Quad 3-State Noninverting Buffer with LSTTL Compatible Inputs

High-Performance Silicon-Gate CMOS

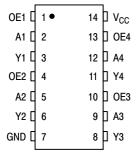
The MC74HCT125A is identical in pinout to the LS125. The device inputs are compatible with standard CMOS and LSTTL outputs.

The MC74HCT125A noninverting buffer is 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.

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. 7A Requirements
- Chip Complexity: 72 FETs or 18 Equivalent Gates
- These are Pb-Free Devices

PIN ASSIGNMENT

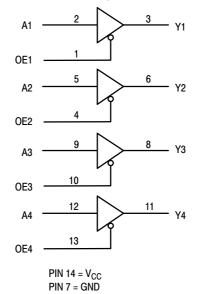


FUNCTION TABLE

HCT125A					
outs	Output				
OE	Υ				
L	Н				
L	L				
Н	Z				
	outs OE L L				

LOGIC DIAGRAM

Active-Low Output Enables

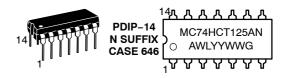




ON Semiconductor®

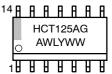
http://onsemi.com

MARKING DIAGRAMS





SOIC-14 D SUFFIX CASE 751A



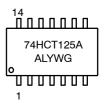


TSSOP-14 DT SUFFIX CASE 948G





SOEIAJ-14 F SUFFIX CASE 965



A = Assembly Location

L, WL = Wafer Lot Y, YY = Year W, WW = Work Week G = Pb-Free Package 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 3 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
l _{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 Plastic DIP† SOIC Package† TSSOP Package†	750 500 450	mW
T _{stg}	Storage Temperature	- 65 to + 150	°C
TL	Lead Temperature, 1 mm from Case for 10 Seconds (Plastic DIP, 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 \leq (V_{in} or V_{out}) \leq 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 Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

†Derating — Plastic DIP: – 10 mW/°C from 65° to 125°C

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)			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	(Figure 1) V _C	C = 2.0 V C = 4.5 V C = 6.0 V	0 0 0	1000 500 400	ns

DC ELECTRICAL CHARACTERISTICS (Voltages Referenced to GND)

				Gu	aranteed Li	mit	
Symbol	Parameter	Test Conditions	V _{CC} V	– 55 to 25°C	≤ 85 °C	≤ 125°C	Unit
V _{IH}	Minimum High-Level Input Voltage	$V_{\text{out}} = V_{\text{CC}} - 0.1 \text{ V}$ $ I_{\text{out}} \le 20 \mu\text{A}$	4.5 to 5.5	2.0	2.0	2.0	V
V _{IL}	Maximum Low-Level Input Voltage	$V_{out} = 0.1 \text{ V}$ $ I_{out} \le 20 \mu\text{A}$	4.5 to 5.5	0.8	0.8	0.8	V
V _{OH}	Minimum High-Level Output Voltage	$\begin{split} &V_{in} = V_{IH} \\ & I_{out} \leq 20 \; \mu A \\ &V_{in} = V_{IH} & I_{out} \leq 6.0 \; mA \end{split}$	4.5 5.5 4.5	4.4 5.4 3.98	4.4 5.4 3.84	4.4 5.4 3.7	V
V _{OL}	Maximum Low-Level Output Voltage	$V_{in} = V_{IL}$ $ I_{out} \le 20 \mu A$	4.5 5.5	0.1 0.1	0.1 0.1	0.1 0.1	٧
I _{in}	Maximum Input Leakage Current	$V_{in} = V_{IL}$ $ I_{out} \le 6.0 \text{ mA}$ $V_{in} = V_{CC} \text{ or GND}$	4.5 5.5	0.26 ± 0.1	0.33 ± 1.0	0.4 ± 1.0	μΑ
I _{OZ}	Maximum Three-State Leakage Current	Output in High-Impedance State $V_{in} = V_{IL} \text{ or } V_{IH}$ $V_{out} = V_{CC} \text{ or GND}$	5.5	± 0.5	± 5.0	± 10	μΑ
I _{CC}	Maximum Quiescent Supply Current (per Package)	$V_{in} = V_{CC}$ or GND $I_{out} = 0 \mu A$	5.5	4.0	40	160	μΑ

AC ELECTRICAL CHARACTERISTICS (C_L = 50 pF, Input t_f = t_f = 6.0 ns, V_{CC} = 5.0 V \pm 10%)

			Guaranteed Limit			
Symbol	Parameter	V _{CC} V	– 55 to 25°C	≤ 85 °C	≤ 125°C	Unit
t _{PLH} , t _{PHL}	Maximum Propagation Delay, Input A to Output Y (Figures 1 and 3)	5.0	18	23	27	ns
t _{PLZ} , t _{PHZ}	Maximum Propagation Delay, Output Enable to Y (Figures 2 and 4)	5.0	24	30	36	ns
t _{PZL} , t _{PZH}	Maximum Propagation Delay, Output Enable to Y (Figures 2 and 4)	5.0	18	23	27	ns
t _{TLH} , t _{THL}	Maximum Output Transition Time, Any Output (Figures 1 and 3)	5.0	12	15	18	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 _C	_C = 5.0 V	

Power Dissipation Capacitance (Per Buffer)* *Used to determine the no-load dynamic power consumption: $P_D = C_{PD} V_{CC}^2 f + I_{CC} V_{CC}$.

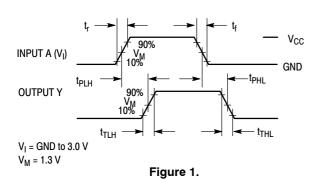
ORDERING INFORMATION

Device	Package	Shipping [†]
MC74HCT125ANG	PDIP-14 (Pb-Free)	25 Units / Rail
MC74HCT125ADG	SOIC-14	55 Units / Rail
MC74HCT125ADR2G	(Pb-Free)	2500 / Tape & Reel
MC74HCT125ADTG	TSSOP-14*	96 Units / Rail
MC74HCT125ADTR2G	TSSOP-14*	2500 / Tape & Reel
MC74HCT125AFG		
MC74HCT125AFELG	(Pb-Free)	2000 / 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.

*This package is inherently Pb-Free.

SWITCHING WAVEFORMS



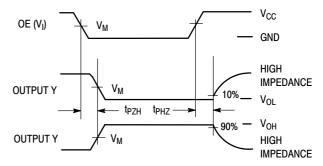
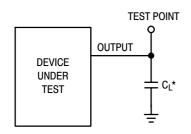
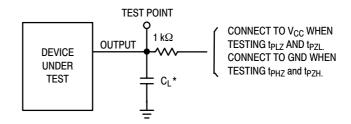


Figure 2.

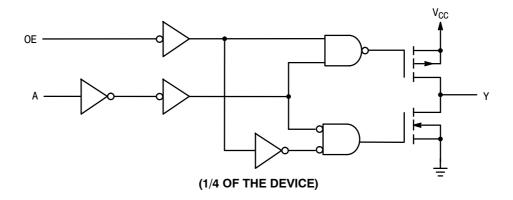




*Includes all probe and jig capacitance

Figure 3. Test Circuit

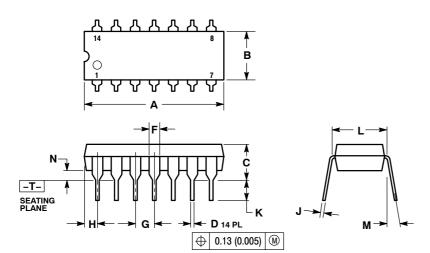
Figure 4. Test Circuit



^{*}Includes all probe and jig capacitance

PACKAGE DIMENSIONS

PDIP-14 CASE 646-06 **ISSUE P**

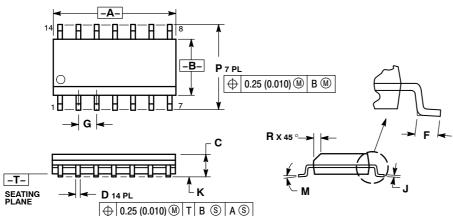


- NOTES:
 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
 4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
 5. ROUNDED CORNERS OPTIONAL.

	INC	HES	MILLIM	IETERS	
DIM	MIN	MAX	MIN MAX		
Α	0.715	0.770	18.16	19.56	
В	0.240	0.260	6.10	6.60	
С	0.145	0.185	3.69	4.69	
D	0.015	0.021	0.38	0.53	
F	0.040	0.070	1.02	1.78	
G	0.100 BSC		2.54	BSC	
Н	0.052	0.095	1.32	2.41	
J	0.008	0.015	0.20	0.38	
K	0.115	0.135	2.92	3.43	
L	0.290	0.310	7.37	7.87	
М		10 °		10 °	
N	0.015	0.039	0.38	1.01	

PACKAGE DIMENSIONS

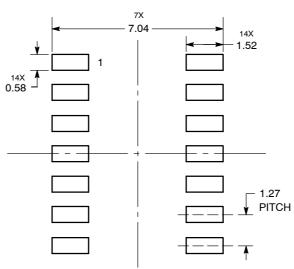
SOIC-14 CASE 751A-03 **ISSUE J**



- NOTES:
 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: MILLIMETER.
 3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
 4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
 5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION, ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

	MILLIN	IETERS	INC	HES
DIM	MIN	MAX	MIN	MAX
Α	8.55	8.75	0.337	0.344
В	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC		0.050 BSC	
۲	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
М	0 °	7°	0 °	7°
Р	5.80	6.20	0.228	0.244
R	0.25	0.50	0.010	0.019

SOLDERING FOOTPRINT*

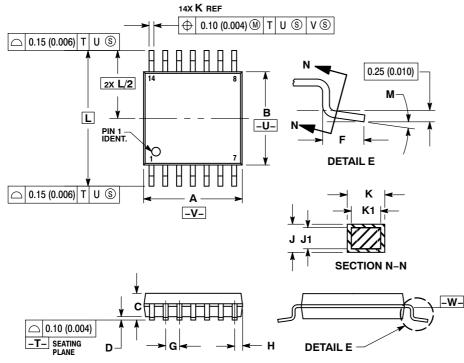


DIMENSIONS: MILLIMETERS

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

PACKAGE DIMENSIONS

TSSOP-14 CASE 948G-01 **ISSUE B**

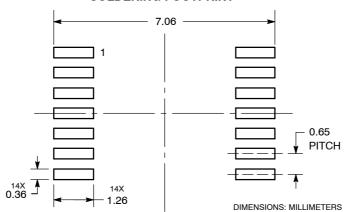


- NOTES:
 1. DIMENSIONING AND TOLERANCING PER
 - DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 CONTROLLING DIMENSION: MILLIMETER.
 DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.
 MOLD FLASH OR GATE BURRS SHALL NOT EXCEPT A 16 (A ORG) DED SIDE.
 - EXCEED 0.15 (0.006) PER SIDE.

 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
- 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-.

	MILLIN	IETERS	INC	HES	
DIM	MIN	MAX	MIN	MAX	
Α	4.90	5.10	0.193	0.200	
В	4.30	4.50	0.169	0.177	
С		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		
Н	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		
М	0 °	8 °	0 °	8 °	

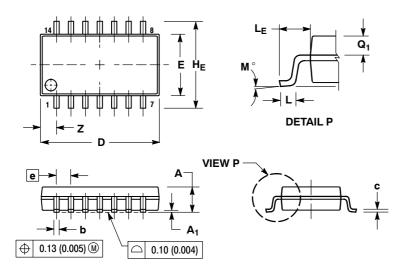
SOLDERING FOOTPRINT*



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

PACKAGE DIMENSIONS

SOEIAJ-14 CASE 965-01 **ISSUE B**



NOTES:

- DIMENSIONING AND TOLERANCING PER ANSI
- 7/14.5M, 1982.
 2. CONTROLLING DIMENSION: MILLIMETER.
 3. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS AND ARE MEASURED AT THE PARTING LINE. MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
- TERMINAL NUMBERS ARE SHOWN FOR
- REFERENCE ONLY.

 THE LEAD WIDTH DIMENSION (b) DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE LEAD WIDTH DIMENSION AT MAXIMUM MATERIAL CONDITION.

 DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT. MINIMUM SPACE
 BETWEEN PROTRUSIONS AND ADJACENT LEAD

	MILLIN	IETERS	INC	HES	
DIM	MIN	MAX	MIN	MAX	
Α		2.05		0.081	
A ₁	0.05	0.20	0.002	0.008	
b	0.35	0.50	0.014	0.020	
С	0.10	0.20	0.004	0.008	
D	9.90	10.50	0.390	0.413	
Е	5.10	5.45	0.201	0.215	
е	1.27	BSC	0.050 BSC		
HE	7.40	8.20	0.291	0.323	
L	0.50	0.85	0.020	0.033	
LE	1.10	1.50	0.043	0.059	
M	0 °	10°	0 °	10°	
Q ₁	0.70	0.90	0.028	0.035	
Z		1.42		0.056	

ON Semiconductor and un are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice on semiconductor and war engineer trademarks of semiconductor components industries, Ite (SciLLC) solitate services are injective to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC 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. "Typical" parameters which may be provided in SCILLC 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. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC 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 SCILLC was negligent regarding the design or manufacture of the part. SCILLC 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:

Literature Distribution Center for ON Semiconductor P.O. Box 5163, Denver, Colorado 80217 USA Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada

Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free USA/Canada

Europe, Middle East and Africa Technical Support: Phone: 421 33 790 2910 Japan Customer Focus Center

Phone: 81-3-5773-3850

ON Semiconductor Website: www.onsemi.com

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative