

# NLU2G17

## Dual Non-Inverting Schmitt-Trigger Buffer

The NLU2G17 MiniGate™ is an advanced high-speed CMOS dual non-inverting Schmitt-trigger buffer in ultra-small footprint.

The NLU2G17 input and output structures provide protection when voltages up to 7.0 V are applied, regardless of the supply voltage.

The NLU2G17 can be used to enhance noise immunity or to square up slowly changing waveforms.

### Features

- High Speed:  $t_{PD} = 4.0 \text{ ns}$  (Typ) @  $V_{CC} = 5.0 \text{ V}$
- Low Power Dissipation:  $I_{CC} = 1 \mu\text{A}$  (Max) at  $T_A = 25^\circ\text{C}$
- Power Down Protection Provided on inputs
- Balanced Propagation Delays
- Overvoltage Tolerant (OVT) Input and Output Pins
- Ultra-Small Packages
- These are Pb-Free Devices

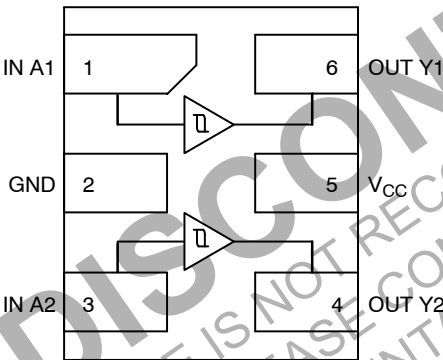


Figure 1. Pinout (Top View)

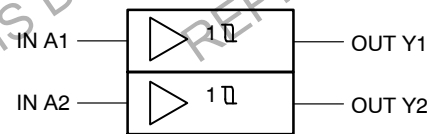


Figure 2. Logic Symbol

### PIN ASSIGNMENT

1	IN A1
2	GND
3	IN A2
4	OUT Y2
5	V <sub>CC</sub>
6	OUT Y1

### FUNCTION TABLE

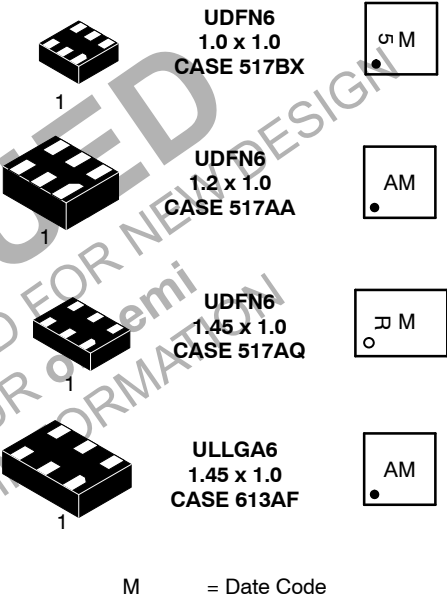
A	Y
L	L
H	H



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### MARKING DIAGRAMS



### ORDERING INFORMATION

See detailed ordering and shipping information on page 4 of this data sheet.

# MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	DC Supply Voltage	−0.5 to +7.0	V
V <sub>IN</sub>	DC Input Voltage	−0.5 to +7.0	V
V <sub>OUT</sub>	DC Output Voltage	−0.5 to +7.0	V
I <sub>IK</sub>	DC Input Diode Current V <sub>IN</sub> < GND	−20	mA
I <sub>OK</sub>	DC Output Diode Current V <sub>OUT</sub> < GND	±20	mA
I <sub>O</sub>	DC Output Source/Sink Current	±12.5	mA
I <sub>CC</sub>	DC Supply Current Per Supply Pin	±25	mA
I <sub>GND</sub>	DC Ground Current per Ground Pin	±25	mA
T <sub>STG</sub>	Storage Temperature Range	−65 to +150	°C
T <sub>L</sub>	Lead Temperature, 1 mm from Case for 10 Seconds	260	°C
T <sub>J</sub>	Junction Temperature Under Bias	150	°C
MSL	Moisture Sensitivity	Level 1	
F <sub>R</sub>	Flammability Rating Oxygen Index: 28 to 34	UL 94 V-0 @ 0.125 in	
I <sub>LATCHUP</sub>	Latchup Performance Above V <sub>CC</sub> and Below GND at 125°C (Note 2)	±500	mA

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.

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 / JESD78.

# RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V <sub>CC</sub>	Positive DC Supply Voltage	1.65	5.5	V
V <sub>IN</sub>	Digital Input Voltage	0	5.5	V
V <sub>OUT</sub>	Output Voltage	0	5.5	V
T <sub>A</sub>	Operating Free-Air Temperature	−55	+125	°C
Δt/ΔV	Input Transition Rise or Fall Rate V <sub>CC</sub> = 3.3 V ± 0.3 V V <sub>CC</sub> = 5.0 V ± 0.5 V	0 0	No Limit No Limit	ns/V

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	V <sub>CC</sub> (V)	T <sub>A</sub> = 25 °C			T <sub>A</sub> = +85°C		T <sub>A</sub> = -55°C to +125°C		Unit
				Min	Typ	Max	Min	Max	Min	Max	
V <sub>T+</sub>	Positive Threshold Voltage		3.0 4.5 5.5		2.0 3.0 3.6	2.2 3.15 3.85		2.2 3.15 3.85		2.2 3.15 3.85	V
V <sub>T-</sub>	Negative Threshold Voltage		3.0 4.5 5.5	0.9 1.35 1.65	1.5 2.3 2.9	1.65 2.46 3.05	0.9 1.35 1.65		0.9 1.35 1.65		V
V <sub>H</sub>	Hysteresis Voltage		3.0 4.5 5.5	0.30 0.40 0.50	0.57 0.67 0.74	1.20 1.40 1.60	0.30 0.40 0.50	1.20 1.40 1.60	0.30 0.40 0.50	1.20 1.40 1.60	V
V <sub>OH</sub>	Minimum High-Level Output Voltage	V <sub>IN</sub> ≥ V <sub>T+MAX</sub> I <sub>OH</sub> = -50 μA	2.0 3.0 4.5	1.9 2.9 4.4	2.0 3.0 4.5		1.9 2.9 4.4		1.9 2.9 4.4		V
		V <sub>IN</sub> ≥ V <sub>T+MAX</sub> I <sub>OH</sub> = -4 mA I <sub>OH</sub> = -8 mA	3.0 4.5	2.58 3.94			2.48 3.80		2.34 3.66		
V <sub>OL</sub>	Maximum Low-Level Output Voltage	V <sub>IN</sub> ≤ V <sub>T-MIN</sub> I <sub>OL</sub> = 50 μA	2.0 3.0 4.5		0 0 0	0.1 0.1 0.1		0.1 0.1 0.1		0.1 0.1 0.1	V
		V <sub>IN</sub> ≤ V <sub>T-MIN</sub> I <sub>OL</sub> = 4 mA I <sub>OL</sub> = 8 mA	3.0 4.5			0.36 0.36		0.44 0.44		0.52 0.52	
I <sub>IN</sub>	Input Leakage Current	0 ≤ V <sub>IN</sub> ≤ 5.5 V	0 to 5.5			±0.1		±1.0		±1.0	μA
I <sub>CC</sub>	Quiescent Supply Current	V <sub>IN</sub> = 5.5 V or GND	5.5			1.0		10		40	μA

AC ELECTRICAL CHARACTERISTICS (Input t<sub>r</sub> = t<sub>f</sub> = 3.0 ns)

Symbol	Parameter	V <sub>CC</sub> (V)	Test Condition	T <sub>A</sub> = 25 °C			T <sub>A</sub> = +85°C		T <sub>A</sub> = -55°C to +125°C		Unit
				Min	Typ	Max	Min	Max	Min	Max	
t <sub>PLH</sub> , t <sub>PHL</sub>	Propagation Delay, Input A to Output Y	3.0 to 3.6	C <sub>L</sub> = 15 pF		7.0	12.8	1.0	15	1.0	17	ns
			C <sub>L</sub> = 50 pF		8.5	16.3	1.0	18.5	1.0	20.5	
		4.5 to 5.5	C <sub>L</sub> = 15 pF		4.0	8.6	1.0	10	1.0	11.5	
			C <sub>L</sub> = 50 pF		5.5	10.6	1.0	12	1.0	13.5	
C <sub>IN</sub>	Input Capacitance				5.0	10		10		10	pF
C <sub>PD</sub>	Power Dissipation Capacitance (Note 3)	5.0			7.0						pF

3. C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is calculated from the dynamic operating current consumption without load. Average operating current can be obtained by the equation I<sub>CC(OPR)</sub> = C<sub>PD</sub> • V<sub>CC</sub> • f<sub>in</sub> + I<sub>CC</sub>. C<sub>PD</sub> is used to determine the no-load dynamic power consumption: P<sub>D</sub> = C<sub>PD</sub> • V<sub>CC</sub><sup>2</sup> • f<sub>in</sub> + I<sub>CC</sub> • V<sub>CC</sub>.

NLU2G17

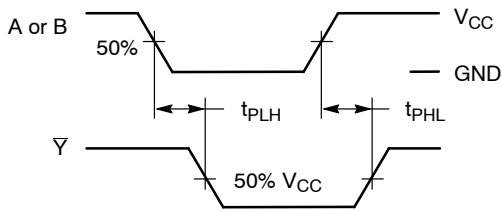


Figure 3. Switching Waveforms

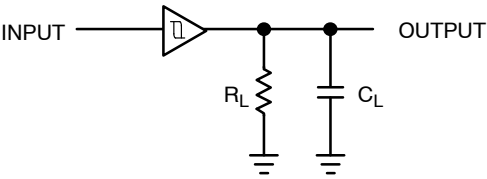
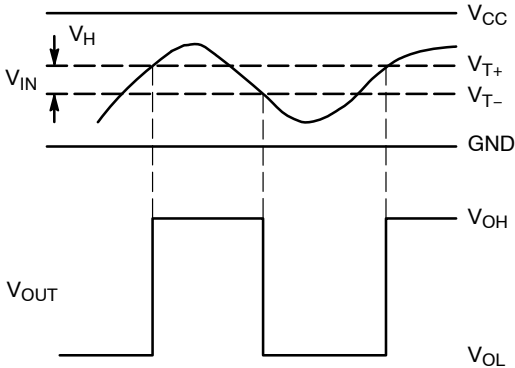
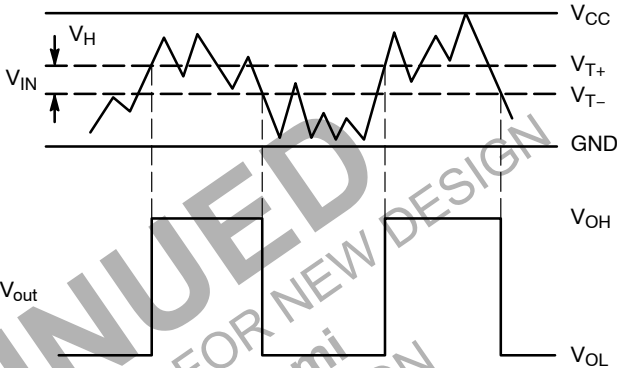


Figure 4. Test Circuit

A 1-MHz square input wave is recommended for propagation delay tests.



(a) A Schmitt-Trigger Squares Up Inputs With Slow Rise and Fall Times



(b) A Schmitt-Trigger Offers Maximum Noise Immunity

Figure 5. Typical Schmitt-Trigger Applications

ORDERING INFORMATION

Device	Package	Shipping†
NLU2G17MUTCG	UDFN6, 1.2 x 1.0, 0.4P (Pb-Free)	3000 / Tape & Reel
NLU2G17AMUTCG	UDFN6, 1.45 x 1.0, 0.5P (Pb-Free)	3000 / Tape & Reel
NLU2G17CMUTCG	UDFN6, 1.0 x 1.0, 0.35P (Pb-Free)	3000 / Tape & Reel
NLU2G17AMX1TCG	ULLGA6, 1.45 x 1.0, 0.5P (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.

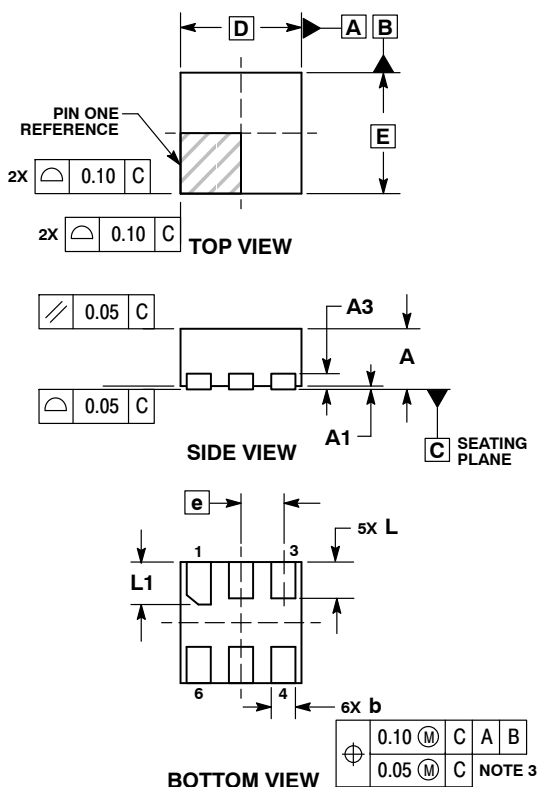
# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



SCALE 4:1

UDFN6, 1x1, 0.35P  
CASE 517BX  
ISSUE O

DATE 18 MAY 2011

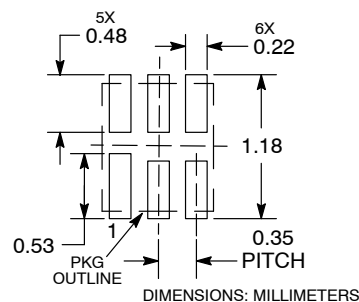


## NOTES:

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.

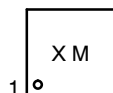
MILLIMETERS		
DIM	MIN	MAX
A	0.45	0.55
A1	0.00	0.05
A3	0.13	REF
b	0.12	0.22
D	1.00	BSC
E	1.00	BSC
e	0.35	BSC
L	0.25	0.35
L1	0.30	0.40

## 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.

## 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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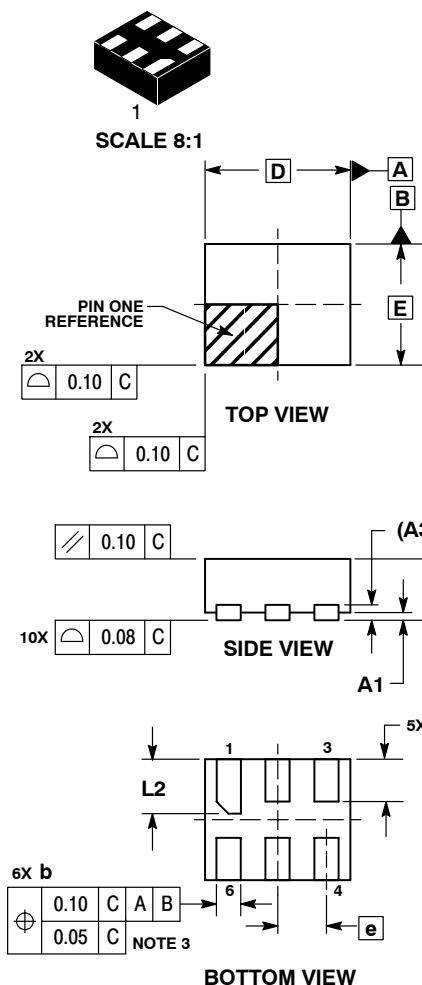
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# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



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

DATE 03 SEP 2010



## 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

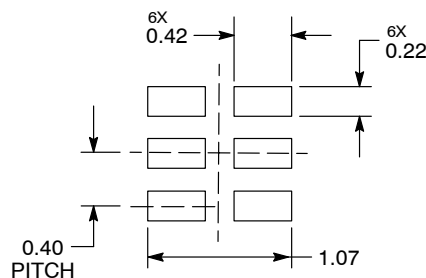
## GENERIC MARKING DIAGRAM\*



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.

## 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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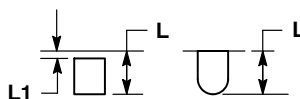
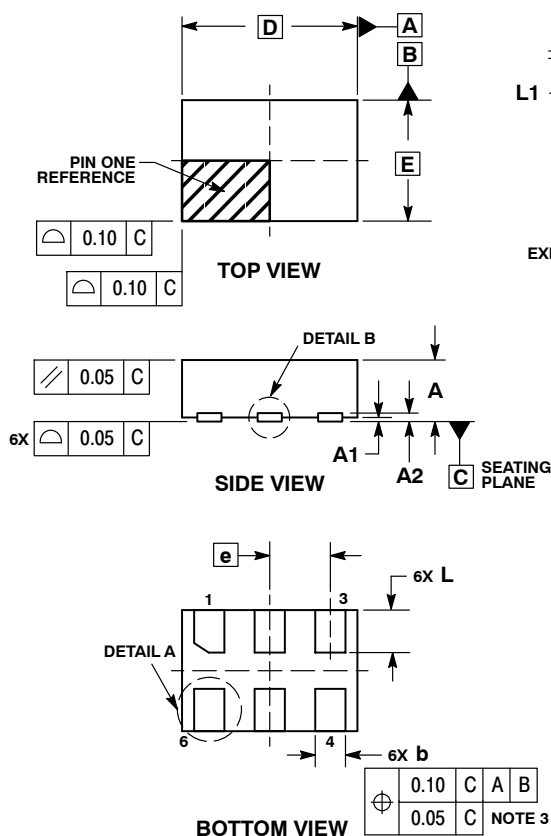
# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



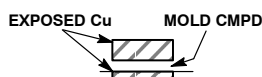
SCALE 4:1

UDFN6, 1.45x1.0, 0.5P  
CASE 517AQ  
ISSUE O

DATE 15 MAY 2008



**DETAIL A**  
OPTIONAL  
CONSTRUCTIONS



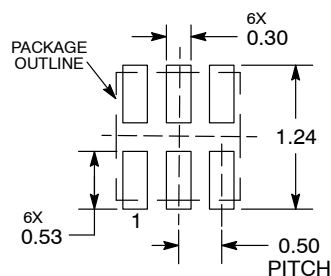
**DETAIL B**  
OPTIONAL  
CONSTRUCTIONS

## NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
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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	0.55
A1	0.00	0.05
A2	0.07	REF
b	0.20	0.30
D	1.45	BSC
E	1.00	BSC
e	0.50	BSC
L	0.30	0.40
L1	—	0.15

## 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.

## GENERIC MARKING DIAGRAM\*



X = Specific Device Code  
M = Date Code

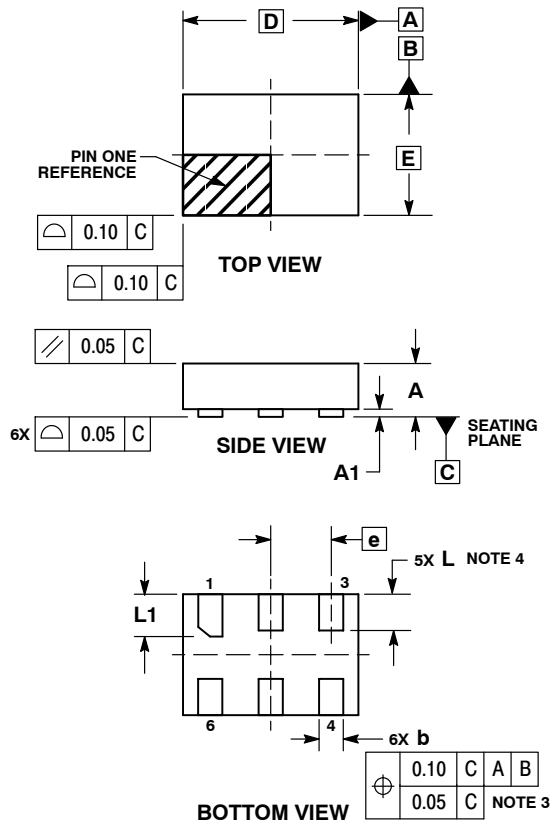
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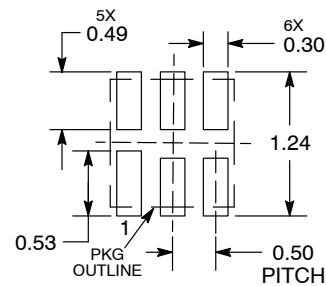


NOTES:

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.
4. A MAXIMUM OF 0.05 PULL BACK OF THE PLATED TERMINAL FROM THE EDGE OF THE PACKAGE IS ALLOWED.

	MILLIMETERS	
DIM	MIN	MAX
A	----	0.40
A1	0.00	0.05
b	0.15	0.25
D	1.45 BSC	
E	1.00 BSC	
e	0.50 BSC	
L	0.25	0.35
L1	0.30	0.40


## MOUNTING FOOTPRINT SOLDERMASK DEFINED\*



DIMENSIONS: MILLIMETERS

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