

Configurable Multifunction Gate

NLV7SZ97

The NLV7SZ97 is an advanced high-speed CMOS multifunction gate. The device allows the user to choose logic functions MUX, AND, OR, NAND, NOR, INVERT and BUFFER. The device has Schmitt-trigger inputs, thereby enhancing noise immunity.

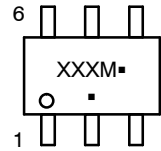
Features

- Designed for 1.65 V to 5.5 V V_{CC} Operation
- 3.3 ns t_{PD} at $V_{CC} = 5 V$ (Typ)
- Inputs/Outputs Overvoltage Tolerant up to 5.5 V
- I_{OFF} Supports Partial Power Down Protection
- Sink 24 mA at 3.0 V
- Available in SC-88 Package
- 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-88/SC70-6/
 SOT-363
 CASE 419B-02

MARKING DIAGRAMS



XXX = Specific Device Code
 M = Date Code*
 ■ = Pb-Free Package

(Note: Microdot may be in either location or may not be present)

*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 8 of this data sheet.

NLV7SZ97

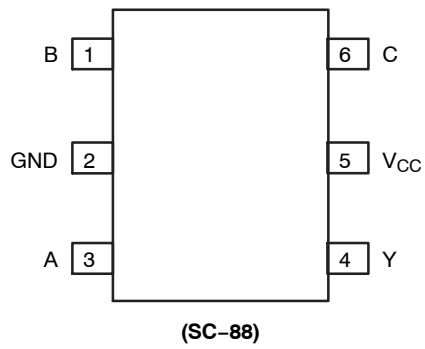


Figure 1. Pinout (Top View)

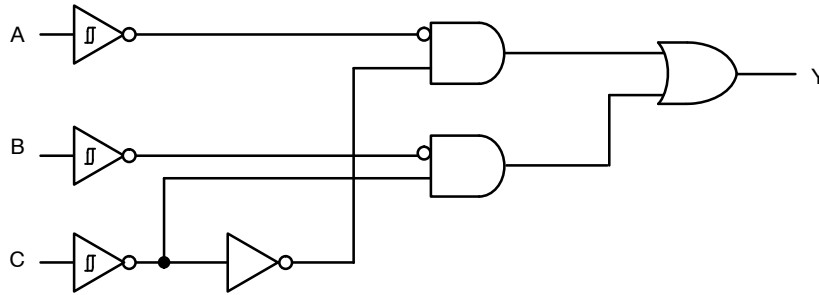


Figure 2. Function Diagram

PIN ASSIGNMENT

Pin	Function
1	B
2	GND
3	A
4	Y
5	V _{CC}
6	C

FUNCTION TABLE*

Input			Output
A	B	C	Y
L	L	L	L
L	L	H	L
L	H	L	H
L	H	H	L
H	L	L	L
H	L	H	H
H	H	L	H
H	H	H	H

*To select a logic function, please refer to "Logic Configurations section".

LOGIC CONFIGURATIONS

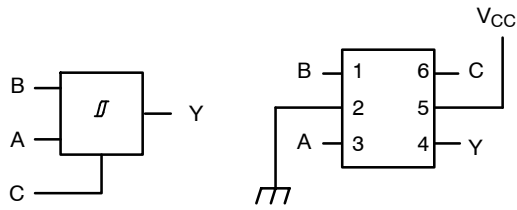


Figure 3. 2-Input MUX

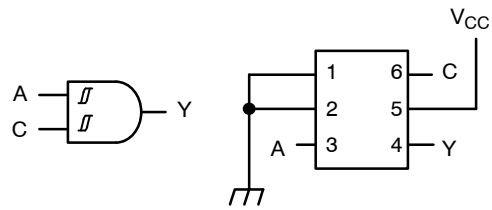


Figure 4. 2-Input AND (When B = "L")

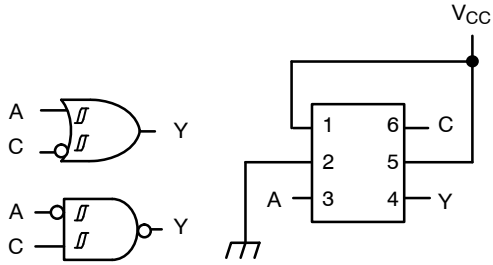


Figure 5. 2-Input OR with Input C Inverted (When B = "H")

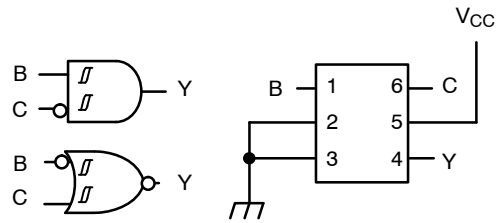


Figure 6. 2-Input AND with Input C Inverted (When A = "L")

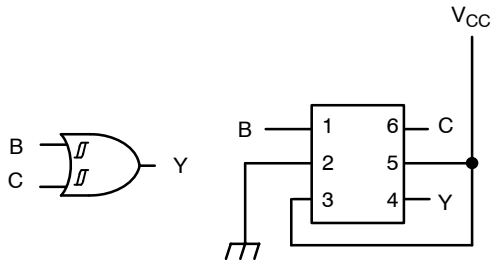


Figure 7. 2-Input OR (When A = "H")

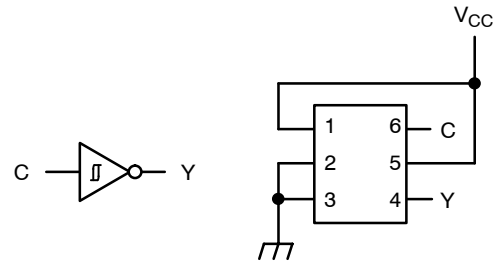


Figure 8. Inverter (When A = "L" and B = "H")

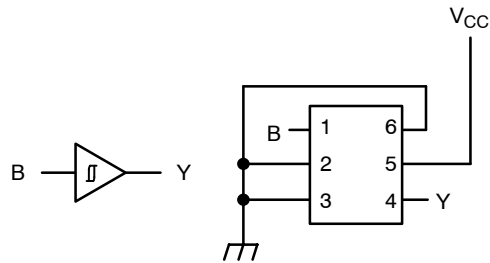


Figure 9. Buffer (When A = C = "L")

NLV7SZ97

MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	DC Supply Voltage	-0.5 to +7.0	V
V_{IN}	DC Input Voltage	-0.5 to +7.0	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 +7.0 -0.5 to +7.0	V
I_{IK}	DC Input Diode Current $V_{IN} < GND$	-50	mA
I_{OK}	DC Output Diode Current $V_{OUT} < GND$	-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	$^{\circ}C$
T_L	Lead Temperature, 1 mm from Case for 10 Secs	260	$^{\circ}C$
T_J	Junction Temperature Under Bias	+150	$^{\circ}C$
θ_{JA}	Thermal Resistance (Note 2) SC-88	377	$^{\circ}C/W$
P_D	Power Dissipation in Still Air SC-88	332	mW
MSL	Moisture Sensitivity	Level 1	
F_R	Flammability Rating Oxygen Oxygen Index: 28 to 34	UL 94 V-0 @ 0.125 in	
V_{ESD}	ESD Withstand Voltage (Note 3) Human Body Mode Charged Device Model	>2000 N/A	V
$I_{LATCHUP}$	Latchup Performance (Note 4)	± 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. Applicable to devices with outputs that may be tri-stated.

2. Measured with minimum pad spacing on an FR4 board, using 10 mm-by-1 inch, 2 ounce copper trace no air flow per JESD51-7.

3. 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	Parameter	Min	Max	Unit
V_{CC}	Positive DC Supply Voltage	1.65	5.5	V
V_{IN}	DC Input Voltage	0	5.5	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 0 0	V_{CC} 5.5 5.5	V
T_A	Operating Free-Air Temperature	-55	+125	$^{\circ}C$
t_r, t_f	Input Rise or Fall Rate $V_{CC} = 1.65$ V to 1.95 V $V_{CC} = 2.3$ V to 2.7 V $V_{CC} = 3.0$ V to 3.6 V $V_{CC} = 4.5$ V to 5.5 V	0 0 0 0	No Limit 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.

NLV7SZ97

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Condition	V _{CC} (V)	T _A = 25°C			-40°C ≤ T _A ≤ 85°C		-55°C ≤ T _A ≤ 125°C		Unit
				Min	Typ	Max	Min	Max	Min	Max	
V _{T+}	Positive Input Threshold Voltage		1.65	0.79	-	1.16	-	1.16	-	1.16	V
			2.3	1.11	-	1.56	-	1.56	-	1.56	
			3.0	1.5	-	1.87	-	1.87	-	1.87	
			4.5	2.16	-	2.74	-	2.74	-	2.74	
			5.5	2.61	-	3.33	-	3.33	-	3.33	
V _{T-}	Negative Input Threshold Voltage		1.65	0.35	-	0.62	0.35	-	0.35	-	V
			2.3	0.58	-	0.87	0.58	-	0.58	-	
			3.0	0.84	-	1.19	0.84	-	0.84	-	
			4.5	1.41	-	1.9	1.41	-	1.41	-	
			5.5	1.78	-	2.2	1.78	-	1.78	-	
V _H	Negative Input Threshold Voltage		1.65	0.3	-	0.62	0.3	0.62	0.3	0.62	V
			2.3	0.4	-	0.8	0.4	0.8	0.4	0.8	
			3.0	0.53	-	0.87	0.53	0.87	0.53	0.87	
			4.5	0.71	-	1.04	0.71	1.04	0.71	1.04	
			5.5	0.8	-	1.2	0.8	1.2	0.8	1.2	
V _{OH}	High-Level Output Voltage V _{IN} = V _{IH} or V _{IL}	I _{OH} = -50 μA	1.65 to 5.5	V _{CC} - 0.1	V _{CC}	-	V _{CC} - 0.1	-	V _{CC} - 0.1	-	V
		I _{OH} = -4 mA	1.65	1.20	1.52	-	1.20	-	1.20	-	
		I _{OH} = -8 mA	2.3	1.9	2.1	-	1.9	-	1.9	-	
		I _{OH} = -16 mA	3	2.4	2.7	-	2.4	-	2.4	-	
		I _{OH} = -24 mA	3	2.3	2.5	-	2.3	-	2.3	-	
		I _{OH} = -32 mA	4.5	3.8	4	-	3.8	-	3.8	-	
V _{OL}	Low-Level Output Voltage V _{IN} = V _{IH} or V _{IL}	I _{OL} = 100 μA	1.65 to 5.5	-	-	0.1	-	0.1	-	0.1	V
		I _{OL} = 4 mA	1.65	-	0.08	0.45	-	0.45	-	0.45	
		I _{OL} = 8 mA	2.3	-	0.2	0.3	-	0.3	-	0.4	
		I _{OL} = 16 mA	3	-	0.28	0.4	-	0.4	-	0.5	
		I _{OL} = 24 mA	3	-	0.38	0.55	-	0.55	-	0.55	
		I _{OL} = 32 mA	4.5	-	0.42	0.55	-	0.55	-	0.65	
I _{IN}	Input Leakage Current	V _{IN} = 5.5 V or GND	1.65 to 5.5	-	-	+0.1	-	+1.0	-	+1.0	μA
I _{OFF}	Power Off Leakage Current	V _{IN} = 5.5 V or V _{OUT} = 5.5 V	0	-	-	1.0	-	10	-	10	μA
I _{CC}	Quiescent Supply Current	V _{IN} = 5.5 V or GND	5.5	-	-	1.0	-	10	-	10	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.

NLV7SZ97

AC ELECTRICAL CHARACTERISTICS

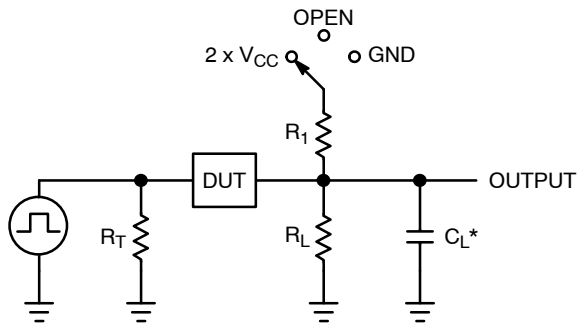
Symbol	Parameter	Condition	V _{CC} (V)	T _A = 25°C			-40°C ≤ T _A ≤ 85°C		-55°C ≤ T _A ≤ 125°C		Unit
				Min	Typ	Max	Min	Max	Min	Max	
t _{PLH} , t _{PHL}	Propagation Delay, (A or B or C) to Y (Figures 10 and 11)	R _L = 1 kΩ, C _L = 30 pF	1.65 to 1.95	-	8.6	14.4	-	14.4	-	14.4	ns
		R _L = 500 Ω, C _L = 30 pF	2.3 to 2.7	-	5.1	8.3	-	8.3	-	8.3	
		R _L = 500 Ω, C _L = 50 pF	3.0 to 3.6	-	3.9	6.3	-	6.3	-	6.3	
			4.5 to 5.5	-	3.3	5.1	-	5.1	-	5.1	

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Condition	Typical	Unit
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}	4.0	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} = 5.0 V, V _{IN} = 0 V or V _{CC}	16 19.5	pF

5. 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} • 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}.

NLV7SZ97



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

Figure 10. Test Circuit

Test	Switch Position	C_L , pF	R_L , Ω	R_1 , Ω
t_{PLH} / t_{PHL}	Open	See AC Characteristics Table		
t_{PLZ} / t_{PZL}	$2 \times V_{CC}$	50	500	500
t_{PHZ} / t_{PZH}	GND	50	500	500

X = Don't Care

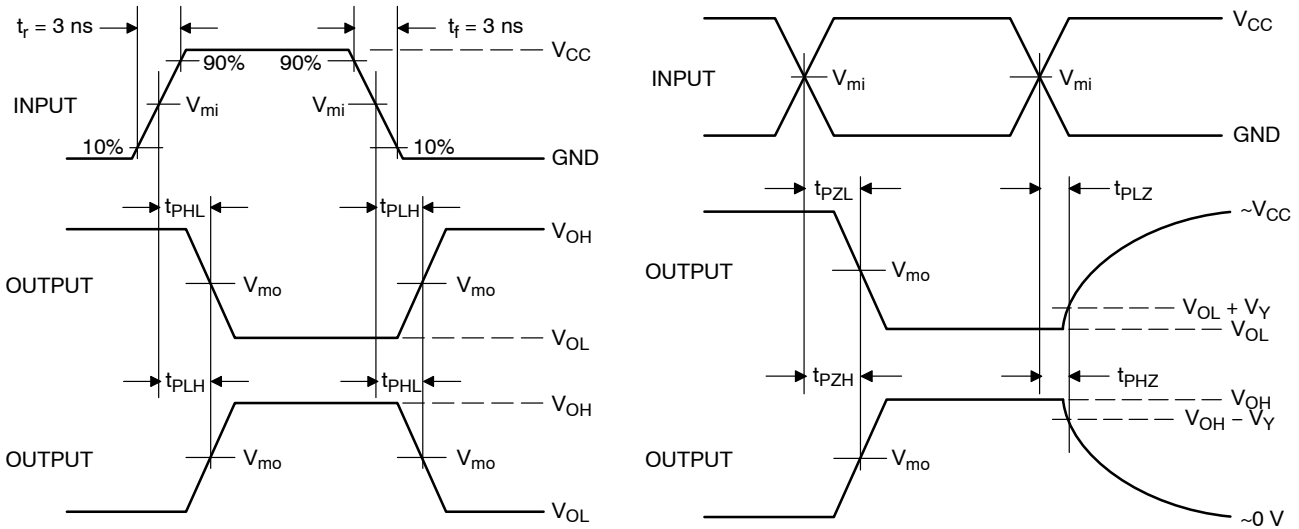


Figure 11. Switching Waveforms

V_{CC} , V	V_{mi} , V	V_{mo} , V		V_y , V
		t_{PLH}, t_{PHL}	$t_{PZL}, t_{PLZ}, t_{PZH}, t_{PHZ}$	
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

NLV7SZ97

DEVICE ORDERING INFORMATION

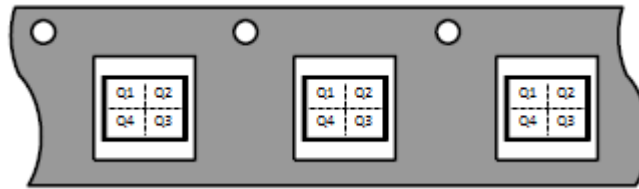
Device	Package	Specific Device Code	Pin 1 Orientation (See below)	Shipping [†]
NLV7SZ97DFT2G*	SC-88 (Pb-Free)	MK	Q4	3000 / Tape & Reel

[†]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-Q101 Qualified and PPAP Capable.

Pin 1 Orientation in Tape and Reel

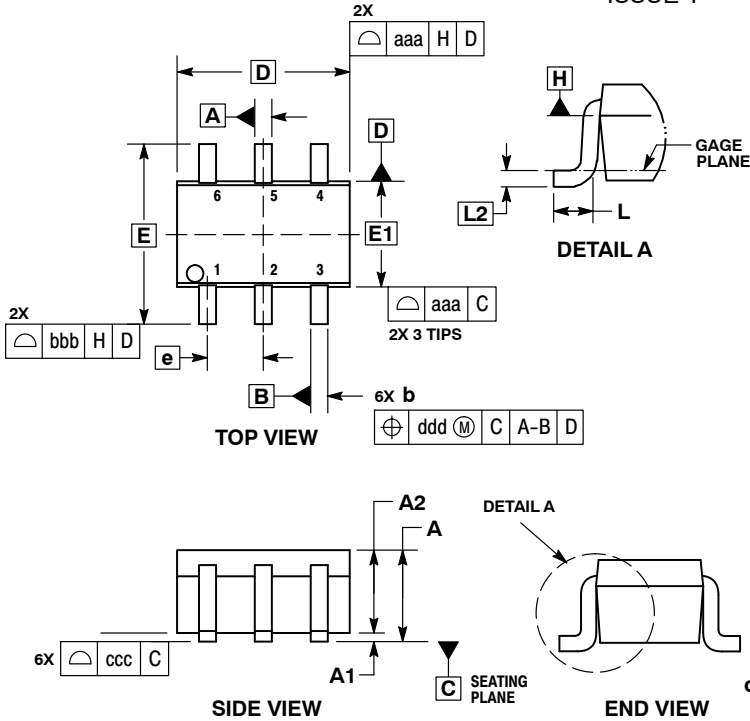
Direction of Feed



NLV7SZ97

PACKAGE DIMENSIONS

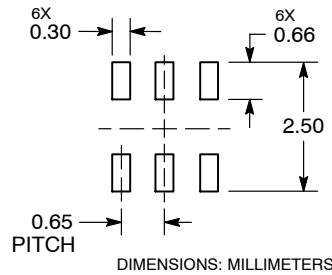
SC-88/SC70-6/SOT-363
CASE 419B-02
ISSUE Y



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
 2. CONTROLLING DIMENSION: MILLIMETERS.
 3. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.20 PER END.
 4. DIMENSIONS D AND E1 AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY AND DATUM H.
 5. DATUMS A AND B ARE DETERMINED AT DATUM H.
 6. DIMENSIONS b AND c APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN 0.08 AND 0.15 FROM THE TIP.
 7. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 TOTAL IN EXCESS OF DIMENSION b AT MAXIMUM MATERIAL CONDITION. THE DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OF THE FOOT.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	---	---	1.10	---	---	0.043
A1	0.00	---	0.10	0.000	---	0.004
A2	0.70	0.90	1.00	0.027	0.035	0.039
b	0.15	0.20	0.25	0.006	0.008	0.010
C	0.08	0.15	0.22	0.003	0.006	0.009
D	1.80	2.00	2.20	0.070	0.078	0.086
E	2.00	2.10	2.20	0.078	0.082	0.086
E1	1.15	1.25	1.35	0.045	0.049	0.053
e	0.65 BSC			0.026 BSC		
L	0.26	0.36	0.46	0.010	0.014	0.018
L2	0.15 BSC			0.006 BSC		
aaa	0.15			0.006		
bbb	0.30			0.012		
ccc	0.10			0.004		
ddd	0.10			0.004		

RECOMMENDED SOLDERING FOOTPRINT*

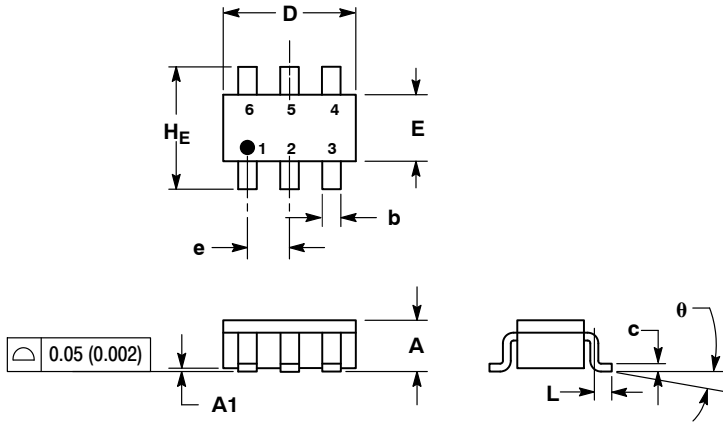


*For additional information on our Pb-Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

NLV7SZ97

PACKAGE DIMENSIONS

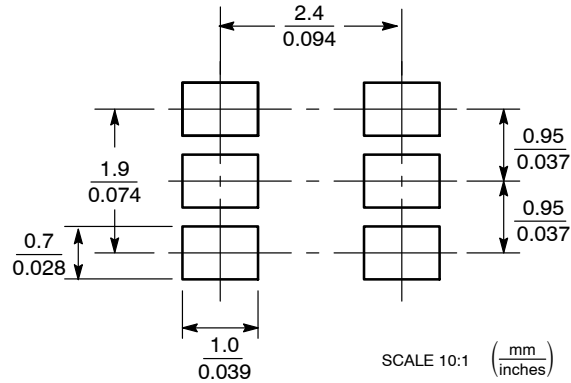
SC-74
CASE 318F-05
ISSUE N



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
 4. 318F-01, -02, -03, -04 OBSOLETE. NEW STANDARD 318F-05.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.90	1.00	1.10	0.035	0.039	0.043
A1	0.01	0.06	0.10	0.001	0.002	0.004
b	0.25	0.37	0.50	0.010	0.015	0.020
c	0.10	0.18	0.26	0.004	0.007	0.010
D	2.90	3.00	3.10	0.114	0.118	0.122
E	1.30	1.50	1.70	0.051	0.059	0.067
e	0.85	0.95	1.05	0.034	0.037	0.041
L	0.20	0.40	0.60	0.008	0.016	0.024
HE	2.50	2.75	3.00	0.099	0.108	0.118
θ	0°	-	10°	0°	-	10°

SOLDERING FOOTPRINT*

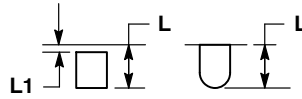
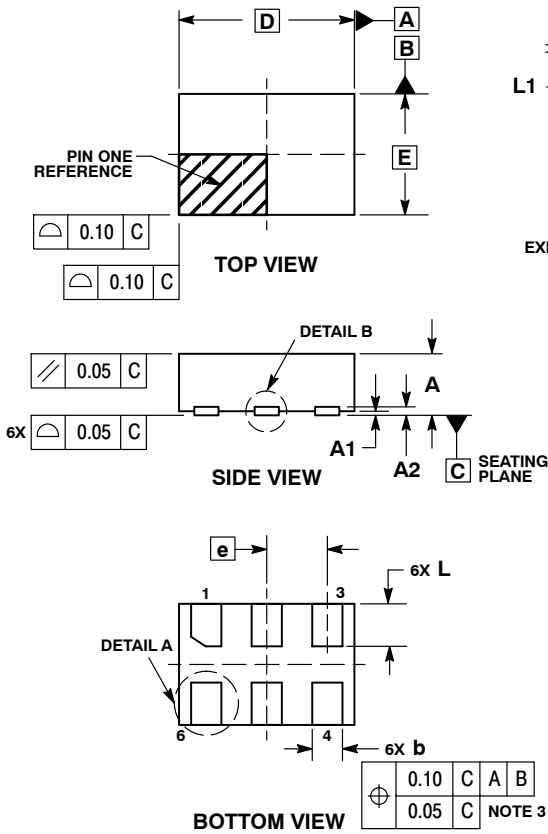


*For additional information on our Pb-Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

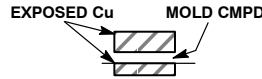
NLV7SZ97

PACKAGE DIMENSIONS

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



DETAIL A
OPTIONAL CONSTRUCTIONS



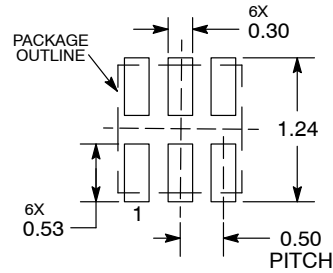
DETAIL B
OPTIONAL CONSTRUCTIONS

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



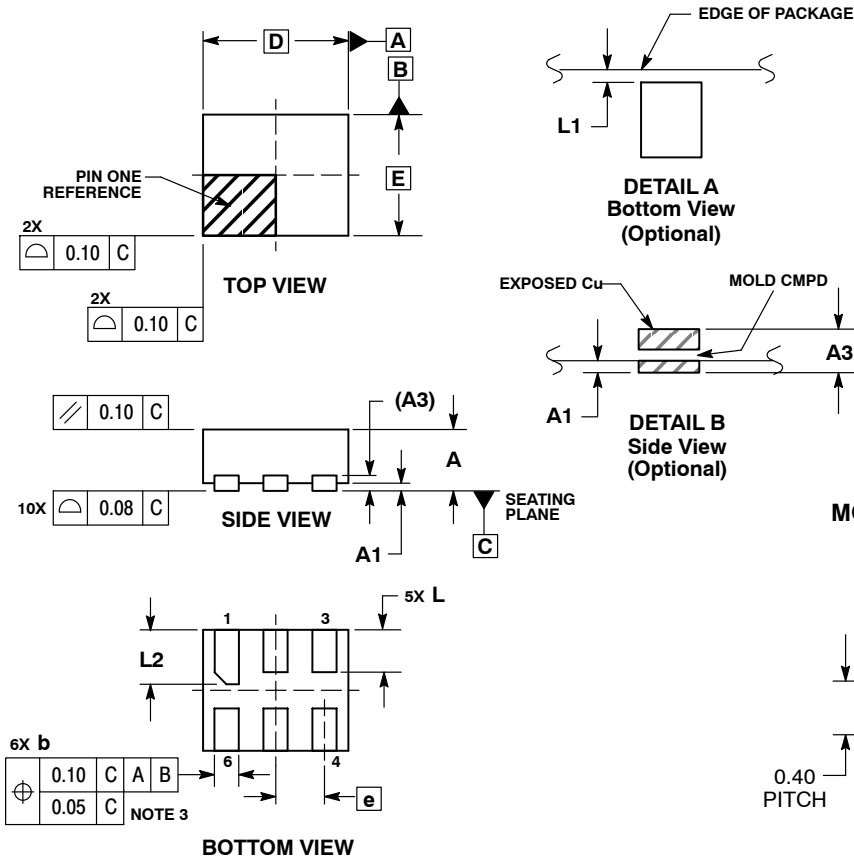
DIMENSIONS: MILLIMETERS

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

NLV7SZ97

PACKAGE DIMENSIONS

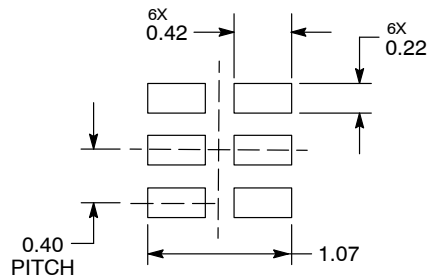
UDFN6, 1.2x1.0, 0.4P
CASE 517AA
ISSUE D



- 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 0.25 AND 0.30 mm FROM TERMINAL.
 4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

MILLIMETERS		
DIM	MIN	MAX
A	0.45	0.55
A1	0.00	0.05
A3	0.127	REF
b	0.15	0.25
D	1.20	BSC
E	1.00	BSC
e	0.40	BSC
L	0.30	0.40
L1	0.00	0.15
L2	0.40	0.50

MOUNTING FOOTPRINT*



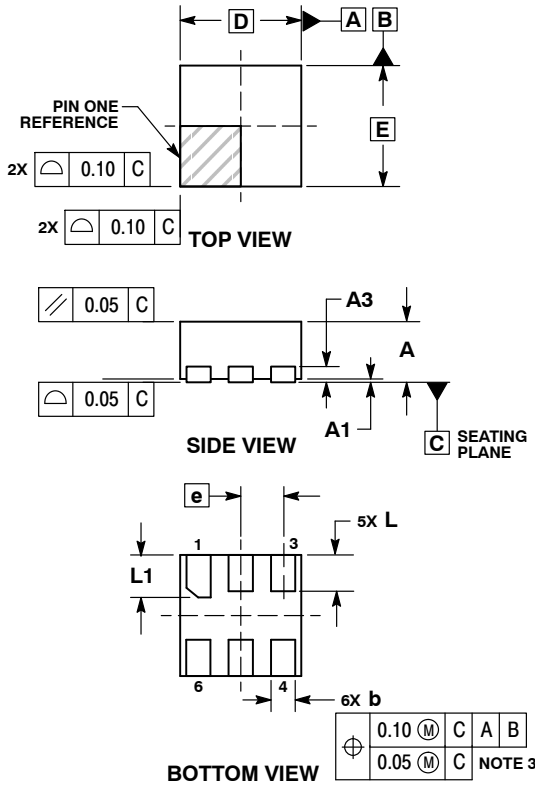
DIMENSIONS: MILLIMETERS

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

NLV7SZ97

PACKAGE DIMENSIONS

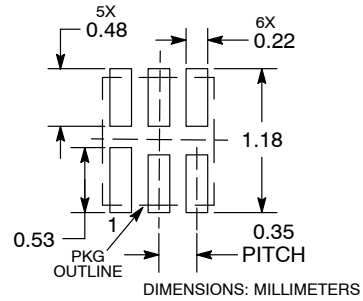
UDFN6, 1x1, 0.35P
CASE 517BX
ISSUE O



- 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.

MILLIMETERS		
DIM	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.

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.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Email Requests to: orderlit@onsemi.com

onsemi Website: www.onsemi.com

TECHNICAL SUPPORT
North American Technical Support:
Voice Mail: 1 800-282-9855 Toll Free USA/Canada
Phone: 011 421 33 790 2910

Europe, Middle East and Africa Technical Support:
Phone: 00421 33 790 2910
For additional information, please contact your local Sales Representative

单击下面可查看定价，库存，交付和生命周期等信息

[>>ON Semiconductor\(安森美\)](#)