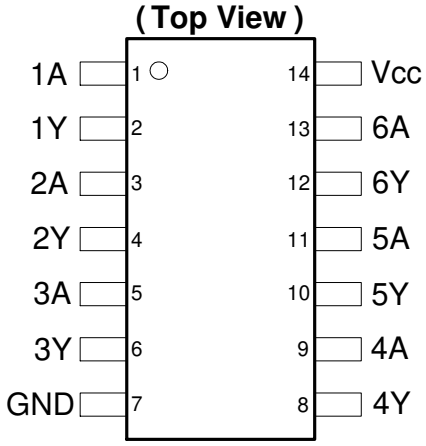
Description

The 74HCU04 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 6.0V.

The gates perform the Boolean function:

$$Y = \overline{A}$$

Pin Assignments



SO-14 / TSSOP-14

Features

- Wide Supply Voltage Range from 2.0V to 6.0V
- Sinks or Sources 4mA 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)
- 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)**

Applications

- Crystal Oscillators, Analog Inverters
- 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

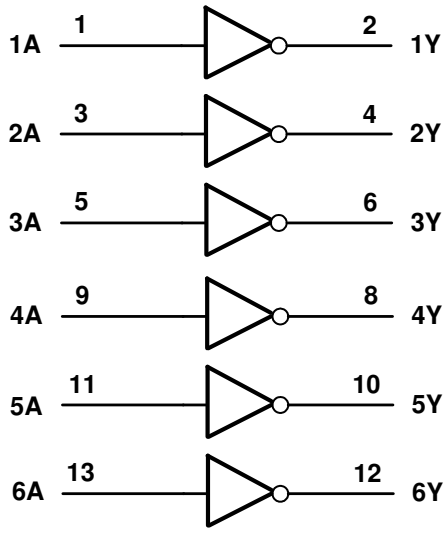
Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

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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**
H	L
L	H

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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 (Note 5)	-0.5 to +7.0	V
I_{IK}	Input Clamp Current V_I < -0.5V or Vi > V_{CC} +0.5V	±20	mA
I_{OK}	Output Clamp Current V_O < -0.5V or V_O > V_{CC} +0.5V	±20	mA
I_O	Continuous Output Current -0.5V < V_O V_{CC} +0.5V	±25	mA
I_{CC}	Continuous Current Through Vcc	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

Notes: 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.
5. Input Voltage cannot exceed V_{CC} to the extent the Maximum clamp current is exceeded.

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

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CC}	Supply Voltage	—	2.0	6.0	V
V_I	Input Voltage	—	0	V_{CC}	V
V_O	Output Voltage	—	0	V_{CC}	V
Δt/ΔV	Input Transition Rise or Fall Rate	V_{CC} = 2.0V	—	625	ns/V
		V_{CC} = 4.5V	—	140	
		V_{CC} = 6.0V	—	85	
T_A	Operating Free-Air Temperature	—	-40	+125	°C

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

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Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Symbol	Parameter	Test Conditions	V_{CC}	T_A = -40°C to +85°C		T_A = -40°C to +125°C		Unit
				Min	Max	Min	Max	
V_{IH}	High-Level Input Voltage	—	2.0V	1.7	—	1.7	—	V
		—	4.5V	3.6	—	3.6	—	
		—	6.0V	4.8	—	4.8	—	
V_{IL}	Low-Level Input Voltage	—	2.0V	—	0.3	—	0.3	V
		—	4.5V	—	0.9	—	0.9	
		—	6.0V	—	1.2	—	1.2	
V_{OH}	High-Level Output Voltage	I_{OH} = -20μA	2.0V	1.8	—	1.9	—	V
		I_{OH} = -20μA	4.5V	4.0	—	4.0	—	
		I_{OH} = -20μA	6.0V	5.5	—	5.5	—	
		I_{OH} = -4.0mA	4.5V	3.84	—	3.7	—	
		I_{OH} = -5.2mA	6.0V	5.34	—	5.2	—	
V_{OL}	Low-Level Output Voltage	I_{OL} = 20μA	2.0V	—	0.2	—	0.2	V
		I_{OL} = 20μA	4.5V	—	0.5	—	0.5	
		I_{OL} = 20μA	6.0V	—	0.5	—	0.5	
		I_{OL} = 4mA	4.5V	—	0.33	—	0.40	
		I_{OL} = 5.2mA	6.0V	—	0.33	—	0.40	
I_I	Input Current	V_I = GND to 5.5V	6.0V	—	±1	—	±1	μA
I_{CC}	Supply Current	V_I = GND or V_{CC}, I_O = 0	6.0V	—	20	—	40	μA

Switching Characteristics

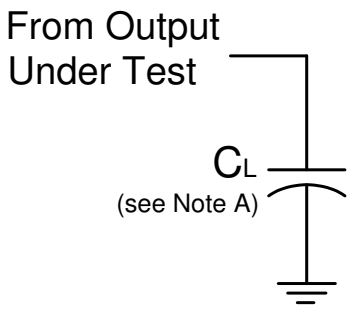
Symbol	Parameter	Test Conditions	V_{CC}	T_A = +25°C			-40°C to +85°C	-40°C to +125°C	Unit
				Min	Typ	Max	Max	Max	
t_{PD}	Propagation Delay A_N to Y_N	Figure 1 C_L = 50pF	2.0V	—	19	70	90	105	ns
			4.5V	—	7	14	18	21	
			6.0V	—	5	12	15	18	
t_t	Transition Time	Figure 1 C_L = 50pF	2.0V	—	19	75	95	110	ns
			4.5V	—	7	15	19	22	
			6.0V	—	6	13	16	19	

Operating Characteristics (@T_A = +25°C, unless otherwise specified.)

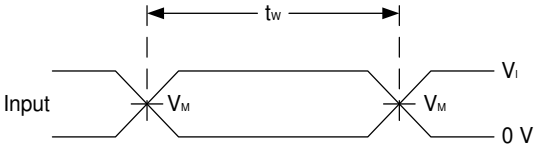
Parameter		Test Conditions	V_{CC} = 6V	Unit
			Typ	
C_{pd}	Power Dissipation Capacitance per Gate	f = 1MHz	10	pF
C_I	Input Capacitance	V_I = V_{CC} – or GND	4	pF

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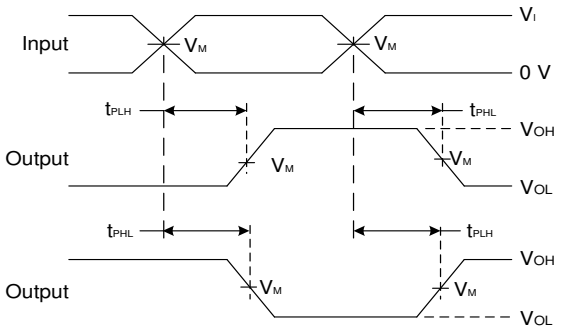
Parameter Measurement Information



V_{CC}	Inputs		V_M	C_L
	V_I	t_r/t_f		
2.0V to 6.0V	V_{CC}	6ns	$V_{CC}/2$	15pF, 50pF



Voltage Waveform
Pulse Duration



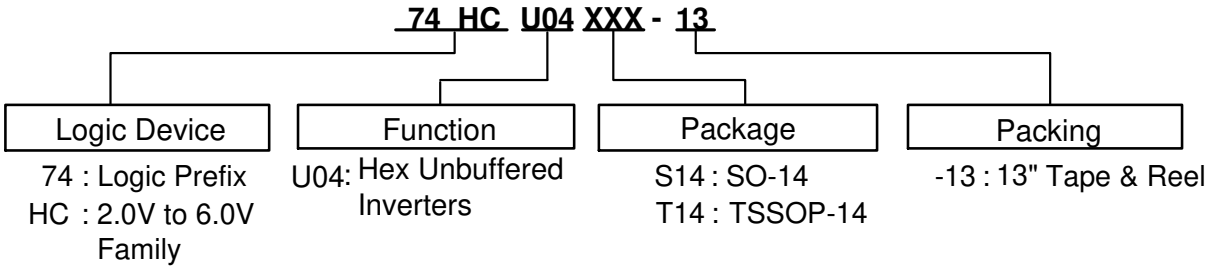
Voltage Waveform
Propagation Delay Times
Inverting and Non Inverting Outputs

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

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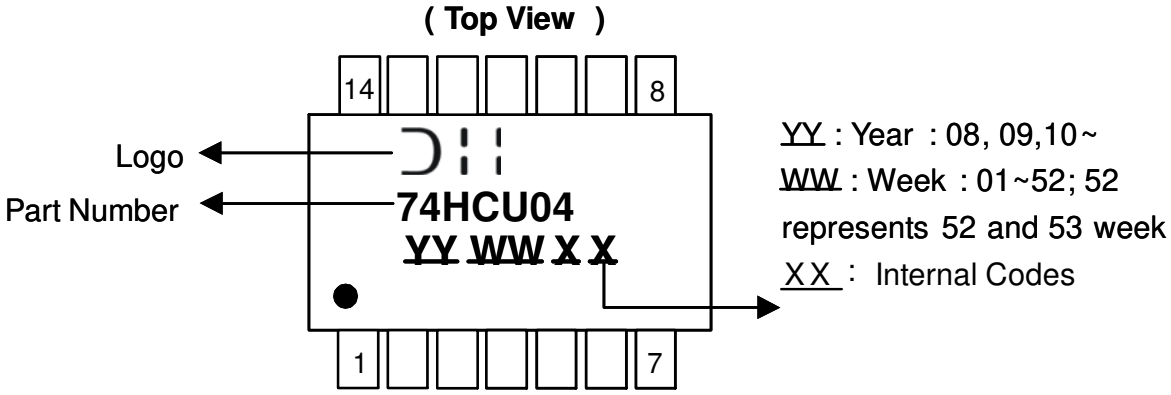
Ordering Information



Device	Package Code	Packaging (Note 7)	7" Tape and Reel	
			Quantity	Part Number Suffix
74HCU04S14-13	S14	SO-14	2500/Tape & Reel	-13
74HCU04T14-13	T14	TSSOP-14	2500/Tape & Reel	-13

Marking Information

(1) SO-14, TSSOP-14



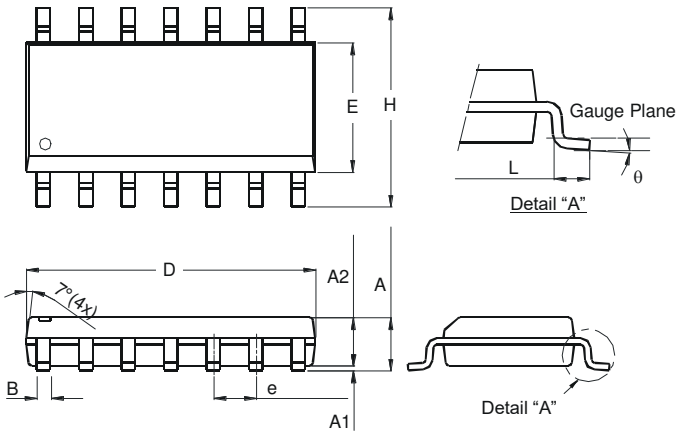
Part Number	Package
74HCU04S14	SO-14
74HCU04T14	TSSOP-14

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Package Outline Dimensions (All dimensions in mm.)

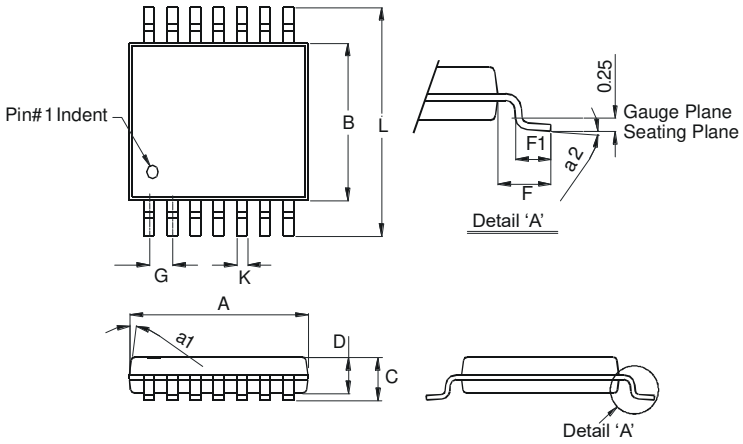
Please see http://www.diodes.com/package-outlines.html for the latest version.

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		

TSSOP-14



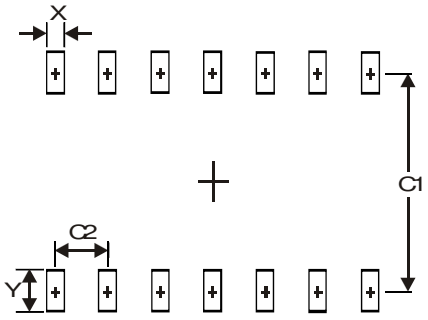
TSSOP-14		
Dim	**Min**	**Max**
a1	7° (4X)	
a2	0°	8°
A	4.9	5.10
B	4.30	4.50
C	-	1.2
D	0.8	1.05
F	1.00 Typ	
F1	0.45	0.75
G	0.65 Typ	
K	0.19	0.30
L	6.40 Typ	
All Dimensions in mm		

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Suggested Pad Layout

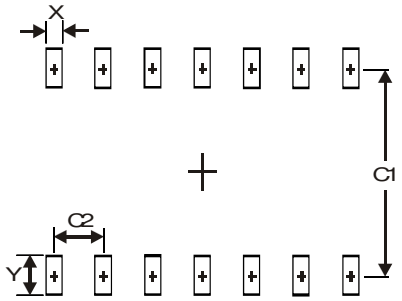
Please see http://www.diodes.com/package-outlines.html for the latest version.

SO-14



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

TSSOP-14



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

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