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Non-Inverting 3-State Buffer

NLV68SZ126

The NLV68SZ126 is 6−channel non−inverting 3−state buffer in a tiny footprint package.

Features

- Designed for 1.65 V to 5.5 V V_{CC} Operation
- 3.4 ns t_{PD} at 5 V (Typ)
- Inputs/Outputs Over−Voltage Tolerant up to 5.5 V
- I_{OFF} Supports Partial Power Down Protection
- Source/Sink 24 mA at 3.0 V
- Available in 2.5 mm x 3.5 mm QFN20 and TSSOP−20 WB Packages
- 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

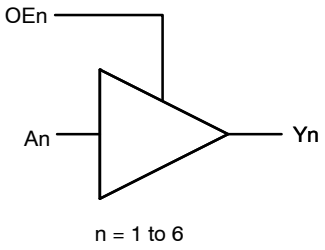

Figure 1. Logic Diagram

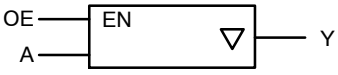

Figure 2. Channel Logic Symbol

FUNCTION TABLE

Input		Output
OEn	**An**	**Yn**
L	X	Z
H	L	L
H	H	H

X = Don't Care

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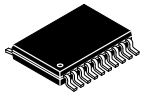
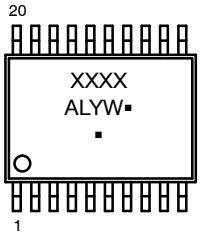
MARKING DIAGRAMS

QFN20, 2.5X3.5, 0.4P
CASE 485CB



TSSOP−20 WB
DT SUFFIX
CASE 948E



XXXX	= Specific Device Code
A	= Assembly Location
L	= Wafer Lot Number
Y	= Year
W	= Work Week
▪	= Pb−Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

See detailed ordering and shipping information on page 6 of this data sheet.

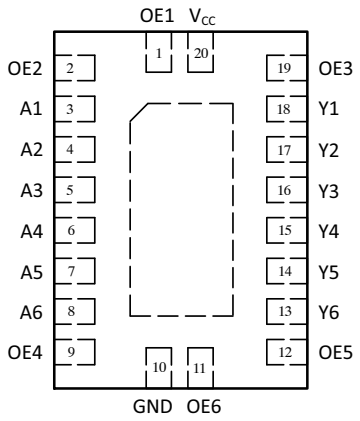


Figure 3. QFN Pinout (Top Through View)

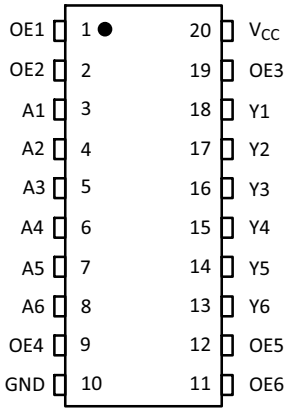


Figure 4. TSSOP Pinout (Top View)

PIN ASSIGNMENT

Number	Name	Type	Description
1	OE1	Input	Channel 1 Control Input
2	OE2	Input	Channel 2 Control Input
3	A1	Input	Channel 1 Data Input
4	A2	Input	Channel 2 Data Input
5	A3	Input	Channel 3 Data Input
6	A4	Input	Channel 4 Data Input
7	A5	Input	Channel 5 Data Input
8	A6	Input	Channel 6 Data Input
9	OE4	Input	Channel 4 Control Input
10	GND	Power	Ground
11	OE6	Input	Channel 6 Control Input
12	OE5	Input	Channel 5 Control Input
13	Y6	Output	Channel 6 Data Output
14	Y5	Output	Channel 5 Data Output
15	Y4	Output	Channel 4 Data Output
16	Y3	Output	Channel 3 Data Ouput
17	Y2	Output	Channel 2 Data Output
18	Y1	Output	Channel 1 Data Output
19	OE3	Input	Channel 3 Control Input
20	V_{CC}	Power	Positive Supply

MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	DC Supply	−0.5 to +6.5	V
V_{IN}	DC Input Voltage	−0.5 to +6.5	V
V_{OUT}	DC Output Voltage Active−Mode (High or Low State) Tri−State Mode (Note 1) Power−Down Mode (V_{CC} = 0 V)	 −0.5 to V_{CC} + 0.5 −0.5 to +6.5 −0.5 to +6.5	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	°C
T_L	Lead Temperature, 1 mm from Case for 10 Seconds	260	°C
T_J	Junction Temperature Under Bias	+150	°C
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 2) Human Body Model Charged Device Model	 2000 2000	V
$I_{LATCHUP}$	Latchup Performance (Note 3)	±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. 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.
3. 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}	Digital Input Voltage	0	5.5	V
V_{OUT}	Output Voltage Active Mode (High or Low State) Tri−State Mode (Note 4) 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	°C
t_r, t_f	Input Transition 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	 20 20 10 5	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.

4. Applicable to devices with outputs that may be tri−stated.

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_{IH}	High−Level Input Voltage		1.65 to 1.95	0.65 × V_{CC}	−	−	0.65 × V_{CC}	−	V
			2.3 to 5.5	0.70 × V_{CC}	−	−	−	−	
V_{IL}	Low−Level Input Voltage		1.65 to 1.95	−	−	0.35 × V_{CC}	−	0.35 × V_{CC}	V
			2.3 to 5.5	−	−	0.30 × V_{CC}	−	0.30 × V_{CC}	
V_{OH}	High−Level Output Voltage	V_{IN} = V_{IH} or V_{IL} I_{OH} = −100 μA I_{OH} = −4 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} 1.4 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} = 4 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	1.65 to 5.5	−	−	±1.0	−	±10.0	μA
I_{OZ}	3−State Output Leakage Current	V_{OUT} = 0 V to 5.5 V	1.65 to 5.5	−	−	±1.0	−	±10.0	μA
I_{OFF}	Power Off Leakage Current	V_{IN} = 5.5 V or V_{OUT} = 5.5 V	0	−	−	1.0	−	10	μA
I_{CC}	Quiescent Supply Current	V_{IN} = V_{CC} or GND	5.5	−	−	5.0	−	50	μA

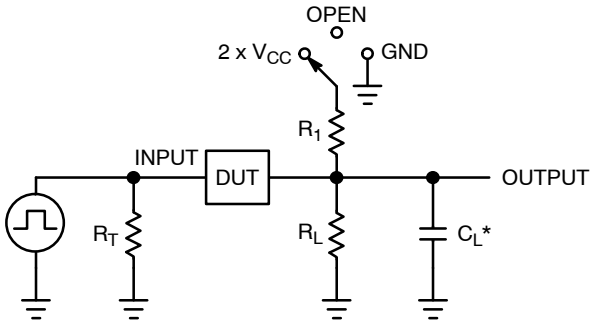
AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	V_{CC} (V)	T_A = 25°C			T_A = −55°C to +125°C		Unit
				Min	Typ	Max	Min	Max	
t_{PLH}, t_{PHL}	Propagation Delay, A to Y (Figures 5 and 6)	R_L = 1 MΩ, C_L = 15 pF	1.65 to 1.95	−	13.0	21.0	−	22.0	ns
		R_L = 1 MΩ, C_L = 15 pF	2.3 to 2.7	−	6.9	10	−	11.0	
		R_L = 1 MΩ, C_L = 15 pF	3.0 to 3.6	−	4.8	6.5	−	7.5	
		R_L = 500 Ω, C_L = 50 pF		−	5.3	7.0	−	8.0	
		R_L = 1 MΩ, C_L = 15 pF	4.5 to 5.5	−	3.4	4.5	−	4.8	
		R_L = 500 Ω, C_L = 50 pF		−	3.8	5.0	−	5.3	
t_{PZH}, t_{PZL}	Output Enable Time, OE to Y (Figures 5 and 6)		1.65 to 1.95	−	12.4	23.0	−	24.0	ns
			2.3 to 2.7	−	6.7	10.5	−	12.0	
			3.0 to 3.6	−	4.6	7.0	−	8.5	
			4.5 to 5.5	−	3.3	5.5	−	5.8	
t_{PHZ}, t_{PLZ}	Output Disable Time, OE to Y (Figures 5 and 6)		1.65 to 1.95	−	9.0	14.5	−	15.0	ns
			2.3 to 2.7	−	5.2	8.0	−	8.5	
			3.0 to 3.6	−	4.2	7.0	−	7.5	
			4.5 to 5.5	−	2.8	5.5	−	6.0	

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Test Conditions	Typical (T_A = 25°C)	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}	2.5	pF
C_{PD}	Power Dissipation Capacitance (Note 5)	10 MHz, V_{CC} = 3.3 V, V_{IN} = 0 V or V_{CC}	9	pF
		10 MHz, V_{CC} = 5.5 V, V_{IN} = 0 V or V_{CC}	11	

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 $I_{CC(OPR)} = C_{PD} \times V_{CC} \times f_{in} + I_{CC}$. C_{PD} is used to determine the no−load dynamic power consumption: $P_D = C_{PD} \times V_{CC}^2 \times f_{in} + I_{CC} \times V_{CC}$.



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

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 × V_{CC}	50	500	500
t_{PHZ}/t_{PZH}	GND	50	500	500

Figure 5. Test Circuit

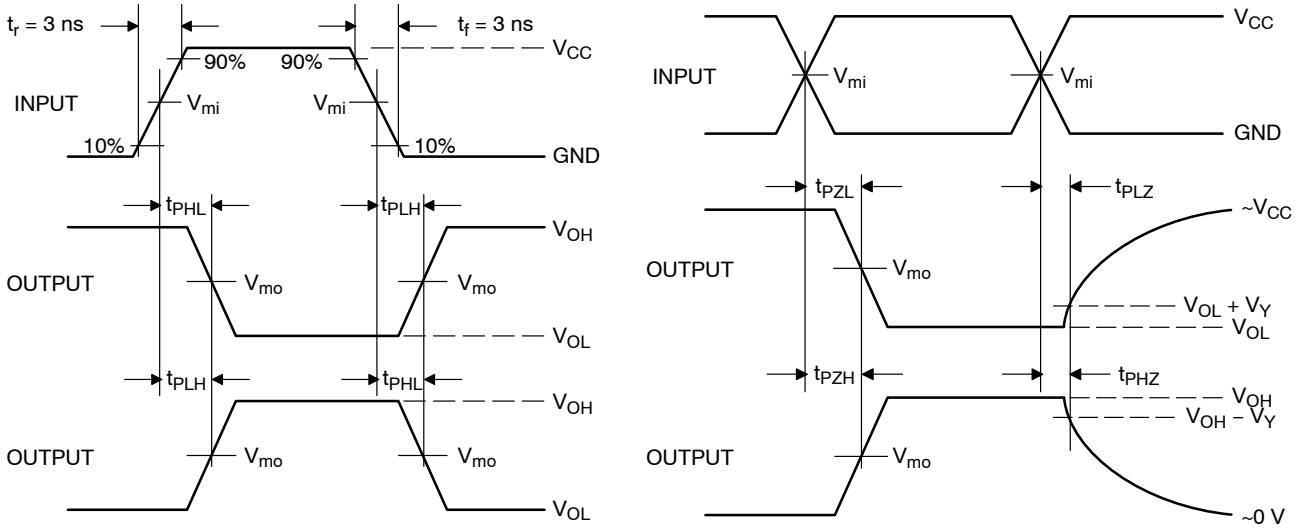


Figure 6. Switching Waveforms

V_{CC} (V)	V_{mi} (V)	V_{mo} (V)	V_Y (V)
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	$V_{CC}/2$	$V_{CC}/2$	0.3
4.5 to 5.5	$V_{CC}/2$	$V_{CC}/2$	0.3

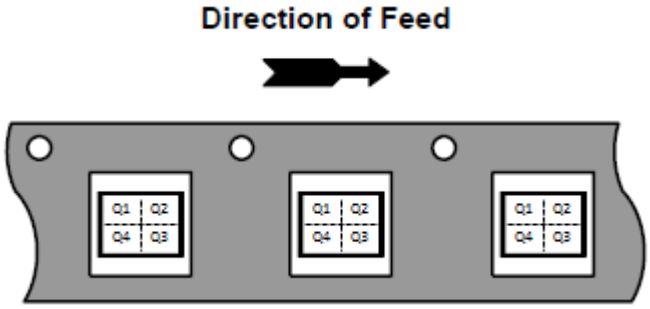
ORDERING INFORMATION

Device	Package	Marking	Pin 1 Orientation (See below)	Shipping†
NLV68SZ126MN2TWG	QFN20, 2.5 x 3.5, 0.4P	Z126	Q1	3000 / Tape & Reel
NLV68SZ126DTR2G (Contact ON Semiconductor)	TSSOP−20	TBD	Q1	2500 / Tape & Reel

†For complete information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

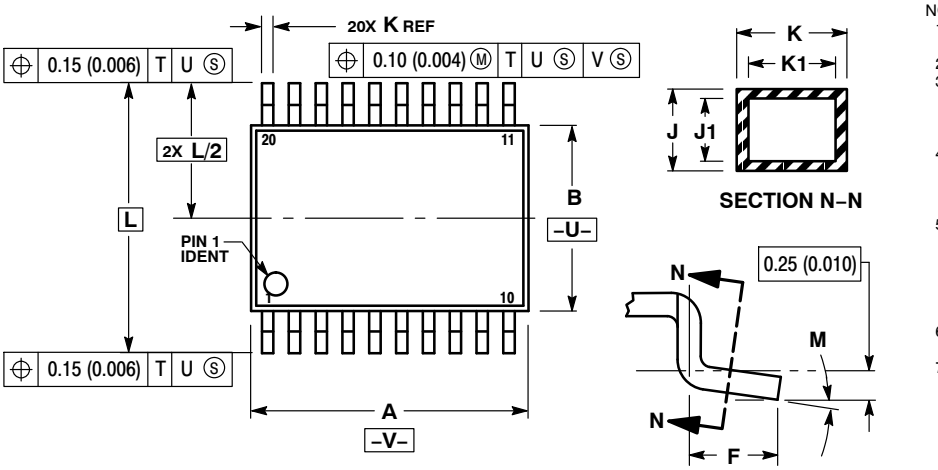
*NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q100 Qualified and PPAP Capable.

Pin 1 Orientation in Tape and Reel



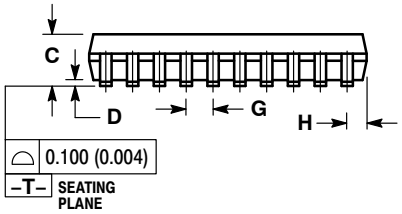
PACKAGE DIMENSIONS

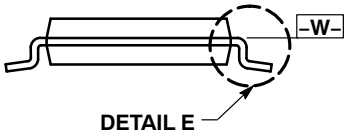
TSSOP−20 WB
CASE 948E
ISSUE D



SECTION N−N

DETAIL E

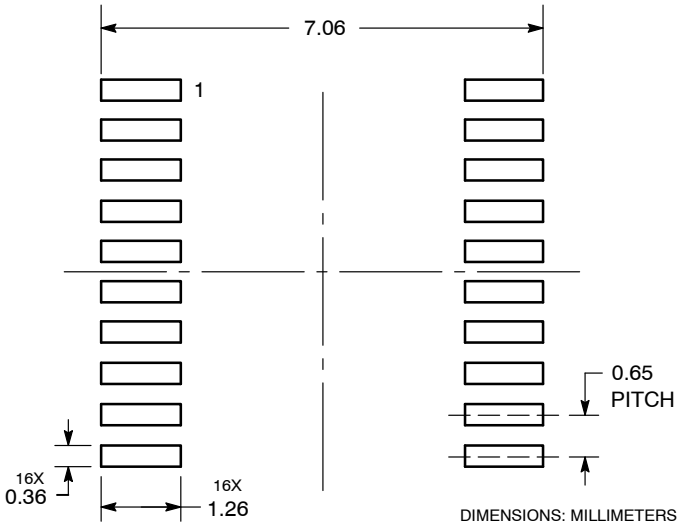




NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
5. DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE K DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
7. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE −W−.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	6.40	6.60	0.252	0.260
B	4.30	4.50	0.169	0.177
C	---	1.20	---	0.047
D	0.05	0.15	0.002	0.006
F	0.50	0.75	0.020	0.030
G	0.65 BSC		0.026 BSC	
H	0.27	0.37	0.011	0.015
J	0.09	0.20	0.004	0.008
J1	0.09	0.16	0.004	0.006
K	0.19	0.30	0.007	0.012
K1	0.19	0.25	0.007	0.010
L	6.40 BSC		0.252 BSC	
M	0°	8°	0°	8°

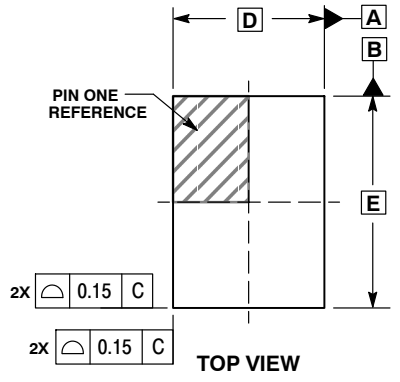
SOLDERING FOOTPRINT

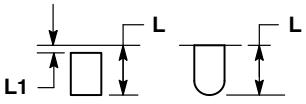


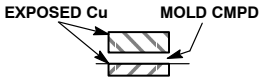
DIMENSIONS: MILLIMETERS

PACKAGE DIMENSIONS

QFN20, 2.5x3.5, 0.4P
CASE 485CB
ISSUE O

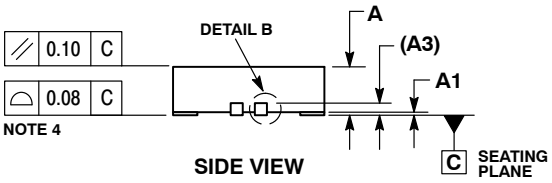


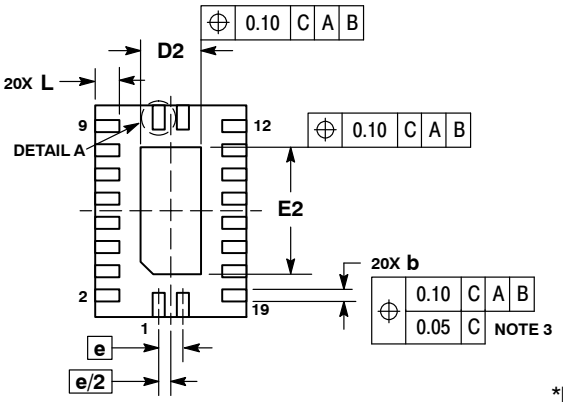




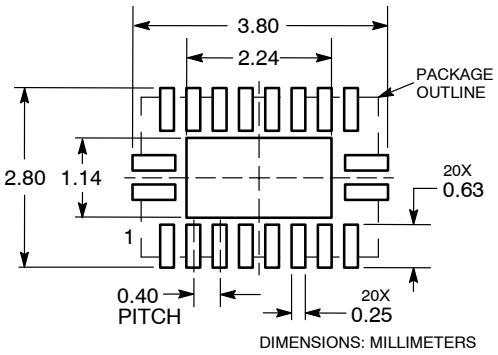
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSIONS b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 MM FROM TERMINAL TIP.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

	MILLIMETERS	
DIM	MIN	MAX
A	0.80	1.00
A1	0.00	0.05
A3	0.20 REF	
b	0.15	0.25
D	2.50 BSC	
D2	0.90	1.10
E	3.50 BSC	
E2	2.00	2.20
e	0.40 BSC	
L	0.35	0.45
L1	---	0.15





SOLDERING 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.

PUBLICATION ORDERING INFORMATION

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

ON Semiconductor 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

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