

## 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

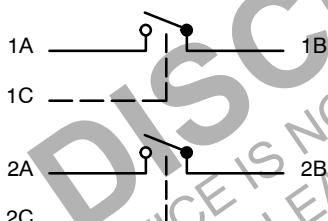


Figure 1. Analog Symbol

### 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.



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### MARKING DIAGRAMS



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



A = Assembly Location  
Y = Year  
WW = Work Week

### PIN ASSIGNMENTS

1A	1	8	$V_{CC}$	GND	○D1D2○	2A
1B	2	7	1C	2C	○C1C2○	2B
2C	3	6	2B	1B	○B1B2○	1C
GND	4	5	2A	1A	○A1A2○	$V_{CC}$
UDFN8 (Top View)			WLCSP8 (Bottom View)			

### 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.

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)	$V_{CC} = < 3.0$ V $V_{CC} = \geq 3.0$ V	0 0	20 10	ns/V

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		$\pm 0.1$		$\pm 1$	$\mu A$	
$I_{S(ON)}$	ON-State Switch Leakage Current	$V_{IS} = V_{CC}$ or GND, $V_I = V_{IH}$ , $V_{OS}$ = Open	5.5		$\pm 0.1$		$\pm 1$	$\mu A$	
$I_{S(OFF)}$	OFF-State Switch Leakage Current	$V_{IS} = V_{CC}$ and $V_{OS}$ = GND, or $V_{IS} = GND$ and $V_{OS} = V_{CC}$ GND, $V_I = V_{IL}$	5.5		$\pm 0.1$		$\pm 1$	$\mu A$	
$I_{CC}$	Quiescent Supply Current	$V_I = V_{CC}$ or GND	5.5		1.0		10	$\mu A$	
$\Delta I_{CC}$	Supply Current Change	$V_I = V_{CC} - 0.6$	5.5				500	$\mu A$	
$C_I$	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	

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>PIS</sub> (t <sub>PZI</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		Ω
			I <sub>S</sub> = 8 mA	2.3	9		
			I <sub>S</sub> = 24 mA	3.0	7.5		
			I <sub>S</sub> = 32 mA	4.5	5.5		
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		Ω
			I <sub>S</sub> = 8 mA	2.3	20		
			I <sub>S</sub> = 24 mA	3.0	11.5		
			I <sub>S</sub> = 32 mA	4.5	7.5		
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>IN</sub> = Sine Wave See Figure 8	1.65			> 270	MHz
			2.3			> 270	
			3.0			> 270	
			4.5			> 270	

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	$R_L = 600 \Omega$ , $C_L = 50 \text{ pF}$ , $f_{IN} = 1 \text{ MHz}$ Sine Wave See Figure 9	1.65	-70		dB	
			2.3	-70			
			3.0	-70			
			4.5	-70			
	R <sub>L</sub> = 50 $\Omega$ , $C_L = 5 \text{ pF}$ , $f_{IN} = 1 \text{ MHz}$ Sine Wave See Figure 9		1.65	-60			
			2.3	-60			
			3.0	-60			
			4.5	-60			
XTalk	Crosstalk Between Switches	$R_L = 600 \Omega$ , $C_L = 50 \text{ pF}$ , $f_{IN} = 1 \text{ MHz}$ Sine Wave See Figure 10	1.65	-100		dB	
			2.3	-100			
			3.0	-100			
			4.5	-100			
	R <sub>L</sub> = 50 $\Omega$ , $C_L = 5 \text{ pF}$ , $f_{IN} = 1 \text{ MHz}$ Sine Wave See Figure 10		1.65	-90			
			2.3	-90			
			3.0	-90			
			4.5	-90			
	Feedthrough Noise, Control to Switch	$R_L = 600 \Omega$ , $C_L = 50 \text{ pF}$ , $f_{IN} = 1 \text{ MHz}$ Square Wave, $t_r = t_f = 2 \text{ ns}$ , See Figure 11	1.65	10		mV <sub>pp</sub>	
			2.3	10			
			3.0	10			
			4.5	15			
THD	Total Harmonic Distortion	$C_L = 50 \text{ pF}$ , $R_L = 50 \Omega$ , $f_{IN} = 600 \text{ Hz to } 20 \text{ KHz}$ 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	$f = 10 \text{ MHz}$	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 <sup>†</sup>
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

<sup>†</sup>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.

**DISCONTINUED**  
THIS DEVICE IS NOT RECOMMENDED FOR NEW DESIGN  
PLEASE CONTACT YOUR onsemi  
REPRESENTATIVE FOR INFORMATION

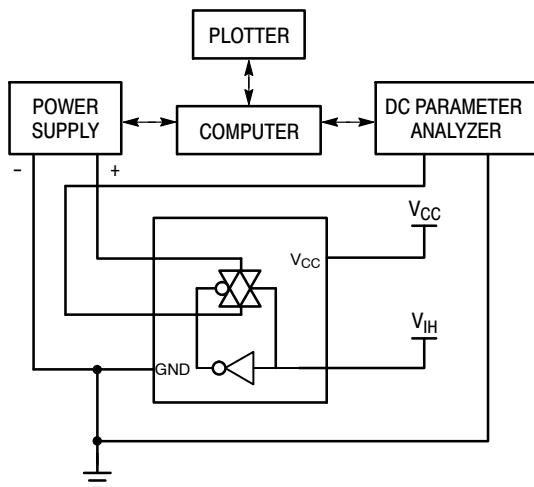


Figure 2. On Resistance Test Set-Up

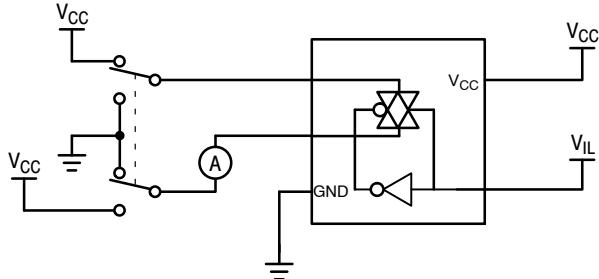


Figure 3. Maximum Off-Channel Leakage Current Test Set-Up

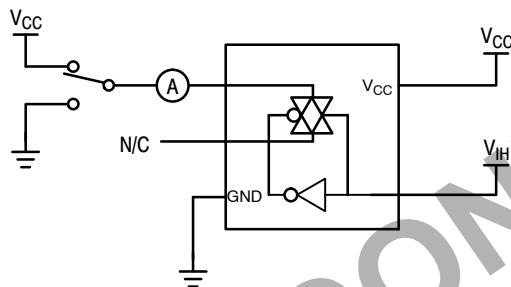


Figure 4. Maximum On-Channel Leakage Current Test Set-Up

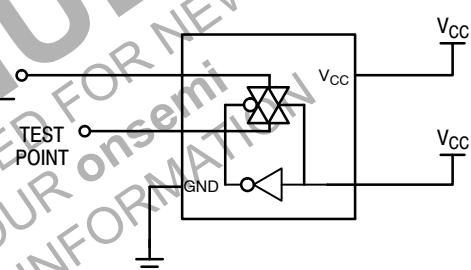


Figure 5. Propagation Delay Test Set-Up

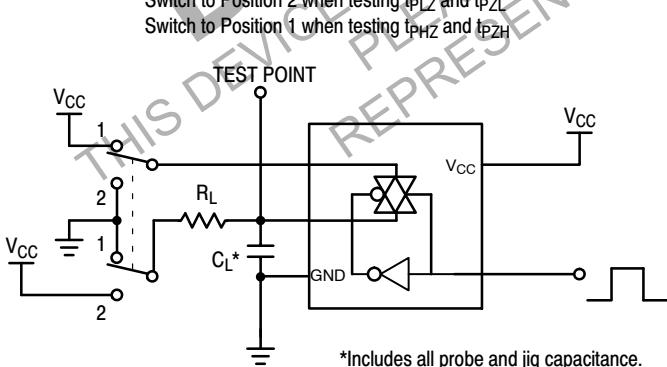


Figure 6. Propagation Delay Output Enable/Disable Test Set-Up

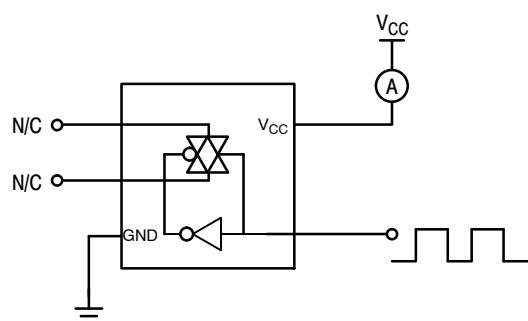
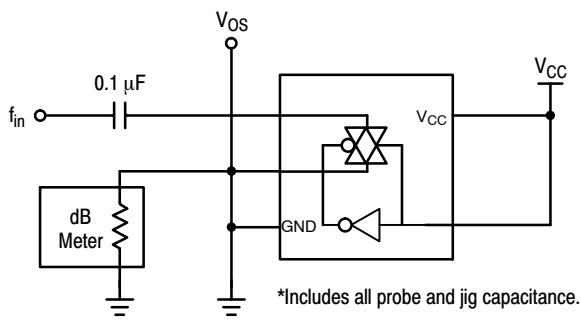
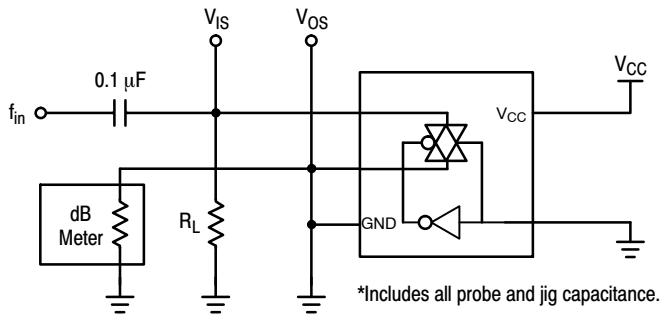


Figure 7. Power Dissipation Capacitance Test Set-Up

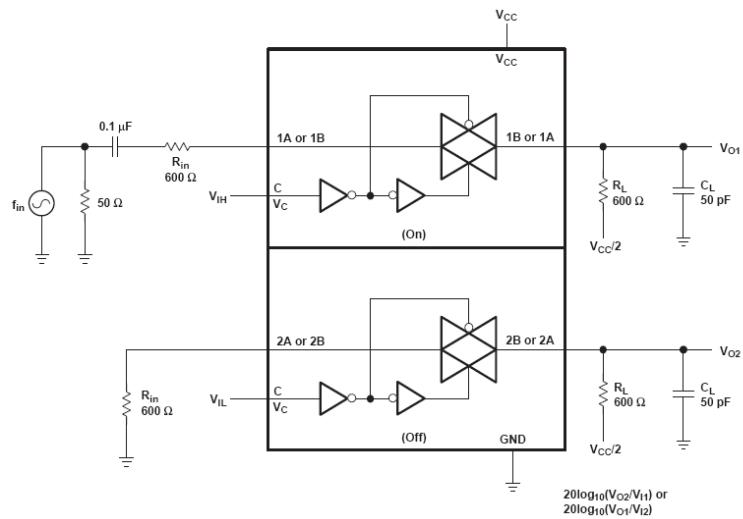
## NLX2G66



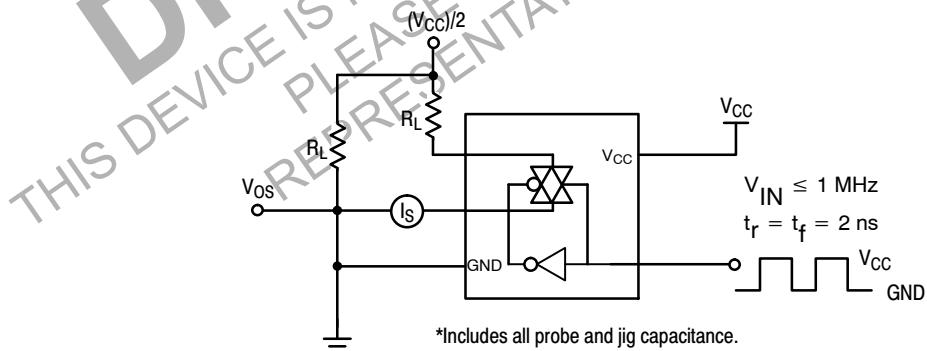
**Figure 8. Maximum On-Channel Bandwidth Test Set-Up**



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

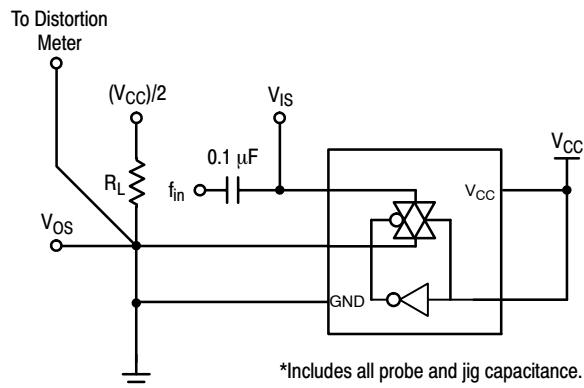


**Figure 10. Crosstalk (between Switches)**

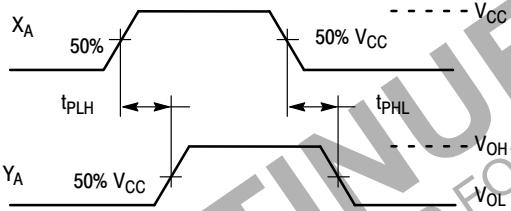


**Figure 11. Feedthrough Noise, ON/OFF Control to Analog Out, Test Set-Up**

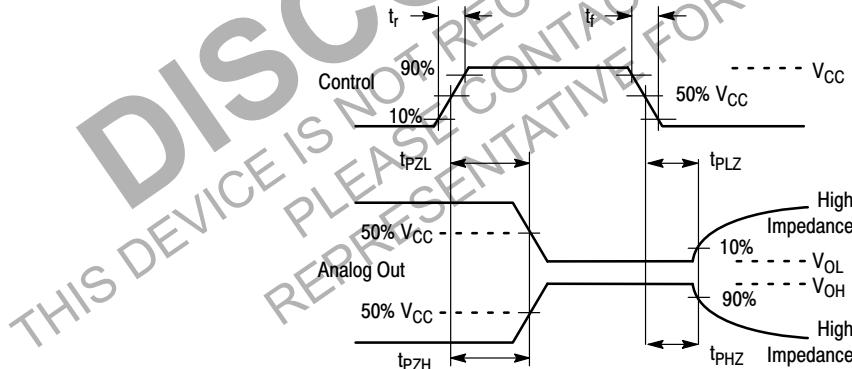
## NLX2G66



**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**

**MECHANICAL CASE OUTLINE**  
PACKAGE DIMENSIONS

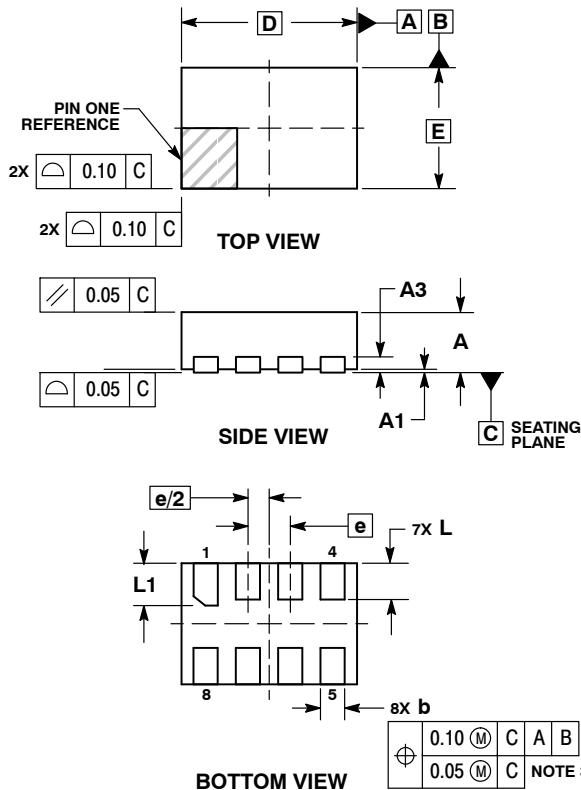
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SCALE 4:1

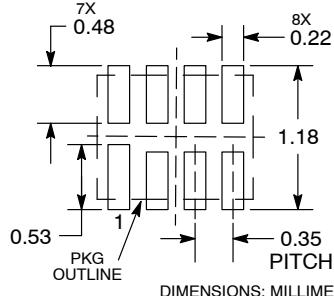
**UDFN8, 1.45x1.00, 0.35P**  
CASE 517BZ  
ISSUE O

DATE 18 MAY 2011



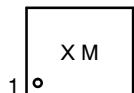
MILLIMETERS		
DIM.	MIN	MAX
A	0.45	0.55
A1	0.00	0.05
A3	0.13	REF
<i>b</i>	0.15	0.25
D	1.45	BSC
E	1.00	BSC
<i>e</i>	0.35	BSC
L	0.25	0.35
L1	0.30	0.40

**RECOMMENDED  
SOLDERING FOOTPRINT\***



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

**GENERIC  
MARKING DIAGRAM\***



X = Specific Device Code  
M = Date Code

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "■", may or may not be present. Some products may not follow the Generic Marking.

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DESCRIPTION:	UDFN8, 1.45X1, 0.35P	PAGE 1 OF 8

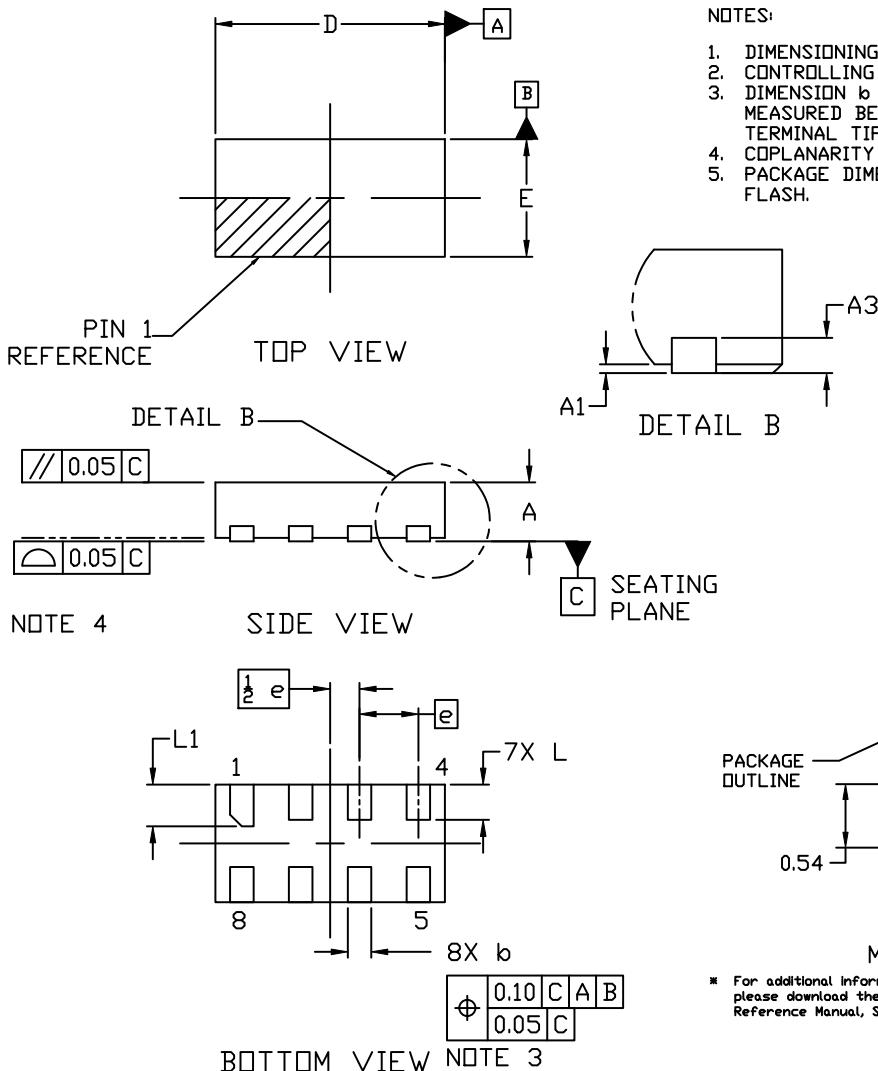
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**MECHANICAL CASE OUTLINE**  
PACKAGE DIMENSIONS

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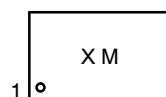
SCALE 4:1



DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.45	0.50	0.55
A1	0.00	---	0.05
A3 0.13 REF			
b	0.15	0.20	0.25
D	1.85	1.95	2.05
E	0.90	1.00	1.10
e	0.50 BSC		
L	0.25	0.30	0.35
L1	0.30	0.35	0.40

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

**GENERIC MARKING DIAGRAM\***



X = Specific Device Code

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\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "■", may or may not be present. Some products may not follow the Generic Marking.

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# MECHANICAL CASE OUTLINE

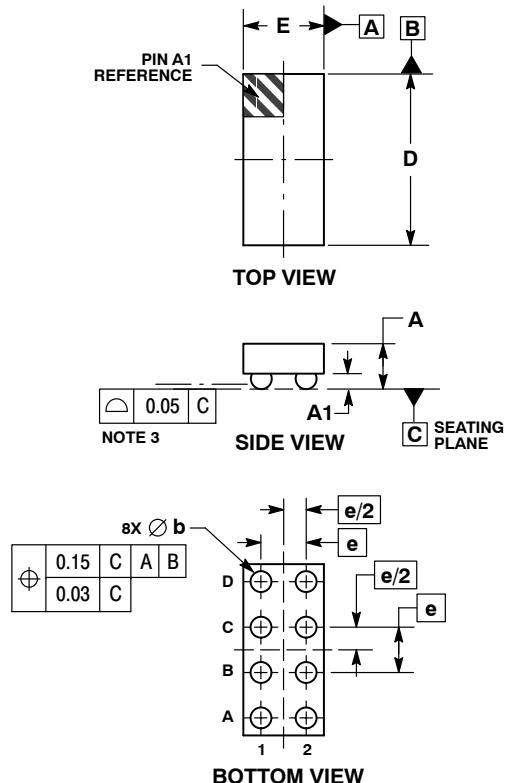
## PACKAGE DIMENSIONS

ON Semiconductor®



WLCSP8, 1.888x0.888  
CASE 567MR  
ISSUE A

DATE 27 OCT 2015



### 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	0.50 BSC

### GENERIC MARKING DIAGRAM\*



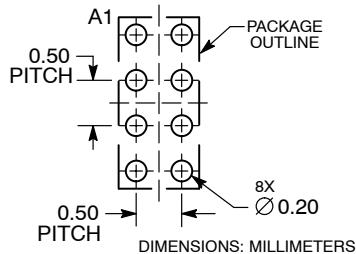
A = Assembly Location

Y = Year

WW = Work Week

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "■", may or may not be present.

### 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.

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DESCRIPTION:	WLCSP8, 1.888X0.888	PAGE 1 OF 6

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