# 74HCT08

Quad 2-Input AND Gate

With LSTTL−Compatible Inputs
High−Performance Silicon−Gate CMOS

The 74HCT08 is identical in pinout to the LS08. The device has TTL−compatible inputs.

Features

- Output Drive Capability: 10 LSTTL Loads
- TTL/NMOS−Compatible Input Levels
- Outputs Directly Interface to CMOS, NMOS and TTL
- Operating Voltage Range: 4.5 to 5.5 V
- Low Input Current: 1.0 μA
- High Noise Immunity Characteristic of CMOS Devices
- In Compliance With the JEDEC Standard No. 7A Requirements
- ESD Performance: HBM > 2000 V; Machine Model > 200 V
- Chip Complexity: 24 FETs or 6 Equivalent Gates
- These are Pb−Free Devices

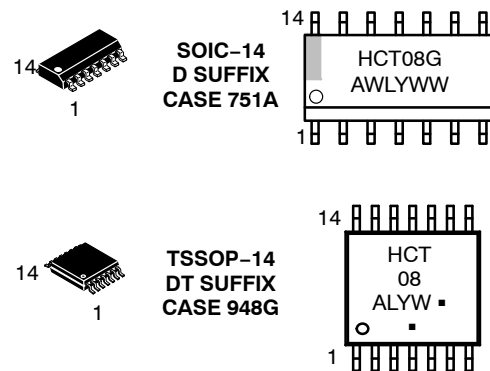### LOGIC DIAGRAM

$Y = AB$
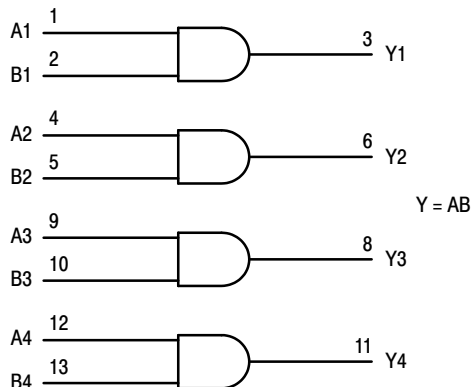
PIN 14 = V_{CC}
PIN 7 = GND

Pinout: 14−Lead Packages (Top View)

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http://onsemi.com
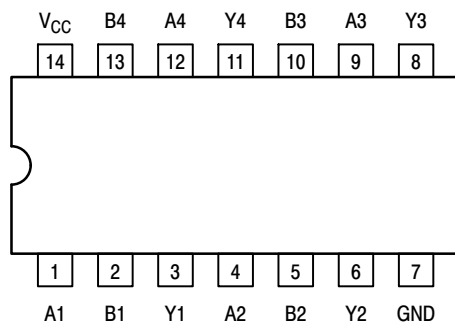
MARKING DIAGRAMS

HCT08	= Device Code	
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)

FUNCTION TABLE

Inputs		Output
A	**B**	**Y**
L	L	L
L	H	L
H	L	L
H	H	H

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

ORDERING INFORMATION

Device	Package	Shipping†
74HCT08DR2G	SOIC−14 (Pb−Free)	2500/Tape & Reel
74HCT08DR2GH	SOIC−14 (Halide−Free)	
74HCT08DTR2G	TSSOP−14*	

†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.

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 + 7.0	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	±25	mA
I_{CC}	DC Supply Current, V_{CC} and GND Pins	±50	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 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 — SOIC Package: − 7 mW/°C from 65° to 125°C
                     TSSOP Package: − 6.1 mW/°C from 65° to 125°C
For high frequency or heavy load considerations, see Chapter 2 of the ON Semiconductor High−Speed CMOS Data Book (DL129/D).

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V_{CC}	DC Supply Voltage (Referenced to GND)	4.5	5.5	V
V_{in}	DC Input Voltage (Referenced to GND)	0	5.5	V
V_{out}	DC 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 (Figure 1) V_{CC} = 2.0 V V_{CC} = 4.5 V V_{CC} = 6.0 V	0 0 0	1000 500 400	ns

74HCT08

DC CHARACTERISTICS (Voltages Referenced to GND)

Symbol	Parameter	Condition	V_{CC} (V)	Guaranteed Limit −55 to 25°C	≤85°C	≤125°C	Unit
V_{IH}	Minimum High−Level Input Voltage	$V_{out} = 0.1V$ $\|I_{out}\| \leq 20\mu A$	4.5 5.5	2.0 2.0	2.0 2.0	2.0 2.0	V
V_{IL}	Maximum Low−Level Input Voltage	$V_{out} = V_{CC} - 0.1V$ $\|I_{out}\| \leq 20\mu A$	4.5 5.5	0.8 0.8	0.8 0.8	0.8 0.8	V
V_{OH}	Minimum High−Level Output Voltage	$V_{in} = V_{IL}$ $\|I_{out}\| \leq 20\mu A$	4.5 5.5	4.4 5.4	4.4 5.4	4.4 5.4	V
		$V_{in} = V_{IL}$ $\|I_{out}\| \leq 4.0mA$	4.5	3.98	3.84	3.70	
V_{OL}	Maximum Low−Level Output Voltage	$V_{in} = V_{IH}$ $\|I_{out}\| \leq 20\mu A$	4.5 5.5	0.1 0.1	0.1 0.1	0.1 0.1	V
		$V_{in} = V_{IH}$ $\|I_{out}\| \leq 4.0mA$	4.5	0.26	0.33	0.40	
I_{in}	Maximum Input Leakage Current	$V_{in} = V_{CC}$ or GND	5.5	±0.1	±1.0	±1.0	µA
I_{CC}	Maximum Quiescent Supply Current (per Package)	$V_{in} = V_{CC}$ or GND $I_{out} = 0\mu A$	5.5	2.0	20	40	µA

Symbol	Parameter	Condition	V_{CC} (V)	≥ −55°C	25 to 125°C	Unit
ΔI_{CC}	Additional Quiescent Supply Current	$V_{in} = 2.4V$, Any One Input $V_{in} = V_{CC}$ or GND, Other Inputs $I_{out} = 0\mu A$	5.5	2.9	2.4	mA

1. Information on typical parametric values can be found in Chapter 2 of the ON Semiconductor High−Speed CMOS Data Book (DL129/D).
2. Total Supply Current = $I_{CC} + \Sigma\Delta I_{CC}$.

AC CHARACTERISTICS (C_L = 50pF, Input $t_r = t_f$ = 6ns)

Symbol	Parameter	V_{CC} (V)	Guaranteed Limit −55 to 25°C	≤85°C	≤125°C	Unit
t_{PLH}, t_{PHL}	Maximum Propagation Delay, Input A or B to Output Y (Figures 1 and 2)	4.5	15	19	22	ns
t_{TLH}, t_{THL}	Maximum Output Transition Time, Any Output (Figures 1 and 2)	4.5	15	19	22	ns
C_{in}	Maximum Input Capacitance		10	10	10	pF

NOTE: For propagation delays with loads other than 50 pF, and information on typical parametric values, see Chapter 2 of the ON Semiconductor High−Speed CMOS Data Book (DL129/D).

		Typical @ 25°C, V_{CC} = 5.0 V, V_{EE} = 0 V	
C_{PD}	Power Dissipation Capacitance (Per Buffer)*	20	pF

* Used to determine the no−load dynamic power consumption: $P_D = C_{PD} V_{CC}^2 f + I_{CC} V_{CC}$. For load considerations, see Chapter 2 of the ON Semiconductor High−Speed CMOS Data Book (DL129/D).
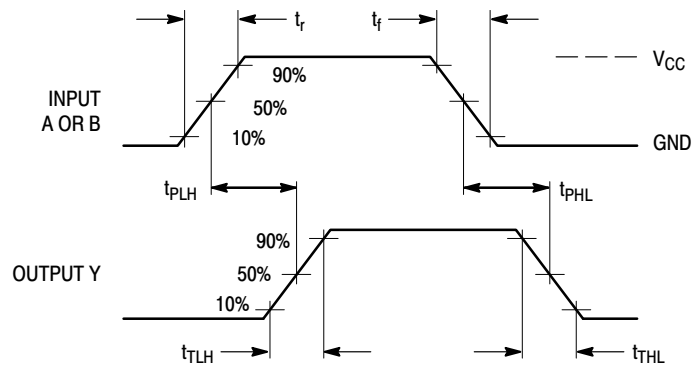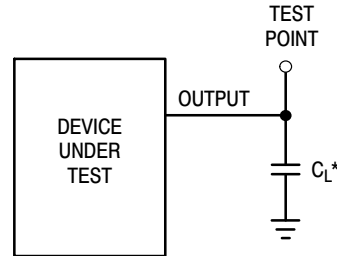
74HCT08

Figure 1. Switching Waveforms

*Includes all probe and jig capacitance
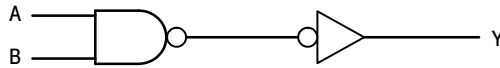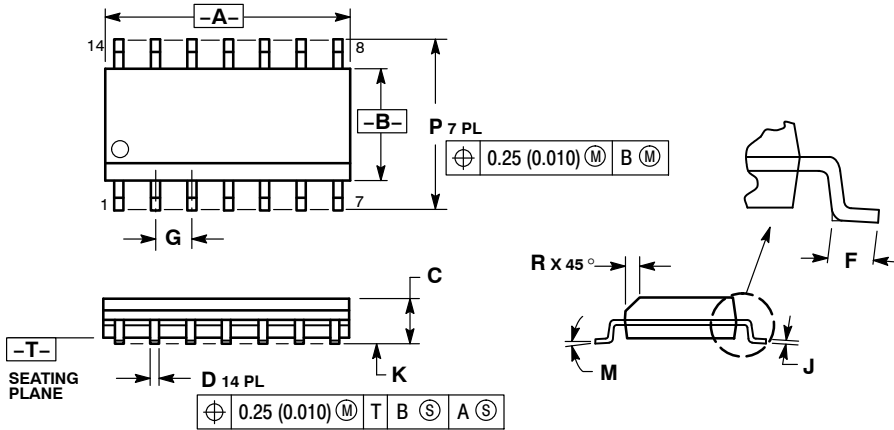
Figure 2. Test Circuit

Figure 3. Expanded Logic Diagram
(1/4 of the Device)

74HCT08
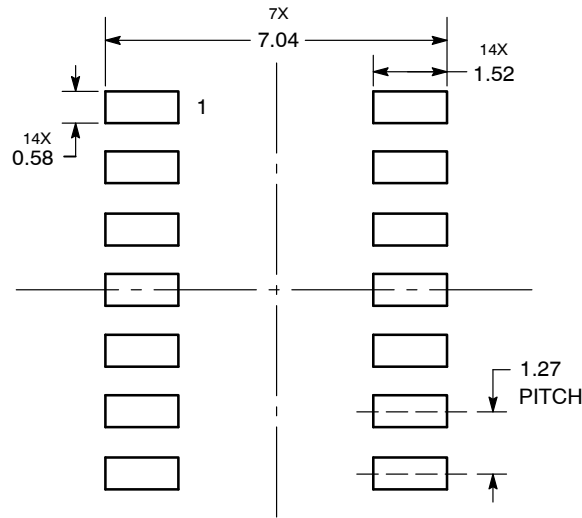
PACKAGE DIMENSIONS

SOIC−14
CASE 751A−03
ISSUE H

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.

DIM	MILLIMETERS		INCHES	
	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

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.

74HCT08

PACKAGE DIMENSIONS

TSSOP−14
CASE 948G−01
ISSUE B

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−.

DIM	MILLIMETERS		INCHES	
	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

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.

74HCT08

74HCT08/D