

Description

The 74AHCT00 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 4.5V to 5.5V.

The gates perform the Boolean function:

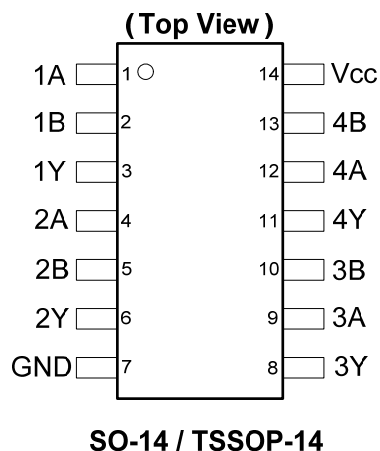
$$Y = \overline{A \bullet B} \text{ or } Y = \overline{A} + \overline{B}$$

Features

- Wide Supply Voltage Range from 4.5V to 5.5V
- Inputs Are TTL Voltage Level Compatible
- Outputs Sink or Source 8mA 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)
- 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)**

- 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 Assignments



Applications

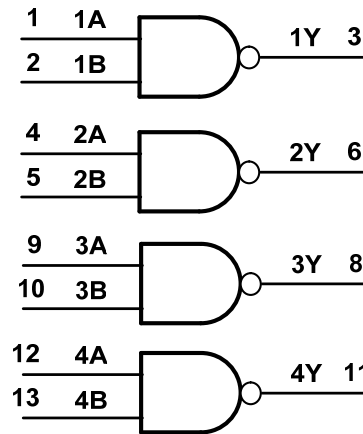
- General Purpose Logic
- Wide array of products such as:
 - PCs, Networking, Notebooks, Netbooks
 - Computer Peripherals, Hard Drives, CD/DVD ROM
 - TV, DVD, DVR, Set Top Box

[Click here for ordering information, located at the end of datasheet](#)

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 _{CC}	Supply Voltage

Logic Diagram



Function Table

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

Absolute Maximum Ratings (Note 4) (@T_A = +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
V _I	Input Voltage Range	-0.5 to +7.0	V
I _{IK}	Input Clamp Current V _I < -0.5V	-20	mA
I _{OK}	Output Clamp Current V _O < 0V	-20	mA
I _{OK}	Output Clamp Current V _O > V _{CC}	20	mA
I _O	Continuous Output Current 0V < V _O < V _{CC}	+/- 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	°C
T _{STG}	Storage Temperature	-65 to +150	°C
P _{TOT}	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.

Recommended Operating Conditions (Note 5) (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Symbol	Parameter	Min	Max	Unit
V_{CC}	Supply Voltage	4.5	5.5	V
V_I	Input Voltage	0	5.5	V
V_O	Output Voltage	0	V_{CC}	V
$\Delta t/\Delta V$	Input Transition Rise or Fall Rate		20	ns/V
T_A	Operating Free-Air Temperature	-40	+125	$^\circ\text{C}$

 Note: 5. 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	$I_{OH} = -50\mu\text{A}$	4.5V	4.4		4.4		V
		$I_{OH} = -8\text{mA}$	4.5V	3.80		3.70		
V_{OL}	Low-Level Output Voltage	$I_{OL} = 50\mu\text{A}$	4.5V		0.1		0.1	V
		$I_{OL} = 8\text{mA}$	4.5V		0.44		0.55	
I_I	Input Current	$V_I = \text{GND to } 5.5\text{V}$	3.6V		± 1		± 2	μA
I_{CC}	Supply Current	$V_I = \text{GND or } V_{CC}, I_O = 0$	3.6V		20		40	μA
ΔI_{CC}	Additional Supply Current	One input at $V_{CC} - 2.1\text{V}$ Other pins at V_{CC} or GND	5.5V		1.35		5	mA

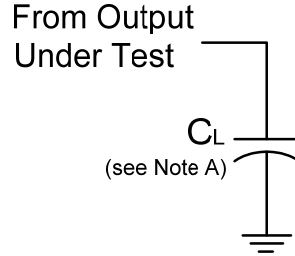
Operating Characteristics

Parameter		Test Conditions	$V_{CC} = 5.5\text{V}$	Unit
			Typ	
C_{pd}	Power dissipation capacitance per gate	$f = 1\text{MHz}$	14.8	pF
C_i	Input Capacitance	$V_i = V_{CC} - \text{or GND}$	4.0	pF

Switching Characteristics

Symbol	Parameter	Test Conditions	V_{CC}	$T_A = +25^\circ\text{C}$			$-40^\circ\text{C to } +85^\circ\text{C}$		$-40^\circ\text{C to } +125^\circ\text{C}$		Unit
				Min	Typ	Max	Min	Max	Min	Max	
t_{PD}	Propagation Delay A_N to Y_N	Figure 1 $C_L = 15\text{pF}$	4.5V to 5.5V	0.5	3.4	6.9	0.5	8.0	0.5	9.0	ns
		Figure 1 $C_L = 50\text{pF}$	4.5V to 5.5V	0.5	4.9	10.0	0.5	10.0	0.5	11.0	

Parameter Measurement Information



V_{CC}	Inputs		V_M Inputs	V_M Outputs	C_L
	V_I	t_r/t_f			
4.5V to 5.5V	3.0 V	3ns	1.5 V	$V_{CC}/2$	15pF, 50pF

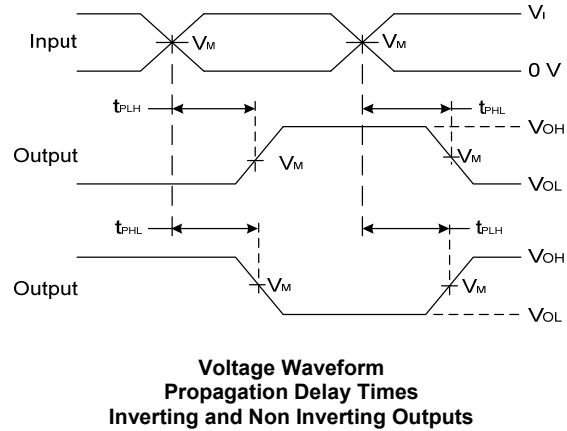
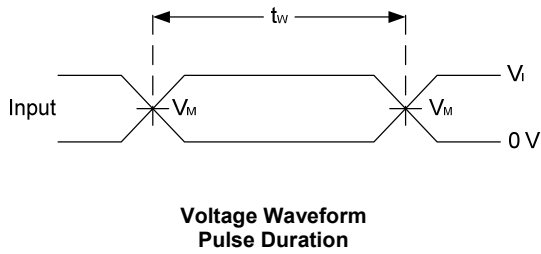
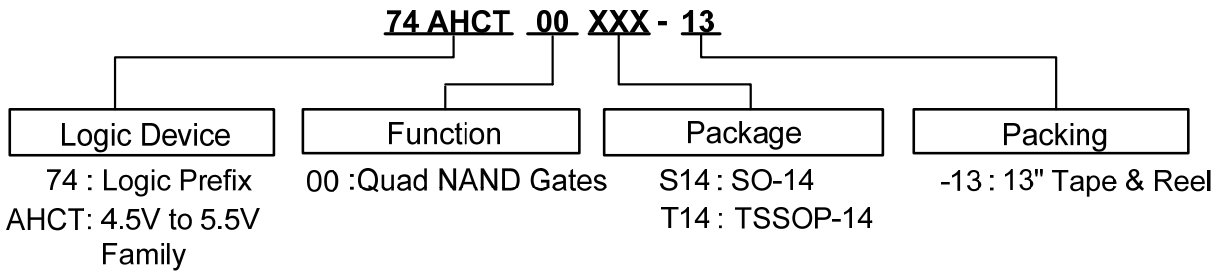


Figure 1 Load Circuit and Voltage Waveforms

- 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_{PLH} and t_{PHL} are the same as t_{PD} .

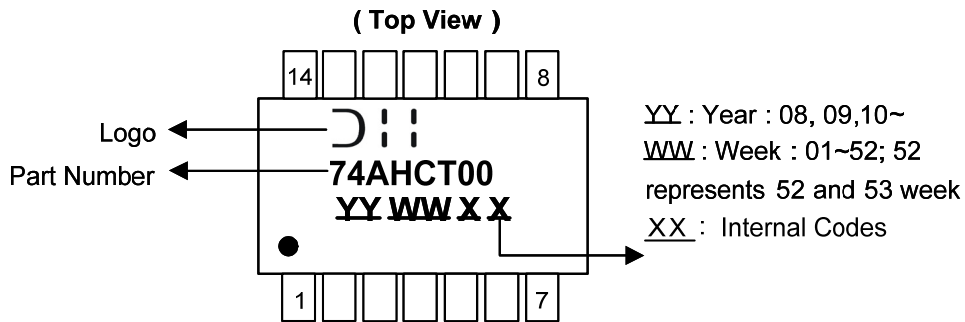
Ordering Information



Part Number	Package Code	Packaging	7" Tape and Reel	
			Quantity	Part Number Suffix
74AHCT00S14-13	S14	SO-14	2500/Tape & Reel	-13
74AHCT00T14-13	T14	TSSOP-14	2500/Tape & Reel	-13

Marking Information

(1) SO-14, TSSOP-14

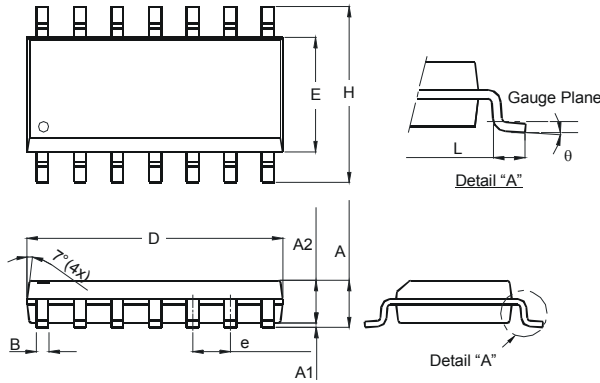


Part Number	Package
74AHCT00S14	SO-14
74AHCT00T14	TSSOP-14

Package Outline Dimensions (All dimensions in mm.)

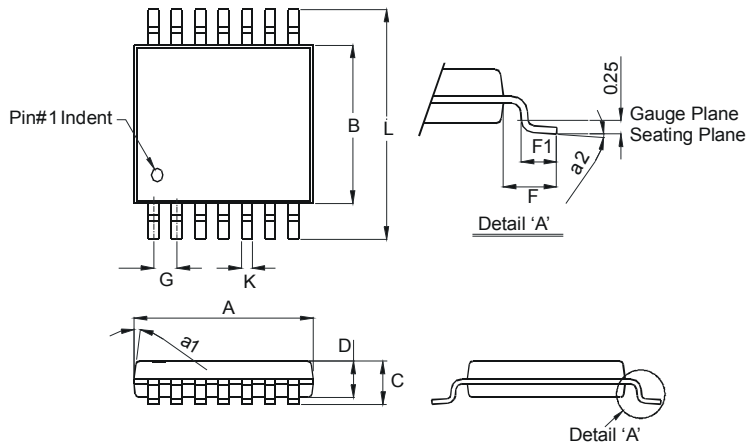
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.

Package Type: SO-14



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

Package Type: TSSOP-14

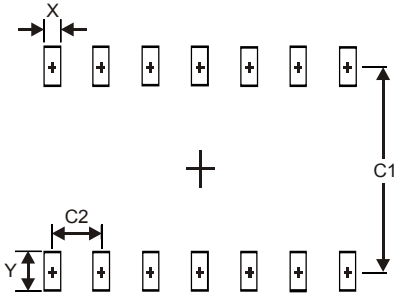


TSSOP-14		
Dim	Min	Max
a1	7° (4X)	
a2	0°	8°
A	4.9	5.10
B	4.30	4.50
C	—	1.2
D	0.8	1.05
F	1.00 Typ	
F1	0.45	0.75
G	0.65 Typ	
K	0.19	0.30
L	6.40 Typ	
All Dimensions in mm		

Suggested Pad Layout

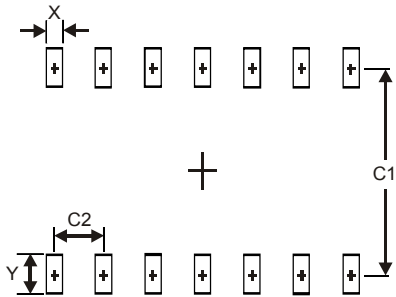
Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.

Package Type: SO-14



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

Package Type: TSSOP-14



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

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