



## U74AC04

CMOS IC

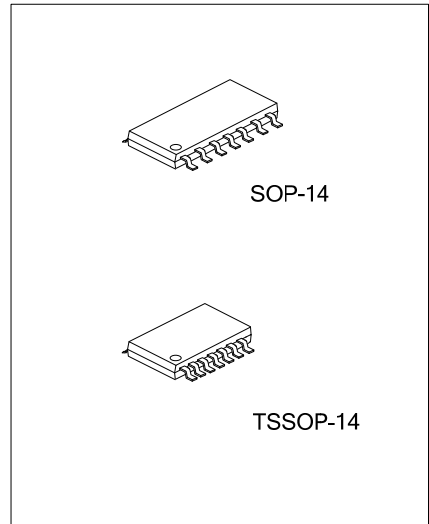
### HEX INVERTERS

#### DESCRIPTION

The **U74AC04** contains six independent inverters and performs the Boolean function  $Y = \overline{A}$  in positive logic circuit.

#### FEATURES

- \* Operation Voltage Range:  $V_{CC} = 2V$  to  $6V$
- \* High Speed:  $t_{PD} = 4ns$  (TYP.) at  $V_{CC} = 5V$
- \* Low Input Current:  $I_{IN} = 0.1\mu A$  (Max.) at  $T_A = 25^\circ C$
- \* Low Power Dissipation:  $I_{CC} = 2\mu A$  (Max.) at  $T_A = 25^\circ C$

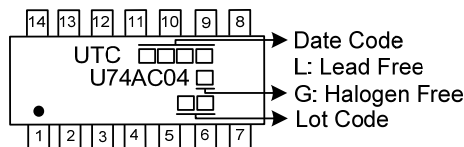


#### ORDERING INFORMATION

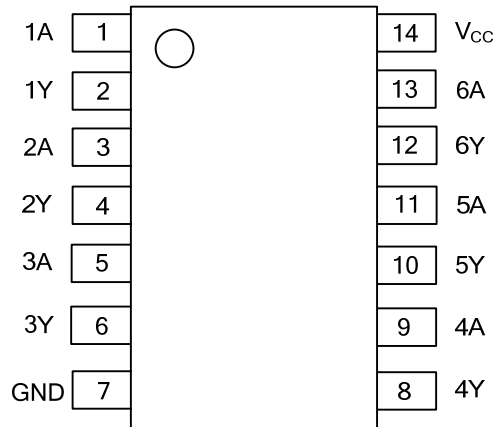
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74AC04L-S14-R	U74AC04G-S14-R	SOP-14	Tape Reel
U74AC04L-P14-R	U74AC04G-P14-R	TSSOP-14	Tape Reel

<p>U74AC04G-S14-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) S14: SOP-14, P14: TSSOP-14</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
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#### MARKING



■ PIN CONFIGURATION

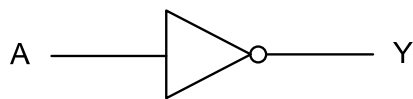


■ FUNCTION TABLE (Each Inverter)

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

Note: H: HIGH voltage level; L: LOW voltage level.

■ LOGIC DIAGRAM (Each Inverter)



Logic Symbol

## ■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V_{CC}$	-0.5 ~ +7	V
Input Voltage	$V_{IN}$	-0.5 ~ $V_{CC}+0.5$	V
Output Voltage	$V_{OUT}$	-0.5 ~ $V_{CC}+0.5$	V
$V_{CC}$ or GND Current	$I_{CC}$	±200	mA
Continuous Output Current ( $V_{OUT}=0$ to $V_{CC}$ )	$I_{OUT}$	±50	mA
Input Clamp Current ( $V_{IN}<0$ or $V_{IN}>V_{CC}$ )	$I_{IK}$	±20	mA
Output Clamp Current ( $V_{OUT}<0$ or $V_{OUT}>V_{CC}$ )	$I_{OK}$	±20	mA
Total Power Dissipation ( $T_A=55^{\circ}C$ )	$P_D$	0.5	W
Storage Temperature	$T_{STG}$	-65 ~ +150	$^{\circ}C$

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	$V_{CC}$		2		6	V
Input Voltage	$V_{IN}$		0		$V_{CC}$	V
Output Voltage	$V_{OUT}$		0		$V_{CC}$	V
Operating Temperature	$T_A$		-40		85	$^{\circ}C$
High-Level Output Current	$I_{OH}$	$V_{CC}=3V$			-12	mA
		$V_{CC}=4.5V$			-24	mA
		$V_{CC}=5.5V$			-24	mA
Low-Level Output Current	$I_{OL}$	$V_{CC}=3V$			12	mA
		$V_{CC}=4.5V$			24	mA
		$V_{CC}=5.5V$			24	mA
Input Transition Rise or Fall Rate	$t_R / t_F$		0		8	ns/V

## ■ ELECTRICAL CHARACTERISTICS ( $T_A=25^{\circ}C$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
High-level Input Voltage	$V_{IH}$	$V_{CC}=3V$	2.1			V	
		$V_{CC}=4.5V$	3.15			V	
		$V_{CC}=5.5V$	3.85			V	
Low-level Input Voltage	$V_{IL}$	$V_{CC}=3V$			0.9	V	
		$V_{CC}=4.5V$			1.35	V	
		$V_{CC}=5.5V$			1.65	V	
High-Level Output Voltage	$V_{OH}$	$V_{CC}=3V$	$I_{OH}=-50\mu A$	2.9	2.99		V
		$V_{CC}=4.5V$		4.4	4.49		V
		$V_{CC}=5.5V$		5.4	5.49		V
		$V_{CC}=3V$	$I_{OH}=-12mA$	2.56			V
		$V_{CC}=4.5V$		3.86			V
		$V_{CC}=5.5V$		4.86			V
Low-Level Output Voltage	$V_{OL}$	$V_{CC}=3V$	$I_{OL}=50\mu A$			0.1	V
		$V_{CC}=4.5V$				0.1	V
		$V_{CC}=5.5V$				0.1	V
		$V_{CC}=3V$	$I_{OL}=12mA$			0.36	V
		$V_{CC}=4.5V$				0.36	V
		$V_{CC}=5.5V$				0.36	V
Input Leakage Current	$I_{I(LEAK)}$	$V_{IN}=V_{CC}$ or GND, $V_{CC}=5.5V$			±0.1	$\mu A$	
Quiescent Supply Current	$I_Q$	$V_{IN}=V_{CC}$ or GND, $I_{OUT}=0$ $V_{CC}=5.5V$			2	$\mu A$	
Input Capacitance	$C_{IN}$	$V_{IN}=V_{CC}$ or GND		2.8		pF	

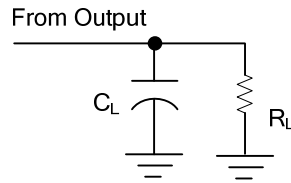
■ SWITCHING CHARACTERISTICS (T<sub>A</sub>=25°C)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation delay from input (nA) to output(nY)	t <sub>PLH</sub>	V <sub>CC</sub> =3.3±0.3V, C <sub>L</sub> =50pF, R <sub>L</sub> =500Ω	1.5	4.5	9	ns
	t <sub>PHL</sub>		1.5	4.5	8.5	ns
	t <sub>PLH</sub>	V <sub>CC</sub> =5±0.5V, C <sub>L</sub> =50pF, R <sub>L</sub> =500Ω	1.5	4	7	ns
	t <sub>PHL</sub>		1.5	3.5	6.5	ns

■ OPERATING CHARACTERISTICS (T<sub>A</sub>=25°C)

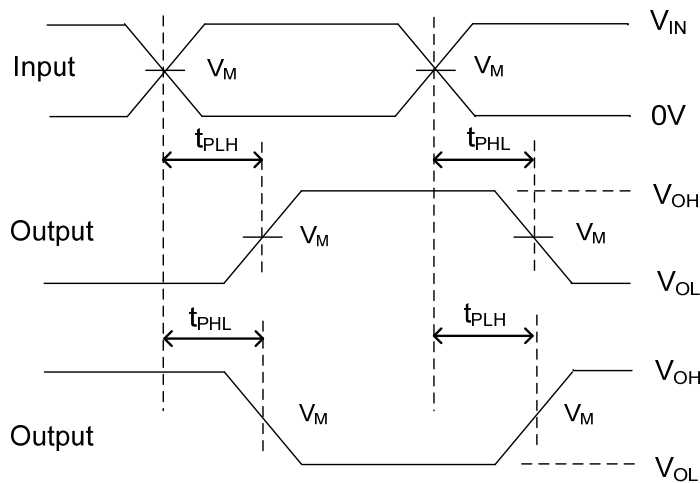
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	C <sub>PD</sub>	C <sub>L</sub> =50pF, f=10MHz		45		pF

■ TEST CIRCUIT AND WAVEFORMS



TEST CIRCUIT

V <sub>CC</sub>	INPUTS		V <sub>M</sub>	C <sub>L</sub>	R <sub>L</sub>
	V <sub>IN</sub>	t <sub>R</sub> , t <sub>F</sub>			
3.3V±0.3V	V <sub>CC</sub>	≤2.5ns	V <sub>CC</sub> /2	50pF	500Ω
5V±0.5V	V <sub>CC</sub>	≤2.5ns	V <sub>CC</sub> /2	50pF	500Ω



VOLTAGE WAVEFORMS

- Notes: 1. C<sub>L</sub> includes probe and jig capacitance  
 2. All input pulses are supplied by generators having the following characteristics: PRR ≤1MHz, Z<sub>O</sub> = 50Ω.

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