NLX2G08

Dual 2-Input AND Gate

The NLX2G08 is an advanced high-speed dual 2-input CMOS AND gate in ultra-small footprint.

The NLX2G08 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_{CC} Operation
- Low Power Dissipation: I_{CC} = 1 μA (Max) at T_A = 25°C
- 24 mA Balanced Output Sink and Source Capability
- Balanced Propagation Delays
- Overvoltage Tolerant (OVT) Input Pins
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

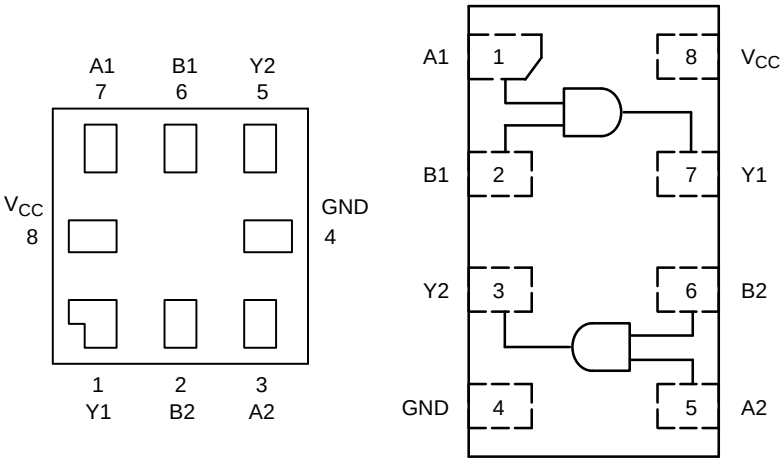

Figure 1. Pinouts

Figure 2. Logic Symbol

FUNCTION TABLE

Y = AB

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

H = HIGH Logic Level
L = LOW Logic Level

PIN ASSIGNMENT

Pin	Function (UQFN8)	Function (ULLGA/ UDFN)
1	Y1	A1
2	B2	B1
3	A2	Y2
4	GND	GND
5	Y2	A2
6	B1	B2
7	A1	Y1
8	V_{CC}	V_{CC}

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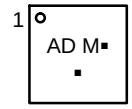
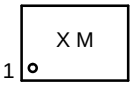
MARKING DIAGRAMS

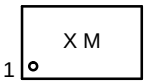
UQFN8
MU SUFFIX
CASE 523AN



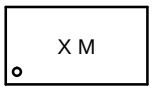
UDFN8
1.45 x 1.0
CASE 517BZ



UDFN8
1.6 x 1.0
CASE 517BY



UDFN8
1.95 x 1.0
CASE 517CA



XX = Specific Device Code
M = Date Code
▪ = Pb−Free Package

(Note: Microdot may be in either location)

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_{CC}	DC Supply Voltage		−0.5 to +7.0	V
V_{IN}	DC Input Voltage		−0.5 to +7.0	V
V_{OUT}	DC Output Voltage		−0.5 to V_{CC} + 0.5	V
I_{IK}	DC Input Diode Current	V_{IN} < GND	−50	mA
I_{OK}	DC Output Diode Current	V_{OUT} < GND	−50	mA
I_O	DC Output Source/Sink Current		±50	mA
I_{CC}	DC Supply Current per Supply Pin		±100	mA
I_{GND}	DC Ground Current per Ground Pin		±100	mA
T_{STG}	Storage Temperature Range		−65 to +150	°C
T_L	Lead Temperature, 1 mm from Case for 10 Seconds		260	°C
T_J	Junction Temperature Under Bias		+150	°C
θ_{JA}	Thermal Resistance (Note 1)		250	°C/W
P_D	Power Dissipation in Still Air at 85°C		250	mW
MSL	Moisture Sensitivity		Level 1	
F_R	Flammability Rating	Oxygen Index: 28 to 34	UL 94 V−0 @ 0.125 in	
V_{ESD}	ESD Withstand Voltage	Human Body Model (Note 2) Machine Model (Note 3) Charged Device Model (Note 4)	>2000 >200 N/A	V
$I_{Latchup}$	Latchup Performance Above V_{CC} and Below GND 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		Min	Max	Unit
V_{CC}	Power DC Supply Voltage	Operating Data Retention Only	1.65 1.5	5.5 5.5	V
V_{IN}	Digital Input Voltage (Note 6)		0	5.5	V
V_{OUT}	Output Voltage		0	V_{CC}	V
T_A	Operating Free−Air Temperature		−55	+125	°C
$\Delta t/\Delta V$	Input Transition Rise or Fall Rate	V_{CC} = 1.8 V ±0.15 V V_{CC} = 2.5 V ±0.2 V V_{CC} = 3.3 V ±0.3 V V_{CC} = 5.0 V ±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

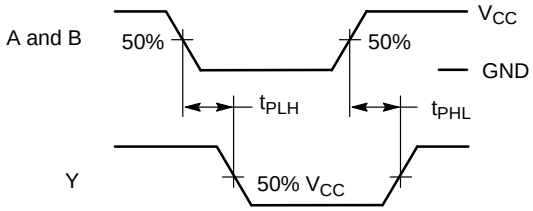
Symbol	Parameter	Condition	V_{CC} (V)	T_A = 25°C			$T_A \le$ 85°C		T_A = −55°C to +125°C		Unit
				Min	Typ	Max	Min	Max	Min	Max	
V_{IH}	High−Level Input Voltage		1.65 2.3 to 5.5	0.75 x V_{CC} 0.7 x V_{CC}			0.75 x V_{CC} 0.7 x V_{CC}		0.75 x V_{CC} 0.7 x V_{CC}		V
V_{IL}	Low−Level Input Voltage		1.65 2.3 to 5.5			0.25 x V_{CC} 0.3 x V_{CC}		0.25 x V_{CC} 0.3 x V_{CC}		0.25 x V_{CC} 0.3 x V_{CC}	V
V_{OH}	High−Level Output Voltage	V_{IN} = V_{IH} or V_{IL}, I_{OH} = −100 μA	1.65 to 5.5	V_{CC} − 0.1	V_{CC}		V_{CC} − 0.1		V_{CC} − 0.1		V
		V_{IN} = V_{IH} or V_{IL} I_{OH} = −4 mA I_{OH} = −8 mA I_{OH} = −12 mA I_{OH} = −16 mA I_{OH} = −24 mA I_{OH} = −32 mA	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_{OL}	Low−Level Output Voltage	V_{IN} = V_{IH} or V_{IL}, I_{OL} = 100 μA	1.65 to 5.5			0.1		0.1		0.1	V
		V_{IN} = V_{IH} or V_{IL} I_{OL} = 4 mA I_{OL} = 8 mA I_{OL} = 12 mA I_{OL} = 16 mA I_{OL} = 24 mA I_{OL} = 32 mA	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_{IN}	Input Leakage Current	0 ≤ V_{IN} ≤ 5.5 V	0 to 5.5			±0.1		±1.0		±1.0	μA
I_{OFF}	Power−Off Input Leakage Current	V_{IN} = 5.5 V	0			1.0		10		10	μA
I_{CC}	Quiescent Supply Current	0 ≤ V_{IN} ≤ 5.5 V	5.5			1.0		10		10	μA

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 ns

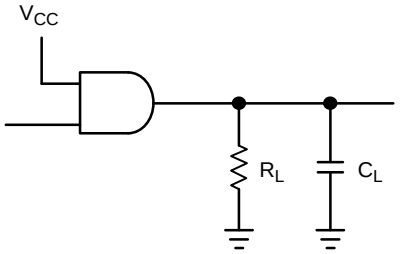
Symbol	Parameter	V_{CC} (V)	Test Condition	T_A = 25°C			$T_A \le$ 85°C		T_A = −55°C to +125°C		Unit
				Min	Typ	Max	Min	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation Delay Input A to Output	1.65 to 1.95	R_L = 1 MΩ, C_L = 15 pF	2.0	5.7	10.5	2.0	11.0	2.0	11.2	ns
		2.3 to 2.7	R_L = 1 MΩ, C_L = 15 pF	1.2	3.5	5.8	1.2	6.2	1.2	6.3	
		3.0 to 3.6	R_L = 1 MΩ, C_L = 15 pF	0.8	2.6	3.9	0.8	4.3	0.8	4.7	
			R_L = 500 Ω, C_L = 50 pF		3.2	4.8		5.2		5.3	
		4.5 to 5.5	R_L = 1 MΩ, C_L = 15 pF		1.9	3.1		3.3	0.5	4.0	
			R_L = 500 Ω, C_L = 50 pF		2.5	3.7		4.0		4.3	
C_{IN}	Input Capacitance	5.5	V_{IN} = 0 V or V_{CC}		2.5						pF
C_{PD}	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; $P_D = C_{PD} \bullet V_{CC}^2 \bullet f_{in} + I_{CC} \bullet V_{CC}$.



PROPAGATION DELAYS
$t_R = t_F$ = 2.5 ns, 10% to 90%; f = 1 MHz; t_W = 500 ns

Figure 3. Switching Waveform



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

Figure 4. Test Circuit

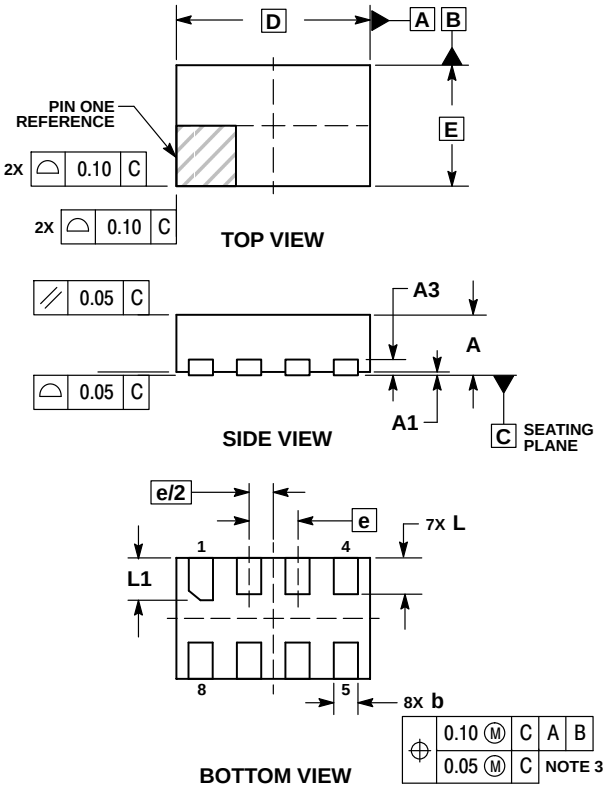
ORDERING INFORMATION

Device	Package	Shipping†
NLX2G08MUTCG	UQFN8 (Pb−Free)	3000 / Tape & Reel
NLX2G08DMUTCG*	UDFN8, 1.95 x 1.0, 0.5P (Pb−Free)	3000 / Tape & Reel
NLX2G08DMUTWG*	UDFN8, 1.95 x 1.0, 0.5P (Pb−Free)	3000 / Tape & Reel

†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.
*These device differ only in tape and reel pin 1 orientation.

PACKAGE DIMENSIONS

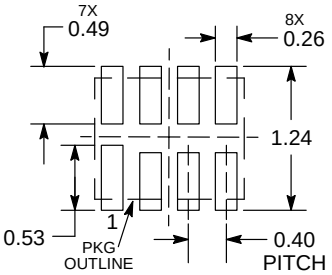
UDFN8 1.6x1.0, 0.4P
CASE 517BY
ISSUE O



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.

	MILLIMETERS	
DIM	MIN	MAX
A	0.45	0.55
A1	0.00	0.05
A3	0.13 REF	
b	0.15	0.25
D	1.60 BSC	
E	1.00 BSC	
e	0.40 BSC	
L	0.25	0.35
L1	0.30	0.40

RECOMMENDED SOLDERING FOOTPRINT*

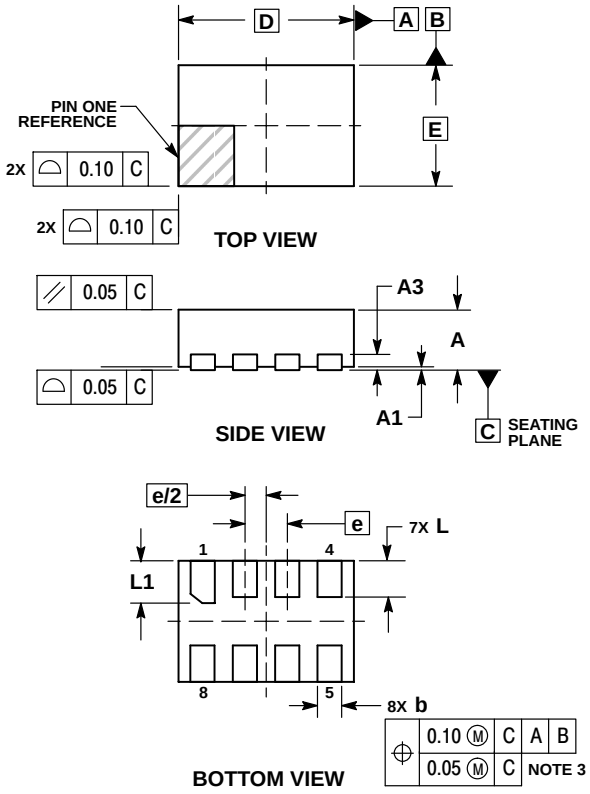


DIMENSIONS: MILLIMETERS

*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



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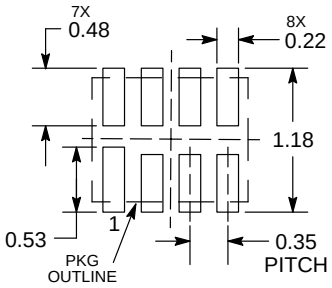
	MILLIMETERS	
DIM	MIN	MAX
A	0.45	0.55
A1	0.00	0.05
A3	0.13 REF	
b	0.15	0.25
D	1.45 BSC	
E	1.00 BSC	
e	0.35 BSC	
L	0.25	0.35
L1	0.30	0.40

RECOMMENDED SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

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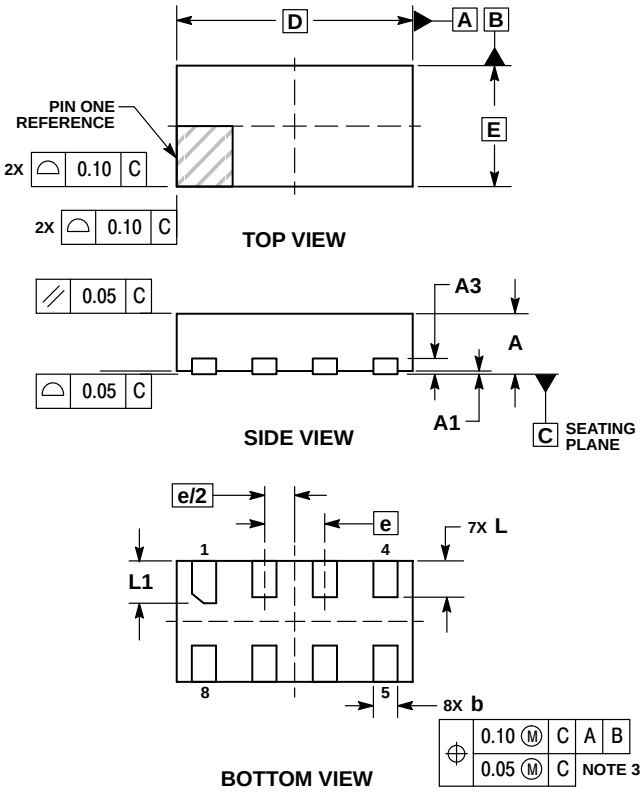
PACKAGE DIMENSIONS

UDFN8 1.95x1.0, 0.5P
CASE 517CA
ISSUE O



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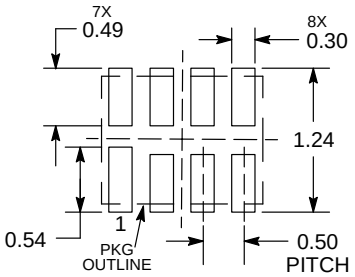
	MILLIMETERS	
DIM	MIN	MAX
A	0.45	0.55
A1	0.00	0.05
A3	0.13 REF	
b	0.15	0.25
D	1.95 BSC	
E	1.00 BSC	
e	0.50 BSC	
L	0.25	0.35
L1	0.30	0.40

RECOMMENDED SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

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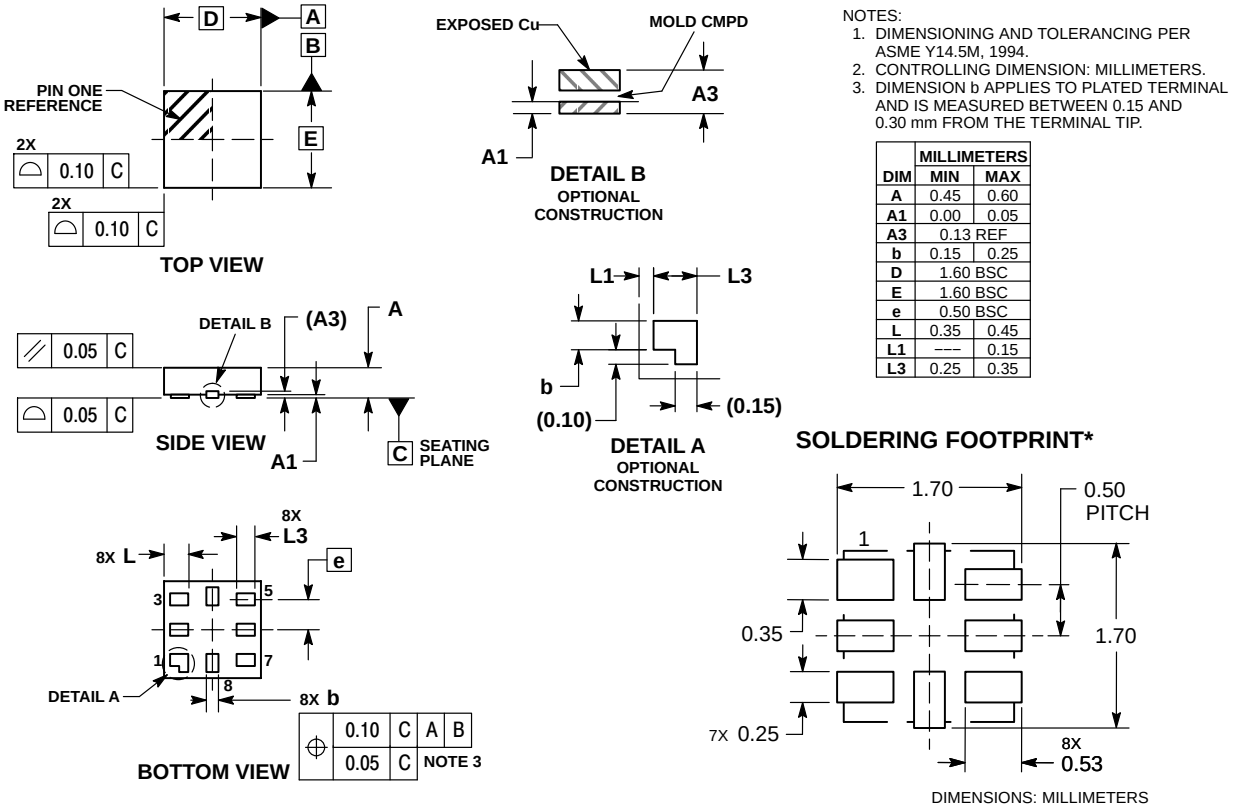
PACKAGE DIMENSIONS

UQFN8
MU SUFFIX
CASE 523AN
ISSUE O



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3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 mm FROM THE TERMINAL TIP.

	MILLIMETERS	
DIM	MIN	MAX
A	0.45	0.60
A1	0.00	0.05
A3	0.13 REF	
b	0.15	0.25
D	1.60 BSC	
E	1.60 BSC	
e	0.50 BSC	
L	0.35	0.45
L1	−−−	0.15
L3	0.25	0.35

DIMENSIONS: MILLIMETERS

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