onsemi

Single Unbuffered Inverter

NLV17SZU04

The NLV17SZU04 is a single unbuffered inverter in tiny footprint packages.

Features

- Designed for 1.65 V to 5.5 V V_{CC} Operation
- 2.1 ns t_{PD} at $V_{CC} = 5 V (typ)$
- Input Overvoltage Tolerant up to 5.5 V
- IOFF Supports Partial Power Down Protection
- Source/Sink 12 mA at 3.0 V
- Available in SC-88A, SOT-553 and SOT-953 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



SC-88A (SOT-353) DF SUFFIX CASE 419A

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MARKING DIAGRAMS





SOT-953 P5 SUFFIX CASE 527AE

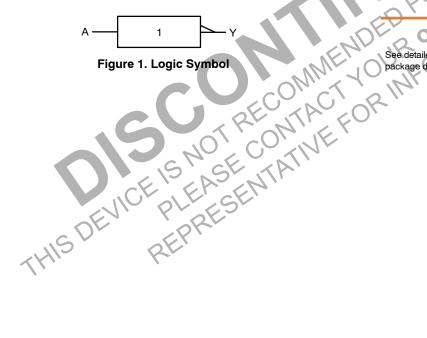


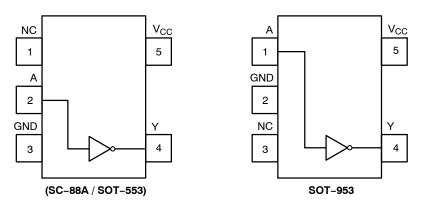
= Specific Device Code = Date Code* = Pb-Free Package

(Note: Microdot may be in either location) Date Code orientation and/or position may vary depending upon manufacturing location.

ORDERING INFORMATION

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







PIN ASSIGNMENT (SC-88A/SOT-553)

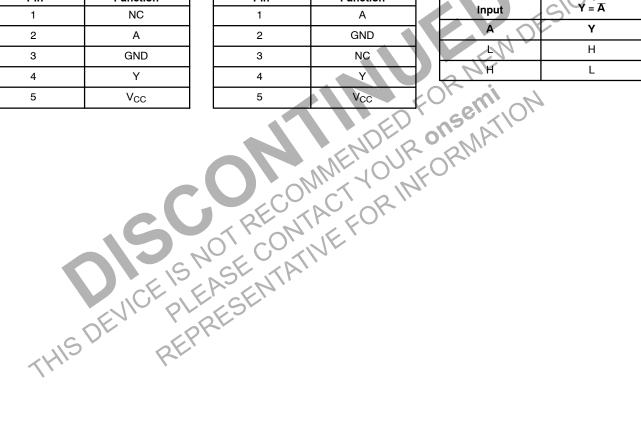
PIN ASSIGNMENT (SOT-953)

FUNCTION TABLE

Output

Pin	Function
1	NC
2	А
3	GND
4	Y
5	V _{CC}

Pin	Function	
1	A	
2	GND	
3	NC	
4	Y	
5	V _{CC}	C
	ENDER	0



MAXIMUM RATINGS

Symbol	Characteristics	Value	Unit	
V _{CC}	DC Supply Voltage	-0.5 to +7.0	V	
V _{IN}	DC Input Voltage	–0.5 to V _{CC} + 0.5	V	
V _{OUT}	DC Output Voltage	–0.5 to V _{CC} + 0.5	V	
I _{IK}	DC Input Diode Current	±50	mA	
Ι _{ΟΚ}	DC Output Diode Current	±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	
TL	Lead Temperature, 1 mm from Case for 10 secs	260	°C	
TJ	Junction Temperature Under Bias	+150	°C	
θ_{JA}	Thermal Resistance (Note 2) SC-88A SOT-553 SOT-953	324	∕ ∘C/W	
P _D	Power Dissipation in Still Air SC-88A SOT-553 SOT-953	386	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	Ser 2000 1000	V	
I _{Latchup}	Latchup Performance (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.
 Applicable to devices with outputs that may be tri-stated.
 Measured with minimum pad spacing on an FR4 board, using 10mm-by-1inch, 2 ounce copper trace no air flow per JESD51-7.
 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	Мах	Unit
V _{CC}	Positive DC Supply Voltage		1.65	5.5	V
V _{IN}	DC Input Voltage		0	5.5	V
Vout	DC Output Voltage		0	V _{CC}	
TA	Operating Temperature Range		-55	+125	°C
t _r , t _f	Input Rise and Fall Time V _C V _C	$_{\rm C}$ = 3.0 V to 3.6 V $_{\rm C}$ = 4.5 V to 5.5 V	0 0	100 20	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

			V _{cc}	Τμ	ς = 25°0	C	–55°C ≤ T	_A ≤ 125°C	
Symbol	Parameter	Condition	(V)	Min	Тур	Max	Min	Max	Units
V _{IH}	High-Level Input		1.65 to 1.95	0.85 V _{CC}	-	-	0.85 V _{CC}	-	V
	Voltage		2.3 to 5.5	0.80 V _{CC}	1	-	0.80 V _{CC}	-	
V _{IL}	Low-Level Input		1.65 to 1.95	-	1	0.15 V _{CC}	-	0.15 V _{CC}	V
	Voltage		2.3 to 5.5	-	-	0.20 V _{CC}	-	0.20 V _{CC}	
V _{OH}	High-Level Output Voltage	$V_{IN} = V_{IH} \text{ or } V_{IL}$ $I_{OH} = -100 \ \mu A$	1.65 to 5.5	V _{CC} – 0.1	V _{CC}	-	V _{CC} – 0.1	-	V
			1.65 2.3 2.7 3.0 3.0 4.5	1.29 1.9 2.2 2.4 2.3 3.8	1.52 2.1 2.3 2.6 2.5 4.2		1.29 1.9 2.2 2.4 2.3 3.8		
V _{OL}	Low-Level Output Voltage	$V_{IN} = V_{IH}$ $I_{OL} = 100 \ \mu A$	1.65 to 5.5	-	1	0.1		0.1	V
			1.65 2.3 2.7 3.0 3.0 4.5		0.08 0.2 0.2 0.24 0.26 0.31	0.24 0.3 0.4 0.4 0.55 0.55		0.24 0.3 0.4 0.4 0.55 0.55	
I _{IN}	Input Leakage Current	$V_{IN} = 5.5 \text{ V or GND}$	1.65 to 5.5)-	<u>±0</u> .1	< P	±1.0	μA
I _{CC}	Quiescent Supply Current	$V_{IN} = V_{CC}$ or GND	5.5	-NP	R	1.0	_	10	μΑ

 Current
 Image: Current

 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.

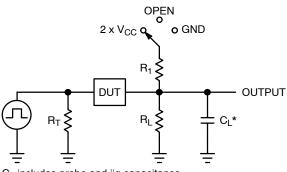
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AC ELECTRICAL CHARACTERISTICS

			V _{CC} T _A		д = 25°	С	–55°C ≤ T	_A ≤ 125°C	
Symbol	Parameter	Condition	(V)	Min	Тур	Max	Min	Max	Units
t _{PLH,}	t _{PLH,} t _{PHL} Propagation Delay, A to Y (Figures 3 and 4)	R_L = 1 M Ω , C_L = 15 pF	1.65 to 1.95	-	3.0	11.7	-	12.1	ns
PHL		R_L = 1 M Ω , C_L = 15 pF	2.3 to 2.7	-	2.2	6.2	-	6.5	
		R_L = 1 MΩ, C_L = 15 pF	3.0 to 3.6	-	2.0	4.5	-	4.8	
		$R_{L} = 500 \ \Omega, \ C_{L} = 50 \ pF$		-	2.5	6.0	-	6.6	
		R_L = 1 MΩ, C_L = 15 pF	4.5 to 5.5	-	1.8	3.9	-	4.1	
		$R_L = 500 \Omega$, $C_L = 50 pF$		-	2.1	5.0	-	5.5	

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Condition	Typical	Units
C _{IN}	Input Capacitance	V_{CC} = 5.5 V, V_{IN} = 0 V or V_{CC}	2.5	pF
C _{OUT}	Output Capacitance	V_{CC} = 5.5 V, V_{IN} = 0 V or V_{CC}	2.5	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} = 5.5 V, V_{IN} = 0 V or V_{CC}	9 11	pF
Average power c		lent capacitance which is calculated from the operating current consule equation: I _{CC(OPR)} = C _{PD} • V _{CC} • f _{in} + I _{CC} . C _{PD} is used to determine to v _{CC} .	Imption with the no-load	but load. dynamic

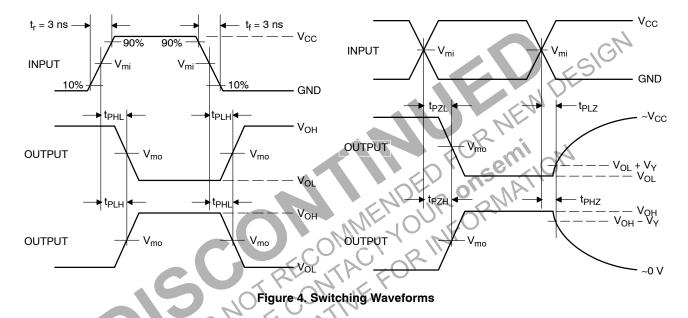


t _{PLH} / t _{PHL} Open See AC Characteristics Table t _{PLZ} / t _{PZL} 2 x V _{CC} 50 500 500 t _{PHZ} / t _{PZH} GND 50 500 500	Test	Switch Position	C _L , pF	R_{L}, Ω	R ₁ , Ω		
	t _{PLH} / t _{PHL}	Open	See AC Characteristics Table				
t _{PHZ} / t _{PZH} GND 50 500 500	t _{PLZ} / t _{PZL}	$2 \times V_{CC}$	50	500	500		
	t _{PHZ} / t _{PZH}	GND	50	500	500		

X = Don't Care

 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



	NCENERGE	Vm	10, V	
V _{CC} , V	V _{mi} , V	t _{PLH} , t _{PHL}	t _{PZL} , t _{PLZ} , t _{PZH} , t _{PHZ}	V _Y , V
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

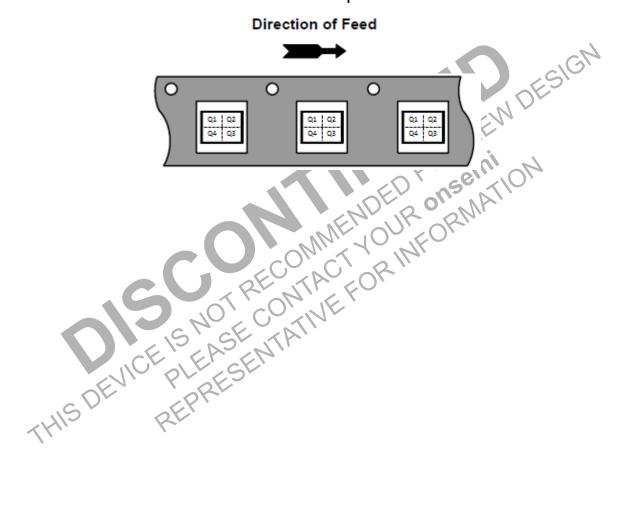
DEVICE ORDERING INFORMATION

Device	Packages	Marking	Pin 1 Orientation (See below)	Shipping [†]
NLV17SZU04DFT2G*	SC-88A	L6	Q4	3000 / Tape & Reel
NL17SZU04XV5T2G-L22087	SOT-553	L6	Q4	4000 / Tape & Reel
NL17SZU04P5T5G-L22088	SOT-953	6 (Rotated 90° CW)	Q2	8000 / 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



NSEM



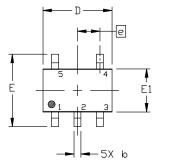
SC-88A (SC-70-5/SOT-353) CASE 419A-02 **ISSUE M**

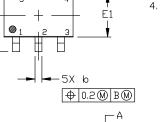
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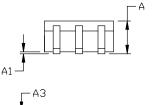
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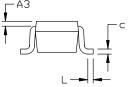
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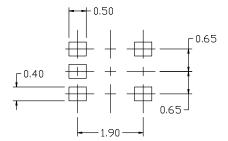
DATE 11 APR 2023











RECOMMENDED MOUNTING FOOTPRINT

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

DIM	MILLIMETERS				
MIU	MIN. NDM.		MAX.		
A	0.80	0.95	1.10		
A1			0.10		
A3	0.20 REF				
b	0.10	0.20	0.30		
С	0.10		0.25		
D	1.80	2.00	5'50		
E	2.00	2.10	5'50		
E1	1.15	1.25	1.35		
e	0.65 BSC				
L	0.10	0.15	0.30		

DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH,

PROTRUSIONS, OR GATE BURRS.MOLD FLASH, PROTRUSIONS,

OR GATE BURRS SHALL NOT EXCEED 0.1016MM PER SIDE.

CONTROLLING DIMENSION: MILLIMETERS 419A-01 DBSOLETE, NEW STANDARD 419A-02

GENERIC MARKING





*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.

XXX = Specific Device Code

Μ = Date Code = Pb-Free Package

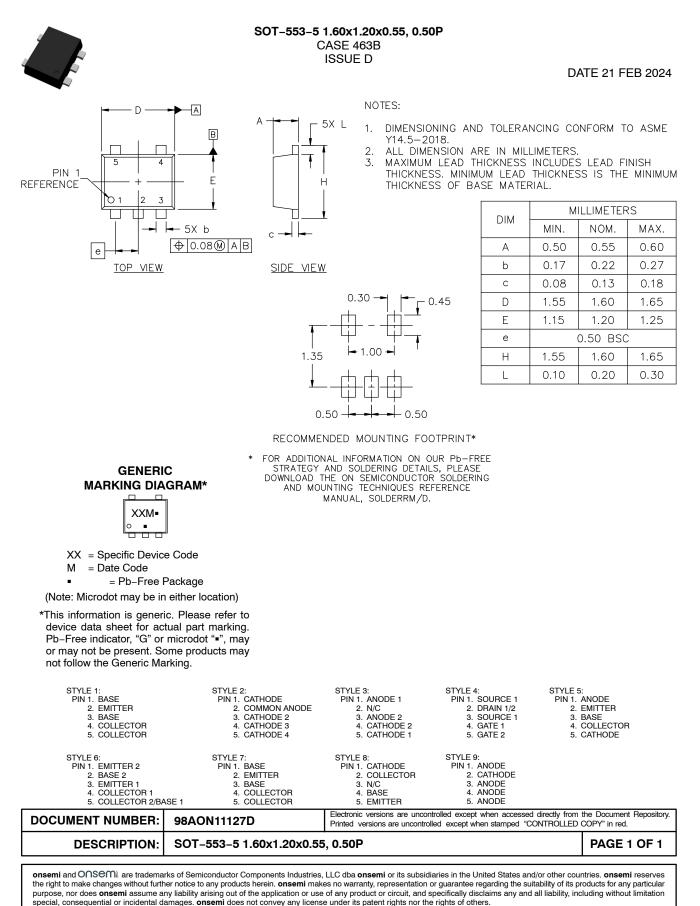
(Note: Microdot may be in either location)

STYLE 1: PIN 1. BASE 2. EMITTER 3. BASE 4. COLLECTOR 5. COLLECTOR	STYLE 2: PIN 1. ANODE 2. EMITTER 3. BASE 4. COLLECTOR 5. CATHODE	STYLE 3: PIN 1. ANODE 1 2. N/C 3. ANODE 2 4. CATHODE 2 5. CATHODE 1	STYLE 4: PIN 1. SOURCE 1 2. DRAIN 1/2 3. SOURCE 1 4. GATE 1 5. GATE 2	STYLE 5: PIN 1. CATHODE 2. COMMON ANOD 3. CATHODE 2 4. CATHODE 3 5. CATHODE 4	E
STYLE 6: PIN 1. EMITTER 2 2. BASE 2 3. EMITTER 1 4. COLLECTOR 5. COLLECTOR 2/BASE	STYLE 7: PIN 1. BASE 2. EMITTER 3. BASE 4. COLLECTOR 1 5. COLLECTOR	STYLE 8: PIN 1. CATHODE 2. COLLECTOR 3. N/C 4. BASE 5. EMITTER	STYLE 9: PIN 1. ANODE 2. CATHODE 3. ANODE 4. ANODE 5. ANODE	Note: Please refer to style callout. If style to out in the datasheet r datasheet pinout or p	ype is not called efer to the device
DOCUMENT NUMBER:	98ASB42984B			ot when accessed directly from when stamped "CONTROLLED (
DESCRIPTION:	N: SC-88A (SC-70-5/SOT-353)				PAGE 1 OF 1

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MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS

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MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



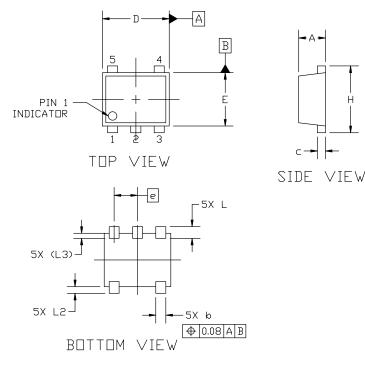
SOT-953 1.00x0.80x0.37, 0.35P CASE 527AE ISSUE F

DATE 17 JAN 2024

DURSEM

NDTES:

- 1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
- 2. CONTROLLING DIMENSION: MILLIMETERS.
- 3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS DF THE BASE MATERIAL.
- 4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.



GENERIC MARKING DIAGRAM*

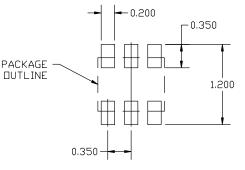


- X = Specific Device Code M = Month Code
- *This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "•", may or may not be present. Some products may not follow the Generic Marking.

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DESCRIPTION:	SOT-953 1.00x0.80x0.37, 0.35P		PAGE 1 OF 9		
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M	MILLIMETERS				
DIM	MIN	NDM	MAX		
А	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		
E	0.75	0.80	0.85		
e	0.35 BSC				
Н	0.95	1.00	1.05		
L	0.125	0.175	0.225		
L2	0.05	0.10	0.15		
L3	0.075 (REF)				



RECOMMENDED MOUNTING FOOTPRINT

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

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