

HEX INVERTERS WITH SCHMITT TRIGGER INPUTS

Description

The 74HC14 provides six independent Schmitt trigger input inverters with standard push-pull outputs. The device is designed for operation with a power supply range of 2.0V to 6.0V.

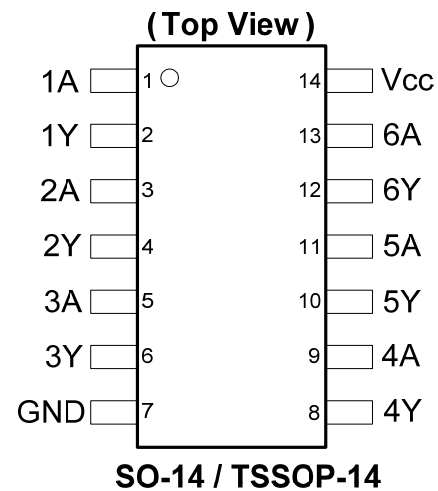
The gates perform the Boolean function:

$$Y = \overline{A}$$

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)**

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

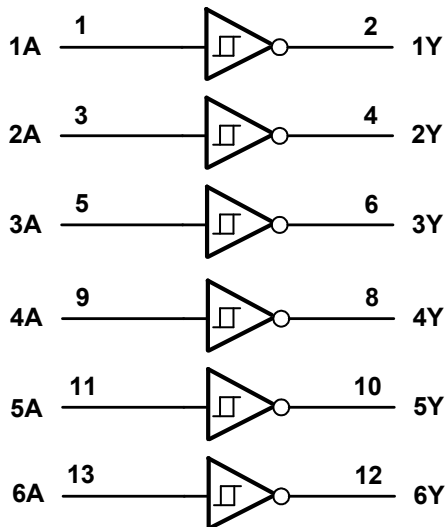
Notes:

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	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

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 V _I > 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 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

- Notes:
- 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.
 - 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:
- Unused inputs should be held at V_{CC} or Ground.

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 _{T+}	Positive-Going Input Threshold Voltage		2.0V	0.7	1.5	0.7	1.5	V
			4.5V	1.7	3.15	1.7	3.15	
			6.0V	2.1	4.2	2.1	4.2	
V _{T-}	Negative-Going Input Threshold Voltage		2.0V	0.3	0.9	0.3	0.9	V
			4.5V	0.9	2.0	0.9	2.0	
			6.0V	1.2	2.6	1.2	2.6	
ΔV _T	Hysteresis (V _{T+} - V _{T-})		2.0V	0.2	1.0	0.2	1.0	V
			4.5V	0.4	1.4	0.4	1.4	
			6.0V	0.6	1.6	0.6	1.6	
V _{OH}	High Level Output Voltage	I _{OH} = -20μA	2.0V	1.9		1.9		V
		I _{OH} = -20μA	4.5V	4.4		4.4		
		I _{OH} = -20μA	6.0V	5.9		5.9		
		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		0.1		0.1	V
		I _{OL} = 20μA	4.5V		0.1		0.1	
		I _{OL} = 20μA	6.0V		0.1		0.1	
		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

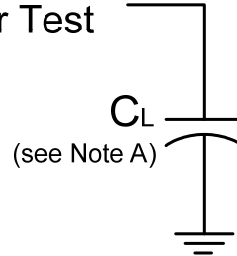
Symbol	Parameter	Test Conditions	V _{CC}	T _A = +25°C			-40°C to +85°C	-40°C to +125°C	Unit
				Min	Typ	Max	Max	Max	
t _{PD}	Propagation Delay A _N to Y _N	Figure 1 C _L = 50 pF	2.0V	—	42	125	155	190	ns
			4.5V	—	15	25	31	38	
			6.0V	—	12	21	26	32	
t _t	Transition Time	Figure 1 C _L = 50 pF	2.0V	—	19	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.)

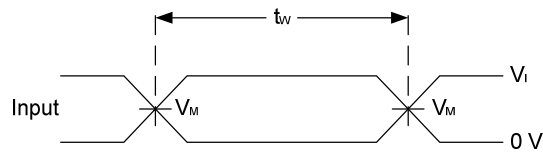
Parameter		Test Conditions	V _{CC} = 6V	Unit
			Typ	
C _{pd}	Power dissipation capacitance per gate	f = 1 MHz	20	pF
C _I	Input Capacitance	V _I = V _{CC} – or GND	4	pF

Parameter Measurement Information

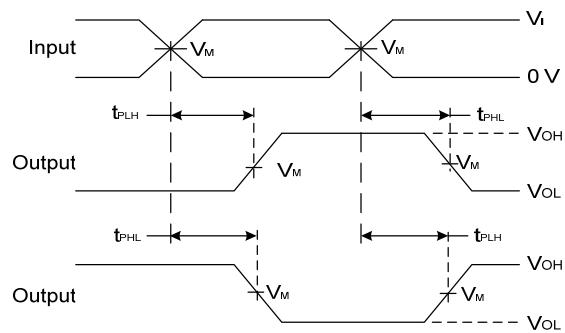
From Output
Under Test



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**

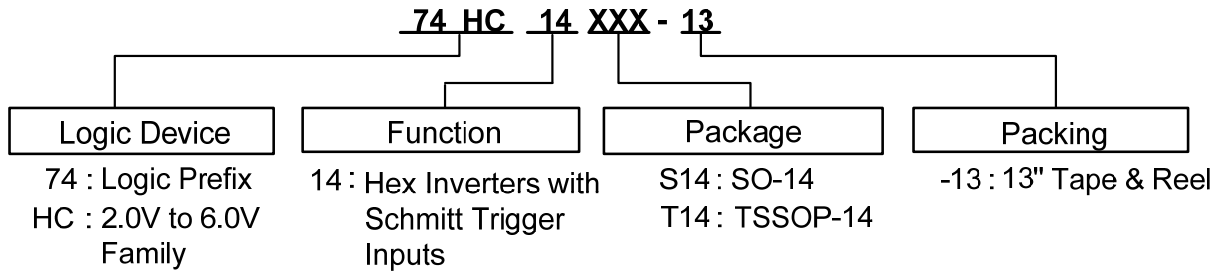


**Voltage Waveform
Propagation Delay Times
Inverting and Non Inverting Outputs**

- 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

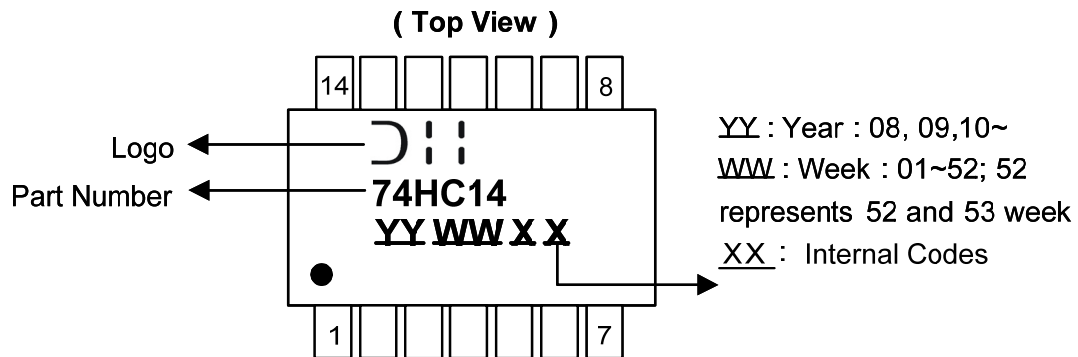
Ordering Information



Device	Package Code	Packaging	7" Tape and Reel	
			Quantity	Part Number Suffix
74HC14S14-13	S14	SO-14	2500/Tape & Reel	-13
74HC14T14-13	T14	TSSOP-14	2500/Tape & Reel	-13

Marking Information

(1) SO-14, TSSOP-14



Part Number	Package
74HC14S14	SO-14
74HC14T14	TSSOP-14

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

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		

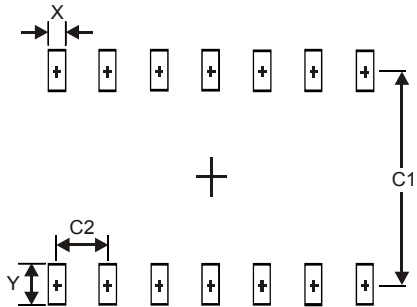
Figure 1 illustrates the dimensions and details of the test specimen. The main dimensions are labeled as A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z. The details are labeled as Detail 'A' and Detail 'B'.

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

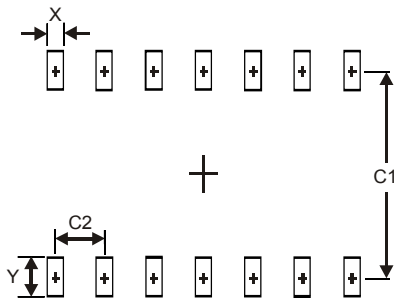
Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for latest version.

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

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Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:

moschip.ru

moschip.ru_4

moschip.ru_6

moschip.ru_9