NL17SZ17

Single Non-Inverting Buffer with Schmitt Trigger

The NL17SZ17 is a single Non−inverting Schmitt Trigger Buffer in three tiny footprint packages. The device performs much as LCX multi−gate products in speed and drive.

Features

- Tiny SOT−353, SOT−553 and SOT−953 Packages
- Source/Sink 24 mA at 3.0 Volts
- Chip Complexity: FETs = 20
- Designed for 1.65 V to 5.5 V V_{CC} Operation
- NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q100 Qualified and PPAP Capable
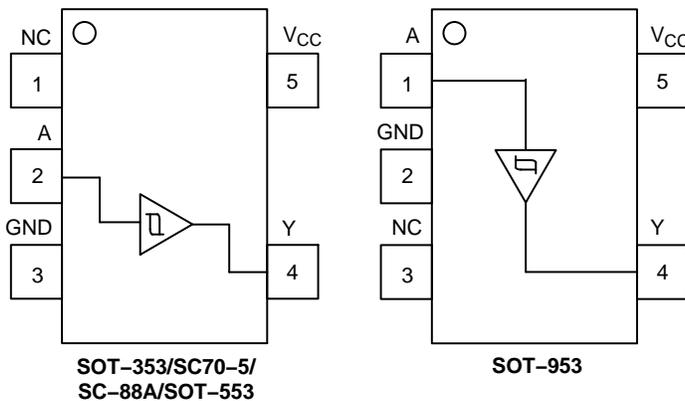- These Devices are Pb−Free and are RoHS Compliant

MARKING DIAGRAMS

| SC−88A (SC−70−5/SOT−353) DF SUFFIX CASE 419A |
| SOT−553 XV5 SUFFIX CASE 463B |

LX = 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.

| SOT−953 CASE 527AE |

A = Specific Device Code
(A with 90 degree clockwise rotation)
M = Month Code

Figure 1. Pinout (Top View)

Figure 2. Logic Symbol

ORDERING INFORMATION

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

PIN ASSIGNMENT
(SOT−353/SC70−5/SC−88A/SOT−553)

Pin	Function
1	NC
2	A
3	GND
4	Y
5	V_{CC}

PIN ASSIGNMENT (SOT−953)

Pin	Function
1	IN A
2	GND
3	NC
4	Y
5	V_{CC}

FUNCTION TABLE

Input	Output
A	**Y**
L	L
H	H

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MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V_{CC}	DC Supply Voltage		−0.5 to +7.0	V
V_I	DC Input Voltage		−0.5 ≤ V_I ≤ +7.0	V
V_O	DC Output Voltage (SOT−353/SC70−5/SC−88A/SOT−553 Packages)	Output in High or LOW State (Note 1) Power−Down Mode	−0.5 to +7.0	V
V_O	DC Output Voltage (SOT−953 Package)		−0.5 to V_{CC} + 0.5	V
I_{IK}	DC Input Diode Current	V_I < GND	−50	mA
I_{OK}	DC Output Diode Current (SOT−953 Package)	V_O < GND, V_O > V_{CC}	±50	mA
I_{OK}	DC Output Diode Current (SOT−353/SC70−5/SC−88A/SOT−553 Packages) V_O < GND		−50	mA
I_O	DC Output Sink Current		±50	mA
I_{CC}	DC Supply Current per Supply Pin		±100	mA
I_{GND}	DC Ground Current per Ground Pin		±100	mA
T_{STG}	Storage Temperature Range		−65 to +150	°C
T_L	Lead Temperature, 1 mm from Case for 10 Seconds		260	°C
T_J	Junction Temperature under Bias		+150	°C
θ_{JA}	Thermal Resistance	SOT−353 (Note 2) SOT−553	350 496	°C/W
P_D	Power Dissipation in Still Air at 85°C	SOT−353 SOT−553	186 135	mW
MSL	Moisture Sensitivity		Level 1	
F_R	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	Class 2 Class C N/A	
$I_{Latchup}$	Latchup Performance Above V_{CC} and Below GND at 85°C (Note 5)		±500	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. I_O absolute maximum rating must be observed.
2. Measured with minimum pad spacing on an FR4 board, using 10 mm−by−1 inch, 2−ounce copper trace with no air flow.
3. Tested to EIA/JESD22−A114−A, rated to EIA/JESD22−A114−B.
4. Tested to EIA/JESD22−A115−A, rated to EIA/JESD22−A115−A.
5. Tested to EIA/JESD78.

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, (Note 6)		0	5.5	V
V_O	Output Voltage (SOT−353/SC70−5/SC−88A/SOT−553 Packages)	(HIGH or LOW State)	0	5.5	V
V_O	Output Voltage (SOT−953 Package)	(HIGH or LOW State)	0	V_{CC}	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 ±0.2 V V_{CC} = 3.0 V ±0.3 V V_{CC} = 5.0 V ±0.5 V	0 0 0	No Limit No Limit No Limit	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.

6. Unused inputs may not be left open. All inputs must be tied to a high−logic voltage level or a low−logic input voltage level.

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DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Condition	V_{CC} (V)	T_A = 25°C			−55°C ≤ T_A ≤ 125°C		Units
				Min	Typ	Max	Min	Max	
V_T+	Positive Input Threshold Voltage		1.65 2.3 2.7 3.0 4.5 5.5	0.6 1.0 1.2 1.3 1.9 2.2	1.0 1.5 1.7 1.9 2.7 3.3	1.4 1.8 2.0 2.2 3.1 3.6	0.6 1.0 1.2 1.3 1.9 2.2	1.4 1.8 2.0 2.2 3.1 3.6	V
V_T-	Negative Input Threshold Voltage		1.65 2.3 2.7 3.0 4.5 5.5	0.2 0.4 0.5 0.6 1.0 1.2	0.5 0.75 0.87 1.0 1.5 1.9	0.8 1.15 1.4 1.5 2.0 2.3	0.2 0.4 0.5 0.6 1.0 1.2	0.8 1.15 1.4 1.5 2.0 2.3	V
V_H	Input Hysteresis Voltage		1.65 2.3 2.7 3.0 4.5 5.5	0.1 0.25 0.3 0.4 0.6 0.7	0.48 0.75 0.83 0.93 1.2 1.4	0.9 1.1 1.15 1.2 1.5 1.7	0.1 0.25 0.3 0.4 0.6 0.7	0.9 1.1 1.15 1.2 1.5 1.7	V
V_{OH}	High–Level Output Voltage $V_{IN} = V_{IH}$ or V_{IL}	$I_{OH} = -100$ μA $I_{OH} = -3$ mA $I_{OH} = -8$ mA $I_{OH} = -12$ mA $I_{OH} = -16$ mA $I_{OH} = -24$ mA $I_{OH} = -32$ mA	1.65 to 5.5 1.65 2.3 2.7 3.0 3.0 4.5	$V_{CC} -0.1$ 1.29 1.9 2.2 2.4 2.3 3.8	V_{CC} 1.52 2.1 2.4 2.7 2.5 4.0		$V_{CC} -0.1$ 1.29 1.9 2.2 2.4 2.3 3.8		V
V_{OL}	Low–Level Output Voltage $V_{IN} = V_{IH}$ or V_{IL}	$I_{OL} = 100$ μA $I_{OL} = 3$ mA $I_{OL} = 8$ mA $I_{OL} = 12$ mA $I_{OL} = 16$ mA $I_{OL} = 24$ mA $I_{OL} = 32$ mA	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 0.55	V
I_{IN}	Input Leakage Current	$V_{IN} = 5.5$ V or GND	0 to 5.5			±0.1		±1.0	μA
I_{OFF}	Power Off Leakage Current (SOT–353/ SC70–5/SC–88A/ SOT–553 Packages)	$V_{IN} = 5.5$ V or $V_{OUT} = 5.5$ V	0			1.0		10	μA
I_{CC}	Quiescent Supply Current	$V_{IN} = 5.5$ V or GND	5.5			1.0		10	μA

AC ELECTRICAL CHARACTERISTICS (Input $t_r = t_f = 3.0$ ns)

Symbol	Parameter	Condition	V_{CC} (V)	T_A = 25°C			−55°C ≤ T_A ≤ 125°C		Units
				Min	Typ	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation Delay Input A to Y (Figures 3 and 4)	$R_L = 1$ MΩ, $C_L = 15$ pF	1.65 1.8 2.5 ± 0.2 3.3 ± 0.3 5.0 ± 0.5	2.0 2.0 1.0 1.0 0.5	9.1 7.6 5.0 3.7 3.1	15 12.5 9.0 6.3 5.2	2.0 2.0 1.0 1.0 0.5	15.6 13 9.5 6.5 5.5	ns
		$R_L = 500$ Ω, $C_L = 50$ pF	3.3 ± 0.3 5.0 ± 0.5	1.5 0.8	4.4 3.7	7.2 5.9	1.5 0.8	7.5 6.2	

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Condition	Typical	Units
C_{IN}	Input Capacitance	$V_{CC} = 5.5$ V, $V_I = 0$ V or V_{CC}	> 2.5	pF
C_{PD}	Power Dissipation Capacitance (Note 7)	10 MHz, $V_{CC} = 3.3$ V, $V_I = 0$ V or V_{CC} 10 MHz, $V_{CC} = 5.5$ V, $V_I = 0$ V or V_{CC}	9 11	pF

7. 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: $I_{CC(OPR)} = C_{PD} \bullet V_{CC} \bullet f_{in} + I_{CC}$. C_{PD} is used to determine the no–load dynamic power consumption; $P_D = C_{PD} \bullet V_{CC}^2 \bullet f_{in} + I_{CC} \bullet V_{CC}$.
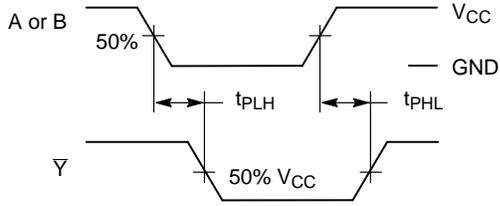
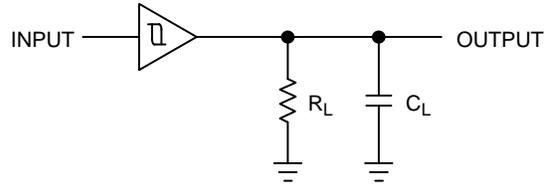**Figure 3. Switching Waveforms**

A 1 MHz square input wave is recommended for propagation delay tests.

Figure 4. Test Circuit
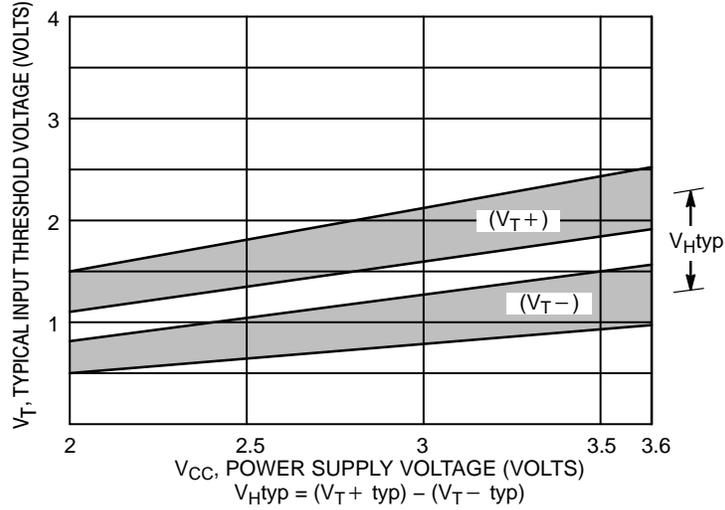

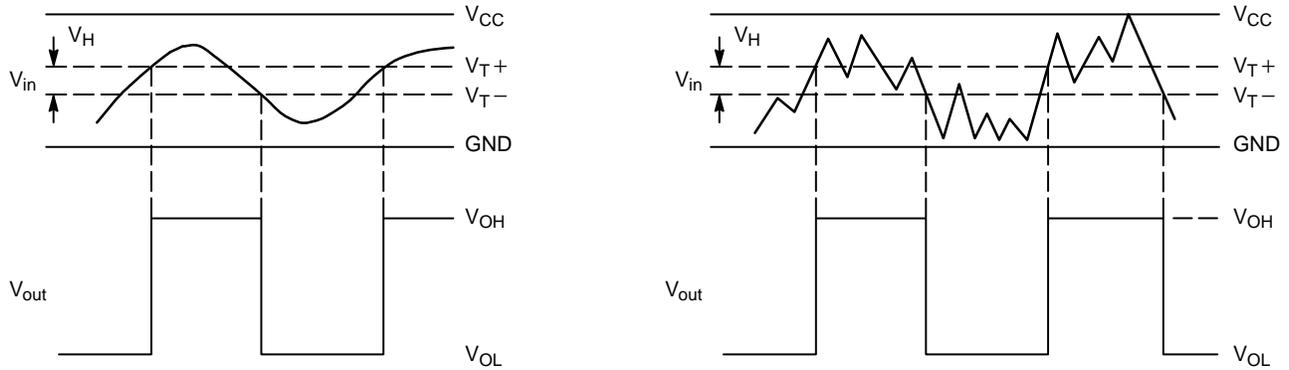$V_H$typ = (V_T+ typ) − (V_T− typ)

Figure 5. Typical Input Threshold, V_T+, V_T− versus Power Supply Voltage

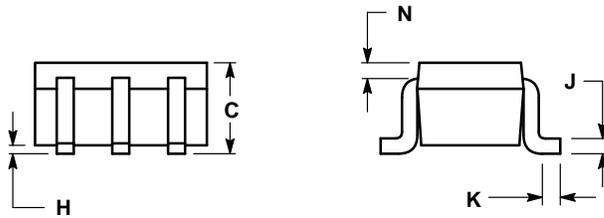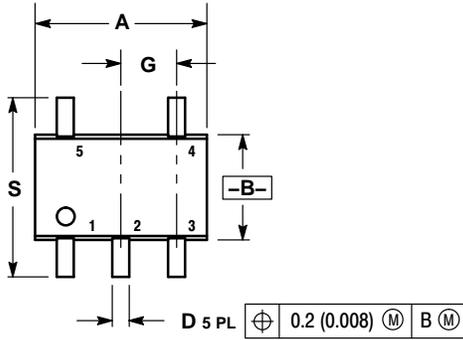(a) A Schmitt−Trigger Squares Up Inputs With Slow Rise and Fall Times

(b) A Schmitt−Trigger Offers Maximum Noise Immunity

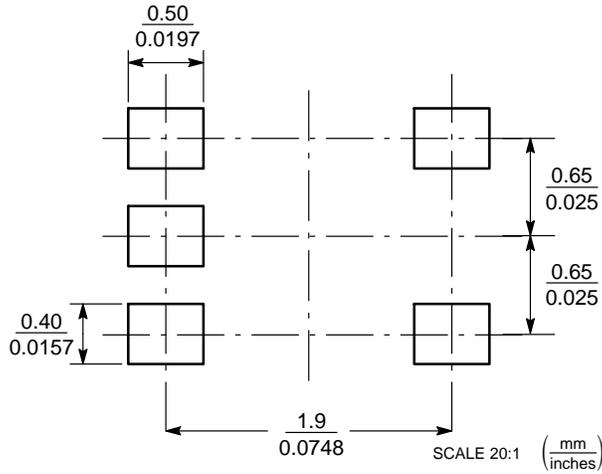**Figure 6. Typical Schmitt−Trigger Applications**

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DEVICE ORDERING INFORMATION

Device Order Number	Package Type	Tape/Reel Size†
NL17SZ17DFT2G	SC−88A/SC−70−5/SOT−353 (Pb−Free)	3000 Units / Tape & Reel
NLV17SZ17DFT2G*	SC−88A/SC−70−5/SOT−353 (Pb−Free)	3000 Units / Tape & Reel
NL17SZ17XV5T2G	SOT−553 (Pb−Free)	4000 Units / Tape & Reel
NL17SZ17P5T5G	SOT−953 (Pb−Free)	8000 Units / 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.

PACKAGE DIMENSIONS

SOT−553
XV5 SUFFIX
CASE 463B
ISSUE B

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.50	0.55	0.60	0.020	0.022	0.024
b	0.17	0.22	0.27	0.007	0.009	0.011
c	0.08	0.13	0.18	0.003	0.005	0.007
D	1.50	1.60	1.70	0.059	0.063	0.067
E	1.10	1.20	1.30	0.043	0.047	0.051
e	0.50 BSC			0.020 BSC		
L	0.10	0.20	0.30	0.004	0.008	0.012
HE	1.50	1.60	1.70	0.059	0.063	0.067

SOLDERING FOOTPRINT*

SCALE 20:1 $\left(\dfrac{mm}{inches}\right)$

*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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PACKAGE DIMENSIONS

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

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

D 5 PL ⊕ 0.2 (0.008) Ⓜ B Ⓜ

SOLDERING FOOTPRINT*

$\frac{0.50}{0.0197}$

$\frac{0.65}{0.025}$

$\frac{0.65}{0.025}$

$\frac{0.40}{0.0157}$

$\frac{1.9}{0.0748}$

SCALE 20:1 $\left(\frac{mm}{inches}\right)$

*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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PACKAGE DIMENSIONS

SOT−953
CASE 527AE
ISSUE E

TOP VIEW

PIN ONE INDICATOR
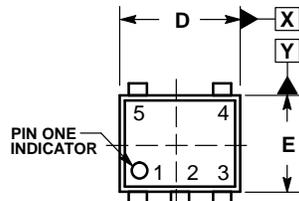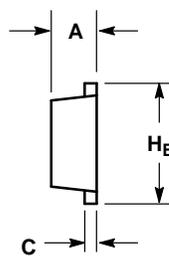
SIDE VIEW

BOTTOM VIEW

⊕ | 0.08 | X | Y
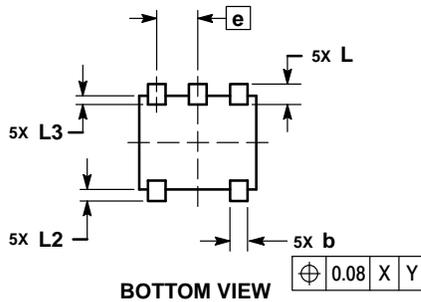
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

DIM	MILLIMETERS		
	MIN	NOM	MAX
A	0.34	0.37	0.40
b	0.10	0.15	0.20
C	0.07	0.12	0.17
D	0.95	1.00	1.05
E	0.75	0.80	0.85
e	0.35 BSC		
H E	0.95	1.00	1.05
L	0.175 REF		
L2	0.05	0.10	0.15
L3	―――	―――	0.15

SOLDERING FOOTPRINT*

PACKAGE OUTLINE

5X 0.20

5X 0.35

1.20

0.35 PITCH
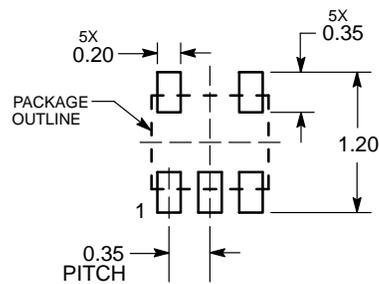
DIMENSIONS: MILLIMETERS

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

NL17SZ17/D

AMEYA360
Components Supply Platform

Authorized Distribution Brand :

ROHM	Sunlord EXPERT IN PASSIVE PARTS	SSM SUSUMU Thin Film Specialist and Innovator	AVERLOGIC	NXP	Elprotronic
2Pai Semi	Ambarella	CanaanTek	Firstohm	GigaDevice	威海半导体 Vanguard Semiconductor

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