ON Semiconductor

Is Now

To learn more about onsemi™, please visit our website at
www.onsemi.com

NLX2G16

Dual Buffer

The NLX2G16 MiniGate™ is an advanced high−speed CMOS dual non−inverting buffer in ultra−small footprint.

The NLX2G16 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 ns (Typ) @ 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 Source and Sink Capability
- Balanced Propagation Delays
- Overvoltage Tolerant (OVT) Input and Output Pins
- Ultra−Small Packages
- NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q100 Qualified and PPAP Capable
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

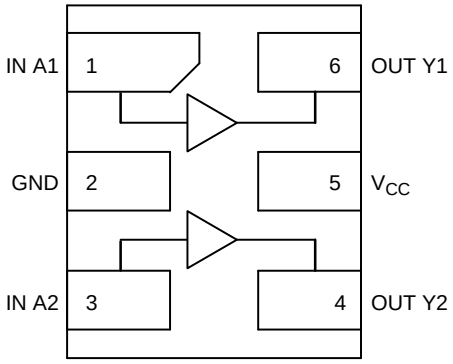


Figure 1. Pinout (Top View)

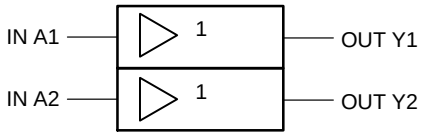


Figure 2. Logic Symbol

FUNCTION TABLE

A	Y
L	L
H	H

PIN ASSIGNMENT

1	IN A1
2	GND
3	IN A2
4	OUT Y2
5	V_{CC}
6	OUT Y1

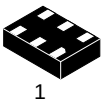
ON Semiconductor®

www.onsemi.com

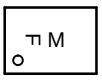
MARKING DIAGRAMS

UDFN6
1.0 x 1.0
CASE 517BX

UDFN6
1.2 x 1.0
CASE 517AA



UDFN6
1.45 x 1.0
CASE 517AQ



M = Date Code

ORDERING INFORMATION

See detailed ordering and shipping information on page 4 of this data sheet.

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 +7.0	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		260	°C
T_J	Junction Temperature Under Bias		150	°C
MSL	Moisture Sensitivity		Level 1	
F_R	Flammability Rating Oxygen	Index: 28 to 34	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 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 no air flow.
2. 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
$\Delta t/\Delta V$	Input Transition Rise or Fall Rate	V_{CC} = 1.8 V ± 0.18 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

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	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}	Low−Level Input Voltage		1.65−1.95	0.75 x V_{CC}			0.75 x V_{CC}		0.75 x V_{CC}		V
			2.3 to 5.5	0.70 x V_{CC}			0.70 x V_{CC}		0.70 x V_{CC}		
V_{IL}	Low−Level Input Voltage		1.65−1.95			0.25 x V_{CC}		0.25 x V_{CC}		0.25 x V_{CC}	V
			2.3 − 5.5			0.30 x V_{CC}		0.30 x V_{CC}		0.30 x V_{CC}	
V_{OH}	High−Level Output Voltage	V_{IN} = V_{IH} or V_{IL} I_{OH} = −100 μA	1.65 − 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 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		1.29 1.9 2.4 2.3 3.8		1.29 1.9 2.4 2.3 3.8		
V_{OL}	Low−Level Output Voltage	V_{IN} = V_{IH} or V_{IL} I_{OL} = 100 μA	1.65 − 5.5			0.1		0.1		0.1	V
		V_{IN} = V_{IH} or V_{IL} I_{OL} = 4 mA I_{OL} = 8 mA I_{OL} = 16 mA I_{OL} = 24 mA I_{OL} = 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		0.24 0.3 0.4 0.55 0.55		0.24 0.3 0.4 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 Output Leakage Current	V_{IN} or V_{OUT} = 5.5 V	0			1.0		10		10	μA
I_{CC}	Quiescent Supply Current	V_{IN} = 0 V or V_{CC}	5.5			1.0		10		10	μA

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

AC ELECTRICAL CHARACTERISTICS (Input $t_r = t_f = 3.0$ nS)

Symbol	Parameter	V_{CC} (V)	Test Condition	T_A = 25°C			T_A = −55°C to +125°C		Unit
				Min	Typ	Max	Min	Max	
t_{PLH}, t_{PHL}	Propagation Delay Input A to Output	1.65−1.95	R_L = 1 MΩ, C_L = 15 pF	1.8	8.0	9.6	1.8	10.2	ns
		2.3−2.7	R_L = 1 MΩ, C_L = 15 pF	1.0	3.0	5.2	1.0	5.8	
		3.0−3.6	R_L = 1 MΩ, C_L = 15 pF	0.8	2.3	3.6	0.8	4.0	
			R_L = 500 Ω, C_L = 50 pF	1.2	3.0	4.6	1.2	5.1	
		4.5−5.5	R_L = 1 MΩ, C_L = 15 pF	0.5	1.8	2.9	0.5	3.2	
			R_L = 500 Ω, C_L = 50 pF	0.8	2.4	3.8	0.8	4.2	
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 $I_{CC(OPR)} = C_{PD} \bullet V_{CC} \bullet f_{in} + I_{CC} \bullet V_{CC}$. C_{PD} is used to determine the no−load dynamic power consumption: $P_D = C_{PD} \bullet V_{CC}^2 \bullet f_{in} + I_{CC} \bullet V_{CC}$.

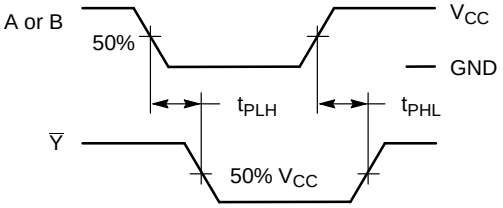
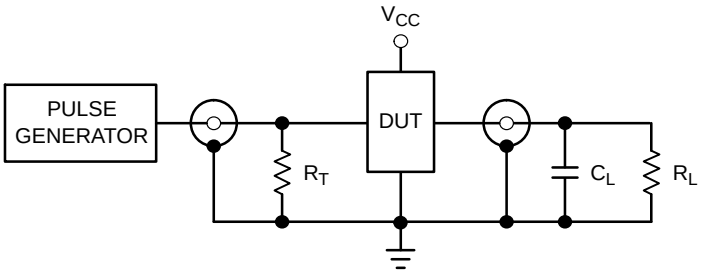


Figure 3. Switching Waveforms



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

Figure 4. Test Circuit

ORDERING INFORMATION

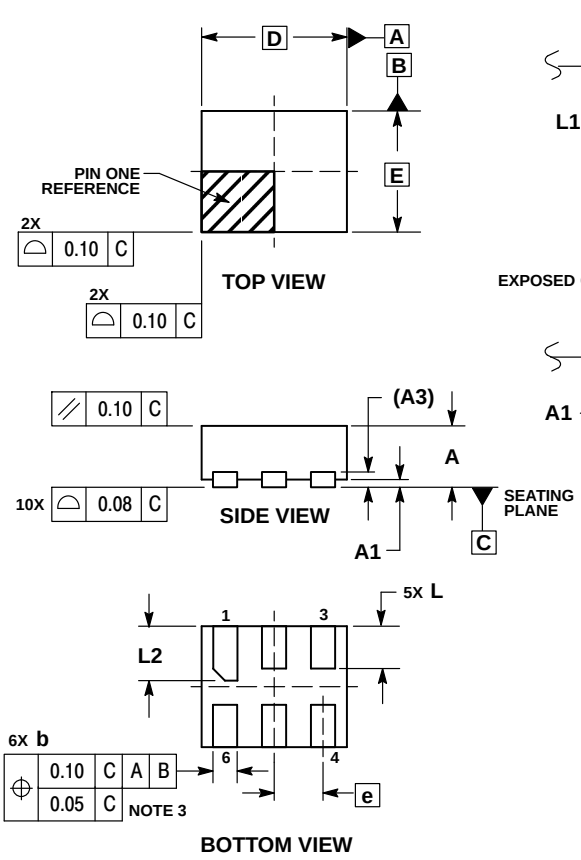
Device	Package	Shipping†
NLX2G16MUTCG	UDFN6, 1.2 x 1.0, 0.4P (Pb−Free)	3000 / Tape & Reel
NLX2G16AMUTCG, NLVX2G16AMUTCG*	UDFN6, 1.45 x 1.0, 0.5P (Pb−Free)	3000 / Tape & Reel
NLX2G16CMUTCG	UDFN6, 1.0 x 1.0, 0.35P (Pb−Free)	3000 / Tape & Reel

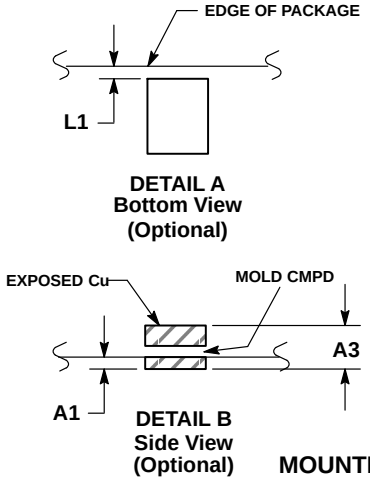
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

*NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q100 Qualified and PPAP Capable.

PACKAGE DIMENSIONS

UDFN6, 1.2x1.0, 0.4P
CASE 517AA
ISSUE D

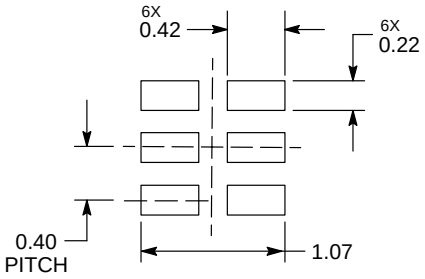




NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.25 AND 0.30 mm FROM TERMINAL.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

	MILLIMETERS	
DIM	MIN	MAX
A	0.45	0.55
A1	0.00	0.05
A3	0.127 REF	
b	0.15	0.25
D	1.20 BSC	
E	1.00 BSC	
e	0.40 BSC	
L	0.30	0.40
L1	0.00	0.15
L2	0.40	0.50

MOUNTING FOOTPRINT*

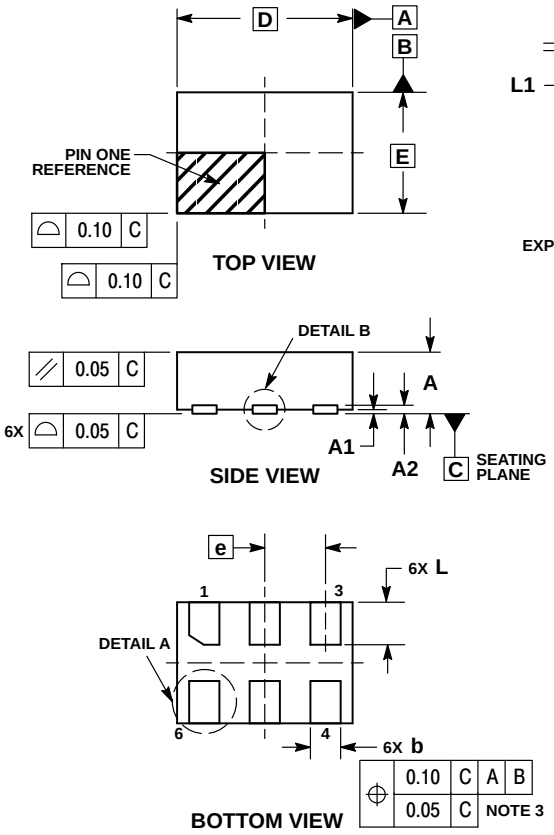


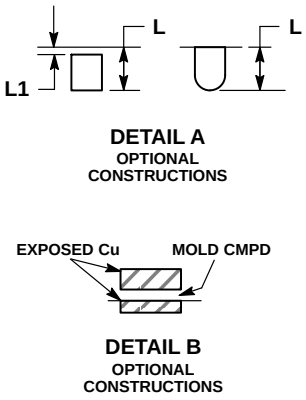
DIMENSIONS: MILLIMETERS

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

PACKAGE DIMENSIONS

UDFN6 1.45x1.0, 0.5P
CASE 517AQ
ISSUE O

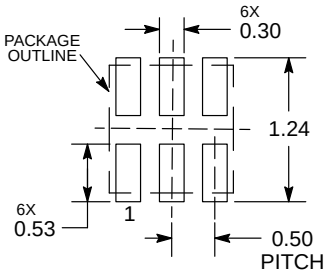




NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 mm FROM THE TERMINAL TIP.

	MILLIMETERS	
DIM	MIN	MAX
A	0.45	0.55
A1	0.00	0.05
A2	0.07 REF	
b	0.20	0.30
D	1.45 BSC	
E	1.00 BSC	
e	0.50 BSC	
L	0.30	0.40
L1	–––	0.15

MOUNTING FOOTPRINT

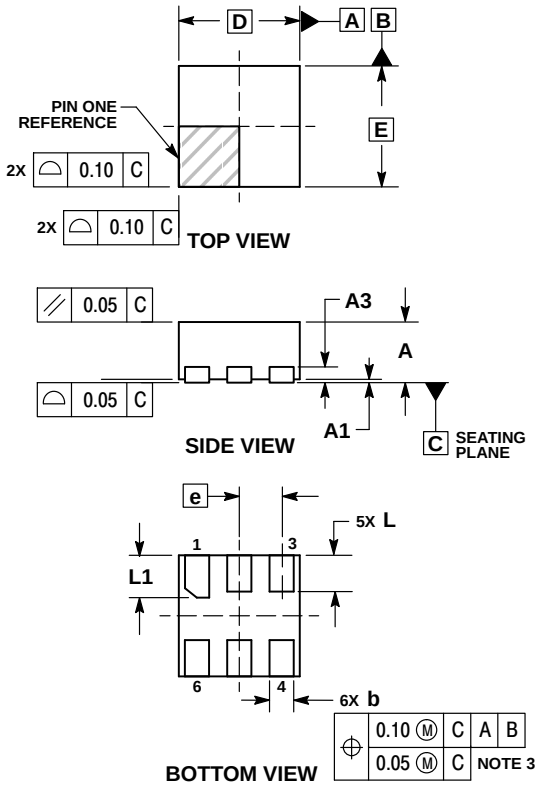


DIMENSIONS: MILLIMETERS

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

PACKAGE DIMENSIONS

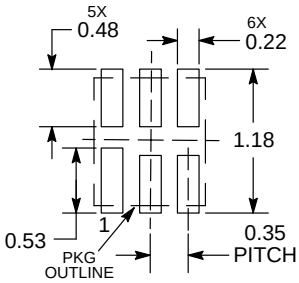
UDFN6 1.0x1.0, 0.35P
CASE 517BX
ISSUE O



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	0.12	0.22
D	1.00 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.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 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