

Quad 2-Input AND Gate

High-Performance Silicon-Gate CMOS

MC74AC08, MC74ACT08

Features

- Outputs Source/Sink 24 mA
- 'ACT08 Has TTL Compatible Inputs
- NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable
- These are Pb-Free Devices

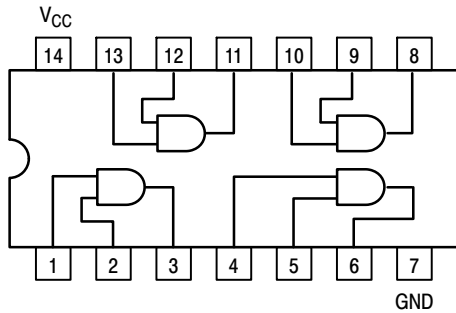
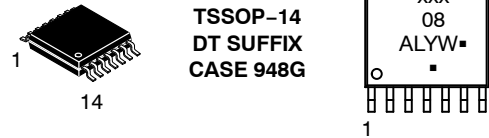
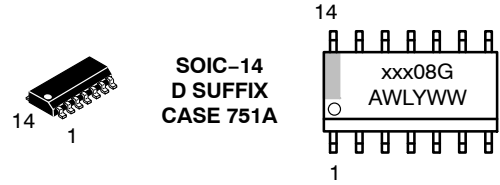


Figure 1. Pinout: 14-Lead Packages Conductors (Top View)

MARKING DIAGRAMS



xxx = AC or ACT
A = Assembly Location
WL or L = Wafer Lot
Y = Year
WW or 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 5 of this data sheet.

MC74AC08, MC74ACT08

MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{CC}	DC Supply Voltage	-0.5 to +7.0	V
V _I	DC Input Voltage	-0.5 ≤ V _I ≤ V _{CC} + 0.5	V
V _O	DC Output Voltage (Note 1)	-0.5 ≤ V _O ≤ V _{CC} + 0.5	V
I _{IK}	DC Input Diode Current	±20	mA
I _{OK}	DC Output Diode Current	±50	mA
I _O	DC Output Sink/Source Current	±50	mA
I _{CC}	DC Supply Current per Output Pin	±50	mA
I _{GND}	DC Ground Current per Output Pin	±50	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
θ _{JA}	Thermal Resistance (Note 2)	SOIC TSSOP 125 170	°C/W
P _D	Power Dissipation in Still Air at 85°C	SOIC TSSOP 125 170	mW
MSL	Moisture Sensitivity	Level 1	
F _R	Flammability Rating	Oxygen Index: 30% – 35% UL 94 V-0 @ 0.125 in	
V _{ESD}	ESD Withstand Voltage	Human Body Model (Note 3) Machine Model (Note 4) Charged Device Model (Note 5) > 2000 > 200 > 1000	V
I _{Latch-Up}	Latch-Up Performance	Above V _{CC} and Below GND at 85°C (Note 6)	±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. I_O absolute maximum rating must be observed.
2. The package thermal impedance is calculated in accordance with JESD51-7.
3. Tested to EIA/JESD22-A114-A.
4. Tested to EIA/JESD22-A115-A.
5. Tested to JESD22-C101-A.
6. Tested to EIA/JESD78.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Typ	Max	Unit	
V _{CC}	Supply Voltage	'AC	2.0	5.0	6.0	V
		'ACT	4.5	5.0	5.5	
V _{in} , V _{out}	DC Input Voltage, Output Voltage (Ref. to GND)	0	-	V _{CC}	V	
t _r , t _f	Input Rise and Fall Time (Note 1) 'AC Devices except Schmitt Inputs	V _{CC} @ 3.0 V	-	150	-	ns/V
		V _{CC} @ 4.5 V	-	40	-	
		V _{CC} @ 5.5 V	-	25	-	
t _r , t _f	Input Rise and Fall Time (Note 2) 'ACT Devices except Schmitt Inputs	V _{CC} @ 4.5 V	-	10	-	ns/V
		V _{CC} @ 5.5 V	-	8.0	-	
T _J	Junction Temperature (PDIP)	-	-	140	°C	
T _A	Operating Ambient Temperature Range	-40	25	85	°C	
I _{OH}	Output Current – High	-	-	-24	mA	
I _{OL}	Output Current – Low	-	-	24	mA	

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.

1. V_{in} from 30% to 70% V_{CC}; see individual Data Sheets for devices that differ from the typical input rise and fall times.
2. V_{in} from 0.8 V to 2.0 V; see individual Data Sheets for devices that differ from the typical input rise and fall times.

MC74AC08, MC74ACT08

DC CHARACTERISTICS

Symbol	Parameter	Conditions	V _{CC} (V)	74AC		74AC		Unit
				T _A = +25°C		T _A = -40°C to +85°C		
				Typ	Guaranteed Limits			
V _{IH}	Minimum High Level Input Voltage	V _{OUT} = 0.1 V or V _{CC} - 0.1 V	3.0	1.5	2.1	2.1	V	
			4.5	2.25	3.15	3.15		
			5.5	2.75	3.85	3.85		
V _{IL}	Maximum Low Level Input Voltage	V _{OUT} = 0.1 V or V _{CC} - 0.1 V	3.0	1.5	0.9	0.9	V	
			4.5	2.25	1.35	1.35		
			5.5	2.75	1.65	1.65		
V _{OH}	Minimum High Level Output Voltage	I _{OUT} = -50 μA	3.0	2.99	2.9	2.9	V	
			4.5	4.49	4.4	4.4		
			5.5	5.49	5.4	5.4		
			V _{IN} = V _{IL} or V _{IH} (Note 3)					
		-12 mA	3.0	-	2.56	2.46	V	
		-24 mA	4.5	-	3.86	3.76		
		-24 mA	5.5	-	4.86	4.76		
V _{OL}	Maximum Low Level Output Voltage	V _{IN} = V _{IL} or V _{IH} (Note 3)	3.0	-	0.36	0.44	V	
			4.5	-	0.36	0.44		
			5.5	-	0.36	0.44		
			I _{OL}					
		12 mA						
		24 mA						
		24 mA						
I _{IN}	Maximum Input Leakage Current	V _I = V _{CC} , GND	5.5	-	±0.1	±1.0	μA	
I _{OLD}	Minimum Dynamic (Note 4) Output Current	V _{OLD} = 1.65 V Max	5.5	-	-	75	mA	
I _{OHD}		V _{OHD} = 3.85 V Min	5.5	-	-	-75	mA	
I _{CC}	Maximum Quiescent Supply Current	V _{IN} = V _{CC} or GND	5.5	-	4.0	40	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.

NOTE: I_{IN} and I_{CC} @ 3.0 V are guaranteed to be less than or equal to the respective limit @ 5.5 V V_{CC}.

3. All outputs loaded; thresholds on input associated with output under test.

4. Maximum test duration 2.0 ms, one output loaded at a time.

AC CHARACTERISTICS

Symbol	Parameter	V _{CC} (V) (Note5)	74AC			74AC		Unit	Fig. No.
			T _A = +25°C C _L = 50 pF			T _A = -40°C to +85°C C _L = 50 pF			
			Min	Typ	Max	Min	Max		
t _{PLH}	Propagation Delay	3.3	1.5	7.5	9.5	1.0	10.0	ns	3-5
		5.0	1.5	5.5	7.5	1.0	8.5		
t _{PHL}	Propagation Delay	3.3	1.5	7.0	8.5	1.0	9.0	ns	3-5
		5.0	1.5	5.5	7.0	1.0	7.5		

5. Voltage Range 3.3 V is 3.3 V ±0.3 V.

Voltage Range 5.0 V is 5.0 V ±0.5 V.

MC74AC08, MC74ACT08

DC CHARACTERISTICS

Symbol	Parameter	Conditions	V _{CC} (V)	74ACT		74ACT		Unit
				T _A = +25°C		T _A = -40°C to +85°C		
				Typ	Guaranteed Limits			
V _{IH}	Minimum High Level Input Voltage	V _{OUT} = 0.1 V or V _{CC} - 0.1 V	4.5	1.5	2.0	2.0	V	
			5.5	1.5	2.0	2.0		
V _{IL}	Maximum Low Level Input Voltage	V _{OUT} = 0.1 V or V _{CC} - 0.1 V	4.5	1.5	0.8	0.8	V	
			5.5	1.5	0.8	0.8		
V _{OH}	Minimum High Level Output Voltage	I _{OUT} = -50 μA	4.5	4.49	4.4	4.4	V	
			5.5	5.49	5.4	5.4		
		V _{IN} = V _{IL} or V _{IH} (Note 6)	-24 mA	4.5	-	3.86	3.76	V
			-24 mA	5.5	-	4.86	4.76	
V _{OL}	Maximum Low Level Output Voltage	I _{OUT} = 50 μA	4.5	0.001	0.1	0.1	V	
			5.5	0.001	0.1	0.1		
		V _{IN} = V _{IL} or V _{IH} (Note 6)	24 mA	4.5	-	0.36	0.44	V
			24 mA	5.5	-	0.36	0.44	
I _{IN}	Maximum Input Leakage Current	V _I = V _{CC} , GND	5.5	-	±0.1	±1.0	μA	
ΔI _{CCCT}	Additional Max. I _{CC} /Input	V _I = V _{CC} - 2.1 V	5.5	0.6	-	1.5	mA	
I _{OLD}	Minimum Dynamic (Note 7) Output Current	V _{OLD} = 1.65 V Max	5.5	-	-	75	mA	
I _{OHD}		V _{OHD} = 3.85 V Min	5.5	-	-	-75	mA	
I _{CC}	Maximum Quiescent Supply Current	V _{IN} = V _{CC} or GND	5.5	-	4.0	40	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.

6. All outputs loaded; thresholds on input associated with output under test.

7. Maximum test duration 2.0 ms, one output loaded at a time.

AC CHARACTERISTICS

Symbol	Parameter	V _{CC} (V) (Note 8)	74ACT			74ACT		Unit	Fig. No.
			T _A = +25°C C _L = 50 pF			T _A = -40°C to +85°C C _L = 50 pF			
			Min	Typ	Max	Min	Max		
t _{PLH}	Propagation Delay	5.0	1.0	-	9.0	1.0	10.0	ns	3-5
t _{PHL}	Propagation Delay	5.0	1.0	-	9.0	1.0	10.0	ns	3-5

8. Voltage Range 5.0 V is 5.0 V ±0.5 V.

CAPACITANCE

Symbol	Parameter	Test Conditions	Value Typ	Unit
C _{IN}	Input Capacitance	V _{CC} = 5.0 V	4.5	pF
C _{PD}	Power Dissipation Capacitance	V _{CC} = 5.0 V	20	pF

MC74AC08, MC74ACT08

ORDERING INFORMATION

Device	Package	Shipping†
MC74AC08DG	SOIC-14 (Pb-Free)	55 Units / Rail
MC74AC08DR2G	SOIC-14 (Pb-Free)	2500 / Tape & Reel
NLV74AC08DR2G*	SOIC-14 (Pb-Free)	2500 / Tape & Reel
MC74AC08DTR2G	TSSOP-14 (Pb-Free)	2500 / Tape & Reel
MC74ACT08DG	SOIC-14 (Pb-Free)	55 Units / Rail
MC74ACT08DR2G	SOIC-14 (Pb-Free)	2500 / Tape & Reel
MC74ACT08DTR2G	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.

MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



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.

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*



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.

GENERIC MARKING DIAGRAM*



- XXXXXX = 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

DOCUMENT NUMBER:	98ASB42565B	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	SOIC-14 NB	PAGE 1 OF 2

onsemi and onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi 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. onsemi does not convey any license under its patent rights nor the rights of others.

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

DOCUMENT NUMBER:	98ASB42565B	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	SOIC-14 NB	PAGE 2 OF 2

onsemi and **ONSEMI** are trademarks of Semiconductor Components Industries, LLC dba **onsemi** or its subsidiaries in the United States and/or other countries. **onsemi** reserves the right to make changes without further notice to any products herein. **onsemi** makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does **onsemi** 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. **onsemi** does not convey any license under its patent rights nor the rights of others.

onsemi, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** 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. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** 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. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** 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 **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

Technical Library: www.onsemi.com/design/resources/technical-documentation
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