



## U74HCU04

Preliminary

CMOS IC

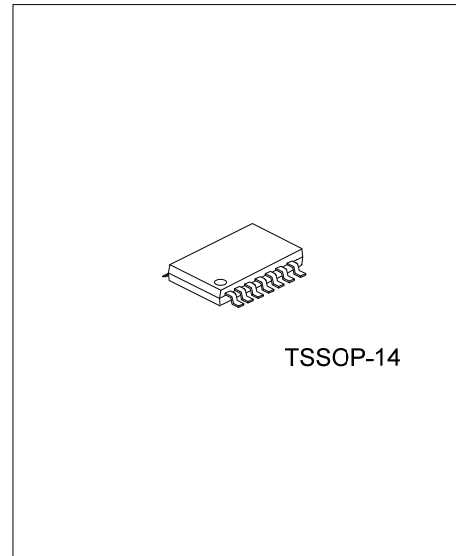
### HEX INVERTERS

#### DESCRIPTION

The **U74HCU04** is designed specifically for 2V to 6V  $V_{CC}$  operation.

This device contains six independent inverters. The devices perform the Boolean function  $Y = \bar{A}$  in positive logic.

This device is fully specified for partial-power-down applications using  $I_{OFF}$ . The  $I_{OFF}$  circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.



#### FEATURES

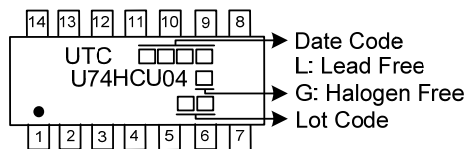
- \* Wide operating voltage range of 2V to 6V
- \* Outputs can drive up to 10 LSTTL loads
- \* Low power consumption, 2µA max  $I_{CC}$
- \* Typical  $t_{PD}=7ns$
- \* ±4mA Output drive at 5V
- \* Low input current of 1µA max
- \* Unbuffered Outputs

#### ORDERING INFORMATION

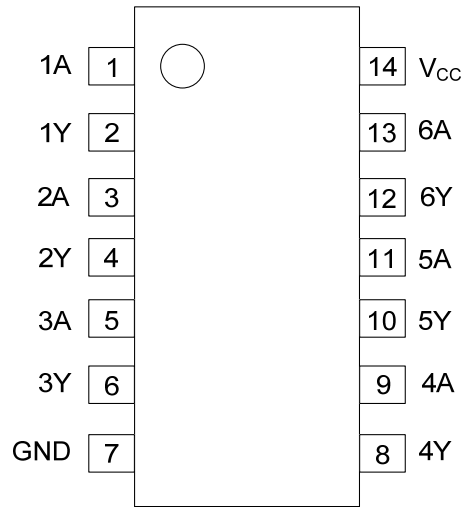
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74HCU04L-P14-R	U74HCU04G-P14-R	TSSOP-14	Tape Reel

<p>U74HCU04G-P14-R</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</p>	<p>(1) R: Tape Reel</p> <p>(2) P14: TSSOP-14</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
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#### MARKING



■ PIN CONFIGURATION

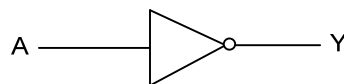


■ FUNCTION TABLE (each gate)

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

Note: H: HIGH Voltage Level    L: LOW Voltage Level

■ LOGIC DIAGRAM (positive logic)



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

PARAMETER	SYMBOL	CONDITIONS	RATINGS	UNIT
Supply Voltage	V <sub>CC</sub>		-0.5 ~ +7	V
Continuous V <sub>CC</sub> or GND Current	I <sub>CC</sub>		±50	mA
Continuous Output Current	I <sub>OUT</sub>		±25	mA
Input Clamp Current	I <sub>IK</sub>	V <sub>IN</sub> <0V	±20	mA
Output Clamp Current	I <sub>OK</sub>	V <sub>OUT</sub> <0V	±20	mA
Storage Temperature Range	T <sub>STG</sub>		-60 ~ +150	°C

Note: 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.

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V <sub>CC</sub>	Operating	2	5	6	V
Input Voltage	V <sub>I</sub>		0		V <sub>CC</sub>	V
Output Voltage	V <sub>O</sub>		0		V <sub>CC</sub>	V
Input Transition Rise or Fall Rate	Δt/Δv	V <sub>CC</sub> =2V			1000	ns/V
		V <sub>CC</sub> =4.5V			500	ns/V
		V <sub>CC</sub> =6V			400	ns/V
Operating Temperature	T <sub>A</sub>		-40		+125	°C

■ ELECTRICAL CHARACTERISTICS (Unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	T <sub>A</sub> =25°C			T <sub>A</sub> =-40~+125°C			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
High-Level Input Voltage	V <sub>IH</sub>	V <sub>CC</sub> =2V	1.7			1.7			V
		V <sub>CC</sub> =4.5V	3.6			3.6			V
		V <sub>CC</sub> =6V	4.8			4.8			V
Low-Level Input Voltage	V <sub>IL</sub>	V <sub>CC</sub> =2V			0.3			0.3	V
		V <sub>CC</sub> =4.5V			0.9			0.9	V
		V <sub>CC</sub> =6V			1.2			1.2	V
High-Level Output Voltage	V <sub>OH</sub>	V <sub>CC</sub> =2V, I <sub>OH</sub> =-20μA	1.8			1.8			V
		V <sub>CC</sub> =4.5V, I <sub>OH</sub> =-20μA	4			4			V
		V <sub>CC</sub> =6V, I <sub>OH</sub> =-20μA	5.5			5.5			V
		V <sub>CC</sub> =4.5V, I <sub>OH</sub> =-4mA	3.98			3.7			V
		V <sub>CC</sub> =6V, I <sub>OH</sub> =-5.2mA	5.48			5.2			V
Low-Level Output Voltage	V <sub>OL</sub>	V <sub>CC</sub> =2V, I <sub>OL</sub> =20μA			0.2			0.2	V
		V <sub>CC</sub> =4.5V, I <sub>OL</sub> =20μA			0.5			0.5	V
		V <sub>CC</sub> =6V, I <sub>OL</sub> =20μA			0.5			0.5	V
		V <sub>CC</sub> =4.5V, I <sub>OL</sub> =4mA			0.26			0.4	V
		V <sub>CC</sub> =6V, I <sub>OL</sub> =5.2mA			0.26			0.4	V
Input Leakage Current	I <sub>I</sub>	V <sub>CC</sub> = 6V, V <sub>IN</sub> = V <sub>CC</sub> or GND			±0.1			±1	μA
Quiescent Supply Current	I <sub>CC</sub>	V <sub>CC</sub> =6V, V <sub>IN</sub> = V <sub>CC</sub> or GND			1			10	μA
Input Capacitance	C <sub>IN</sub>	V <sub>CC</sub> =2V ~6V		5			-		pF

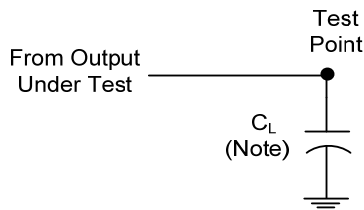
■ SWITCHING CHARACTERISTICS (Input:  $t_R=t_F=6ns$ ,  $C_L=50pF$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	T <sub>A</sub> =25°C			T <sub>A</sub> =-40~+125°C			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
Propagation Delay From Input (A) to Output(Y)	t <sub>PD</sub>	V <sub>CC</sub> =2V		20	80			105	ns
		V <sub>CC</sub> =4.5V		8	16			21	ns
		V <sub>CC</sub> =6V		7	14			18	ns
Transition Time Input to Output(Y)	t <sub>F</sub>	V <sub>CC</sub> =2V		19	75			110	ns
		V <sub>CC</sub> =4.5V		8	15			22	ns
		V <sub>CC</sub> =6V		6	13			19	ns

■ OPERATING CHARACTERISTICS (f=10MHz, T<sub>A</sub>=25°C, unless otherwise specified)

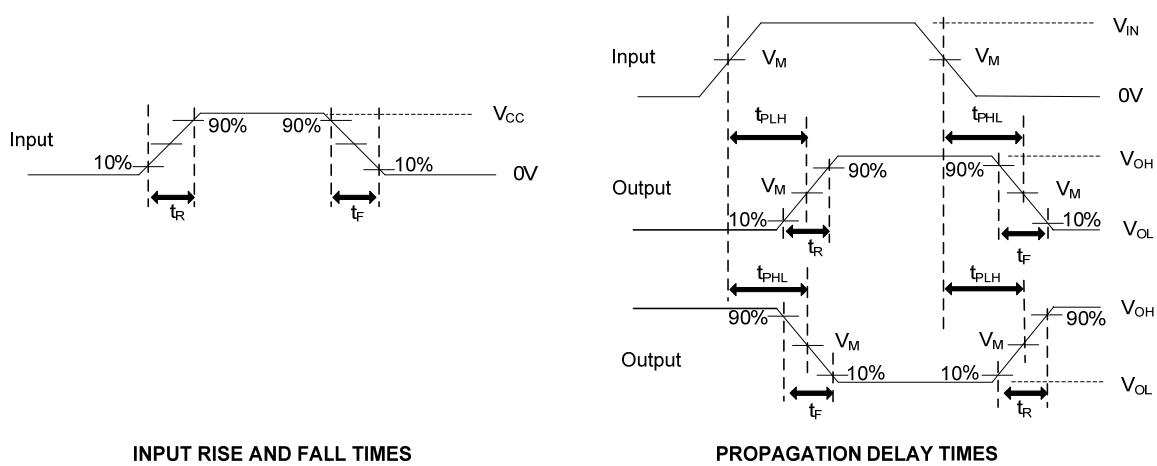
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	C <sub>PD</sub>	No Load		20		pF

■ TEST CIRCUIT AND WAVEFORMS



Note:  $C_L$  includes probe and jig capacitance.

Fig.1 Load circuitry for switching times.



- Notes: 1.  $C_L$  includes probe and jig capacitance.
- 2. All input pulses are supplied by generators having the following characteristics: PRR  $\leq$  10MHz,  $Z_o = 50\Omega$ .

Fig. 2 Propagation delay from input to output and input voltage waveforms.

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