



**THE DATASHEET OF
74AHCU04S14-13**



Description

The 74AHCU04 provides provides six independent unbuffered inverters 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:

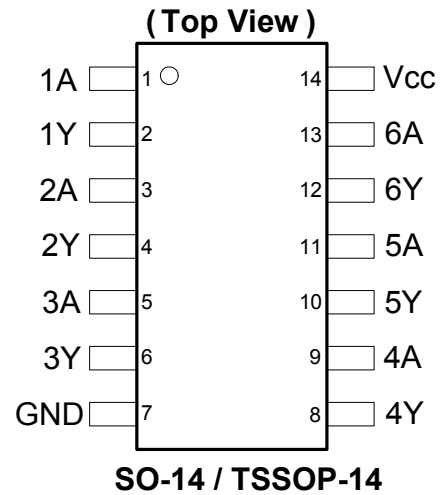
$$Y = \overline{A}$$

Features

- Wide Supply Voltage Range from 2.0V to 5.5V
- Sinks or Sources 8mA at $V_{CC} = 4.5V$
- 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)**

- 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

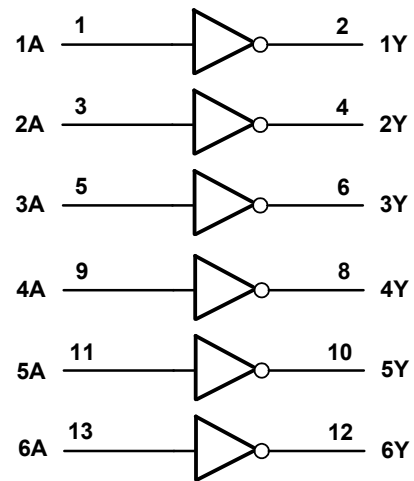
- Suited for use as an inverter in a crystal oscillator
- General Purpose Logic
- Wide array of products such as:
 - PCs, Networking, Notebooks, Netbooks
 - Computer Peripherals, Hard Drives, CD/DVD ROM
 - TV, DVD, DVR, Set Top Box

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

Pin Descriptions

Pin Number	Pin Name	Function
1	1A	Data Input
2	1Y	Data Output
3	2A	Data Input
4	2Y	Data Output
5	3A	Data Input
6	3Y	Data Output
7	GND	Ground
8	4Y	Data Output
9	4A	Data Input
10	5Y	Data Output
11	5A	Data Input
12	6Y	Data Output
13	6A	Data Input
14	V _{CC}	Supply Voltage

Logic Diagram



Function Table

Input	Output
A	Y
L	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 < -0.5V	-20	mA
I _{OK}	Output Clamp Current V _O > V _{CC} + 0.5V	25	mA
I _O	Continuous Output Current -0.5V < V _O < V _{CC} + 0.5V	+/- 25	mA
I _{CC}	Continuous Current Through V _{CC}	75	mA
I _{GND}	Continuous Current Through GND	-75	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	Conditions	Min	Max	Unit
V_{CC}	Supply Voltage		2.0	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	$V_{CC} = 3.0\text{V to }3.6\text{V}$		100	ns/V
		$V_{CC} = 4.5\text{V to }5.5\text{V}$		20	
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		2.0V	1.7		1.7		V
			3.0V	2.4		2.4		
			5.5V	4.4		4.4		
V_{IL}	Low-Level input Voltage		2.0V		0.3		0.3	V
			3.0 V		0.6		0.6	
			5.5V		1.1		1.1	
V_{OH}	High-Level Output Voltage	$I_{OH} = -50\mu\text{A}$	2.0V	1.8		1.8		V
		$I_{OH} = -50\mu\text{A}$	3.0V	2.7		2.7		
		$I_{OH} = -50\mu\text{A}$	4.5V	4.0		4.0		
		$I_{OH} = -4\text{mA}$	3.0V	2.48		2.40		
		$I_{OH} = -8\text{mA}$	4.5V	3.80		3.70		
V_{OL}	Low-Level Output Voltage	$I_{OL} = 50\mu\text{A}$	2.0V		0.2		0.2	V
		$I_{OL} = 50\mu\text{A}$	3.0V		0.3		0.3	
		$I_{OL} = 50\mu\text{A}$	4.5V		0.5		0.5	
		$I_{OL} = 4\text{mA}$	3.0V		0.44		0.55	
		$I_{OL} = 8\text{mA}$	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

Operating Characteristics

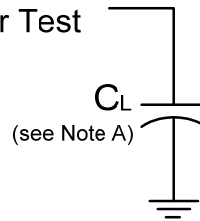
Parameter		Test Conditions	$V_{CC} = 2.0\text{V}$	$V_{CC} = 3.3\text{V}$	$V_{CC} = 5\text{V}$	Unit
			Typ	Typ	Typ	
C_{pd}	Power Dissipation Capacitance per Gate	$f = 1\text{MHz}$	7.9	8.3	9.1	pF
C_i	Input Capacitance	$V_I = V_{CC} - \text{ or } \text{GND}$	4.0	4.0	4.0	pF

Switching Characteristics

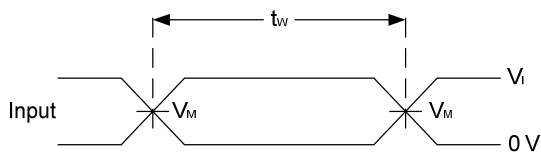
Symbol	Parameter	Test Conditions	V _{CC}	T _A = +25°C			-40°C to +85°C		-40°C to +125°C		Unit
				Min	Typ	Max	Min	Max	Min	Max	
t _{PD}	Propagation Delay A _N to Y _N	Figure 1 C _L = 15pF	3.0V to 3.6V	0.5	3.0	7.1	0.5	8.0	0.5	9.0	ns
			4.5V to 5.5V	0.5	2.4	5.5	0.5	6.5	0.5	7.0	
		Figure 1 C _L = 50pF	3.0V to 3.6V	0.5	3.4	10.6	0.5	12.0	0.5	13.5	
			4.5V to 5.5V	0.5	3.5	7.0	0.5	8.0	0.5	9.0	

Parameter Measurement Information

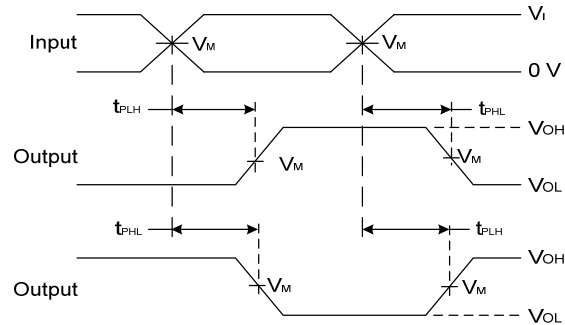
From Output Under Test



V _{CC}	Inputs		V _M	C _L
	V _I	t _r /t _f		
3.3V to 3.6V	V _{CC}	3ns	V _{CC} /2	15pF, 50pF
4.5V to 5.5V	V _{CC}	3ns	V _{CC} /2	15pF, 50pF



**Voltage Waveform
Pulse Duration**

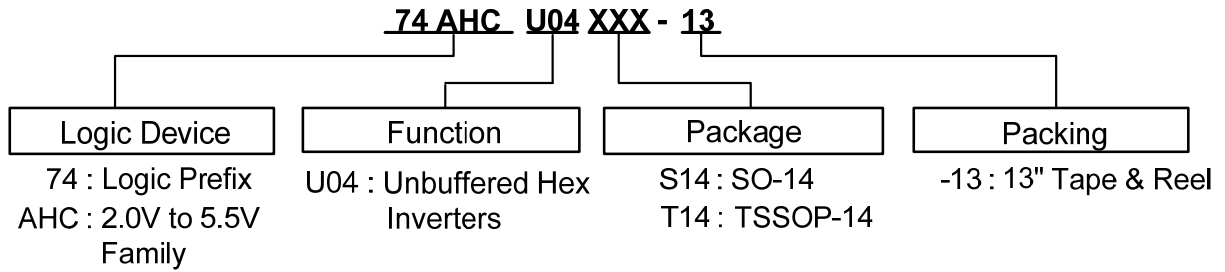


**Voltage Waveform
Propagation Delay Times
Inverting and Non Inverting Outputs**

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

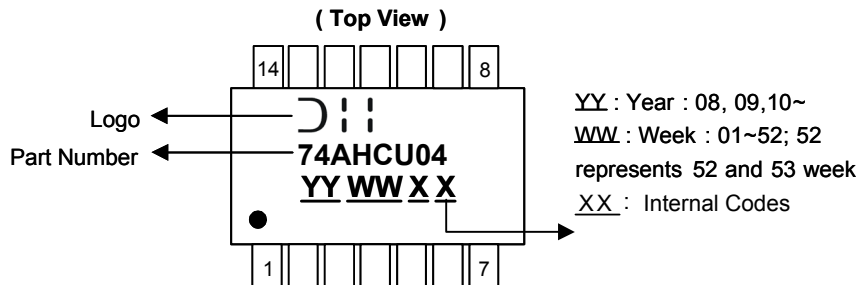
Ordering Information



Part Number	Package Code	Packaging	7" Tape and Reel	
			Quantity	Part Number Suffix
74AHC04S14-13	S14	SO-14	2500/Tape & Reel	-13
74AHC04T14-13	T14	TSSOP-14	2500/Tape & Reel	-13

Marking Information

(1) SO-14, TSSOP-14

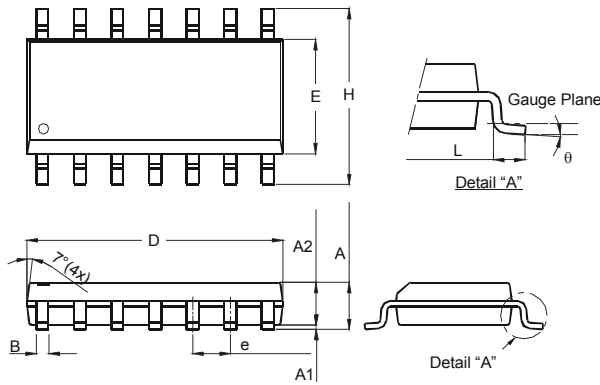


Part Number	Package
74AHC04S14	SO-14
74AHC04T14	TSSOP-14

Package Outline Dimensions (All dimensions in mm.)

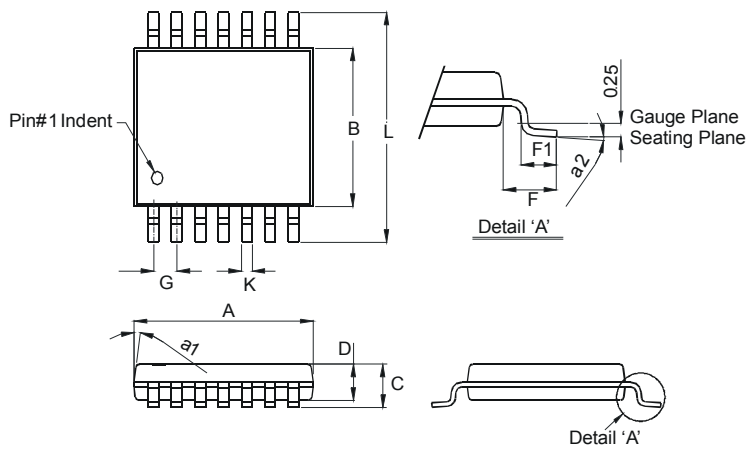
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.

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

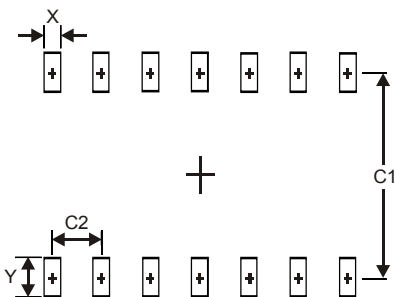


TSSOP-14		
Dim	Min	Max
a1	7° (4X)	
a2	0°	8°
A	4.9	5.10
B	4.30	4.50
C	—	1.2
D	0.8	1.05
F	1.00 Typ	
F1	0.45	0.75
G	0.65 Typ	
K	0.19	0.30
L	6.40 Typ	
All Dimensions in mm		

Suggested Pad Layout

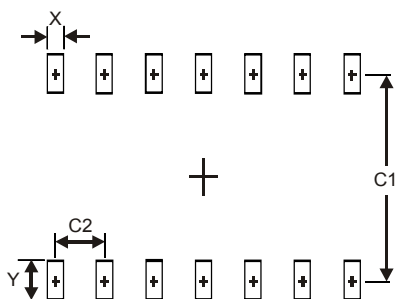
Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.

Package Type: SO-14



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

NEW PRODUCT

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