MC74AC08, MC74ACT08

Quad 2-Input AND Gate

- Outputs Source/Sink 24 mA
- ′ACT08 Has TTL Compatible Inputs
- Pb−Free Packages are Available

ON Semiconductor™

http://onsemi.com

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
DC Supply Voltage (Referenced to GND)	V_{CC}	−0.5 to +7.0	V
DC Input Voltage (Referenced to GND)	V_{in}	−0.5 to V_{CC} +0.5	V
DC Output Voltage (Referenced to GND)	V_{out}	−0.5 to V_{CC} +0.5	V
DC Input Current, per Pin	I_{in}	±20	mA
DC Output Sink/Source Current, per Pin	I_{out}	±50	mA
DC V_{CC} or GND Current per Output Pin	I_{CC}	±50	mA
Storage Temperature	T_{stg}	−65 to +150	°C

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

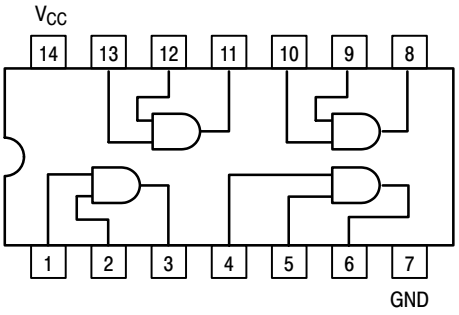
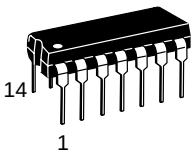
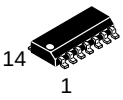


Figure 1. Pinout: 14−Lead Packages Conductors
(Top View)

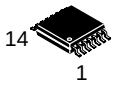
*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



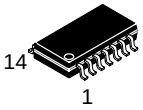
PDIP−14
N SUFFIX
CASE 646



SO−14
D SUFFIX
CASE 751A



TSSOP−14
DT SUFFIX
CASE 948G



SOEIAJ−14
M SUFFIX
CASE 965

ORDERING INFORMATION

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

DEVICE MARKING INFORMATION

See general marking information in the device marking section on page 5 of this data sheet.

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

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.

DC CHARACTERISTICS

Symbol	Parameter	Conditions	V_{CC} (V)	74AC T_A = +25°C Typ	74AC T_A = −40°C to +85°C Guaranteed Limits		Unit
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) I_{OH} −12 mA	3.0	−	2.56	2.46	V
		I_{OH} −24 mA	4.5	−	3.86	3.76	
		I_{OH} −24 mA	5.5	−	4.86	4.76	
V_{OL}	Maximum Low Level Output Voltage	V_{IN} = V_{IL} or V_{IH}(Note 3) I_{OL} 12 mA	3.0	−	0.36	0.44	V
		I_{OL} 24 mA	4.5	−	0.36	0.44	
		I_{OL} 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
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

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 (For Figures and Waveforms − See Section 3 of the ON Semiconductor FACT Data Book, DL138/D)

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

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.

DC CHARACTERISTICS

Symbol	Parameter	Conditions	V_{CC} (V)	74ACT T_A = +25°C		74ACT T_A = −40°C to +85°C	Unit
				Typ	Guaranteed Limits		
V_{IH}	Minimum High Level Input Voltage	V_{OUT} = 0.1 V	4.5	1.5	2.0	2.0	V
		or V_{CC} − 0.1 V	5.5	1.5	2.0	2.0	
V_{IL}	Maximum Low Level Input Voltage	V_{OUT} = 0.1 V	4.5	1.5	0.8	0.8	V
		or V_{CC} − 0.1 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)					V
		−24 mA	4.5	−	3.86	3.76	
		−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)					V
		24 mA	4.5	−	0.36	0.44	
		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_{CCT}	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

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 (For Figures and Waveforms − See Section 3 of the ON Semiconductor FACT Data Book, DL138/D)

Symbol	Parameter	V_{CC} (V) (Note 8)	74ACT T_A = +25°C, C_L = 50 pF			74ACT T_A = −40°C to +85°C, C_L = 50 pF		Unit	Fig. No.
			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

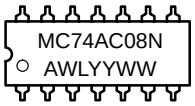
8. Voltage Range 5.0 V is 5.0 V ±0.5 V.

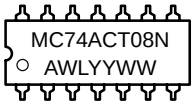
CAPACITANCE

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

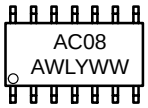
MARKING DIAGRAMS

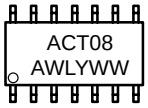
PDIP−14





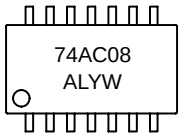
SOIC−14

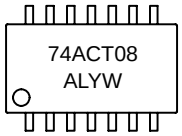




TSSOP−14

SOEIAJ−14





A = Assembly Location
WL, L = Wafer Lot
YY, Y = Year
WW, W = Work Week

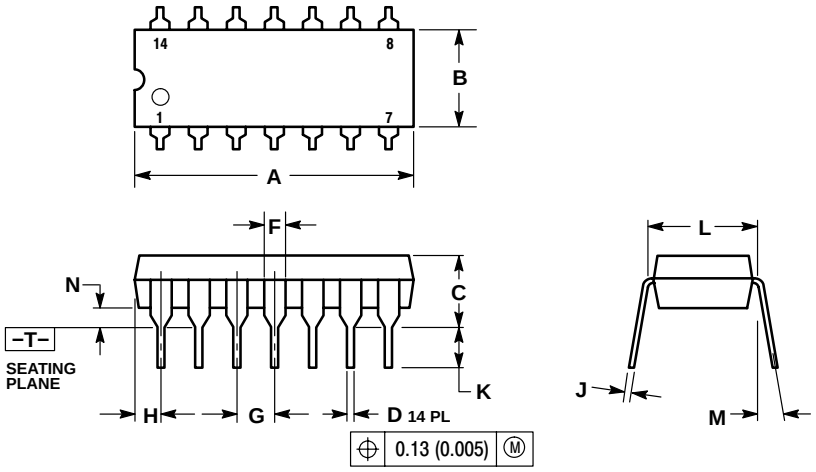
ORDERING INFORMATION

Device	Package	Shipping†
MC74AC08N	PDIP−14	500 Units / Rail
MC74AC08D	SOIC−14	55 Units / Rail
MC74AC08DR2	TSSOP−14	2500 / Tape & Reel
MC74AC08DTR2	TSSOP−14 (Pb−Free)	2500 / Tape & Reel
MC74AC08MEL	SOEIAJ−14 (Pb−Free)	2000 / Tape & Reel
MC74ACT08N	PDIP−14	500 Units / Rail
MC74ACT08D	SOIC−14	55 Units / Rail
MC74ACT08DR2	SOIC−14	2500 / Tape & Reel
MC74ACT08DTR2G	SOIC−14 (Pb−Free)	2500 / Tape & Reel
MC74ACT08NG	PDIP−14 (Pb−Free)	500 Units / Rail
MC74ACT08MEL	SOEIAJ−14 (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.

PACKAGE DIMENSIONS

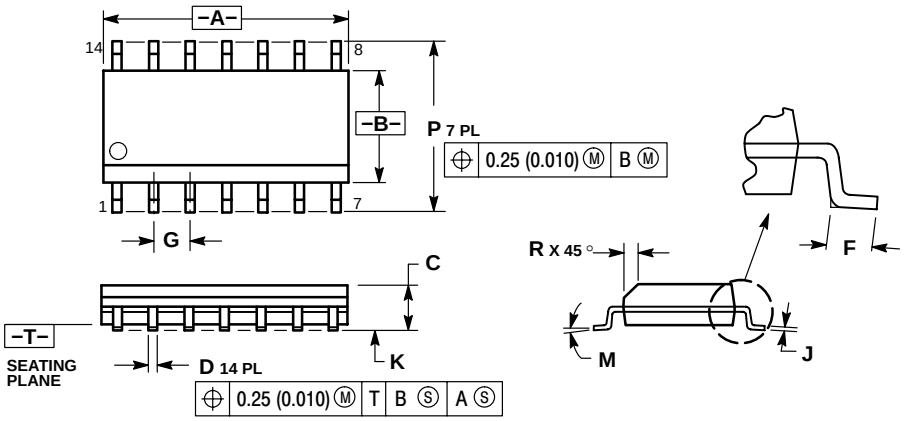
PDIP−14
N SUFFIX
CASE 646−06
ISSUE N



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.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.715	0.770	18.16	18.80
B	0.240	0.260	6.10	6.60
C	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	
H	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
M	−−−	10 °	−−−	10 °
N	0.015	0.039	0.38	1.01

SOIC−14
D SUFFIX
CASE 751A−03
ISSUE G

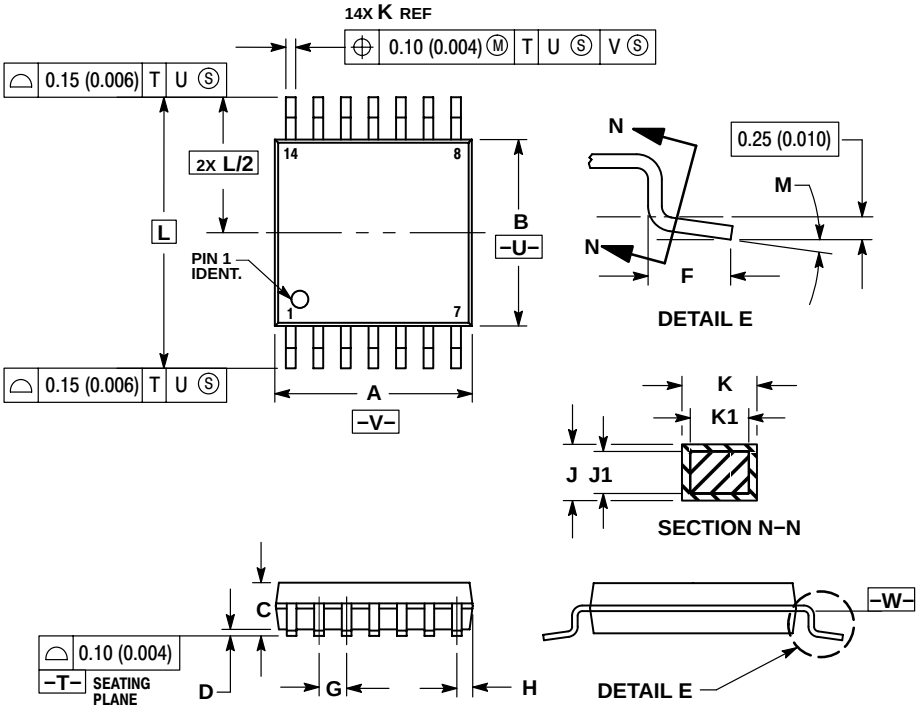


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005)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

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	8.55	8.75	0.337	0.344
B	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	
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
M	0 °	7 °	0 °	7 °
P	5.80	6.20	0.228	0.244
R	0.25	0.50	0.010	0.019

PACKAGE DIMENSIONS

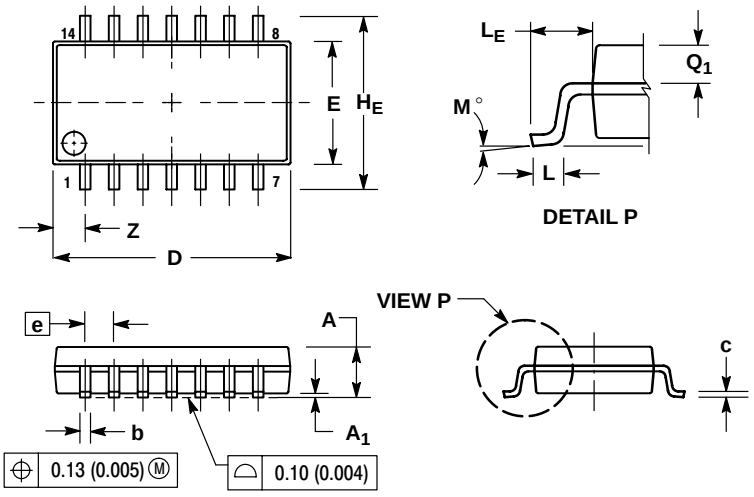
TSSOP−14
DT SUFFIX
CASE 948G−01
ISSUE O



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 °

SOEIAJ−14
M SUFFIX
CASE 965−01
ISSUE O



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 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.
4. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
5. 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 TO BE 0.46 (0.018).

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	---	2.05	---	0.081
A_1	0.05	0.20	0.002	0.008
b	0.35	0.50	0.014	0.020
c	0.18	0.27	0.007	0.011
D	9.90	10.50	0.390	0.413
E	5.10	5.45	0.201	0.215
e	1.27 BSC		0.050 BSC	
H_E	7.40	8.20	0.291	0.323
0.50	0.50	0.85	0.020	0.033
L_E	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

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
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ON Semiconductor Website: http://onsemi.com

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For additional information, please contact your local Sales Representative.

MC74AC08/D