



**THE DATASHEET OF
NL17SG14P5T5G**



Inverter with Schmitt-Trigger

NL17SG14

The NL17SG14 is a single inverter with Schmitt-trigger input in tiny footprint packages. The device is designed to operate for $V_{CC} = 0.9\text{ V}$ to 3.6 V .

Features

- Designed for 0.9 V to 3.6 V V_{CC} Operation
- 2.4 ns (Typ) at $V_{CC} = 3.0\text{ V}$, $C_L = 15\text{ pF}$
- Inputs/Outputs Over-Voltage Tolerant up to 3.6 V
- I_{OFF} Supports Partial Power Down Protection
- Available in UDFN Package
- -Q Suffix 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 RoHS-Compliant

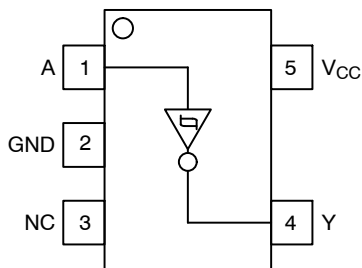


Figure 1. SOT-953 (Top Thru View)

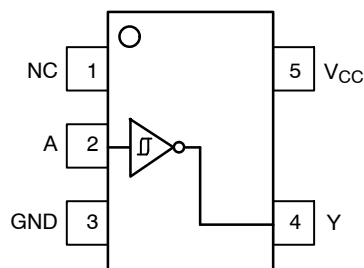


Figure 2. SC-88A (Top View)

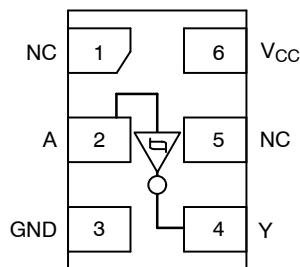


Figure 3. UDFN (Top View)

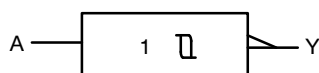
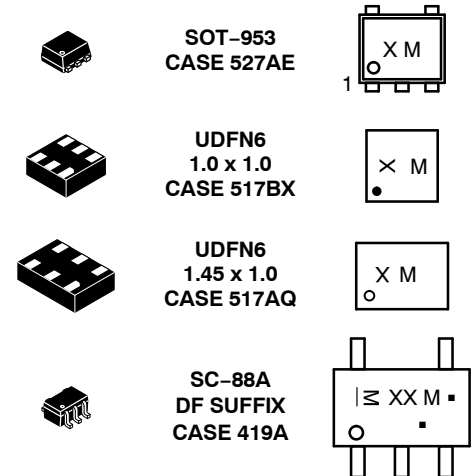


Figure 4. Logic Symbol

MARKING DIAGRAMS



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.

PIN ASSIGNMENT			
	SOT-953	SC-88A	UDFN6
1	A	NC	NC
2	GND	A	A
3	NC	GND	GND
4	Y	Y	Y
5	V_{CC}	V_{CC}	NC
6			V_{CC}

FUNCTION TABLE	
A Input	Y Output
L	H
H	L

ORDERING INFORMATION

See detailed ordering, marking and shipping information in the package dimensions section on page 6 of this data sheet.

NL17SG14

Table 1. MAXIMUM RATINGS

Symbol	Parameter	Value	Unit	
V_{CC}	DC Supply Voltage	-0.5 to +4.3	V	
V_{IN}	DC Input Voltage	-0.5 to +4.3	V	
V_{OUT}	DC Output Voltage	Active-Mode (High or Low State) Tri-State Mode (Note 1) Power-Down Mode ($V_{CC} = 0$ V)	-0.5 to $V_{CC} + 0.5$ -0.5 to +4.3 -0.5 to +4.3	V
I_{IK}	DC Input Diode Current	$V_{IN} < GND$	-20	mA
I_{OK}	DC Output Diode Current	$V_{OUT} < GND$	-20	mA
I_{OUT}	DC Output Source/Sink Current		± 20	mA
I_{CC} or I_{GND}	DC Supply Current Per Supply Pin or Ground Pin		± 20	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 (Note 2)		154	°C/W
P_D	Power Dissipation in Still Air		812	mW
θ_{JA}	Thermal Resistance (Note 2)	SC-88A SOT-953 UDFN6	377 254 154	°C/W
P_D	Power Dissipation in Still Air	SC-88A SOT-953 UDFN6	332 491 812	mW
MSL	Moisture Sensitivity		Level 1	
FR	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	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.

1. Applicable to devices with outputs that may be tri-stated.
2. Measured with minimum pad spacing on an FR4 board, using 10 mm – by – 1inch, 2 ounce copper trace no air flow per JESD51-7.
3. HBM tested to EIA / JESD22-A114-A. CDM tested to JESD22-C101-A. JEDEC recommends that ESD qualification to EIA/JESD22-A115A (Machine Model) be discontinued.
4. Tested to EIA/JESD78 Class II.

Table 2. RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit	
V_{CC}	Positive DC Supply Voltage	0.9	3.6	V	
V_{IN}	Digital Input Voltage	0	3.6	V	
V_{OUT}	Output Voltage	Active Mode (High or Low State) Tri-State Mode (Note 1) Power Down Mode ($V_{CC} = 0$ V)	0 0 0	V_{CC} 3.6 3.6	V
T_A	Operating Free-Air Temperature	-55	+125	°C	
t_r, t_f	Input Transition Rise or Fall Rate	0	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.

NL17SG14

Table 3. DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	V _{CC} (V)	T _A = 25°C			T _A = -55°C to +125°C		Unit
				Min	Typ	Max	Min	Max	
V _{T+}	Positive Going Input Threshold Voltage		0.9	-	0.7	-	-	-	V
			1.1	-	0.81	0.95	-	0.95	
			1.4	-	0.94	1.16	-	1.16	
			1.65	-	1.06	1.3	-	1.3	
			2.3	-	1.36	1.73	-	1.73	
			3.0	-	1.8	2.24	-	2.24	
V _{T-}	Negative Going Input Threshold Voltage		0.9	-	0.23	-	-	-	V
			1.1	0.15	0.33	-	0.15	-	
			1.4	0.3	0.47	-	0.3	-	
			1.65	0.35	0.6	-	0.35	-	
			2.3	0.55	0.85	-	0.55	-	
			3.0	0.95	1.13	-	0.95	-	
V _H	Hysteresis Voltage		0.9	-	0.27	-	-	-	V
			1.1	0.2	0.35	0.8	0.2	0.8	
			1.4	0.25	0.41	0.86	0.25	0.86	
			1.65	0.30	0.46	0.9	0.30	0.9	
			2.3	0.40	0.56	1.05	0.40	1.05	
			3.0	0.49	0.59	1.1	0.49	1.1	
V _{OH}	High-Level Output Voltage	V _{IN} = V _{IH} or V _{IL}							V
		I _{OH} = -20 μA	0.9	-	0.75	-	-	-	
		I _{OH} = -0.3 mA	1.1 to 1.3	0.75 x V _{CC}	-	-	0.75 x V _{CC}	-	
		I _{OH} = -1.7 mA	1.4 to 1.6	0.75 x V _{CC}	-	-	0.75 x V _{CC}	-	
		I _{OH} = -3.0 mA	1.65 to 1.95	V _{CC} - 0.45	-	-	V _{CC} - 0.45	-	
		I _{OH} = -4.0 mA	2.3 to 2.7	2.0	-	-	2.0	-	
V _{OL}	Low-Level Output Voltage	V _{IN} = V _{IH} or V _{IL}							V
		I _{OL} = 20 μA	0.9	-	0.1	-	-	-	
		I _{OL} = 0.3 mA	1.1 to 1.3	-	-	0.25 x V _{CC}	-	0.25 x V _{CC}	
		I _{OL} = 1.7 mA	1.4 to 1.6	-	-	0.25 x V _{CC}	-	0.25 x V _{CC}	
		I _{OL} = 3.0 mA	1.65 to 1.95	-	-	0.45	-	0.45	
		I _{OL} = 4.0 mA	2.3 to 2.7	-	-	0.4	-	0.4	
I _{IN}	Input Leakage Current	V _{IN} = 0 V to 3.6 V	0.9 to 3.6	-	-	±0.1	-	±1.0	μA
I _{OFF}	Power Off Leakage Current	V _{IN} = 0 V to 3.6 V; V _{OUT} = 0 V to 3.6 V	0	-	-	1.0	-	10.0	μA
I _{CC}	Quiescent Supply Current	V _{IN} = V _{CC} or GND	0.9 to 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.

NL17SG14

Table 4. AC ELECTRICAL CHARACTERISTICS

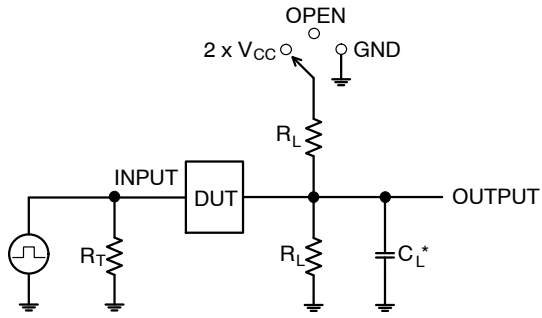
Symbol	Parameter	Test Condition	V _{CC} (V)	T _A = 25°C			T _A = -55°C to +125°C		Unit
				Min	Typ	Max	Min	Max	
t _{PLH} , t _{PHL}	Propagation Delay, A to Y (Figures 5 and 6)	C _L = 10 pF, R _L = 1 MΩ	0.9	-	38.0	-	-	-	ns
			1.1 to 1.3	-	9.7	24.1	-	35.9	
			1.4 to 1.6	-	5.4	10.5	-	11.3	
			1.65 to 1.95	-	3.9	7.8	-	8.2	
			2.3 to 2.7	-	2.8	5.4	-	5.8	
			3.0 to 3.6	-	2.3	4.4	-	4.6	
		C _L = 15 pF, R _L = 1 MΩ	0.9	-	38.4	-	-	-	
			1.1 to 1.3	-	9.9	25.1	-	41.6	
			1.4 to 1.6	-	5.6	11.5	-	12.6	
			1.65 to 1.95	-	4.1	8.4	-	8.7	
			2.3 to 2.7	-	2.9	5.7	-	6.1	
			3.0 to 3.6	-	2.4	4.6	-	5.0	
		C _L = 30 pF, R _L = 1 MΩ	0.9	-	39.6	-	-	-	
			1.1 to 1.3	-	10.5	35.7	-	58.1	
			1.4 to 1.6	-	6.0	15.8	-	17.6	
			1.65 to 1.95	-	4.7	10.7	-	11.7	
			2.3 to 2.7	-	3.2	6.9	-	8.1	
			3.0 to 3.6	-	2.6	5.2	-	6.1	

Table 5. CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Test Condition	Typical (T _A = 25°C)	Unit
C _{IN}	Input Capacitance	V _{CC} = 0 V	3.0	pF
C _{OUT}	Output Capacitance	V _{CC} = 0 V	3.0	pF
C _{PD}	Power Dissipation Capacitance (Note 5)	f = 10 MHz, V _{CC} = 0.9 V to 3.6 V, V _{IN} = 0 V or V _{CC}	4.0	pF

5. C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the dynamic operating current consumption without load. Average operating current can be obtained by the equation I_{CC(OPR)} = C_{PD} • V_{CC} • f_{in} + I_{CC}. C_{PD} is used to determine the no-load dynamic power consumption: P_D = C_{PD} • V_{CC}² • f_{in} + I_{CC} • V_{CC}.

NL17SG14



C_L includes probe and jig capacitance
 R_T is Z_{OUT} of pulse generator (typically 50 Ω)
 $f = 1$ MHz

Figure 5. Test Circuit

Test	Switch Position
t_{PLH} / t_{PHL}	Open
t_{PLZ} / t_{PZL}	$2 \times V_{CC}$
t_{PHZ} / t_{PZH}	GND

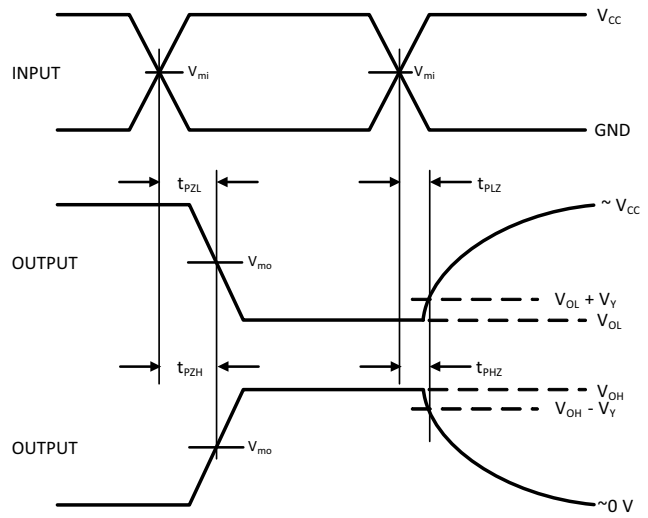
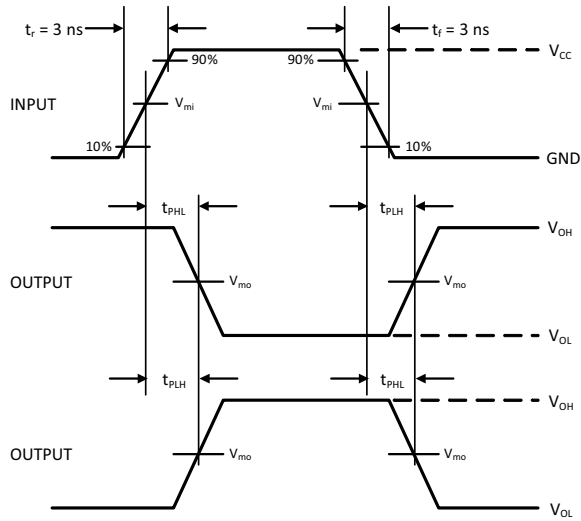


Figure 6. Switching Waveforms

V_{CC}, V	V_{mi}, V	V_{mo}, V	V_Y, V
0.9	$V_{CC}/2$	$V_{CC}/2$	0.1
1.1 to 1.3	$V_{CC}/2$	$V_{CC}/2$	0.1
1.4 to 1.6	$V_{CC}/2$	$V_{CC}/2$	0.1
1.65 to 1.95	$V_{CC}/2$	$V_{CC}/2$	0.15
2.3 to 2.7	$V_{CC}/2$	$V_{CC}/2$	0.15
3.0 to 3.6	1.5	1.5	0.3

NL17SG14

ORDERING INFORMATION

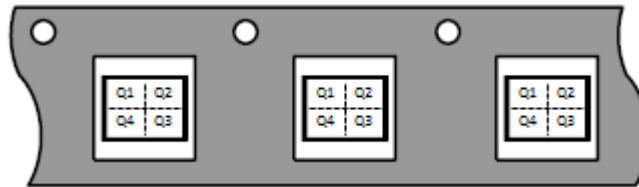
Device	Package	Marking	Pin 1 Orientation (See below)	Shipping [†]
NL17SG14MU1TCG	UDFN6, 1.45 x 1.0	4 (Rotated 180°CW)	Q4	3000 / Tape & Reel
NL17SG14DFT2G	SC-88A	AR	Q4	3000 / Tape & Reel
NL17SG14DFT2G-Q*	SC-88A	AR	Q4	3000 / Tape & Reel
NL17SG14P5T5G	SOT-953	2	Q2	8000 / Tape & Reel

[†]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.

*-Q Suffix 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

Direction of Feed



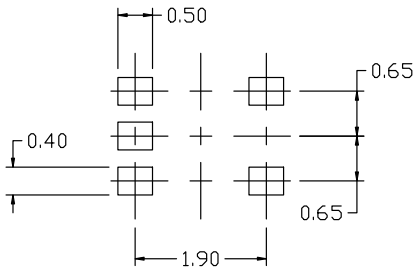
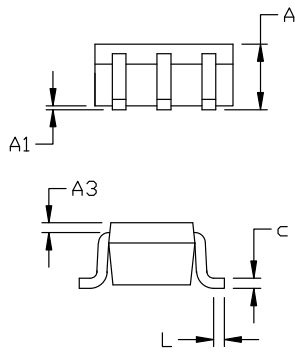
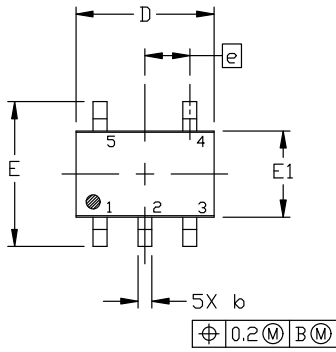
NL17SG14

PACKAGE DIMENSIONS

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

NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS
3. 419A-01 OBSOLETE. NEW STANDARD 419A-02
4. 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.



DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	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
E	2.00	2.10	2.20
E1	1.15	1.25	1.35
e	0.65 BSC		
L	0.10	0.15	0.30

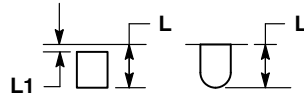
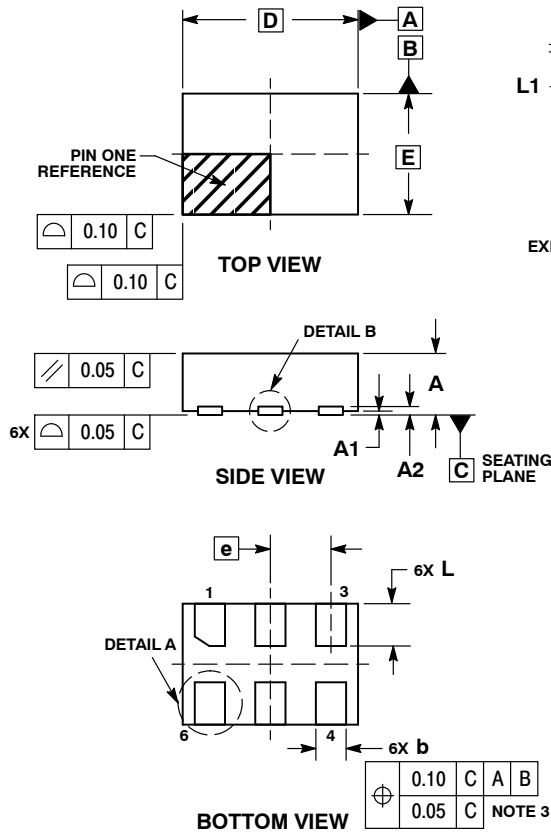
**RECOMMENDED
MOUNTING FOOTPRINT**

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

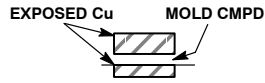
NL17SG14

PACKAGE DIMENSIONS

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



DETAIL A
OPTIONAL
CONSTRUCTIONS



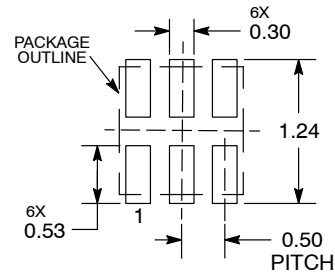
DETAIL B
OPTIONAL
CONSTRUCTIONS

NOTES:

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

MILLIMETERS		
DIM	MIN	MAX
A	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
e	0.50	BSC
L	0.30	0.40
L1	---	0.15

MOUNTING FOOTPRINT



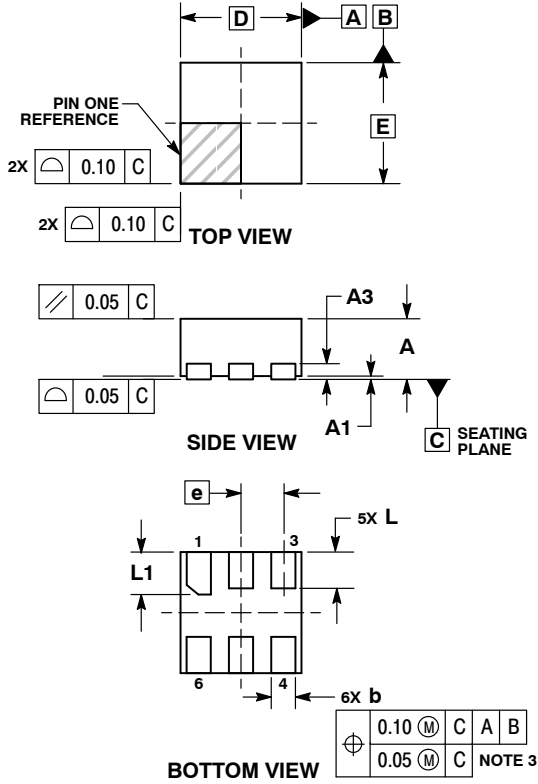
DIMENSIONS: MILLIMETERS

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

NL17SG14

PACKAGE DIMENSIONS

UDFN6, 1x1, 0.35P
CASE 517BX
ISSUE O

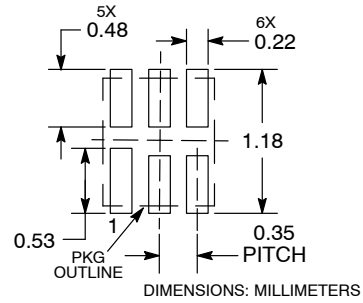


NOTES:

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

DIM	MILLIMETERS	
	MIN	MAX
A	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	
e	0.35 BSC	
L	0.25	0.35
L1	0.30	0.40

RECOMMENDED SOLDERING FOOTPRINT*

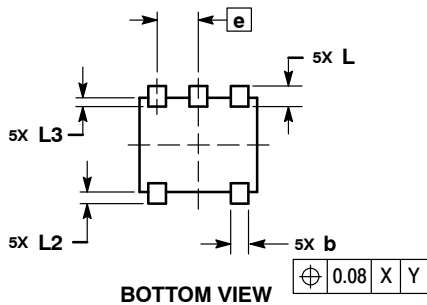
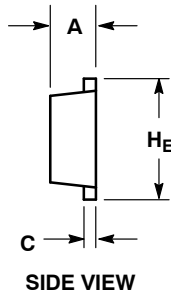
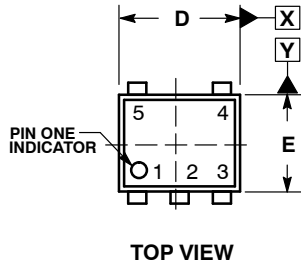


*For additional information on our Pb-Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

NL17SG14

PACKAGE DIMENSIONS

SOT-953
CASE 527AE
ISSUE E

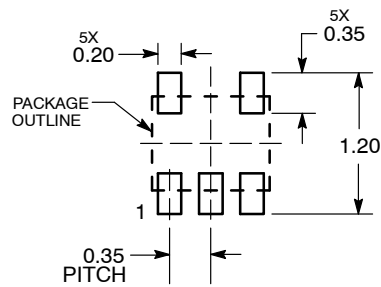


NOTES:

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.

MILLIMETERS			
DIM	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*



DIMENSIONS: MILLIMETERS

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

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 www.onsemi.com/site/pdf/Patent-Marking.pdf. **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:
 Technical Library: 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

Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

 [View NL17SG14P5T5G on WIN SOURCE](#)

 [ON Semiconductor](#) Information

Optimize Your Supply Chain with WIN SOURCE Solutions

-  Global Sourcing Solution
-  Obsolete Management
-  Cost Control Management
-  Shortage Management
-  Alternative Solution
-  Excess Inventory Management