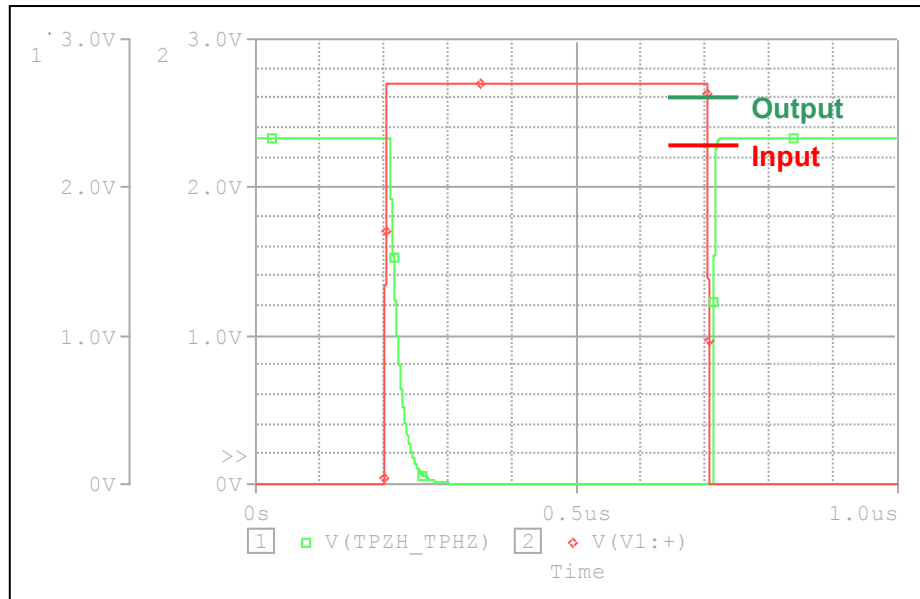


Comparison table $C_L = 50 \text{ Pf}$, $R_L = 500 \Omega$

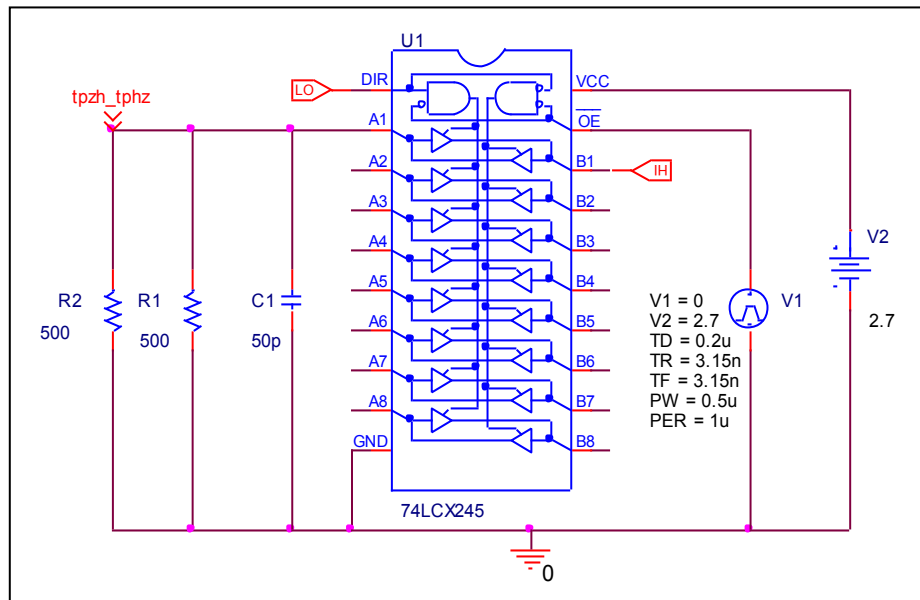
$V_{CC} = 2.7 \text{ V}$, $t_r = t_f = 2.5 \text{ ns}$	Measurement	Simulation	%Error
$t_{PLH} \text{ (ns)}$	8	7.9710	-0.362
$t_{PHL} \text{ (ns)}$	8	7.8270	-2.163

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

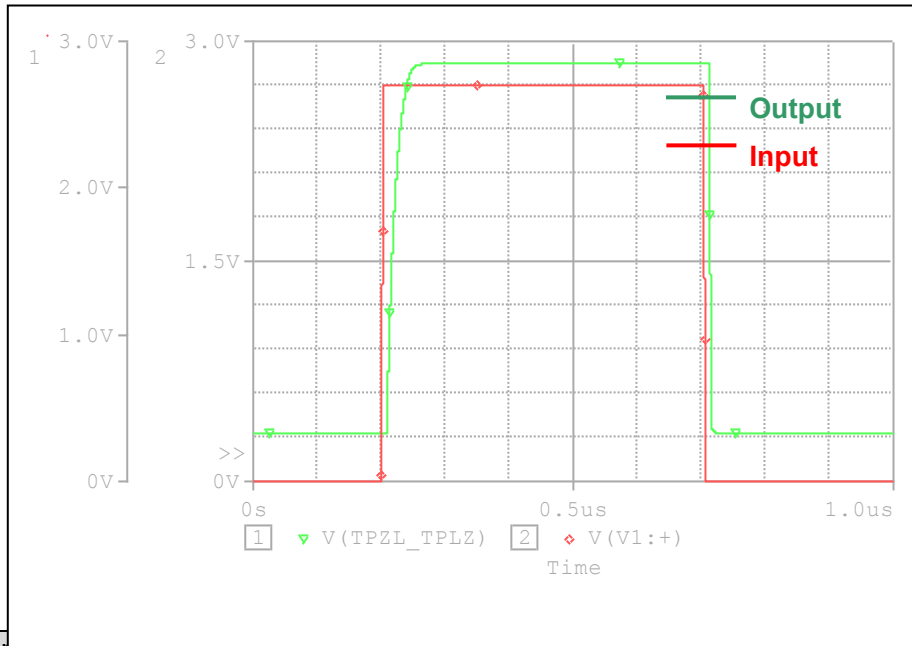


Comparison table $C_L = 50 \text{ pF}$, $R_L = 500 \Omega$

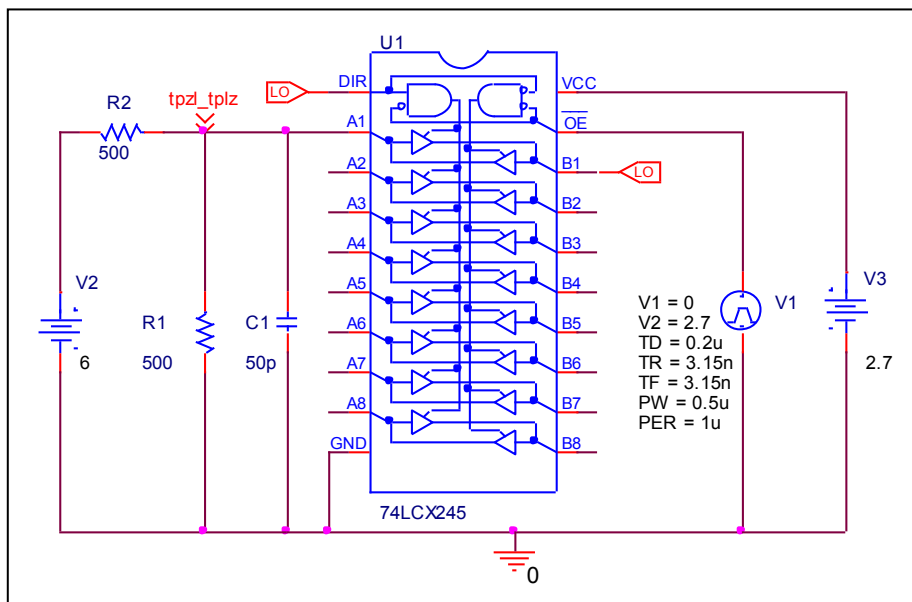
$V_{CC} = 2.7 \text{ V}$, $t_r = t_f = 2.5 \text{ ns}$	Measurement	Simulation	%Error
$t_{PZH} \text{ (ns)}$	9.5	9.4468	-0.560
$t_{PHZ} \text{ (ns)}$	8.5	8.4095	-1.065

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

$V_{CC} = 2.7$ V, $t_r = t_f = 2.5$ ns	Measurement	Simulation	%Error
t_{PZL} (ns)	9.5	9.4525	-0.500
t_{PLZ} (ns)	8.5	8.4464	-0.631