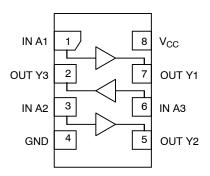
Triple Non-Inverting Buffer

The NLX3G16 MiniGate™ is an advanced high-speed CMOS triple non-inverting buffer in ultra-small footprint.

The NLX3G16 input and output structures provide protection when voltages up to 7.0 V are applied, regardless of the supply voltage.

Features

- High Speed: $t_{PD} = 1.8 \text{ ns (Typ)} @ V_{CC} = 5.0 \text{ V}$
- Designed for 1.65 V to 5.5 V V_{CC} Operation
- Low Power Dissipation: $I_{CC} = 1 \mu A$ (Max) at $T_A = 25^{\circ}C$
- 24 mA Balanced Output Source and Sink Capability
- Balanced Propagation Delays
- Overvoltage Tolerant (OVT) Input and Output Pins
- Ultra-Small Packages
- These are Pb-Free Devices



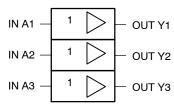


Figure 1. Pinout (Top View)

Figure 2. Logic Symbol

PIN ASSIGNMENT

1	IN A1	
2	OUT Y3	
3	IN A2	
4	GND	
5	OUT Y2	
6	IN A3	
7	OUT Y1	
8	V _{CC}	

FUNCTION TABLE

Α	Y
L	L
H	H



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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





UDFN8 1.45 x 1.0 CASE 517BZ





UDFN8 1.6 x 1.0 CASE 517BY





UDFN8 1.95 x 1.0 CASE 517CA



J or AD = Specific Device Code

M = Date Code

■ = Pb-Free Package

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

MAXIMUM RATINGS

Symbol	Parameter	Parameter			
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 +7.0	V	
I _{IK}	DC Input Diode Current	V _{IN} < GND	-50	mA	
lok	DC Output Diode Current	V _{OUT} < GND	-50	mA	
Io	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 Second	ds	260	°C	
TJ	Junction Temperature Under Bias	150	°C		
MSL	Moisture Sensitivity	Level 1			
F _R	Flammability Rating Oxygen	UL 94 V-0 @ 0.125 in			
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.

- Measured with minimum pad spacing on an FR4 board, using 10 mm-by-1 inch, 2 ounce copper trace no air flow.
 Tested to EIA/JESD22-A114-A.
- 3. Tested to EIA/UESD22-A115-A.
- 4. Tested to JESD22-C101-A.
- 5. Tested to EIA / JESD78.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V _{CC}	Positive DC Supply Voltage	1.65	5.5	V
V _{IN}	Digital Input Voltage	0	5.5	V
V _{OUT}	Output Voltage	0	5.5	V
T _A	Operating Free-Air Temperature	-55	+125	°C
Δt/ΔV	Input Transition Rise or Fall Rate $\begin{array}{c} V_{CC}=1.8~V\pm0.18\\ V_{CC}=2.5~V\pm0.2~V\\ V_{CC}=3.3~V\pm0.3~V\\ V_{CC}=5.0~V\pm0.5~V \end{array}$	0 0 0 0	20 20 10 5	ns/V

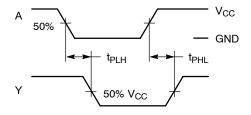
DC ELECTRICAL CHARACTERISTICS

			V _{CC}	Voc. T _A = 25 °C		T _A = +	⊦85°C	T _A = -5 +12			
Symbol	Parameter	Conditions	(V)	Min	Тур	Max	Min	Max	Min	Max	Unit
V _{IH}	Low-Level Input Voltage		1.65 to 5.5	0.70 x V _{CC}			0.70 x V _{CC}				V
V _{IL}	Low-Level Input Voltage		1.65 to 5.5			0.30 x V _{CC}		0.30 x V _{CC}		0.30 x V _{CC}	V
V _{OH}	High- Level Output	$V_{IN} = V_{IH} \text{ or } V_{IL}$ $I_{OH} = -100 \mu A$	1.65 to .5	V _{CC} - 0.1	V _{CC}		V _{CC} - 0.1		V _{CC} - 0.1		V
	Voltage	$\begin{aligned} &V_{IN} = V_{IH} \text{ or } V_{IL} \\ &I_{OH} = -4 \text{ mA} \\ &I_{OH} = -8 \text{ mA} \\ &I_{OH} = -12 \text{ mA} \\ &I_{OH} = -16 \text{ mA} \\ &I_{OH} = -24 \text{ mA} \\ &I_{OH} = -32 \text{ mA} \end{aligned}$	1.65 2.3 2.7 3.0 3.0 4.5	1.4 1.9 2.2 2.4 2.3 3.8	1.50 2.1 2.4 2.7 2.5 4.0		1.4 1.9 2.2 2.4 2.3 3.8		1.4 1.9 2.2 2.4 2.3 3.8		
V _{OL}	Low-Level Output	$V_{IN} = V_{IH} \text{ or } V_{IL}$ $I_{OL} = 100 \mu A$	1.65 – 5.5			0.1		0.1		0.1	V
	Voltage	$\begin{aligned} &V_{IN} = V_{IH} \text{ or } V_{IL} \\ &I_{OH} = 4 \text{ mA} \\ &I_{OH} = 8 \text{ mA} \\ &I_{OH} = 12 \text{ mA} \\ &I_{OH} = 16 \text{ mA} \\ &I_{OH} = 24 \text{ mA} \\ &I_{OH} = 32 \text{ mA} \end{aligned}$	1.65 2.3 2.7 3.0 3.0 4.5		0.2 0.2 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	$0 \le V_{IN} \le 5.5 V$	0 to 5.5			±0.1		±1.0		±1.0	μΑ
I _{OFF}	Power-Off Output Leakage Current	V _{IN} or V _{OUT} = 5.5 V	0			1.0		10		10	μΑ
I _{CC}	Quiescent Supply Current	$0 \le V_{IN} \le V_{CC}$	5.5			1.0		10		10	μΑ

AC ELECTRICAL CHARACTERISTICS (Input $t_r = t_f = 3.0 \text{ nS}$)

		V _{CC}	Test	т	΄ _A = 25 °	С	T _A = ·	+85°C	T _A = -5 +12		
Symbol	Parameter	(V)	Condition	Min	Тур	Max	Min	Max	Min	Max	Unit
t _{PLH} , t _{PHL}	Propagation Delay Input A to	1.65–1.95	$R_L = 1 M\Omega$, $C_L = 15 pF$	1.8	6.0	7.9	1.8	8.8	1.8	12	ns
	Output	2.3-2.7	$R_L = 1 M\Omega$, $C_L = 15 pF$	1.0	3.0	5.2	1.0	5.8	1.0	9.1	
		3.0-3.6	$R_L = 1 M\Omega$, $C_L = 15 pF$	0.8	2.3	3.6	0.8	4.0	0.8	6.5	
			$R_L = 500 \Omega,$ $C_L = 50 pF$	1.2	3.0	4.6	1.2	5.1	1.2	7.6	
		4.5-5.5	$R_L = 1 M\Omega$, $C_L = 15 pF$	0.5	1.8	2.9	0.5	3.2	0.5	5.5	
			$R_L = 500 \Omega$, $C_L = 50 pF$	0.8	2.4	3.8	0.8	4.2	0.8	6.4	
C _{IN}	Input Capacitance	5.5	V _{IN} = 0 V or V _{CC}		7.0						pF
C _{PD}	Power Dissipation Capacitance (Note 6)	3.3 5.5	10 MHz V _{IN} = 0 V or V _{CC}		9 11						pF

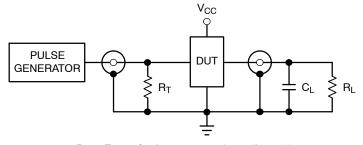
^{6.} C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the dynamic operating current consumption without load. Average operating current can be obtained by the equation I_{CC(OPR)} = C_{PD} • V_{CC} • f_{in} + I_{CC}. C_{PD} is used to determine the no–load dynamic power consumption: P_D = C_{PD} • V_{CC}² • f_{in} + I_{CC} • V_{CC}.



PROPAGATION DELAYS

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

Figure 3. Switching Waveforms



 $R_T = Z_{OUT}$ of pulse generator (typically 50 Ω)

Figure 4. Test Circuit

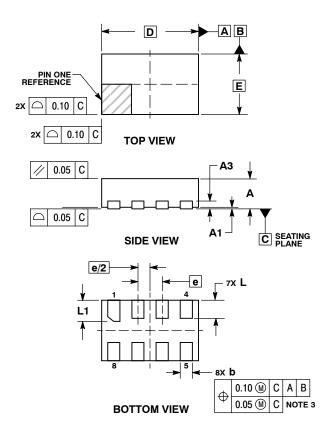
ORDERING INFORMATION

Device	Package	Shipping [†]
NLX3G16AMX1TCG	ULLGA8, 1.95 x 1.0, 0.5P (Pb-Free)	3000 / Tape & Reel
NLX3G16BMX1TCG	ULLGA8, 1.6 x 1.0, 0.4P (Pb-Free)	3000 / Tape & Reel
NLX3G16CMX1TCG	ULLGA8, 1.45 x 1.0, 0.35P (Pb-Free)	3000 / Tape & Reel
NLX3G16DMUTCG	UDFN8, 1.95 x 1.0, 0.5P (Pb-Free)	3000 / Tape & Reel
NLX3G16EMUTCG	UDFN8, 1.6 x 1.0, 0.4P (Pb-Free)	3000 / Tape & Reel
NLX3G16FMUTCG	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.

PACKAGE DIMENSIONS

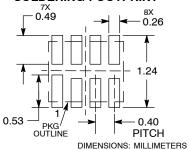
UDFN8 1.6x1.0, 0.4P CASE 517BY ISSUE O



- 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			
Α	0.45	0.55			
A1	0.00	0.05			
А3	0.13 REF				
b	0.15	0.25			
D	1.60	BSC			
E	1.00	BSC			
е	0.40	BSC			
L	0.25	0.35			
L1	0.30	0.40			

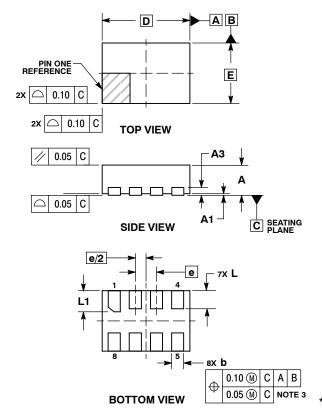
RECOMMENDED SOLDERING FOOTPRINT*



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

PACKAGE DIMENSIONS

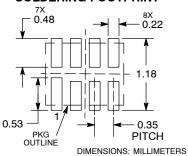
UDFN8 1.45x1.0, 0.35P CASE 517BZ ISSUE O



- 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.

	MILLIMETERS			
DIM	MIN MAX			
Α	0.45	0.55		
A1	0.00	0.05		
А3	0.13 REF			
b	0.15	0.25		
D	1.45	BSC		
Е	1.00	BSC		
е	0.35 BSC			
L	0.25	0.35		
L1	0.30	0.40		

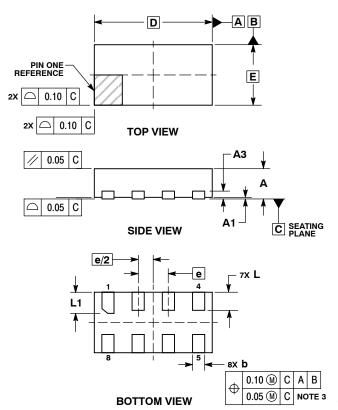
RECOMMENDED SOLDERING FOOTPRINT*



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

PACKAGE DIMENSIONS

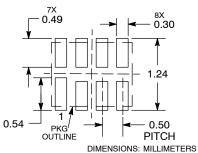
UDFN8 1.95x1.0, 0.5P CASE 517CA ISSUE O



- NOTES:
 1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
 2. CONTROLLING DIMENSION: MILLIMETERS.
 3. DIMENSION & 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				
Α	0.45	0.55			
A1	0.00	0.05			
А3	0.13 REF				
b	0.15	0.25			
D	1.95	BSC			
Е	1.00	BSC			
е	0.50 BSC				
L	0.25	0.35			
L1	0.30	0.40			

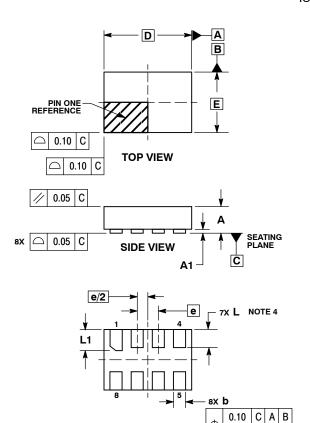
RECOMMENDED SOLDERING FOOTPRINT*



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PACKAGE DIMENSIONS

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



BOTTOM VIEW

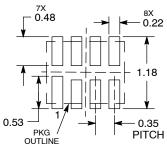
Ф

0.05 C NOTE 3

- NOTES:
 1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
 2. CONTROLLING DIMENSION: MILLIMETERS.
 3. DIMENSION & 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			
Α		0.40		
A1	0.00	0.05		
b	0.15	0.25		
D	1.45	BSC		
Е	1.00	BSC		
е	0.35 BSC			
Ĺ	0.25	0.35		
L1	0.30	0.40		

MOUNTING FOOTPRINT SOLDERMASK DEFINED*

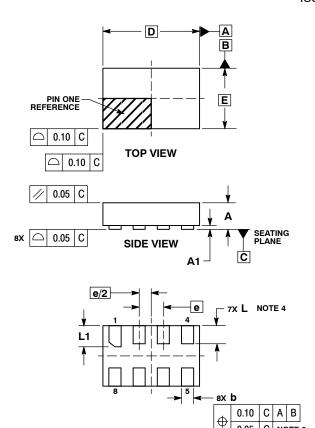


DIMENSIONS: MILLIMETERS

^{*}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 **ISSUE A**

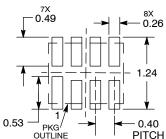


BOTTOM VIEW

- NOTES:
 1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
 2. CONTROLLING DIMENSION: MILLIMETERS.
 3. DIMENSION & 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	
Α		0.40	
A1	0.00	0.05	
b	0.15	0.25	
D	1.60	BSC	
Е	1.00	BSC	
е	0.40 BSC		
L	0.25	0.35	
L1	0.30	0.40	

MOUNTING FOOTPRINT SOLDERMASK DEFINED*



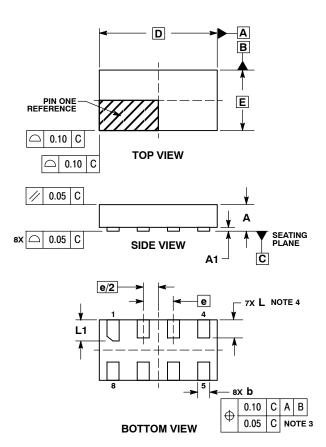
DIMENSIONS: MILLIMETERS

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0.05 C NOTE 3

PACKAGE DIMENSIONS

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

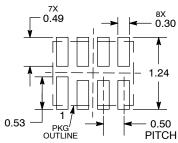


NOTES

- DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994. CONTROLLING DIMENSION: MILLIMETERS.
- DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND
- 0.30 mm FROM THE TERMINAL TIP.
 A MAXIMUM OF 0.05 PULL BACK OF THE PLATED TERMINAL FROM THE EDGE OF THE PACKAGE IS ALLOWED.

	MILLIMETERS	
DIM	MIN	MAX
Α		0.40
A1	0.00	0.05
b	0.15	0.25
D	1.95 BSC	
Е	1.00 BSC	
е	0.50 BSC	
L	0.25	0.35
L1	0.30	0.40

MOUNTING FOOTPRINT SOLDERMASK DEFINED*



DIMENSIONS: MILLIMETERS

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