

# NLV17SZ07

## Single Non-Inverting Buffer with Open Drain Output

The NLV17SZ07 is a high performance single non-inverting buffer with open drain outputs operating from a 1.65 to 5.5 V supply.

The Output stage is open drain with Over Voltage Tolerance. This allows the NLV17SZ07 to be used to interface 5.0 V circuits to circuits of any voltage between 0 and +7.0 V.

### Features

- Tiny SOT-353 Package
- Extremely High Speed:  $t_{PD}$  2.5 ns (typical) at  $V_{CC} = 5$  V
- Designed for 1.65 V to 5.5 V  $V_{CC}$  Operation, CMOS Compatible
- Over Voltage Tolerant Inputs  $V_{IN}$  may be Between 0 and 7.0 V for  $V_{CC}$  Between 0.5 and 5.5 V
- TTL Compatible – Interface Capability with 5.0 V TTL Logic with  $V_{CC} = 2.7$  V to 3.6 V
- LVCMOS Compatible
- 24 mA Output Sink Capability, Pullup may be between 0 and 7.0 V
- Near Zero Static Supply Current Substantially Reduces System Power Requirements
- Chip Complexity: FET = 20
- 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

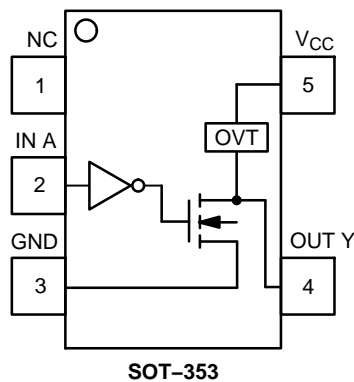


Figure 1. Pinout

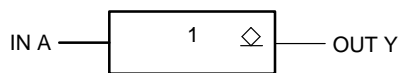


Figure 2. Logic Symbol



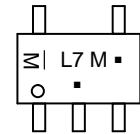
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### MARKING DIAGRAMS



SC-88A / SOT-353 / SC-70  
DF SUFFIX  
CASE 419A



L7 = 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 5 of this data sheet.

# NLV17SZ07

## PIN ASSIGNMENT

Pin	Function
1	NC
2	IN A
3	GND
4	OUT Y
5	V <sub>CC</sub>

## FUNCTION TABLE

Input	Output
A	Y
L	L
H	Z

## MAXIMUM RATINGS

Symbol	Characteristics	Value	Unit
V <sub>CC</sub>	DC Supply Voltage	-0.5 to +7.0	V
V <sub>I</sub>	DC Input Voltage	-0.5 ≤ V <sub>I</sub> ≤ +7.0	V
V <sub>O</sub>	DC Output Voltage Active Mode, LOW State (Note 1) Tri-State Mode 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
I <sub>OK</sub>	DC Output Diode Current V <sub>O</sub> < GND	-50	mA
I <sub>IK</sub>	DC Input Diode Current V <sub>I</sub> < GND	-50	mA
I <sub>O</sub>	DC Output Sink Current	±50	mA
I <sub>CC</sub>	DC Supply Current per Supply Pin	±100	mA
I <sub>GND</sub>	DC Ground Current per Ground Pin	±100	mA
T <sub>STG</sub>	Storage Temperature Range	-65 to +150	°C
P <sub>D</sub>	Power Dissipation in Still Air	186	mW
θ <sub>JA</sub>	Thermal Resistance	350	°C/W
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
I <sub>Latch-Up</sub>	Latch-Up Performance Above V <sub>CC</sub> and Below GND at 85°C (Note 5)	±500	mA
MSL	Moisture Sensitivity	Level 1	
F <sub>R</sub>	Flammability Rating Oxygen Index: 28 to 34	UL 94 V-0 @ 0.125 in	
ESD	ESD Classification Human Body Model (Note 3) Machine Model (Note 4) Charged Device Model (Note 5)	Class 2 Class B N/A	

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. I<sub>O</sub> absolute maximum rating must be observed.
2. Tested to EIA/JESD22-A114-A, rated to EIA/JESD22-A114-B.
3. Tested to EIA/JESD22-A115-A, rated to EIA/JESD22-A115-A.
4. Tested to JESD22-C101-A.
5. Tested to EIA/JESD78.

# NLV17SZ07

## RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
$V_{CC}$	Supply Voltage Operating Data Retention Only	1.65 1.5	5.5 5.5	V
$V_I$	Input Voltage	0	5.5	V
$V_O$	Output Voltage Active Mode, LOW State Tri-State Mode Power-Down Mode ( $V_{CC} = 0$ V)	0 0 0	$V_{CC}$ 5.5 5.5	V
$T_A$	Operating Free-Air Temperature	-55	+125	°C
$\Delta t/\Delta V$	Input Transition Rise or Fall Rate $V_{CC} = 2.5$ V $\pm 0.2$ V $V_{CC} = 3.0$ V $\pm 0.3$ V $V_{CC} = 5.0$ V $\pm 0.5$ V	0 0 0	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	$V_{CC}$ (V)	$T_A = 25^\circ\text{C}$			$-55^\circ\text{C} \leq T_A \leq 125^\circ\text{C}$		Unit
				Min	Typ	Max	Min	Max	
$V_{IH}$	High-Level Input Voltage		1.65 to 1.95 2.3 to 5.5	$0.75 V_{CC}$ $0.7 V_{CC}$			$0.75 V_{CC}$ $0.7 V_{CC}$		V
$V_{IL}$	Low-Level Input Voltage		1.65 to 1.95 2.3 to 5.5			$0.25 V_{CC}$ $0.3 V_{CC}$		$0.25 V_{CC}$ $0.3 V_{CC}$	V
$I_{LKG}$	Z-State Output Leakage Current	$V_{IN} = V_{IH}$ $V_{OUT} = V_{CC}$ or GND	2.3 to 5.5			$\pm 5.0$		$\pm 10.0$	$\mu\text{A}$
$V_{OL}$	Low-Level Output Voltage $V_{IN} = V_{IL}$	$I_{OL} = 100 \mu\text{A}$	1.65 to 5.5		0.0	0.1		0.1	V
		$I_{OL} = 4 \text{ mA}$	1.65		0.08	0.24		0.24	
		$I_{OL} = 8 \text{ mA}$	2.3		0.20	0.3		0.3	
		$I_{OL} = 12 \text{ mA}$	2.7		0.22	0.4		0.4	
		$I_{OL} = 16 \text{ mA}$	3.0		0.28	0.4		0.4	
		$I_{OL} = 24 \text{ mA}$	3.0		0.38	0.55		0.55	
		$I_{OL} = 32 \text{ mA}$	4.5		0.42	0.55		0.55	
$I_{IN}$	Input Leakage Current	$V_{IN} = 5.5$ V or GND	0 to 5.5			$\pm 0.1$		$\pm 1.0$	$\mu\text{A}$
$I_{OFF}$	Power Off Leakage Current	$V_{IN} = 5.5$ V or $V_{OUT} = 5.5$ V	0			1		10	$\mu\text{A}$
$I_{CC}$	Quiescent Supply Current	$V_{IN} = 5.5$ V or GND	5.5			1		10	$\mu\text{A}$
$I_{CCT}$	Quiescent Supply Current	$V_{IN} = 3.0$ V	3.6			10		100	$\mu\text{A}$

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.

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## AC ELECTRICAL CHARACTERISTICS $t_R = t_F = 2.5 \text{ ns}$ ; $C_L = 50 \text{ pF}$ ; $R_L = 500 \Omega$

Symbol	Parameter	Condition	$V_{CC}$ (V)	$T_A = 25^\circ\text{C}$			$-55^\circ\text{C} \leq T_A \leq 125^\circ\text{C}$		Unit
				Min	Typ	Max	Min	Max	
$t_{PZL}$	Propagation Delay (Figure 3 and 4)	$R_L = R_1 = 500 \Omega$ , $C_L = 50 \text{ pF}$	$1.8 \pm 0.15$	0.8	5.3	11.6	0.8	12.0	ns
			$2.5 \pm 0.2$	1.2	3.7	5.8	1.2	6.4	
			$3.3 \pm 0.3$	0.8	2.9	4.4	0.8	4.8	
			$5.0 \pm 0.5$	0.5	2.3	3.5	0.5	3.9	
$t_{PLZ}$	Propagation Delay (Figure 3 and 4)	$R_L = R_1 = 500 \Omega$ , $C_L = 50 \text{ pF}$	$1.8 \pm 0.15$	0.8	5.3	11.6	0.8	1.20	ns
			$2.5 \pm 0.2$	1.2	2.8	5.8	1.2	6.4	
			$3.3 \pm 0.3$	0.8	2.1	4.4	0.8	4.8	
			$5.0 \pm 0.5$	0.5	1.4	3.5	0.5	3.9	

## CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Condition	Typical	Unit
$C_{IN}$	Input Capacitance	$V_{CC} = 5.5 \text{ V}$ , $V_I = 0 \text{ V}$ or $V_{CC}$	> 2.5	pF
$C_{OUT}$	Output Capacitance	$V_{CC} = 5.5 \text{ V}$ , $V_I = 0 \text{ V}$ or $V_{CC}$	4.0	pF
$C_{PD}$	Power Dissipation Capacitance (Note 6)	10 MHz, $V_{CC} = 5.5 \text{ V}$ , $V_I = 0 \text{ V}$ or $V_{CC}$	4.0	pF

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

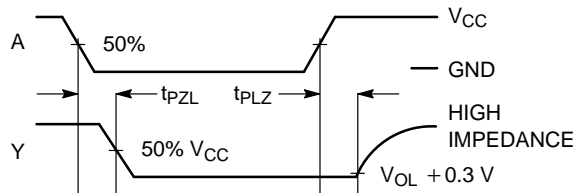


Figure 3. Switching Waveforms

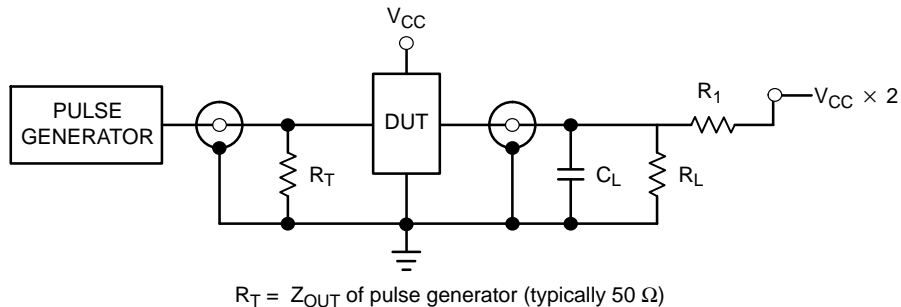


Figure 4. Test Circuit

# NLV17SZ07

## DEVICE ORDERING INFORMATION

Device	Package	Shipping†
NLV17SZ07DFT2G*	SOT-353/SC70-5/SC-88A (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.

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

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

ON Semiconductor®



SCALE 2:1

SC-88A (SC-70-5/SOT-353)  
CASE 419A-02  
ISSUE L

DATE 17 JAN 2013



### SOLDER FOOTPRINT

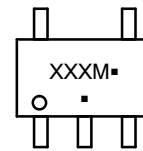


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 419A-01 OBSOLETE. NEW STANDARD 419A-02.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.071	0.087	1.80	2.20
B	0.045	0.053	1.15	1.35
C	0.031	0.043	0.80	1.10
D	0.004	0.012	0.10	0.30
G	0.026 BSC		0.65 BSC	
H	---	0.004	---	0.10
J	0.004	0.010	0.10	0.25
K	0.004	0.012	0.10	0.30
N	0.008 REF		0.20 REF	
S	0.079	0.087	2.00	2.20

### 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.

- |  |  |  |  |  |
|--|--|--|--|--|
| <p>STYLE 1:<br/>PIN 1. BASE<br/>2. EMITTER<br/>3. BASE<br/>4. COLLECTOR<br/>5. COLLECTOR</p>                   | <p>STYLE 2:<br/>PIN 1. ANODE<br/>2. EMITTER<br/>3. BASE<br/>4. COLLECTOR<br/>5. CATHODE</p>  | <p>STYLE 3:<br/>PIN 1. ANODE 1<br/>2. N/C<br/>3. ANODE 2<br/>4. CATHODE 2<br/>5. CATHODE 1</p> | <p>STYLE 4:<br/>PIN 1. SOURCE 1<br/>2. DRAIN 1/2<br/>3. SOURCE 1<br/>4. GATE 1<br/>5. GATE 2</p> | <p>STYLE 5:<br/>PIN 1. CATHODE<br/>2. COMMON ANODE<br/>3. CATHODE 2<br/>4. CATHODE 3<br/>5. CATHODE 4</p>  |
| <p>STYLE 6:<br/>PIN 1. EMITTER 2<br/>2. BASE 2<br/>3. EMITTER 1<br/>4. COLLECTOR<br/>5. COLLECTOR 2/BASE 1</p> | <p>STYLE 7:<br/>PIN 1. BASE<br/>2. EMITTER<br/>3. BASE<br/>4. COLLECTOR<br/>5. COLLECTOR</p> | <p>STYLE 8:<br/>PIN 1. CATHODE<br/>2. COLLECTOR<br/>3. N/C<br/>4. BASE<br/>5. EMITTER</p>      | <p>STYLE 9:<br/>PIN 1. ANODE<br/>2. CATHODE<br/>3. ANODE<br/>4. ANODE<br/>5. ANODE</p>           | <p>Note: Please refer to datasheet for style callout. If style type is not called out in the datasheet refer to the device datasheet pinout or pin assignment.</p> |

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DESCRIPTION:	SC-88A (SC-70-5/SOT-353)	PAGE 1 OF 1

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