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 Ω at V_{CC} = 4.5 V and I_S = 32 mA
- Rail−to−Rail Input/Output
- High Speed, Typical t_{PD} < 1 ns at V_{CC} = 4.5 V and C_L = 50 pF
- 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

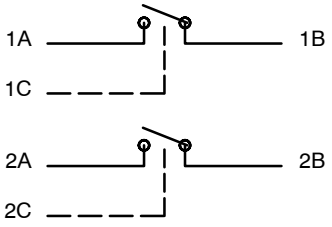


Figure 1. Analog Symbol

PIN ASSIGNMENTS

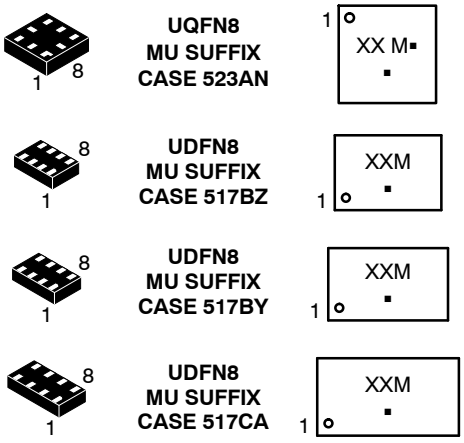
UDFN8	UQFN8−0.5P	Description
1	7	1A
2	6	1B
3	5	2C
4	4	GND
5	3	2A
6	2	2B
7	1	1C
8	8	V_{CC}

This document contains information on a product under development. ON Semiconductor reserves the right to change or discontinue this product without notice.

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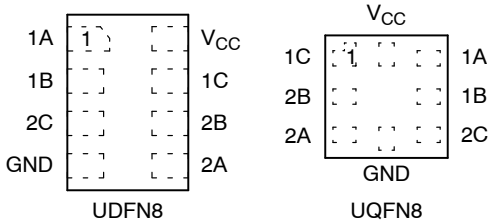
MARKING DIAGRAMS



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

(*Note: Microdot may be in either location)

PIN ASSIGNMENTS



(Top Views)

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.

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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 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.

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	Guaranteed Limit −55° to 125°C 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	−55° to 125°C 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†
NLX2G66AMUTCG (In Development)	UQFN8−0.5P, 1.6 mm x 1.6 mm (Pb−Free)	3000 / Tape & Reel
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
NLX2G66EMUTCG (In Development)	UDFN8−0.4P, 1.6 mm x 1.0 mm (Pb−Free)	3000 / Tape & Reel
NLX2G66FMUTCG (In Development)	UDFN8−0.35P, 1.45 mm x 1.0 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.

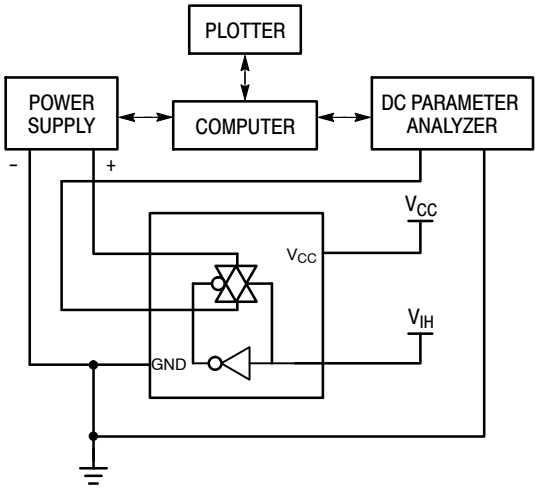


Figure 2. On Resistance Test Set−Up

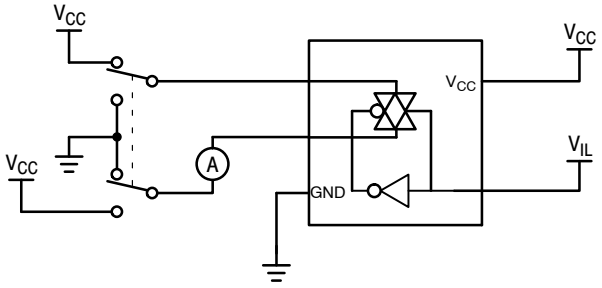


Figure 3. Maximum Off−Channel Leakage Current Test Set−Up

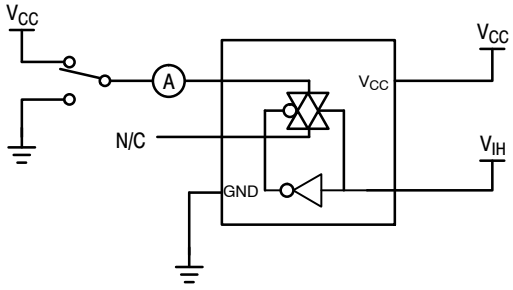


Figure 4. Maximum On−Channel Leakage Current Test Set−Up

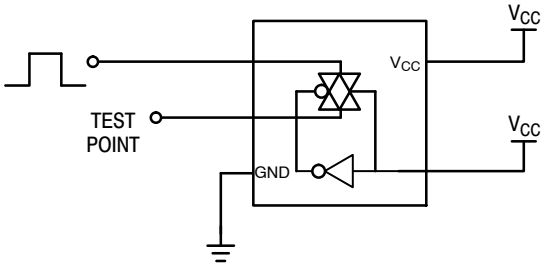


Figure 5. Propagation Delay Test Set−Up

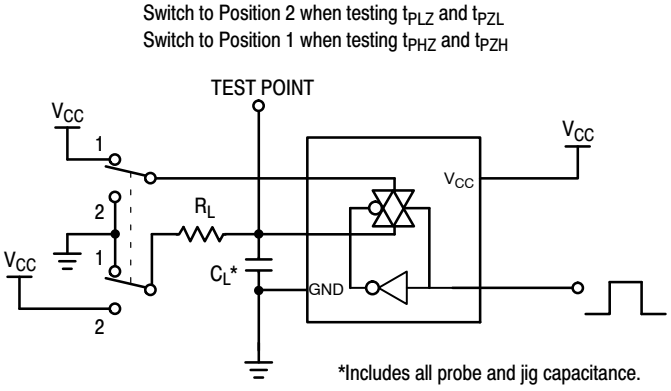


Figure 6. Propagation Delay Output Enable/Disable Test Set−Up

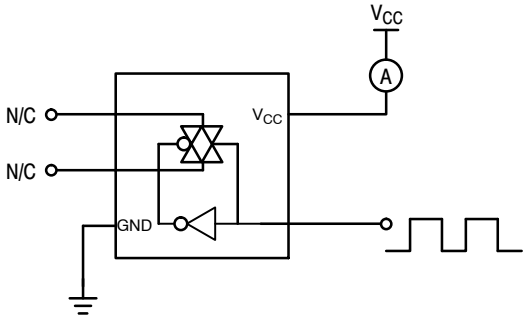


Figure 7. Power Dissipation Capacitance Test Set−Up

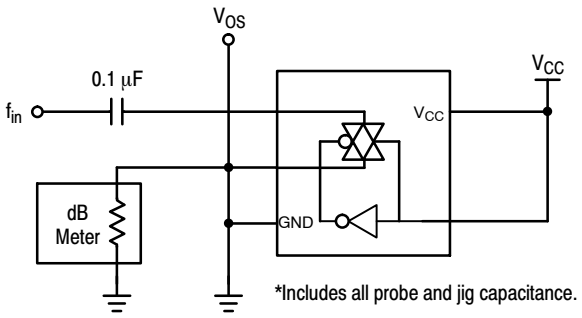


Figure 8. Maximum On−Channel Bandwidth Test Set−Up

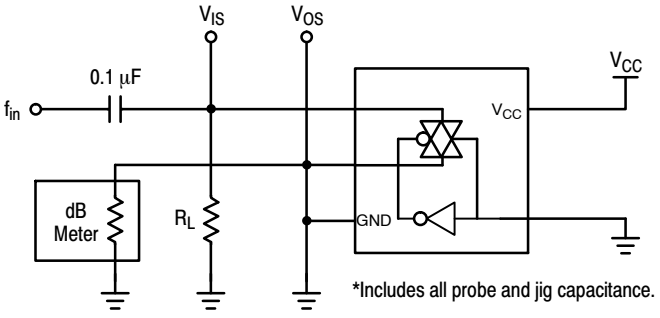


Figure 9. Off−Channel Feedthrough Isolation Test Set−Up

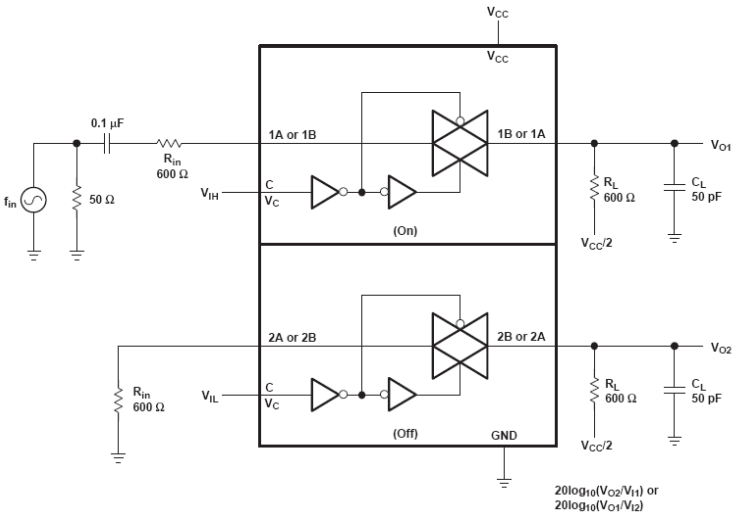


Figure 10. Crosstalk (between Switches)

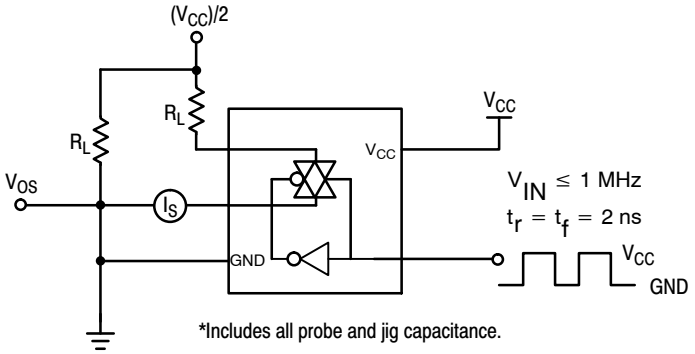


Figure 11. Feedthrough Noise, ON/OFF Control to Analog Out, Test Set−Up

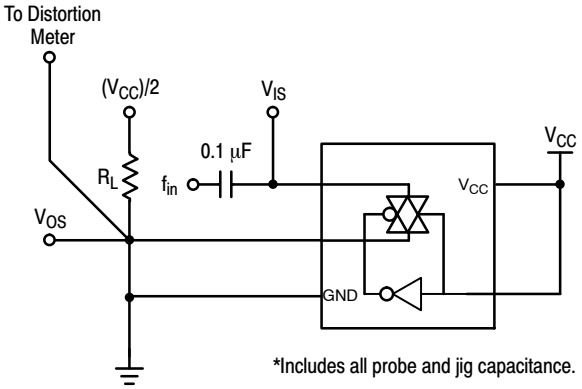


Figure 12. Total Harmonic Distortion Test Set−Up

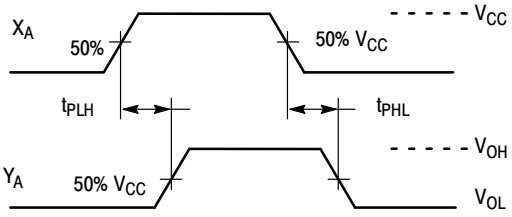


Figure 13. Propagation Delay, Analog In to Analog Out Waveforms

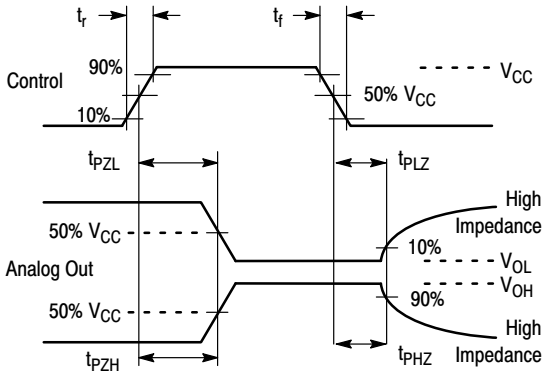
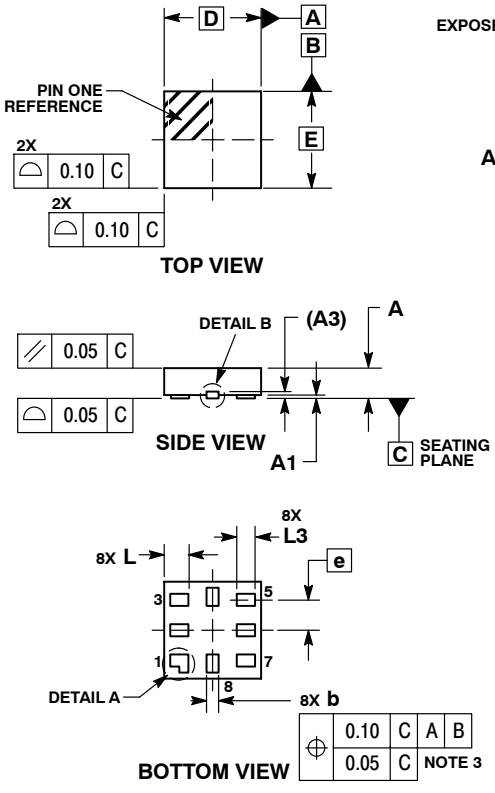
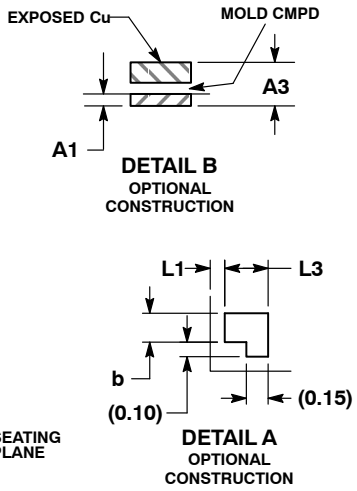


Figure 14. Propagation Delay, ON/OFF Control

PACKAGE DIMENSIONS

UQFN8
MU SUFFIX
CASE 523AN
ISSUE O

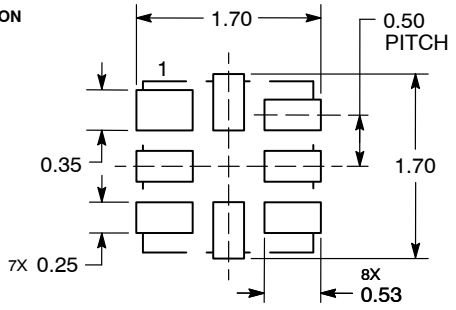




NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 mm FROM THE TERMINAL TIP.

	MILLIMETERS	
DIM	MIN	MAX
A	0.45	0.60
A1	0.00	0.05
A3	0.13 REF	
b	0.15	0.25
D	1.60 BSC	
E	1.60 BSC	
e	0.50 BSC	
L	0.35	0.45
L1	---	0.15
L3	0.25	0.35

SOLDERING FOOTPRINT*

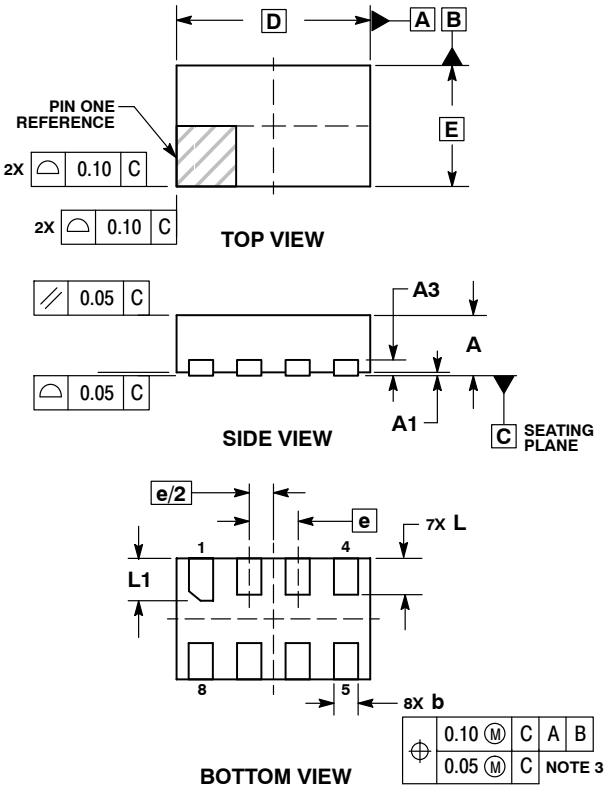


DIMENSIONS: MILLIMETERS

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

PACKAGE DIMENSIONS

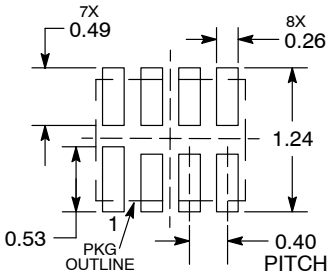
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CASE 517BY
ISSUE O



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
A	0.45	0.55
A1	0.00	0.05
A3	0.13 REF	
b	0.15	0.25
D	1.60 BSC	
E	1.00 BSC	
e	0.40 BSC	
L	0.25	0.35
L1	0.30	0.40

RECOMMENDED SOLDERING FOOTPRINT*

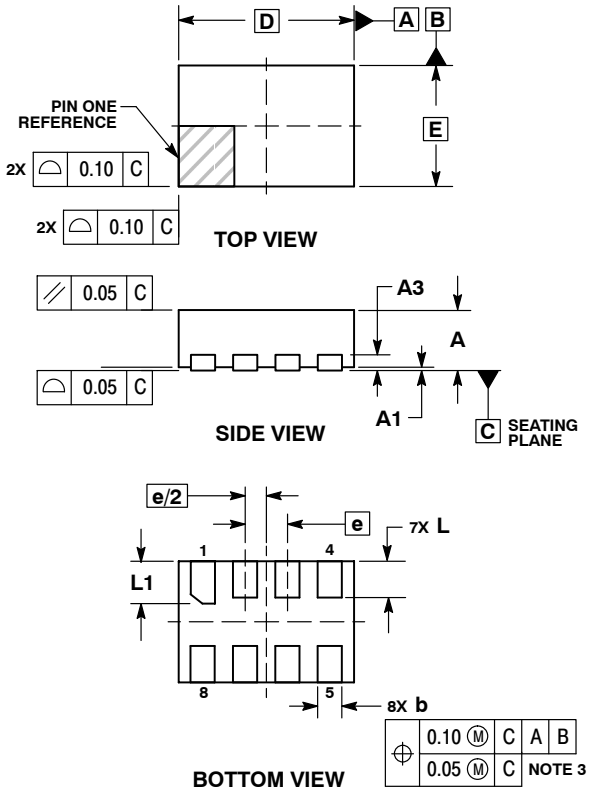


DIMENSIONS: MILLIMETERS

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

PACKAGE DIMENSIONS

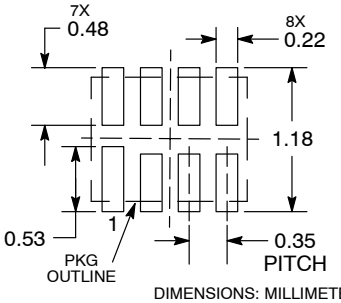
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CASE 517BZ
ISSUE O



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
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*

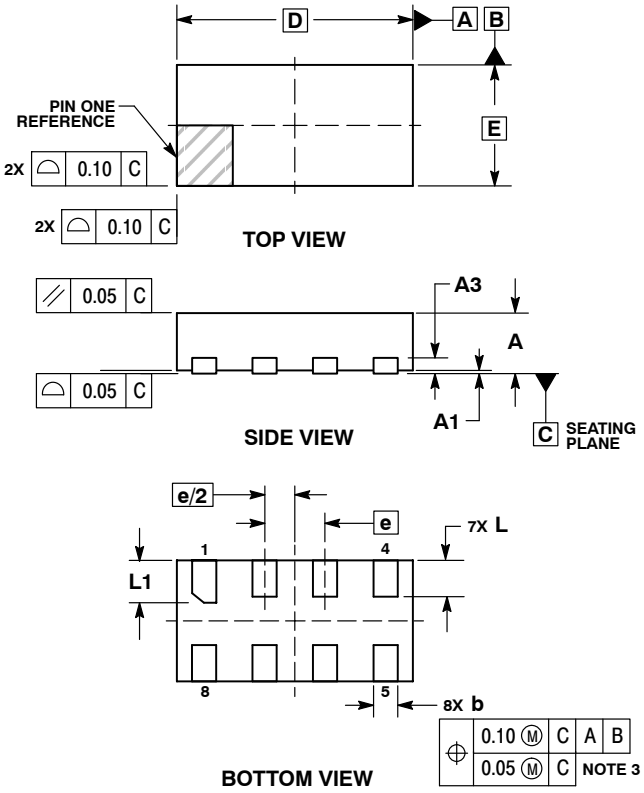


DIMENSIONS: MILLIMETERS

*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

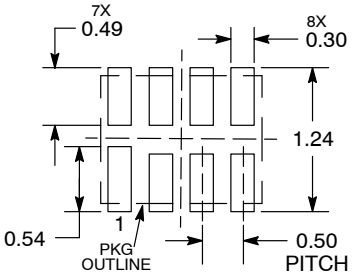
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CASE 517CA
ISSUE O



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.

	MILLIMETERS	
DIM	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*



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.

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