

# Single 3-Input OR Gate

## NL17SZ332

The NL17SZ332 is a single 3-input OR Gate in tiny footprint packages.

### Features

- Designed for 1.65 V to 5.5 V  $V_{CC}$  Operation
- 2.4 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
- Source/Sink 24 mA at 3.0 V
- Chip Complexity < 100 FETs
- This Device is Pb-Free, Halogen Free/BFR Free and is RoHS Compliant

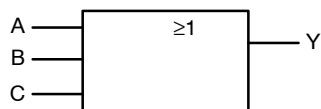
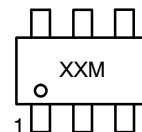


Figure 1. Logic Symbol

### MARKING DIAGRAMS



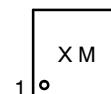
SC-74  
CASE 318F-05



UDFN6  
1.45 x 1.0  
CASE 517AQ



UDFN6  
1.0 x 1.0  
CASE 517BX



X, XX = Specific Device Code  
M = Date Code  
▪ = Pb-Free Package

### ORDERING INFORMATION

See detailed ordering, marking and shipping information in the package dimensions section on page 6 of this data sheet.

NL17SZ332

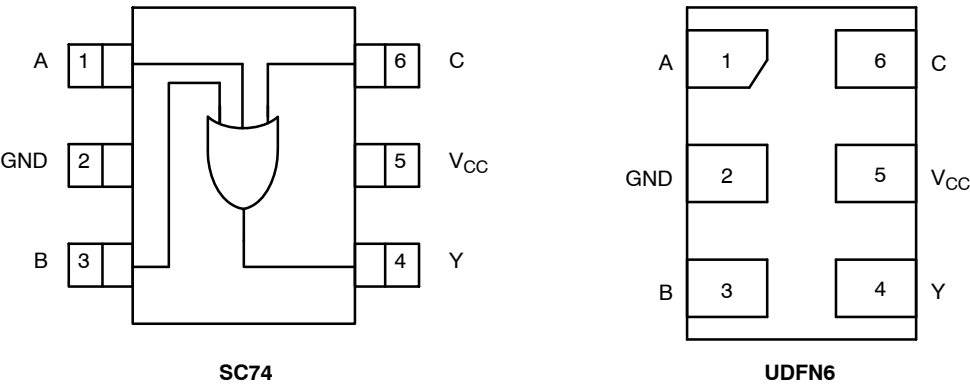


Figure 2. Pinout (Top View)

PIN ASSIGNMENT

Pin	Function
1	A
2	GND
3	B
4	Y
5	V <sub>CC</sub>
6	C

FUNCTION TABLE (Y = A + B + C)

Input			Output
A	B	C	Y
H	X	X	H
X	H	X	H
X	X	H	H
L	L	L	L

H = HIGH Logic Level  
L = LOW Logic Level  
X = Either LOW or HIGH Logic Level

## MAXIMUM RATINGS

Symbol	Characteristics	Value	Unit
$V_{CC}$	DC Supply Voltage	-0.5 to +6.5	V
$V_{IN}$	DC Input Voltage	-0.5 to +6.5	V
$V_{OUT}$	DC Output Voltage Active-Mode (High or Low State) Tri-State Mode (Note 1) Power-Down Mode ( $V_{CC} = 0$ V)	-0.5 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	$\pm 50$	mA
$I_{CC}$ or $I_{GND}$	DC Supply Current per Supply Pin or Ground Pin	$\pm 100$	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
$\theta_{JA}$	Thermal Resistance (Note 2) SC-74 UDFN6	320 154	°C/W
$P_D$	Power Dissipation in Still Air SC-74 UDFN6	390 812	mW
MSL	Moisture Sensitivity	Level 1	-
$F_R$	Flammability 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	2000 1000	V
$I_{Latchup}$	Latchup Performance (Note 4)	$\pm 100$	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.
2. Measured with minimum pad spacing on an FR4 board, using 10mm-by-1inch, 2 ounce copper trace no air flow per JESD51-7.
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	Characteristics	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	$V_{CC}$	
		0	5.5	
		0	5.5	
$T_A$	Operating Temperature Range	-55	+125	°C
$t_r, t_f$	Input Rise and Fall Time $V_{CC} = 1.65$ 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 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

Symbol	Parameter	Condition	V <sub>CC</sub> (V)	T <sub>A</sub> = 25°C			-55°C ≤ T <sub>A</sub> ≤ 125°C		Units
				Min	Typ	Max	Min	Max	
V <sub>IH</sub>	High-Level Input Voltage		1.65 to 1.95	0.65 V <sub>CC</sub>	–	–	0.65 V <sub>CC</sub>	–	V
			2.3 to 5.5	0.70 V <sub>CC</sub>	–	–	0.70 V <sub>CC</sub>	–	
V <sub>IL</sub>	Low-Level Input Voltage		1.65 to 1.95	–	–	0.35 V <sub>CC</sub>	–	0.35 V <sub>CC</sub>	V
			2.3 to 5.5	–	–	0.30 V <sub>CC</sub>	–	0.30 V <sub>CC</sub>	
V <sub>OH</sub>	High-Level Output Voltage	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	1.65 to 5.5	V <sub>CC</sub> – 0.1	V <sub>CC</sub>	–	V <sub>CC</sub> – 0.1	–	V
		I <sub>OH</sub> = –100 μA	1.65	1.29	1.4	–	1.29	–	
		I <sub>OH</sub> = –4 mA	2.3	1.9	2.1	–	1.9	–	
		I <sub>OH</sub> = –8 mA	3.0	2.4	2.7	–	2.4	–	
		I <sub>OH</sub> = –16 mA	3.0	2.3	2.5	–	2.3	–	
		I <sub>OH</sub> = –24 mA	4.5	3.8	4.0	–	3.8	–	
		I <sub>OH</sub> = –32 mA							
V <sub>OL</sub>	Low-Level Output Voltage	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	1.65 to 5.5	–	–	0.1	–	0.1	V
		I <sub>OL</sub> = 100 μA	1.65	–	0.08	0.24	–	0.24	
		I <sub>OL</sub> = 4 mA	2.3	–	0.2	0.3	–	0.3	
		I <sub>OL</sub> = 8 mA	3.0	–	0.28	0.4	–	0.4	
		I <sub>OL</sub> = 16 mA	3.0	–	0.38	0.55	–	0.55	
		I <sub>OL</sub> = 24 mA	4.5	–	0.42	0.55	–	0.55	
		I <sub>OL</sub> = 32 mA							
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	μA
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	μA
I <sub>CC</sub>	Quiescent Supply Current	V <sub>IN</sub> = V <sub>CC</sub> or GND	5.5	–	–	1.0	–	10	μA

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.

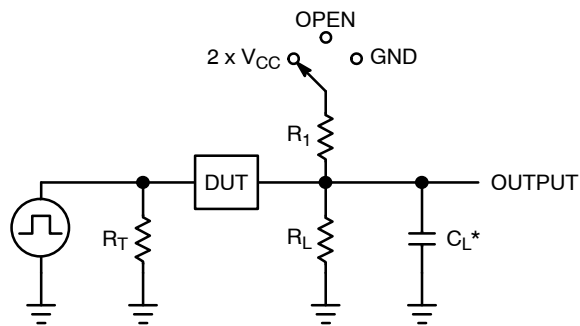
## AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Condition	V <sub>CC</sub> (V)	T <sub>A</sub> = 25°C			-55°C ≤ T <sub>A</sub> ≤ 125°C		Units
				Min	Typ	Max	Min	Max	
t <sub>PLH</sub> , t <sub>PHL</sub>	Propagation Delay, A or B or C to Y (Figures 3 and 4)	R <sub>L</sub> = 1 MΩ, C <sub>L</sub> = 15 pF	1.65 to 1.95	–	6.5	18.5	–	19.0	ns
		R <sub>L</sub> = 1 MΩ, C <sub>L</sub> = 15 pF	2.3 to 2.7	–	3.0	11.0	–	11.5	
		R <sub>L</sub> = 1 MΩ, C <sub>L</sub> = 15 pF	3.0 to 3.6	–	2.4	7.5	–	8.0	
		R <sub>L</sub> = 500 Ω, C <sub>L</sub> = 50 pF		–	3.0	8.5	–	9.0	
		R <sub>L</sub> = 1 MΩ, C <sub>L</sub> = 15 pF	4.5 to 5.5	–	1.9	5.5	–	6.0	
		R <sub>L</sub> = 500 Ω, C <sub>L</sub> = 50 pF		–	2.4	7.0	–	7.5	

## CAPACITIVE CHARACTERISTICS

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

5. 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<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>.



$C_L$  includes probe and jig capacitance  
 $R_T$  is  $Z_{OUT}$  of pulse generator (typically 50  $\Omega$ )  
 $f = 1$  MHz

Figure 3. Test Circuit

Test	Switch Position	$C_L$ , pF	$R_L$ , $\Omega$	$R_1$ , $\Omega$
$t_{PLH} / t_{PHL}$	Open	See AC Characteristics Table		
$t_{PLZ} / t_{PZL}$	$2 \times V_{CC}$	50	500	500
$t_{PHZ} / t_{PZH}$	GND	50	500	500

X = Don't Care

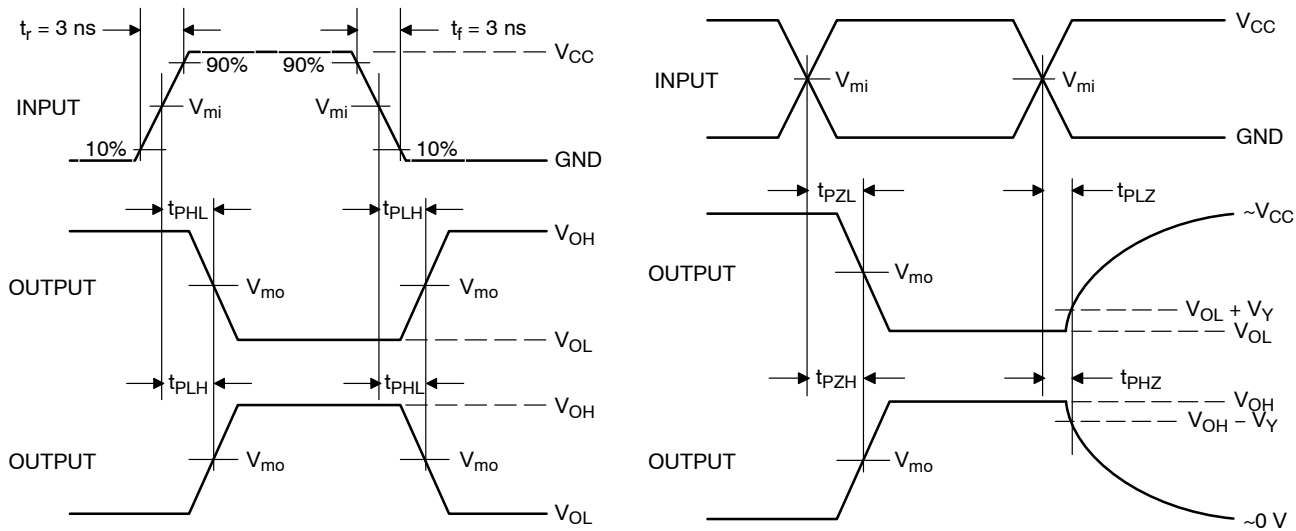


Figure 4. Switching Waveforms

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

# NL17SZ332

## DEVICE ORDERING INFORMATION

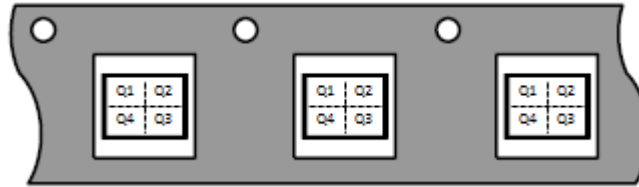
Device	Packages	Specific Device Code	Pin 1 Orientation (See below)	Shipping <sup>†</sup>
NL17SZ332DBVT1G	SC-74	AE	Q4	3000 / Tape & Reel
NL17SZ332MU1TCG (In Development)	UDFN6, 1.45x1.0, 0.5P	6	Q4	3000 / Tape & Reel
NL17SZ332MU3TCG (In Development)	UDFN6, 1.0x1.0, 0.35P	6	Q4	3000 / Tape & Reel

<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.

\*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

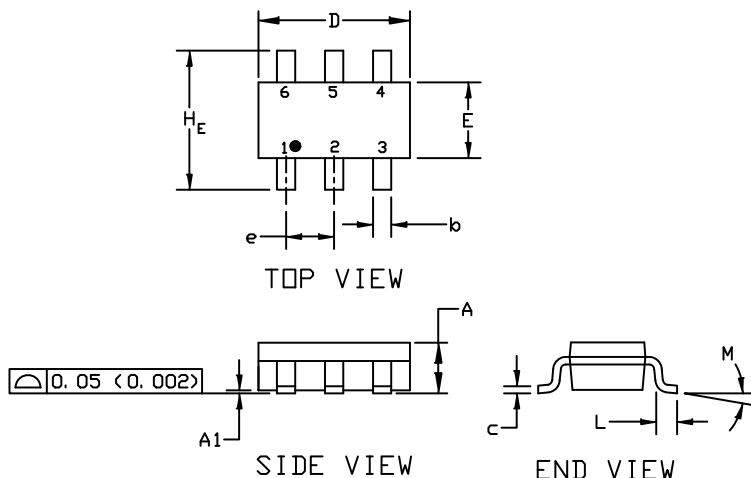




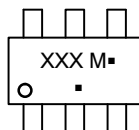
SCALE 2:1

SC-74  
CASE 318F  
ISSUE P

DATE 07 OCT 2021



GENERIC  
MARKING DIAGRAM\*



XXX = Specific Device Code  
M = Date Code  
▪ = Pb-Free Package

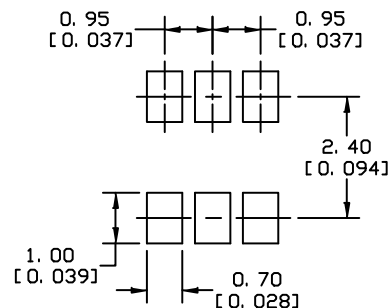
(Note: Microdot may be in either location)

\*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.

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994
2. CONTROLLING DIMENSION: INCHES
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.

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
H <sub>E</sub>	2.50	2.75	3.00	0.099	0.108	0.118
L	0.20	0.40	0.60	0.008	0.016	0.024
M	0°	---	10°	0°	---	10°



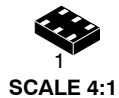
\* For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERM/D.

SOLDERING FOOTPRINT

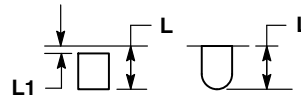
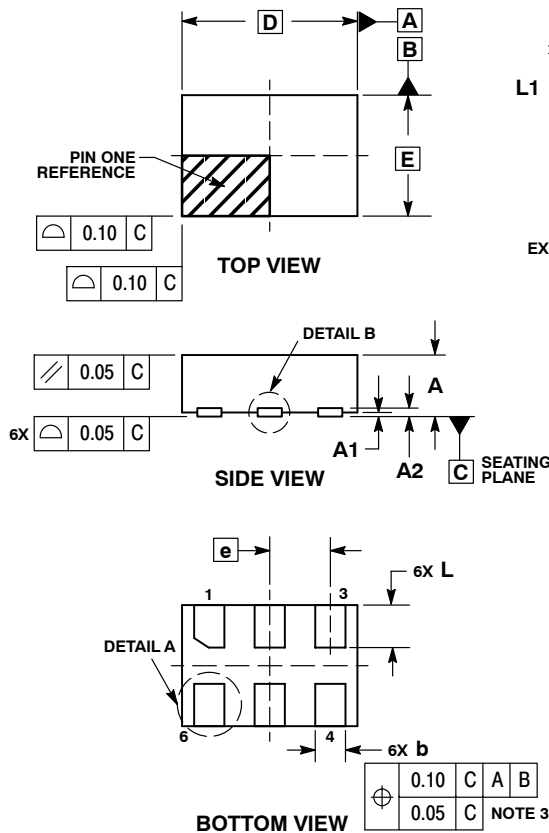
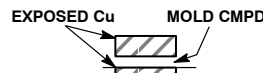
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STYLE 7: PIN 1. SOURCE 1 2. GATE 1 3. DRAIN 2 4. SOURCE 2 5. GATE 2 6. DRAIN 1	STYLE 8: PIN 1. EMITTER 1 2. BASE 2 3. COLLECTOR 2 4. EMITTER 2 5. BASE 1 6. COLLECTOR 1	STYLE 9: PIN 1. EMITTER 2 2. BASE 2 3. COLLECTOR 1 4. EMITTER 1 5. BASE 1 6. COLLECTOR 2	STYLE 10: PIN 1. ANODE/CATHODE 2. BASE 3. EMITTER 4. COLLECTOR 5. ANODE 6. CATHODE	STYLE 11: PIN 1. EMITTER 2. BASE 3. ANODE/CATHODE 4. ANODE 5. CATHODE 6. COLLECTOR	

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DESCRIPTION:	SC-74	PAGE 1 OF 1

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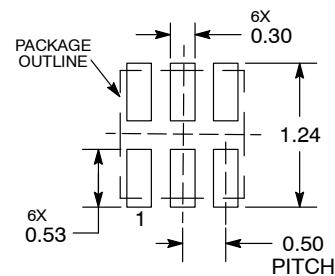

**UDFN6, 1.45x1.0, 0.5P**  
**CASE 517AQ**  
**ISSUE O**

DATE 15 MAY 2008


**DETAIL A**  
**OPTIONAL**  
**CONSTRUCTIONS**

**DETAIL B**  
**OPTIONAL**  
**CONSTRUCTIONS**
**NOTES:**

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

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<b>DESCRIPTION:</b>	<b>UDFN6, 1.45x1.0, 0.5P</b>	<b>PAGE 1 OF 1</b>

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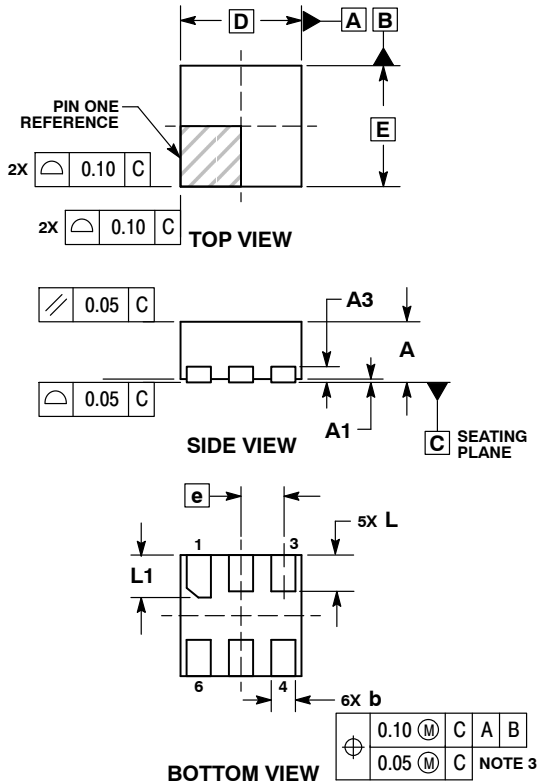




SCALE 4:1

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

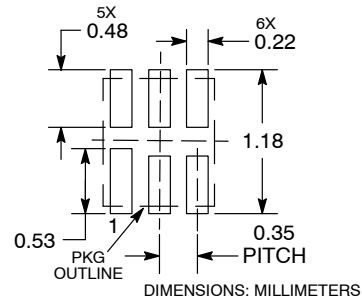
DATE 18 MAY 2011



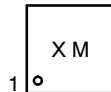
## NOTES:

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 **onsemi** 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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<b>DESCRIPTION:</b>	<b>UDFN6, 1x1, 0.35P</b>	<b>PAGE 1 OF 1</b>

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