## **ON Semiconductor**

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# **Dual Buffer with 3-State Outputs**

#### **NL27WZ126**

The NL27WZ126 is a high performance dual noninverting buffer operating from a 1.65 V to 5.5 V supply.

#### **Features**

- Designed for 1.65 V to 5.5 V V<sub>CC</sub> Operation
- 2.4 ns  $t_{PD}$  at  $V_{CC} = 5 \text{ V (typ)}$
- Inputs/Outputs Overvoltage Tolerant up to 5.5 V
- I<sub>OFF</sub> Supports Partial Power Down Protection
- Source/Sink 24 mA at 3.0 V
- Available in US8, UDFN8 and UQFN8 Packages
- Chip Complexity < 100 FETs
- NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable
- These Devices are Pb–Free, Halogen Free/BFR Free and are RoHS Compliant



Figure 1. Logic Symbol



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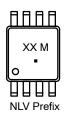
www.onsemi.com





US8 US SUFFIX CASE 493







UDFN8, 1.45x1.0 MU3 SUFFIX CASE 517BZ





UDFN8, 1.95x1.0 MU1 SUFFIX CASE 517CA





UQFN8, 1.4x1.2 MQ2 SUFFIX CASE 523AS





UQFN8, 1.6x1.6 MQ1 SUFFIX CASE 523AN



X, XX, XXXX = Specific Device Code
A = Assembly Location
L = Lot Code
Y = Year Code
W = Week Code
M = Date Code

Pb-Free Package

#### **ORDERING INFORMATION**

See detailed ordering, marking and shipping information in the package dimensions section on page 7 of this data sheet.

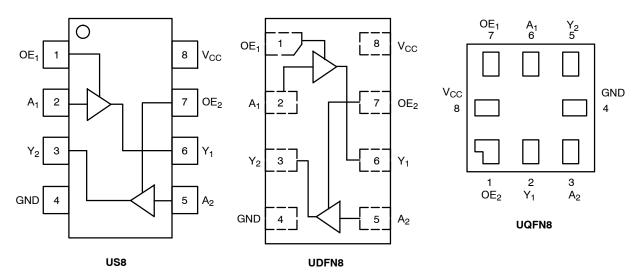


Figure 2. Pinout

## PIN ASSIGNMENT (US8 / UDFN8)

Pin	Function
1	OE <sub>1</sub>
2	A <sub>1</sub>
3	Y <sub>2</sub>
4	GND
5	A <sub>2</sub>
6	Y <sub>1</sub>
7	OE <sub>2</sub>
8	V <sub>CC</sub>

## PIN ASSIGNMENT (UQFN8)

Pin	Function
1	OE <sub>2</sub>
2	Y <sub>1</sub>
3	A <sub>2</sub>
4	GND
5	Y <sub>2</sub>
6	A <sub>1</sub>
7	OE <sub>1</sub>
8	V <sub>CC</sub>

#### **FUNCTION TABLE**

Inp	Output	
OE <sub>n</sub> A <sub>n</sub>		Y <sub>n</sub>
Н	Н	Н
Н	L	L
L	X	Z

X = Don't Care

n = 1, 2

#### **MAXIMUM RATINGS**

Symbol	Char	acteristics	Value	Unit
V <sub>CC</sub>	DC Supply Voltage	NLV	-0.5 to +7.0 -0.5 to +6.5	V
$V_{IN}$	DC Input Voltage	NLV	-0.5 to +7.0 -0.5 to +6.5	V
V <sub>OUT</sub>	DC Output Voltage (NLV)  Active–Mode (High or Low State)  Tri–State Mode (Note 1)  Power–Down Mode (V <sub>CC</sub> = 0 V)		-0.5 to V <sub>CC</sub> + 0.5 -0.5 to +7.0 -0.5 to +7.0	V
	DC Output Voltage	Active-Mode (High or Low State) Tri-State Mode (Note 1) Power-Down Mode (V <sub>CC</sub> = 0 V)	-0.5 to V <sub>CC</sub> + 0.5 -0.5 to +6.5 -0.5 to +6.5	V
I <sub>IK</sub>	DC Input Diode Current	V <sub>IN</sub> < GND	-50	mA
I <sub>OK</sub>	DC Output Diode Current	-50	mA	
I <sub>OUT</sub>	DC Output Source/Sink Current		±50	mA
I <sub>CC</sub> or I <sub>GND</sub>	DC Supply Current per Supply Pin or	Ground Pin	±100	mA
T <sub>STG</sub>	Storage Temperature Range		-65 to +150	°C
TL	Lead Temperature, 1 mm from Case	for 10 secs	260	°C
$T_J$	Junction Temperature Under Bias		+150	°C
$\theta_{\sf JA}$	Thermal Resistance (Note 2)	US8 UQFN8 UDFN8	250 210 231	°C/W
P <sub>D</sub>	Power Dissipation in Still Air	US8 UQFN8 UDFN8	500 595 541	mW
MSL	Moisture Sensitivity		Level 1	-
F <sub>R</sub>	Flammability Rating	Oxygen Index: 28 to 34	UL 94 V-0 @ 0.125 in	-
V <sub>ESD</sub>	ESD Withstand Voltage (Note 3)	Human Body Model Charged Device Model	2000 1000	V
I <sub>Latchup</sub>	Latchup Performance (Note 4)		±100	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. Applicable to devices with outputs that may be tri-stated.
- Applicable to devices with outputs that may be the stated.
   Measured with minimum pad spacing on an FR4 board, using 10mm-by-1inch, 2 ounce copper trace no air flow per JESD51-7.
   HBM tested to ANSI/ESDA/JEDEC JS-001-2017. CDM tested to EIA/JESD22-C101-F. JEDEC recommends that ESD qualification to EIA/JESD22–A115–A (Machine Model) be discontinued per JEDEC/JEP172A.

  4. Tested to EIA/JESD78 Class II.

#### RECOMMENDED OPERATING CONDITIONS

Symbol	Characteristics	Min	Max	Unit
V <sub>CC</sub>	Positive DC Supply Voltage	1.65	5.5	V
V <sub>IN</sub>	DC Input Voltage	0	5.5	V
V <sub>OUT</sub>	DC Output Voltage Active–Mode (High or Low State)	0 0 0	V <sub>CC</sub> 5.5 5.5	
T <sub>A</sub>	Operating Temperature Range	-55	+125	°C
t <sub>r</sub> , t <sub>f</sub>	Input Rise and Fall Time $V_{CC} = 1.65 \text{ V to } 1.95 \text{ V} \\ V_{CC} = 2.3 \text{ V to } 2.7 \text{ V} \\ V_{CC} = 3.0 \text{ V to } 3.6 \text{ V} \\ V_{CC} = 4.5 \text{ V to } 5.5 \text{ V} \\ \end{array}$	0 0 0 0	20 20 10 5	ns/V

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

#### DC ELECTRICAL CHARACTERISTICS

			V <sub>CC</sub>	T <sub>A</sub> = 25°C			-55°C ≤ T	<sub>A</sub> ≤ 125°C	
Symbol	Parameter	Condition	(V)	Min	Тур	Max	Min	Max	Units
V <sub>IH</sub>	High-Level Input		1.65 to 1.95	0.65 V <sub>CC</sub>	_	-	0.65 V <sub>CC</sub>	_	V
	Voltage		2.3 to 5.5	0.70 V <sub>CC</sub>	_	-	0.70 V <sub>CC</sub>	-	
$V_{IL}$	Low-Level Input		1.65 to 1.95	-	_	0.35 V <sub>CC</sub>	=	0.35 V <sub>CC</sub>	٧
	Voltage		2.3 to 5.5	-	-	0.30 V <sub>CC</sub>	-	0.30 V <sub>CC</sub>	
Vон	High-Level Output Voltage	$\begin{split} V_{IN} &= V_{IH} \text{ or } V_{IL} \\ I_{OH} &= -100  \mu\text{A} \\ I_{OH} &= -4 \text{ mA} \\ I_{OH} &= -8 \text{ mA} \\ I_{OH} &= -12 \text{ mA} \\ I_{OH} &= -16 \text{ mA} \\ I_{OH} &= -24 \text{ mA} \\ I_{OH} &= -32 \text{ mA} \end{split}$	1.65 to 5.5 1.65 2.3 2.7 3.0 3.0 4.5	V <sub>CC</sub> - 0.1 1.29 1.9 2.2 2.4 2.3 3.8	V <sub>CC</sub> 1.4 2.1 2.4 2.7 2.5 4.0	- - - - -	V <sub>CC</sub> - 0.1 1.29 1.9 2.2 2.4 2.3 3.8	- - - - -	>
V <sub>OL</sub>	Low-Level Output Voltage	$\begin{split} &V_{IN} = V_{IH} \text{ or } V_{IL} \\ &I_{OL} = 100  \mu\text{A} \\ &I_{OL} = 4 \text{ mA} \\ &I_{OL} = 8 \text{ mA} \\ &I_{OL} = 12 \text{ mA} \\ &I_{OL} = 16 \text{ mA} \\ &I_{OL} = 24 \text{ mA} \\ &I_{OL} = 32 \text{ mA} \end{split}$	1.65 to 5.5 1.65 2.3 2.7 3.0 3.0 4.5	- - - - - -	- 0.08 0.2 0.22 0.28 0.38 0.42	0.1 0.24 0.3 0.4 0.4 0.55 0.55	- - - - -	0.1 0.24 0.3 0.4 0.4 0.55	V
I <sub>IN</sub>	Input Leakage Current	V <sub>IN</sub> = 5.5 V or GND	1.65 to 5.5	-	-	±0.1	-	±1.0	μΑ
I <sub>OFF</sub>	Power Off Leakage Current	V <sub>IN</sub> = 5.5 V or V <sub>OUT</sub> = 5.5 V	0	-	-	1.0	-	10	μΑ
Icc	Quiescent Supply Current	V <sub>IN</sub> = V <sub>CC</sub> or GND	5.5	-	-	1.0	-	10	μΑ
I <sub>OZ</sub>	3-State Output Leakage	$V_{IN} = V_{IL}$ or $V_{IH}$ $V_{OUT} = 0$ V to 5.5 V	2.3 to 5.5	-	_	±0.5	-	±5	μΑ

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

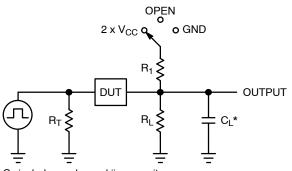
#### **AC ELECTRICAL CHARACTERISTICS**

		V <sub>CC</sub>		Т	A = 25°	С	–55°C ≤ T	<sub>A</sub> ≤ 125°C	
Symbol	Parameter	(V)	Condition	Min	Тур	Max	Min	Max	Units
t <sub>PLH</sub> ,	Propagation Delay,	1.65 to 1.95		-	6.0	12.0	-	13.0	ns
<sup>T</sup> PHL	t <sub>PHL</sub> A to Y	2.3 to 2.7	R1 = Open	_	3.5	7.5	-	8.0	
	3.0 to 3.6		-	2.6	5.2	-	5.5		
		4.5 to 5.5		-	2.0	5.7	-	6.0	
		3.0 to 3.6	CL = 50 pF, RL = 500 $\Omega$	-	3.0	4.5	-	4.8	
	4.5 to 5.5	R1 = Open	_	2.4	5.0	-	5.3		
toslh,	Output to Output Skew	3.0 to 3.6	RL = 500 $\Omega$ , CL = 50 pF	-	0.08	1.0	-	1.0	ns
toshl		4.5 to 5.5		_	0.05	0.8	-	0.8	
t <sub>PZH</sub> ,	Output Enable Time,	1.65 to 1.95		-	6.5	14.0	-	15.0	ns
t <sub>PZL</sub>	OE to Y (Figures 3 and 4)	2.3 to 2.7		_	3.7	8.5	-	9.0	
		3.0 to 3.6		_	2.8	6.2	-	6.5	
		4.5 to 5.5		_	2.1	5.5	-	5.8	
t <sub>PHZ</sub> ,	Output Disable Time,	1.65 to 1.95		-	4.2	12.0	-	13.0	ns
t <sub>PLZ</sub>	OE to Y (Figures 3 and 4)	2.3 to 2.7		_	3.1	8.0	-	8.5	
		3.0 to 3.6		_	2.6	5.7	-	6.0	
		4.5 to 5.5		_	2.6	4.7	-	5.0	

#### **CAPACITIVE CHARACTERISTICS**

Symbol	Parameter	Condition	Typical	Units
C <sub>IN</sub>	Input Capacitance	$V_{CC} = 5.5 \text{ V}, V_{IN} = 0 \text{ V or } V_{CC}$	2.5	pF
C <sub>OUT</sub>	Output Capacitance	$V_{CC} = 5.5 \text{ V}, V_{IN} = 0 \text{ V or } V_{CC}$	2.5	pF
C <sub>PD</sub>	Power Dissipation Capacitance (Note 5)	10 MHz, $V_{CC}$ = 3.3 V, $V_{IN}$ = 0 V or $V_{CC}$ 10 MHz, $V_{CC}$ = 5.5 V, $V_{IN}$ = 0 V or $V_{CC}$	9 11	pF

<sup>5.</sup> C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation:  $I_{CC(OPR)} = C_{PD} \bullet V_{CC} \bullet f_{in} + I_{CC}$ .  $C_{PD}$  is used to determine the no–load dynamic power consumption;  $P_D = C_{PD} \bullet V_{CC}^2 \bullet f_{in} + I_{CC} \bullet V_{CC}$ .



Test	Switch Position	C <sub>L</sub> , pF	$R_L, \Omega$	<b>R</b> <sub>1</sub> , Ω
t <sub>PLH</sub> / t <sub>PHL</sub>	Open	See AC Characteristics Table		
t <sub>PLZ</sub> / t <sub>PZL</sub>	2 x V <sub>CC</sub>	50	500	500
t <sub>PHZ</sub> / t <sub>PZH</sub>	GND	50	500	500

X = Don't Care

 $C_L$  includes probe and jig capacitance  $R_T$  is  $Z_{OUT}$  of pulse generator (typically 50  $\Omega)$ 

f = 1 MHz

Figure 3. Test Circuit

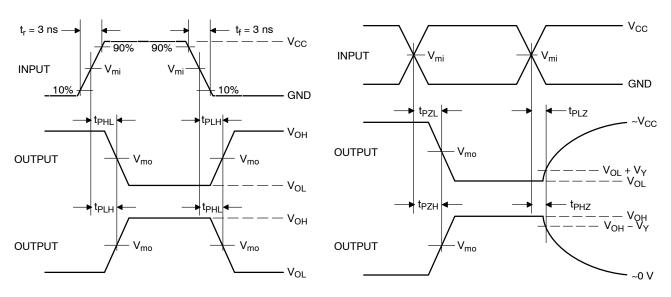


Figure 4. Switching Waveforms

		V <sub>m</sub>		
V <sub>CC</sub> , V	V <sub>mi</sub> , V	t <sub>PLH</sub> , t <sub>PHL</sub>	t <sub>PZL</sub> , t <sub>PLZ</sub> , t <sub>PZH</sub> , t <sub>PHZ</sub>	V <sub>Y</sub> , V
1.65 to 1.95	V <sub>CC</sub> /2	V <sub>CC</sub> /2	V <sub>CC</sub> /2	0.15
2.3 to 2.7	V <sub>CC</sub> /2	V <sub>CC</sub> /2	V <sub>CC</sub> /2	0.15
3.0 to 3.6	V <sub>CC</sub> /2	V <sub>CC</sub> /2	V <sub>CC</sub> /2	0.3
4.5 to 5.5	V <sub>CC</sub> /2	V <sub>CC</sub> /2	V <sub>CC</sub> /2	0.3

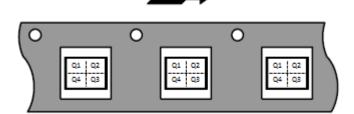
#### **DEVICE ORDERING INFORMATION**

Device	Packages	Specific Device Code	Pin 1 Orientation (See below)	Shipping <sup>†</sup>
NL27WZ126USG	US8	M2	Q4	3000 / Tape & Reel
NLV27WZ126USG*	US8	M2	Q4	3000 / Tape & Reel
NL27WZ126MQ1TCG (In Development)	UQFN8, 1.6 x 1.6, 0.5P	TBD	TBD	3000 / Tape & Reel
NL27WZ126MU1TCG (In Development)	UDFN8, 1.95 x 1.0, 0.5P	TBD	TBD	3000 / Tape & Reel
NL27WZ126MU3TCG (In Development)	UDFN8, 1.45 x 1.0, 0.35P	TBD	TBD	3000 / Tape & Reel
NL27WZ126MQ2TCG (In Development)	UQFN8, 1.4 x 1.2, 0.4P	TBD	TBD	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.

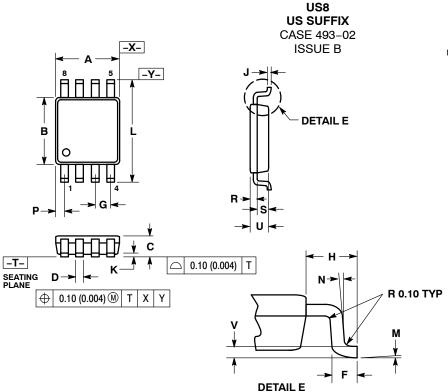
#### Pin 1 Orientation in Tape and Reel

#### Direction of Feed



<sup>\*</sup>NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable.

#### PACKAGE DIMENSIONS

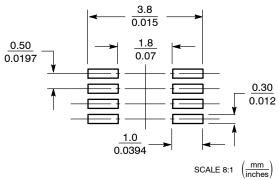


- NOTES:
  1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: MILLIMETERS.
  3. DIMENSION "A" DOES NOT INCLUDE MOLD FLASH, PROTRUSION OR GATE BURR. MOLD FLASH. PROTRUSION AND GATE BURR SHALL NOT EXCEED 0.140 MM (0.0055") PER SIDE.
  4. DIMENSION "B" DOES NOT INCLUDE INTER-LEAD FLASH OR PROTRUSION. INTER-LEAD FLASH AND PROTRUSION SHALL NOT E3XCEED 0.140 (0.0055") PER SHALL NOT E3XCEED 0.140 (0.0055") PER
- SIDE.

  5. LEAD FINISH IS SOLDER PLATING WITH THICKNESS OF 0.0076–0.0203 MM.
- (300-800 "). 6. ALL TOLERANCE UNLESS OTHERWISE SPECIFIED ±0.0508 (0.0002 ").

	MILLIN	LLIMETERS INCHES		HES
DIM	MIN	MAX	MIN	MAX
Α	1.90	2.10	0.075	0.083
В	2.20	2.40	0.087	0.094
C	0.60	0.90	0.024	0.035
D	0.17	0.25	0.007	0.010
F	0.20	0.35	0.008	0.014
G	0.50	BSC	0.020	BSC
Н	0.40	REF	0.016 REF	
J	0.10	0.18	0.004	0.007
K	0.00	0.10	0.000	0.004
L	3.00	3.20	0.118	0.126
М	0 °	6°	0 °	6 °
N	5 °	10 °	5 °	10 °
Р	0.23	0.34	0.010	0.013
R	0.23	0.33	0.009	0.013
S	0.37	0.47	0.015	0.019
U	0.60	0.80	0.024	0.031
V	0.12	BSC	0.005	BSC

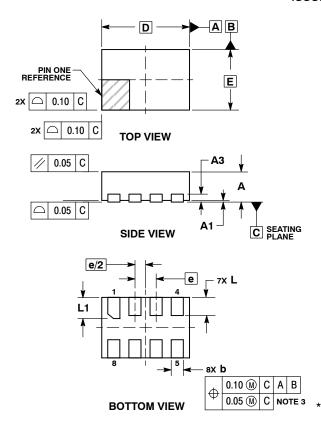
#### **SOLDERING FOOTPRINT\***



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

#### **PACKAGE DIMENSIONS**

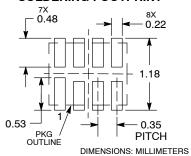
UDFN8, 1.45x1, 0.35P CASE 517BZ ISSUE O



- NOTES:
  1. DIMENSIONING AND TOLERANCING PER
- ASME Y14.5M, 1994.
  2. CONTROLLING DIMENSION: MILLIMETERS.
  3. DIMENSION & APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN
- 0.15 AND 0.20 MM FROM TERMINAL TIP. 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
A     0.45     0.55       A1     0.00     0.05       A3     0.13 REF       b     0.15     0.25
A1         0.00         0.05           A3         0.13 REF           b         0.15         0.25
<b>A3</b> 0.13 REF <b>b</b> 0.15 0.25
<b>b</b> 0.15 0.25
<b>D</b> 1.45 BSC
E 1.00 BSC
e 0.35 BSC
L 0.25 0.35
<b>L1</b> 0.30 0.40

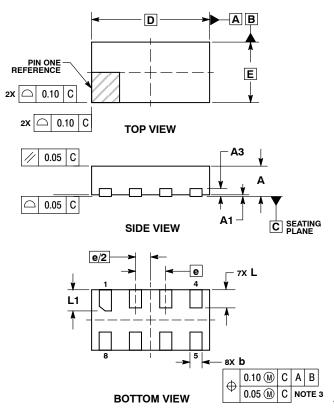
#### **RECOMMENDED SOLDERING FOOTPRINT\***



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#### **PACKAGE DIMENSIONS**

UDFN8, 1.95x1, 0.5P CASE 517CA ISSUE O



#### NOTES:

- NOTES:

  1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.

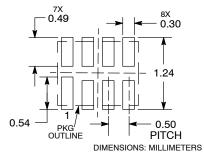
  2. CONTROLLING DIMENSION: MILLIMETERS.

  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
Α	0.45	0.55
A1	0.00	0.05
А3	0.13 REF	
b	0.15	0.25
D	1.95 BSC	
Е	1.00 BSC	
е	0.50 BSC	
L	0.25	0.35
11	0.30	0.40

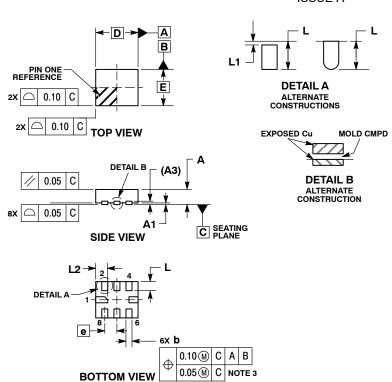
#### **RECOMMENDED SOLDERING FOOTPRINT\***



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#### **PACKAGE DIMENSIONS**

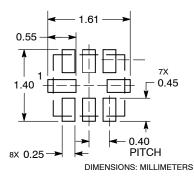
#### UQFN8, 1.4x1.2, 0.4P CASE 523AS **ISSUE A**



- 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 0.25 mm FROM THE TERMINAL TIP.

	MILLIMETERS	
DIM	MIN	MAX
Α	0.45	0.55
A1	0.00	0.05
А3	0.13 REF	
b	0.15	0.25
D	1.40 BSC	
Е	1.20 BSC	
е	0.40 BSC	
L	0.20	0.40
L1		0.15
L2	0.30	0.50

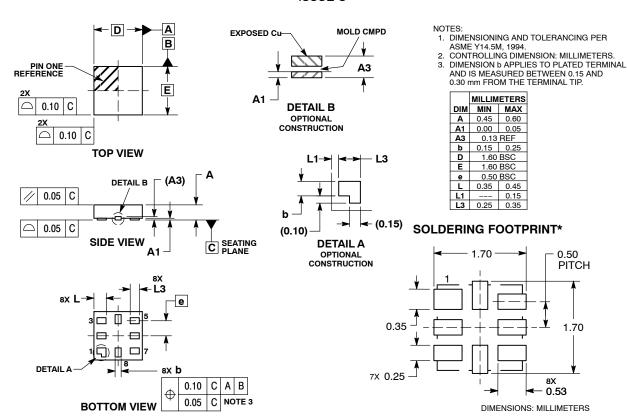
#### **SOLDERING FOOTPRINT\***



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#### PACKAGE DIMENSIONS

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