

# NL7SZ18

## 1-to-2 Demultiplexer with 3-State Deselected Output

The NL7SZ18 is a high-performance non-inverting 1-to-2 demultiplexer. With the Select input [S] at Low, data at A is passed to Y0 and Y1 is set to high impedance. With the Select input [S] at High, data at A is passed to Y1 and Y0 is set to high impedance. The device operates over the voltage range from 1.65 V to 5.5 V.

This device has been optimized for on-board buffering applications and offers mixed (1.65 V, 2.3 V, 3.0 V and 5.5 V) voltage capability by providing over voltage tolerance (OVT\*) circuitry on I/O pins.

### Features

- High-Speed Propagation Delay  
 $t_{PD}$  2.5 nS (Typ), Load 50 pF @ 5.0 V
- Power Down Impedance  
 Outputs in High-Z
- Output Drive Capability  
 32 mA @ 5.0 V
- Broad  $V_{CC}$  Operating Range  
 1.65 V to 5.5 V
- Surface Mount Technology  
 SC-70, 6-Lead and UDFN6 Packaging
- OVT\* on Inputs/Outputs
- Pb-Free Package is Available

### Typical Applications

- Cell Phones
- PDAs
- Digital Cameras
- Video Cameras

### Important Information

- ESD Protection: MM >200 V, Human Body Model >2000 V
- Latch-Up Max Rating: 300 mA
- Pin-to-Pin Compatible with NC7SZ18

\*Over Voltage Tolerance (OVT) enables input and output pins to function outside (higher) of their operating voltages, with no damage to the devices or to signal integrity.

**PIN/FUNCTION TABLE**

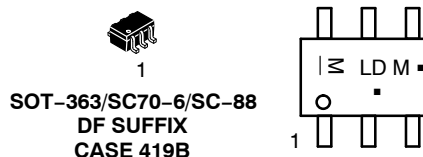
Pin	Function
A	Data Input
S	Demultiplexer Select
Y <sub>0</sub>	Output 1
Y <sub>1</sub>	Output 2



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### MARKING DIAGRAMS

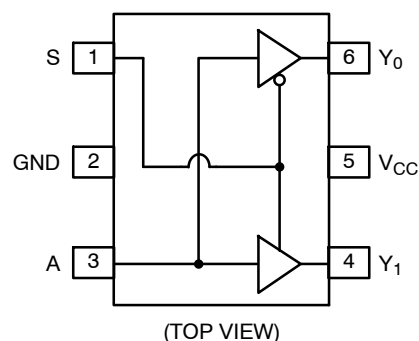


LD, T = Device Marking  
 M = Date Code\*  
 ■ = Pb-Free Package

(Note: Microdot may be in either location)

\*Date Code orientation and/or position may vary depending upon manufacturing location.

### PIN ASSIGNMENT



### TRUTH TABLE

Input		Output	
S	A	Y <sub>0</sub>	Y <sub>1</sub>
L	L	L	Z
L	H	H	Z
H	L	Z	L
H	H	Z	H

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

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## MAXIMUM RATINGS

Rating	Symbol	Value	Unit
DC Supply Voltage	$V_{CC}$	-0.5 to +7.0	V
DC Input Voltage	$V_{IN}$	-0.5 to +7.0	V
DC Output Voltage	$V_{OUT}$	-0.5 to +7.0	V
DC Input Diode Current @ $V_1 < -0.5$ V	$I_{IK}$	-50	mA
DC Output Diode Current @ $V_1 < -0.5$ V	$I_{OK}$	-50	mA
DC Output Sink Current	$I_{OUT}$	$\pm 50$	mA
DC Supply Current per Supply Pin	$I_{CC}$	$\pm 100$	mA
DC Ground Current per Ground Pin	$I_{GND}$	$\pm 100$	mA
Storage Temperature Range	$T_{STG}$	-65 to +150	$^{\circ}C$
Lead Temperature, 1 mm from Case for 10 Seconds	$T_L$	260	$^{\circ}C$
Junction Temperature Under Bias	$T_J$	+150	$^{\circ}C$
Thermal Resistance (Note 1)	$\theta_{JA}$	250	$^{\circ}C/W$
Power Dissipation in Still Air at 85 $^{\circ}C$	$P_D$	180	mW
Moisture Sensitivity	MSL	Level 1	-
Flammability Rating	Oxygen Index: 28 to 34 $F_R$	UL 94 V-0 @ 0125 in	-
ESD Withstand Voltage	Human Body Model (Note 2) Machine Model (Note 3) Charged Device Model (Note 4) $V_{ESD}$	> 2000 > 200 n/a	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.

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/JESD22-A115-A.
4. Tested to JESD22-C101-A.

## RECOMMENDED OPERATING CONDITIONS

Rating	Symbol	Value	Unit
DC Supply Voltage	$V_{CC}$	1.65 to 5.5	V
DC Supply Voltage, Data Retention	$V_{CC}$	1.5 to 5.5	V
Input Voltage	$V_{IN}$	0 to 5.5	V
Output Voltage	$V_{OUT}$	0 to 5.5	V
Operating Temperature	$T_A$	-55 to 125	$^{\circ}C$
Input Rise and Fall Times	$t_r, t_f$	$V_{CC}$ @ 1.8 $\pm$ 0.15 V $V_{CC}$ @ 2.5 $\pm$ 0.2 V $V_{CC}$ @ 3.3 $\pm$ 0.3 V $V_{CC}$ @ 5.0 $\pm$ 0.5 V	0 to 20 0 to 20 0 to 10 0 to 5
Thermal Resistance	$\theta_{JA}$	350	$^{\circ}C/W$

## ORDERING INFORMATION

Device Order Number	Package	Shipping <sup>†</sup>
NL7SZ18DFT2	SC70-6	3000 / Tape & Reel
NL7SZ18DFT2G	SC70-6 (Pb-Free)	3000 / Tape & Reel
NL7SZ18MUR2G	UDFN6 (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.

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## DC ELECTRICAL CHARACTERISTICS

Parameter	Condition		Symbol	V <sub>CC</sub> (V)	T <sub>A</sub> = 25°C			T <sub>A</sub> = -55°C to 125°C		Unit
					Min	Typ	Max	Min	Max	
High-Level Input Voltage			V <sub>IH</sub>	1.65–1.95 2.3–5.5	0.75 V <sub>CC</sub> 0.70 V <sub>CC</sub>			0.75 V <sub>CC</sub> 0.70 V <sub>CC</sub>		V
Low-Level Output Voltage			V <sub>IL</sub>	1.65–1.95 2.3–5.5			0.25 V <sub>CC</sub> 0.30 V <sub>CC</sub>		0.25 V <sub>CC</sub> 0.30 V <sub>CC</sub>	V
High-Level Output Voltage	V <sub>IN</sub> = V <sub>IH</sub>	I <sub>OH</sub> = -100 μA	V <sub>OH</sub>	1.65 2.3 3.0 4.5	1.55 2.20 2.90 4.40	1.65 2.30 3.00 4.50		1.55 2.20 2.90 4.40		V
		I <sub>OH</sub> = -4.0 mA I <sub>OH</sub> = -8.0 mA I <sub>OH</sub> = -16 mA I <sub>OH</sub> = -24 mA I <sub>OH</sub> = -32 mA		1.65 2.3 3.0 4.5	1.29 1.90 2.40 2.30 3.80	1.52 2.15 2.80 2.68 4.20		1.29 1.90 2.40 2.30 3.80		
Low-Level Output Voltage	V <sub>IN</sub> = V <sub>IL</sub>	I <sub>OL</sub> = 100 μA	V <sub>OL</sub>	1.65 2.3 3.0 4.5		0.0 0.0 0.0 0.0	0.10 0.10 0.10 0.10		0.10 0.10 0.10 0.10	V
		I <sub>OL</sub> = 4.0 mA I <sub>OL</sub> = 8.0 mA I <sub>OL</sub> = 16 mA I <sub>OL</sub> = 24 mA I <sub>OL</sub> = 32 mA		1.65 2.3 3.0 4.5		0.08 0.10 0.15 0.22 0.22	0.24 0.30 0.40 0.55 0.55		0.24 0.30 0.40 0.55 0.55	
Input Leakage Current	V <sub>IN</sub> = 5.5 V, GND		I <sub>IN</sub>	0.0 to 5.5			±0.1		±1.0	μA
Output High-Z Current	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> 0 < V <sub>out</sub> ≤ 5.5 V		I <sub>OZ</sub>	1.65 to 5.5			±0.5		±5.0	μA
Power-Off Leakage Current	V <sub>IN</sub> or V <sub>CC</sub> = 5.5 V		I <sub>OFF</sub>	0.0			1.0		10	μA
Quiescent Supply Current	V <sub>IN</sub> = 5.5 V, GND		I <sub>CC</sub>	1.8 to 5.5			1.0		10	μA

AC ELECTRICAL CHARACTERISTICS

Parameter	Condition	Figure	Symbol	V <sub>CC</sub>	T <sub>A</sub> = 25°C			T <sub>A</sub> = -55°C to 125°C		Unit
					Min	Typ	Max	Min	Max	
Propagation Delay A to Y <sub>0</sub> or Y <sub>1</sub>	C <sub>L</sub> = 15 pF R <sub>D</sub> = 1.0 MΩ S = OPEN	Figures 1 & 3	t <sub>PLH</sub> t <sub>PHL</sub>	1.8 ± 0.15	2.0	6.3	10.1	2.0	10.5	nS
	2.5 ± 0.2			1.0	3.6	5.7	1.0	6.0		
				3.3 ± 0.3	0.8	2.7	4.0	0.8	4.3	
				5.0 ± 0.5	0.5	2.0	3.1	0.5	3.3	
Output Enable Time	C <sub>L</sub> = 50 pF R <sub>D</sub> , R <sub>U</sub> = 500 Ω S = GND for t <sub>PZH</sub> S = V <sub>IN</sub> for t <sub>PZL</sub> V <sub>I</sub> = 2 × V <sub>CC</sub>	Figures 1 & 3	t <sub>PZL</sub> t <sub>PZH</sub>	1.8 ± 0.15	3.0	6.9	12	3.0	12.5	nS
	2.5 ± 0.2			1.8	4.2	6.8	1.8	7.3		
				3.3 ± 0.3	1.2	3.2	5.0	1.2	5.5	
				5.0 ± 0.5	0.8	2.5	4.0	0.8	4.3	
Output Enable Time	C <sub>L</sub> = 50 pF R <sub>D</sub> , R <sub>D</sub> = 500 Ω S = GND for t <sub>PHZ</sub> S = V <sub>IN</sub> for t <sub>PLZ</sub> V <sub>I</sub> = 2 × V <sub>CC</sub>	Figures 1 & 3	t <sub>PLZ</sub> t <sub>PHZ</sub>	1.8 ± 0.15	2.5	6.0	10	2.5	10.5	nS
	2.5 ± 0.2			1.5	4.0	6.8	1.5	7.1		
				3.3 ± 0.3	0.8	2.9	4.9	0.8	5.3	
				5.0 ± 0.5	0.3	1.8	3.5	0.3	3.7	
Input Capacitance			C <sub>IN</sub>	OPEN		2.5				pF
Output Capacitance			C <sub>OUT</sub>	3.3		4.0				pF
Power Dissipation Capacitance	Note 5	Figure 2	C <sub>PD</sub>	3.3 5.0		16 19.5				pF

5. C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is derived from dynamic operating current consumption (I<sub>CCD</sub>) at no output loading and operating at 50% duty cycle (see Figure 2). C<sub>PD</sub> is related to I<sub>CCD</sub> dynamic operating current by the expression: I<sub>CCD</sub> = (C<sub>PD</sub>) (V<sub>CC</sub>) (f<sub>IN</sub>) + (I<sub>CCD</sub>static).

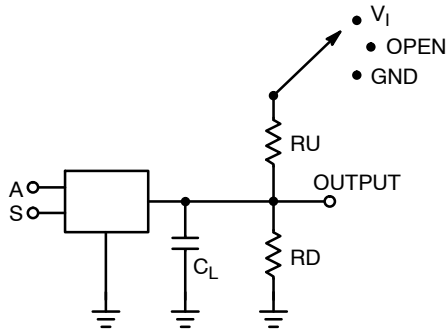


Figure 1. AC Test Circuit

C<sub>L</sub> Includes Load and Stray Capacitance  
Input PRR = 1.0 MHz; t<sub>w</sub> = 500 nS

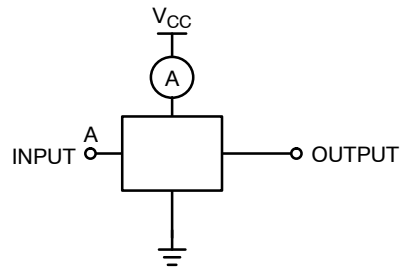


Figure 2. I<sub>CCD</sub> Test Circuit

Input = AC Waveform; t<sub>r</sub> = t<sub>f</sub> = 1.8 nS  
PRR = 10 MHz; Duty Cycle = 50%  
S Input = GND or x

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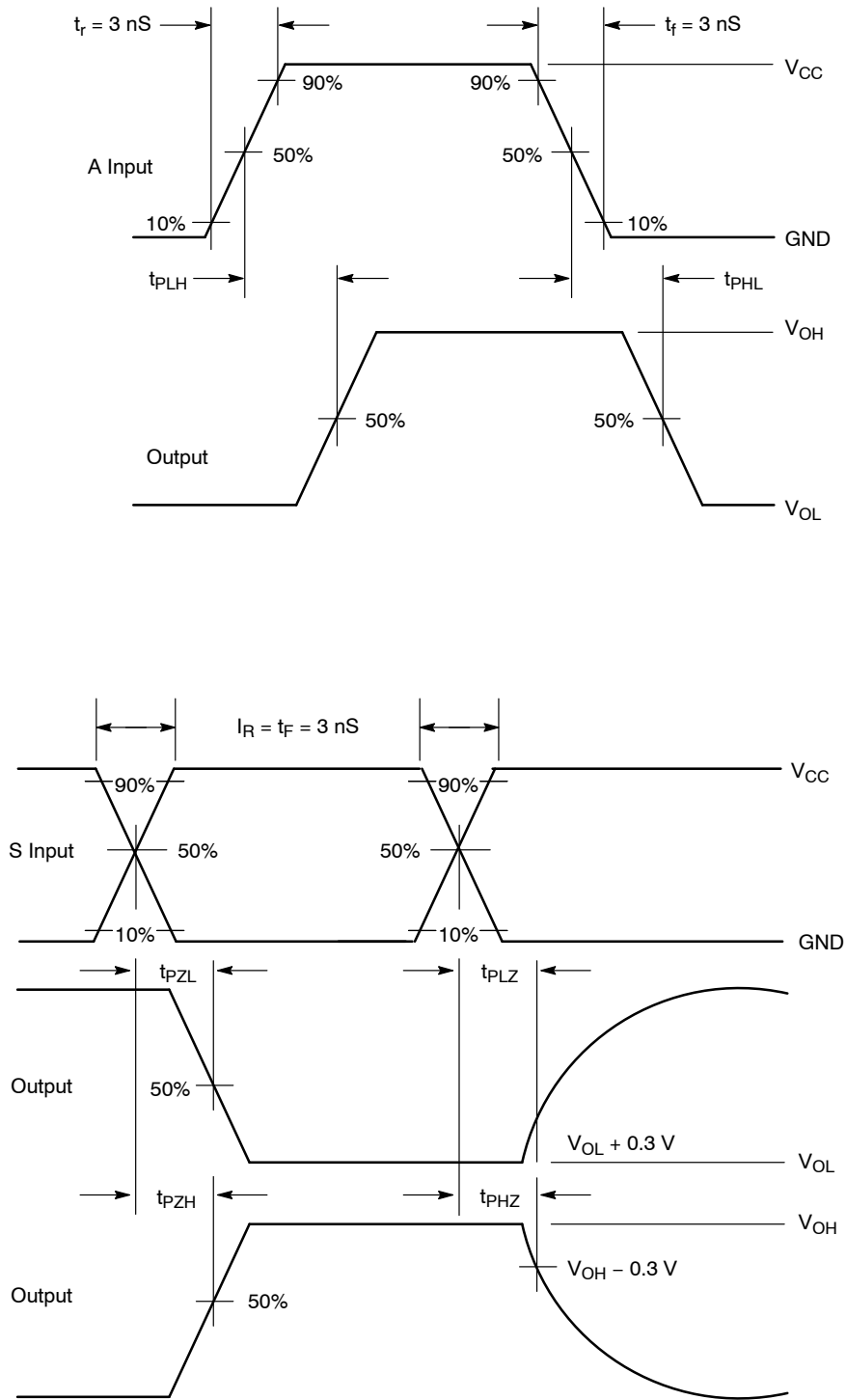
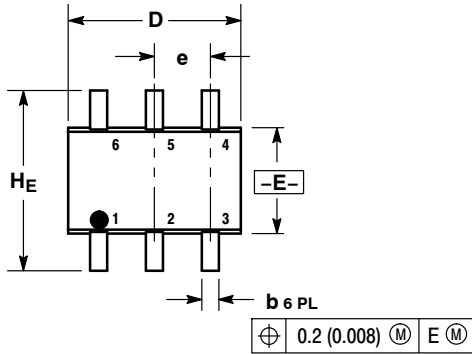


Figure 3. AC Waveforms

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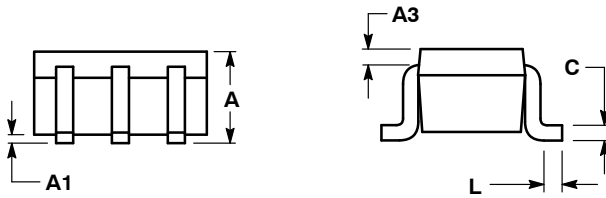
## PACKAGE DIMENSIONS

SC-88/SC70-6/SOT-363  
CASE 419B-02  
ISSUE W

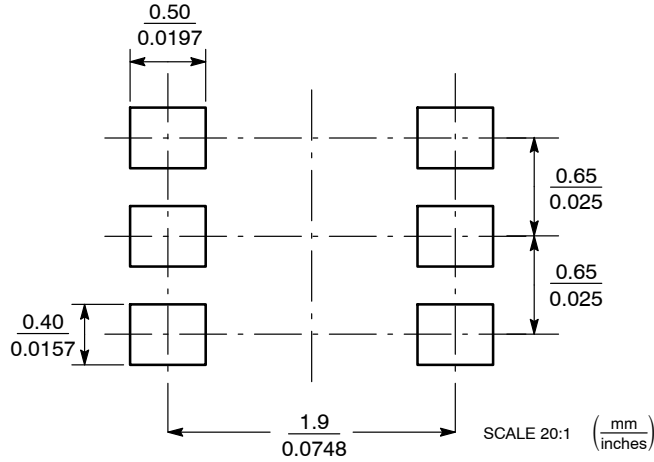


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. 419B-01 OBSOLETE, NEW STANDARD 419B-02.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.80	0.95	1.10	0.031	0.037	0.043
A1	0.00	0.05	0.10	0.000	0.002	0.004
A3	0.20 REF			0.008 REF		
b	0.10	0.21	0.30	0.004	0.008	0.012
C	0.10	0.14	0.25	0.004	0.005	0.010
D	1.80	2.00	2.20	0.070	0.078	0.086
E	1.15	1.25	1.35	0.045	0.049	0.053
e	0.65 BSC			0.026 BSC		
L	0.10	0.20	0.30	0.004	0.008	0.012
HE	2.00	2.10	2.20	0.078	0.082	0.086



### SOLDERING FOOTPRINT\*

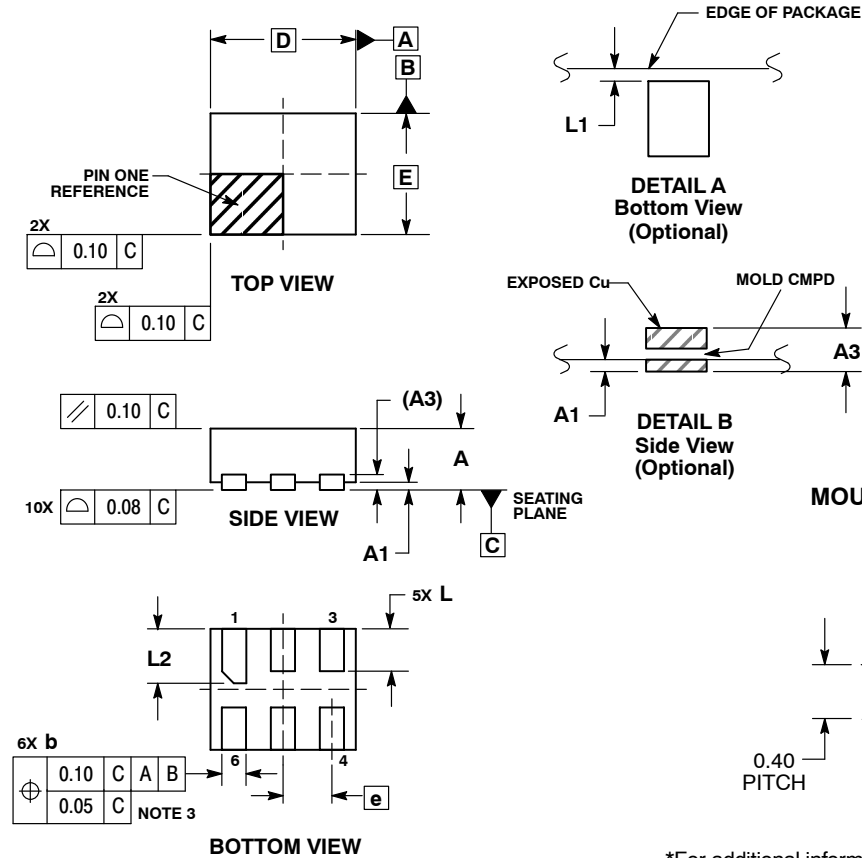


\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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## PACKAGE DIMENSIONS

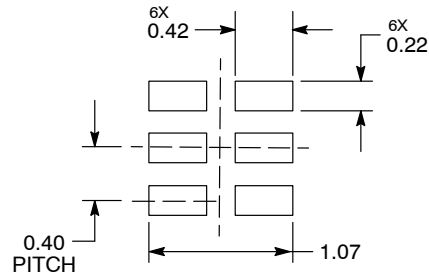
UDFN6, 1.2x1.0, 0.4P  
CASE 517AA-01  
ISSUE D



- 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.

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