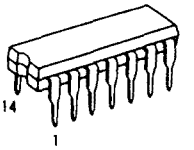
HEX Schmitt Inverter

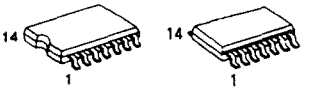
The TC74HC14A is a high speed CMOS SCHMITT INVERTER fabricated with silicon gate C^2MOS technology.

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

Pin configuration and function are the same as the TC74HC04A but the inputs have 25% V_{CC} hysteresis and with its Schmitt trigger function, the TC74HC14A can be used as a line receiver which will receive slow input signals.

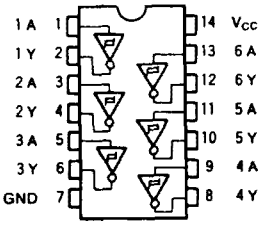
All inputs are equipped with protection circuits against static discharge or transient excess voltage.





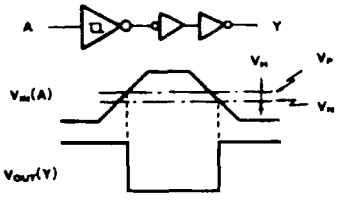
Features

- High Speed: t_{pd} = 11ns(Typ.) at V_{CC} = 5V
- Low Power Dissipation: I_{CC} = 1μA(Max.) at Ta = 25°C
- High Noise Immunity: V_{NIH} = 1.1V at V_{CC} = 5V
- Output Drive Capability: 10 LSTTL Loads
- Symmetrical Output Impedance: $|I_{OH}| = I_{OL}$ = 4mA(Min.)
- Balanced Propagation Delays: $t_{pLH} = t_{pHL}$
- Wide Operating Voltage Range: V_{CC}(opr) = 2V ~ 6V
- Pin and Function Compatible with 74LS14



(TOP VIEW)

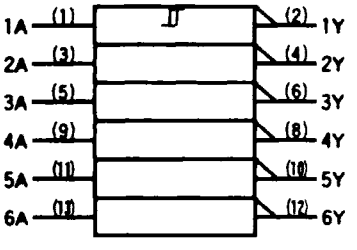
Pin Assignment



Logic Diagram, Waveform

Truth Table

A	Y
L	H
H	L



IEC Logic Symbol

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Supply Voltage Range	V_{CC}	-0.5 ~ 7	V
DC Input Voltage	V_{IN}	-0.5 ~ V_{CC} + 0.5	V
DC Output Voltage	V_{OUT}	-0.5 ~ 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 ~ 150	°C
Lead Temperature 10sec	T_L	300	°C

*500mW in the range of Ta = -40°C ~ 65°C. From Ta = 65°C to 85°C a derating factor of -10mW/°C shall be applied until 300mW.

Recommended Operating Conditions

Parameter	Symbol	Value	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_{opr}	-40 ~ 85	°C

DC Electrical Characteristics

Parameter	Symbol	Test Condition		V_{CC}	Ta = 25°C Min	Ta = 25°C Typ.	Ta = 25°C Max.	Ta = -40 ~ 85°C Min.	Ta = -40 ~ 85°C Max.	Unit
Positive Threshold Voltage	V_P	-		2.0 4.5 6.0	1.0 2.3 3.0	1.25 2.7 3.5	1.5 3.15 4.2	1.0 2.3 3.0	1.5 3.15 4.2	V
Negative Threshold Voltage	V_N	-		2.0 4.5 6.0	0.3 1.13 1.5	0.65 1.6 2.3	0.9 2.0 2.6	0.3 1.13 1.5	0.9 2.0 2.6	V
Hysteresis Voltage	V_H	-		2.0 4.5 6.0	0.3 0.6 0.8	0.6 1.1 1.2	1.0 1.4 1.7	0.3 0.6 0.8	1.0 1.4 1.7	V
High-Level Output Voltage	V_{OH}	V_{IN} = V_{IH} or V_{IL}	I_{OH} = -20μA	2.0 4.5 6.0	1.9 4.4 5.9	2.0 4.5 6.0	- - -	1.9 4.4 5.9	- - -	V
			I_{OH} = -4 mA I_{OH} = -5.2mA	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} or V_{IL}	I_{OL} = 20μA	2.0 4.5 6.0	- - -	0.0 0.0 0.0	0.1 0.1 0.1	- - -	0.1 0.1 0.1	V
			I_{OL} = 4 mA I_{OL} = 5.2mA	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	

AC Electrical Characteristics (C_L = 15pF, V_{CC} = 5V, Ta = 25°C)

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}	–	–	11	21	

AC Electrical Characteristics (C_L = 50pF, Input $t_r = t_f$ = 6ns)

Parameter	Symbol	Test Condition		Ta = 25°C			Ta = -40 ~ 85°C		Unit
			V_{CC}	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	–	42	125	–	155	
			4.5	–	14	25	–	31	
			6.0	–	12	21	–	26	
Input Capacitance	C_{IN}	–		–	5	10	-	10	pF
Power Dissipation Capacitance	C_{PD}(1)	–		–	28	-	-	-	

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:

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

Notes