

# NL27WZ86

## Dual 2-Input Exclusive-OR Gate

The NL27WZ86 is a high performance dual 2-input Exclusive-OR Gate operating from a 1.65 V to 5.5 V supply.

- Extremely High Speed:  $t_{PD}$  2.4 ns (typical) at  $V_{CC} = 5.0$  V
- Designed for 1.65 V to 5.5 V  $V_{CC}$  Operation
- Over Voltage Tolerant Inputs and Outputs
- LVTTL Compatible – Interface Capability With 5.0 V TTL Logic with  $V_{CC} = 3.0$  V
- LVCMS Compatible
- 24 mA Balanced Output Sink and Source Capability
- Near Zero Static Supply Current Substantially Reduces System Power Requirements
- Replacement for NC7WZ86

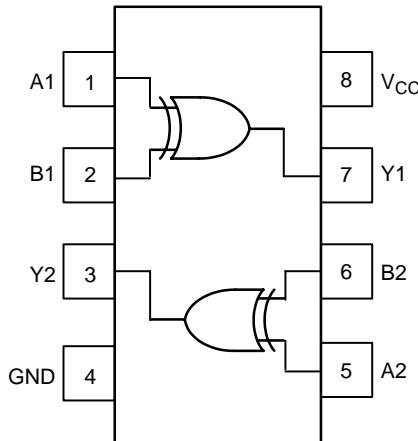


Figure 1. Pinout (Top View)

### PIN ASSIGNMENT

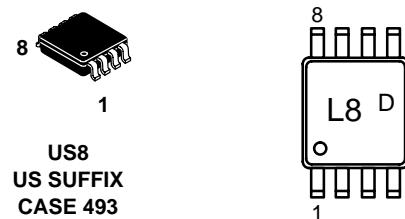
Pin	Function
1	A1
2	B1
3	Y2
4	GND
5	A2
6	B2
7	Y1
8	V <sub>CC</sub>



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### MARKING DIAGRAM



D = Date Code

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

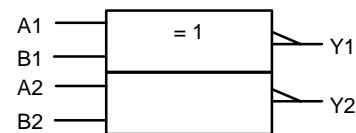


Figure 2. Logic Symbol

### FUNCTION TABLE

Input		Output $Y = A + B$
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>	DC Supply Voltage	–0.5 to +7.0	V
V <sub>I</sub>	DC Input Voltage	–0.5 to +7.0	V
V <sub>O</sub>	DC Output Voltage	–0.5 to +7.0	V
I <sub>IK</sub>	DC Input Diode Current V <sub>I</sub> < GND	–50	mA
I <sub>OK</sub>	DC Output Diode Current V <sub>O</sub> < GND	–50	mA
I <sub>O</sub>	DC Output Sink Current	±50	mA
I <sub>CC</sub>	DC Supply Current per Supply Pin	±100	mA
I <sub>GND</sub>	DC Ground Current per Ground Pin	±100	mA
T <sub>STG</sub>	Storage Temperature Range	–65 to +150	°C
T <sub>L</sub>	Lead Temperature, 1 mm from Case for 10 Seconds	260	°C
T <sub>J</sub>	Junction Temperature under Bias	+150	°C
θ <sub>JA</sub>	Thermal Resistance (Note 1)	250	°C/W
P <sub>D</sub>	Power Dissipation in Still Air at 85°C	250	mW
MSL	Moisture Sensitivity	Level 1	
F <sub>R</sub>	Flammability Rating Oxygen Index: 28 to 34	UL 94 V-0 @ 0.125 in	
V <sub>ESD</sub>	ESD Withstand Voltage Human Body Model (Note 2) Machine Model (Note 3) Charged Device Model (Note 4)	> 2000 > 200 N/A	V

Maximum Ratings are those values beyond which damage to the device may occur. Exposure to these conditions or conditions beyond those indicated may adversely affect device reliability. Functional operation under absolute maximum-rated conditions is not implied. Functional operation should be restricted to the Recommended Operating Conditions.

1. Measured with minimum pad spacing on an FR4 board, using 10 mm-by-1 inch, 2 ounce copper trace with no air flow.
2. Tested to EIA/JESD22-A114-A.
3. Tested to EIA/JESD22-A115-A.
4. Tested to JESD22-C101-A.

## RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V <sub>CC</sub>	Supply Voltage Operating Data Retention Only	1.65 1.5	5.5 5.5	V
V <sub>I</sub>	Input Voltage (Note 5)	0	5.5	V
V <sub>O</sub>	Output Voltage (HIGH or LOW State)	0	5.5	V
T <sub>A</sub>	Operating Free-Air Temperature	–40	+125	°C
Δt/ΔV	Input Transition Rise or Fall Rate V <sub>CC</sub> = 1.8 V ± 0.15 V V <sub>CC</sub> = 2.5 V ± 0.2 V V <sub>CC</sub> = 3.0 V ± 0.3 V V <sub>CC</sub> = 5.0 V ± 0.5 V	0 0 0 0	20 20 10 5	ns/V

5. Unused inputs may not be left open. All inputs must be tied to a high- or low-logic input voltage level.

## DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	V <sub>CC</sub> (V)	T <sub>A</sub> = 25°C			-40°C ≤ T <sub>A</sub> ≤ 85°C		Unit	Condition
			Min	Typ	Max	Min	Max		
V <sub>IH</sub>	High-Level Input Voltage	1.65 to 1.95 2.3 to 5.5	0.75 V <sub>CC</sub> 0.7 V <sub>CC</sub>			0.75 V <sub>CC</sub> 0.7 V <sub>CC</sub>		V	
V <sub>IL</sub>	Low-Level Input Voltage	1.65 to 1.95 2.3 to 5.5			0.25 V <sub>CC</sub> 0.3 V <sub>CC</sub>		0.25 V <sub>CC</sub> 0.3 V <sub>CC</sub>	V	
V <sub>OH</sub>	High-Level Output Voltage V <sub>IN</sub> = V <sub>IH</sub>	1.65	1.55	1.65		1.55		V	I <sub>OH</sub> = -100 μA
		1.8	1.7	1.8		1.7			
		2.3	2.2	2.3		2.2			
		3.0	2.9	3.0		2.9			
		4.5	4.4	4.5		4.4			
	Low-Level Output Voltage V <sub>IN</sub> = V <sub>IL</sub>	1.65	1.29	1.52		1.29		V	I <sub>OH</sub> = -4 mA
		2.3	1.9	2.15		1.9			I <sub>OH</sub> = -8 mA
		3.0	2.4	2.80		2.4			I <sub>OH</sub> = -16 mA
		3.0	2.3	2.68		2.3			I <sub>OH</sub> = -24 mA
		4.5	3.8	4.20		3.8			I <sub>OH</sub> = -32 mA
V <sub>OL</sub>	Low-Level Output Voltage V <sub>IN</sub> = V <sub>IL</sub>	1.65		0.0	0.1		0.1	V	I <sub>OL</sub> = 100 μA
		1.8		0.0	0.1		0.1		
		2.3		0.0	0.1		0.1		
		3.0		0.0	0.1		0.1		
		4.5		0.0	0.1		0.1		
	Quiescent Supply Current V <sub>IN</sub> = 5.5 V, GND	1.65		0.08	0.24		0.24	V	I <sub>OL</sub> = 4 mA
		2.3		0.10	0.30		0.30		I <sub>OL</sub> = 8 mA
		3.0		0.15	0.40		0.40		I <sub>OL</sub> = 16 mA
		3.0		0.22	0.55		0.55		I <sub>OL</sub> = 24 mA
		4.5		0.22	0.55		0.55		I <sub>OL</sub> = 32 mA
I <sub>IN</sub>	Input Leakage Current	0 to 5.5			± 1.0		± 1.0	μA	0 V ≤ V <sub>IN</sub> ≤ 5.5 V
I <sub>OFF</sub>	Power Off Leakage Current	0.0			1.0		10	μA	V <sub>IN</sub> or V <sub>OUT</sub> = 5.5 V
I <sub>CC</sub>	Quiescent Supply Current	1.65 to 5.5			1.0		10	μA	V <sub>IN</sub> = 5.5 V, GND

AC ELECTRICAL CHARACTERISTICS t<sub>R</sub> = t<sub>F</sub> = 3.0 ns

Symbol	Parameter	Condition	V <sub>CC</sub> (V)	T <sub>A</sub> = 25°C			-40°C ≤ T <sub>A</sub> ≤ 125°C		Unit
				Min	Typ	Max	Min	Max	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay (Figure 3 and 4)	R <sub>L</sub> = 1 MΩ, C <sub>L</sub> = 15 pF	1.8 ± 0.15	2.0	7.9	9.0	2.0	10.5	ns
		R <sub>L</sub> = 1 MΩ, C <sub>L</sub> = 15 pF	2.5 ± 0.2	1.2	4.1	7.0	1.2	7.5	
		R <sub>L</sub> = 1 MΩ, C <sub>L</sub> = 15 pF	3.3 ± 0.3	0.8	3.0	4.8	0.8	5.2	
		R <sub>L</sub> = 500 Ω, C <sub>L</sub> = 50 pF		1.2	3.8	5.4	1.2	5.9	
		R <sub>L</sub> = 1 MΩ, C <sub>L</sub> = 15 pF	5.0 ± 0.5	0.5	2.2	3.5	0.5	3.8	
		R <sub>L</sub> = 500 Ω, C <sub>L</sub> = 50 pF		0.8	2.9	4.2	1.0	4.6	

## CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Condition	Typical	Unit
C <sub>IN</sub>	Input Capacitance	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 0 V or V <sub>CC</sub>	2.5	pF
C <sub>PD</sub>	Power Dissipation Capacitance (Note 6)	10 MHz, V <sub>CC</sub> = 3.3 V, V <sub>I</sub> = 0 V or V <sub>CC</sub> 10 MHz, V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 0 V or V <sub>CC</sub>	9 11	pF

6. C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation: I<sub>CC(OPR)</sub> = C<sub>PD</sub> • V<sub>CC</sub> • f<sub>in</sub> + I<sub>CC</sub>. C<sub>PD</sub> is used to determine the no-load dynamic power consumption; P<sub>D</sub> = C<sub>PD</sub> • V<sub>CC</sub><sup>2</sup> • f<sub>in</sub> + I<sub>CC</sub> • V<sub>CC</sub>.

# NL27WZ86

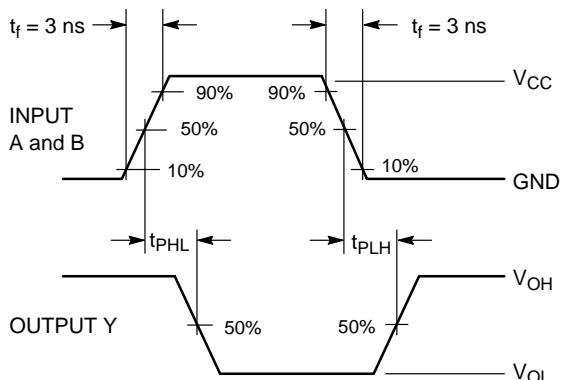
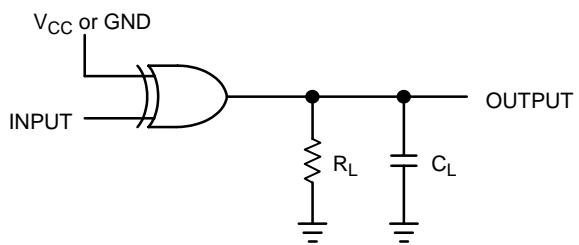


Figure 3. Switching Waveform



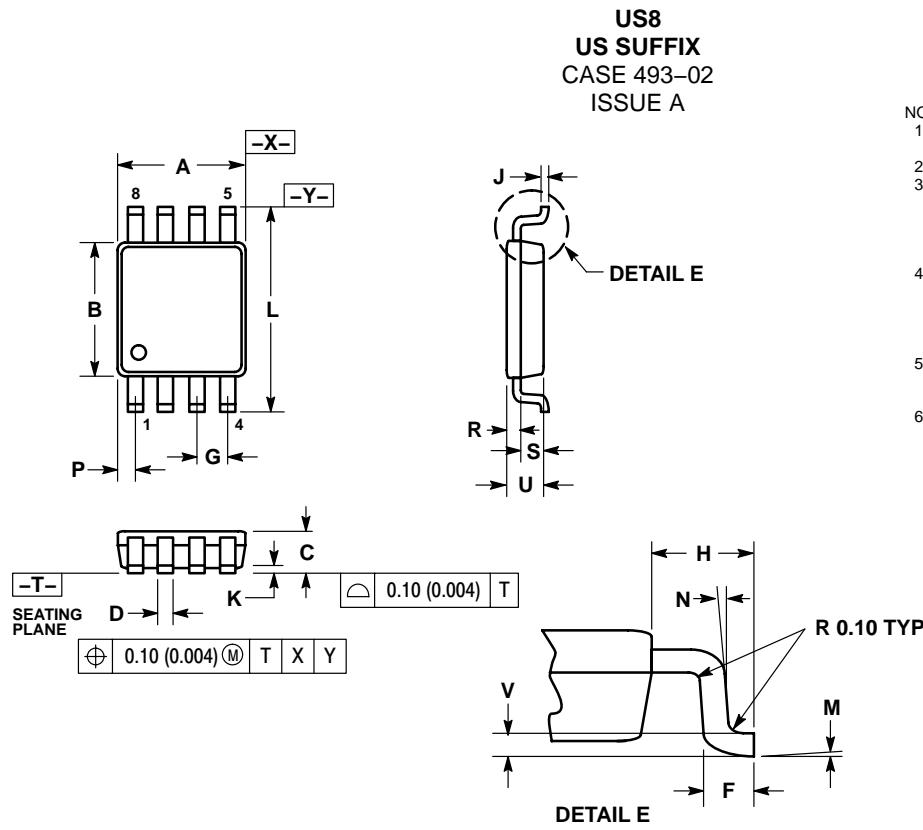
A 1-MHz square input wave is recommended for propagation delay tests.

Figure 4. Test Circuit

## DEVICE ORDERING INFORMATION

Device Order Number	Device Nomenclature							Package Type	Tape and Reel Size
	Logic Circuit Indicator	No. of Gates per Package	Temp Range Identifier	Technology	Device Function	Package Suffix	Tape and Reel Suffix		
NL27WZ86US	NL	2	7	WZ	86	US		US8	178 mm, 3000 Units

## PACKAGE DIMENSIONS

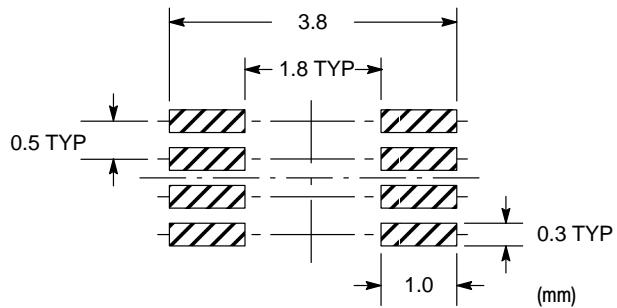


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION "A" DOES NOT INCLUDE MOLD FLASH, PROTRUSION OR GATE BURR. MOLD FLASH, PROTRUSION AND GATE BURR SHALL NOT EXCEED 0.140 MM (0.0055") PER SIDE.
4. DIMENSION "B" DOES NOT INCLUDE INTER-LEAD FLASH OR PROTRUSION. INTER-LEAD FLASH AND PROTRUSION SHALL NOT EXCEED 0.140 (0.0055") PER SIDE.
5. LEAD FINISH IS SOLDER PLATING WITH THICKNESS OF 0.0076–0.0203 MM. (300–800  $\mu$ m).
6. ALL TOLERANCE UNLESS OTHERWISE SPECIFIED  $\pm 0.0508$  (0.0002").

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.90	2.10	0.075	0.083
B	2.20	2.40	0.087	0.094
C	0.60	0.90	0.024	0.035
D	0.17	0.25	0.007	0.010
F	0.20	0.35	0.008	0.014
G	0.50 BSC		0.020 BSC	
H	0.40 REF		0.016 REF	
J	0.10	0.18	0.004	0.007
K	0.00	0.10	0.000	0.004
L	3.00	3.20	0.118	0.126
M	0°	6°	0°	6°
N	5°	10°	5°	10°
P	0.23	0.34	0.010	0.013
R	0.23	0.33	0.009	0.013
S	0.37	0.47	0.015	0.019
U	0.60	0.80	0.024	0.031
V	0.12 BSC		0.005 BSC	

## SOLDERING FOOTPRINT\*



\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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