

HEX INVERTERS WITH OPEN DRAIN OUTPUTS

Description

The 74HCT05 provides provides six independent inverters with open drain outputs. The device is designed for operation with a power supply range of 4.5V to 5.5V.

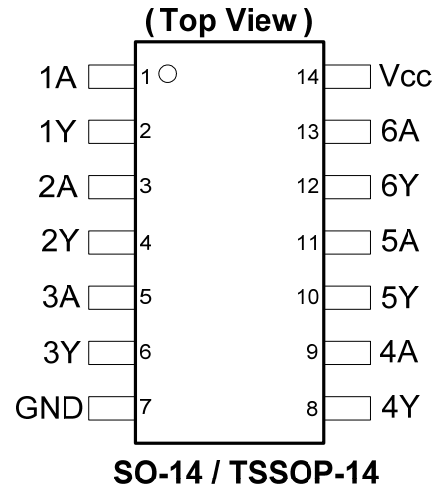
The gates perform the Boolean function:

$$Y = \overline{A}$$

Features

- Wide Supply Voltage Range from 4.5V to 5.5V
- Pin Compatible with Low Power Schottky (LSTTL)
- Inputs Are TTL Voltage Level Compatible
- Sinks 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

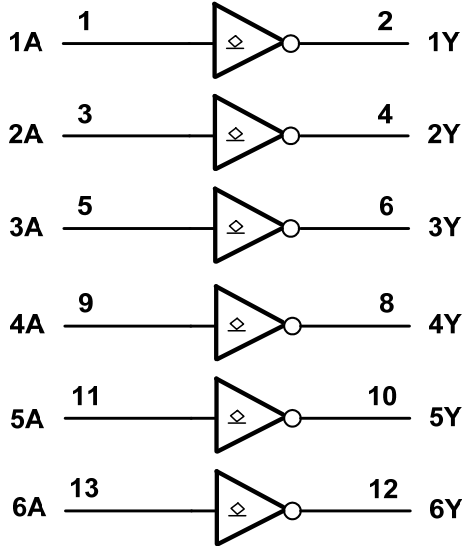
- General Purpose Logic
- Wide array of products such as:
 - PCs, networking, notebooks, netbooks
 - Computer peripherals, hard drives, CD/DVD ROM
 - TV, DVD, DVR, set top box

- 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	Vcc	Supply Voltage

Logic Diagram



Function Table

Input	Output
A	Y
H	L
L	Z

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		4.5	5.5	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} = 4.5V to 5.5V		500	ns/V
T _A	Operating Free-Air Temperature		-40	+125	°C

- Note: 6. 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 _{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 _{OL}	Low-level Output Voltage	I _{OL} = 20μA	4.5V		0.1		0.1	V
		I _{OL} = 4.0 mA	4.5V		0.33		0.4	
I _{OZ}	Z State Leakage Current	V _O = 0 to 5.5V V _I = V _{IL}	5.5V		± 5.0		± 10	μA
I _I	Input Current	V _I = GND to 6.0V	6.0V		± 1		± 1	μA
I _{CC}	Supply Current	V _I = GND or V _{CC} , I _O = 0	6.0V		20		40	μA
ΔI _{CC}	Additional Supply Current	One Input at V _{CC} -2.1V Other Pins at V _{CC} or GND	4.5V to 5.5V		540		590	μA

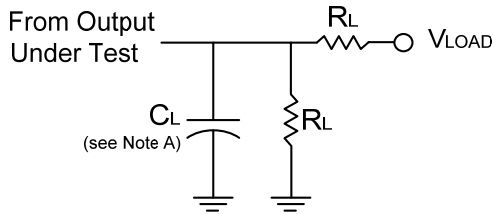
Switching Characteristics

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	4.5V	—	12	20	24	27	ns
t _t	Transition time	Figure 1 C _L = 50pF	4.5V	—	7	14	19	22	ns

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

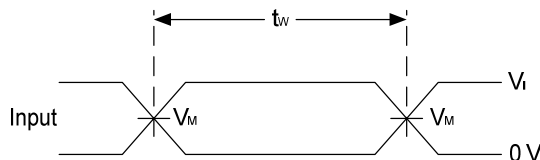
Parameter		Test Conditions	V _{CC} = 5.5V	Unit
			Typ	
C _{pd}	Power Dissipation Capacitance per Gate	f = 1MHz	17	pF
C _i	Input Capacitance	V _i = V _{CC} – or GND	4	pF

Parameter Measurement Information

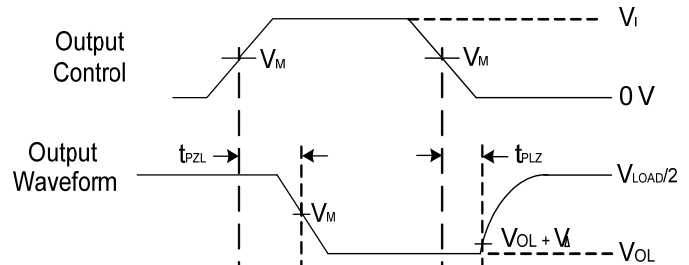


TEST	Condition
t _{PLZ} (see Notes D and E)	V _{load}
t _{PZL} (see Notes D and F)	V _{load}

V _{CC}	Inputs		V _M	V _{LOAD}	C _L	R _L	V _Δ
	V _i	t _r /t _f					
4.5V	1.5V	≤6ns	3.0V	2 X V _{CC}	50pF	2KΩ	10% of V _{CC}



Voltage Waveform Pulse Duration

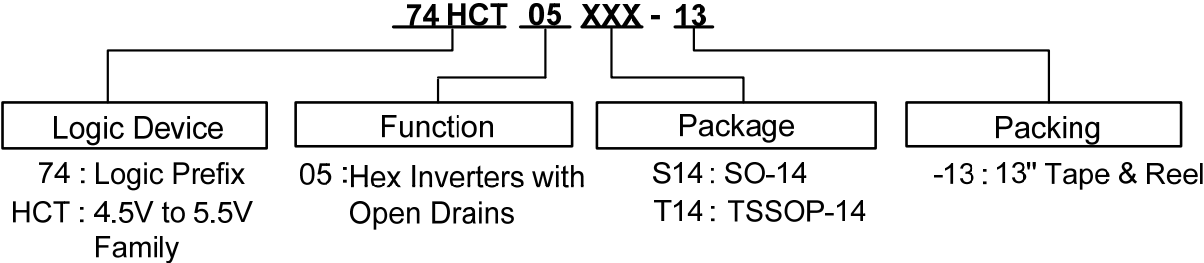


Voltage Waveform Propagation Delay Times

- Notes:
- A. Includes test lead and test apparatus capacitance.
 - B. All pulses are supplied at pulse repetition rate ≤ 1 MHz
 - C. The inputs are measured one at a time with one transition per measurement.
 - D. For the open drain device t_{PLZ} and t_{PZL} are the same as t_{PD}
 - E. t_{PZL} is measured at V_M.
 - D. t_{PLZ} is measured at V_{OL} + V_Δ
 - F. A Thevenin equivalent load may be used in place of V_{CC} X 2 and resistor divider

Figure 1 Load Circuit and Voltage Waveforms

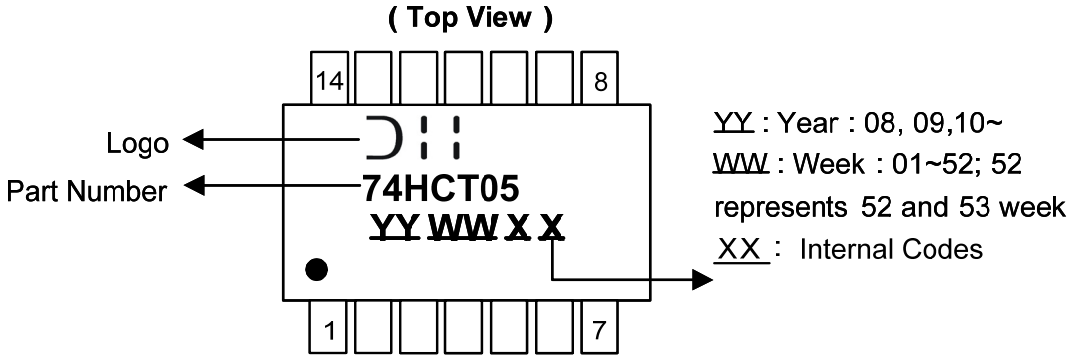
Ordering Information



Device	Package Code	Packaging	7" Tape and Reel	
			Quantity	Part Number Suffix
74HCT05S14-13	S14	SO-14	2500/Tape & Reel	-13
74HCT05T14-13	T14	TSSOP-14	2500/Tape & Reel	-13

Marking Information

(1) SO-14, TSSOP-14

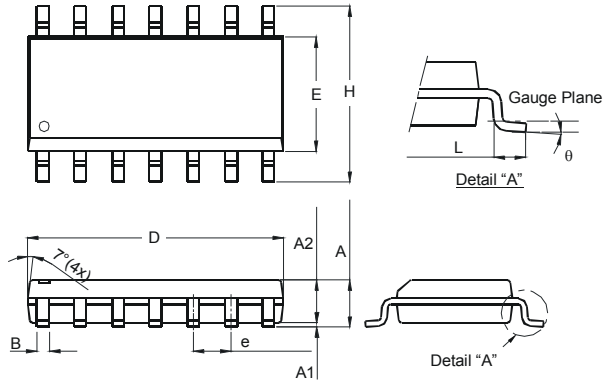


Part Number	Package
74HCT05S14	SO-14
74HCT05T14	TSSOP-14

Package Outline Dimensions (All dimensions in mm.)

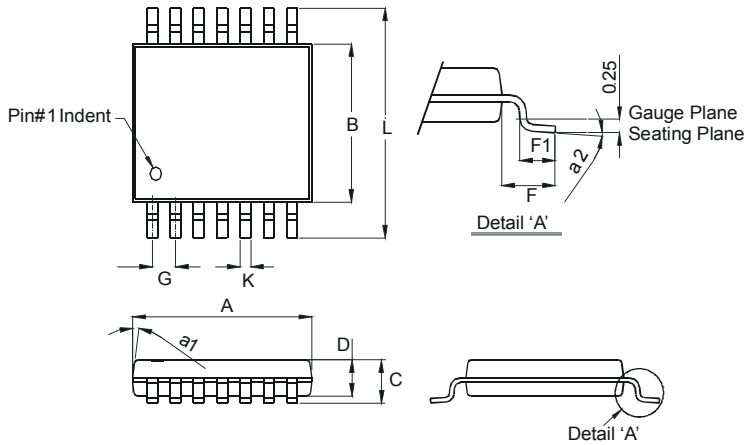
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.

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

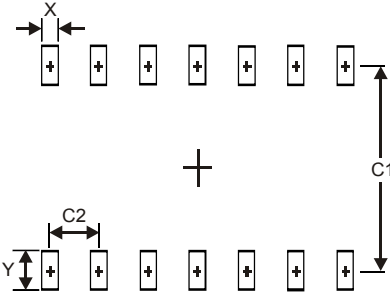


TSSOP-14		
Dim	Min	Max
a1	7° (4X)	
a2	0°	8°
A	4.9	5.10
B	4.30	4.50
C	—	1.2
D	0.8	1.05
F	1.00 Typ	
F1	0.45	0.75
G	0.65 Typ	
K	0.19	0.30
L	6.40 Typ	
All Dimensions in mm		

Suggested Pad Layout

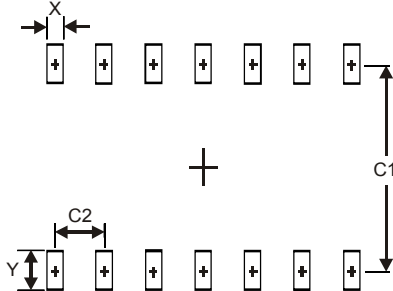
Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for latest version.

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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