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74HCT08

QUADRUPLE 2-INPUT AND GATES

## Description

The 74HCT08 provides four independent 2-input AND gates with standard push-pull outputs. The device is designed for operation with a power supply range of 4.5V to 5.5V.

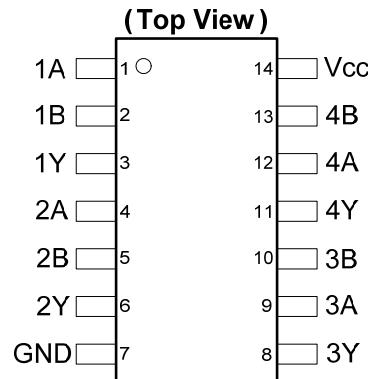
The gates perform the Boolean function:

$$Y = A \bullet B \text{ or } Y = \overline{\overline{A}} + \overline{\overline{B}}$$

## Features

- Wide Supply Voltage Range from 4.5V to 5.5V
- Pin Compatible with Low Power Schottky (LSTTL)
- Inputs Are TTL Voltage Level Compatible
- Sinks or sources 4mA at  $V_{CC} = 4.5V$
- CMOS low power consumption
- Schmitt Trigger Action at All Inputs
- ESD Protection Exceeds JESD 22
  - 200-V Machine Model (A115-A)
  - 2000-V Human Body Model (A114-A)
  - Exceeds 1000-V Charged Device Model (C101C)
- Range of Package Options SO-14 and TSSOP-14
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)**

## Pin Assignments



SO-14 / TSSOP-14

## Applications

- General Purpose Logic
- Wide array of products such as:
  - PCs, networking, notebooks, netbooks
  - Computer peripherals, hard drives, CD/DVD ROM
  - TV, DVD, DVR, set top box

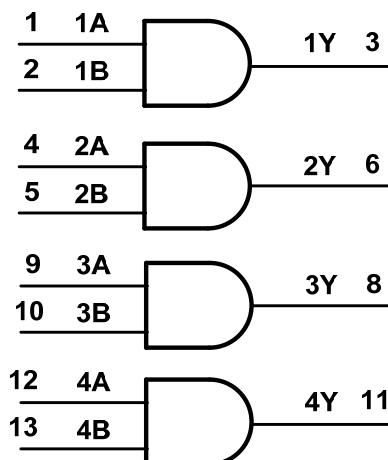
Notes:

1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See <http://www.diodes.com> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

## Pin Descriptions

Pin Number	Pin Name	Function
1	1A	Data Input
2	1B	Data Input
3	1Y	Data Output
4	2A	Data Input
5	2B	Data Input
6	2Y	Data Output
7	GND	Ground
8	3Y	Data Output
9	3A	Data Input
10	3B	Data Input
11	4Y	Data Output
12	4A	Data Input
13	4B	Data Input
14	V <sub>CC</sub>	Supply Voltage

## Logic Diagram



## Function Table

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

### Absolute Maximum Ratings (Note 4) (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Symbol	Description	Rating	Unit
ESD HBM	Human Body Model ESD Protection	2	kV
ESD CDM	Charged Device Model ESD Protection	1	kV
ESD MM	Machine Model ESD Protection	200	V
$V_{CC}$	Supply Voltage Range	-0.5 to +7.0	V
$V_I$	Input Voltage Range (Note 5)	-0.5 to +7.0	V
$I_{IK}$	Input Clamp Current $V_I < -0.5\text{V}$ or $V_I > V_{CC} + 0.5\text{V}$	$\pm 20$	mA
$I_{OK}$	Output Clamp Current $V_O < -0.5\text{V}$ or $V_O > V_{CC} + 0.5\text{V}$	$\pm 20$	mA
$I_O$	Continuous Output Current $-0.5\text{V} < V_O < V_{CC} + 0.5\text{V}$	$+/ - 25$	mA
$I_{CC}$	Continuous Current Through $V_{CC}$	50	mA
$I_{GND}$	Continuous Current Through GND	-50	mA
$T_J$	Operating Junction Temperature	-40 to +150	$^\circ\text{C}$
$T_{STG}$	Storage Temperature	-65 to +150	$^\circ\text{C}$
$P_{TOT}$	Total Power Dissipation	500	mW

Notes: 4. Stresses beyond the absolute maximum may result in immediate failure or reduced reliability. These are stress values and device operation should be within recommended values.  
 5. Input Voltage cannot exceed  $V_{CC}$  to the extent the maximum clamp current is exceeded.

### Recommended Operating Conditions (Note 6) (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CC}$	Supply Voltage		4.5	5.5	V
$V_I$	Input Voltage		0	$V_{CC}$	V
$V_O$	Output Voltage		0	$V_{CC}$	V
$\Delta t/\Delta V$	Input Transition Rise or Fall Rate	$V_{CC} = 4.5\text{V}$ to $5.5\text{V}$	—	500	ns/V
$T_A$	Operating Free-Air Temperature		-40	+125	$^\circ\text{C}$

Note: 6. Unused inputs should be held at  $V_{CC}$  or Ground.

### Electrical Characteristics (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Symbol	Parameter	Test Conditions	$V_{CC}$	$T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$		$T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$		Unit
				Min	Max	Min	Max	
$V_{IH}$	High-level Input Voltage		4.5V to 5.5V	2.0	—	2.0	—	V
$V_{IL}$	Low-level Input voltage		4.5V to 5.5V	—	0.8	—	0.8	V
$V_{OH}$	High-level Output Voltage	$I_{OH} = -20\mu\text{A}$	4.5V	4.4	—	4.4	—	V
		$I_{OH} = -4\text{mA}$	4.5V	3.80	—	3.70	—	
$V_{OL}$	Low-level Output Voltage	$I_{OL} = 20\mu\text{A}$	4.5V	—	0.1	—	0.1	V
		$I_{OL} = 4\text{mA}$	4.5V	—	0.33	—	0.4	
$I_I$	Input Current	$V_I = \text{GND}$ to $6.0\text{V}$	6.0V	—	$\pm 1$	—	$\pm 1$	$\mu\text{A}$
$I_{CC}$	Supply Current	$V_I = \text{GND}$ or $V_{CC}$ , $I_O = 0$	6.0V	—	20	—	40	$\mu\text{A}$
$\Delta I_{CC}$	Additional Supply Current	One input at $V_{CC} - 2.1\text{V}$ Other pins at $V_{CC}$ or GND	4.5V to 5.5V	—	675	—	735	$\mu\text{A}$

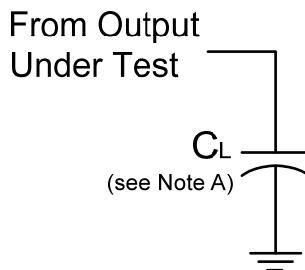
## Switching Characteristics

Symbol	Parameter	Test Conditions	V <sub>CC</sub>	T <sub>A</sub> = +25°C			-40°C to +85°C	-40°C to +125°C	Unit
				Min	Typ	Max	Max	Max	
t <sub>PD</sub>	Propagation Delay A <sub>N</sub> to Y <sub>N</sub>	Figure 1 C <sub>L</sub> = 50pF	4.5V	—	14	24	30	36	ns
t <sub>t</sub>	Transition Time	Figure 1 C <sub>L</sub> = 50pF	4.5V	—	7	15	19	22	ns

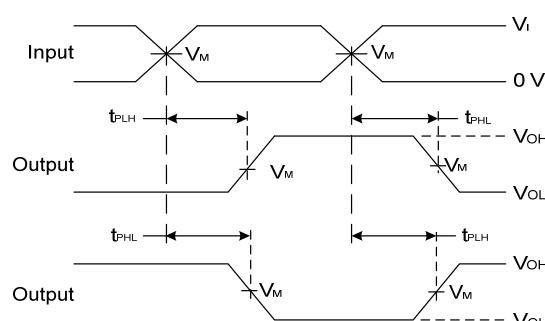
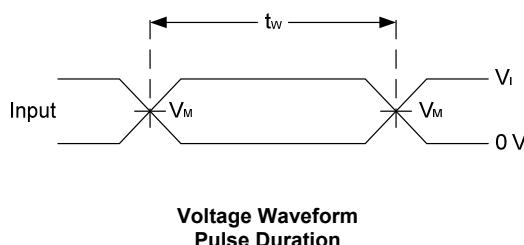
## Operating Characteristics (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Parameter		Test Conditions	V <sub>CC</sub> = 5.5 V	Unit
			Typ	
C <sub>pd</sub>	Power dissipation capacitance per gate	f = 1 MHz	22	pF
C <sub>I</sub>	Input Capacitance	V <sub>I</sub> = V <sub>CC</sub> – or GND	4	pF

## Parameter Measurement Information



V <sub>cc</sub>	Inputs		V <sub>M</sub>	C <sub>L</sub>
	V <sub>I</sub>	t <sub>r</sub> /t <sub>f</sub>		
4.5V	3.0V	3ns	1.5V	V <sub>OH</sub> /2



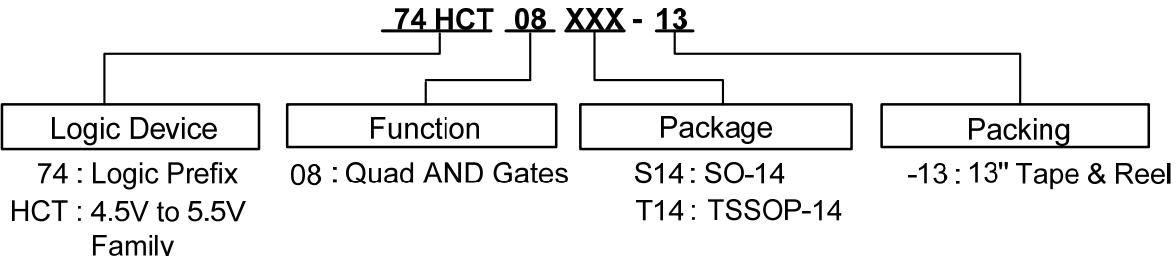
## Voltage Waveform Propagation Delay Times Inverting and Non Inverting Outputs

Notes:

- A. Includes test lead and test apparatus capacitance.
- B. All pulses are supplied at pulse repetition rate  $\leq 1$  MHz.
- C. Inputs are measured separately one transition per measurement.
- D.  $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{PD}$ .

**Figure 1 Load Circuit and Voltage Waveforms**

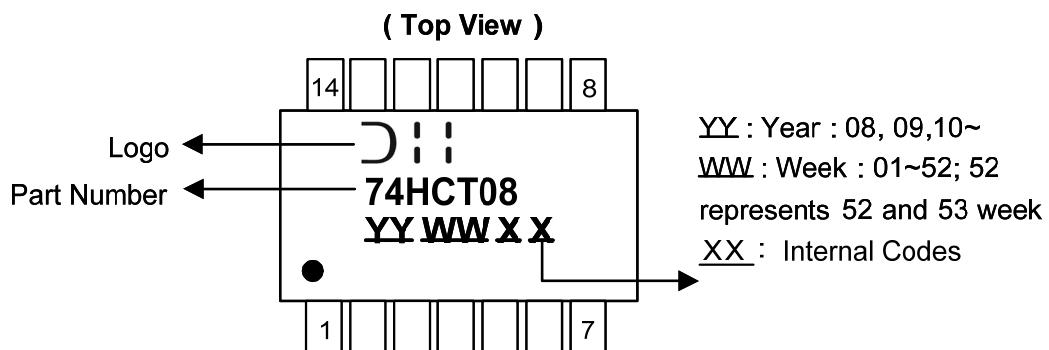
## Ordering Information



Device	Package Code	Packaging	7" Tape and Reel	
			Quantity	Part Number Suffix
74HCT08S14-13	S14	SO-14	2500/Tape & Reel	-13
74HCT08T14-13	T14	TSSOP-14	2500/Tape & Reel	-13

## Marking Information

(1) SO-14, TSSOP-14

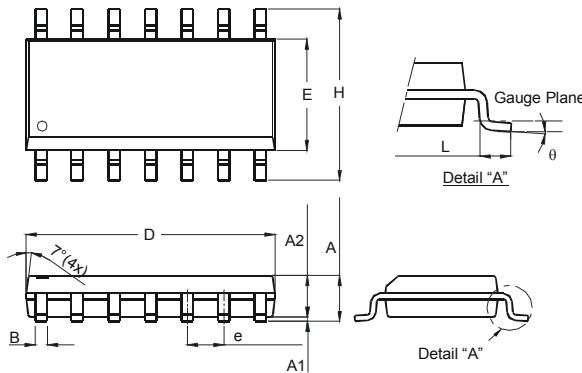


Part Number	Package
74HCT08S14	SO-14
74HCT08T14	TSSOP-14

## Package Outline Dimensions (All dimensions in mm.)

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.

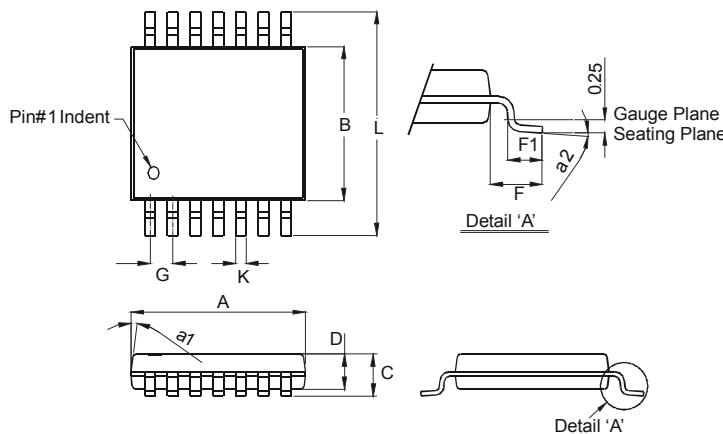
Package Type: SO-14



SO-14		
Dim	Min	Max
<b>A</b>	1.47	1.73
<b>A1</b>	0.10	0.25
<b>A2</b>	1.45 Typ	
<b>B</b>	0.33	0.51
<b>D</b>	8.53	8.74
<b>E</b>	3.80	3.99
<b>e</b>	1.27 Typ	
<b>H</b>	5.80	6.20
<b>L</b>	0.38	1.27
<b>θ</b>	0°	8°

All Dimensions in mm

Package Type: TSSOP-14



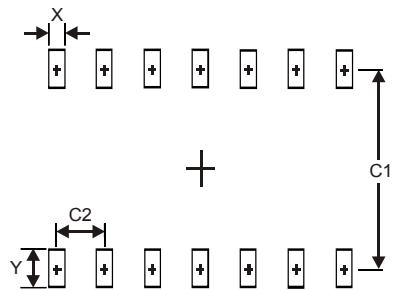
TSSOP-14		
Dim	Min	Max
<b>a1</b>	7° (4X)	
<b>a2</b>	0°	8°
<b>A</b>	4.9	5.10
<b>B</b>	4.30	4.50
<b>C</b>	—	1.2
<b>D</b>	0.8	1.05
<b>F</b>	1.00 Typ	
<b>F1</b>	0.45	0.75
<b>G</b>	0.65 Typ	
<b>K</b>	0.19	0.30
<b>L</b>	6.40 Typ	

All Dimensions in mm

## Suggested Pad Layout

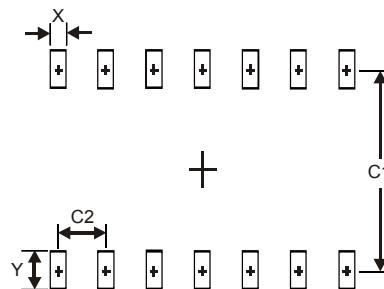
Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for latest version.

Package Type: SO-14



Dimensions	Value (in mm)
X	0.60
Y	1.50
C1	5.4
C2	1.27

Package Type: TSSOP-14



Dimensions	Value (in mm)
X	0.45
Y	1.45
C1	5.9
C2	0.65

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