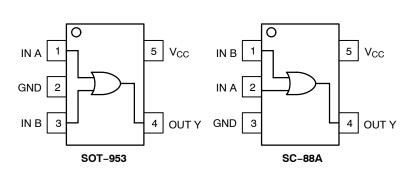
# **Single 2-Input OR Gate**

The NL17SG32 MiniGate<sup>™</sup> is an advanced high-speed CMOS 2-input OR gate in ultra-small footprint.

The NL17SG32 input structures provides protection when voltages up to 4.6 V are applied.

#### Features

- Wide Operating  $V_{CC}$  Range: 0.9 V to 3.6 V
- High Speed:  $t_{PD}$  = 2.4 ns (Typ) at  $V_{CC}$  = 3.0 V,  $C_L$  = 15 pF
- Low Power Dissipation:  $I_{CC} = 0.5 \ \mu A \ (Max)$  at  $T_A = 25^{\circ}C$
- 4.6 V Overvoltage Tolerant (OVT) Input Pins
- Ultra-Small Packages
- These are Pb-Free and Halide-Free Devices



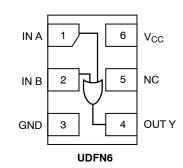


Figure 1. Pinouts (Top View)

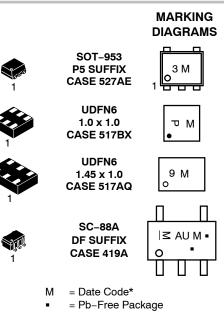


Figure 2. Logic Symbol



# **ON Semiconductor®**

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(Note: Microdot may be in either location)

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

PIN ASSIGNMENT							
SOT-953 SC-88A UDFN6							
1	IN A	IN B	IN A				
2	GND	IN A	IN B				
3	IN B	GND	GND				
4	OUT Y	OUT Y	OUT Y				
5	V <sub>CC</sub>	V <sub>CC</sub>	NC				
6			V <sub>CC</sub>				

#### FUNCTION TABLE

A Input	B Input	Y Output
L	L	L
L	Н	Н
Н	L	н
Н	Н	Н

## **ORDERING INFORMATION**

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

## MAXIMUM RATINGS

Symbol	Parame	ter	Value	Unit
V <sub>CC</sub>	DC Supply Voltage		–0.5 to +5.5	V
V <sub>IN</sub>	DC Input Voltage		-0.5 to +4.6	V
V <sub>OUT</sub>	DC Output Voltage	Output at High or Low State Power–Down Mode ( $V_{CC} = 0 V$ )	-0.5 to V <sub>CC</sub> +0.5 -0.5 to +4.6	V
I <sub>IK</sub>	DC Input Diode Current	V <sub>IN</sub> < GND	-20	mA
Ι <sub>ΟΚ</sub>	DC Output Diode Current	V <sub>OUT</sub> < GND	-20	mA
I <sub>OUT</sub>	DC Output Source/Sink Current		±20	mA
I <sub>CC</sub>	DC Supply Current per Supply Pin		±20	mA
I <sub>GND</sub>	DC Ground Current per Ground Pin		±20	mA
T <sub>STG</sub>	Storage Temperature Range		-65 to +150	°C
ΤL	Lead Temperature, 1 mm from Case for 10 Se	econds	260	°C
TJ	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	
$V_{\text{ESD}}$	ESD Withstand Voltage	Human Body Model (Note 2) Machine Model (Note 3)	>2000 >200	V
ILATCHUP	Latchup Performance Above	e V <sub>CC</sub> and Below GND at 125℃ (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.
Measured with minimum pad spacing on an FR4 board, using 10 mm-by-1 inch, 2-ounce copper trace with no air flow.
Tested to EIA/JESD22-A114-A.
Tested to EIA/JESD22-A115-A.

4. Tested to EIA/JESD78.

#### **RECOMMENDED OPERATING CONDITIONS**

Symbol	Characteristics	Min	Max	Unit
V <sub>CC</sub>	Positive DC Supply Voltage	0.9	3.6	V
V <sub>IN</sub>	Digital Input Voltage	0.0	3.6	V
V <sub>OUT</sub>	Output Voltage Output at High or Low Power-Down Mode (V <sub>CC</sub>		V <sub>CC</sub> 3.6	V
T <sub>A</sub>	Operating Temperature Range	-55	+125	°C
$\Delta t$ / $\Delta V$	Input Transition Rise or Fail Rate $V_{CC} = 3.3 V_{CC}$	± 0.3 V 0	10	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

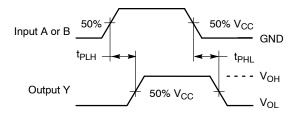
					T <sub>A</sub> =	25°C	7⊿ -55°C to	∖ = o +125°C	
Symbol	Parameter	C	Conditions V <sub>CC</sub> (		Min	Max	Min	Max	Unit
V <sub>IH</sub>	High-Level Input			0.9	V <sub>CC</sub>		V <sub>CC</sub>		V
	Voltage			1.1 to 1.3	0.7xV <sub>CC</sub>		0.7xV <sub>CC</sub>		1
				1.4 to 1.6	$0.65 \mathrm{xV}_{\mathrm{CC}}$		$0.65 \mathrm{xV}_{\mathrm{CC}}$		1
				1.65 to 1.95	$0.65 \mathrm{xV}_{\mathrm{CC}}$		$0.65 \mathrm{xV}_{\mathrm{CC}}$		1
				2.3 to 2.7	1.7		1.7		1
				3.0 to 3.6	2.0		2.0		1
VIL	Low-Level Input			0.9		GND		GND	V
	Voltage			1.1 to 1.3		0.3xV <sub>CC</sub>		0.3xV <sub>CC</sub>	1
				1.4 to 1.6		0.35xV <sub>CC</sub>		0.35xV <sub>CC</sub>	1
				1.65 to 1.95		0.35xV <sub>CC</sub>		0.35xV <sub>CC</sub>	1
				2.3 to 2.7		0.7		0.7	1
				3.0 to 3.6		0.8		0.8	1
V <sub>OH</sub>	High-Level	V <sub>IN</sub> =	I <sub>OH</sub> = –20 μA	0.9	0.75		0.75		V
	Output Voltage	V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = -0.3 mA	1.1 to 1.3	$0.75 \mathrm{xV}_{\mathrm{CC}}$		$0.75 \mathrm{xV}_{\mathrm{CC}}$		1
			I <sub>OH</sub> = -1.7 mA	1.4 to 1.6	$0.75 \mathrm{xV}_{\mathrm{CC}}$		$0.75 \mathrm{xV}_{\mathrm{CC}}$		1
			I <sub>OH</sub> = -3.0 mA	1.65 to 1.95	Vcc-0.45		Vcc-0.45		1
			I <sub>OH</sub> = -4.0 mA	2.3 to 2.7	2.0		2.0		1
			I <sub>OH</sub> = -8.0 mA	3.0 to 3.6	2.48		2.48		1
V <sub>OL</sub>	Low-Level	V <sub>IN</sub> =	I <sub>OL</sub> = 20 μA	0.9 to 3.6		0.1		0.1	V
	Output Voltage	V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> = 1.1 mA	1.1 to 1.3		0.25xV <sub>CC</sub>		0.25xV <sub>CC</sub>	1
			I <sub>OL</sub> = 1.7 mA	1.4 to 1.6		0.25xV <sub>CC</sub>		0.25xV <sub>CC</sub>	1
			I <sub>OL</sub> = 3.0 mA	1.65 to 1.95		0.45		0.45	1
			I <sub>OL</sub> = 4.0 mA	2.3 to 2.7		0.4		0.4	1
			I <sub>OL</sub> = 8.0 mA	3.0 to 3.6		0.4		0.4	1
I <sub>IN</sub>	Input Leakage Current	0 ≤	$V_{IN} \leq 3.6 V$	0 to 3.6		±0.1		±1.0	μΑ
I <sub>CC</sub>	Quiescent Supply Current	V <sub>IN</sub> =	V <sub>CC</sub> or GND	3.6		0.5		10.0	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.

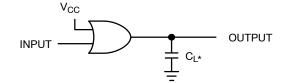
Symbol	Parameter	meter Test Condition $V_{CC}$ (V) $T_A = 25^{\circ} C$		•	T⊿ -55°C to	∖ = o +125°C				
				Min Typ		Max	ax Min Max		Unit	
t <sub>PLH</sub> ,	Propagation Delay,	$C_L = 10 \text{ pF},$	0.9	-	12.2	14.4	-	18.0	ns	
t <sub>PHL</sub>	A or B to Y	$R_L = 1 M\Omega$	1.1 to 1.3	-	8.8	12.4	-	16.2		
			1.4 to 1.6	-	5.0	8.5	-	10.0		
			1.65 to 1.95	-	3.6	6.2	-	6.7		
			2.3 to 2.7	-	2.7	3.9	-	4.4		
			3.0 to 3.6	-	2.1	3.1	-	3.7		
		C <sub>L</sub> R <sub>L</sub>	$C_L = 15 \text{ pF},$	0.9	-	13.0	16.0	-	18.0	ns
			$\bar{R_L} = 1 M\Omega$	1.1 to 1.3	-	7.8	12.0	-	16.0	
			1.4 to 1.6	-	5.9	9.3	-	11.2		
			1.65 to 1.95	-	4.5	6.9	-	7.1		
			2.3 to 2.7	-	3.0	4.4	-	5.0		
			3.0 to 3.6	-	2.4	3.4	-	3.9		
		$C_L = 30 \text{ pF},$	0.9	-	14.0	17.2	-	20.0	ns	
		$R_L = 1 M\Omega$	1.1 to 1.3	-	11.0	14.1	-	17.8		
			1.4 to 1.6	-	8.0	12.1	-	15.9		
			1.65 to 1.95	-	6.0	9.2	-	9.6		
			2.3 to 2.7	-	3.9	5.7	-	6.1		
			3.0 to 3.6	-	3.0	4.4	-	4.8		
C <sub>IN</sub>	Input Capacitance		0 to 3.6		3	-	-	-	pF	
C <sub>PD</sub>	Power Dissipation Capacitance (Note 5)	f = 10 MHz	0.9 to 3.6	-	4	-	-	-	pF	

#### AC ELECTRICAL CHARACTERISTICS (Input tr = tf = 3.0 ns)

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.
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>.







\*Includes all probe and jig capacitance. A 1–MHz square input wave is recommended for propagation delay tests.



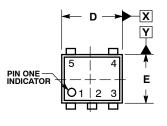
#### **ORDERING INFORMATION**

Device	Package	Shipping <sup>†</sup>
NL17SG32P5T5G	SOT-953 (Pb-Free)	8000 / Tape & Reel
NL17SG32DFT2G	SC-88A (Pb-Free)	3000 / Tape & Reel
NL17SG32AMUTCG	UDFN6 1.45 x 1 mm (Pb-Free)	3000 / Tape & Reel
NL17SG32CMUTCG	UDFN6 1 x 1 mm (Pb-Free)	3000 / Tape & Reel

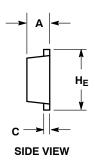
+For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

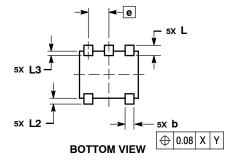
### PACKAGE DIMENSIONS

SOT-953 CASE 527AE ISSUE E



TOP VIEW

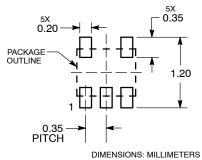




- NOTES: 1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994. 2. CONTROLLING DIMENSION: MILLIMETERS 3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL. 4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

TERCIT, THE THE BOOME, OT A						
	MILLIMETERS					
DIM	MIN NOM MAX					
Α	0.34	0.37	0.40			
b	0.10	0.15	0.20			
С	0.07	0.12	0.17			
D	0.95	1.00	1.05			
Е	0.75	0.80	0.85			
е		0.35 BS	С			
HE	0.95	1.00	1.05			
L		0.175 RE	F			
L2	0.05	0.10	0.15			
L3			0.15			

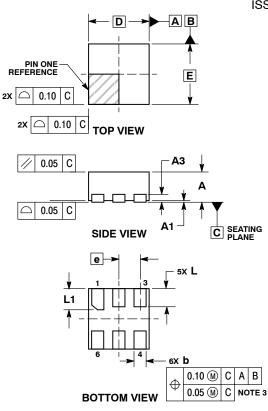
#### **SOLDERING FOOTPRINT\***



\*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, 1x1, 0.35P CASE 517BX ISSUE O

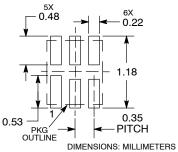


- NOTES:
   DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
   CONTROLLING DIMENSION: MILLIMETERS.
   DIMENSION & APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.20 MM FROM TERMINAL TIP.
   PACKAGE DIMENSIONS EXCLUSIVE OF BURRS AND MOLD FLASH.

  - MILLIMETERS

DIM	MIN	MAX			
Α	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			
е	0.35	BSC			
L	0.25	0.35			
L1	0.30	0.40			

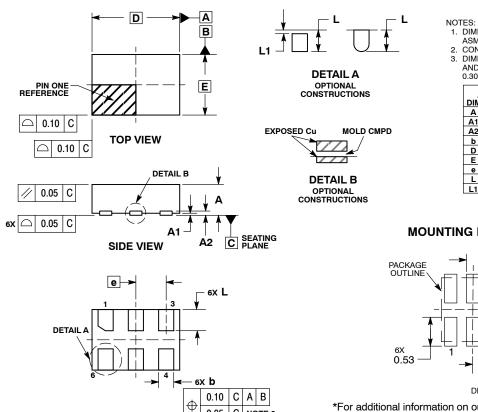




\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

#### PACKAGE DIMENSIONS

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



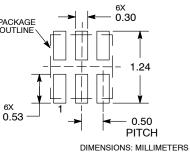
0.05 C NOTE 3

**BOTTOM VIEW** 

NOTES:
 DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
 CONTROLLING DIMENSION: MILLIMETERS.
 DIMENSION & APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 mm FROM THE TERMINAL TIP.

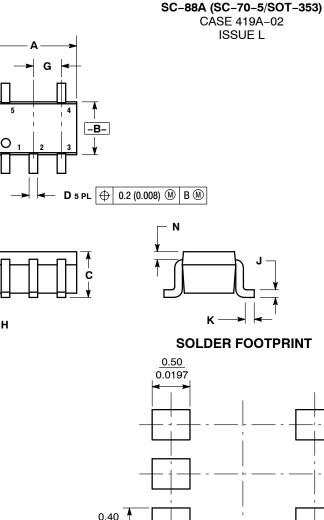
_	MILLIMETERS				
DIM	MIN	MAX			
Α	0.45	0.55			
A1	0.00	0.05			
A2	0.07 REF				
b	0.20	0.30			
D	1.45	BSC			
E	1.00	BSC			
е	0.50	BSC			
L	0.30	0.40			
L1		0.15			

#### **MOUNTING 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



NOTES:

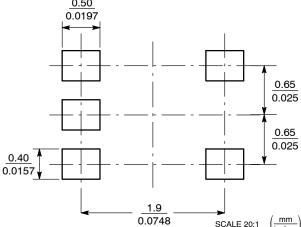
BURRS.

З.

DIES:
 DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 CONTROLLING DIMENSION: INCH.
 419A-01 OBSOLETE. NEW STANDARD

419A-02 DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE 4

	INC	HES	MILLIMETERS		
DIM	MIN	MAX	MIN	MAX	
Α	0.071	0.087	1.80	2.20	
В	0.045	0.053	1.15	1.35	
С	0.031	0.043	0.80	1.10	
D	0.004	0.012	0.10	0.30	
G	0.026	BSC	0.65 BSC		
Н		0.004		0.10	
J	0.004	0.010	0.10	0.25	
Κ	0.004	0.012	0.10	0.30	
Ν	0.008 REF		0.20	REF	
S	0.079	0.087	2.00	2.20	



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