

# Quad 2-Input AND Gate 74AC08, 74ACT08

#### **Description**

The AC08/ACT08 contains four, 2-input AND gates.

#### **Features**

- I<sub>CC</sub> Reduced by 50% on 74AC Only
- Outputs Source/Sink 24 mA

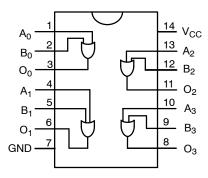


Figure 1. Connection Diagram

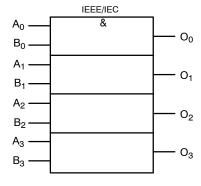


Figure 2. Logic Symbol

## **PIN DESCRIPTION**

Pin Name	Description		
A <sub>n</sub> , B <sub>n</sub>	Inputs		
O <sub>n</sub>	Outputs		

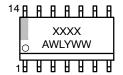






# MARKING DIAGRAM

SOIC-14



XXXX = Specific Device Code A = Assembly Location WL = Wafer Lot

Y = Year WW = Work Week G = Pb-Free Package

#### TSSOP-14 WB



XXX = Specific Device Code
A = Assembly Location

L = Wafer Lot
Y = Year
W = Work Week
= 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.

#### **ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Rating
V <sub>CC</sub>	Supply Voltage	-0.5 V to +7.0 V
I <sub>IK</sub>	DC Input Diode Current $V_I = -0.5 \text{ V}$	–20 mA
	$V_{I} = V_{CC} + 0.5$	+20 mA
VI	DC Input Voltage	-0.5 V to V <sub>CC</sub> + 0.5 V
l <sub>OK</sub>	DC Output Diode Current $V_0 = -0.5 \text{ V}$	–20 mA
	$V_{O} = V_{CC} + 0.5 V$	+20 mA
Vo	DC Output Voltage	-0.5 V to V <sub>CC</sub> + $0.5$ V
Io	DC Output Source or Sink Current	±50 mA
I <sub>CC</sub> or I <sub>GND</sub>	DC V <sub>CC</sub> or Ground Current per Output Pin	±50 mA
T <sub>STG</sub>	Storage Temperature	−65°C to +150°C
$T_J$	Junction Temperature	140°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	Rating
VCC	Supply Voltage AC	2.0 V to 6.0 V
	ACT	4.5 V to 5.5 V
VI	Input Voltage	0 V to V <sub>CC</sub>
V <sub>O</sub>	Output Voltage	0 V to V <sub>CC</sub>
T <sub>A</sub>	Operating Temperature	-40°C to +85°C
ΔV / Δt	Minimum Input Edge Rate, AC Devices: V <sub>IN</sub> from 30% to 70% of V <sub>CC</sub> , V <sub>CC</sub> @ 3.3 V, 4.5 V, 5.5 V	125 mV/ns
ΔV / Δt	Minimum Input Edge Rate, ACT Devices: V <sub>IN</sub> from 0.8 V to 2.0 V, V <sub>CC</sub> @ 4.5 V, 5.5 V	125 mV/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 FOR AC

				T <sub>A</sub> = +	25°C	T <sub>A</sub> = -40°C to +85°C	
Symbol	Parameter	V <sub>cc</sub> (V)	Conditions	Тур.	Gı	uaranteed Limits	Units
V <sub>IH</sub>	Minimum HIGH Level Input Voltage	3.0	V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> – 0.1 V	1.5	2.1	2.1	V
		4.5		2.25	3.15	3.15	
		5.5		2.75	3.85	3.85	
V <sub>IL</sub>	Maximum LOW Level Input Voltage	3.0	V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> - 0.1 V	1.5	0.9	0.9	V
		4.5		2.25	1.35	1.35	
		5.5		2.75	1.65	1.65	
V <sub>OH</sub>	Minimum HIGH Level Output Voltage	3.0	I <sub>OUT</sub> = -50 μA	2.99	2.9	2.9	V
		4.5		4.49	4.4	4.4	
		5.5		5.49	5.4	5.4	
		3.0	$V_{IN} = V_{IL}$ or $V_{IH}$ , $I_{OH} = -12$ mA	-	2.56	2.46	
		4.5	$V_{IN} = V_{IL}$ or $V_{IH}$ , $I_{OH} = -24$ mA	-	3.86	3.76	
		5.5	$V_{IN} = V_{IL}$ or $V_{IH}$ , $I_{OH} = -24$ mA (Note 1)	_	4.86	4.76	
V <sub>OL</sub>	Maximum LOW Level Output Voltage	3.0	I <sub>OUT</sub> = 50 μA	0.002	0.1	0.1	V
		4.5		0.001	0.1	0.1	
		5.5		0.001	0.1	0.1	
		3.0	$V_{IN} = V_{IL}$ or $V_{IH}$ , $I_{OL} = 12$ mA	-	0.36	0.44	
		4.5	$V_{IN} = V_{IL}$ or $V_{IH}$ , $I_{OL} = 24$ mA	-	0.36	0.44	
		5.5	$V_{IN} = V_{IL}$ or $V_{IH}$ , $I_{OL} = 24$ mA (Note 1)	-	0.36	0.44	
I <sub>IN</sub> (Note 3)	Maximum Input Leakage Current	5.5	V <sub>I</sub> = V <sub>CC</sub> , GND	-	±0.1	±1.0	μΑ
I <sub>OLD</sub>	Minimum Dynamic Output Current	5.5	V <sub>OLD</sub> = 1.65 V Max.	-	_	75	mA
I <sub>OHD</sub>	(Note 2)	5.5	V <sub>OHD</sub> = 3.85 V Min.	-	-	-75	mA
I <sub>CC</sub> (Note 3)	Maximum Quiescent Supply Current	5.5	V <sub>IN</sub> = V <sub>CC</sub> or GND	-	2.0	20.0	μΑ

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.

- 1. All outputs loaded; thresholds on input associated with output under test.
- Maximum test duration 2.0 ms, one output loaded at a time.
   I<sub>IN</sub> and I<sub>CC</sub> @ 3.0 V are guaranteed to be less than or equal to the respective limit @ 5.5 V V<sub>CC</sub>.

# DC ELECTRICAL CHARACTERISTICS FOR ACT

				T <sub>A</sub> = +	-25°C	$T_A = -40^{\circ}C$ to $+85^{\circ}C$	
Symbol	Parameter	V <sub>cc</sub> (V)	Conditions	Typ. Guaranteed Limits		uaranteed Limits	Units
V <sub>IH</sub>	Minimum HIGH Level Input Voltage	4.5	V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> – 0.1 V	1.5	2.0	2.0	V
		5.5		1.5	2.0	2.0	
$V_{IL}$	Maximum LOW Level Input Voltage	4.5	V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> – 0.1 V	1.5	0.8	0.8	V
		5.5		1.5	0.8	0.8	
V <sub>OH</sub>	Minimum HIGH Level Output Voltage	4.5	I <sub>OUT</sub> = -50 μA	4.49	4.4	4.4	V
		5.5		5.49	5.4	5.4	
		4.5	$V_{IN} = V_{IL}$ or $V_{IH}$ , $I_{OH} = -24$ mA	-	3.86	3.76	
		5.5	V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> , I <sub>OH</sub> = -24 mA (Note 4)	-	4.86	4.76	
V <sub>OL</sub>	Maximum LOW Level Output Voltage	4.5	I <sub>OUT</sub> = 50 μA	0.001	0.1	0.1	V
		5.5		0.001	0.1	0.1	
		4.5	$V_{IN} = V_{IL}$ or $V_{IH}$ , $I_{OL} = 24$ mA	-	0.36	0.44	
		5.5	V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> , I <sub>OL</sub> = 24 mA (Note 4)	-	0.36	0.44	
I <sub>IN</sub>	Maximum Input Leakage Current	5.5	V <sub>I</sub> = V <sub>CC</sub> , GND	-	±0.1	±1.0	μΑ
I <sub>CCT</sub>	Maximum I <sub>CC</sub> /Input	5.5	V <sub>I</sub> = V <sub>CC</sub> - 2.1 V	0.6	-	1.5	mA
I <sub>OLD</sub>	Minimum Dynamic Output Current	5.5	V <sub>OLD</sub> = 1.65 V Max.	-	-	75	mA
I <sub>OHD</sub>	(Note 5)	5.5	V <sub>OHD</sub> = 3.85 V Min.	-	-	-75	mA
I <sub>CC</sub>	Maximum Quiescent Supply Current	5.5	V <sub>IN</sub> = V <sub>CC</sub> or GND	-	4.0	40.0	μΑ

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.

#### AC ELECTRICAL CHARACTERISTICS FOR AC

		V <sub>CC</sub> (V)		T <sub>A</sub> = +25°C C <sub>L</sub> = 50 pF		T <sub>A</sub> = -40°C C <sub>L</sub> =	C to +85°C 50 pF	
Symbol	Parameter	(Note 6)	Min.	Тур.	Max.	Min.	Max.	Units
t <sub>PLH</sub>	Propagation Delay	3.3	1.5	7.5	9.5	1.0	10.0	ns
		5.0	1.5	5.5	7.5	1.0	8.5	!
t <sub>PHL</sub>	Propagation Delay	3.3	1.5	7.0	8.5	1.0	9.0	ns
		5.0	1.5	5.5	7.0	1.0	7.5	

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. Voltage range 3.3 is 3.3 V ±0.3 V. Voltage range 5.0 is 5.0 V ±0.5 V.

#### AC ELECTRICAL CHARACTERISTICS FOR ACT

		V <sub>CC</sub> (V)	T <sub>A</sub> = +25°C C <sub>L</sub> = 50 pF		T <sub>A</sub> = -40°C to +85°C C <sub>L</sub> = 50 pF			
Symbol	Parameter	(Note 7)	Min.	Тур.	Max.	Min.	Max.	Units
t <sub>PLH</sub>	Propagation Delay	5.0	1.0	6.5	9.0	1.0	10.0	ns
t <sub>PHL</sub>	Propagation Delay	5.0	1.0	6.5	9.0	1.0	10.0	ns

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.

<sup>4.</sup> All outputs loaded; thresholds on input associated with output under test.

<sup>5.</sup> Maximum test duration 2.0 ms, one output loaded at a time.

<sup>7.</sup> Voltage Range 5.0 is 5.0 V  $\pm$ 0.5 V.

# **CAPATICANCE**

Symbol	Parameter	Conditions	Тур.	Units
C <sub>IN</sub>	Input Capacitance	V <sub>CC</sub> = OPEN	4.5	pF
C <sub>PD</sub>	Power Dissipation Capacitance	V <sub>CC</sub> = 5.0 V	30.0	pF

# **ORDERING INFORMATION**

Order Number	Device Marking	Package	Shipping (Qty / Packing) <sup>†</sup>
74AC08MTCX	AC 08	TSSOP-14 WB (Pb-Free/Halogen Free)	2500 / Tape & Reel
74AC08SCX	AC08	SOIC-14 (Pb-Free/Halogen Free)	2500 / Tape & Reel
74ACT08MTC	ACT 08	TSSOP-14 WB (Pb-Free/Halogen Free)	96 / Tube
74ACT08MTCX	ACT 08	TSSOP-14 WB (Pb-Free/Halogen Free)	2500 / Tape & Reel
74ACT08SC	ACT08	SOIC-14 NB (Pb-Free/Halogen Free)	55 / Tube
74ACT08SCX	ACT08	SOIC-14 (Pb-Free/Halogen Free)	2500 / Tape & Reel

<sup>†</sup>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.

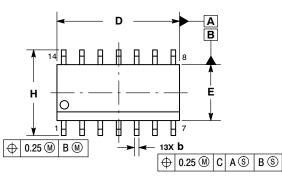


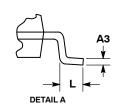


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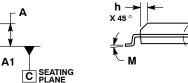
SOIC-14 NB CASE 751A-03 ISSUE L

**DATE 03 FEB 2016** 





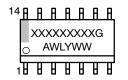




- NOTES:
  1. DIMENSIONING AND TOLERANCING PER
  - ASME Y14.5M, 1994.
    CONTROLLING DIMENSION: MILLIMETERS.
- DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF AT
- MAXIMUM MATERIAL CONDITION.
  DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSIONS.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

	MILLIN	IETERS	INCHES	
DIM	MIN	MAX	MIN	MAX
Α	1.35	1.75	0.054	0.068
A1	0.10	0.25	0.004	0.010
АЗ	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
Е	3.80	4.00	0.150	0.157
е	1.27	BSC	0.050	BSC
Н	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°

#### **GENERIC MARKING DIAGRAM\***

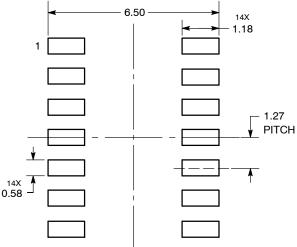


XXXXX = Specific Device Code Α = Assembly Location

WL = Wafer Lot Υ = Year WW = Work Week = 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.

# **SOLDERING FOOTPRINT\*** - 6.50 -



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.

#### **STYLES ON PAGE 2**

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# SOIC-14 CASE 751A-03 ISSUE L

# DATE 03 FEB 2016

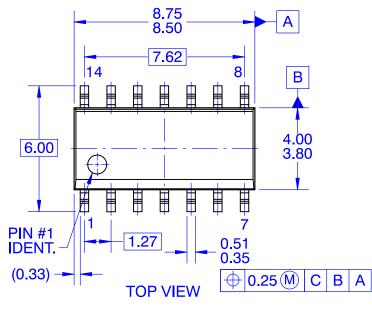
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STYLE 5: PIN 1. COMMON CATHODE 2. ANODE/CATHODE 3. ANODE/CATHODE 4. ANODE/CATHODE 5. ANODE/CATHODE 6. NO CONNECTION 7. COMMON ANODE 8. COMMON CATHODE 9. ANODE/CATHODE 10. ANODE/CATHODE 11. ANODE/CATHODE 12. ANODE/CATHODE 13. NO CONNECTION 14. COMMON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

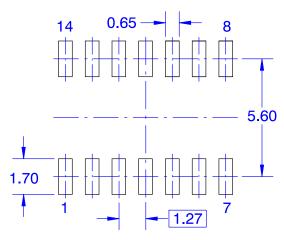
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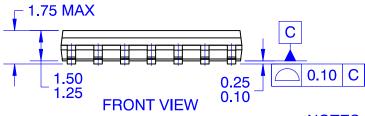


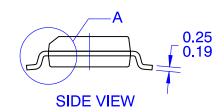
**DATE 30 SEP 2016** 





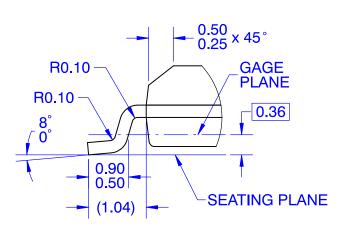
LAND PATTERN RECOMMENDATION





## **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
- LAND PATTERN STANDARD: SOIC127P600X145-14M
- E. CONFORMS TO ASME Y14.5M, 2009

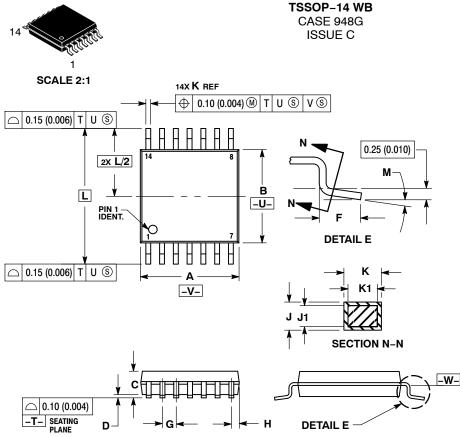


DETAIL A SCALE 16:1

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**DATE 17 FEB 2016** 

- NOTES.

  1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

  2. CONTROLLING DIMENSION: MILLIMETER.

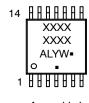
  3. DIMENSION A DOES NOT INCLUDE MOLD
- FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
  DIMENSION B DOES NOT INCLUDE
- INTERLEAD FLASH OR PROTRUSION.
  INTERLEAD FLASH OR PROTRUSION SHALL
- INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) 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 DEFERENCE ONLY
- REFERENCE ONLY.
  DIMENSION A AND B ARE TO BE
  DETERMINED AT DATUM PLANE -W-.

	MILLIN	IETERS	INCHES	
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 °

#### **GENERIC MARKING DIAGRAM\***



= Assembly Location

= Wafer Lot V = 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.

PLANE	ם	-7GF	— <b>4</b>   F—	n DETAILE —
	sc	LDERING F	OOTPRINT	
-	<b>-</b>	7.0	6 ———	
	1		[	
			[ [	
— <u>E</u>	<u> </u>			
, [			] <del>-</del> [	0.65 PITCH
14X + [		14X	-[	<del></del>
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DESCRIPTION:	TSSOP-14 WB		PAGE 1 OF 1	

**DIMENSIONS: MILLIMETERS** 

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