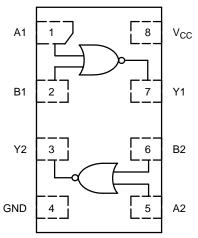
## **Dual 2-Input NOR Gate**

The NLX2G02 is an advanced high-speed dual 2-input CMOS NOR gate in ultra-small footprint.

The NLX2G02 input structures provide protection when voltages up to 7.0 volts are applied, regardless of the supply voltage.

#### Features

- High Speed:  $t_{PD}$  2.5 ns (typical) at  $V_{CC} = 5.0$  V
- Designed for 1.65 V to 5.5 V V<sub>CC</sub> Operation
- Low Power Dissipation:  $I_{CC} = 1 \ \mu A$  (Max) at  $T_A = 25^{\circ}C$
- 24 mA Balanced Output Sink and Source Capability
- Balanced Propagation Delays
- Overvoltage Tolerant (OVT) Input Pins
- This is a Pb–Free Device





# IEEE/IEC A1 B1 A2 B2

Figure 2. Logic Symbol

#### **PIN ASSIGNMENT**

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

## FUNCTION TABLE $Y = \overline{A + B}$

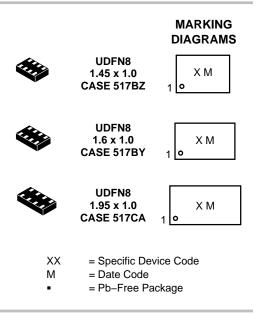
Inp	Output	
Α	В	Y
L	L	Н
L	Н	L
Н	L	L
Н	Н	L

H = HIGH Logic Level L = LOW Logic Level



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#### **ORDERING INFORMATION**

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

#### MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V <sub>CC</sub>	DC Supply Voltage		-0.5 to +7.0	V
V <sub>IN</sub>	DC Input Voltage		-0.5 to +7.0	V
V <sub>OUT</sub>	DC Output Voltage		-0.5 to V <sub>CC</sub> + 7.0	V
Ι <sub>ΙΚ</sub>	DC Input Diode Current	V <sub>IN</sub> < GND	-50	mA
I <sub>OK</sub>	DC Output Diode Current	V <sub>OUT</sub> < GND	-50	mA
Ι <sub>Ο</sub>	DC Output Source/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
ΤL	Lead Temperature, 1 mm from Case for 10 Seconds	3	260	°C
TJ	Junction Temperature Under Bias		150	°C
$\theta_{JA}$	Thermal Resistance (Note 1)		N/A	°C/W
PD	Power Dissipation in Still Air at 85°C		N/A	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
I <sub>Latchup</sub>	Latchup Performance Above V <sub>CC</sub> and Below GND a	at 125°C (Note 5)	±500	mA

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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.

5. Tested to EIA/JESD78.

#### **RECOMMENDED OPERATING CONDITIONS**

Symbol	Parameter	Parameter			
V <sub>CC</sub>	Power DC Supply Voltage	Operating Data Retention Only	1.65 1.5	5.5 5.5	V
V <sub>IN</sub>	Digital Input Voltage (Note 6)		0	5.5	V
V <sub>OUT</sub>	Output Voltage		0	V <sub>CC</sub>	V
T <sub>A</sub>	Operating Free–Air Temperature		-55	+125	°C
Δt/ΔV	Input Transition Rise or Fall Rate	$V_{CC} = 1.8 V \pm 0.15 V$ $V_{CC} = 2.5 V \pm 0.2 V$ $V_{CC} = 3.3 V \pm 0.3 V$ $V_{CC} = 5.0 V \pm 0.5 V$	0 0 0 0	20 20 10 5	ns/V

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

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

#### DC ELECTRICAL CHARACTERISTICS

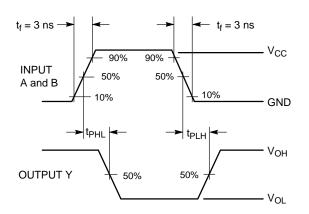
			V <sub>CC</sub>	т	a = 25°	c	T <sub>A</sub> ≤	85°C	T <sub>A</sub> = -5 +12		
Symbol	Parameter	Condition	(V)	Min	Тур	Max	Min	Max	Min	Max	Unit
V <sub>IH</sub>	High–Level Input Voltage		1.65 2.3 to 5.5	0.75 x V <sub>CC</sub> 0.7 x V <sub>CC</sub>			0.75 x V <sub>CC</sub> 0.7 x V <sub>CC</sub>		0.75 x V <sub>CC</sub> 0.7 x V <sub>CC</sub>		V
V <sub>IL</sub>	Low-Level Input Voltage		1.65 2.3 to 5.5			0.25 x V <sub>CC</sub> 0.3 x V <sub>CC</sub>		0.25 x V <sub>CC</sub> 0.3 x V <sub>CC</sub>		0.25 x V <sub>CC</sub> 0.3 x V <sub>CC</sub>	V
V <sub>OH</sub>	High–Level Output Voltage		1.65 to 5.5	V <sub>CC</sub> – 0.1	V <sub>CC</sub>		V <sub>CC</sub> – 0.1		V <sub>CC</sub> – 0.1		V
			1.65 2.3 2.7 3.0 3.0 4.5	1.29 1.9 2.2 2.4 2.3 3.8	1.5 2.1 2.4 2.7 2.5 4.0		1.29 1.9 2.2 2.4 2.3 3.8		1.29 1.9 2.2 2.4 2.3 3.8		
V <sub>OL</sub>	Low–Level Output Voltage		1.65 to 5.5			0.1		0.1		0.1	V
			1.65 2.3 2.7 3.0 3.0 4.5		0.08 0.20 0.22 0.28 0.38 0.42	0.24 0.3 0.4 0.4 0.55 0.55		0.24 0.3 0.4 0.4 0.55 0.55		0.24 0.3 0.4 0.4 0.55 0.55	
I <sub>IN</sub>	Input Leakage Current	$0 \leq V_{IN} \leq 5.5 \text{ V}$	0 to 5.5			±0.1		±1.0		±1.0	μΑ
I <sub>OFF</sub>	Power–Off Input Leakage Current	V <sub>IN</sub> = 5.5 V	0			1.0		10		10	μΑ
I <sub>CC</sub>	Quiescent Supply Current	V <sub>IN</sub> = V <sub>CC</sub> or GND	5.5			1.0		10		10	μΑ

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

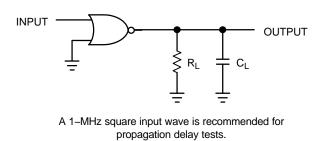
#### AC ELECTRICAL CHARACTERISTICS $t_R = t_F = 2.5 \text{ ns}$

		v <sub>cc</sub>		т	- A = 25°	с	T <sub>A</sub> ≤	85°C	T <sub>A</sub> = - to +1		
Symbol	Parameter	(V)	Test Condition	Min	Тур	Max	Min	Max	Min	Max	Unit
t <sub>PLH</sub>	Propagation Delay	1.65 to 1.95	$R_L = 1 M\Omega$ , $C_L = 15 pF$	2.0	7.4	9.5	2.0	9.7			ns
t <sub>PHL</sub>	Input A to Output	2.3 to 2.7	$R_L = 1 M\Omega$ , $C_L = 15 pF$	1.2	3.3	5.4	1.2	5.8			
		3.0 to 3.6	$R_L = 1 M\Omega$ , $C_L = 15 pF$	0.8	2.6	3.9	0.8	4.3			
			$R_L = 500 \ \Omega, \ C_L = 50 \ pF$	1.2	3.2	4.8	1.2	5.2			
		4.5 to 5.5	$R_L = 1 M\Omega, C_L = 15 pF$	0.5	1.9	3.1	0.5	3.3			
			$R_L = 500 \ \Omega, \ C_L = 50 \ pF$	0.8	2.5	3.7	0.8	4.0			
C <sub>IN</sub>	Input Capacitance	5.5	$V_{IN} = 0 V \text{ or } V_{CC}$		2.5						pF
C <sub>PD</sub>	Power Dissipation Capacitance (Note 7)	3.3 5.5	10 MHz, $V_{IN} = 0V$ or $V_{CC}$		9 11						pF

7.  $C_{PD}$  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:  $I_{CC(OPR)} = C_{PD} \bullet V_{CC} \bullet f_{in} + I_{CC}$ .  $C_{PD}$  is used to determine the no–load dynamic power consumption;  $P_D = C_{PD} \bullet V_{CC}^2 \bullet f_{in} + I_{CC} \bullet V_{CC}$ .









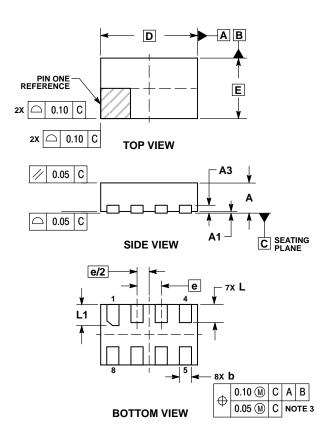
#### ORDERING INFORMATION

Device	Device Package		
NLX2G02DMUTCG	UDFN8, 1.95 x 1.0, 0.5P (Pb-Free)	3000 / Tape & Reel	
NLX2G02EMUTCG	UDFN8, 1.6 x 1.0, 0.4P (Pb–Free)	3000 / Tape & Reel	
NLX2G02FMUTCG	UDFN8, 1.45 x 1.0, 0.35P (Pb–Free)	3000 / Tape & Reel	

<sup>+</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

#### PACKAGE DIMENSIONS

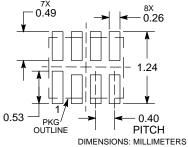
UDFN8 1.6x1.0, 0.4P CASE 517BY ISSUE O



- NOTES:
   DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
   CONTROLLING DIMENSION: MILLIMETERS.
   DIMENSION & APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.20 MM FROM TERMINAL TIP.
   PACKAGE DIMENSIONS EXCLUSIVE OF BURRS AND MOLD FLASH.

BURF	BURRS AND MOLD FLA						
	MILLIN	MILLIMETERS					
DIM	MIN	MAX					
Α	0.45	0.55					
A1	0.00	0.05					
A3	0.13	0.13 REF					
b	0.15	0.25					
D	1.60	BSC					
E	1.00	BSC					
е	0.40	0.40 BSC					
L	0.25	0.35					
L1	0.30	0.40					

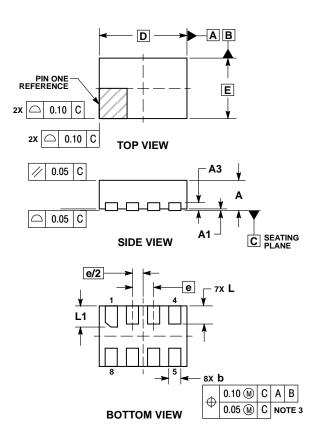
#### RECOMMENDED **SOLDERING FOOTPRINT\***



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

#### PACKAGE DIMENSIONS

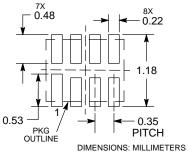
UDFN8 1.45x1.0, 0.35P CASE 517BZ ISSUE O



- NOTES:
   DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
   CONTROLLING DIMENSION: MILLIMETERS.
   DIMENSION & APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.20 MM FROM TERMINAL TIP.
   PACKAGE DIMENSIONS EXCLUSIVE OF BURRS AND MOLD FLASH.

BURRS AND MOLD FL						
	MILLIN	MILLIMETERS				
DIM	MIN	MAX				
Α	0.45	0.55				
A1	0.00 0.05					
A3	0.13 REF					
b	0.15	0.25				
D	1.45	BSC				
Е	1.00	BSC				
е	0.35	0.35 BSC				
L	0.25 0.35					
L1	0.30	0.40				

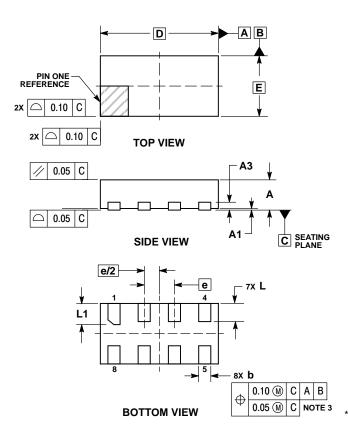
# RECOMMENDED SOLDERING FOOTPRINT\*



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#### PACKAGE DIMENSIONS

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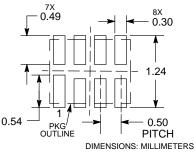


NOTES: 1. DIMENSIONING AND TOLERANCING PER

- ASME Y14.5M, 1994. 2. CONTROLLING DIMENSION: MILLIMETERS.
- 3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN
- 0.15 AND 0.20 MM FROM TERMINAL TIP. 4. PACKAGE DIMENSIONS EXCLUSIVE OF BURRS AND MOLD FLASH.

BUILIN	BURRS AND MOLD IL						
	MILLIN	MILLIMETERS					
DIM	MIN MAX						
Α	0.45	0.55					
A1	0.00 0.05 0.13 REF						
A3							
b	0.15	0.25					
D	1.95	BSC					
E	1.00	BSC					
е	0.50	BSC					
L	0.25	0.35					
L1	0.30	0.40					

#### RECOMMENDED SOLDERING FOOTPRINT\*



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