

Schmitt Trigger Buffer, Dual, Non-Inverting

NL27WZ17

The NL27WZ17 is a high performance dual buffer with Schmitt-Trigger inputs operating from a 1.65 to 5.5 V supply.

Features

- Designed for 1.65 V to 5.5 V V_{CC} Operation
- 3.7 ns t_{PD} at $V_{CC} = 5$ V (Typ)
- Inputs/Outputs Overvoltage Tolerant up to 5.5 V
- I_{OFF} Supports Partial Power Down Protection
- Sink 32 mA at 4.5 V
- Available in SC-88, SC-74, and UDFN6 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

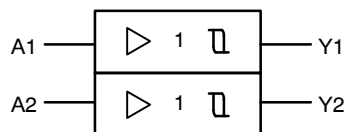


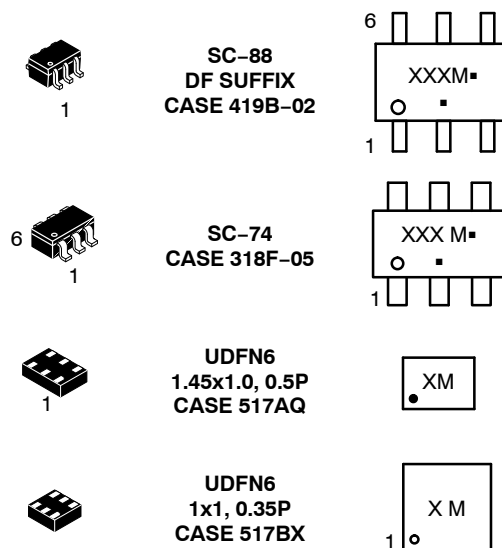
Figure 1. Logic Symbol



ON Semiconductor®

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MARKING DIAGRAMS



X, XXX = Specific Device Code

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.

ORDERING INFORMATION

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

NL27WZ17

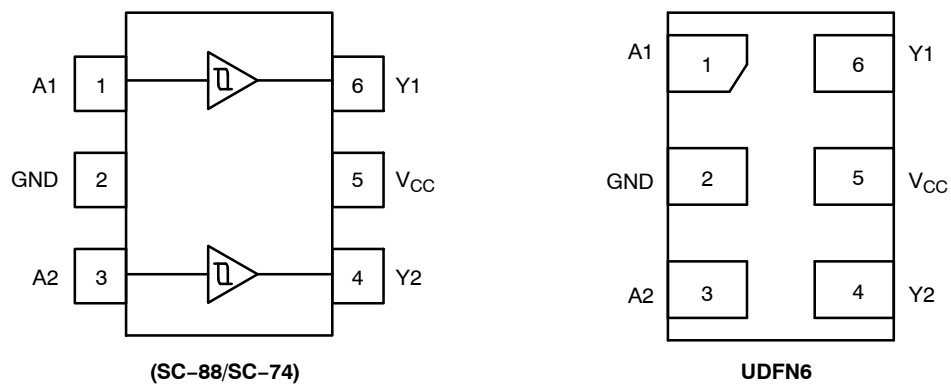


Figure 2. Pinout (Top View)

PIN ASSIGNMENT

Pin	Function
1	A1
2	GND
3	A2
4	Y2
5	V _{CC}
6	Y1

FUNCTION TABLE

A Input	Y Output
L	L
H	H

MAXIMUM RATINGS

Symbol	Characteristics	Value	Units
V_{CC}	DC Supply Voltage SC-88 (NLV) SC-88, SC-74, UDFN6	-0.5 to +7.0 -0.5 to +6.5	V
V_{IN}	DC Input Voltage SC-88 (NLV) SC-88, SC-74, UDFN6	-0.5 to +7.0 -0.5 to +6.5	V
V_{OUT}	DC Output Voltage SC-88 (NLV) Active-Mode (High or Low State) Tri-State Mode (Note 1) Power-Down Mode ($V_{CC} = 0$ V)	-0.5 to $V_{CC} + 0.5$ -0.5 to +7.0 -0.5 to +7.0	V
	DC Output Voltage SC-88, SC-74, UDFN6 Active-Mode (High or Low State) Tri-State Mode (Note 1) Power-Down Mode ($V_{CC} = 0$ V)	-0.5 to $V_{CC} + 0.5$ -0.5 to +6.5 -0.5 to +6.5	V
I_{IK}	DC Input Diode Current, $V_{IN} < GND$	-50	mA
I_{OK}	DC Output Diode Current, $V_{OUT} < GND$	-50	mA
I_{OUT}	DC Output Source/Sink Current	± 50	mA
I_{CC} or I_{GND}	DC Supply Current per Supply Pin or Ground Pin	± 100	mA
T_{STG}	Storage Temperature Range	-65 to +150	°C
T_L	Lead Temperature, 1 mm from Case for 10 secs	260	°C
T_J	Junction Temperature under Bias	+150	°C
θ_{JA}	Thermal Resistance (Note 2) SC-88 SC-74 UDFN6	659	°C/W
		555	
		382	
P_D	Power Dissipation in Still Air SC-88 SC-74 UDFN6	190	mW
		225	
		327	
MSL	Moisture Sensitivity	Level 1	-
F_R	Flameability Rating Oxygen Index: 28 to 34	UL 94-V-0 @ 0.125 in	-
V_{ESD}	ESD Withstand Voltage (Note 3) Human Body Model Charged Device Model (NLV) Charged Device Model	2000	V
		1000	
		N/A	
$I_{LATCHUP}$	Latchup Performance (Note 4) (NLV)	± 100	mA
		± 500	

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.
2. Measured with minimum pad spacing on an FR4 board, using 10 mm-by-1 inch, 2 ounce copper trace no air flow.
3. 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	Parameter	Min	Max	Unit
V_{CC}	Positive DC Supply Voltage	1.65	5.5	V
V_{IN}	DC Input Voltage	0	5.5	V
V_{OUT}	DC Output Voltage Active-Mode (High or Low State) Tri-State Mode (Note 1) Power-Down Mode ($V_{CC} = 0$ V)	0	V_{CC}	V
		0	5.5	
		0	5.5	
T_A	Operating Temperature Range	-55	+125	°C
t_r, t_f	Input Transition Rise or Fall Rate $V_{CC} = 1.65$ V to 1.95 V $V_{CC} = 2.3$ V to 2.7 V $V_{CC} = 3.0$ V to 3.6 V $V_{CC} = 4.5$ V to 5.5 V	0	No Limit	ns
		0	No Limit	
		0	No Limit	
		0	No Limit	

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

Symbol	Parameter	Condition	V _{CC} (V)	T _A = 25°C			-40°C ≤ T _A ≤ 85°C		-55°C ≤ T _A ≤ 125°C		Unit
				Min	Typ	Max	Min	Max	Min	Max	
V _{T+}	Positive Input Threshold Voltage		1.65	–	1.0	1.4	–	1.4	–	1.4	V
			2.3	–	1.5	1.8	–	1.8	–	1.8	
			2.7	–	1.7	2	–	2	–	2	
			3	–	1.9	2.2	–	2.2	–	2.2	
			4.5	–	2.7	3.1	–	3.1	–	3.1	
			5.5	–	3.3	3.6	–	3.6	–	3.6	
V _{T–}	Negative Input Threshold Voltage		1.65	0.2	0.5	–	0.2	–	0.2	–	V
			2.3	0.4	0.75	–	0.4	–	0.4	–	
			2.7	0.5	0.87	–	0.5	–	0.5	–	
			3	0.6	1.0	–	0.6	–	0.6	–	
			4.5	1.0	1.5	–	1.0	–	1.0	–	
			5.5	1.2	1.9	–	1.2	–	1.2	–	
V _H	Input Hysteresis Voltage		1.65	0.1	0.48	0.9	0.1	0.9	0.1	0.9	V
			2.3	0.25	0.75	1.1	0.25	1.1	0.25	1.1	
			2.7	0.3	0.83	1.15	0.3	1.15	0.3	1.15	
			3	0.4	0.93	1.2	0.4	1.2	0.4	1.2	
			4.5	0.6	1.2	1.5	0.6	1.5	0.6	1.5	
			5.5	0.7	1.4	1.7	0.7	1.7	0.7	1.7	
V _{OH}	High-Level Output Voltage V _{IN} = V _{IH} or V _{IL}	I _{OH} = –100 μA	1.65 to 5.5	V _{CC} – 0.1	V _{CC}	–	V _{CC} – 0.1	–	V _{CC} – 0.1	–	V
		I _{OH} = –4 mA	1.65	1.29	1.52	–	1.29	–	1.29	–	
		I _{OH} = –8 mA	2.3	1.9	2.1	–	1.9	–	1.9	–	
		I _{OH} = –12 mA	2.7	2.2	2.4	–	2.2	–	2.2	–	
		I _{OH} = –16 mA	3	2.4	2.7	–	2.4	–	2.4	–	
		I _{OH} = –24 mA	3	2.3	2.5	–	2.3	–	2.3	–	
		I _{OH} = –32 mA	4.5	3.8	4	–	3.8	–	3.8	–	
V _{OL}	Low-Level Output Voltage V _{IN} = V _{IH} or V _{IL}	I _{OL} = 100 μA	1.65 to 5.5	–	–	0.1	–	0.1	–	0.1	V
		I _{OL} = 4 mA	1.65	–	0.08	0.24	–	0.24	–	0.24	
		I _{OL} = 8 mA	2.3	–	0.2	0.3	–	0.3	–	0.3	
		I _{OL} = 12 mA	2.7	–	0.22	0.4	–	0.4	–	0.4	
		I _{OL} = 16 mA	3	–	0.28	0.4	–	0.4	–	0.4	
		I _{OL} = 24 mA	3	–	0.38	0.55	–	0.55	–	0.55	
		I _{OL} = 32 mA	4.5	–	0.42	0.55	–	0.55	–	0.55	
I _{IN}	Input Leakage Current	V _{IN} = 5.5 V or GND	1.65 to 5.5	–	–	±0.1	–	±1.0	–	±1.0	μA
I _{OFF}	Power Off Leakage Current	V _{IN} = 5.5 V or V _{OUT} = 5.5 V	0	–	–	1	–	10	–	10	μA
I _{CC}	Quiescent Supply Current	V _{IN} = 5.5 V or GND	5.5	–	–	1	–	10	–	10	μA

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AC ELECTRICAL CHARACTERISTICS (Input $t_R = t_F = 3.0$ ns)

Symbol	Parameter	Condition	V_{CC} (V)	$T_A = 25^\circ\text{C}$			$-40^\circ\text{C} \leq T_A \leq 85^\circ\text{C}$		$-55^\circ\text{C} \leq T_A \leq 125^\circ\text{C}$		Unit
				Min	Typ	Max	Min	Max	Min	Max	
t _{PLH} t _{PHL}	Propagation Delay (Figures 3 and 4)	RL = 1 M Ω , CL = 15 pF	1.65 to 1.95	–	9.1	15	–	15.6	–	15.6	ns
			2.3 to 2.7	–	5.0	9.0	–	9.5	–	9.5	
		RL = 1 M Ω , CL = 15 pF	3.0 to 3.6	–	3.7	6.3	–	6.5	–	6.5	
			4.5 to 5.5	–	3.1	5.2	–	5.5	–	5.5	
			3.0 to 3.6	–	4.4	7.2	–	7.5	–	7.5	
			4.5 to 5.5	–	3.7	5.9	–	6.2	–	6.2	

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Condition	Typical	Unit
C _{IN}	Input Capacitance	$V_{CC} = 5.5$ V, $V_I = 0$ V or V_{CC}	2.5	pF
C _{OUT}	Output Capacitance	$V_{CC} = 5.5$ V, $V_I = 0$ V or V_{CC}	4.0	pF
C _{PD}	Power Dissipation Capacitance (Note 5)	10 MHz, $V_{CC} = 3.3$ V, $V_{IN} = 0$ V or V_{CC} 10 MHz, $V_{CC} = 5.0$ V, $V_{IN} = 0$ V or V_{CC}	11 12.5	pF

5. C_{PD} 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: $I_{CC(OPR)} = C_{PD} \cdot V_{CC} \cdot f_{in} \cdot I_{CC}$. C_{PD} is used to determine the no-load dynamic power consumption; $P_D = C_{PD} \cdot V_{CC}^2 \cdot f_{in} \cdot I_{CC} \cdot V_{CC}$.

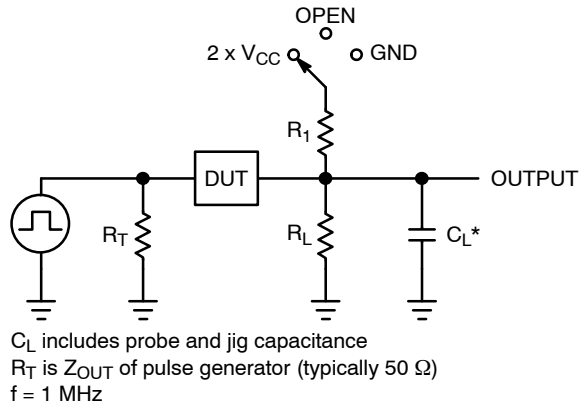


Figure 3. Test Circuit

Test	Switch Position	C_L , pF	R_L , Ω	R_1 , Ω
t_{PLH} / t_{PHL}	Open	See AC Characteristics Table		
t_{PLZ} / t_{PZL}	$2 \times V_{CC}$	-	-	-
		See AC Characteristics Table		
t_{PHZ} / t_{PZH}	GND	-	-	-
		See AC Characteristics Table		

X = Don't Care

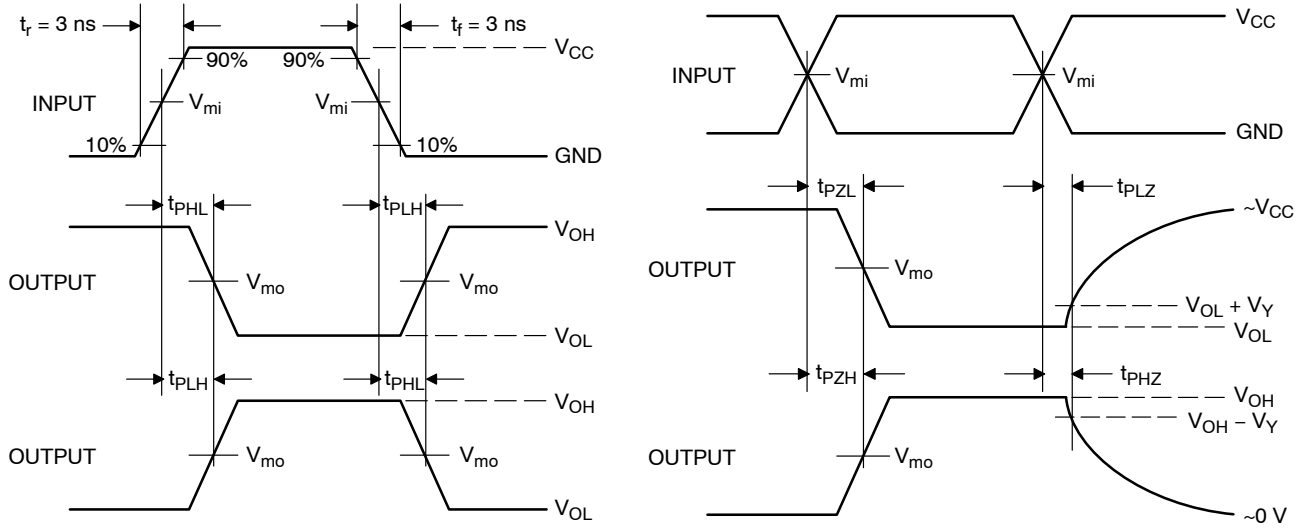


Figure 4. Switching Waveforms

V_{CC} , V	V_{mi} , V	V_{mo} , V		V_Y , V
		t_{PLH}, t_{PHL}	$t_{PLZ}, t_{PLZ}, t_{PZH}, t_{PHZ}$	
1.65 to 1.95	$V_{CC}/2$	$(V_{OH} - V_{OL}) / 2$	$V_{CC} / 2$	0.15
2.3 to 2.7	$V_{CC}/2$	$(V_{OH} - V_{OL}) / 2$	$V_{CC} / 2$	0.15
3.0 to 3.6	$V_{CC}/2$	$(V_{OH} - V_{OL}) / 2$	$V_{CC} / 2$	0.3
4.5 to 5.5	$V_{CC}/2$	$(V_{OH} - V_{OL}) / 2$	$V_{CC} / 2$	0.3

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ORDERING INFORMATION

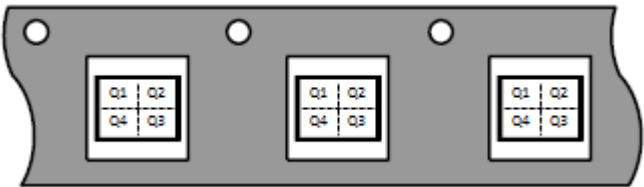
Device	Package	Specific Device Code	Pin1 Orientation (See below)	Shipping [†]
NL27WZ17DFT2G	SC-88	MX	Q4	3000 / Tape & Reel
NLV27WZ17DFT2G*	SC-88	MX	Q4	3000 / Tape & Reel
NL27WZ17DBVT1G	SC-74	AC	Q4	3000 / Tape & Reel
NL27WZ17MU1TCG	UDFN6 1.45 x 1.0, 0.5P	K (Rotated 90° CW)	Q4	3000 / Tape & Reel
NL27WZ17MU3TCG	UDFN6 1.0 x 1.0, 0.35P	D	Q4	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.

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

Pin 1 Orientation in Tape and Reel

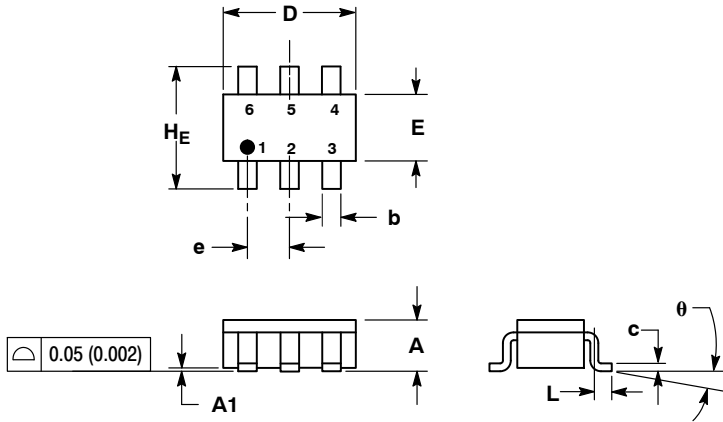
Direction of Feed



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PACKAGE DIMENSIONS

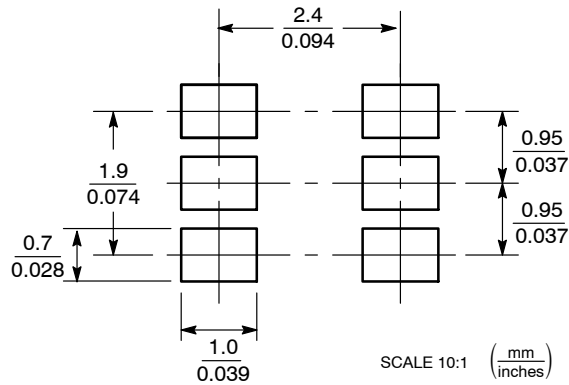
SC-74
CASE 318F-05
ISSUE N



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
 4. 318F-01, -02, -03, -04 OBSOLETE. NEW STANDARD 318F-05.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.90	1.00	1.10	0.035	0.039	0.043
A1	0.01	0.06	0.10	0.001	0.002	0.004
b	0.25	0.37	0.50	0.010	0.015	0.020
c	0.10	0.18	0.26	0.004	0.007	0.010
D	2.90	3.00	3.10	0.114	0.118	0.122
E	1.30	1.50	1.70	0.051	0.059	0.067
e	0.85	0.95	1.05	0.034	0.037	0.041
L	0.20	0.40	0.60	0.008	0.016	0.024
H_E	2.50	2.75	3.00	0.099	0.108	0.118
θ						

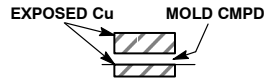
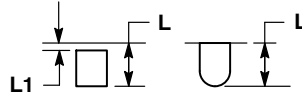
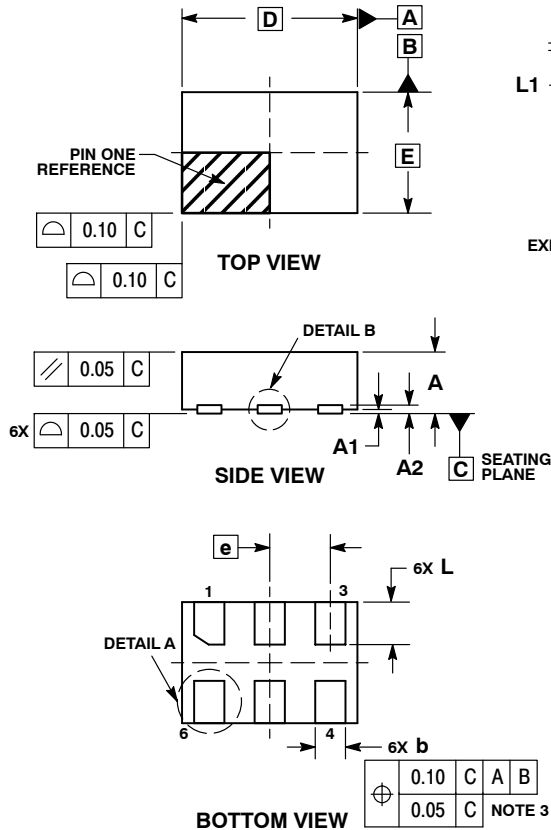
SOLDERING FOOTPRINT*



*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

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

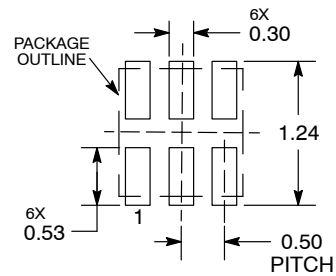


NOTES:

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	0.55
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



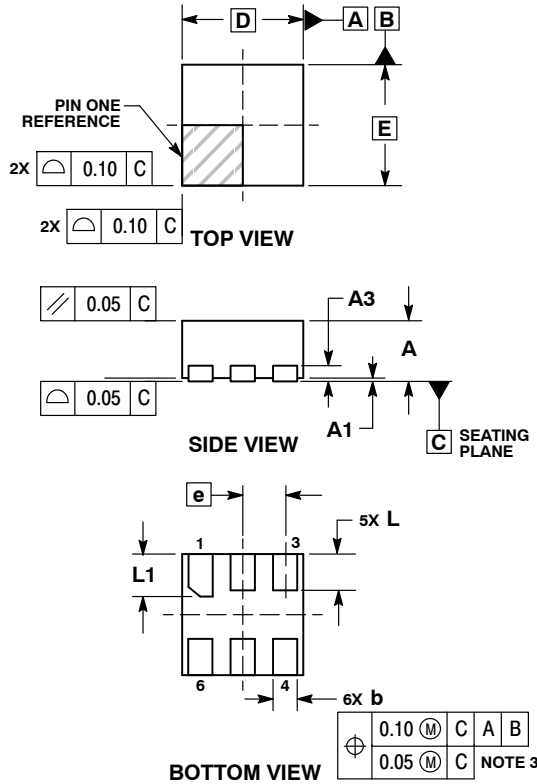
DIMENSIONS: MILLIMETERS

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

NL27WZ17

PACKAGE DIMENSIONS

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

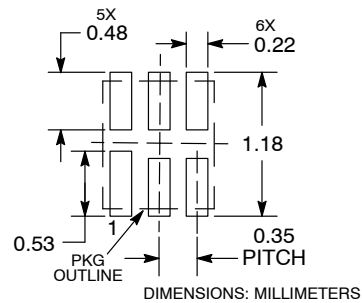


NOTES:

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	0.12	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.

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Voice Mail: 1 800-282-9855 Toll Free USA/Canada

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