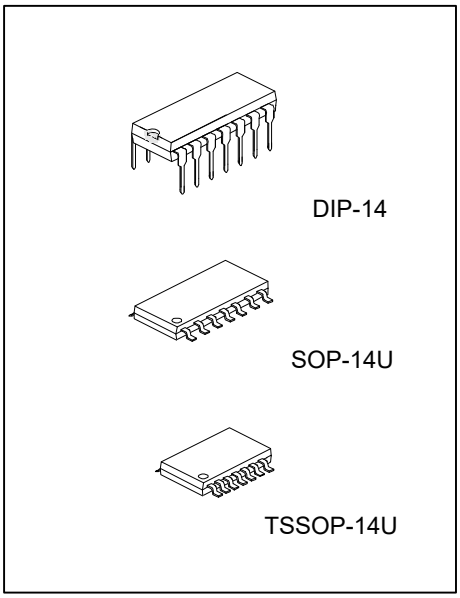
U74HCT04

CMOS IC

HEX INVERTERS



■ DESCRIPTION

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

■ FEATURES

* Operating Voltage Range of 4.5V to 5.5V
* Low Power Consumption, 20μA Max I_{CC}
* Typical t_{PD}=13ns
* ±4mA Output Drive at 5V
* Low Input Current of 1uA Max
* Inputs are TTL-Voltage compatible

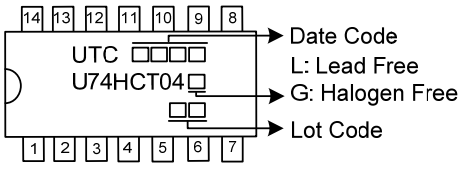
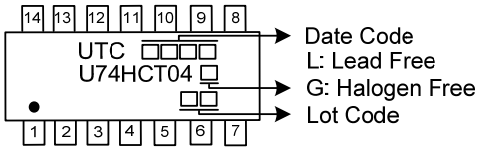
■ ORDERING INFORMATION

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

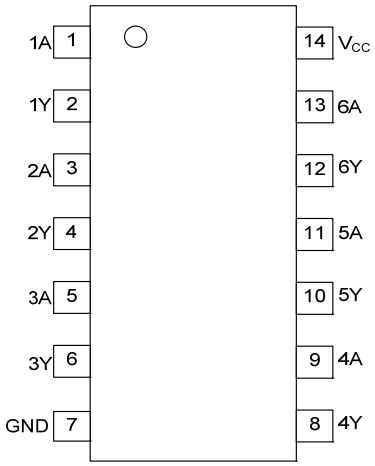
U74HCT04G-D14-T
(1)Packing Type
(2)Package Type
(3)Green Package

(1) T: Tube, R: Tape Reel
(2) D14: DIP-14, UEA: SOP-14U, UEB: TSSOP-14U
(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING

DIP-14	SOP-14U / TSSOP-14U
	

■ PIN CONFIGURATION



■ FUNCTION TABLE (each gate)

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

■ LOGIC DIAGRAM (positive logic)

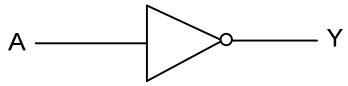


Fig.1 logic diagram for U74HCT04

■ ABSOLUTE MAXIMUM RATING (T_A=25°C, unless otherwise specified) (Note 2)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{CC}	-0.5 ~ 7	V
Input Clamp Current (V_I<0)	I_{IK}	±20	mA
Output Clamp Current (V_O<0)	I_{OK}	±20	mA
Output Current	I_{OUT}	±25	mA
V_{CC} or GND Current	I_{CC}	±50	mA
Storage Temperature	T_{STG}	-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.

■ RECOMMENDED OPERATING COMDITIONS (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}	Operating	4.5	5	5.5	V
Input Voltage	V_{IN}		0		V_{CC}	V
Output Voltage	V_{OUT}		0		V_{CC}	V
Operating Temperature	T_A		-40		+125	°C
Input transition rise/fall time	$\Delta t/\Delta v$				500	ns

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	DIP-14	θ_{JA}	100	°C/W
	SOP-14U		125	°C/W
	TSSOP-14U		150	°C/W

■ STATIC CHARACTERISTICS (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Positive-Going Input Threshold Voltage	V_{IH}	V_{CC}=4.5~5.5V		2			V
Negative-Going Input Threshold Voltage	V_{IL}	V_{CC}=4.5~5.5V				0.8	V
High-Level Output Voltage	V_{OH}	V_{CC}=4.5V V_I=V_{IH} or V_{IL}	I_{OH}=-20μA	4.4	4.499		V
			I_{OH}=-4mA	3.98	4.3		V
Low-Level Output Voltage	V_{OL}		I_{OL}=20μA		0.001	0.1	V
			I_{OL}=4mA		0.17	0.26	V
Input Leakage Current	I_I	V_{CC}=5.5V			±0.1	±100	nA
Quiescent Supply Current	I_{CC}	V_{CC}=5.5V, V_I=V_{CC} or 0, I_O=0				2	μA
Additional Quiescent Supply Current	ΔI_{CC}	V_{CC}=5.5V,One input at 0.5V or 2.4V, other inputs at Vcc or 0				2.4	mA
Input Capacitance	C_I	V_{CC} =4.5V to 5.5V			3	10	pF

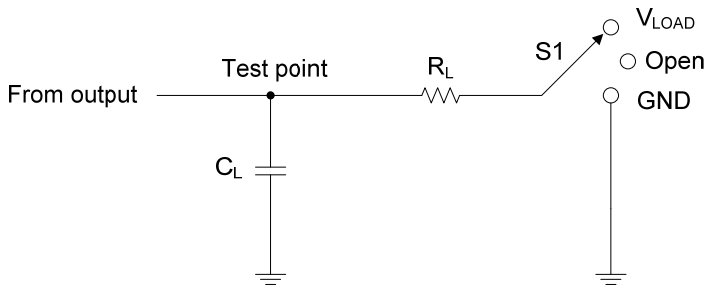
■ DYNAMIC CHARACTERISTICS (Input: t_R, t_F=6ns, C_L=50pF, PRR≤1MHz, unless otherwise specified)

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

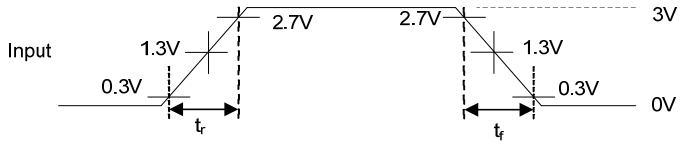
■ TEST CIRCUIT AND WAVEFORMS



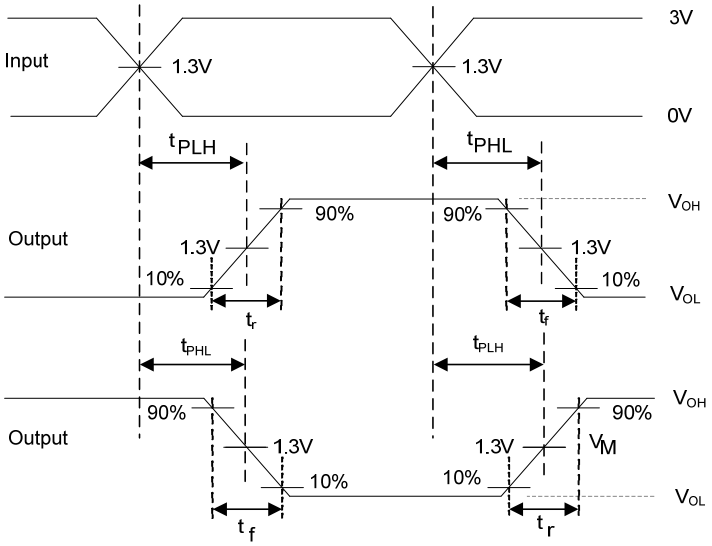
TEST CIRCUIT

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