

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: $I_{CC} = 1$ μ A (Max) at $T_A = 25^\circ$ 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

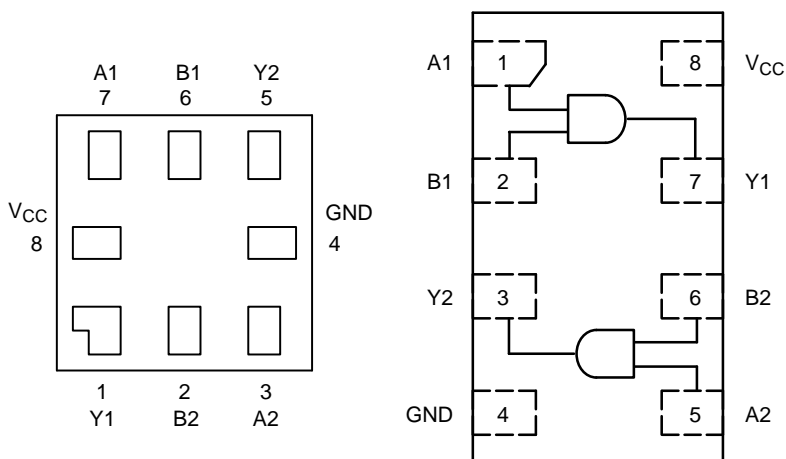


Figure 1. Pinouts



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}



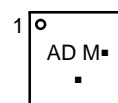
ON Semiconductor®

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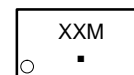
MARKING DIAGRAMS



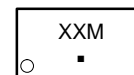
UQFN8
MU SUFFIX
CASE 523AN



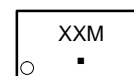
ULLGA8
1.45 x 1.0
CASE 613AA



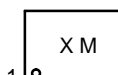
ULLGA8
1.6 x 1.0
CASE 613AB



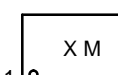
ULLGA8
1.95 x 1.0
CASE 613AC



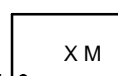
UDFN8
1.45 x 1.0
CASE 517BZ



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.

NLX2G08

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)	TBD TBD 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 $V_{CC} = 1.8\text{ V} \pm 0.15\text{ V}$ $V_{CC} = 2.5\text{ V} \pm 0.2\text{ V}$ $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$ $V_{CC} = 5.0\text{ V} \pm 0.5\text{ V}$	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.

NLX2G08

DC ELECTRICAL CHARACTERISTICS

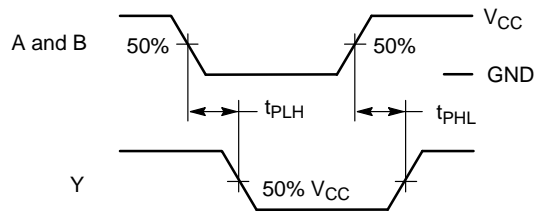
Symbol	Parameter	Condition	V _{CC} (V)	T _A = 25°C			T _A ≤ 85°C		T _A = -55°C to +125°C		Unit
				Min	Typ	Max	Min	Max	Min	Max	
V _{IH}	High-Level Input Voltage		1.65 2.3 to 5.5	0.75 x V _{CC} 0.7 x V _{CC}			0.75 x V _{CC} 0.7 x V _{CC}		0.75 x V _{CC} 0.7 x V _{CC}		V
V _{IL}	Low-Level Input Voltage		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	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 ≤ 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

AC ELECTRICAL CHARACTERISTICS t_R = t_F = 2.5 ns

Symbol	Parameter	V _{CC} (V)	Test Condition	T _A = 25°C			T _A ≤ 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} • V_{CC} • f_{in} + I_{CC}. C_{PD} is used to determine the no-load dynamic power consumption; P_D = C_{PD} • V_{CC}² • f_{in} + I_{CC} • V_{CC}.

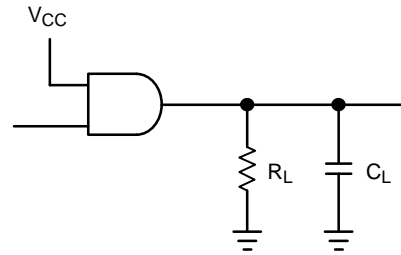
NLX2G08



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
NLX2G08AMX1TCG	ULLGA8, 1.95 x 1.0, 0.5P (Pb-Free)	3000 / Tape & Reel
NLX2G08BMX1TCG	ULLGA8, 1.6 x 1.0, 0.4P (Pb-Free)	3000 / Tape & Reel
NLX2G08CMX1TCG	ULLGA8, 1.45 x 1.0, 0.35P (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
NLX2G08EMUTCG	UDFN8, 1.6 x 1.0, 0.4P (Pb-Free)	3000 / Tape & Reel
NLX2G08FMUTCG	UDFN8, 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.

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

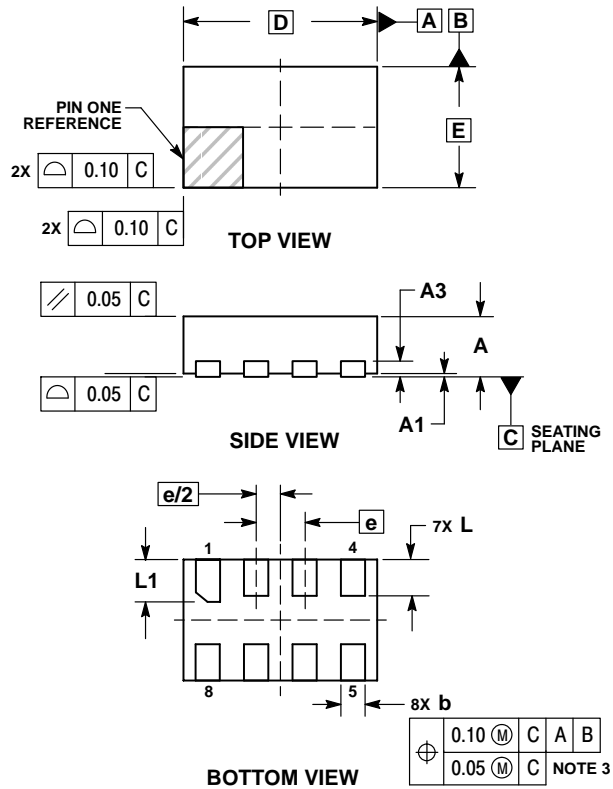
NLX2G08

PACKAGE DIMENSIONS

UDFN8 1.6x1.0, 0.4P

CASE 517BY

ISSUE O

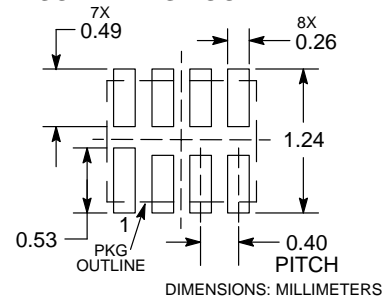


NOTES:

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.

DIM	MILLIMETERS	
	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*

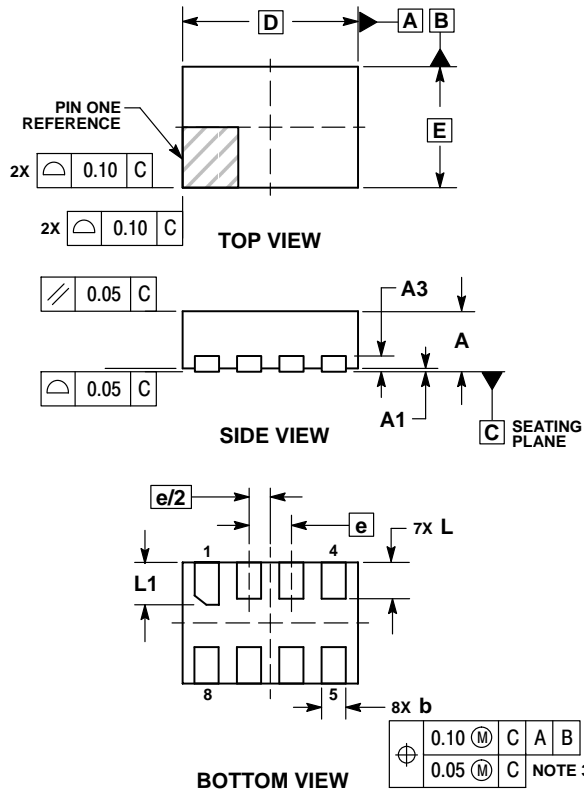


*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

NLX2G08

PACKAGE DIMENSIONS

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

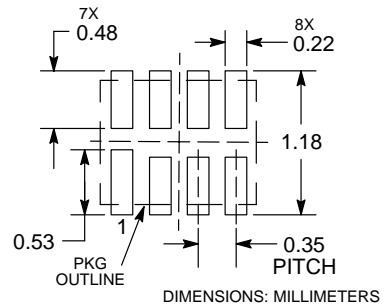


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3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.20 MM FROM TERMINAL TIP.
4. PACKAGE DIMENSIONS EXCLUSIVE OF BURRS AND MOLD FLASH.

DIM	MILLIMETERS	
	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*

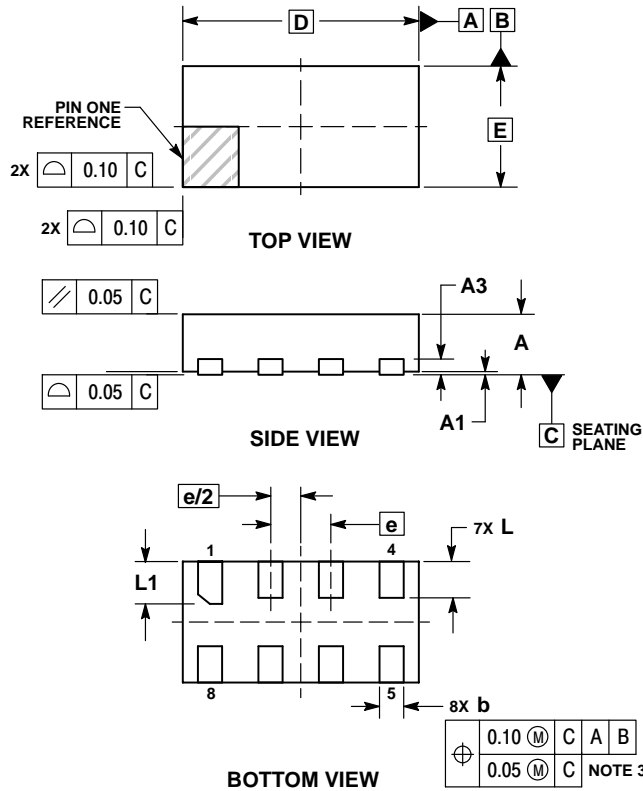


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NLX2G08

PACKAGE DIMENSIONS

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

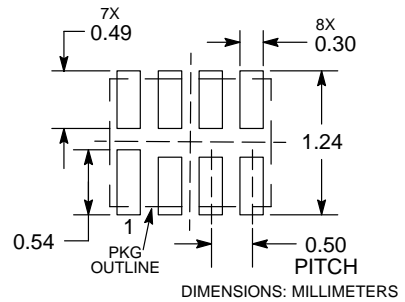


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MILLIMETERS		
DIM	MIN	MAX
A	0.45	0.55
A1	0.00	0.05
A3	0.13 REF	
b	0.15	0.25
D	1.95 BSC	
E	1.00 BSC	
e	0.50 BSC	
L	0.25	0.35
L1	0.30	0.40

RECOMMENDED SOLDERING FOOTPRINT*

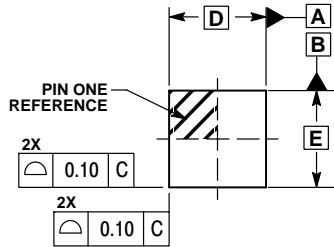


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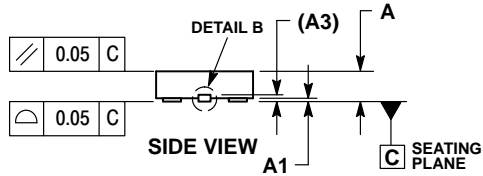
NLX2G08

PACKAGE DIMENSIONS

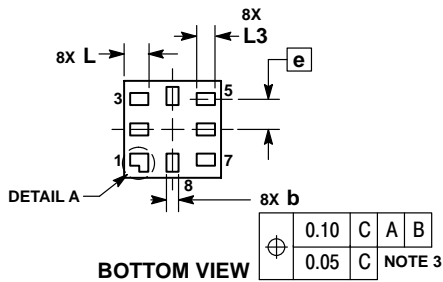
UQFN8
MU SUFFIX
CASE 523AN
ISSUE O



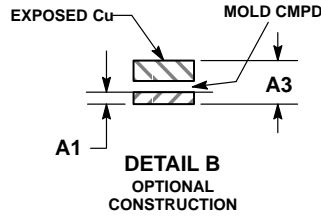
TOP VIEW



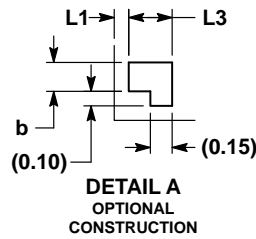
SIDE VIEW



BOTTOM VIEW



DETAIL B
OPTIONAL
CONSTRUCTION

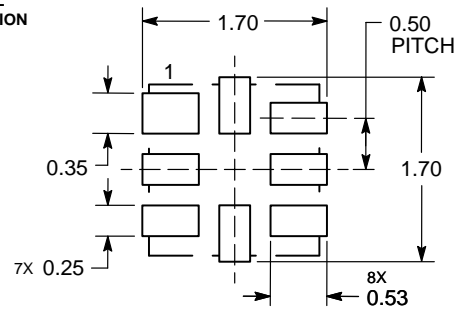


DETAIL A
OPTIONAL
CONSTRUCTION

- NOTES:
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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

SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

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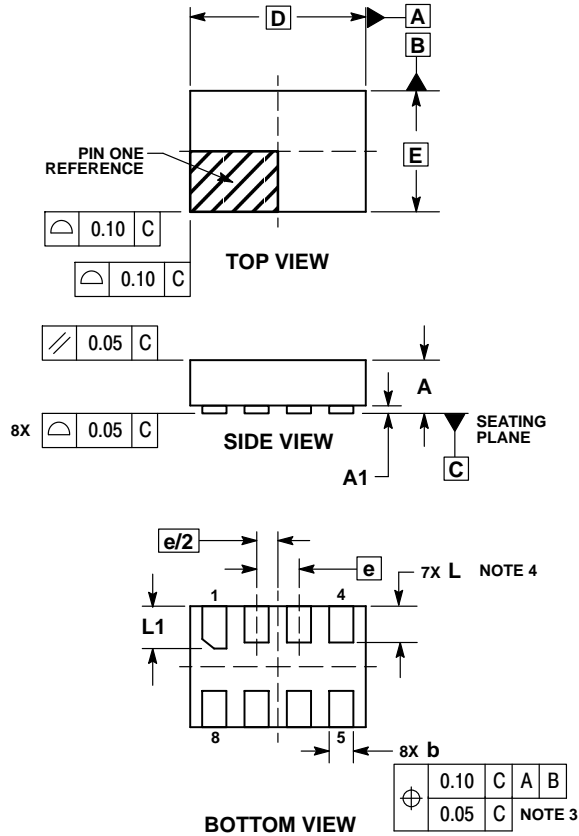
NLX2G08

PACKAGE DIMENSIONS

ULLGA8 1.45x1.0, 0.35P

CASE 613AA

ISSUE A

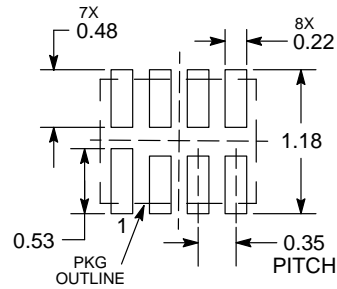


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4. A MAXIMUM OF 0.05 PULL BACK OF THE PLATED TERMINAL FROM THE EDGE OF THE PACKAGE IS ALLOWED.

MILLIMETERS		
DIM	MIN	MAX
A	—	0.40
A1	0.00	0.05
b	0.15	0.25
D	1.45	BSC
E	1.00	BSC
e	0.35	BSC
L	0.25	0.35
L1	0.30	0.40

MOUNTING FOOTPRINT SOLDERMASK DEFINED*



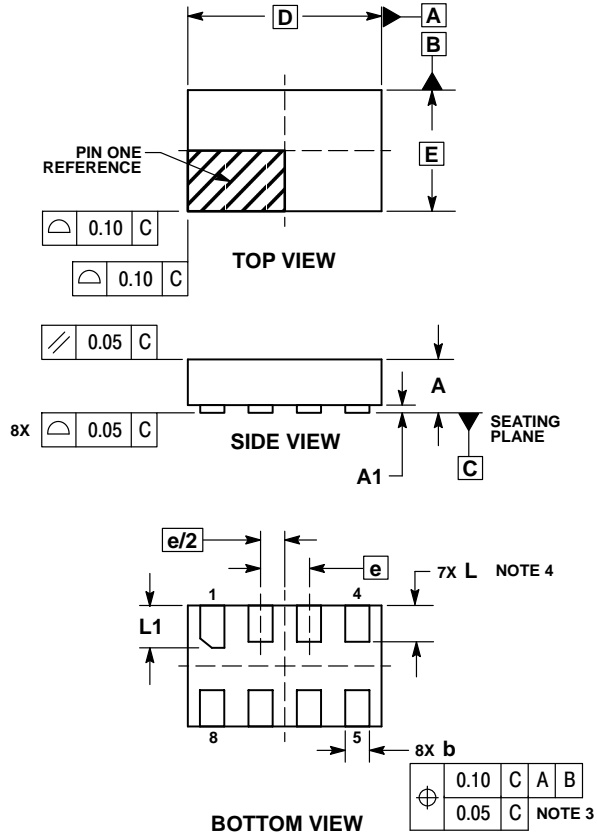
DIMENSIONS: MILLIMETERS

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NLX2G08

PACKAGE DIMENSIONS

ULLGA8 1.6x1.0, 0.4P
CASE 613AB
ISSUE A

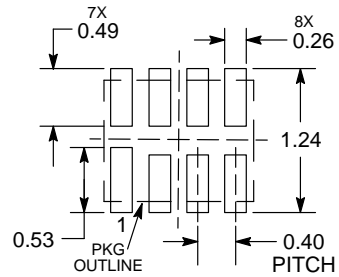


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MILLIMETERS		
DIM	MIN	MAX
A	—	0.40
A1	0.00	0.05
b	0.15	0.25
D	1.60	BSC
E	1.00	BSC
e	0.40	BSC
L	0.25	0.35
L1	0.30	0.40

MOUNTING FOOTPRINT SOLDERMASK DEFINED*



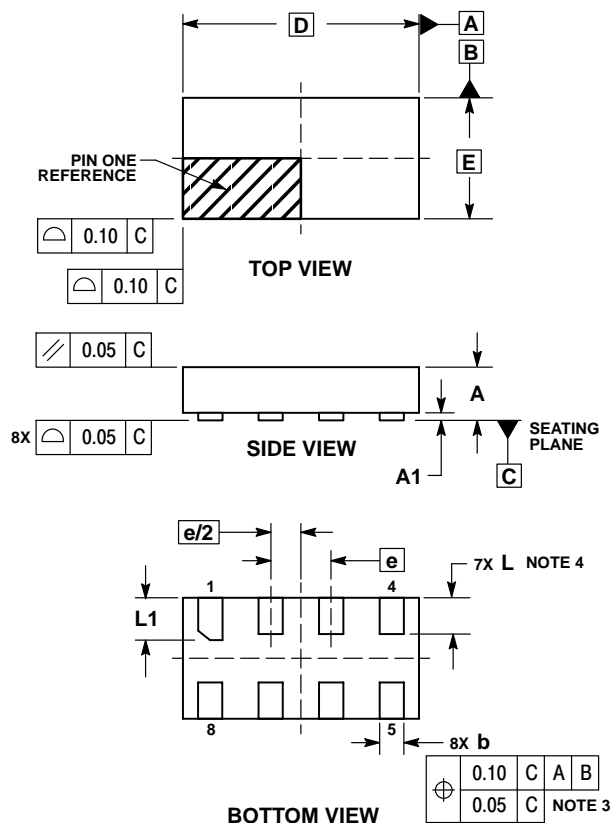
DIMENSIONS: MILLIMETERS

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NLX2G08

PACKAGE DIMENSIONS

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

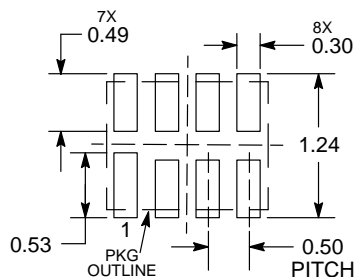


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DIM	MILLIMETERS	
	MIN	MAX
A	---	0.40
A1	0.00	0.05
b	0.15	0.25
D	1.95 BSC	
E	1.00 BSC	
e	0.50 BSC	
L	0.25	0.35
L1	0.30	0.40

MOUNTING FOOTPRINT SOLDERMASK DEFINED*



DIMENSIONS: MILLIMETERS

*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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