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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 Ω 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
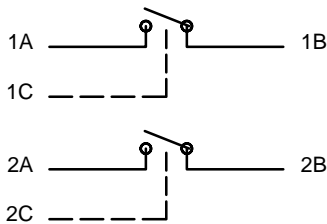
Figure 1. Analog Symbol

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

UDFN8
MU SUFFIX
CASE 517BZ
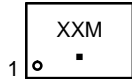
UDFN8
MU SUFFIX
CASE 517CA

XX = Specific Device Code
M = Date Code
▪ = Pb−Free Package

WLCSP8
FC SUFFIX
CASE 567MR
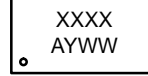
A = Assembly Location
Y = Year
WW = Work Week

PIN ASSIGNMENTS

UDFN8
(Top View)

WLCSP8
(Bottom View)
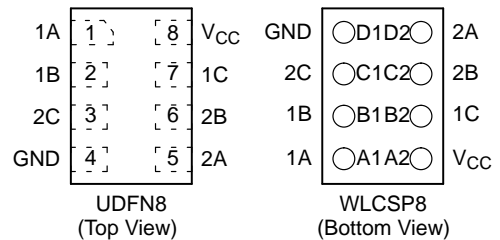
FUNCTION TABLE

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.

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		±50	mA
I_{IK}	Control input diode current		−50	mA
$I_{I/O}$	Continuous DC Current Through Analog Switch		±100	mA
I_L	Latch−up Current, (Above V_{CC} and below GND at 125°C)		±100	mA
T_s	Storage Temperature		−65 to +150	°C
V_{ESD}	ESD Withstand Voltage: Human Body Model (HBM) Machine Model (MM)		≥ 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	0	20	ns/V
		V_{CC} = ≥ 3.0 V	0	10	

Table 3. ELECTRICAL CHARACTERISTICS

				Guaranteed Limit				
				25°C		−55° to 125°C		
Symbol	Parameter	Condition	V_{CC}	Min	Max	Min	Max	Unit
V_{IH}	High−Level Input Voltage, Control Input		1.65 to 1.95			V_{CC} x 0.65		V
			2.3 to 5.5			V_{CC} x 0.7		
V_{IL}	Low−Level Input Voltage, Control Input		1.65 to 1.95				V_{CC} x 0.35	V
			2.3 to 5.5				V_{CC} x 0.30	
I_I	Input Leakage Current, Control Input	V_I = V_{CC} or GND	5.5		±0.1		±1	μA
$I_{S(ON)}$	ON−State Switch Leakage Current	V_{IS} = V_{CC} or GND, V_I = V_{IH}, V_{OS} = Open	5.5		±0.1		±1	μA
$I_{S(OFF)}$	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		±0.1		±1	μA
I_{CC}	Quiescent Supply Current	V_I = V_{CC} or GND	5.5		1.0		10	μA
ΔI_{CC}	Supply Current Change	V_I = V_{CC} − 0.6	5.5				500	μA
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$_{CC}$	Guaranteed Limit −55° to 125°C Min	Max	Unit
t$_{PLH}$, t$_{PHL}$	Propagation Delay, A to B, B to A	C$_L$ = 30 pF, R$_L$ = 1 kΩ	1.8		6.5	ns
			2.5		3.3	
		C$_L$ = 50 pF, R$_L$ = 500 Ω	3.3		2.5	
			5.0		2.2	
t$_{EN}$ (t$_{PZL}$, t$_{PZH}$)	Enable Time, C to Analog Output (A or B)	C$_L$ = 50 pF, R$_L$ = 500 Ω See Figure 6	1.8		10	ns
			2.5		6.5	
			3.3		5.5	
			5.0		4.9	
t$_{DIS}$ (t$_{PLZI}$, t$_{PHZ}$)	Disable Time, C to Analog Output (A or B)	C$_L$ = 50 pF, R$_L$ = 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$_{CC}$	25°C Typ	−55° to 125°C Min	Max	Unit
R$_{ON}$	On–Resistance	V$_{IS}$ = V$_{CC}$ or GND, V$_I$ = V$_{IH}$, See Figure 2	I$_S$ = 4 ma	1.65	12		30	Ω
			I$_S$ = 8 ma	2.3	9		20	
			I$_S$ = 24 ma	3.0	7.5		15	
			I$_S$ = 32 ma	4.5	5.5		13	
R$_{ON(peak)}$	Peak On–Resistance	V$_{IS}$ = GND to V$_{CC}$; V$_I$ = V$_{IH}$, See Figure 2	I$_S$ = 4 ma	1.65	74.5		220	Ω
			I$_S$ = 8 ma	2.3	20		75	
			I$_S$ = 24 ma	3.0	11.5		25	
			I$_S$ = 32 ma	4.5	7.5		17	
ΔR$_{ON}$	On–Resistance Mismatch between Switches	V$_{IS}$ = GND to V$_{CC}$; V$_I$ = V$_{IH}$, See Figure 2	I$_S$ = 4 ma	1.65			8.0	Ω
			I$_S$ = 8 ma	2.3			5.0	
			I$_S$ = 24 ma	3.0			3.0	
			I$_S$ = 32 ma	4.5			2.0	
BW	Bandwidth (f$_{-3dB}$)	R$_L$ = 50 Ω, C$_L$ = 5 pF, f$_{IN}$ = 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_{CC}	25°C Typ	Unit
ISO$_{Off}$	Off–Channel Feedthrough Isolation	R_L = 600 Ω, C_L = 50 pF, f_{IN} = 1 MHz Sine Wave See Figure 9	1.65	−70	dB
			2.3	−70	
			3.0	−70	
			4.5	−70	
		R_L = 50 Ω, C_L = 5 pF, f_{IN} = 1 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 Ω, C_L = 50 pF, f_{IN} = 1 MHz Sine Wave See Figure 10	1.65	−100	dB
			2.3	−100	
			3.0	−100	
			4.5	−100	
		R_L = 50 Ω, C_L = 5 pF, f_{IN} = 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_L = 600 Ω, C_L = 50 pF, f_{IN} = 1 MHz Square Wave, t_r = t_f = 2 ns, See Figure 11	1.65	10	mV$_{pp}$
			2.3	10	
			3.0	10	
			4.5	15	
THD	Total Harmonic Distortion	C_L = 50 pF, R_L = 50 Ω, f_{IN} = 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_{CC}	25°C Typ	Unit
C_{PD}	Power Dissipation Capacitance	f = 10 MHz	1.65	8.0	pF
			2.3	8.9	
			3.0	9.6	
			4.5	10.9	

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.
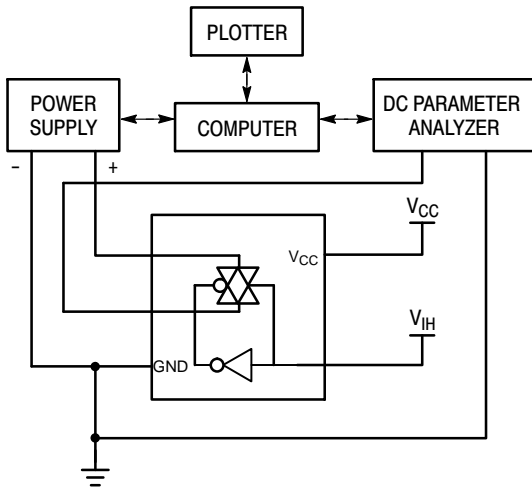
Figure 2. On Resistance Test Set−Up
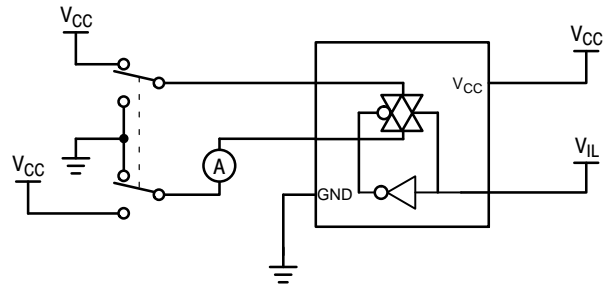
Figure 3. Maximum Off−Channel Leakage Current Test Set−Up
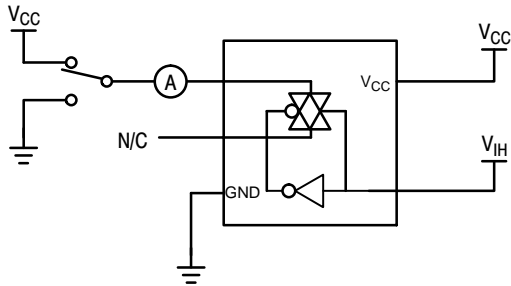
Figure 4. Maximum On−Channel Leakage Current Test Set−Up
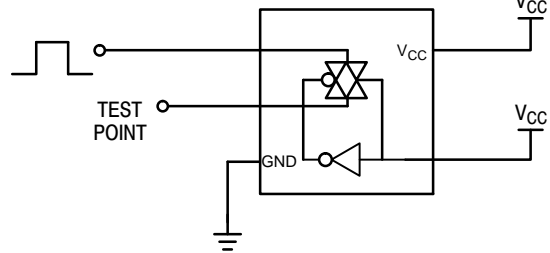
Figure 5. Propagation Delay Test Set−Up

Switch to Position 2 when testing t_{PLZ} and t_{PZL}
Switch to Position 1 when testing t_{PHZ} and t_{PZH}

*Includes all probe and jig capacitance.
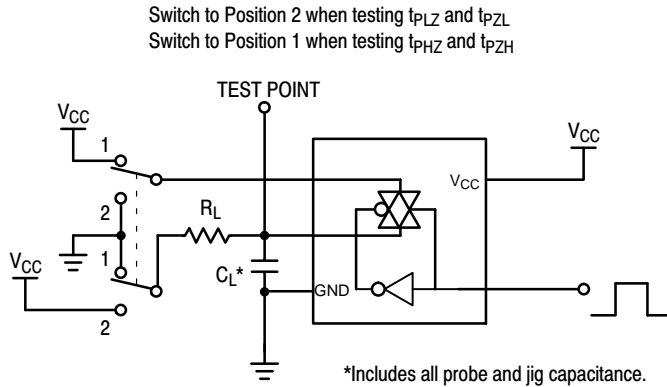
Figure 6. Propagation Delay Output Enable/Disable Test Set−Up
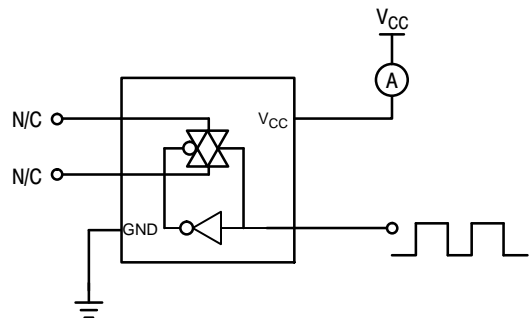
Figure 7. Power Dissipation Capacitance Test Set−Up

NLX2G66
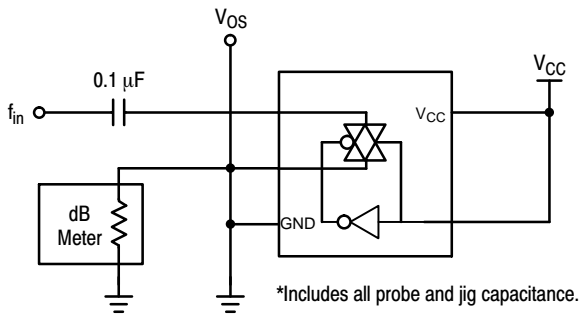
Figure 8. Maximum On–Channel Bandwidth
Test Set–Up
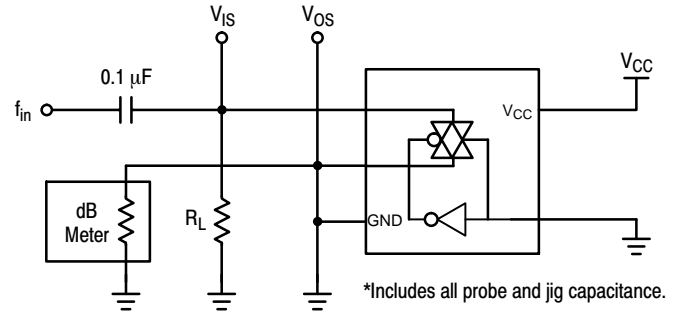
Figure 9. Off–Channel Feedthrough Isolation
Test Set–Up
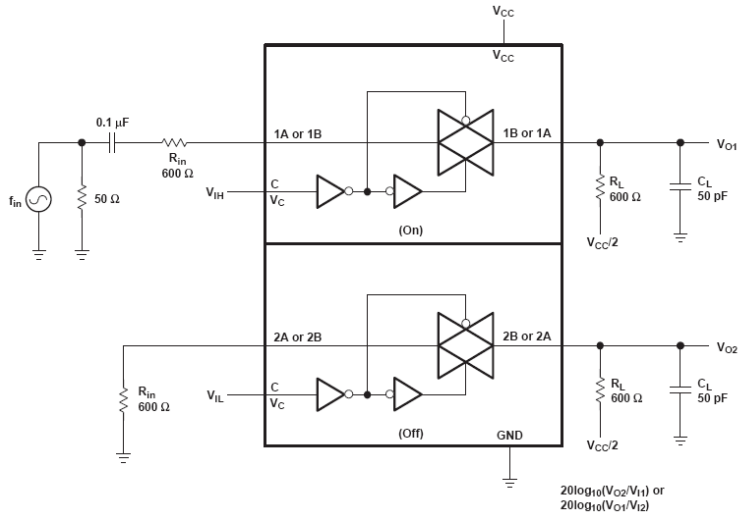
Figure 10. Crosstalk (between Switches)
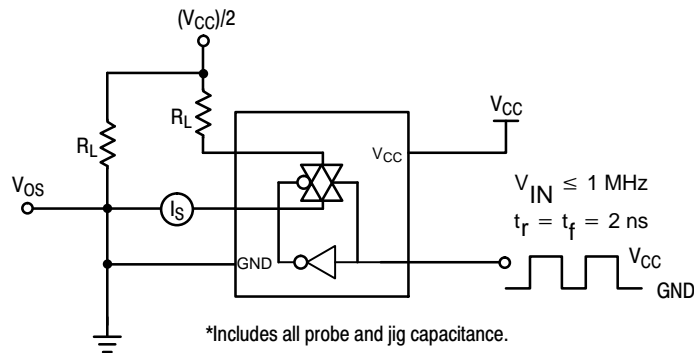
Figure 11. Feedthrough Noise, ON/OFF Control
to Analog Out, Test Set–Up

NLX2G66
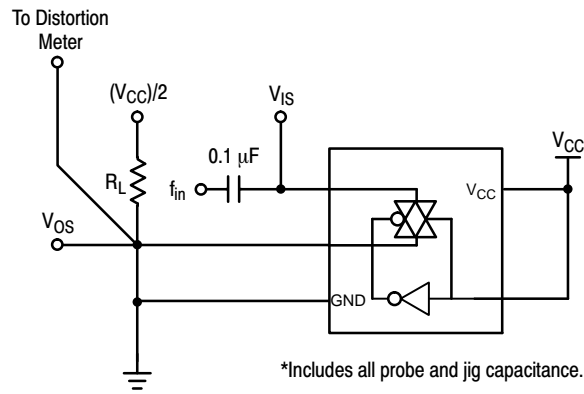
Figure 12. Total Harmonic Distortion Test
Set–Up

*Includes all probe and jig capacitance.
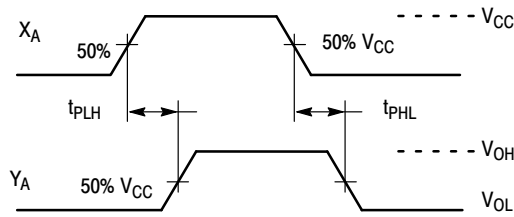
Figure 13. Propagation Delay, Analog In to
Analog Out Waveforms
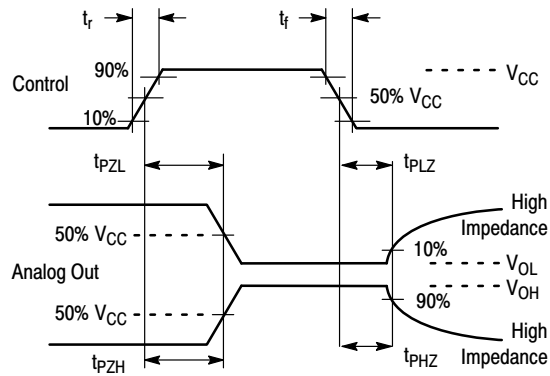
Figure 14. Propagation Delay, ON/OFF Control

NLX2G66

PACKAGE DIMENSIONS

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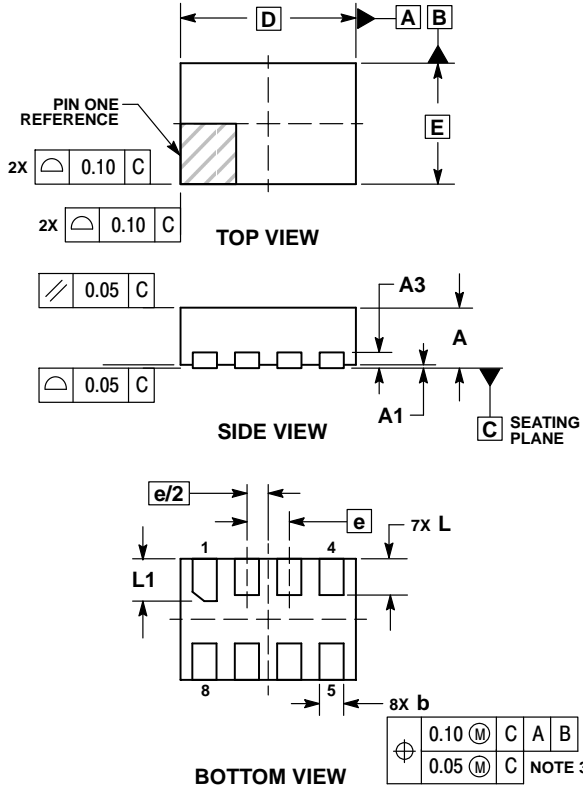
TOP VIEW

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
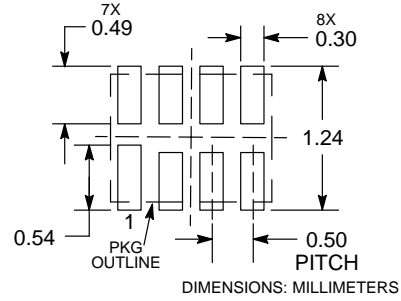0.05 Ⓜ C NOTE 3

PIN ONE REFERENCE

D A B

E

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
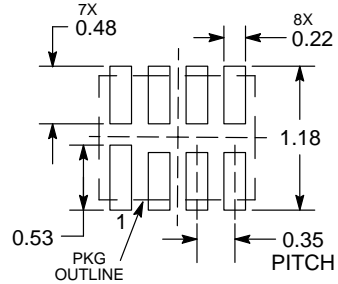
RECOMMENDED SOLDERING FOOTPRINT*

7X
0.48

8X
0.22

1.18

0.53

1

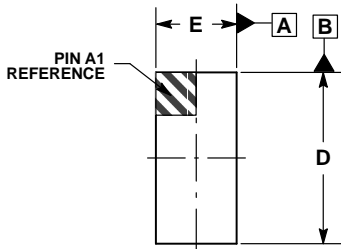PKG OUTLINE

0.35
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.
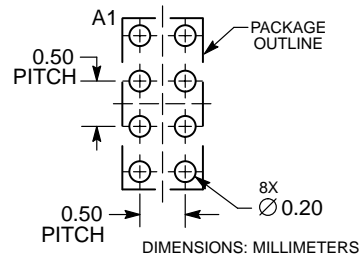
NLX2G66

PACKAGE DIMENSIONS

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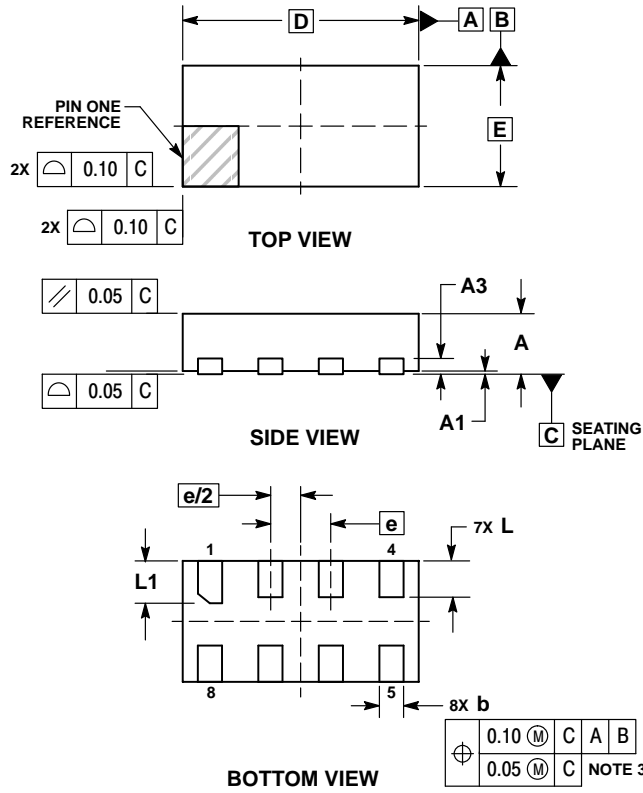
TOP VIEW

2X | ⌒ | 0.10 | C

2X | ⌒ | 0.10 | C

SIDE VIEW

| ⫽ | 0.05 | C

| ⌒ | 0.05 | C

A3

A

A1

C SEATING PLANE

BOTTOM VIEW

e/2

e

7X L

L1

8X b

| ⊕ | 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*

7X
0.49

8X
0.30

1.24

0.54

1

0.50

PKG OUTLINE

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.

NLX2G66

PACKAGE DIMENSIONS

WLCSP8, 1.888x0.888
CASE 567MR
ISSUE O

TOP VIEW
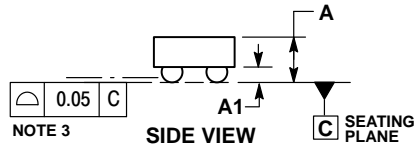
SIDE VIEW
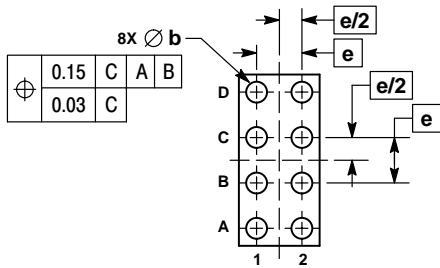
0.05 C
NOTE 3

A1

C SEATING PLANE

BOTTOM VIEW

8X ⌀ b

| 0.15 | C | A | B |
| 0.03 | C | | |

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*

A1
0.50 PITCH
0.50 PITCH

PACKAGE OUTLINE

8X ⌀ 0.20

DIMENSIONS: MILLIMETERS

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PUBLICATION ORDERING INFORMATION

NLX2G66/D