

# Quad 2-Input Exclusive OR Gate

This device contains four independent 2-input Exclusive-OR gates. It performs the Boolean functions  $Y=A \oplus B=AB+\overline{A}\overline{B}$  in positive logic.



**N SUFFIX  
PLASTIC**

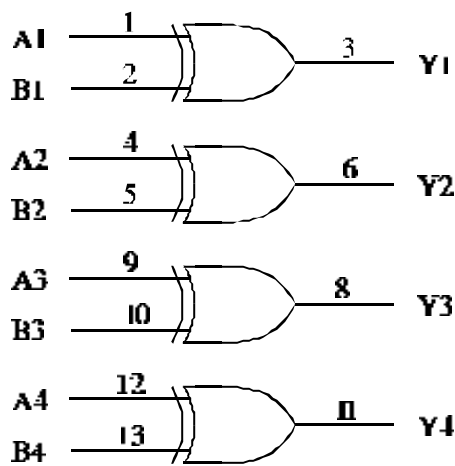


**D SUFFIX  
SOIC**

**ORDERING INFORMATION**

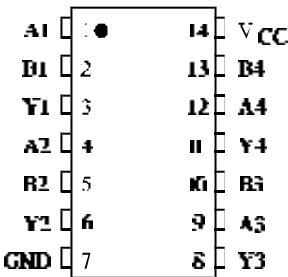
SL74LS86N Plastic  
SL74LS86D SOIC  
 $T_A = 0^\circ \text{ to } 70^\circ \text{ C}$  for all packages

## LOGIC DIAGRAM



PIN 14 =  $V_{CC}$   
PIN 7 = GND

## PIN ASSIGNMENT



## FUNCTION TABLE

Inputs		Output
A	B	Y
L	L	L
L	H	H
H	L	H
H	H	L

## MAXIMUM RATINGS\*

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	Supply Voltage	7.0	V
V <sub>IN</sub>	Input Voltage	7.0	V
V <sub>OUT</sub>	Output Voltage	5.5	V
T <sub>stg</sub>	Storage Temperature Range	-65 to +150	°C

\*Maximum Ratings are those values beyond which damage to the device may occur. Functional operation should be restricted to the Recommended Operating Conditions.

## RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V <sub>CC</sub>	Supply Voltage	4.75	5.25	V
V <sub>IH</sub>	High Level Input Voltage	2.0		V
V <sub>IL</sub>	Low Level Input Voltage		0.8	V
I <sub>OH</sub>	High Level Output Current		-0.4	mA
I <sub>OL</sub>	Low Level Output Current		8.0	mA
T <sub>A</sub>	Ambient Temperature Range	0	+70	°C

## DC ELECTRICAL CHARACTERISTICS over full operating conditions

Symbol	Parameter		Test Conditions	Guaranteed Limit		Unit
				Min	Max	
V <sub>IK</sub>	Input Clamp Voltage		V <sub>CC</sub> = min, I <sub>IN</sub> = -18 mA		-1.5	V
V <sub>OH</sub>	High Level Output Voltage		V <sub>CC</sub> = min, I <sub>OH</sub> = -0.4 mA	2.7		V
V <sub>OL</sub>	Low Level Output Voltage		V <sub>CC</sub> = min, I <sub>OL</sub> = 4 mA		0.4	V
			V <sub>CC</sub> = min, I <sub>OL</sub> = 8 mA		0.5	
I <sub>IH</sub>	High Level Input Current		V <sub>CC</sub> = max, V <sub>IN</sub> = 2.7 V		40	μA
			V <sub>CC</sub> = max, V <sub>IN</sub> = 7.0 V		0.2	mA
I <sub>IL</sub>	Low Level Input Current		V <sub>CC</sub> = max, V <sub>IN</sub> = 0.4 V		-0.8	mA
I <sub>O</sub>	Output Short Circuit Current		V <sub>CC</sub> = max, V <sub>O</sub> = 0 V (Note 1)	-20	-100	mA
I <sub>CC</sub>	Supply Current	Total with outputs high	V <sub>CC</sub> = max		10	mA
		Total with outputs low			15	

Note 1: Not more than one output should be shorted at a time, and duration should not exceed one second.



**AC ELECTRICAL CHARACTERISTICS** ( $T_A=25^\circ\text{C}$ ,  $V_{CC}=5.0\text{ V}$ ,  $C_L=15\text{ pF}$ ,  $R_L=2\text{ k}\Omega$ ,  $t_r=15\text{ ns}$ ,  $t_f=6.0\text{ ns}$ )

Symbol	Parameter	Min	Max	Unit
$t_{PLH}$	Propagation Delay, Input A or B to Output Y (Other input low)		23	ns
$t_{PHL}$	Propagation Delay, Input A or B to Output Y (Other input low)		17	ns
$t_{PLH}$	Propagation Delay, Input A or B to Output Y (Other input high)		30	ns
$t_{PHL}$	Propagation Delay, Input A or B to Output Y (Other input high)		22	ns

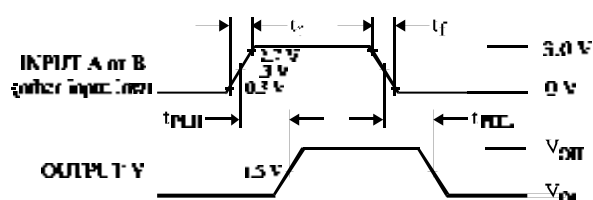


Figure 1. Switching Waveforms

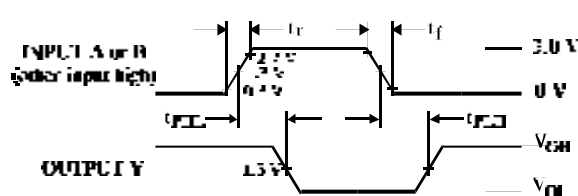
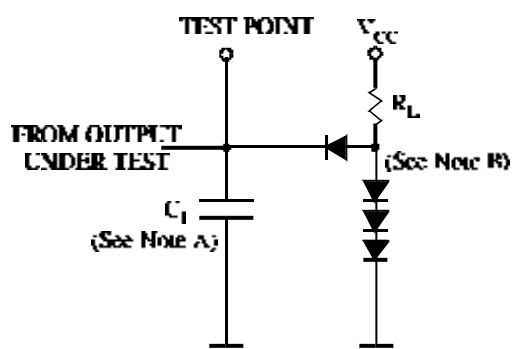


Figure 2. Switching Waveforms



NOTES A.  $C_L$  includes probe and jig capacitance.  
B. All diodes are 1N916 or 1N3064.

Figure 3. Test Circuit