



#### **QUADRUPLE 2-INPUT NAND GATES**

### **Description**

The 74HC00 provides provides four independent 2-input NAND gates with standard push-pull outputs. The device is designed for operation with a power supply range of 2.0V to 6.0V.

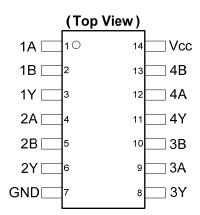
The gates perform the Boolean function:

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

### **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.

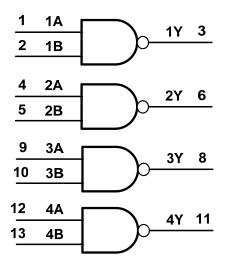
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.



## **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	V <sub>CC</sub>	Supply Voltage

## **Logic Diagram**



### **Function Table**

Inp	Output	
Α	В	Υ
L	L	Н
L	Н	Н
Н	L	Н
Н	Н	L



## Absolute Maximum Ratings (Note 4) (@T<sub>A</sub> = +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	٧
V <sub>CC</sub>	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 $V_I < -0.5V$ or $V_i > V_{CC} + 0.5V$	±20	mA
lok	Output Clamp Current V <sub>O</sub> < -0.5V or V <sub>O</sub> > V <sub>CC</sub> +0.5V	±20	mA
Ιο	Continuous output current -0.5V < V <sub>O</sub> V <sub>CC</sub> +0.5V	+/- 25	mA
Icc	Continuous current through Vcc	50	mA
I <sub>GND</sub>	Continuous current through GND	-50	mA
TJ	Operating Junction Temperature	-40 to +150	°C
T <sub>STG</sub>	Storage Temperature	-65 to +150	°C
Ртот	Total Power Dissipation	500	mW

Notes:

## Recommended Operating Conditions (Note 6) (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Max	Unit
Vcc	Supply Voltage		2.0	6.0	V
VI	Input Voltage		0	$V_{CC}$	V
Vo	Output Voltage		0	V <sub>CC</sub>	V
		V <sub>CC</sub> = 2.0V		625	
Δt/ΔV	Input transition rise or fall rate	V <sub>CC</sub> = 4.5V		140	ns/V
		V <sub>CC</sub> = 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.

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. V<sub>CC</sub> to the extent the maximum clamp current is exceeded.

<sup>5.</sup> Input Voltage cannot exceed Vcc to the extent the Maximum clamp current is exceeded.



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

Comple ed	Downwater	Took Conditions		$T_A = -40^\circ$	°C to 85°C	T <sub>A</sub> = -40°	C to 125°C	I I mid
Symbol	Parameter	Test Conditions	Vcc	Min	Max	Min	Max	Unit
			2.0V	1.5		1.5		
$V_{IH}$	High-level Input Voltage		4.5V	3.15		3.15		V
	Voltage		6.0V	4.2		4.2		
	Laurelian d		2.0V		0.5		0.5	
$V_{IL}$	Low-level input voltage		4.5V		1.35		1.35	V
	voltage		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		
$V_{OH}$	High-level Output Voltage	I <sub>OH</sub> = -20μA	6.0V	5.9		5.9		
	Vollago	$I_{OH}$ = -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 <sub>OL</sub> = 20μA	4.5V		0.1		0.1	
$V_{OL}$	Low-level Output Voltage	I <sub>OL</sub> = 20μA	6.0V		0.1		0.1	V
	Vollage	I <sub>OL</sub> = 4mA	4.5V		0.33		0.44	1
		I <sub>OL</sub> = 5.2mA	6.0V		0.33		0.44	
IJ	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	μΑ

# **Switching Characteristics**

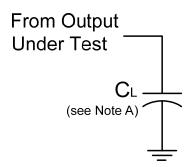
Symbol	Parameter	Test	V	-	T <sub>A</sub> = +25°(	3	-40°C to +85°C	-40°C to +125°C	Unit
Syllibol	Parameter	Conditions	V <sub>CC</sub>	Min	Тур.	Max	Max	Max	Ullit
	Danasantina	Ciarra 4	2.0V	_	25	90	115	135	
$t_{PD}$	$t_{PD}$ Propagation Figure 1 Delay $A_N$ to $Y_N$ $C_L = 50pF$	•	4.5V	_	9	18	23	27	ns
		CL = 50PF	6.0V	_	7	15	20	23	
		Figure 1	2.0V	_	19	75	95	110	
t <sub>t</sub>	Transition Time	Figure 1 $C_L = 50pF$	4.5V	_	7	15	19	22	ns
		CL = 50PF	6.0V	_	6	13	16	19	

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

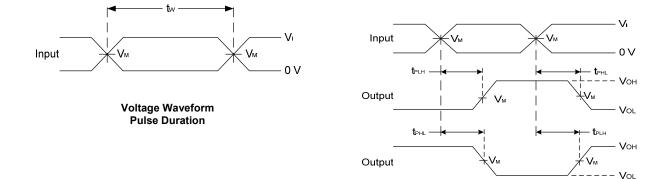
Parameter		Test Conditions	V <sub>CC</sub> = 6V Typ	Unit
C <sub>pd</sub>	Power Dissipation Capacitance per Gate	f = 1 MHz	22	pF
Cı	Input Capacitance	$V_1 = V_{CC} - \text{or GND}$	4	pF



### **Parameter Measurement Information**



Vcc	Inp	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

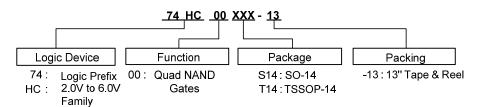
- Notes: A . Includes test lead and test apparatus capacitance.

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

Figure 1 Load Circuit and Voltage Waveforms



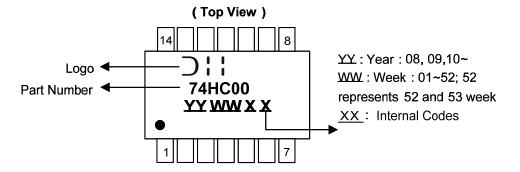
### **Ordering Information**



	Device	Package Code	Packaging	7" Tape and Reel	
		rackage code	Packaging	Quantity	Part Number Suffix
Lead-free Green	74HC00S14-13	S14	SO-14	2500/Tape & Reel	-13
Lead-free Green	74HC00T14-13	T14	TSSOP-14	2500/Tape & Reel	-13

## **Marking Information**

(1) SO-14, TSSOP-14



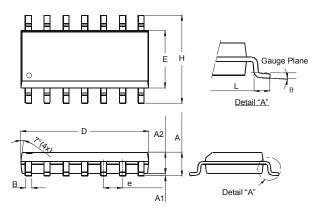
Part Number	Package
74HC00S14	SO-14
74HC00T14	TSSOP-14



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

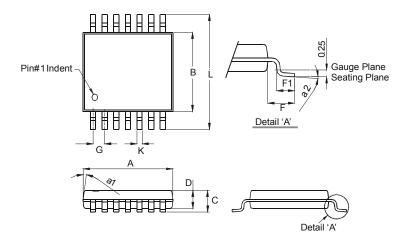
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.

### 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 Dimensions in mm			

#### Package Type: TSSOP-14

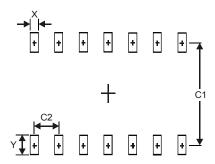


	TSSOP-14				
Dim	Min	Max			
a1	7° (	4X)			
a2	0°	8°			
Α	4.9	5.10			
В	4.30	4.50			
С	_	1.2			
D	0.8	1.05			
F	1.00	Тур			
F1	0.45	0.75			
G	0.65 Typ				
K	0.19	0.30			
L	6.40	Тур			
All Dimensions in mm					

### **Suggested Pad Layout**

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

#### Package Type: SO-14

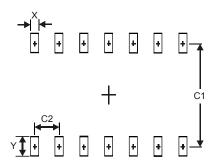


Dimensions	Value (in mm)
Х	0.60
Y	1.50
C1	5.4
C2	1.27



### 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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