MC74LVX08DTR2G Datasheet
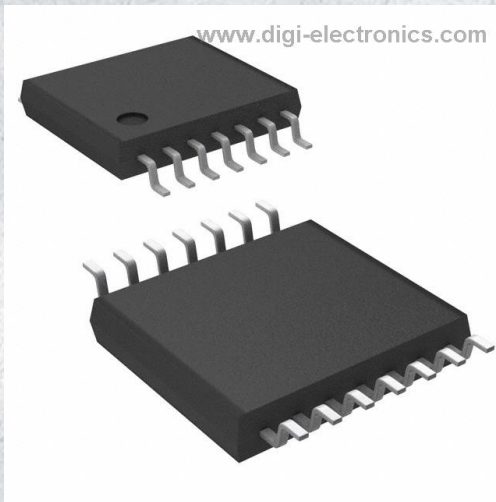
DiGi Electronics Part Number	MC74LVX08DTR2G-DG
Manufacturer	onsemi
Manufacturer Product Number	MC74LVX08DTR2G
Description	IC GATE AND 4CH 2-INP 14TSSOP
Detailed Description	AND Gate IC 4 Channel 14-TSSOP

Purchase and inquiry

Manufacturer Product Number:	Manufacturer:
MC74LVX08DTR2G	onsemi
Series:	Product Status:
74LVX	Active
Logic Type:	Number of Circuits:
AND Gate	4
Number of Inputs:	Features:
2	-
Voltage - Supply:	Current - Quiescent (Max):
2V ~ 3.6V	2 µA
Current - Output High, Low:	Input Logic Level - Low:
4mA, 4mA	0.5V ~ 0.8V
Input Logic Level - High:	Max Propagation Delay @ V, Max CL:
1.5V ~ 2.4V	10.6ns @ 3.3V, 50pF
Operating Temperature:	Mounting Type:
-40°C ~ 85°C	Surface Mount
Supplier Device Package:	Package / Case:
14-TSSOP	14-TSSOP (0.173", 4.40mm Width)
Base Product Number:	
74LVX08	

Environmental & Export classification

RoHS Status:	Moisture Sensitivity Level (MSL):
ROHS3 Compliant	1 (Unlimited)
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	
8542.39.0001	

onsemi

Quad 2-Input AND Gate
With 5 V−Tolerant Inputs

MC74LVX08

The MC74LVX08 is an advanced high speed CMOS 2−input AND gate. The inputs tolerate voltages up to 6.5 V, allowing the interface of 5.0 V systems to 3.0 V systems.

Features

- High Speed: t_{PD} = 4.8 ns (Typ) at V_{CC} = 3.3 V
- Low Power Dissipation: I_{CC} = 2 μA (Max) at T_A = 25°C
- Power Down Protection Provided on Inputs
- Balanced Propagation Delays
- Low Noise: V_{OLP} = 0.5 V (Max)
- Pin and Function Compatible with Other Standard Logic Families
- Latchup Performance Exceeds 300 mA
- ESD Performance:
      Human Body Model > 2000 V
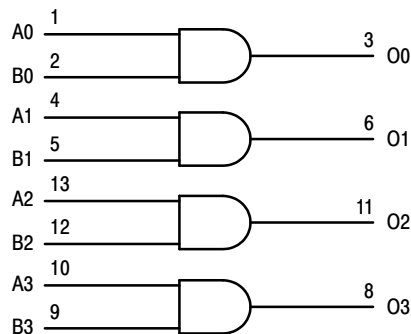- These Devices are Pb−Free and are RoHS Compliant

SOIC−14 NB
D SUFFIX
CASE 751A

TSSOP−14
DT SUFFIX
CASE 948G

PIN ASSIGNMENT

V_{CC}	A2	B2	O2	A3	B3	O3
14	13	12	11	10	9	8

1	2	3	4	5	6	7
A0	B0	O0	A1	B1	O1	GND
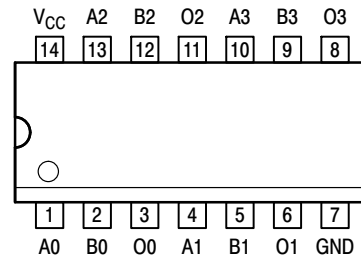
14−Lead (Top View)

MARKING DIAGRAMS

14

XXXXXXG
AWLYWW

1

SOIC−14 NB

14

XXX
XXX
ALYW▪

1
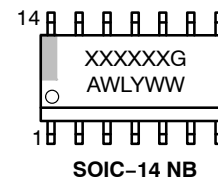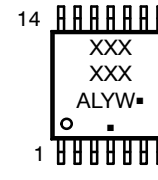
TSSOP−14

XXX	= Specific Device Code
A	= Assembly Location
WL, L	= Wafer Lot
Y	= Year
WW, W	= Work Week
G or ▪	= Pb−Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

Figure 1. Logic Diagram

PIN NAMES

Pins	Function
An, Bn	Data Inputs
On	Outputs

FUNCTION TABLE

| INPUTS		OUTPUTS
An	**Bn**	**On**
L	L	L
L	H	L
H	L	L
H	H	H

May, 2024 − Rev. 7

MC74LVX08

MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V_{CC}	DC Supply Voltage		−0.5 to +6.5	V
V_{in}	DC Input Voltage		−0.5 to +6.5	V
V_{out}	DC Output Voltage		−0.5 to V_{CC} +0.5	V
I_{IK}	Input Diode Current		−20	mA
I_{OK}	Output Diode Current		±20	mA
I_{out}	DC Output Current, per Pin		±25	mA
I_{CC}	DC Supply Current, V_{CC} and GND Pins		±50	mA
P_D	Power Dissipation	SOIC TSSOP	1077 833	mW
T_{stg}	Storage Temperature		−65 to +150	°C

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.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V_{CC}	DC Supply Voltage	2.0	3.6	V
V_{in}	DC Input Voltage	0	5.5	V
V_{out}	DC Output Voltage	0	V_{CC}	V
T_A	Operating Temperature, All Package Types	−40	+85	°C
Δt/ΔV	Input Rise and Fall Time	0	100	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

Symbol	Parameter	Test Conditions	V_{CC} V	T_A = 25°C			T_A = −40 to 85°C		Unit
				Min	Typ	Max	Min	Max	
V_{IH}	High−Level Input Voltage		2.0 3.0 3.6	1.5 2.0 2.4			1.5 2.0 2.4		V
V_{IL}	Low−Level Input Voltage		2.0 3.0 3.6			0.5 0.8 0.8		0.5 0.8 0.8	V
V_{OH}	High−Level Output Voltage (V_{in} = V_{IH} or V_{IL})	I_{OH} = −50 μA I_{OH} = −50 μA I_{OH} = −4 mA	2.0 3.0 3.0	1.9 2.9 2.58	2.0 3.0		1.9 2.9 2.48		V
V_{OL}	Low−Level Output Voltage (V_{in} = V_{IH} or V_{IL})	I_{OL} = 50 μA I_{OL} = 50 μA I_{OL} = 4 mA	2.0 3.0 3.0		0.0 0.0	0.1 0.1 0.36		0.1 0.1 0.44	V
I_{in}	Input Leakage Current	V_{in} = 5.5 V or GND	3.6			±0.1		±1.0	μA
I_{CC}	Quiescent Supply Current	V_{in} = V_{CC} or GND	3.6			2.0		20.0	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.

MC74LVX08

AC ELECTRICAL CHARACTERISTICS (Input $t_r = t_f = 3.0$ ns)

Symbol	Parameter	Test Conditions		$T_A = 25°C$			$T_A = −40$ to $85°C$		Unit
				Min	Typ	Max	Min	Max	
t_{PLH}, t_{PHL}	Propagation Delay, Input to Output	$V_{CC} = 2.7V$	$C_L = 15$ pF $C_L = 50$ pF		6.3 8.8	11.4 14.9	1.0 1.0	13.5 17.0	ns
		$V_{CC} = 3.3 ± 0.3V$	$C_L = 15$ pF $C_L = 50$ pF		4.8 7.3	7.1 10.6	1.0 1.0	8.5 12.0	
t_{OSHL} t_{OSLH}	Output−to−Output Skew (Note 1)	$V_{CC} = 2.7$ V $V_{CC} = 3.3 ±0.3$ V	$C_L = 50$ pF $C_L = 50$ pF			1.5 1.5		1.5 1.5	ns

1. Skew is defined as the absolute value of the difference between the actual propagation delay for any two separate outputs of the same device. The specification applies to any outputs switching in the same direction, either HIGH−to−LOW (t_{OSHL}) or LOW−to−HIGH (t_{OSLH}); parameter guaranteed by design.

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	$T_A = 25°C$			$T_A = −40$ to $85°C$		Unit
		Min	Typ	Max	Min	Max	
Cin	Input Capacitance		4	10		10	pF
C_{PD}	Power Dissipation Capacitance (Note 2)		18				pF

2. 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: $I_{CC(OPR)} = C_{PD} • V_{CC} • f_{in} + I_{CC}/4$ (per gate). C_{PD} is used to determine the no−load dynamic power consumption; $P_D = C_{PD} • V_{CC}^2 • f_{in} + I_{CC} • V_{CC}$.

NOISE CHARACTERISTICS (Input $t_r = t_f = 3.0$ ns, $C_L = 50$ pF, $V_{CC} = 3.3$ V, Measured in SOIC Package)

| Symbol	Characteristic	$T_A = 25°C$		Unit
		Typ	Max	
V_{OLP}	Quiet Output Maximum Dynamic V_{OL}	0.3	0.5	V
V_{OLV}	Quiet Output Minimum Dynamic V_{OL}	−0.3	−0.5	V
V_{IHD}	Minimum High Level Dynamic Input Voltage		2.0	V
V_{ILD}	Maximum Low Level Dynamic Input Voltage		0.8	V

MC74LVX08

OPEN

V_{CC} ○   ○ GND

R_L

DEVICE UNDER TEST

OUTPUT

C_L*
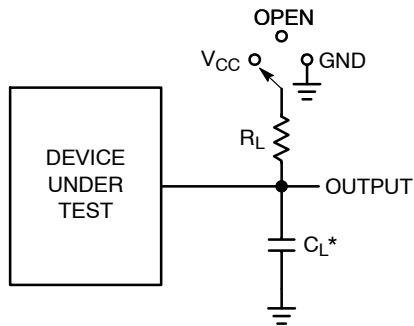
*C_L Includes probe and jig capacitance

Test	Switch Position	C_L	R_L
t_{PLH} / t_{PHL}	Open	See AC Charac-terisitcs Table	1 kΩ
t_{PLZ} / t_{PZL}	V_{CC}		
t_{PHZ} / t_{PZH}	GND		

Figure 1. Test Circuit
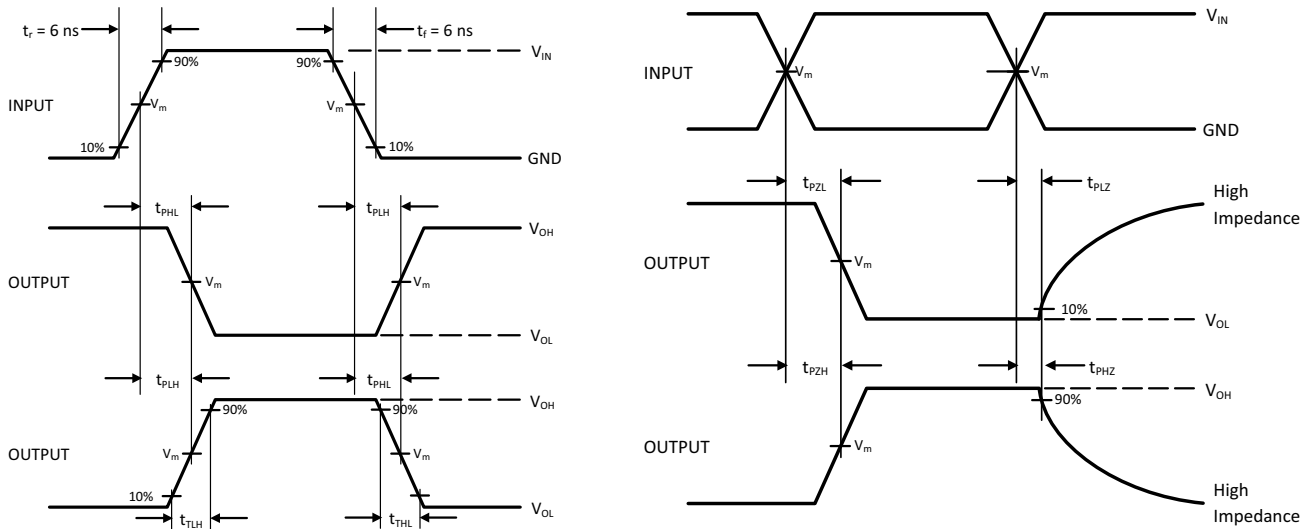
Device	V_{IN}, V	V_m, V
MC74LVX08	V_{CC}	50% x V_{CC}

Figure 2. Switching Waveforms

ORDERING INFORMATION

Device	Marking	Package	Shipping†
MC74LVX08DR2G	LVX08	SOIC−14	2500 Tape & Reel
MC74LVX08DTR2G	LVX 08	TSSOP−14	2500 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.

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS
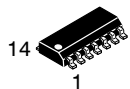
SOIC−14 NB
CASE 751A−03
ISSUE L

DATE 03 FEB 2016

14

1

SCALE 1:1

D
A
B

14   8

H   **E**

1   7

⊕ | 0.25 Ⓜ | B Ⓜ

13X **b**

⊕ | 0.25 Ⓜ | C | A Ⓢ | B Ⓢ

A3

L

DETAIL A

A

⌓ | 0.10

e   **A1**

C | SEATING PLANE

h
X 45°

DETAIL A

M
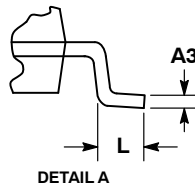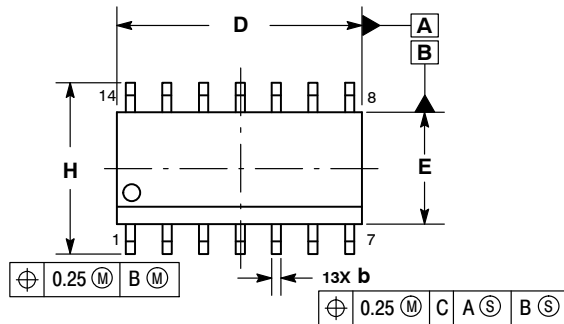
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF AT MAXIMUM MATERIAL CONDITION.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSIONS.
5. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.

DIM	MILLIMETERS		INCHES	
---	MIN	MAX	MIN	MAX
A	1.35	1.75	0.054	0.068
A1	0.10	0.25	0.004	0.010
A3	0.19	0.25	0.008	0.010
b	0.35	0.49	0.014	0.019
D	8.55	8.75	0.337	0.344
E	3.80	4.00	0.150	0.157
e	1.27 BSC		0.050 BSC	
H	5.80	6.20	0.228	0.244
h	0.25	0.50	0.010	0.019
L	0.40	1.25	0.016	0.049
M	0°	7°	0°	7°
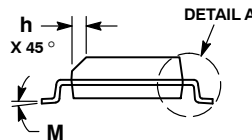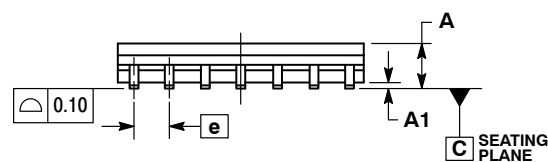
SOLDERING FOOTPRINT*
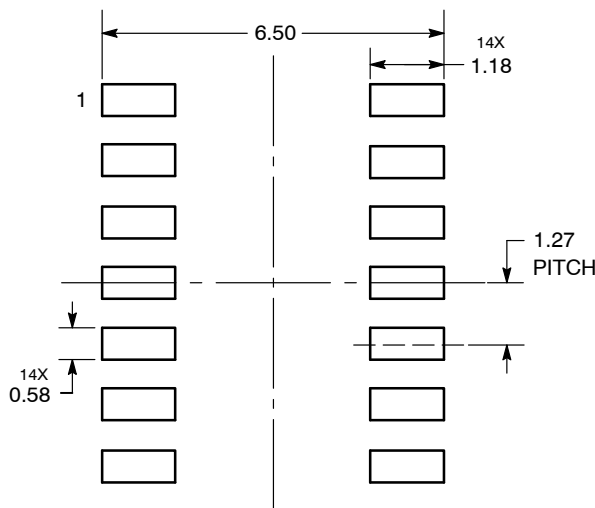
6.50

14X
1.18

1

1.27
PITCH

14X
0.58

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.

GENERIC MARKING DIAGRAM*

14

XXXXXXXXXG
AWLYWW

1
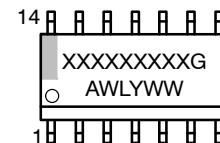
XXXXX = Specific Device Code
A = Assembly Location
WL = Wafer Lot
Y = Year
WW = Work Week
G = Pb−Free Package

*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.

STYLES ON PAGE 2

SOIC−14
CASE 751A−03
ISSUE L

DATE 03 FEB 2016

STYLE 1:
PIN 1. COMMON CATHODE
2. ANODE/CATHODE
3. ANODE/CATHODE
4. NO CONNECTION
5. ANODE/CATHODE
6. NO CONNECTION
7. ANODE/CATHODE
8. ANODE/CATHODE
9. ANODE/CATHODE
10. NO CONNECTION
11. ANODE/CATHODE
12. ANODE/CATHODE
13. NO CONNECTION
14. COMMON ANODE

STYLE 2:
CANCELLED

STYLE 3:
PIN 1. NO CONNECTION
2. ANODE
3. ANODE
4. NO CONNECTION
5. ANODE
6. NO CONNECTION
7. ANODE
8. ANODE
9. ANODE
10. NO CONNECTION
11. ANODE
12. ANODE
13. NO CONNECTION
14. COMMON CATHODE

STYLE 4:
PIN 1. NO CONNECTION
2. CATHODE
3. CATHODE
4. NO CONNECTION
5. CATHODE
6. NO CONNECTION
7. CATHODE
8. CATHODE
9. CATHODE
10. NO CONNECTION
11. CATHODE
12. CATHODE
13. NO CONNECTION
14. COMMON ANODE

STYLE 5:
PIN 1. COMMON CATHODE
2. ANODE/CATHODE
3. ANODE/CATHODE
4. ANODE/CATHODE
5. ANODE/CATHODE
6. NO CONNECTION
7. COMMON ANODE
8. COMMON CATHODE
9. ANODE/CATHODE
10. ANODE/CATHODE
11. ANODE/CATHODE
12. ANODE/CATHODE
13. NO CONNECTION
14. COMMON ANODE

STYLE 6:
PIN 1. CATHODE
2. CATHODE
3. CATHODE
4. CATHODE
5. CATHODE
6. CATHODE
7. CATHODE
8. ANODE
9. ANODE
10. ANODE
11. ANODE
12. ANODE
13. ANODE
14. ANODE

STYLE 7:
PIN 1. ANODE/CATHODE
2. COMMON ANODE
3. COMMON CATHODE
4. ANODE/CATHODE
5. ANODE/CATHODE
6. ANODE/CATHODE
7. ANODE/CATHODE
8. ANODE/CATHODE
9. ANODE/CATHODE
10. ANODE/CATHODE
11. COMMON CATHODE
12. COMMON ANODE
13. ANODE/CATHODE
14. ANODE/CATHODE

STYLE 8:
PIN 1. COMMON CATHODE
2. ANODE/CATHODE
3. ANODE/CATHODE
4. NO CONNECTION
5. ANODE/CATHODE
6. ANODE/CATHODE
7. COMMON ANODE
8. COMMON ANODE
9. ANODE/CATHODE
10. ANODE/CATHODE
11. NO CONNECTION
12. ANODE/CATHODE
13. ANODE/CATHODE
14. COMMON CATHODE

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DESCRIPTION:	SOIC−14 NB		PAGE 2 OF 2

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MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

TSSOP−14 WB
CASE 948G
ISSUE C

DATE 17 FEB 2016

14

SCALE 2:1

1

14X **K** REF

⊕ | 0.10 (0.004) Ⓜ | T | U Ⓢ | V Ⓢ

⌂ | 0.15 (0.006) | T | U Ⓢ

2X **L/2**

L

PIN 1 IDENT.

14   8

1   7

B
−U−

A
−V−

⌂ | 0.15 (0.006) | T | U Ⓢ

N

0.25 (0.010)

M

N

F

DETAIL E

K
K1

J J1

SECTION N−N

C

⌂ | 0.10 (0.004)

−T− SEATING PLANE

D   **G**   **H**

DETAIL E

−W−
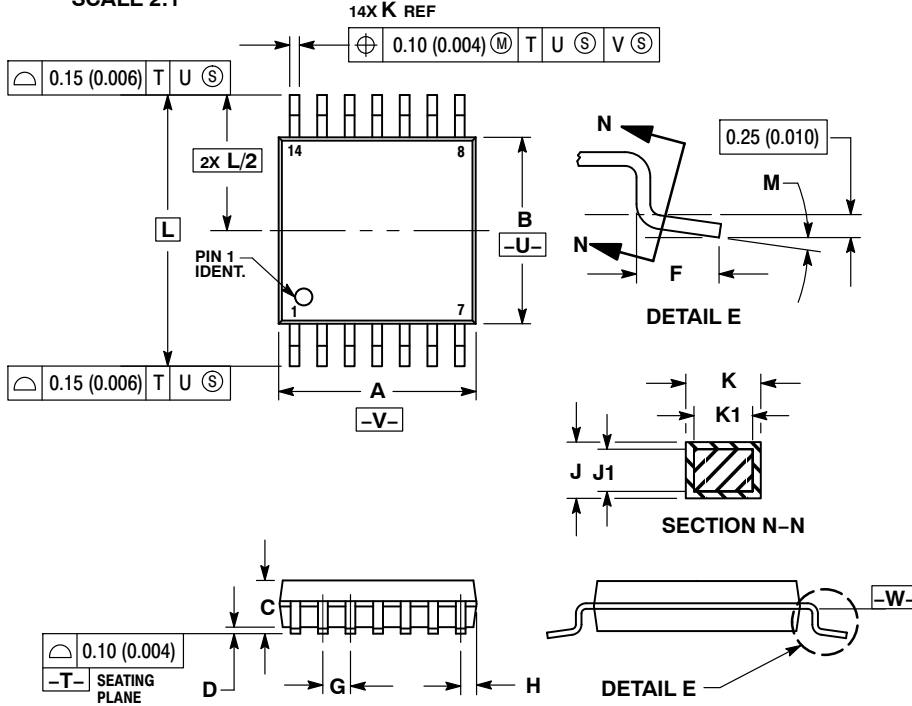
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD 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−.

DIM	MILLIMETERS		INCHES	
	MIN	**MAX**	**MIN**	**MAX**
A	4.90	5.10	0.193	0.200
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	0.50	0.60	0.020	0.024
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 °

RECOMMENDED SOLDERING FOOTPRINT*
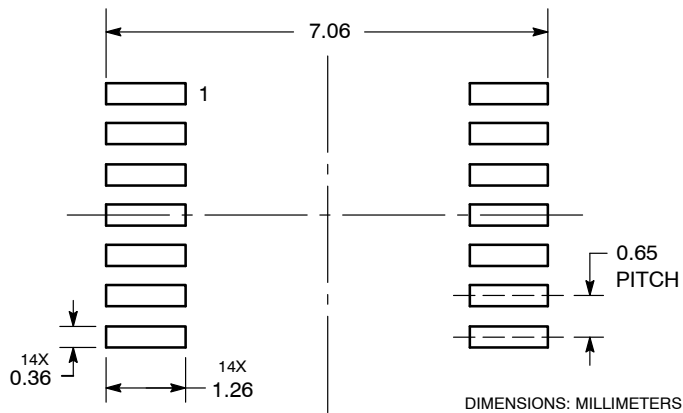
7.06

1

0.65 PITCH

14X 0.36

14X 1.26

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.

GENERIC MARKING DIAGRAM*

14

XXXX
XXXX
ALYW▪

1
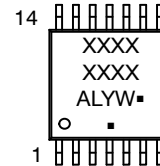
A = Assembly Location
L = Wafer Lot
Y = Year
W = Work Week
▪ = Pb−Free Package

(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.

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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

◊

OUR CERTIFICATE

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