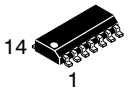
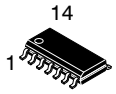
3-STATE Quad Buffers

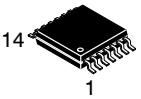
MM74HC125, MM74HC126



SOIC−14
CASE 751A−03



SOIC−14
CASE 751EF



TSSOP−14 WB
CASE 948G

General Description

The MM74HC125 and MM74HC126 are general purpose 3−STATE high speed non−inverting buffers utilizing advanced silicon−gate CMOS technology. They have high drive current outputs which enable high speed operation even when driving large bus capacitances. These circuits possess the low power dissipation of CMOS circuitry, yet have speeds comparable to low power Schottky TTL circuits. Both circuits are capable of driving up to 15 low power Schottky inputs.

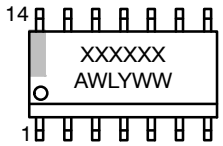
The MM74HC125 require the 3−STATE control input C to be taken high to put the output into the high impedance condition, whereas the MM74HC126 require the control input to be low to put the output into high impedance.

All inputs are protected from damage due to static discharge by diodes to VCC and ground.

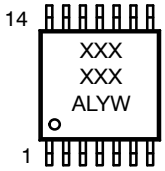
Features

- Typical Propagation Delay: 13 ns
- Wide Operating Voltage Range: 2 V – 6 V
- Low Input Current: 1 μA Maximum
- Low Quiescent Current: 160 μA maximum (74HC Series)
- Fanout of 15 LS−TTL Loads
- These Devices are Pb−Free, Halide Free and are RoHS Compliant

MARKING DIAGRAM



SOIC−14



TSSOP−14 WB

XXXXX = Specific Device Code
A = Assembly Location
WL, L = Wafer Lot
Y = Year
WW, W = Work Week

ORDERING INFORMATION

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

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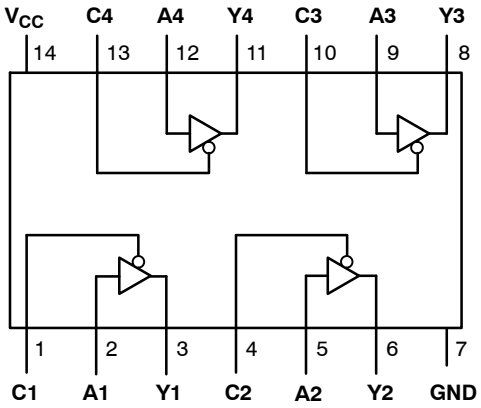
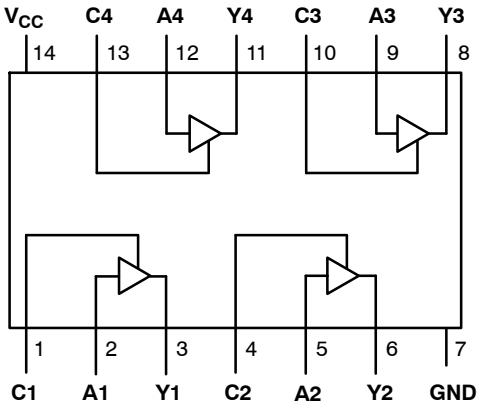
Connection Diagram



Top View (MM74HC125)



Top View (MM74HC126)

Figure 1. Pin Assignments for SOIC and TSSOP

TRUTH TABLE (MM74HC125)

Inputs		Output
A	C	Y
H	L	H
L	L	L
X	H	Z

TRUTH TABLE (MM74HC126)

Inputs		Output
A	C	Y
H	H	H
L	H	L
X	L	Z

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ABSOLUTE MAXIMUM RATINGS (Note 1)

Symbol	Parameter	Rating
V_{CC}	Supply Voltage	–0.5 to +6.5 V
V_{IN}	DC Input Voltage	–0.5 to V_{CC} + 0.5 V
V_{OUT}	DC Output Voltage	–0.5 to V_{CC} + 0.5 V
I_{IK}, I_{OK}	Clamp Diode Current	±20 mA
I_{OUT}	DC Output Current, per Pin	35 mA
I_{CC}	DC V_{CC} or GND Current, per Pin	±70 mA
T_{STG}	Storage Temperature Range	–65°C to +150°C
P_D	Power Dissipation SOIC TSSOP	1077 mW 833 mW
T_L	Lead Temperature (Soldering 10 Seconds)	260°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.

1. Unless otherwise specified all voltages are referenced to ground.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter		Min	Max	Unit
V_{CC}	Supply Voltage		2	6	V
V_{IN}, V_{OUT}	DC Input or Output Voltage		0	V_{CC}	V
T_A	Operating Temperature Range		–55	+125	°C
t_r, t_f	Input Rise or Fall Time	V_{CC} = 2.0 V	–	1000	ns
		V_{CC} = 4.5 V	–	500	ns
		V_{CC} = 6.0 V	–	400	ns

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.

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DC CHARACTERISTICS (Note 2)

Symbol	Parameter	Conditions	V_{CC} (V)	T_A = 25°C		T_A = −40°C to 85°C	T_A = −55°C to 125°C	Unit
				Typ	Guaranteed Limits			
V_{IH}	Minimum HIGH Level Input Voltage		2.0	–	1.5	1.5	1.5	V
			4.5	–	3.15	3.15	3.15	
			6.0	–	4.2	4.2	4.2	
V_{IL}	Maximum LOW Level Input Voltage		2.0	–	0.5	0.5	0.5	V
			4.5	–	1.35	1.35	1.35	
			6.0	–	1.8	1.8	1.8	
V_{OH}	Minimum HIGH Level Output Voltage	V_{IN} = V_{IH} or V_{IL}, $\|I_{OUT}\| \le 20$ μA	2.0	2.0	1.9	1.9	1.9	V
			4.5	4.5	4.4	4.4	4.4	
			6.0	6.0	5.9	5.9	5.9	
		V_{IN} = V_{IH} or V_{IL}, $\|I_{OUT}\| \le 6.0$ mA	4.5	4.2	3.98	3.84	3.7	
		V_{IN} = V_{IH} or V_{IL}, $\|I_{OUT}\| \le 7.8$ mA	6.0	5.7	5.48	5.34	5.2	
V_{OL}	Maximum LOW Level Output Voltage	V_{IN} = V_{IH} or V_{IL}, $\|I_{OUT}\| \le 20$ μA	2.0	0	0.1	0.1	0.1	V
			4.5	0	0.1	0.1	0.1	
			6.0	0	0.1	0.1	0.1	
		V_{IN} = V_{IH} or V_{IL}, $\|I_{OUT}\| \le 6.0$ mA	4.5	0.2	0.26	0.33	0.4	
		V_{IN} = V_{IH} or V_{IL}, $\|I_{OUT}\| \le 7.8$ mA	6.0	0.2	0.26	0.33	0.4	
I_{OZ}	Maximum 3−STATE Output Leakage Current	V_{IN} = V_{IH} or V_{IL}, V_{OUT} = V_{CC} or GND, C_n = Disabled	6.0	–	±0.5	±5	±10	μA
I_{IN}	Maximum Input Current	V_{IN} = V_{CC} or GND	6.0	–	±0.1	±1.0	±1.0	μA
I_{CC}	Maximum Quiescent Supply Current	V_{IN} = V_{CC} or GND, I_{OUT} = 0 μA	6.0	–	8.0	80	160	μA

2. For a power supply of 5 V ±10% the worst case output voltages (V_{OH}, and V_{OL}) occur for HC at 4.5 V. Thus the 4.5 V values should be used when designing with this supply. Worst case V_{IH} and V_{IL} occur at V_{CC} = 5.5 V and 4.5 V respectively. (The V_{IH} value at 5.5 V is 3.85 V.) The worst case leakage current (I_{IN}, I_{CC}, and I_{OZ}) occur for CMOS at the higher voltage and so the 6.0 V values should be used.

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AC CHARACTERISTICS (V_{CC} = 5 V, T_A = 25°C, C_L = 45 pF, $t_r = t_f$ = 6 ns)

Symbol	Parameter	Conditions	Typ	Guaranteed Limit	Unit
t_{PHL}, t_{PLH}	Maximum Propagation Delay Time		13	18	ns
t_{PZH}	Maximum Output Enable Time to HIGH Level	R_L = 1 kΩ	13	25	ns
t_{PHZ}	Maximum Output Disable Time from HIGH Level	R_L = 1 kΩ, C_L = 5 pF	17	25	ns
t_{PZL}	Maximum Output Enable Time to LOW Level	R_L = 1 kΩ	18	25	ns
t_{PLZ}	Maximum Output Disable Time from LOW Level	R_L = 1 kΩ, C_L = 5 pF	13	25	ns

AC CHARACTERISTICS (V_{CC} = 2.0 V to 6.0 V, C_L = 50 pF, $t_r = t_f$ = 6 ns (unless otherwise specified))

Symbol	Parameter	V_{CC} (V)	Conditions	T_A = 25°C	T_A = −40°C to 85°C	T_A = −55°C to 125°C		Unit
				Typ	Guaranteed Limits			
t_{PHL}, t_{PLH}	Maximum Propagation Delay Time	2.0		40	100	125	150	ns
		4.5		14	20	25	30	
		6.0		12	17	21	25	
t_{PLH}, t_{PHL}	Maximum Propagation Delay Time	2.0	C_L = 150 pF,	35	130	163	195	ns
		4.5		14	26	33	39	
		6.0		12	22	28	39	
t_{PZH}, t_{PZL}	Maximum Output Enable Time	2.0	R_L = 1 kΩ	25	125	156	188	ns
		4.5		14	25	31	38	
		6.0		12	21	26	31	
t_{PHZ}, t_{PLZ}	Maximum Output Disable Time	2.0	R_L = 1 kΩ	25	125	156	188	ns
		4.5		14	25	31	38	
		6.0		12	21	26	31	
t_{PZL}, t_{PZH}	Maximum Output Enable Time	2.0	C_L = 150 pF, R_L = 1 kΩ	35	140	175	210	ns
		4.5		15	28	35	42	
		6.0		13	24	30	36	
t_{TLH}, t_{THL}	Maximum Output Rise and Fall Time	2.0	C_L = 50 pF	30	60	75	90	ns
		4.5		7	12	15	18	
		6.0		6	10	13	15	
C_{IN}	Input Capacitance			5	10	10	10	pF
C_{OUT}	Output Capacitance Outputs			15	20	20	20	pF
C_{PD}	Power Dissipation Capacitance (per gate) (Note 3)		Enabled	45	–	–	–	pF
			Disabled	6	–	–	–	

3. C_{PD} determines the no load dynamic power consumption, $P_D = C_{PD} V_{CC}^2 f + I_{CC} V_{CC}$, and the no load dynamic current consumption, $I_S = C_{PD} V_{CC} f + I_{CC}$.

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ORDERING INFORMATION

Part Number	Marking	Package	Shipping†
MM74HC125M	HC125A	SOIC−14, Case 751A (Pb−Free, Halide Free)	55 Units / Tube
MM74HC125MX	HC125A	SOIC−14, Case 751A (Pb−Free, Halide Free)	2500 / Tape & Reel
MM74HC125MTC	HC 125A	TSSOP−14, Case 948G (Pb−Free, Halide Free)	96 Units / Tube
MM74HC125MTCX	HC 125A	TSSOP−14 WB, Case 948G (Pb−Free, Halide Free)	2500 / Tape & Reel
MM74HC126M	HC126A	SOIC−14, Case 751A (Pb−Free, Halide Free)	55 Units / Tube
MM74HC126MX	HC126A	SOIC−14, Case 751EF (Pb−Free, Halide Free)	2500 / Tape & Reel
MM74HC126MTCX	HC 126A	TSSOP−14 WB, Case 948G (Pb−Free, Halide Free)	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.

NOTE: Device also available in Tape and Reel. Specify by appending suffix letter “X” to the ordering number.

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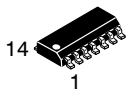
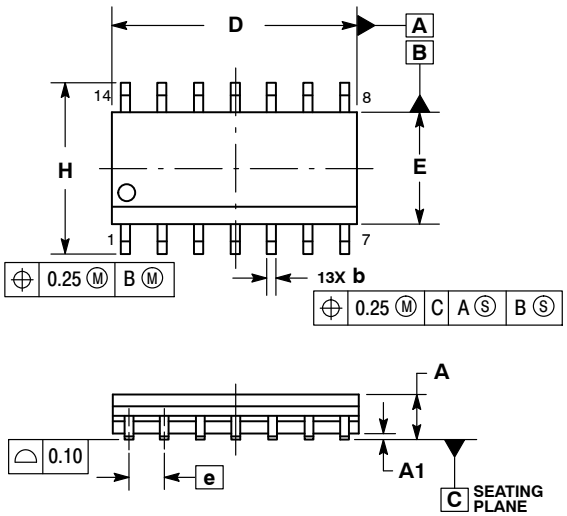
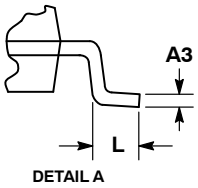


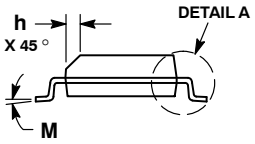
SCALE 1:1

SOIC−14 NB
CASE 751A−03
ISSUE L

DATE 03 FEB 2016



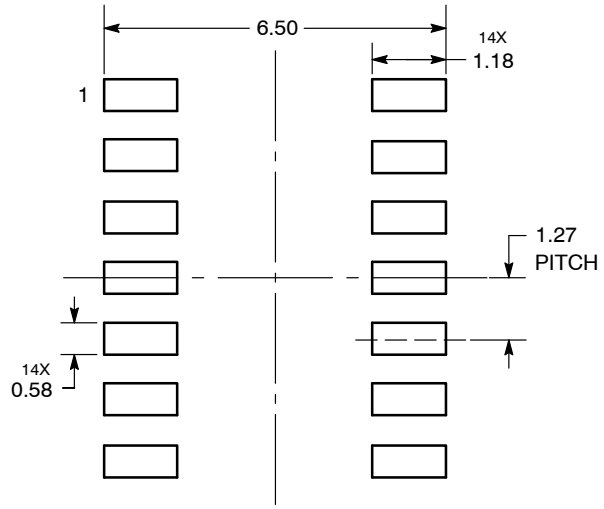




NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF AT MAXIMUM MATERIAL CONDITION.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSIONS.
5. MAXIMUM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

	MILLIMETERS		INCHES	
DIM	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 °

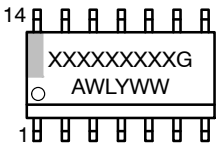
SOLDERING FOOTPRINT*



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*



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

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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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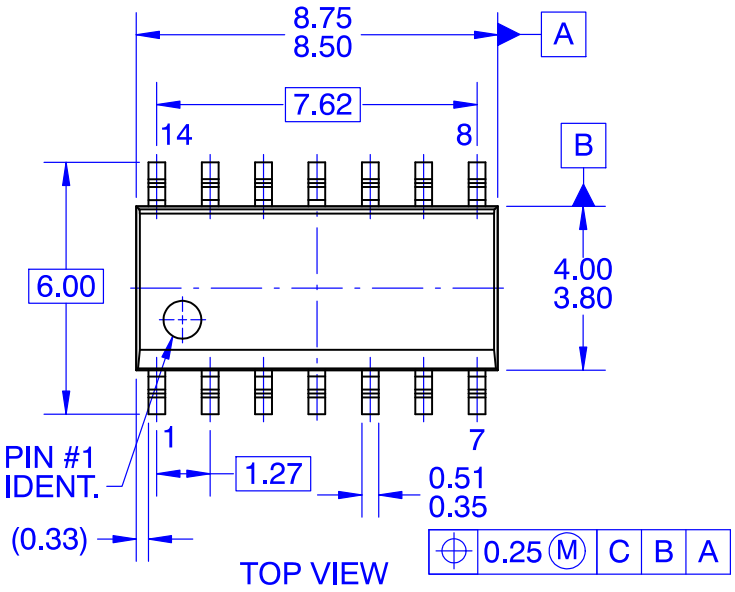
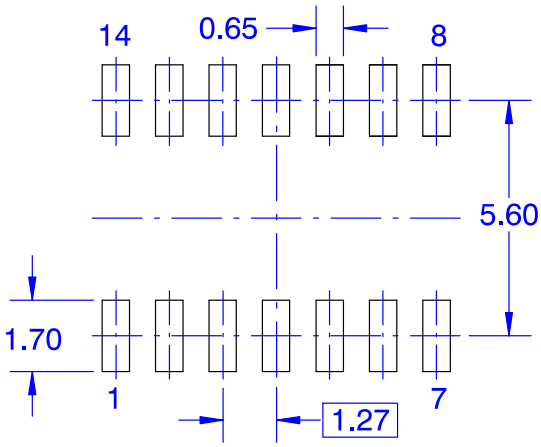
SOIC14
CASE 751EF
ISSUE O

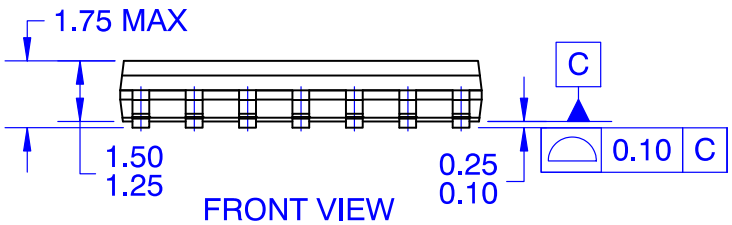
DATE 30 SEP 2016



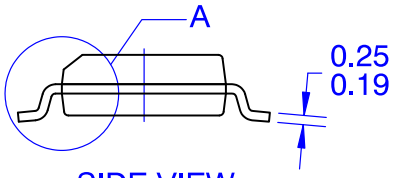
TOP VIEW



LAND PATTERN RECOMMENDATION

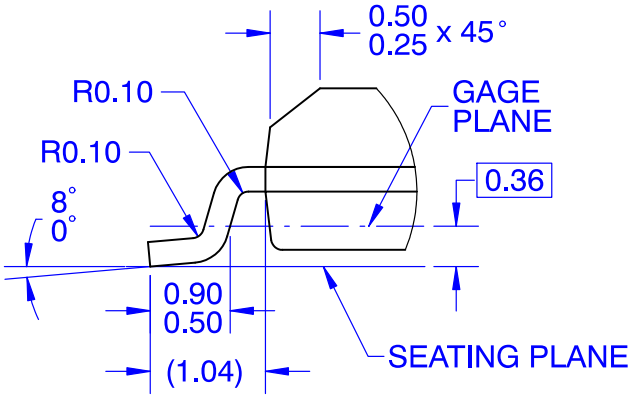


FRONT VIEW



SIDE VIEW

NOTES:
A. CONFORMS TO JEDEC MS−012, VARIATION AB, ISSUE C
B. ALL DIMENSIONS ARE IN MILLIMETERS
C. DIMENSIONS DO NOT INCLUDE MOLD FLASH OR BURRS
D. LAND PATTERN STANDARD: SOIC127P600X145−14M
E. CONFORMS TO ASME Y14.5M, 2009



DETAIL A
SCALE 16 : 1

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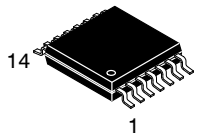
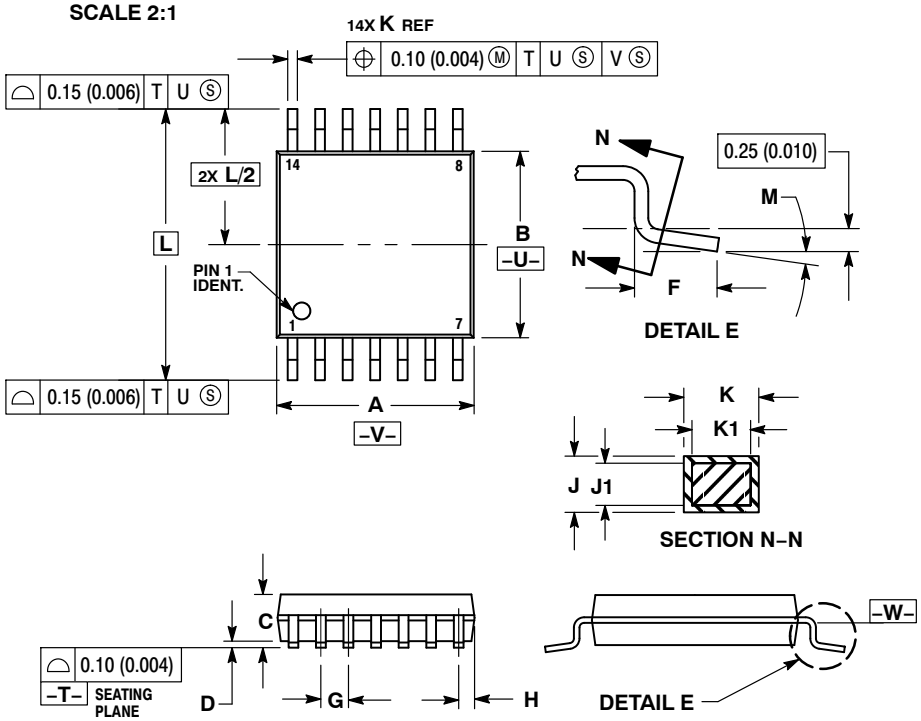


SCALE 2:1

TSSOP−14 WB
CASE 948G
ISSUE C

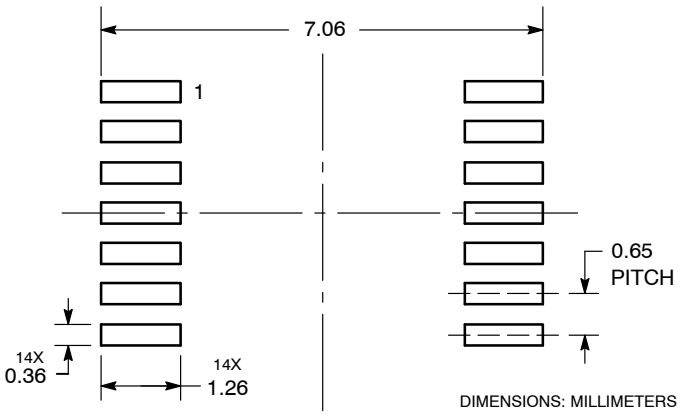
DATE 17 FEB 2016



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	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 °

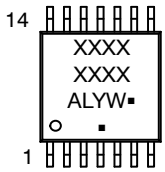
RECOMMENDED SOLDERING FOOTPRINT*



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*



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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