TC74HCU04AP/AF/AFN

HEX INVERTER

The TC74HCU04A is a high speed CMOS INVERTER fabricated with silicon gate C^2MOS technology.

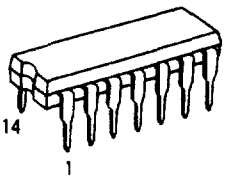
It achieves the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation.

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

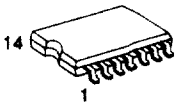
All inputs are equipped with protection circuits against static discharge or transient excess voltage.

FEATURES:

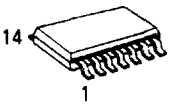
- High Speed ..... t_{pd}=4ns(typ.) at V_{CC}=5V
- Low Power Dissipation ..... I_{CC}=1μA(Max.)at Ta=25℃
- High Noise Immunity ..... $V_{NIH}=V_{NIL}$=10% V_{CC}(Min.)
- Output Drive Capability ..... 10 LSTTL Loads
- Symmetrical Output Impedance ··· $|I_{OH}|=I_{OL}$=4mA(Min.)
- Balanced Propagation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



DIP14 (3 D14A-P)

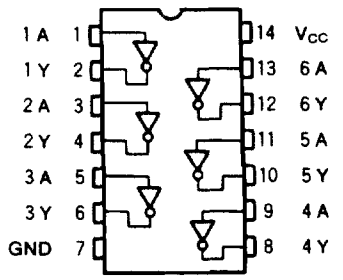


MFP 14
(F14GB-P)



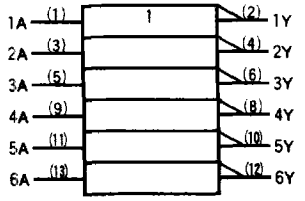
SOP 14
(SOP14-P-225A)

PIN ASSIGNMENT



(TOP VIEW)

IEC LOGIC SYMBOL



TRUTH TABLE

A	Y
L	H
H	L

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(MFP)	mW
Storage Temperature	T_{stg}	$-65 \sim 150$	℃
Lead Temperature 10sec	T_L	300	℃

*500mW in the range of Ta= −40℃～ 65℃. From Ta=65℃ to 85℃ a derating factor of −10mW/℃ 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}	$-40 \sim 85$	℃

DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITION		V_{CC}	Ta=25℃ MIN.	Ta=25℃ TYP.	Ta=25℃ MAX.	Ta=−40 ～85℃ MIN.	Ta=−40 ～85℃ MAX.	UNIT
High−Level Input Voltage	V_{IH}			2.0	1.7	−	−	1.7	−	V
				4.5	3.6	−	−	3.6	−	
				6.0	4.8	−	−	4.8	−	
Low−Level Input Voltage	V_{IL}			2.0	−	−	0.3	−	0.3	V
				4.5	−	−	0.9	−	0.9	
				6.0	−	−	1.2	−	1.2	
High−Level Output Voltage	V_{OH}	$V_{IN}=V_{IL}$	$I_{OH}=-20\ \mu A$	2.0	1.8	2.0	−	1.9	−	V
				4.5	4.0	4.5	−	4.4	−	
				6.0	5.5	5.9	−	5.9	−	
		$V_{IN}=GND$	$I_{OH}=-4$ mA	4.5	4.18	4.31	−	4.13	−	
			$I_{OH}=-5.2$mA	6.0	5.68	5.80	−	5.63	−	
Low−Level Output Voltage	V_{OL}	$V_{IN}=V_{IH}$	$I_{OL}=20\ \mu A$	2.0	−	0.0	0.2	−	0.2	V
				4.5	−	0.0	0.5	−	0.5	
				6.0	−	0.1	0.5	−	0.5	
		$V_{IN}=V_{CC}$	$I_{OL}=4$ mA	4.5	−	0.17	0.26	−	0.33	
			$I_{OL}=5.2$mA	6.0	−	0.18	0.26	−	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	

AC ELECTRICAL CHARACTERISTICS(C_L=15pF, V_{CC}=5V, Ta=25℃, Input $t_r=t_f$=6ns)

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	ns

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

PARAMETER	SYMBOL	TEST CONDITION		Ta=25℃			Ta=−40 ~85℃		UNIT
			V_{CC}	MIN.	TYP.	MAX.	MIN.	MAX.	
Output Transition Time	t_{TLH} t_{THL}		2.0	–	25	75	–	95	ns
			4.5	–	7	15	–	19	
			6.0	–	6	13	–	16	
Propagation Delay Time	t_{pLH} t_{pHL}		2.0	–	18	60	–	75	
			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:

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