

TC74HCU04AP, TC74HCU04AF, TC74HCU04AFN

HEX INVERTER

The TC74HCU04A is a high speed CMOS INVERTER fabricated with silicon gate C²MOS technology.

It achieves the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation.

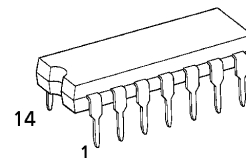
Since the internal circuit is composed of a single stage inverter, it can be used in analog applications such as crystal oscillators.

All inputs are equipped with protection circuits against static discharge or transient excess voltage.

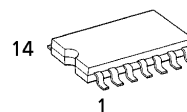
FEATURES:

- High Speed..... $t_{pd} = 4\text{ns}(\text{typ.})$ at $V_{CC} = 5\text{V}$
- Low Power Dissipation..... $I_{CC} = 1\mu\text{A}(\text{Max.})$ at $T_a = 25^\circ\text{C}$
- High Noise Immunity..... $V_{NIH} = V_{NIH} = 10\%V_{CC}(\text{Min.})$
- Output Drive Capability.....10 LSTTL Loads
- Symmetrical Output Impedance... $|I_{OH}| = |I_{OL}| = 4\text{mA}(\text{Min.})$
- Balanced Propagation Delays..... $t_{pLH} \approx t_{pHL}$
- Wide Operating Voltage Range... $V_{CC}(\text{opr.}) = 2\text{V} \sim 6\text{V}$
- Pin and Function Compatible with 74LS04

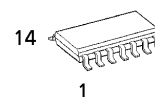
(Note) The JEDEC SOP (FN) is not available in Japan.



P (DIP14-P-300-2.54)
Weight : 0.96g (Typ.)

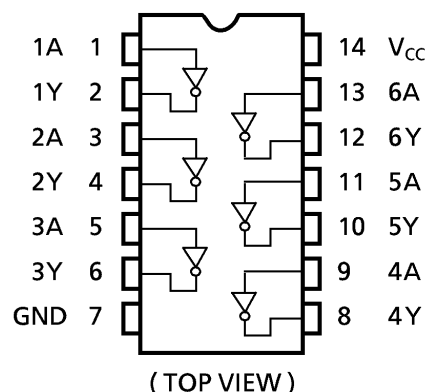


F (SOP14-P-300-1.27)
Weight : 0.18g (Typ.)

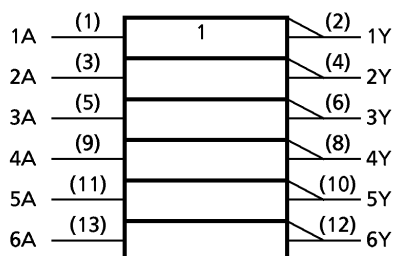


FN (SOL14-P-150-1.27)
Weight : 0.12g (Typ.)

PIN ASSIGNMENT



IEC LOGIC SYMBOL



TRUTH TABLE

A	Y
L	H
H	L

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ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage Range	V_{CC}	$-0.5 \sim 7$	V
DC Input Voltage	V_{IN}	$-0.5 \sim V_{CC} + 0.5$	V
DC Output Voltage	V_{OUT}	$-0.5 \sim V_{CC} + 0.5$	V
Input Diode Current	I_{IK}	± 20	mA
Output Diode Current	I_{OK}	± 20	mA
DC Output Current	I_{OUT}	± 25	mA
DC V_{CC} / Ground Current	I_{CC}	± 50	mA
Power Dissipation	P_D	500 (DIP)* / 180 (SOP)	mW
Storage Temperature	T_{stg}	$-65 \sim 150$	°C

*500mW in the range of $T_a = -40^\circ\text{C} \sim 65^\circ\text{C}$. From $T_a = 65^\circ\text{C}$ to 85°C a derating factor of $-10\text{mW}/^\circ\text{C}$ shall be applied until 300mW.

RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage	V_{CC}	$2 \sim 6$	V
Input Voltage	V_{IN}	$0 \sim V_{CC}$	V
Output Voltage	V_{OUT}	$0 \sim V_{CC}$	V
Operating Temperature	T_{opr}	$-40 \sim 85$	°C

DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITION		V _{CC} (V)	Ta = 25°C			Ta = −40~85°C		UNIT
					MIN.	TYP.	MAX.	MIN.	MAX.	
High - Level Input Voltage	V _{IH}			2.0 4.5 6.0	1.7 3.6 4.8	— — —	— — —	1.7 3.6 4.8	— — —	V
Low - Level Input Voltage	V _{IL}			2.0 4.5 6.0	— — —	— — —	0.3 0.9 1.2	— — —	0.3 0.9 1.2	V
High - Level Output Voltage	V _{OH}	V _{IN} = V _{IL}	I _{OH} = − 20 μA	2.0 4.5 6.0	1.8 4.0 5.5	2.0 4.5 5.9	— — —	1.9 4.4 5.9	— — —	V
		V _{IN} = GND	I _{OH} = − 4 mA I _{OH} = − 5.2 mA	4.5 6.0	4.18 5.68	4.31 5.80	— —	4.13 5.63	— —	
Low - Level Output Voltage	V _{OL}	V _{IN} = V _{IH}	I _{OL} = 20 μA	2.0 4.5 6.0	— — —	0.0 0.0 0.1	0.2 0.5 0.5	— — —	0.2 0.5 0.5	V
		V _{IN} = V _{CC}	I _{OL} = 4 mA I _{OL} = 5.2 mA	4.5 6.0	— —	0.17 0.18	0.26 0.26	— —	0.33 0.33	
Input Leakage Current	I _{IN}	V _{IN} = V _{CC} or GND		6.0	—	—	± 0.1	—	± 1.0	μA
Quiescent Supply Current	I _{CC}	V _{IN} = V _{CC} or GND		6.0	—	—	1.0	—	10.0	

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AC ELECTRICAL CHARACTERISTICS ($C_L = 15\text{pF}$, $V_{CC} = 5\text{V}$, $T_a = 25^\circ\text{C}$, Input $t_r = t_f = 6\text{ns}$)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Transition Time	t_{TLH} t_{THL}		—	4	8	ns
Propagation Delay Time	t_{pLH} t_{pHL}		—	4	8	

AC ELECTRICAL CHARACTERISTICS ($C_L = 50\text{pF}$, Input $t_r = t_f = 6\text{ns}$)

PARAMETER	SYMBOL	TEST CONDITION	Ta = 25°C			Ta = −40~85°C		UNIT	
			V _{CC} (V)	MIN.	TYP.	MAX.	MIN.		MAX.
Output Transition Time	t _{TLH} t _{THL}		2.0	—	30	75	—	95	ns
			4.5	—	8	15	—	19	
			6.0	—	7	13	—	16	
Propagation Delay Time	t _{pLH} t _{pHL}		2.0	—	18	60	—	75	ns
			4.5	—	6	12	—	15	
			6.0	—	5	10	—	13	
Input Capacitance	C _{IN}			—	9	15	—	15	pF
Power Dissipation Capacitance	C _{PD} (1)			—	13	—	—	—	

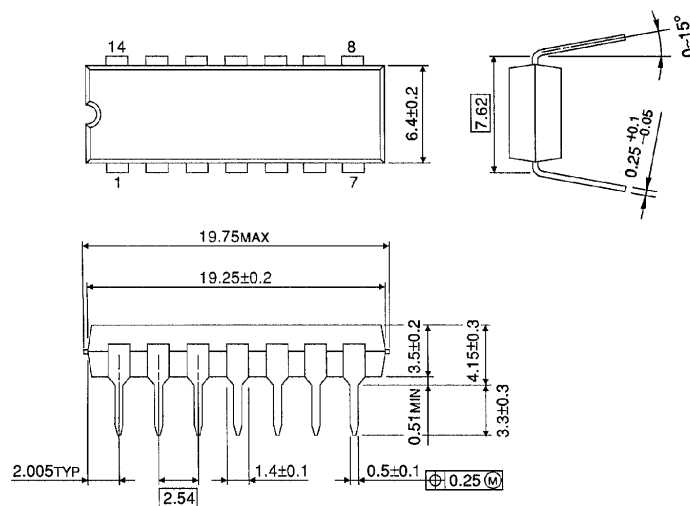
Note (1) C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

Average operating current can be obtained by the equation :

$$I_{CC}(\text{opr}) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC} / 6 \text{ (per Gate)}$$

DIP 14PIN OUTLINE DRAWING (DIP14-P-300-2.54)

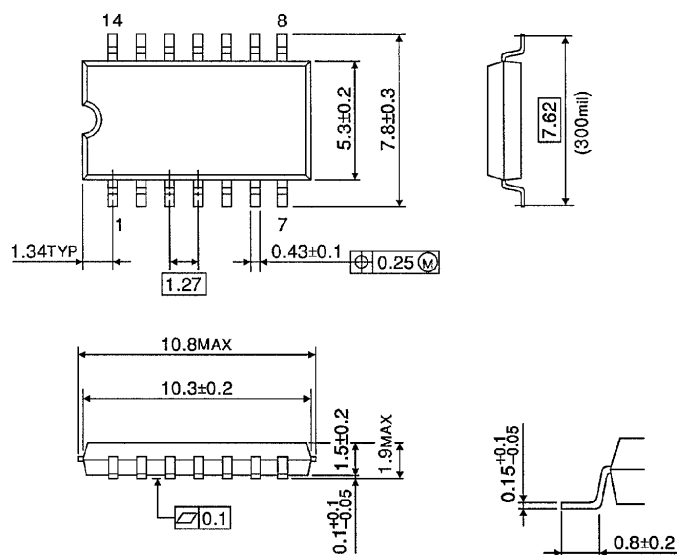
Unit in mm



Weight : 0.96g (Typ.)

SOP 14PIN (200mil BODY) OUTLINE DRAWING (SOP14-P-300-1.27)

Unit in mm

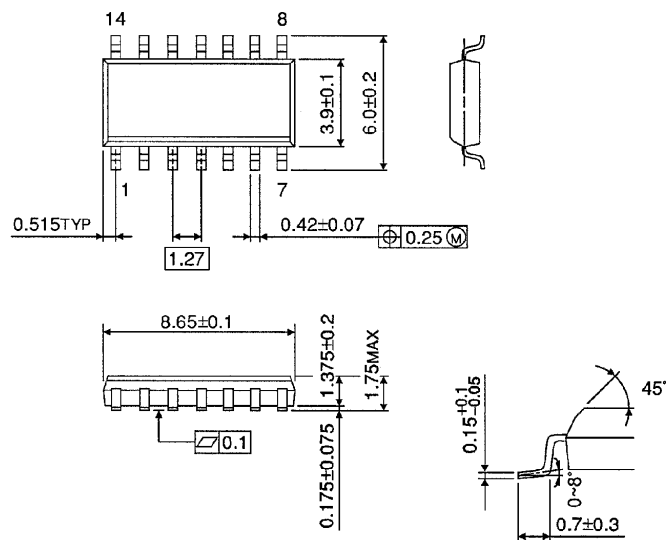


Weight : 0.18g (Typ.)

SOP 14PIN (150mil BODY) OUTLINE DRAWING (SOL14-P-150 -1.27)

Unit in mm

(Note) This package is not available in Japan.



Weight : 0.12g (Typ.)