

# NLX2G66

## Dual Bilateral Analog Switch / Digital Multiplexer

The NLX2G66 is a dual single pole, single throw (SPST) analog switch / digital multiplexer. This single supply voltage IC is designed with a sub-micron CMOS technology to provide low propagation delays ( $t_{pd}$ ) and ON resistance ( $R_{ON}$ ), while maintaining low power dissipation. This bi-lateral switch can be used with either analog or digital signals that may vary across the full power supply range from  $V_{CC}$  to GND.

### Features

- Wide  $V_{CC}$  Operating Range: 1.65 V to 5.5 V
- OVT up to +5.5 V for Control Pin
- $R_{ON}$ : Typically 5.5  $\Omega$  at  $V_{CC} = 4.5$  V and  $I_S = 32$  mA
- Rail-to-Rail Input/Output
- High On-Off Output Voltage Ratio
- High Degree of Linearity
- Ultra-Small Pb-Free, Halide-Free, RoHS-Compliant Packages
- ESD Performance: > 5000 V HBM, > 400 V MM

### Typical Applications

- Cell Phones, PDAs, MP3 and other Portable Media Players

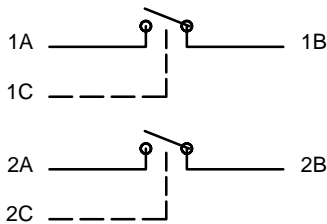


Figure 1. Analog Symbol

### PIN ASSIGNMENTS

UDFN8	WLCSP8	Description
1	A1	1A
2	B1	1B
3	C1	2C
4	D1	GND
5	D2	2A
6	C2	2B
7	B2	1C
8	A2	$V_{CC}$

This document contains information on some products that are still under development. ON Semiconductor reserves the right to change or discontinue these products without notice.



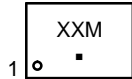
**ON Semiconductor®**

[www.onsemi.com](http://www.onsemi.com)

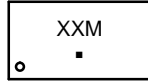
### MARKING DIAGRAMS



**UDFN8**  
MU SUFFIX  
CASE 517BZ



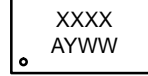
**UDFN8**  
MU SUFFIX  
CASE 517CA



XX = Specific Device Code  
M = Date Code  
■ = Pb-Free Package

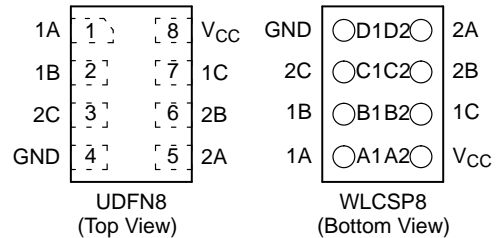


**WLCSP8**  
FC SUFFIX  
CASE 567MR



A = Assembly Location  
Y = Year  
WW = Work Week

### PIN ASSIGNMENTS



### FUNCTION TABLE

Control Input (C)	Switch
L	OFF
H	ON

### ORDERING INFORMATION

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

# NLX2G66

**Table 1. MAXIMUM RATINGS**

Symbol	Rating	Value	Unit
$V_{CC}$	Positive DC Supply Voltage	-0.5 to +7.0	V
$V_S$	Switch Input / Output Voltage (Pins 1A, 1B, 2A and 2B)	-0.5 to + $V_{CC}$ + 0.5	V
$V_I$	Digital Control Input Voltage (Pins 1C and 2C)	-0.5 to +7.0	V
$I_{OK}$	I/O port diode current	$\pm 50$	mA
$I_{IK}$	Control input diode current	-50	mA
$I_{I/O}$	Continuous DC Current Through Analog Switch	$\pm 100$	mA
$I_L$	Latch-up Current, (Above $V_{CC}$ and below GND at 125°C)	$\pm 100$	mA
$T_s$	Storage Temperature	-65 to +150	°C
$V_{ESD}$	ESD Withstand Voltage: Human Body Model (HBM) Machine Model (MM)	$\geq 5000$ > 400	V

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.

**Table 2. RECOMMENDED OPERATING CONDITIONS**

Symbol	Parameter	Min	Max	Unit	
$V_{CC}$	Positive DC Supply Voltage	1.65	5.5	V	
$V_S$	Switch Input / Output Voltage (Pins 1A, 2A, 1B and 2B)	GND	$V_{CC}$	V	
$V_I$	Digital Control Input Voltage (Pins 1C and 2C)	GND	5.5	V	
$T_A$	Operating Temperature Range	-55	+125	°C	
$t_r, t_f$	Input Transition Rise or Fall Time (ON/OFF Control Input)	$V_{CC} = < 3.0\text{ V}$	0	20	ns/V
		$V_{CC} = \geq 3.0\text{ V}$	0	10	

**Table 3. ELECTRICAL CHARACTERISTICS**

Symbol	Parameter	Condition	$V_{CC}$	Guaranteed Limit				Unit
				25°C		-55° to 125°C		
				Min	Max	Min	Max	
$V_{IH}$	High-Level Input Voltage, Control Input		1.65 to 1.95			$V_{CC} \times 0.65$		V
			2.3 to 5.5			$V_{CC} \times 0.7$		
$V_{IL}$	Low-Level Input Voltage, Control Input		1.65 to 1.95				$V_{CC} \times 0.35$	V
			2.3 to 5.5				$V_{CC} \times 0.30$	
$I_I$	Input Leakage Current, Control Input	$V_I = V_{CC}$ or GND	5.5		$\pm 0.1$		$\pm 1$	$\mu\text{A}$
$I_{S(ON)}$	ON-State Switch Leakage Current	$V_{IS} = V_{CC}$ or GND, $V_I = V_{IH}$ , $V_{OS} = \text{Open}$	5.5		$\pm 0.1$		$\pm 1$	$\mu\text{A}$
$I_{S(OFF)}$	OFF-State Switch Leakage Current	$V_{IS} = V_{CC}$ and $V_{OS} = \text{GND}$ , or $V_{IS} = \text{GND}$ and $V_{OS} = V_{CC}$ GND, $V_I = V_{IL}$ .	5.5		$\pm 0.1$		$\pm 1$	$\mu\text{A}$
$I_{CC}$	Quiescent Supply Current	$V_I = V_{CC}$ or GND	5.5		1.0		10	$\mu\text{A}$
$\Delta I_{CC}$	Supply Current Change	$V_I = V_{CC} - 0.6$	5.5				500	$\mu\text{A}$
$C_I$	Control Input Capacitance		5				3.0	pF
$C_{I/O(OFF)}$	Switch OFF Input / Output Capacitance	See Figure 3	5				6.0	pF
$C_{I/O(ON)}$	Switch ON Input / Output Capacitance	See Figure 4	5				13	pF

# NLX2G66

**Table 4. SWITCHING CHARACTERISTICS**

Symbol	Parameter	Condition	V <sub>CC</sub>	Guaranteed Limit		Unit
				-55° to 125°C		
				Min	Max	
t <sub>PLH</sub> , t <sub>PHL</sub>	Propagation Delay, A to B, B to A	C <sub>L</sub> = 30 pF, R <sub>L</sub> = 1 kΩ	1.8		6.5	ns
			2.5		3.3	
		C <sub>L</sub> = 50 pF, R <sub>L</sub> = 500 Ω	3.3		2.5	
			5.0		2.2	
t <sub>EN</sub> (t <sub>PZL</sub> , t <sub>PZH</sub> )	Enable Time, C to Analog Output (A or B)	C <sub>L</sub> = 50 pF, R <sub>L</sub> = 500 Ω See Figure 6	1.8		10	ns
			2.5		6.5	
			3.3		5.5	
			5.0		4.9	
t <sub>DIS</sub> (t <sub>PLZ</sub> , t <sub>PHZ</sub> )	Disable Time, C to Analog Output (A or B)	C <sub>L</sub> = 50 pF, R <sub>L</sub> = 500 Ω See Figure 6	1.8		9.0	ns
			2.5		7.2	
			3.3		6.5	
			5.0		6.0	

**Table 5. ANALOG SWITCH CHARACTERISTICS**

Symbol	Parameter	Conditions	V <sub>CC</sub>	25°C	-55° to 125°C		Unit	
				Typ	Min	Max		
R <sub>ON</sub>	On-Resistance	V <sub>IS</sub> = V <sub>CC</sub> or GND, V <sub>I</sub> = V <sub>IH</sub> , See Figure 2	I <sub>S</sub> = 4 ma	1.65	12		30	Ω
			I <sub>S</sub> = 8 ma	2.3	9		20	
			I <sub>S</sub> = 24 ma	3.0	7.5		15	
			I <sub>S</sub> = 32 ma	4.5	5.5		13	
R <sub>ON(peak)</sub>	Peak On-Resistance	V <sub>IS</sub> = GND to V <sub>CC</sub> ; V <sub>I</sub> = V <sub>IH</sub> , See Figure 2	I <sub>S</sub> = 4 ma	1.65	74.5		220	Ω
			I <sub>S</sub> = 8 ma	2.3	20		75	
			I <sub>S</sub> = 24 ma	3.0	11.5		25	
			I <sub>S</sub> = 32 ma	4.5	7.5		17	
ΔR <sub>ON</sub>	On-Resistance Mismatch between Switches	V <sub>IS</sub> = GND to V <sub>CC</sub> ; V <sub>I</sub> = V <sub>IH</sub> , See Figure 2	I <sub>S</sub> = 4 ma	1.65			8.0	Ω
			I <sub>S</sub> = 8 ma	2.3			5.0	
			I <sub>S</sub> = 24 ma	3.0			3.0	
			I <sub>S</sub> = 32 ma	4.5			2.0	
BW	Bandwidth (f <sub>-3dB</sub> )	R <sub>L</sub> = 50 Ω, C <sub>L</sub> = 5 pF, f <sub>N</sub> = Sine Wave See Figure 8	1.65				> 270	MHz
			2.3				> 270	
			3.0				> 270	
			4.5				> 270	

# NLX2G66

**Table 5. ANALOG SWITCH CHARACTERISTICS** (continued)

Symbol	Parameter	Conditions	V <sub>CC</sub>	25°C	Unit
				Typ	
ISO <sub>Off</sub>	Off-Channel Feedthrough Isolation	R <sub>L</sub> = 600 Ω, C <sub>L</sub> = 50 pF, f <sub>IN</sub> = 1 MHz Sine Wave See Figure 9	1.65	-70	dB
			2.3	-70	
			3.0	-70	
			4.5	-70	
		R <sub>L</sub> = 50 Ω, C <sub>L</sub> = 5 pF, f <sub>IN</sub> = 1 MHz Sine Wave See Figure 9	1.65	-60	
			2.3	-60	
			3.0	-60	
			4.5	-60	
XTalk	Crosstalk Between Switches	R <sub>L</sub> = 600 Ω, C <sub>L</sub> = 50 pF, f <sub>IN</sub> = 1 MHz Sine Wave See Figure 10	1.65	-100	dB
			2.3	-100	
			3.0	-100	
			4.5	-100	
		R <sub>L</sub> = 50 Ω, C <sub>L</sub> = 5 pF, f <sub>IN</sub> = 1 MHz Sine Wave See Figure 10	1.65	-90	
			2.3	-90	
			3.0	-90	
			4.5	-90	
	Feedthrough Noise, Control to Switch	R <sub>L</sub> = 600 Ω, C <sub>L</sub> = 50 pF, f <sub>IN</sub> = 1 MHz Square Wave, t <sub>r</sub> = t <sub>f</sub> = 2 ns, See Figure 11	1.65	10	mV <sub>pp</sub>
			2.3	10	
			3.0	10	
			4.5	15	
THD	Total Harmonic Distortion	C <sub>L</sub> = 50 pF, R <sub>L</sub> = 50 Ω, f <sub>IN</sub> = 600 Hz to 20 KHz Sine Wave, See Figure 12	2.3	0.025	%
			3.0	0.015	
			4.5	0.01	

**Table 6. POWER DISSIPATION CHARACTERISTICS**

Symbol	Parameter	Conditions	V <sub>CC</sub>	25°C	Unit
				Typ	
C <sub>PD</sub>	Power Dissipation Capacitance	f = 10 MHz	1.65	8.0	pF
			2.3	8.9	
			3.0	9.6	
			4.5	10.9	

# NLX2G66

**Table 7. DEVICE ORDERING INFORMATION**

Device Order Number	Package	Shipping†
NLX2G66DMUTAG	UDFN8–0.5P, 1.95 mm x 1.0 mm (Pb–Free)	3000 / Tape & Reel
NLX2G66DMUTCG	UDFN8–0.5P, 1.95 mm x 1.0 mm (Pb–Free)	3000 / Tape & Reel
NLX2G66MU3TCG (In Development)	UDFN8–0.35P, 1.45 mm x 1.0 mm (Pb–Free)	3000 / Tape & Reel
NLX2G66FCTAG	WLCSP8, 1.888 mm x 0.888 mm (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.

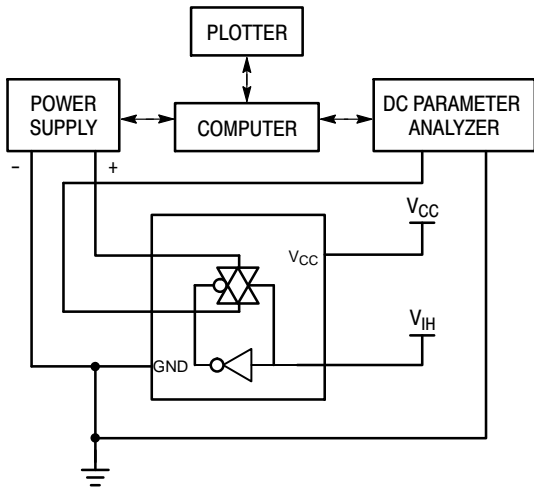


Figure 2. On Resistance Test Set-Up

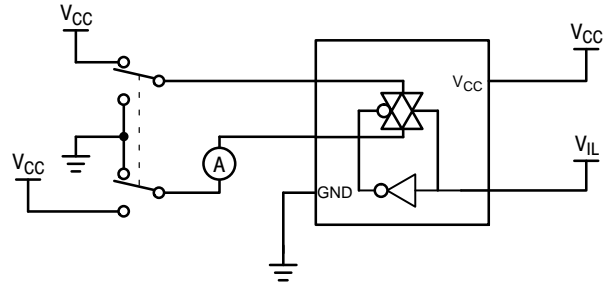


Figure 3. Maximum Off-Channel Leakage Current Test Set-Up

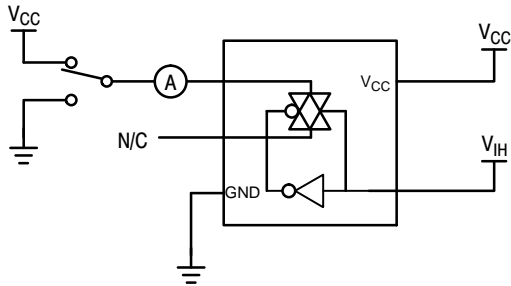


Figure 4. Maximum On-Channel Leakage Current Test Set-Up

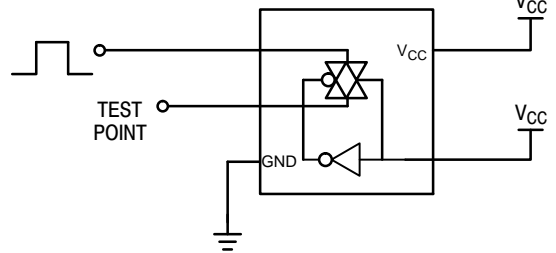


Figure 5. Propagation Delay Test Set-Up

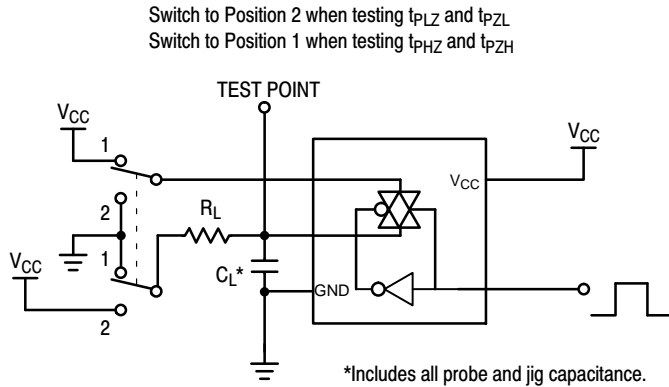


Figure 6. Propagation Delay Output Enable/Disable Test Set-Up

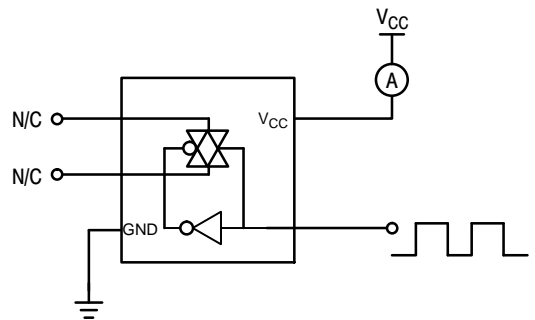
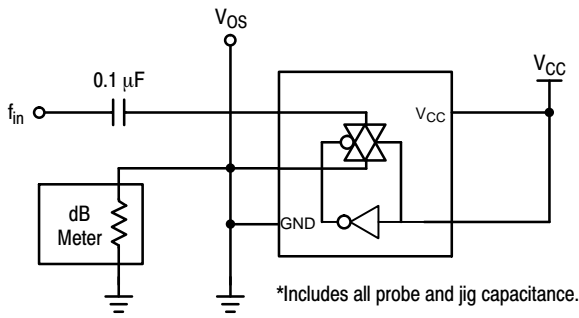
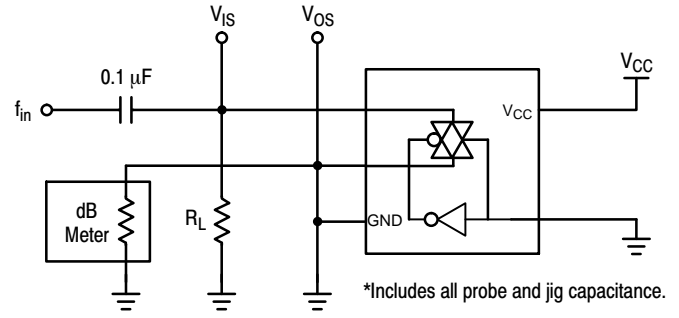


Figure 7. Power Dissipation Capacitance Test Set-Up

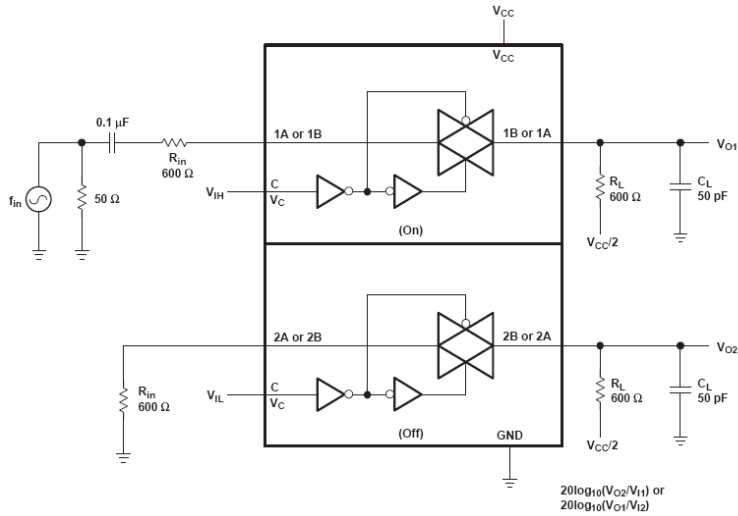
# NLX2G66



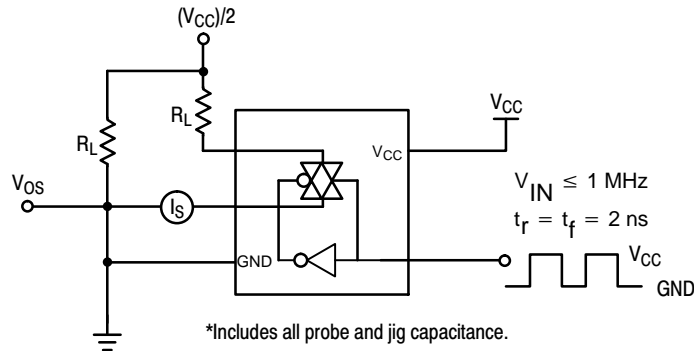
**Figure 8. Maximum On-Channel Bandwidth Test Set-Up**



**Figure 9. Off-Channel Feedthrough Isolation Test Set-Up**

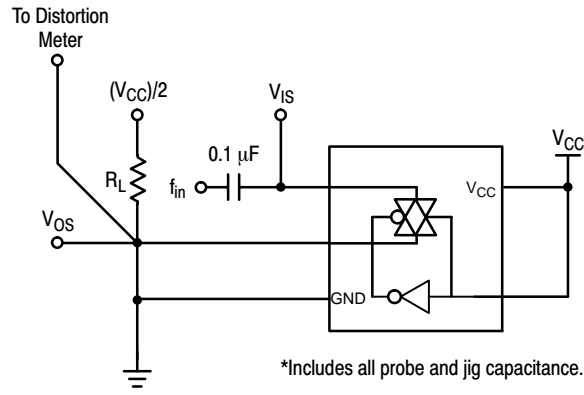


**Figure 10. Crosstalk (between Switches)**

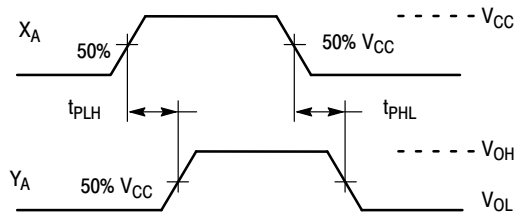


**Figure 11. Feedthrough Noise, ON/OFF Control to Analog Out, Test Set-Up**

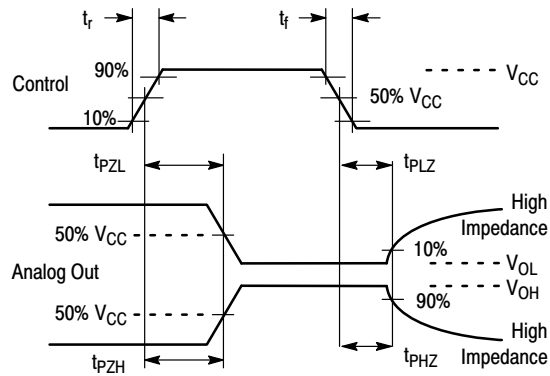
# NLX2G66



**Figure 12. Total Harmonic Distortion Test Set-Up**



**Figure 13. Propagation Delay, Analog In to Analog Out Waveforms**



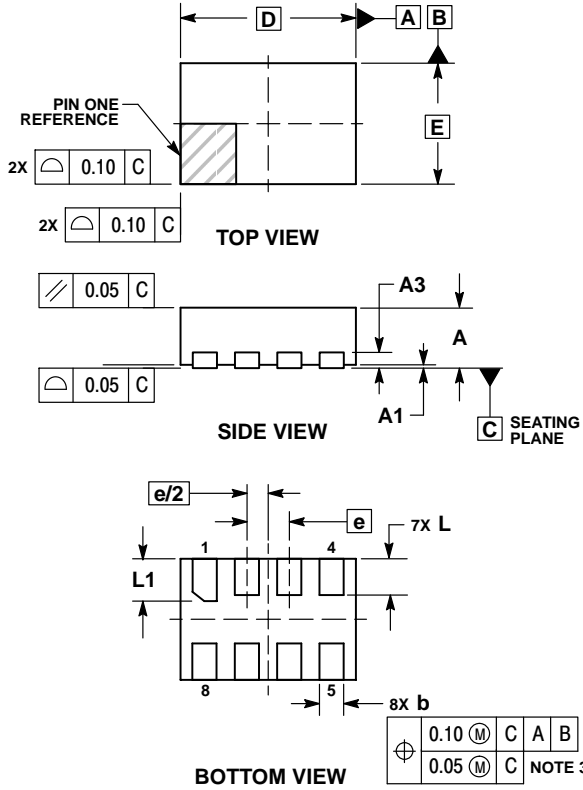
**Figure 14. Propagation Delay, ON/OFF Control**



# NLX2G66

## PACKAGE DIMENSIONS

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

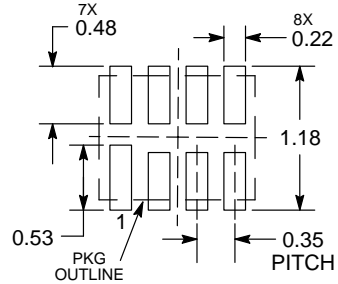


**NOTES:**

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\***

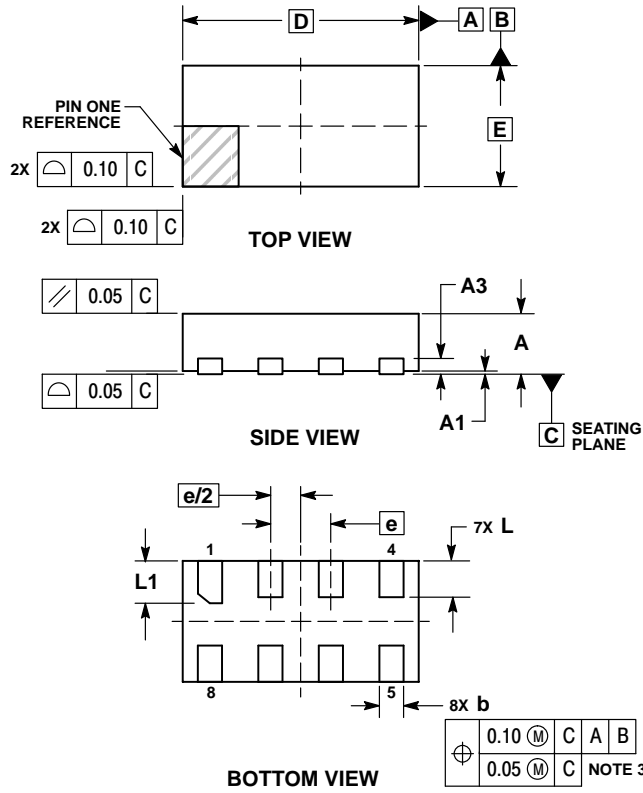


\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

# NLX2G66

## PACKAGE DIMENSIONS

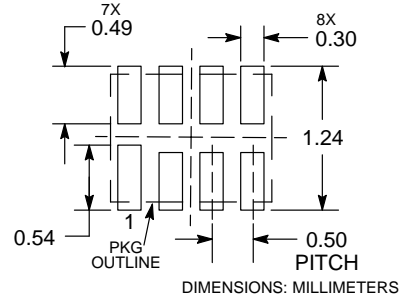
UDFN8 1.95x1.0, 0.5P  
CASE 517CA  
ISSUE O



- 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.

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\*

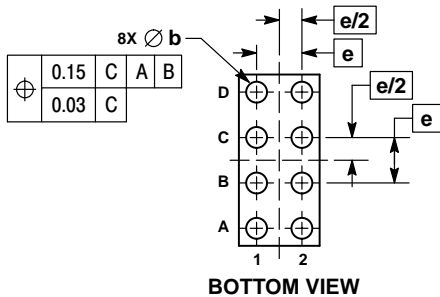
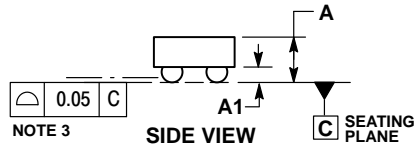
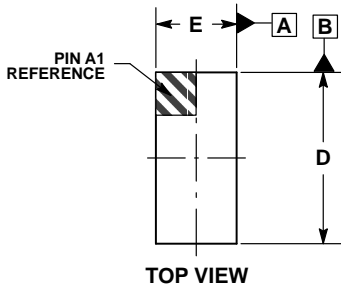


\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

# NLX2G66

## PACKAGE DIMENSIONS

**WLCSP8, 1.888x0.888**  
**CASE 567MR**  
**ISSUE O**

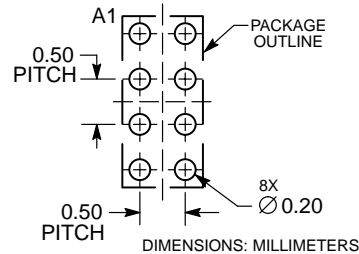


**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. COPLANARITY APPLIES TO SPHERICAL CROWNS OF SOLDER BALLS.

DIM	MILLIMETERS	
	MIN	MAX
A	—	0.50
A1	0.15	0.19
b	0.21	0.25
D	1.858	1.918
E	0.858	0.918
e	0.50 BSC	

**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.

ON Semiconductor and the are registered trademarks of Semiconductor Components Industries, LLC (SCILLC) or its subsidiaries in the United States and/or other countries. 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-Marketing.pdf](http://www.onsemi.com/site/pdf/Patent-Marketing.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  
 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](mailto: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](http://www.onsemi.com)  
**Order Literature:** <http://www.onsemi.com/orderlit>  
 For additional information, please contact your local Sales Representative