NLX2G32

Dual 2-Input OR Gate

The NLX2G32 is a high performance dual 2−input OR Gate operating from a 1.65 V to 5.5 V supply.

Features

- Extremely High Speed: t_{PD} 2.5 ns (typical) at V_{CC} = 5 V
- Designed for 1.65 V to 5.5 V V_{CC} Operation
- Over Voltage Tolerant Inputs
- LVTTL Compatible − Interface Capability With 5 V TTL Logic with V_{CC} = 3 V
- LVCMOS Compatible
- 24 mA Balanced Output Sink and Source Capability
- Near Zero Static Supply Current Substantially Reduces System Power Requirements
- Replacement for NC7WZ32
- Chip Complexity: FET = 120
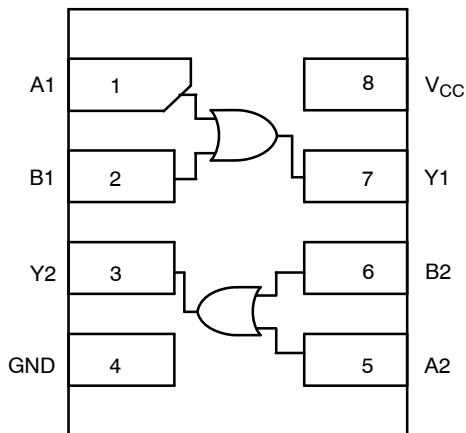- These are Pb−Free Devices
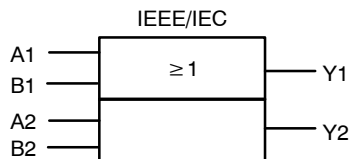

Figure 1. Pinout

IEEE/IEC

Figure 2. Logic Symbol

ON Semiconductor®

http://onsemi.com

MARKING DIAGRAMS

ULLGA8 1.45 x 1.0 CASE 613AA	YM	
ULLGA8 1.6 x 1.0 CASE 613AB	ATM ▪	
ULLGA8 1.95 x 1.0 CASE 613AC	ATM ▪	
UDFN8 1.45 x 1.0 CASE 517BZ	X M	
UDFN8 1.6 x 1.0 CASE 517BY	X M	
UDFN8 1.95 x 1.0 CASE 517CA	X M	
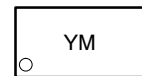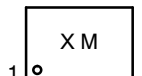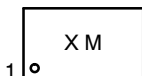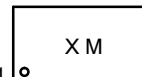
XX = Specific Device Code
M = Date Code
▪ = Pb−Free Package

ORDERING INFORMATION

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

PIN ASSIGNMENT

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

FUNCTION TABLE

Input		Output
		Y = A + B
A	**B**	**Y**
L	L	L
L	H	H
H	L	H
H	H	H

NLX2G32

MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V_{CC}	DC Supply Voltage		-0.5 to $+7.0$	V
V_I	DC Input Voltage		-0.5 to $+7.0$	V
V_O	DC Output Voltage		-0.5 to $+7.0$	V
I_{IK}	DC Input Diode Current	$V_I <$ GND	-50	mA
I_{OK}	DC Output Diode Current	$V_O <$ GND	-50	mA
I_O	DC Output 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
$I_{Latch-Up}$	Latch–Up Performance	Above V_{CC} and Below GND at 85°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}	Supply Voltage	Operating Data Retention Only	1.65 1.5	5.5 5.5	V
V_I	Input Voltage	(Note 6)	0	5.5	V
V_O	Output Voltage	(HIGH or LOW State)	0	V_{CC}	V
T_A	Operating Free–Air Temperature		-40	$+85$	°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} = 3.0 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–logic voltage level or a low–logic input voltage level.

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Condition	V_{CC} (V)	T_A = +25°C			T_A = −40°C to +85°C		Unit
				Min	Typ	Max	Min	Max	
V_{IH}	HIGH Level Input Voltage		1.65 to 1.95	0.75 V_{CC} 0.7 V_{CC}			0.75 V_{CC} 0.7 V_{CC}		V
V_{IL}	LOW Level Input Voltage		1.65 to 1.95 2.3 to 5.5			0.3 V_{CC}		0.3 V_{CC}	V
V_{OH}	HIGH Level Output Voltage $V_{IN} = V_{IH}$	I_{OH} = −100 μA	1.65 2.3 3.0 4.5	1.55 2.2 2.9 4.4	1.65 2.3 3.0 4.5		1.55 2.2 2.9 4.4		V
		I_{OH} = −4 mA I_{OH} = −8 mA I_{OH} = −16 mA I_{OH} = −24 mA I_{OH} = −32 mA	1.65 2.3 3.0 3.0 4.5	1.29 1.9 2.4 2.3 3.8	1.52 2.15 2.8 2.68 4.2		1.20 1.9 2.4 2.3 3.8		
V_{OL}	Low−Level Output Voltage $V_{IN} = V_{IL}$	I_{OL} = 100 μA	1.65 2.3 3.0 4.5		0 0 0 0	0.1 0.1 0.1 0.1			V
		I_{OH} = 4 mA I_{OH} = 8 mA I_{OH} = 16 mA I_{OH} = 24 mA I_{OH} = 32 mA	1.65 2.3 3.0 3.0 4.5		0.08 0.1 0.15 0.22 0.22	0.24 0.3 0.4 0.55 0.55			
I_{IN}	Input Leakage Current	V_{IN} = V_{CC} or GND	0 to 5.5			± 0.1		± 1.0	μA
I_{OFF}	Power OFF Leakage Current	V_{IN} or V_{OUT} = 5.5 V	0.0			1.0		10	
I_{CC}	Quiescent Supply Current	V_{IN} = V_{CC} or GND	5.5			1.0		10	μA

AC ELECTRICAL CHARACTERISTICS $t_R = t_F$ = 3.0 ns

Symbol	Parameter	Condition	V_{CC} (V)	T_A = 25°C			−40°C ≤ T_A ≤ 85°C		Unit
				Min	Typ	Max	Min	Max	
t_{PLH}	Propagation Delay (Figure 3 and 4)	R_L = 1 MΩ, C_L = 15 pF	1.8 ± 0.15 2.5 ± 0.2	2.0 1.0	8.0 3.5	9.5 5.8	2.0 1.0	10.5 6.2	ns
t_{PHL}		R_L = 1 MΩ, C_L = 15 pF	3.3 ± 0.3	0.8	2.6	3.9	0.8	4.3	
		R_L = 500 Ω, C_L = 50 pF		1.2	3.2	4.8	1.2	5.2	
		R_L = 1 MΩ, C_L = 15 pF	5.0 ± 0.5	0.5	1.9	3.1	0.5	3.3	
		R_L = 500 Ω, C_L = 50 pF		0.8	2.5	3.7	0.8	4.0	

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Condition	Typical	Unit
C_{IN}	Input Capacitance	V_{CC} = 5.5 V, V_I = 0 V or V_{CC}	2.5	pF
C_{PD}	Power Dissipation Capacitance (Note 7)	10 MHz, V_{CC} = 3.3 V, V_I = 0 V or V_{CC}	9	pF
		10 MHz, V_{CC} = 5.5 V, V_I = 0 V or V_{CC}	11	

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: $I_{CC(OPR)} = C_{PD} \cdot V_{CC} \cdot f_{in} + I_{CC}$. C_{PD} is used to determine the no−load dynamic power consumption; $P_D = C_{PD} \cdot V_{CC}^2 \cdot f_{in} + I_{CC} \cdot V_{CC}$.
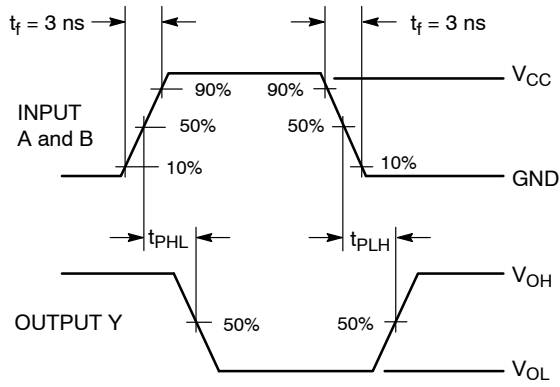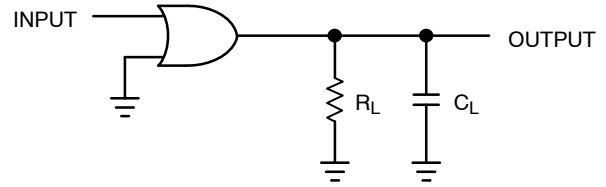
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Figure 3. Switching Waveform

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

Figure 4. Test Circuit

DEVICE ORDERING INFORMATION

Device Order Number	Package Type	Tape and Reel Size†
NLX2G32AMX1TCG	ULLGA, 1.95x1 (Pb−Free)	178 mm, 3000 Units / Tape & Reel
NLX2G32BMX1TCG	ULLGA, 1.6x1 (Pb−Free)	178 mm, 3000 Units / Tape & Reel
NLX2G32CMX1TCG	ULLGA, 1.45x1 (Pb−Free)	178 mm, 3000 Units / Tape & Reel
NLX2G32DMUTCG	UDFN8, 1.95 x 1.0, 0.5P (Pb−Free)	3000 Units / Tape & Reel
NLX2G32EMUTCG	UDFN8, 1.6 x 1.0, 0.4P (Pb−Free)	3000 Units / Tape & Reel
NLX2G32FMUTCG	UDFN8, 1.45 x 1.0, 0.35P (Pb−Free)	3000 Units / 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.

NLX2G32

PACKAGE DIMENSIONS

UDFN8 1.6x1.0, 0.4P
CASE 517BY
ISSUE O
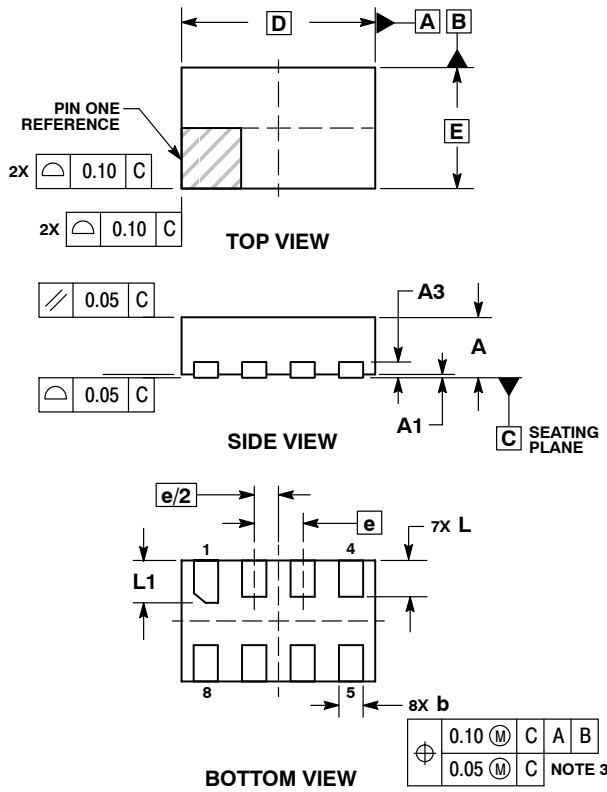
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.20 MM FROM TERMINAL TIP.
4. PACKAGE DIMENSIONS EXCLUSIVE OF BURRS AND MOLD FLASH.

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

TOP VIEW

2X | 0.10 | C
2X | 0.10 | C

SIDE VIEW

0.05 | C
0.05 | C

A3
A
A1
C SEATING PLANE

BOTTOM VIEW

e/2
e
7X L
L1
1   4
8   5
8X b

⊕ | 0.10 Ⓜ | C | A | B
  | 0.05 Ⓜ | C | NOTE 3

RECOMMENDED SOLDERING FOOTPRINT*

7X
0.49
8X
0.26
1.24
0.53
PKG OUTLINE
1
0.40
PITCH

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.
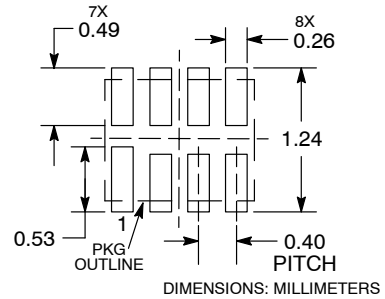
NLX2G32

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

TOP VIEW

SIDE VIEW

BOTTOM VIEW

RECOMMENDED SOLDERING FOOTPRINT*
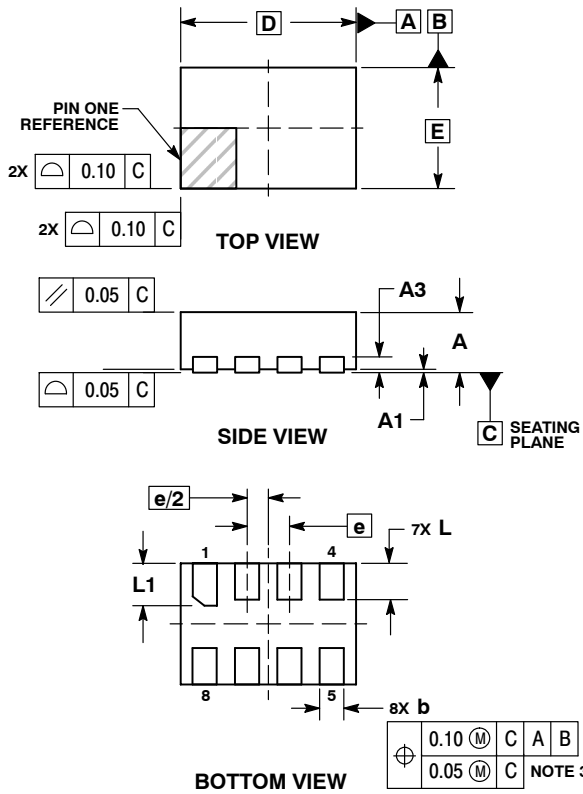
DIMENSIONS: MILLIMETERS

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NLX2G32

PACKAGE DIMENSIONS

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

TOP VIEW

2X | △ | 0.10 | C

2X | △ | 0.10 | C

SIDE VIEW

// | 0.05 | C

△ | 0.05 | C

C SEATING PLANE

BOTTOM VIEW

| ⊕ | 0.10 Ⓜ | C | A | B |
| | 0.05 Ⓜ | C | NOTE 3 |

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	1.95 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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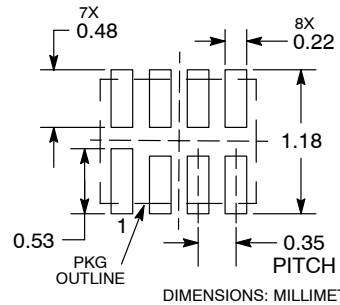
NLX2G32

PACKAGE DIMENSIONS

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

TOP VIEW

SIDE VIEW

BOTTOM VIEW

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.

DIM	MILLIMETERS	
---	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
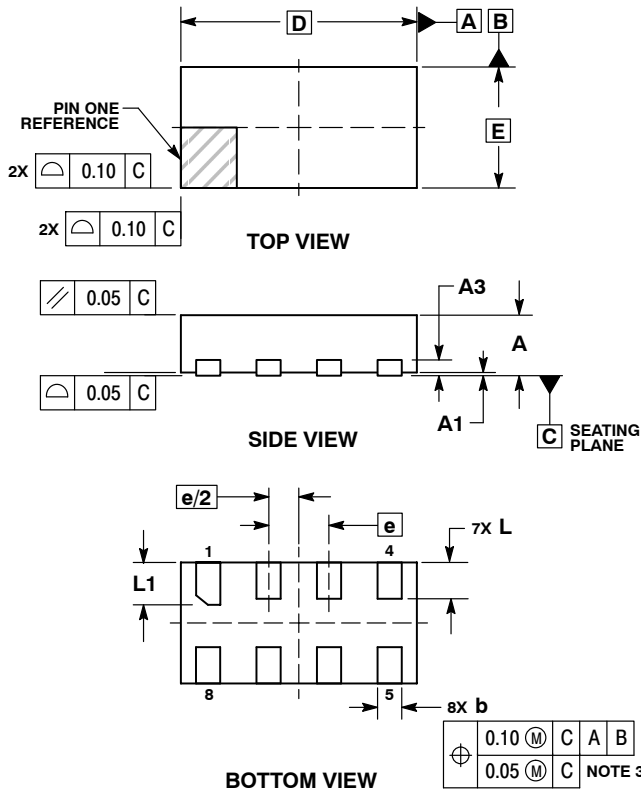**SOLDERMASK DEFINED***

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.

NLX2G32

PACKAGE DIMENSIONS

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

TOP VIEW

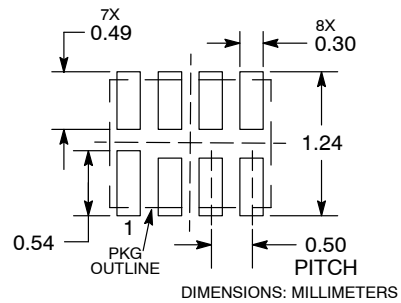**SIDE VIEW**

BOTTOM VIEW

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.

DIM	MILLIMETERS	
	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***
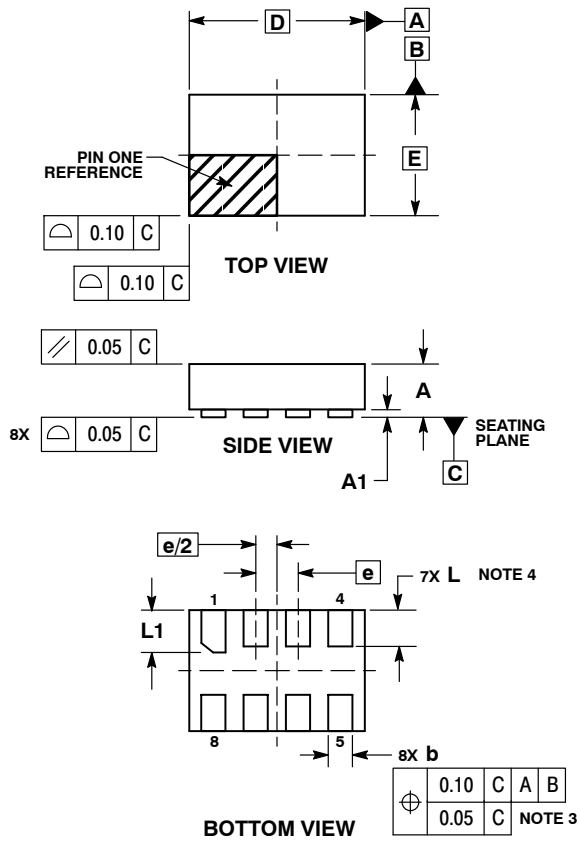
DIMENSIONS: MILLIMETERS

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

NLX2G32

PACKAGE DIMENSIONS

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

PIN ONE REFERENCE

TOP VIEW

0.10 C

0.10 C

0.05 C

8X   0.05 C

SIDE VIEW

SEATING PLANE

A1   C

e/2

e

7X L   NOTE 4

L1

1   4

8   5

8X b
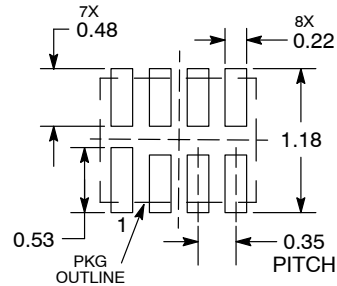
0.10 C A B

0.05 C   NOTE 3

BOTTOM VIEW

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.

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*

7X
0.49

8X
0.30

1.24

0.53

PKG OUTLINE

1

0.50
PITCH

DIMENSIONS: MILLIMETERS

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