MC74HC125A, MC74HC126A

Quad 3-State Noninverting Buffers

High−Performance Silicon−Gate CMOS

The MC74HC125A and MC74HC126A are identical in pinout to the LS125 and LS126. The device inputs are compatible with standard CMOS outputs; with pullup resistors, they are compatible with LSTTL outputs.

The HC125A and HC126A noninverting buffers are designed to be used with 3−state memory address drivers, clock drivers, and other bus−oriented systems. The devices have four separate output enables that are active−low (HC125A) or active−high (HC126A).

Features

- Output Drive Capability: 15 LSTTL Loads
- Outputs Directly Interface to CMOS, NMOS, and TTL
- Operating Voltage Range: 2.0 to 6.0 V
- Low Input Current: 1.0 μA
- High Noise Immunity Characteristic of CMOS Devices
- In Compliance with the JEDEC Standard No. 7 A Requirements
- Chip Complexity: 72 FETs or 18 Equivalent Gates
- 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

LOGIC DIAGRAM

HC125A
Active−Low Output Enables

HC126A
Active−High Output Enables
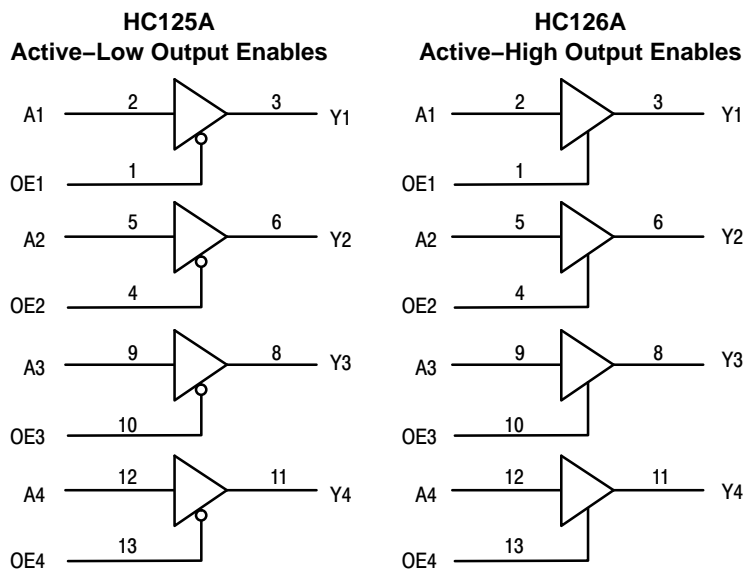
PIN 14 = V_{CC}
PIN 7 = GND

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SOIC−14 NB
D SUFFIX
CASE 751A

TSSOP−14
DT SUFFIX
CASE 948G

PIN ASSIGNMENT

OE1	1	14	V_{CC}
A1	2	13	OE4
Y1	3	12	A4
OE2	4	11	Y4
A2	5	10	OE3
Y2	6	9	A3
GND	7	8	Y3
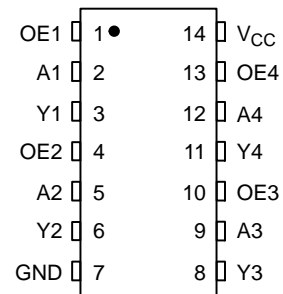
MARKING DIAGRAMS
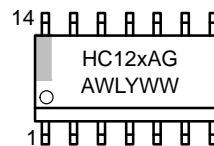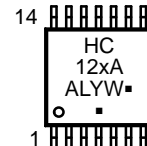
SOIC−14 NB　　　**TSSOP−14**

x	= 5, 6
A	= Assembly Location
L, WL	= Wafer Lot
Y, YY	= Year
W, WW	= Work Week
G or ▪	= Pb−Free Package

(Note: Microdot may be in either location)

FUNCTION TABLE

HC125A			HC126A		
Inputs		Output	Inputs		Output
A	OE	Y	A	OE	Y
H	L	H	H	H	H
L	L	L	L	H	L
X	H	Z	X	L	Z

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	DC Supply Voltage (Referenced to GND)	−0.5 to +7.0	V
V_{in}	DC Input Voltage (Referenced to GND)	−0.5 to V_{CC} + 0.5	V
V_{out}	DC Output Voltage (Referenced to GND)	−0.5 to V_{CC} + 0.5	V
I_{in}	DC Input Current, per Pin	±20	mA
I_{out}	DC Output Current, per Pin	±35	mA
I_{CC}	DC Supply Current, V_{CC} and GND Pins	±75	mA
P_D	Power Dissipation in Still Air SOIC Package† TSSOP Package†	500 450	mW
T_{stg}	Storage Temperature	−65 to +150	°C
T_L	Lead Temperature, 1 mm from Case for 10 Seconds (SOIC or TSSOP Package)	260	°C

This device contains protection circuitry to guard against damage due to high static voltages or electric fields. However, precautions must be taken to avoid applications of any voltage higher than maximum rated voltages to this high−impedance circuit. For proper operation, V_{in} and V_{out} should be constrained to the range GND ≤ (V_{in} or V_{out}) ≤ V_{CC}.

Unused inputs must always be tied to an appropriate logic voltage level (e.g., either GND or V_{CC}). Unused outputs must be left open.

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.
†Derating: SOIC Package: −7 mW/°C from 65° to 125°C
           TSSOP Package: −6.1 mW/°C from 65° to 125°C

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V_{CC}	DC Supply Voltage (Referenced to GND)	2.0	6.0	V
V_{in}, V_{out}	DC Input Voltage, Output Voltage (Referenced to GND)	0	V_{CC}	V
T_A	Operating Temperature, All Package Types	−55	+125	°C
t_r, t_f	Input Rise and Fall Time V_{CC} = 2.0 V (Figure 1) V_{CC} = 4.5 V V_{CC} = 6.0 V	0 0 0	1000 500 400	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.

DC ELECTRICAL CHARACTERISTICS (Voltages Referenced to GND)

Symbol	Parameter	Test Conditions		V_{CC} V	Guaranteed Limit			Unit
					−55 to 25°C	≤ 85°C	≤ 125°C	
V_{IH}	Minimum High−Level Input Voltage	$V_{out} = V_{CC} − 0.1$ V $|I_{out}| \leq 20$ µA		2.0 3.0 4.5 6.0	1.5 2.1 3.15 4.2	1.5 2.1 3.15 4.2	1.5 2.1 3.15 4.2	V
V_{IL}	Maximum Low−Level Input Voltage	$V_{out} = 0.1$ V $|I_{out}| \leq 20$ µA		2.0 3.0 4.5 6.0	0.5 0.9 1.35 1.8	0.5 0.9 1.35 1.8	0.5 0.9 1.35 1.8	V
V_{OH}	Minimum High−Level Output Voltage	$V_{in} = V_{IH}$ $|I_{out}| \leq 20$ µA		2.0 4.5 6.0	1.9 4.4 5.9	1.9 4.4 5.9	1.9 4.4 5.9	V
		$V_{in} = V_{IH}$	$|I_{out}| \leq 3.6$ mA $|I_{out}| \leq 6.0$ mA $|I_{out}| \leq 7.8$ mA	3.0 4.5 6.0	2.48 3.98 5.48	2.34 3.84 5.34	2.2 3.7 5.2	
V_{OL}	Maximum Low−Level Output Voltage	$V_{in} = V_{IL}$ $|I_{out}| \leq 20$ µA		2.0 4.5 6.0	0.1 0.1 0.1	0.1 0.1 0.1	0.1 0.1 0.1	V
		$V_{in} = V_{IL}$	$|I_{out}| \leq 3.6$ mA $|I_{out}| \leq 6.0$ mA $|I_{out}| \leq 7.8$ mA	3.0 4.5 6.0	0.26 0.26 0.26	0.33 0.33 0.33	0.4 0.4 0.4	
I_{in}	Maximum Input Leakage Current	$V_{in} = V_{CC}$ or GND		6.0	±0.1	±1.0	±1.0	µA
I_{OZ}	Maximum Three−State Leakage Current	Output in High−Impedance State $V_{in} = V_{IL}$ or V_{IH} $V_{out} = V_{CC}$ or GND		6.0	±0.5	±5.0	±10	µA
I_{CC}	Maximum Quiescent Supply Current (per Package)	$V_{in} = V_{CC}$ or GND $I_{out} = 0$ µA		6.0	4.0	40	160	µA

AC ELECTRICAL CHARACTERISTICS (C_L = 50 pF, Input $t_r = t_f$ = 6.0 ns)

Symbol	Parameter	V_{CC} V	Guaranteed Limit			Unit
			−55 to 25°C	≤ 85°C	≤ 125°C	
t_{PLH}, t_{PHL}	Maximum Propagation Delay, Input A to Output Y (Figures 1 and 3)	2.0 3.0 4.5 6.0	90 36 18 15	115 45 23 20	135 60 27 23	ns
t_{PLZ}, t_{PHZ}	Maximum Propagation Delay, Output Enable to Y (Figures 2 and 4)	2.0 3.0 4.5 6.0	120 45 24 20	150 60 30 26	180 80 36 31	ns
t_{PZL}, t_{PZH}	Maximum Propagation Delay, Output Enable to Y (Figures 2 and 4)	2.0 3.0 4.5 6.0	90 36 18 15	115 45 23 20	135 60 27 23	ns
t_{TLH}, t_{THL}	Maximum Output Transition Time, Any Output (Figures 1 and 3)	2.0 3.0 4.5 6.0	60 22 12 10	75 28 15 13	90 34 18 15	ns
C_{in}	Maximum Input Capacitance	−	10	10	10	pF
C_{out}	Maximum 3−State Output Capacitance (Output in High−Impedance State)	−	15	15	15	pF

		Typical @ 25°C, V_{CC} = 5.0 V	
C_{PD}	Power Dissipation Capacitance (Per Buffer)*	30	pF

* Used to determine the no−load dynamic power consumption: $P_D = C_{PD} V_{CC}^2 f + I_{CC} V_{CC}$.

SWITCHING WAVEFORMS
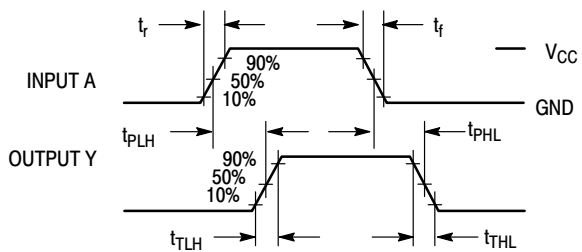
Figure 1.
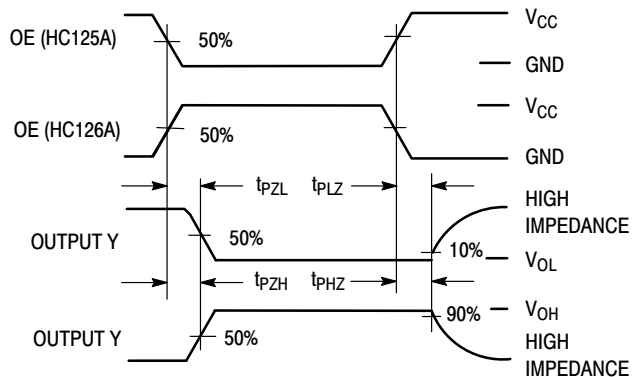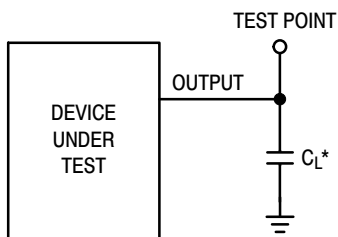

Figure 2.

*Includes all probe and jig capacitance

Figure 3. Test Circuit

CONNECT TO V_{CC} WHEN TESTING t_{PLZ} AND t_{PZL}. CONNECT TO GND WHEN TESTING t_{PHZ} and t_{PZH}.
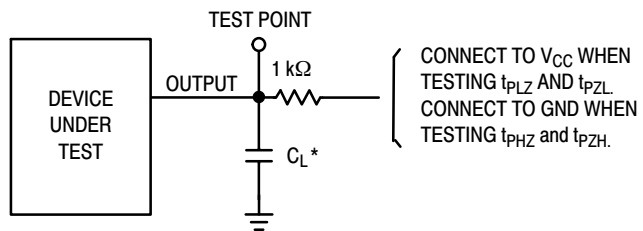
*Includes all probe and jig capacitance

Figure 4. Test Circuit

HC125A
(1/4 OF THE DEVICE)
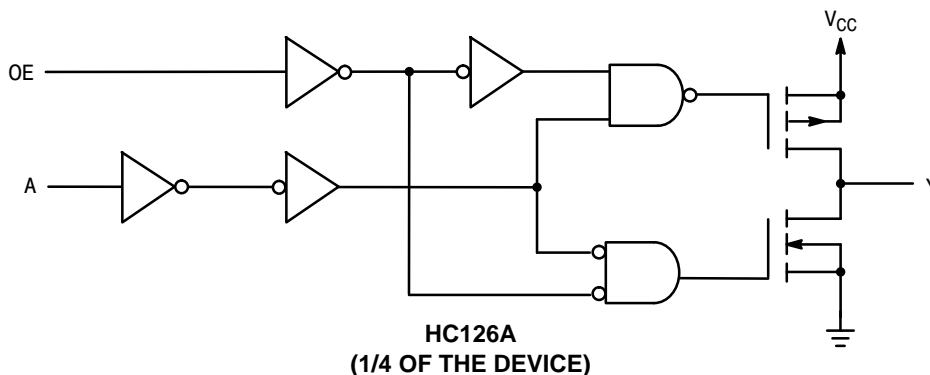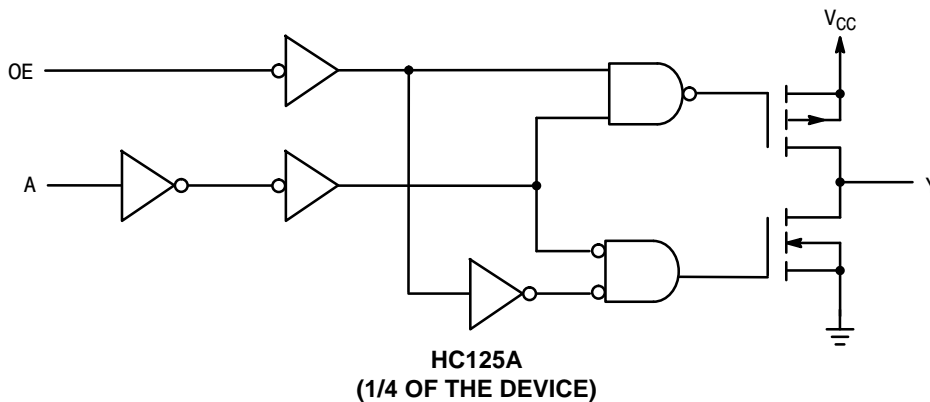
HC126A
(1/4 OF THE DEVICE)

ORDERING INFORMATION

Device	Package	Shipping[†]
MC74HC125ADG	SOIC–14 NB (Pb–Free)	55 Units / Rail
MC74HC125ADR2G	SOIC–14 NB (Pb–Free)	2500 / Tape & Reel
MC74HC125ADTG	TSSOP–14 (Pb–Free)	96 Units / Rail
MC74HC125ADTR2G	TSSOP–14 (Pb–Free)	2500 / Tape & Reel
MC74HC126ADG	SOIC–14 NB (Pb–Free)	55 Units / Rail
MC74HC126ADR2G	SOIC–14 NB (Pb–Free)	2500 / Tape & Reel
MC74HC126ADTR2G	TSSOP–14 (Pb–Free)	2500 / Tape & Reel
NLV74HC125ADG*	SOIC–14 NB (Pb–Free)	55 Units / Rail
NLV74HC125ADR2G*	SOIC–14 NB (Pb–Free)	2500 / Tape & Reel
NLV74HC125ADTG*	TSSOP–14 (Pb–Free)	55 Units / Rail
NLV74HC125ADTR2G*	TSSOP–14 (Pb–Free)	2500 / Tape & Reel
NLV74HC126ADR2G*	SOIC–14 NB (Pb–Free)	2500 / Tape & Reel
NLV74HC126ADTR2G*	TSSOP–14 (Pb–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.

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

PACKAGE DIMENSIONS

TSSOP−14
CASE 948G
ISSUE B

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

N

F

0.25 (0.010)

M

DETAIL E

K

K1

J J1

SECTION N−N

C

△ | 0.10 (0.004)

−T− SEATING
PLANE

D

G

H

−W−

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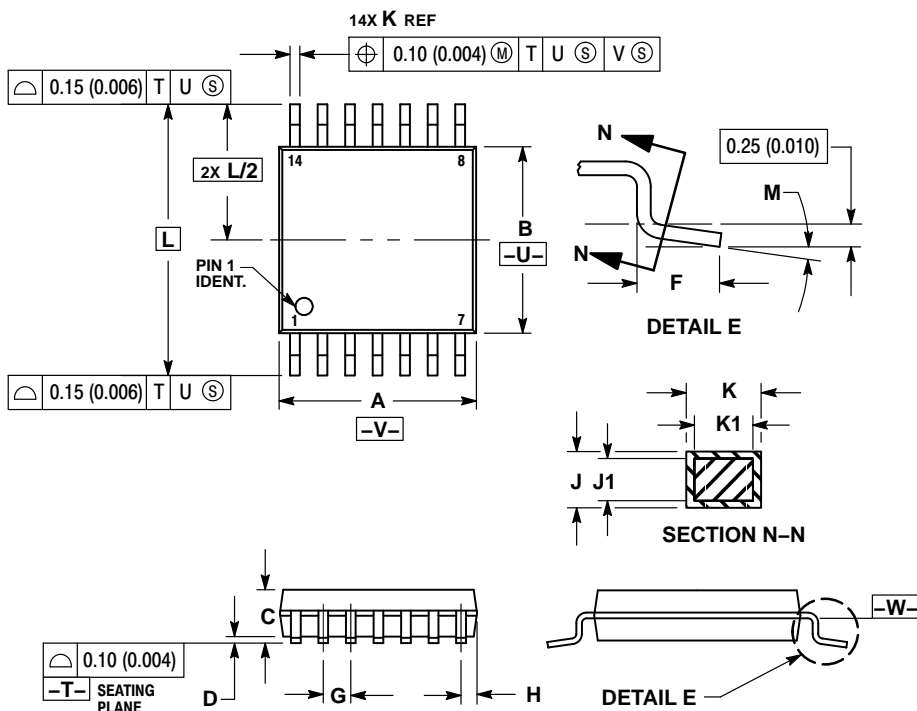
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD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

SOLDERING FOOTPRINT*
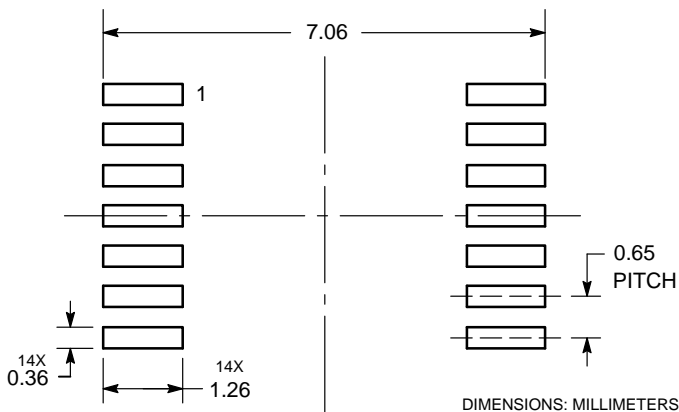
7.06

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 ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

MC74HC125A, MC74HC126A

PACKAGE DIMENSIONS
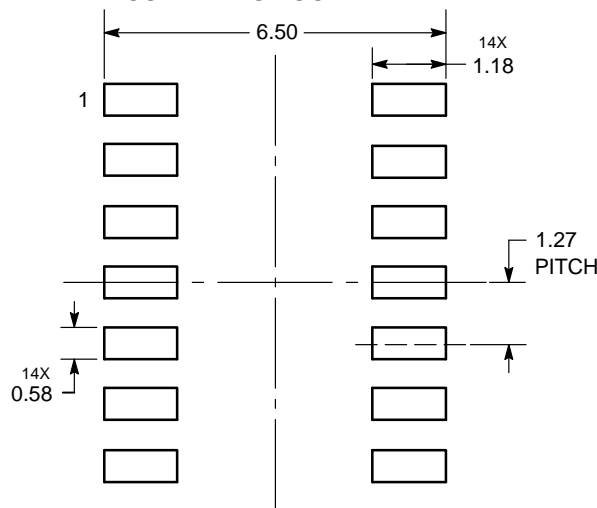
SOIC−14 NB
CASE 751A−03
ISSUE K
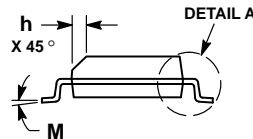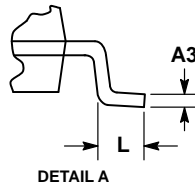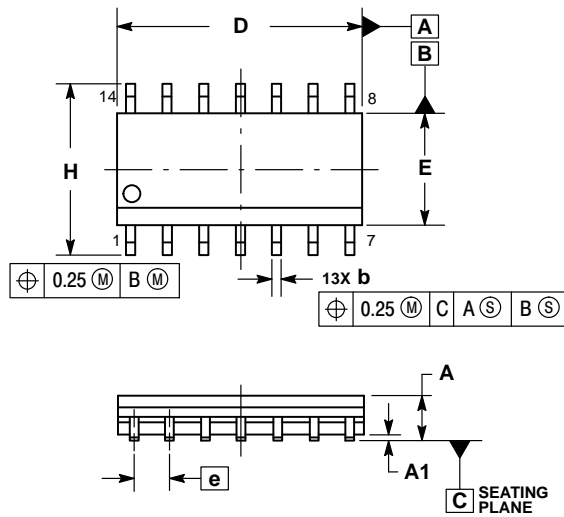
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF AT MAXIMUM MATERIAL CONDITION.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSIONS.
5. MAXIMUM 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 °

DETAIL A

SEATING PLANE

SOLDERING FOOTPRINT*

6.50

14X
1.18

1.27
PITCH

14X
0.58

DIMENSIONS: MILLIMETERS

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

MC74HC125A/D

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Components Supply Platform

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