



## U74HCT04

CMOS IC

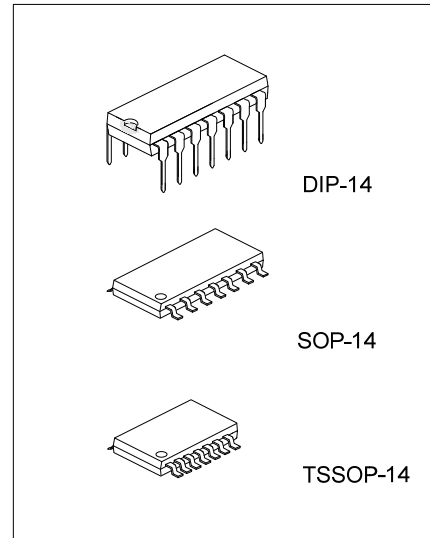
### HEX INVERTERS

#### DESCRIPTION

The **U74HCT04** devices contain six independent inverters. They perform the Boolean function  $Y = \bar{A}$  in positive logic.

#### FEATURES

- \* Operating Voltage Range of 4.5V to 5.5V
- \* Low Power Consumption, 20µA Max I<sub>CC</sub>
- \* Typical t<sub>PD</sub>=13ns
- \* ±4mA Output Drive at 5V
- \* Low Input Current of 1uA Max
- \* Inputs are TTL-Voltage compatible



#### ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74HCT04L-D14-T	U74HCT04G-D14-T	DIP-14	Tube
U74HCT04L-S14-R	U74HCT04G-S14-R	SOP-14	Tape Reel
U74HCT04L-P14-R	U74HCT04G-P14-R	TSSOP-14	Tape Reel

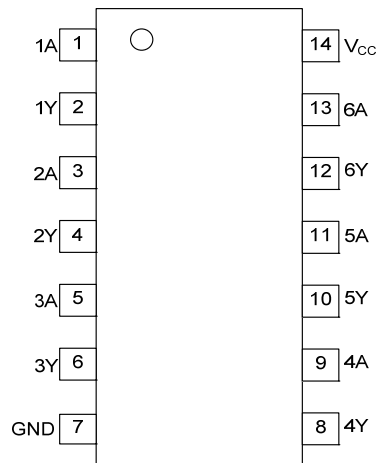
<p>U74HCT04G-D14-T</p> <p>(1)Packing Type (2)Package Type (3)Green Package</p>	<p>(1) R: Tape Reel, T: Tube (2) D14: DIP-14, P14: TSSOP-14, S14: SOP-14 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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#### MARKING

DIP-14	SOP-14 / TSSOP-14
<p>14 13 12 11 10 9 8 → Date Code UTC □□□□ U74HCT04 □ □□ → Lot Code</p> <p>L: Lead Free G: Halogen Free</p>	<p>14 13 12 11 10 9 8 → Date Code UTC □□□□ U74HCT04 □ □□ → Lot Code</p> <p>L: Lead Free G: Halogen Free</p>



■ PIN CONFIGURATION



■ FUNCTION TABLE (each gate)

INPUT(A)	OUTPUT(Y)
L	H
H	L

■ LOGIC DIAGRAM (positive logic)

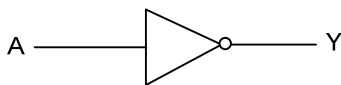


Fig.1 logic diagram for U74HCT04

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■ ABSOLUTE MAXIMUM RATING (T<sub>A</sub>=25°C, unless otherwise specified) (Note 2)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V <sub>CC</sub>	-0.5 ~ 7	V
Input Clamp Current (V <sub>I</sub> <0)	I <sub>IK</sub>	±20	mA
Output Clamp Current (V <sub>O</sub> <0)	I <sub>OK</sub>	±20	mA
Output Current	I <sub>OUT</sub>	±25	mA
V <sub>CC</sub> or GND Current	I <sub>CC</sub>	±50	mA
Storage Temperature	T <sub>STG</sub>	-65 ~ +150	°C

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	DIP-14	80	°C/W
	SOP-14	86	
	TSSOP-14	113	

■ RECOMMENDED OPERATING CONDITIONS (T<sub>A</sub>=25°C, unless otherwise specified)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V <sub>CC</sub>	Operating	4.5	5	5.5	V
Input Voltage	V <sub>IN</sub>		0		V <sub>CC</sub>	V
Output Voltage	V <sub>OUT</sub>		0		V <sub>CC</sub>	V
Operating Temperature	T <sub>A</sub>		-40		+125	°C
Input transition rise/fall time	Δt/Δv				500	ns

■ STATIC CHARACTERISTICS (T<sub>A</sub>=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
Positive-Going Input Threshold Voltage	V <sub>IH</sub>	V <sub>CC</sub> =4.5~5.5V	2			V	
Negative-Going Input Threshold Voltage	V <sub>IL</sub>	V <sub>CC</sub> =4.5~5.5V			0.8	V	
High-Level Output Voltage	V <sub>OH</sub>	V <sub>CC</sub> =4.5V V <sub>I</sub> =V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> =-20μA	4.4	4.499		V
			I <sub>OH</sub> =-4mA	3.98	4.3		V
Low-Level Output Voltage	V <sub>OL</sub>	V <sub>CC</sub> =4.5V V <sub>I</sub> =V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> =20μA		0.001	0.1	V
			I <sub>OL</sub> =4mA		0.17	0.26	V
Input Leakage Current	I <sub>I</sub>	V <sub>CC</sub> =5.5V		±0.1	±100	nA	
Quiescent Supply Current	I <sub>CC</sub>	V <sub>CC</sub> =5.5V, V <sub>I</sub> =V <sub>CC</sub> or 0, I <sub>O</sub> =0			2	μA	
Additional Quiescent Supply Current	ΔI <sub>CC</sub>	V <sub>CC</sub> =5.5V, One input at 0.5V or 2.4V, other inputs at V <sub>CC</sub> or 0			2.4	mA	
Input Capacitance	C <sub>I</sub>	V <sub>CC</sub> =4.5V to 5.5V		3	10	pF	

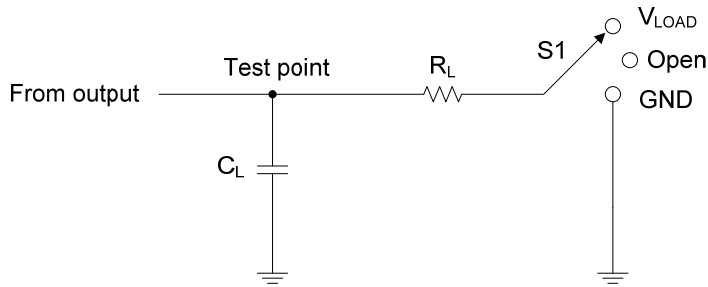
■ DYNAMIC CHARACTERISTICS (Input:  $t_R, t_F=6ns$ ,  $C_L=50pF$ ,  $PRR \leq 1MHz$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation delay from input (A) to output(Y)	$t_{PLH}/t_{PHL}$	$V_{CC}=4.5V$		14	20	ns
		$V_{CC}=5.5V$		13	18	ns
Rise/fall time for output(Y)	$t_t$	$V_{CC}=4.5V$		9	15	ns
		$V_{CC}=5.5V$		8	14	ns

■ OPERATING CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	$C_{PD}$	No Load		20		pF

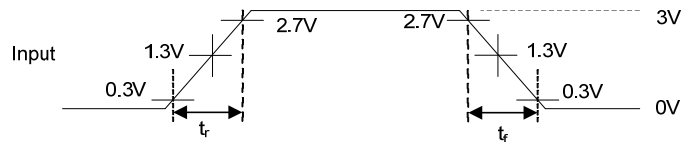
## TEST CIRCUIT AND WAVEFORMS



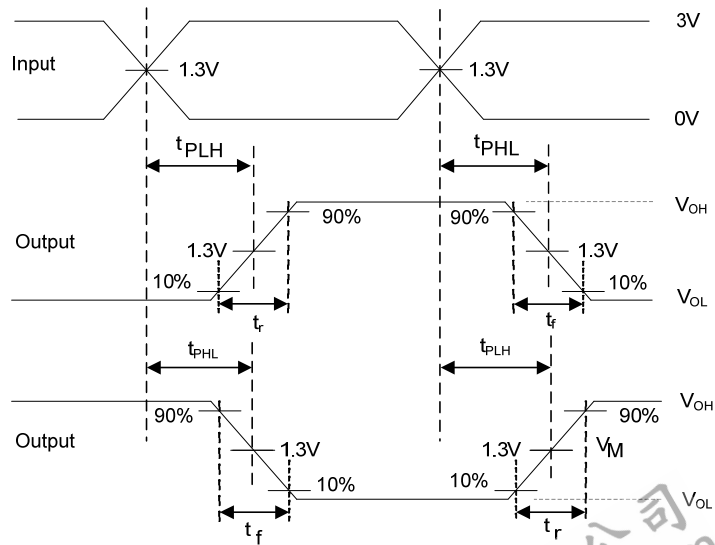
**TEST CIRCUIT**

TEST	S1
$t_{PLH}/t_{PHL}$	Open

Inputs		$V_M$	$V_{LOAD}$	$C_L$
$V_{IN}$	$t_r, t_f$			
3.0 V	6 ns	$V_{CC}/2$	$V_{CC}$	50 pF



**VOLTAGE WAVEFORMS  
INPUT RISE AND FALL TIMES**



**VOLTAGE WAVEFORMS  
PROPAGATION DELAY AND OUTPUT TRANSITION TIMES**

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