

#### **QUADRUPLE 2-INPUT AND GATES**

### **Description**

The 74HC08 provides provides four independent 2-input AND gates with standard push-pull outputs. The device is designed for operation with a power supply range of 2.0V to 6.0V.

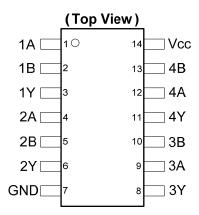
The gates perform the Boolean function:

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

#### **Features**

- Wide Supply Voltage Range from 2.0V to 6.0V
- Sinks or Sources 4mA at V<sub>CC</sub> = 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.

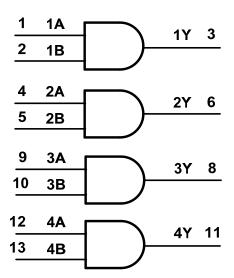
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.



## **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	Vcc	Supply Voltage

# **Logic Diagram**



## **Function Table**

Inp	Output	
Α	В	Y
L	L	L
L	Н	L
Н	L	L
Н	Н	Н



## Absolute Maximum Ratings (Note 4) (@TA = +25°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
Vcc	Supply Voltage Range	-0.5 to +7.0	V
VI	Input Voltage Range (Note 5)	-0.5 to +7.0	V
I <sub>IK</sub>	Input Clamp Current V <sub>I</sub> < -0.5V or Vi> V <sub>CC</sub> +0.5V	±20	mA
lok	Output Clamp Current $V_O < -0.5V$ or $V_O > V_{CC} +0.5V$	±20	mA
lo	Continuous output current -0.5V < V <sub>O</sub> V <sub>CC</sub> +0.5V	+/- 25	mA
I <sub>CC</sub>	Continuous current through V <sub>CC</sub>	50	mA
I <sub>GND</sub>	Continuous current through GND	-50	mA
TJ	T <sub>J</sub> Operating Junction Temperature		°C
T <sub>STG</sub>	T <sub>STG</sub> Storage Temperature		°C
P <sub>TOT</sub>	Total Power Dissipation	500	mW

Notes:

## Recommended Operating Conditions (Note 6) (@TA = +25°C, unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Max	Unit
V <sub>CC</sub>	Supply Voltage		2.0	6.0	V
VI	Input Voltage		0	V <sub>CC</sub>	V
Vo	Output Voltage		0	V <sub>CC</sub>	V
		$V_{CC} = 2.0V$	_	625	
Δt/ΔV	Input Transition Rise or Fall Rate	$V_{CC}$ = 4.5 $V$	_	140	ns/V
		$V_{CC} = 6.0V$	_	85	
T <sub>A</sub>	Operating Free-Air Temperature		-40	+125	°C

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

<sup>4.</sup> Stresses beyond the absolute maximum may result in immediate failure or reduced reliability. These are stress values and device operation should be within recommend values.

<sup>5.</sup> Input Voltage cannot exceed  $V_{\text{CC}}$  to the extent the Maximum clamp current is exceeded



## Electrical Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Cumbal	Dovomotov	Test Conditions	V	T <sub>A</sub> = -40°	C to +85°C	T <sub>A</sub> = -40°C	to +125°C	Unit
Symbol	Parameter	rest Conditions	V <sub>CC</sub>	Min	Max	Min	Max	Unit
			2.0V	1.5	_	1.5	_	
$V_{IH}$	High-level Input Voltage		4.5V	3.15	_	3.15	_	V
			6.0V	4.2	_	4.2	_	
			2.0V	_	0.5	_	0.5	
$V_{IL}$	Low-level Input Voltage		4.5V	_	1.35	_	1.35	V
			6.0V	_	1.8		1.8	
		$I_{OH} = -20 \mu A$	2.0V	1.9	_	1.9	_	V
		I <sub>OH</sub> = -20μA	4.5V	4.4	_	4.4	_	
V <sub>OH</sub>	/ <sub>OH</sub> High-level Output Voltage	I <sub>OH</sub> = -20μA	6.0V	5.9	_	5.9	_	
		I <sub>OH</sub> = -4.0mA	4.5V	3.84	_	3.7	_	
		I <sub>OH</sub> = -5.2mA	6.0V	5.34	_	5.2	_	
		I <sub>OL</sub> = 20μA	2.0V	_	0.1	_	0.1	
		$I_{OL} = 20\mu A$	4.5V	_	0.1	_	0.1	
$V_{OL}$	Low-level Output Voltage	I <sub>OL</sub> = 20μA	6.0V	_	0.1	_	0.1	V
		I <sub>OL</sub> = 4mA	4.5V	_	0.33	_	0.44	
		I <sub>OL</sub> = 5.2 mA	6.0V	_	0.33	_	0.44	
II	Input Current	V <sub>I</sub> =GND to 5.5V	6.0V	_	± 1	_	± 1	μΑ
Icc	Supply Current	$V_I = GND \text{ or } V_{CC},$ $I_O = 0$	6.0V	_	20	_	40	μА

## **Switching Characteristics**

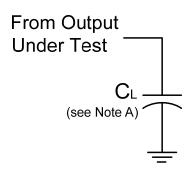
Symbol	Paramotor	Test	Vcc		T <sub>A</sub> = +25°0	3	-40°C to +85°C	-40°C to +125°C	Unit
Syllibol	Symbol Parameter Conditi		ditions		Тур.	Max	Max	Max	Oilit
	top   1 0	Figure 1	2.0V	_	25	90	115	125	
$t_{PD}$		Propagation Figure 1 Delay $A_N$ to $Y_N$ $C_L = 50pF$	4.5V	_	9	18	23	27	ns
	Delay AN to TN	CL = 50PF	6.0V	_	7	15	20	23	
		Figure 1	2.0V	_	19	75	95	110	
t <sub>t</sub> Transition Time	Figure 1 - C <sub>L</sub> = 50pF -	4.5V	_	7	15	19	22	ns	
		CL = 30pi	6.0V	_	6	13	16	19	

## Operating Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)

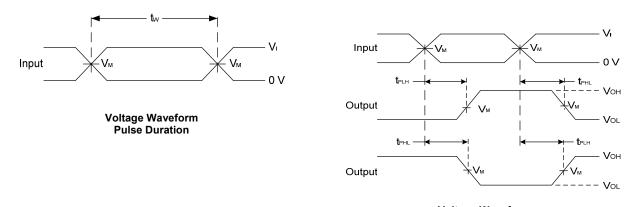
Parameter		Test Conditions	V <sub>CC</sub> = 6V Typ	Unit
C <sub>pd</sub>	Power Dissipation Capacitance per Gate	f = 1 MHz	20	pF
Cı	Input Capacitance	$V_1 = V_{CC} - \text{or GND}$	4	pF



### **Parameter Measurement Information**



V <sub>CC</sub>	lnı	outs	V <sub>M</sub>	CL	
	VI	t <sub>r</sub> /t <sub>f</sub>			
2.0V to 6.0V	V <sub>CC</sub>	6ns	V <sub>CC</sub> /2	15pF,50pF	



Voltage Waveform Propagation Delay Times Inverting and Non Inverting Outputs

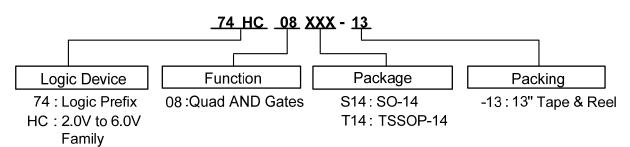
Notes: A. Includes test lead and test apparatus capacitance.

- B. All pulses are supplied at pulse repetition rate ≤ 1 MHz
- C. Inputs are measured separately one transition per measurement
- D.  $t_{\text{PLH}}$  and  $t_{\text{PHL}}$  are the same as  $t_{\text{PD}}$

Figure 1 Load Circuit and Voltage Waveforms



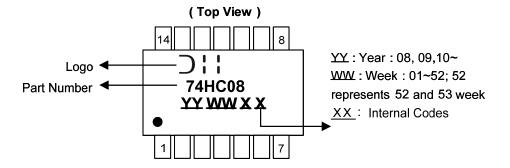
## **Ordering Information**



	Davisa	Dookses Code	Dookoaina	7" Tap	e and Reel
	Device	Package Code	Packaging	Quantity	Part Number Suffix
Lead-free Green	74HC08S14-13	S14	SO-14	2500/Tape & Reel	-13
Lead-free Green	74HC08T14-13	T14	TSSOP-14	2500/Tape & Reel	-13

### **Marking Information**

(1) SO-14, TSSOP-14



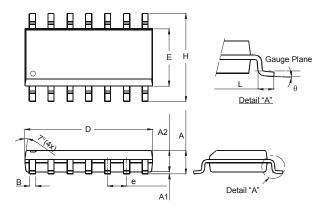
Part Number	Package
74HC08S14	SO-14
74HC08T14	TSSOP-14



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

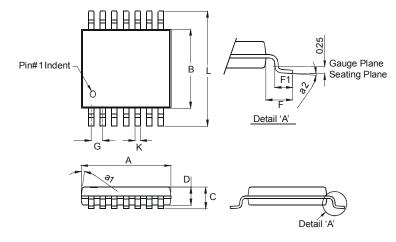
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.

#### Package Type: SO-14



	SO-14	
Dim	Min	Max
Α	1.47	1.73
A1	0.10	0.25
A2	1.45	Тур
В	0.33	0.51
D	8.53	8.74
Е	3.80	3.99
е	1.27	Тур
Н	5.80	6.20
L	0.38	1.27
θ	0°	8°
All Di	mensions	s in mm

#### Package Type: TSSOP-14

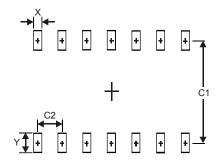


	TSSOP-14					
Dim	im Min Max					
a1	7° (	4X)				
a2	0°	8°				
Α	4.9	5.10				
В	4.30	4.50				
С	_	1.2				
D	0.8	1.05				
F	1.00	Тур				
F1	0.45	0.75				
G	<b>G</b> 0.65 Typ					
K	0.19	0.30				
L	6.40 Typ					
All Dir	nensions	s in mm				

### **Suggested Pad Layout**

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

#### Package Type: SO-14

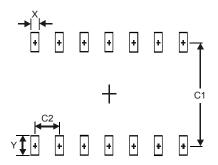


Dimensions	Value (in mm)
Х	0.60
Y	1.50
C1	5.4
C2	1.27



### Suggested Pad Layout (cont.)

Package Type: TSSOP-14



Dimensions	Value (in mm)
Х	0.45
Υ	1.45
C1	5.9
C2	0.65

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