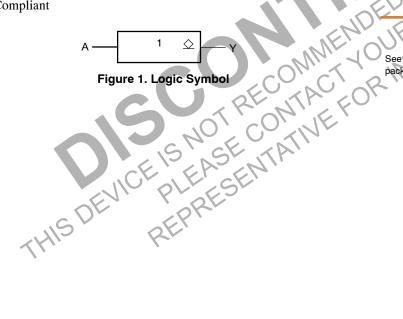


# **Single Non-Inverting Buffer** with Open Drain Output

# **NLV17SZ07**

The NLV17SZ07 is a single non-inverting buffer with open drain outputs in tiny footprint packages.

- Designed for 1.65 V to 5.5 V V<sub>CC</sub> Operation
- 2.1 ns  $t_{PD}$  at  $V_{CC} = 5 \text{ V (typ)}$
- Input/Output Overvoltage Tolerant up to 5.5 V
- IOFF Supports Partial Power Down Protection
- Sink 24 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



# **MARKING DIAGRAMS**



SC-88A **DF SUFFIX CASE 419A** 





SOT-553 **XV5 SUFFIX** CASE 463B





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.

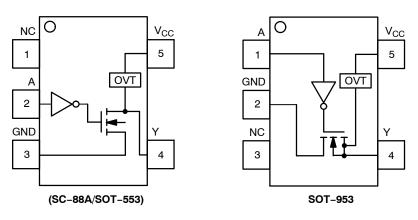


Figure 2. Pinout (Top View)

# **PIN ASSIGNMENT**

(SC-88A/SOT-553)

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

# PIN ASSIGNMENT (SOT-953)

Pin	Function		Pin	Function	Input	7
1	NC		1	A	A	
2	А		2	GND	YN -	
3	GND		3	NC	MH	
4	Y		4	Y	ORINI	
5	V <sub>CC</sub>		5	V <sub>CC</sub>	E CentiON	
THIS	DEVICE PI	N	O RECONTAINSESENTAIN	MENDEL MEYOUR ACTORIN	FORMATION FORMATION	

# **FUNCTION TABLE**

Input	Output	
A	Y	
YN	L	
H	Z	

# **MAXIMUM RATINGS**

Symbol	Characteristics	Value	Unit	
V <sub>CC</sub>	DC Supply Voltage		-0.5 to +7.0	V
V <sub>IN</sub>	DC Input Voltage		-0.5 to +7.0	V
V <sub>OUT</sub>	DC Output Voltage Active-Mode (High or L Tri-State Mod Power-Down Mode (V	e (Note 1)	-0.5 to V <sub>CC</sub> + 0.5 -0.5 to +7.0 -0.5 to +7.0	V
	DC Output Voltage (NL17SZ07P5T5G-L22	088 Only)	-0.5 to V <sub>CC</sub> + 0.5	
I <sub>IK</sub>	DC Input Diode Current	' <sub>IN</sub> < GND	-50	mA
I <sub>OK</sub>	DC Output Diode Current V <sub>O</sub>	<sub>UT</sub> < GND	-50	mA
	DC Output Diode Current (NL17SZ07P5T5G-L22	088 Only)	±50	
l <sub>out</sub>	DC Output Source/Sink Current		±50	mA
I <sub>CC</sub> or I <sub>GND</sub>	DC Supply Current per Supply Pin or Ground Pin		±100	mA
T <sub>STG</sub>	Storage Temperature Range		-65 to +150	<b>7</b> ∘c
$T_L$	Lead Temperature, 1 mm from Case for 10 secs		260	°C
$T_J$	Junction Temperature Under Bias		+150	°C
θЈΑ	Thermal Resistance (Note 2)	SC-88A SOT-553 SOT-953	377 324 254	°C/W
P <sub>D</sub>	Power Dissipation in Still Air	SC-88A SOT-553 SOT-953	332 386 491	mW
MSL	Moisture Sensitivity	201	Level 1	=
F <sub>R</sub>	Flammability Rating Oxygen Index	c: 28 to 34	UL 94 V-0 @ 0.125 in	-
V <sub>ESD</sub>	ESD Withstand Voltage (Note 3)  Human Bo Charged Dev	ody Model ice Model	2000 1000	V
I <sub>Latchup</sub>	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.

1. Applicable to devices with outputs that may be tri–stated.

Applicable to devices with duputs that may be the 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.
 Tested to EIA/JESD78 Class II.

THIS DEW

# RECOMMENDED OPERATING CONDITIONS

Symbol	Characteristics			Max	Unit
V <sub>CC</sub>	Positive DC Supply Voltage		1.65	5.5	V
V <sub>IN</sub>	DC Input Voltage		0	5.5	V
V <sub>OUT</sub>	DC Output Voltage	Active–Mode (High or Low State) Tri–State Mode (Note 1) Power–Down Mode ( $V_{CC}$ = 0 V)	0 0 0	V <sub>CC</sub> 5.5 5.5	V
	DC Output Voltage	(NL17SZ07P5T5G-L22088 Only)	0	V <sub>CC</sub>	
T <sub>A</sub>	Operating Temperature Range		-55	+125	°C
t <sub>r</sub> , t <sub>f</sub>	Input Rise and Fall Time	$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$ $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	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 <sub>CC</sub>	Т	A = 25°	С	–55°C ≤ T	A ≤ 125°C	
Symbol	Parameter	Condition	(V)	Min	Тур	Max	Min	Max	Units
V <sub>IH</sub>	High-Level Input		1.65 to 1.95	0.75 x V <sub>CC</sub>	-	-	0.75 x V <sub>CC</sub>	-	V
	Voltage		2.3 to 5.5	0.70 x V <sub>CC</sub>		- 1	0.70 x V <sub>CC</sub>	_	
$V_{IL}$	Low-Level Input		1.65 to 1.95	4-	_	0.25 x V <sub>CC</sub>	-	0.25 x V <sub>CC</sub>	V
	Voltage		2.3 to 5.5	-	)	0.30 x V <sub>CC</sub>		0.30 x V <sub>CC</sub>	
V <sub>OL</sub>	Low-Level Output Voltage	$\begin{aligned} &V_{IN} = V_{IH} \text{ or } V_{IL} \\ &I_{OL} = 100  \mu\text{A} \\ &I_{OL} = 4 \text{ mA} \\ &I_{OL} = 8 \text{ mA} \\ &I_{OL} = 12 \text{ mA} \\ &I_{OL} = 16 \text{ mA} \\ &I_{OL} = 24 \text{ mA} \\ &I_{OL} = 32 \text{ mA} \end{aligned}$	1.65 to 5.5 1.65 2.3 2.7 3.0 3.0 4.5	MENC C-	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	A	0.1 0.24 0.3 0.4 0.4 0.55	V
I <sub>IN</sub>	Input Leakage Cur- rent	V <sub>IN</sub> = 5.5 V or GND	1.65 to 5.5	IE-PO	-	±0.1	ı	±1.0	μΑ
l <sub>OZ</sub>	3-State Output Leakage Current	V <sub>OUT</sub> = 0 V to 5.5 V	1.65 to 5.5	-	_	±0.5	ı	±5.0	μΑ
l <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	ı	10	μА
	Power Off Leakage Current (NL17SZ07P5T5G- L22088 Only)	V <sub>IN</sub> = 5.5 V	0	-	-	1.0	ı	10	μΑ
Icc	Quiescent Supply Current	V <sub>IN</sub> = V <sub>CC</sub> or GND	5.5	-	_	1.0	-	10	μΑ
I <sub>CCT</sub>	Quiescent Supply Current	V <sub>IN</sub> = 3.0 V	3.6	-	-	10	-	100	μА

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.

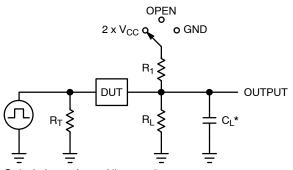
### **AC ELECTRICAL CHARACTERISTICS**

			V <sub>CC</sub> T <sub>A</sub> = 25°C		С	-55°C ≤ T <sub>A</sub> ≤ 125°C			
Symbol	Parameter	Condition	(V)	Min	Тур	Max	Min	Max	Units
t <sub>PZL</sub>	Propagation Delay, A to Y		1.65 to 1.95	-	6.0	9.0	_	9.5	ns
	(Figures 3 and 4)		2.3 to 2.7	-	3.6	6.1	-	6.5	
			3.0 to 3.6	-	2.7	5.6	=	6.0	
			4.5 to 5.5	-	2.1	4.4	_	4.8	
t <sub>PLZ</sub>	t <sub>PLZ</sub> Propagation Delay, A to Y (Figures 3 and 4)	1.65 to 1.95	-	4.0	9.0	_	9.5	ns	
			2.3 to 2.7	-	2.8	6.1	-	6.5	
			3.0 to 3.6	_	2.5	5.6	_	6.0	
			4.5 to 5.5		2.2	4.4	_	4.8	

### **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	$V_{CC} = 5.5 \text{ V}, V_{IN} = 0 \text{ V or } V_{CC}$	4.0	pF
C <sub>PD</sub>	Power Dissipation Capacitance (Note 5)	10 MHz, $V_{CC}$ = 5.5 V, $V_{IN}$ = 0 V or $V_{CC}$	4.0	pF

<sup>5.</sup> 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: |<sub>CC(OPR)</sub> = C<sub>PD</sub> • V<sub>CC</sub> • f<sub>In</sub> + |<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> + |<sub>CC</sub> • V<sub>CC</sub>.



Test	Switch Position	C <sub>L</sub> , pF	$R_L, \Omega$	R <sub>1</sub> , Ω	
t <sub>PLH</sub> / t <sub>PHL</sub>	Open	See AC Characteristics Table			
t <sub>PLZ</sub> / t <sub>PZL</sub>	2 x V <sub>CC</sub>	50	500	500	
t <sub>PHZ</sub> / t <sub>PZH</sub>	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

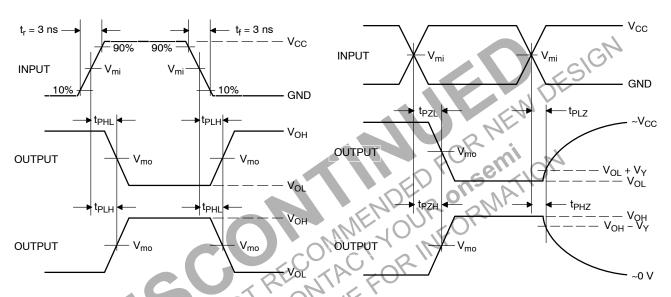


Figure 4. Switching Waveforms

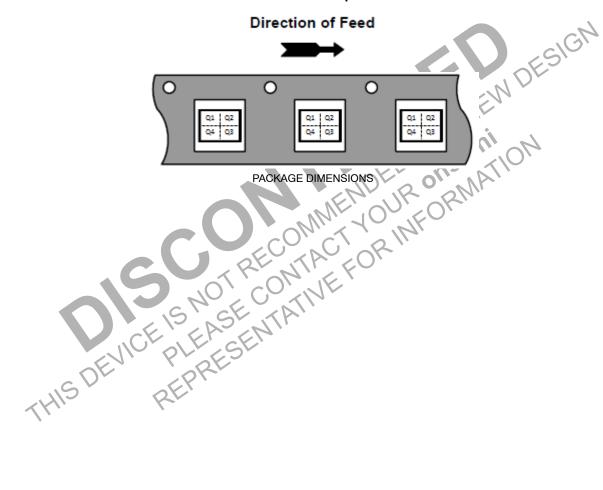
	110 1 F G	V <sub>r</sub>		
V <sub>CC</sub> , V	V <sub>mi</sub> , V	t <sub>PLH</sub> , t <sub>PHL</sub>	t <sub>PZL</sub> , t <sub>PLZ</sub> , t <sub>PZH</sub> , t <sub>PHZ</sub>	V <sub>Y</sub> , V
1.65 to 1.95	V <sub>CC</sub> /2	V <sub>CC</sub> /2	V <sub>CC</sub> /2	0.15
2.3 to 2.7	V <sub>CC</sub> /2	V <sub>CC</sub> /2	V <sub>CC</sub> /2	0.15
3.0 to 3.6	V <sub>CC</sub> /2	V <sub>CC</sub> /2	V <sub>CC</sub> /2	0.3
4.5 to 5.5	V <sub>CC</sub> /2	V <sub>CC</sub> /2	V <sub>CC</sub> /2	0.3

### **DEVICE ORDERING INFORMATION**

Device	Packages	Specific Device Code	Pin 1 Orientation (See below)	Shipping <sup>†</sup>
NLV17SZ07DFT2G*	SC-88A	L7	Q4	3000 / Tape & Reel
NL17SZ07DFT2G-F22038	SC-88A	L7	Q4	3000 / Tape & Reel
NL17SZ07XV5T2G-L22087	SOT-553	L7	Q4	4000 / Tape & Reel
NL17SZ07P5T5G-L22088	SOT-953	D (Rotated 180° CW)	Q2	8000 / 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.

Pin 1 Orientation in Tape and Reel



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





0



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

**DATE 11 APR 2023** 

#### NOTES:

- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- CONTROLLING DIMENSION: MILLIMETERS
- 419A-01 DBSDLETE, NEW STANDARD 419A-02
- DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH,

DIM	MILLIMETERS				
INITU	MIN.	N□M.	MAX.		
А	0.80	0.95	1.10		
A1			0.10		
A3	0.20 REF				
b	0.10	0.20	0.30		
C	0.10		0.25		
D	1.80	2.00	2,20		
Е	2.00	2.10	2.20		
E1	1.15	1.25	1.35		
е	0.65 BSC				
L	0.10	0.15	0.30		

5X b

◆ 0.2 M B M

- PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.1016MM PER SIDE.

	L <del>-▶</del>   <del> -</del> -	
<u> </u>	0.50	5

#### 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.

5. COLLECTOR

# **GENERIC MARKING DIAGRAM\***



\*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

= Date Code

= Pb-Free Package

(Note: Microdot may be in either location)

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

DOCUMENT NUMBER:	98ASB42984B	Electronic versions are uncontrolled except when accessed directly from the Document Repositor Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.		
DESCRIPTION:	SC-88A (SC-70-5/SOT-353)		PAGE 1 OF 1	

5. EMITTER

onsemi and ONSEMI. are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. **onsemi** makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

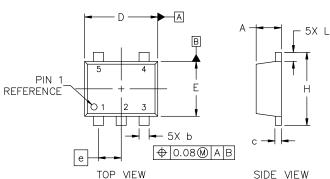
5. COLLECTOR 2/BASE 1





# SOT-553-5 1.60x1.20x0.55, 0.50P CASE 463B ISSUE D

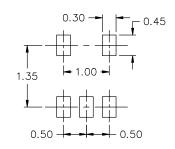
**DATE 21 FEB 2024** 



### NOTES:

- . DIMENSIONING AND TOLERANCING CONFORM TO ASME Y14.5-2018.
- . ALL DIMENSION ARE IN MILLIMETERS.
- 3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.

DIM	MILLIMETERS			
DIM	MIN.	NOM.	MAX.	
А	0.50	0.55	0.60	
Ь	0.17	0.22	0.27	
O	0.08	0.13	0.18	
О	1.55	1.60	1.65	
E	1.15	1.20	1.25	
е	0.50 BSC			
Н	1.55	1.60	1.65	
L	0.10	0.20	0.30	



### RECOMMENDED 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.

# GENERIC MARKING DIAGRAM\*



XX = 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.

STYLE 1: PIN 1. BASE 2. EMITTER 3. BASE 4. COLLECTOR 5. COLLECTOR	STYLE 2: PIN 1. CATHODE 2. COMMON ANODE 3. CATHODE 2 4. CATHODE 3 5. CATHODE 4	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. ANODE 2. EMITTER 3. BASE 4. COLLECTOR 5. CATHODE
STYLE 6: PIN 1. EMITTER 2 2. BASE 2 3. EMITTER 1 4. COLLECTOR 1 5. COLLECTOR 2/BASE 1	STYLE 7: PIN 1. BASE 2. EMITTER 3. BASE 4. COLLECTOR 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	

DOCUMENT NUMBER: 98AON11127D Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.

DESCRIPTION: SOT-553-5 1.60x1.20x0.55, 0.50P PAGE 1 OF 1

onsemi and ONSEMI are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

MILLIMFTERS

 $N\square M$ 

0.37

0.15

0.12

1.00

0.80

0.35 BSC

1.00

0.175

0.10

(REF)

-0.350

0.075

-0.200

MIN

0.34

0.10

0.07

0.95

0.75

0.95

0.125

0.05

DIM

Α

b

C

 $\mathbb{D}$ 

E

9 Н

L2

L3





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

**DATE 17 JAN 2024** 

MAX

0.40

0.20

0.17

1.05

0.85

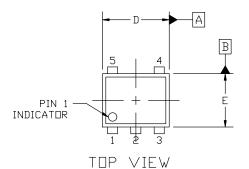
1.05

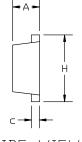
0.225

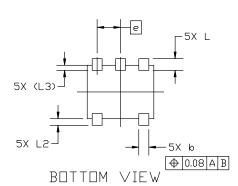
0.15

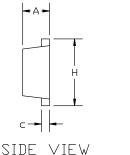
#### NOTES:

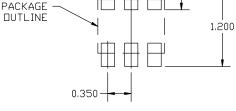
- DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
- CONTROLLING DIMENSION: MILLIMETERS.
- MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
- 4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.











# 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.

# **GENERIC MARKING DIAGRAM\***



= Specific Device Code

= 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.

DOCUMENT NUMBER:	98AON26457D	Electronic versions are uncontrolled except when accessed directly from the Document Repositor Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.		
DESCRIPTION:	SOT-953 1.00x0.80x0.37, 0.35P		PAGE 1 OF 1	

onsemi and Onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries, onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

onsemi, ONSEMI., and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "onsemi" or its affiliates and/or subsidiaries in the United States and/or other countries. onsemi owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of onsemi's product/patent coverage may be accessed at <a href="www.onsemi.com/site/pdf/Patent-Marking.pdf">www.onsemi.com/site/pdf/Patent-Marking.pdf</a>. onsemi reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and onsemi makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems. or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

#### ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

 $\textbf{Technical Library:} \ \underline{www.onsemi.com/design/resources/technical-documentation}$ 

onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

For additional information, please contact your local Sales Representative at

www.onsemi.com/support/sales