NLX2G00

Dual 2-Input NAND Gate

The NLX2G00 is an advanced high-speed dual 2-input CMOS NAND gate in ultra-small footprint.

The NLX2G00 input structures provide protection when voltages up to 7.0 volts are applied, regardless of the supply voltage.

Features

- 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
- 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
- This is a Pb−Free Device

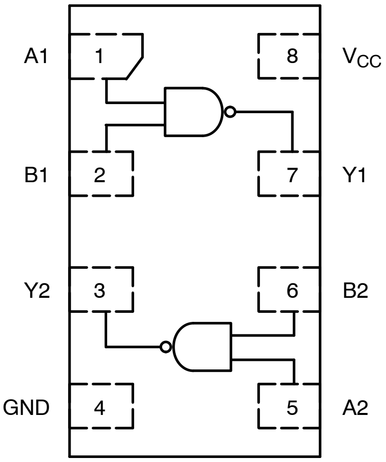

Figure 1. Pinout

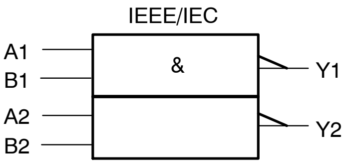

Figure 2. Logic Symbol

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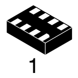
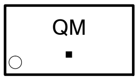
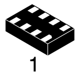
MARKING DIAGRAMS

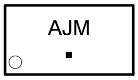


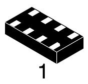
ULLGA8
1.45 x 1.0
CASE 613AA



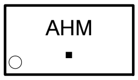


ULLGA8
1.6 x 1.0
CASE 613AB





ULLGA8
1.95 x 1.0
CASE 613AC



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

PIN ASSIGNMENT

Pin	Function
1	A1
2	B1
3	Y2
4	GND
5	A2
6	B2
7	Y1
8	V_{CC}

FUNCTION TABLE

$Y = \overline{AB}$

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

H = HIGH Logic Level
L = LOW Logic Level

ORDERING INFORMATION

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

December, 2009 − Rev. 0

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		TBD	°C
T_J	Junction Temperature Under Bias		TBD	°C
θ_{JA}	Thermal Resistance (Note 1)		TBD	°C/W
P_D	Power Dissipation in Still Air at 85°C		TBD	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 Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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

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	0.75 x V_{CC}			0.75 x V_{CC}		0.75 x V_{CC}		V
			2.3 to 5.5	0.7 x V_{CC}			0.7 x V_{CC}		0.7 x V_{CC}		
V_{IL}	Low−Level Input Voltage		1.65			0.25 x V_{CC}		0.25 x V_{CC}		0.25 x V_{CC}	V
			2.3 to 5.5			0.3 x V_{CC}		0.3 x V_{CC}		0.3 x V_{CC}	
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	1.65	1.29	1.5		1.29		1.29		
		I_{OH} = −8 mA	2.3	1.9	2.1		1.9		1.9		
		I_{OH} = −12 mA	2.7	2.2	2.4		2.2		2.2		
		I_{OH} = −16 mA	3.0	2.4	2.7		2.4		2.4		
		I_{OH} = −24 mA	3.0	2.3	2.5		2.3		2.3		
		I_{OH} = −32 mA	4.5	3.8	4.0		3.8		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	1.65		0.08	0.24		0.24		0.24	
		I_{OL} = 8 mA	2.3		0.20	0.3		0.3		0.3	
		I_{OL} = 12 mA	2.7		0.22	0.4		0.4		0.4	
		I_{OL} = 16 mA	3.0		0.28	0.4		0.4		0.4	
		I_{OL} = 24 mA	3.0		0.38	0.55		0.55		0.55	
		I_{OL} = 32 mA	4.5		0.42	0.55		0.55		0.55	
I_{IN}	Input Leakage Current	$0 \le V_{IN} \le 5.5$ 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	$0 \le V_{IN} \le 5.5$ V	5.5			1.0		10		10	μA

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	TBD	TBD	ns
		2.3 to 2.7	R_L = 1 MΩ, C_L = 15 pF	1.2	3.2	5.3	1.2	5.7	TBD	TBD	
		3.0 to 3.6	R_L = 1 MΩ, C_L = 15 pF	0.8	2.4	3.7	0.8	4.0	TBD	TBD	
			R_L = 500 Ω, C_L = 50 pF	1.2	3.0	4.6	1.2	4.9	TBD	TBD	
		4.5 to 5.5	R_L = 1 MΩ, C_L = 15 pF	0.5	1.9	2.9	0.5	3.2	TBD	TBD	
			R_L = 500 Ω, C_L = 50 pF	0.8	2.4	3.6	0.8	3.9	TBD	TBD	
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; $P_D = C_{PD} \bullet V_{CC}^2 \bullet f_{in} + I_{CC} \bullet V_{CC}$.

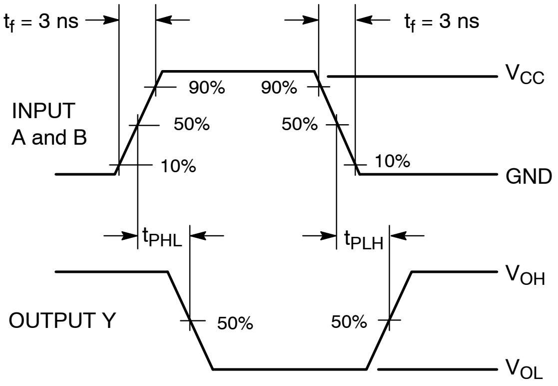
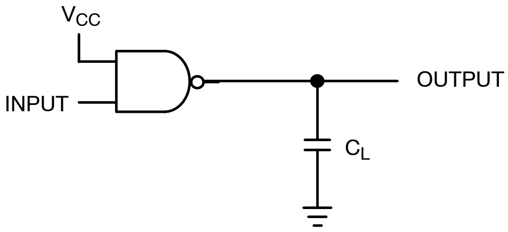


Figure 3. Switching Waveform



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

Figure 4. Test Circuit

ORDERING INFORMATION

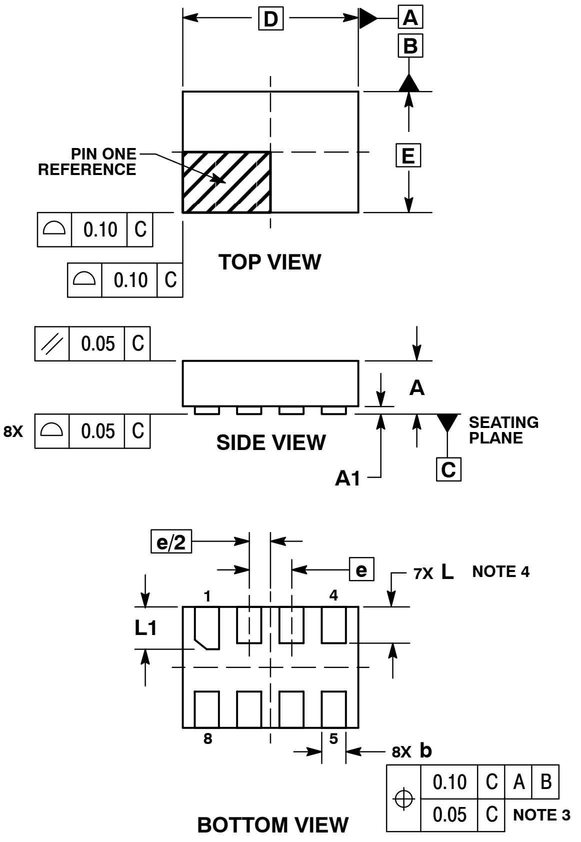
Device	Package	Shipping†
NLX2G00AMX1TCG	ULLGA8, 1.95 x 1.0, 0.5P (Pb−Free)	3000 / Tape & Reel
NLX2G00BMX1TCG	ULLGA8, 1.6 x 1.0, 0.4P (Pb−Free)	3000 / Tape & Reel
NLX2G00CMX1TCG	ULLGA8, 1.45 x 1.0, 0.35P (Pb−Free)	3000 / Tape & Reel

†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.

PACKAGE DIMENSIONS

ULLGA8 1.45x1.0, 0.35P

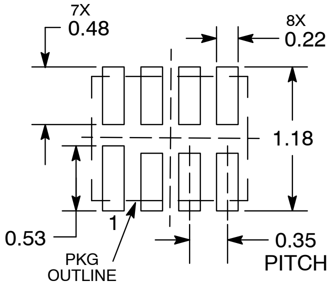
CASE 613AA−01
ISSUE A



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 0.30 mm FROM THE TERMINAL TIP.
4. A MAXIMUM OF 0.05 PULL BACK OF THE PLATED TERMINAL FROM THE EDGE OF THE PACKAGE IS ALLOWED.

	MILLIMETERS	
DIM	MIN	MAX
A	---	0.40
A1	0.00	0.05
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

MOUNTING FOOTPRINT SOLDERMASK DEFINED*



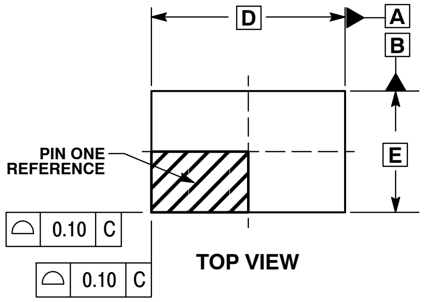
DIMENSIONS: MILLIMETERS

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

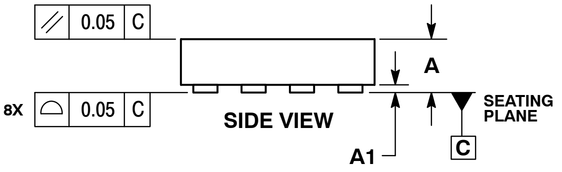
PACKAGE DIMENSIONS

ULLGA8 1.6x1.0, 0.4P

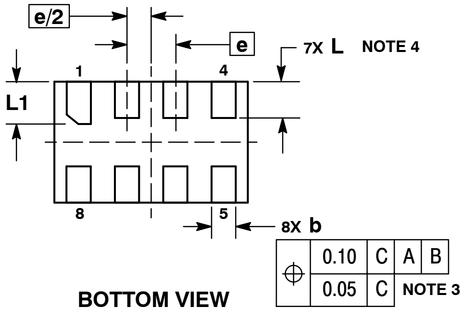
CASE 613AB−01
ISSUE A



TOP VIEW



SIDE VIEW



BOTTOM VIEW

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
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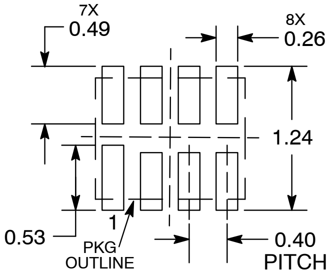
4. A MAXIMUM OF 0.05 PULL BACK OF THE PLATED TERMINAL FROM THE EDGE OF THE PACKAGE IS ALLOWED.

	MILLIMETERS	
DIM	MIN	MAX
A	−−−	0.40
A1	0.00	0.05
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

MOUNTING FOOTPRINT SOLDERMASK DEFINED*



DIMENSIONS: MILLIMETERS

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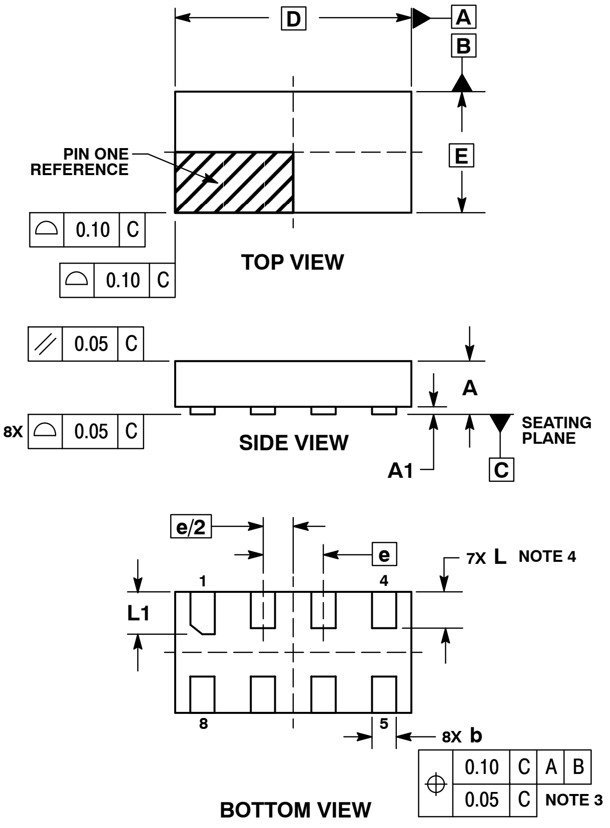
PACKAGE DIMENSIONS

ULLGA8 1.95x1.0, 0.5P
CASE 613AC−01
ISSUE A



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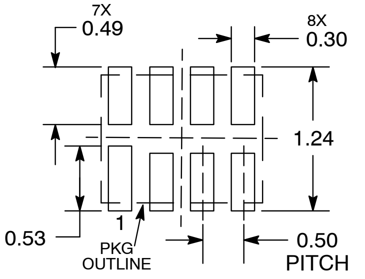
	MILLIMETERS	
DIM	**MIN**	**MAX**
A	−−−	0.40
A1	0.00	0.05
b	0.15	0.25
D	1.95 BSC	
E	1.00 BSC	
e	0.50 BSC	
L	0.25	0.35
L1	0.30	0.40

MOUNTING FOOTPRINT SOLDERMASK DEFINED*



DIMENSIONS: MILLIMETERS

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