

#### **Description**

The 74AHC00 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 5.5V. The inputs are tolerant to 5.5V allowing this device to be used in a mixed voltage environment.

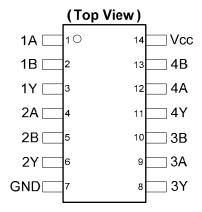
The gates perform the Boolean function:

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

#### **Features**

- Wide Supply Voltage Range from 2.0V to 5.5V
- Outputs Sink or Source 8 mA at V<sub>CC</sub> = 4.5V
- CMOS Low Power Consumption
- Schmitt Trigger Action at All Inputs
- Inputs can be driven by 3.3V or 5.5V allowing for voltage translation applications.
- 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)
- Latch-Up Exceeds 250mA per JESD 78, Class II
- 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.

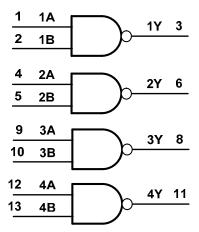
**Click for Ordering Information** 



## **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) (@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
$V_{CC}$	Supply Voltage Range	-0.5 to +7.0	V
VI	Input Voltage Range	-0.5 to +7.0	V
lık	Input Clamp Current V <sub>I</sub> < -0.5V	-20	mA
I <sub>OK</sub>	Output Clamp Current V <sub>O</sub> < -0.5V	-20	mA
I <sub>OK</sub>	Output Clamp Current V <sub>O</sub> > V <sub>CC</sub> +0.5V	25	mA
I <sub>O</sub>	Continuous Output Current -0.5V < V <sub>O</sub> V <sub>CC</sub> +0.5V	+/- 25	mA
Icc	Continuous Current Through V <sub>CC</sub>	75	mA
I <sub>GND</sub>	Continuous Current Through GND	-75	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

Note: 4. 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.



# Recommended Operating Conditions (Note 5) (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Max	Unit
Vcc	Supply Voltage		2.0	5.5	V
VI	Input Voltage		0	5.5	V
Vo	Output Voltage		0	V <sub>CC</sub>	V
Δt/ΔV	Input Transition Disc or Fall Data	V <sub>CC</sub> = 3.0V to 3.6V		100	20/1/
ΔυΔν	Input Transition Rise or Fall Rate	V <sub>CC</sub> = 4.5V to 5.5V		20	ns/V
T <sub>A</sub>	Operating Free-Air Temperature		-40	+125	°C

Note: 5. Unused inputs should be held at V<sub>CC</sub> or Ground.

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

0	B	T4 0 4141	.,	T <sub>A</sub> = -40°	C to +85°C	T <sub>A</sub> = -40°C	c to +125°C	
Symbol Pa	Parameter	Test Conditions	Test Conditions V <sub>CC</sub>	Min	Max	Min	Max	Unit
			2.0V	1.5		1.5		
$V_{IH}$	High-Level Input		3.0V	2.1		2.1		V
	Voltage		5.5V	3.85		3.85		
	L avert avert transit		2.0V		0.5		0.5	
$V_{IL}$	Low-Level Input		3.0V		0.9		0.9	V
	Voltage		5.5V		1.65		1.65	
	High-Level Output Voltage	I <sub>OH</sub> = -50μA	2.0V	1.9		1.9		V
		I <sub>OH</sub> = -50μA	3.0V	2.9		2.9		
$V_{OH}$		I <sub>OH</sub> = -50μA	4.5V	4.4		4.4		
		$I_{OH} = -4mA$	3.0V	2.48		2.40		
		$I_{OH} = -8mA$	4.5V	3.80		3.70		
		$I_{OL} = 50\mu A$	2.0V		0.1		0.1	
	Lave Lavel Ovitavit	$I_{OL} = 50\mu A$	3.0V		0.1		0.1	
$V_{OL}$	Low-Level Output Voltage	I <sub>OL</sub> = 50μA	4.5V		0.1		0.1	V
		I <sub>OL</sub> = 4mA	3.0V		0.44		0.55	
		I <sub>OL</sub> = 8mA	4.5V		0.44		0.55	
II	Input Current	V <sub>I</sub> = GND to 5.5V	3.6V		±1		±2	μΑ
Icc	Supply Current	$V_I = GND \text{ or } V_{CC}, I_O=0$	3.6V		20		40	μA

# **Operating Characteristics**

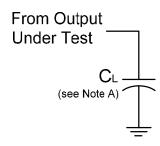
Parameter		Test	$V_{CC} = 2.0V$	$V_{CC} = 3.3V$	V <sub>CC</sub> = 5	Unit
	raiametei	Conditions	Тур	Тур	Тур	Offic
$C_{\sf pd}$	Power Dissipation Capacitance per Gate	f = 1MHz	9.7	11.0	14.8	pF
C <sub>i</sub>	Input Capacitance	$V_i = V_{CC} - \text{or GND}$	4.0	4.0	4.0	pF



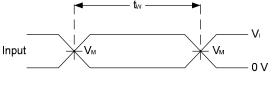
### **Switching Characteristics**

Symbol Parameter	Test	V <sub>CC</sub>	T <sub>A</sub> = +25°C		-40°C to +85°C		-40°C to +125°C		Unit		
	Parameter	Conditions	<b>V</b> CC	Min	Тур	Max	Min	Max	Min	Max	Unit
		Figure 1	3.0V to 3.6V	0.5	4.5	7.9	1.0	9.5	0.5	10.0	
	Propagation	$C_L = 15pF$	4.5V to 5.5V	0.5	3.2	5.5	1.0	6.5	0.5	7.0	20
t <sub>PD</sub>	Delay A <sub>N</sub> to Y <sub>N</sub>	Figure 1	3.0V to 3.6V	0.5	6.0	11.4	1.0	13.0	0.5	14.5	ns
		$C_L = 50pF$	4.5V to 5.5V	0.5	4.5	7.5	1.0	8.5	0.5	9.5	

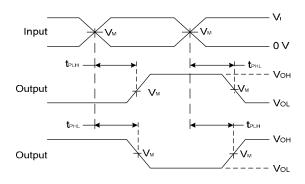
### **Parameter Measurement Information**



V	Inp	uts	V	C
V <sub>CC</sub>	VI	t <sub>r</sub> /t <sub>f</sub>	V <sub>M</sub>	G <sub>L</sub>
3.3V to 3.6V	V <sub>CC</sub>	3ns	V <sub>CC</sub> /2	15pF, 50pF
4.5V to 5.5V	V <sub>CC</sub>	3ns	V <sub>CC</sub> /2	15pF, 50pF



Voltage Waveform Pulse Duration



Voltage Waveform Propagation Delay Times Inverting and Non Inverting Outputs

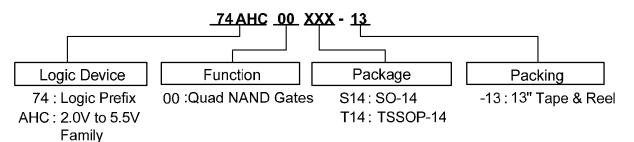
Figure 1 Load Circuit and Voltage Waveforms

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  $t_{\text{PD}}$



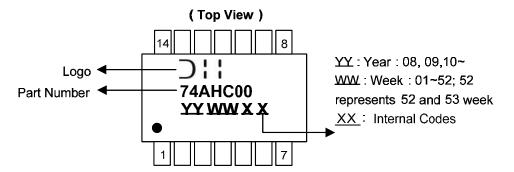
## **Ordering Information**



7" Tape and Reel Package Code **Device Packaging** Quantity Part Number Suffix 74AHC00S14-13 SO-14 S14 2500/Tape & Reel -13 74AHC00T14-13 T14 TSSOP-14 2500/Tape & Reel -13

#### **Marking Information**

#### (1) SO-14, TSSOP-14



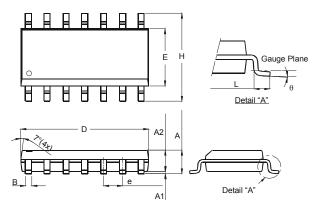
Part Number	Package
74AHC00S14	SO-14
74AHC00T14	TSSOP-14



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

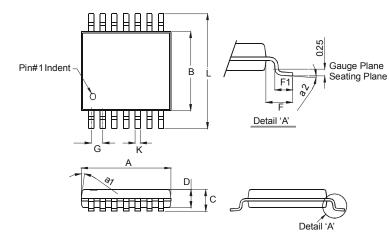
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.

#### 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



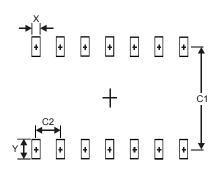
	TSSOP-14					
Dim	Min	Max				
a1	7° (	4X)				
a2	0°	8°				
Α	4.9	5.10				
В	4.30	4.50				
С		1.2				
D	8.0	1.05				
F	1.00	Тур				
F1	0.45	0.75				
G	0.65 Typ					
K	0.19	0.30				
Ĺ	6.40	Тур				
All Dir	All Dimensions in mm					



# **Suggested Pad Layout**

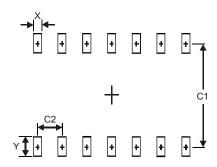
Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.

#### Package Type: SO-14



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

#### Package Type: TSSOP-14



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



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