

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

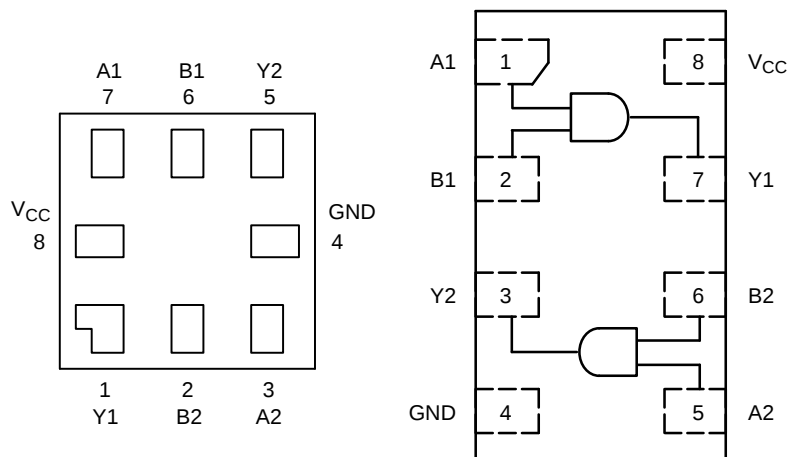


Figure 1. Pinouts

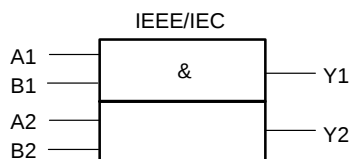


Figure 2. Logic Symbol

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

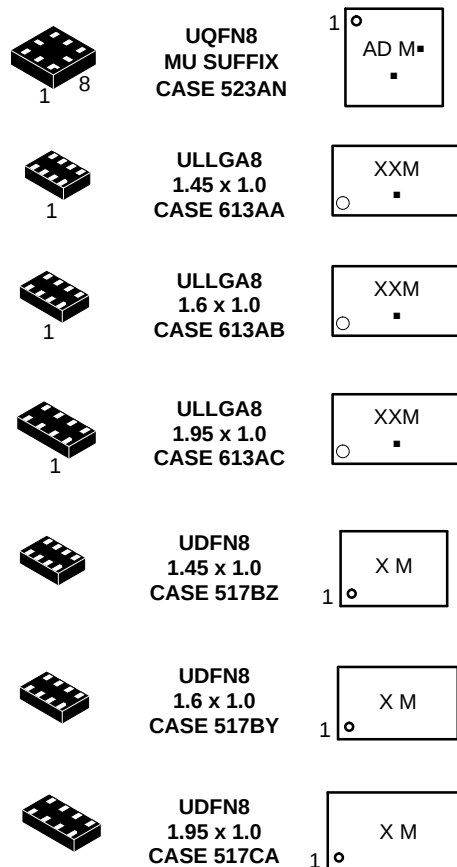
Pin	Function (UQFN8)	Function (ULLGA/UDFN)
1	Y1	A1
2	B2	B1
3	A2	Y2
4	GND	GND
5	Y2	A2
6	B1	B2
7	A1	Y1
8	V_{CC}	V_{CC}



ON Semiconductor®

www.onsemi.com

MARKING DIAGRAMS



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.

DC ELECTRICAL CHARACTERISTICS

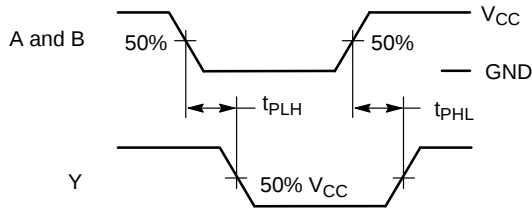
Symbol	Parameter	Condition	V _{CC} (V)	T _A = 25°C			T _A ≤ 85°C		T _A = -55°C to +125°C		Unit
				Min	Typ	Max	Min	Max	Min	Max	
V _{IH}	High-Level Input Voltage		1.65 2.3 to 5.5	0.75 x V _{CC} 0.7 x V _{CC}			0.75 x V _{CC} 0.7 x V _{CC}		0.75 x V _{CC} 0.7 x V _{CC}		V
V _{IL}	Low-Level Input Voltage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

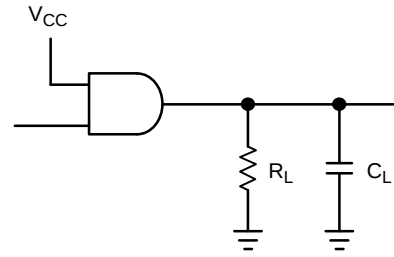
NLX2G08



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

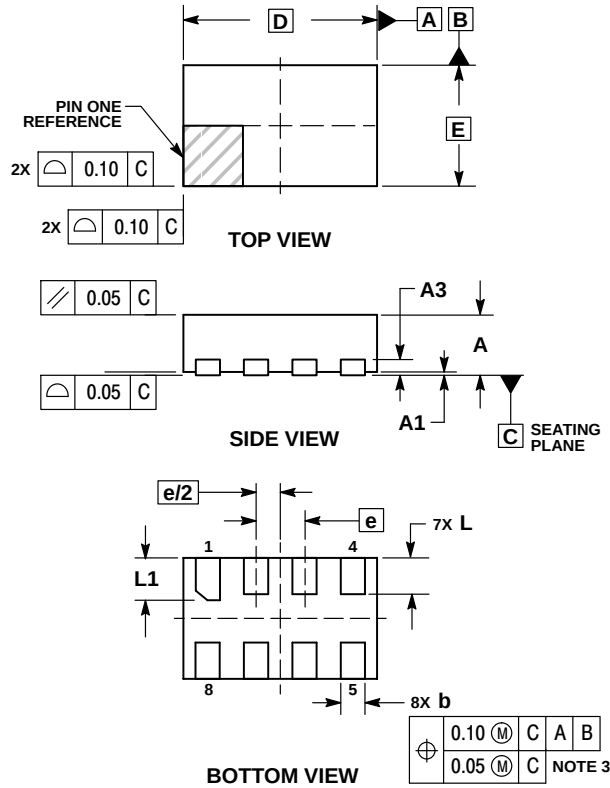
[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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

NLX2G08

PACKAGE DIMENSIONS

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

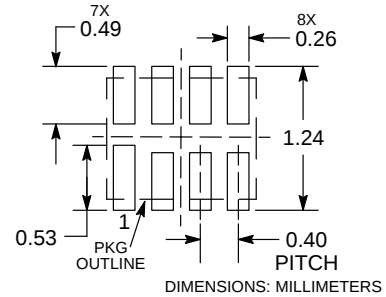


NOTES:

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.

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*

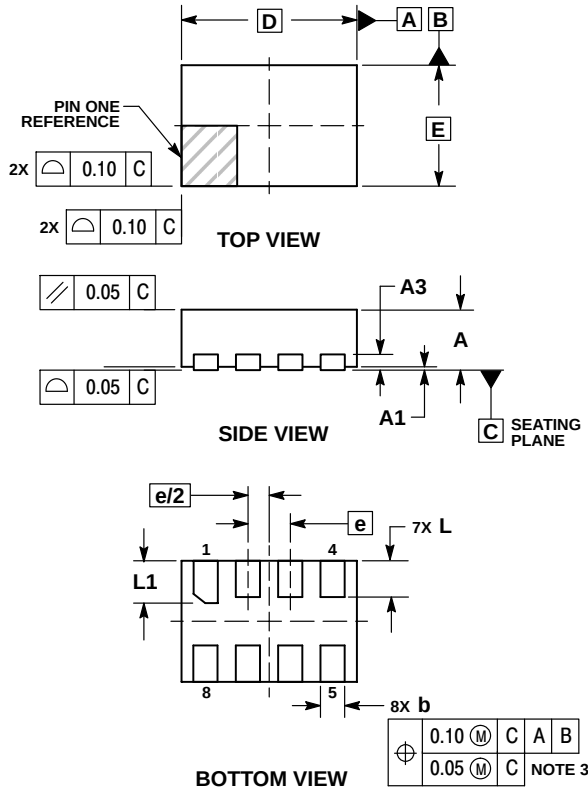


*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

NLX2G08

PACKAGE DIMENSIONS

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

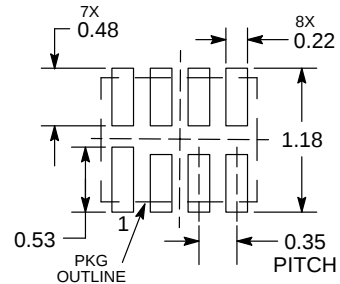


NOTES:

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	1.45 BSC	
E	1.00 BSC	
e	0.35 BSC	
L	0.25	0.35
L1	0.30	0.40

RECOMMENDED SOLDERING FOOTPRINT*



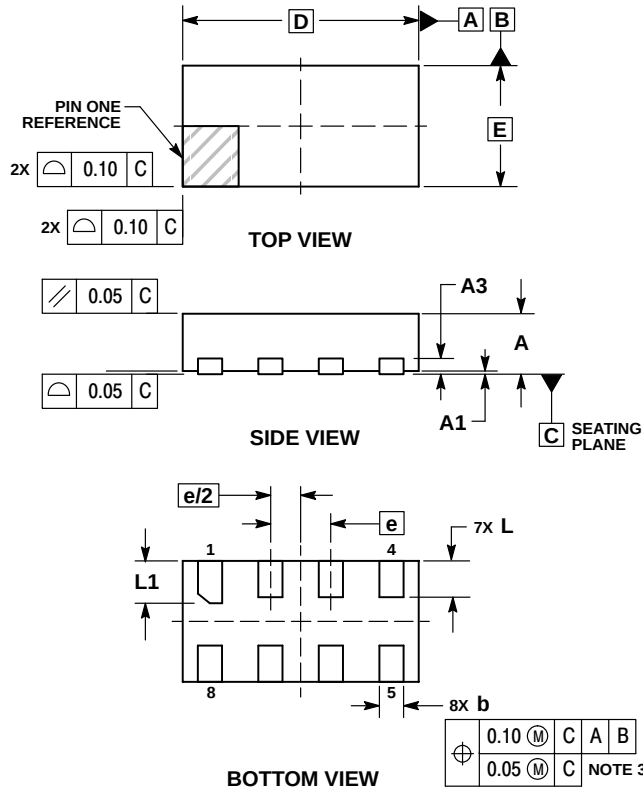
DIMENSIONS: MILLIMETERS

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

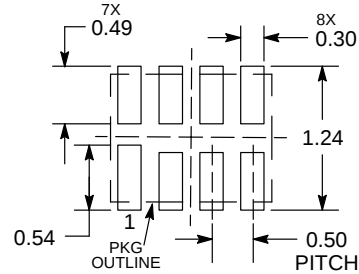


NOTES:

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	1.95	BSC
E	1.00	BSC
e	0.50	BSC
L	0.25	0.35
L1	0.30	0.40

RECOMMENDED SOLDERING FOOTPRINT*

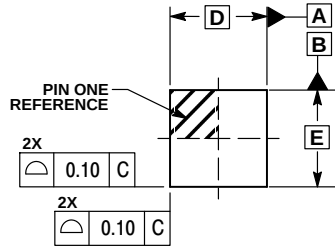


*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

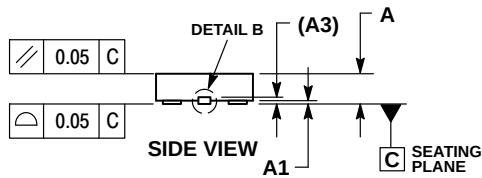
NLX2G08

PACKAGE DIMENSIONS

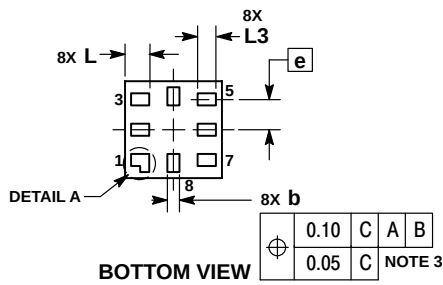
UQFN8 MU SUFFIX CASE 523AN ISSUE O



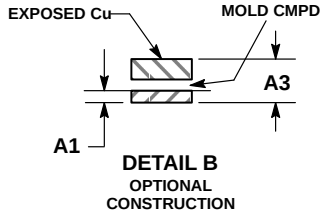
TOP VIEW



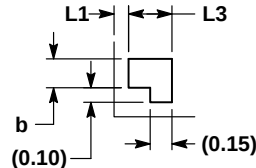
SIDE VIEW



BOTTOM VIEW



DETAIL B
OPTIONAL
CONSTRUCTION



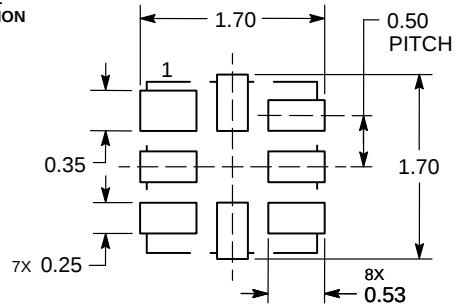
DETAIL A
OPTIONAL
CONSTRUCTION

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.

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

SOLDERING FOOTPRINT*



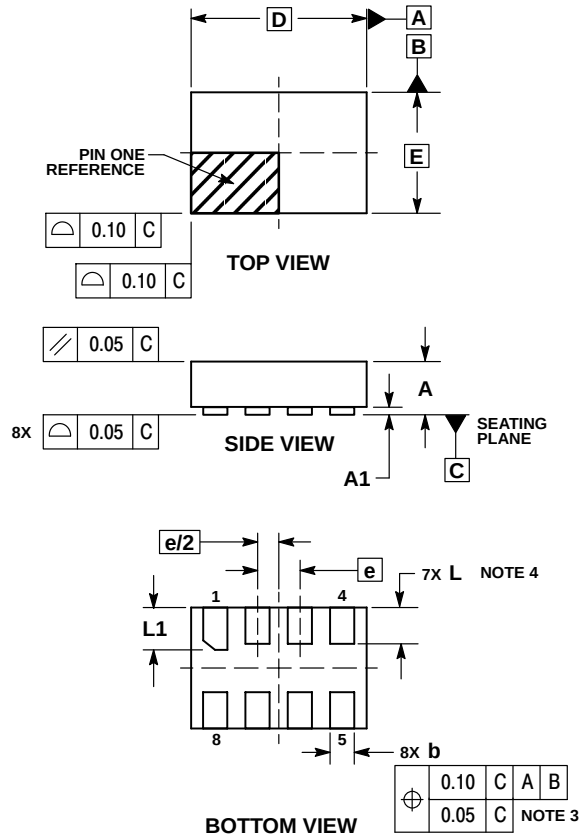
DIMENSIONS: MILLIMETERS

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

NLX2G08

PACKAGE DIMENSIONS

ULLGA8 1.45x1.0, 0.35P
CASE 613AA
ISSUE A

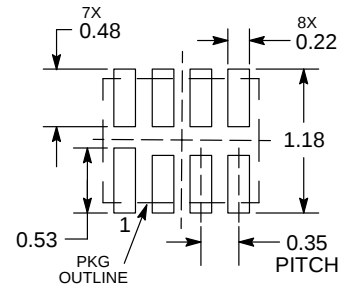


NOTES:

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*



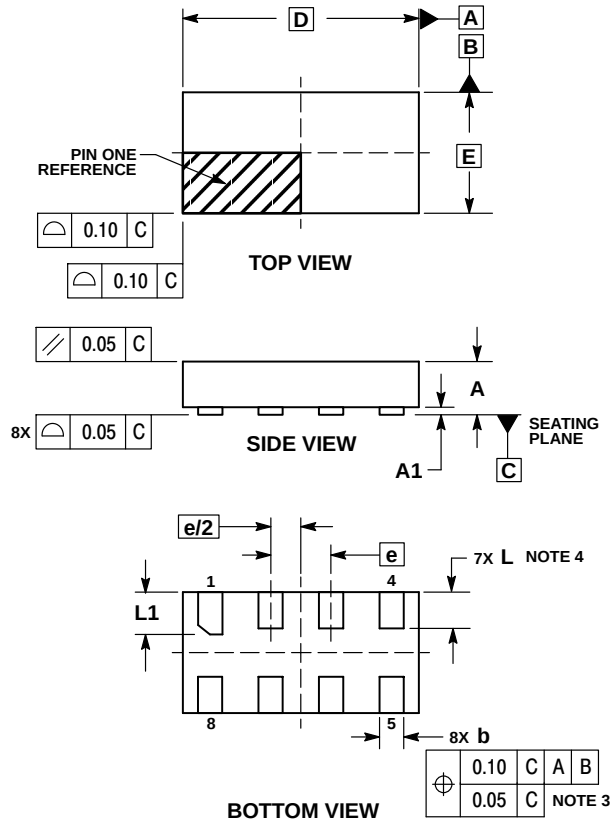
DIMENSIONS: MILLIMETERS

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

NLX2G08

PACKAGE DIMENSIONS

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

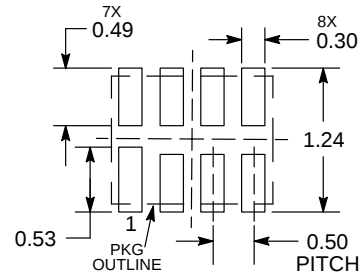


NOTES:

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	1.95	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.

ON Semiconductor and are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of SCILLC's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81-3-5817-1050

ON Semiconductor Website: www.onsemi.com

Order Literature: <http://www.onsemi.com/orderlit>

For additional information, please contact your local Sales Representative

NLX2G08/D