

**TC74HC14AP, TC74HC14AF, TC74HC14AFN**

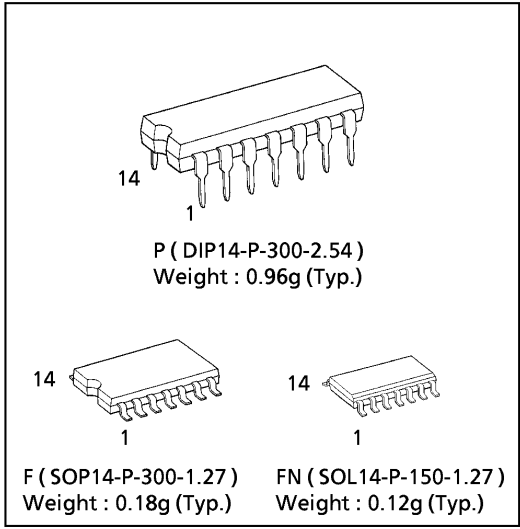
**HEX SCHMITT INVERTER**

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

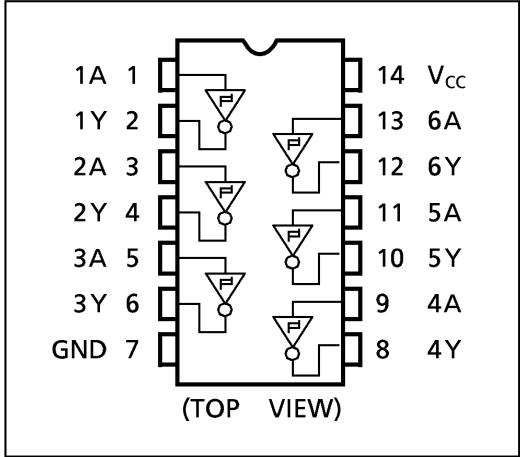
The TC74HC14A is a high speed CMOS SCHMITT INVERTER fabricated with silicon gate C<sup>2</sup>MOS technology. It achieves the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation. Pin configuration and function are the same as the TC74HC04A but the inputs have 25% V<sub>CC</sub> hysteresis and with its schmitt trigger function, the TC74HC14A can be used as a line receivers which will receive slow input signals. All inputs are equipped with protection circuits against static discharge or transient excess voltage.

**FEATURES :**

- High Speed..... $t_{pd} = 11\text{ns}(\text{typ.})$  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..... $V_H = 1.1\text{V}$  at  $V_{CC} = 5\text{V}$
- 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 74LS14



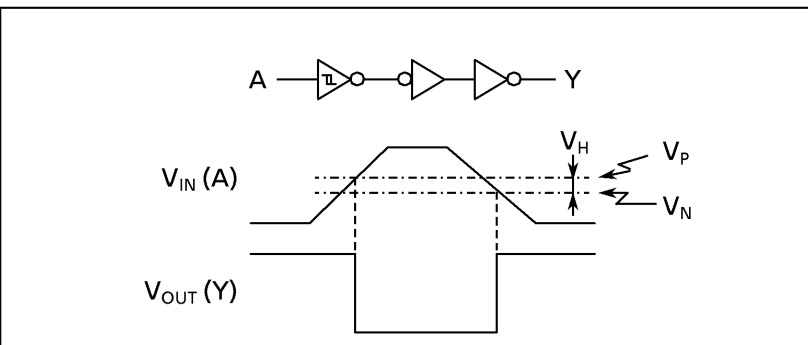
**PIN ASSIGNMENT**



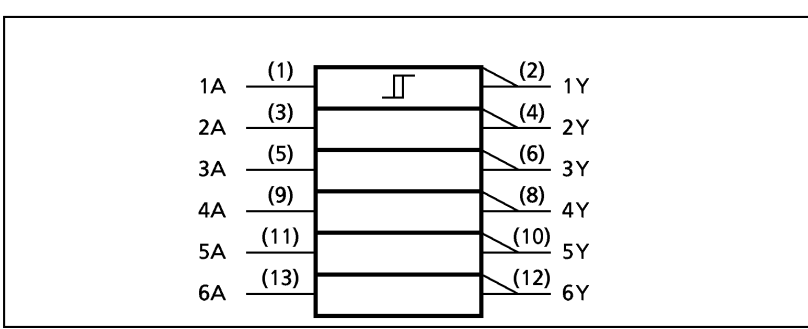
**TRUTH TABLE**

A	Y
L	H
H	L

**SYSTEM DIAGRAM, WAVEFORM**



**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 (SOP)	mW
Storage Temperature	$T_{stg}$	-65~150	°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  $85^{\circ}\text{C}$  a derating factor of  $-10\text{mW}/^{\circ}\text{C}$  shall be applied until 300mW.

## RECOMMENDED OPERING 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	$V_{CC}$ (V)	$T_a = 25^{\circ}\text{C}$			$T_a = -40 \sim 85^{\circ}\text{C}$		UNIT	
				MIN.	TYP.	MAX.	MIN.	MAX.		
Positive Threshold Voltage	$V_P$		2.0	1.0	1.25	1.50	1.0	1.50	V	
			4.5	2.3	2.70	3.15	2.3	3.15		
			6.0	3.0	3.50	4.20	3.0	4.20		
Negative Threshold Voltage	$V_N$		2.0	0.30	0.65	0.9	0.30	0.9	V	
			4.5	1.13	1.60	2.0	0.13	2.0		
			6.0	1.50	2.30	2.6	1.50	2.6		
Hysteresis Voltage	$V_H$		2.0	0.3	0.6	1.0	0.3	1.0	V	
			4.5	0.6	1.1	1.4	0.6	1.4		
			6.0	0.8	1.2	1.7	0.8	1.7		
High Level Output Voltage	$V_{OH}$	$V_{IN} = V_{IL}$	$I_{OH} = -20\mu\text{A}$	2.0	1.9	2.0	—	1.9	—	V
				4.5	4.4	4.5	—	4.4	—	
				6.0	5.9	6.0	—	5.9	—	
Low-Level Output Voltage	$V_{OL}$	$V_{IN} = V_{IH}$	$I_{OL} = 20\mu\text{A}$	2.0	—	0.0	0.1	—	0.1	V
				4.5	—	0.0	0.1	—	0.1	
				6.0	—	0.0	0.1	—	0.1	
Input Leakage Current	$I_{IN}$	$V_{IN} = V_{CC}$ or GND	6.0	—	—	±0.1	—	±1.0	$\mu\text{A}$	
			6.0	—	—	1.0	—	10.0		
Quiescent Supply Current	$I_{CC}$	$V_{IN} = V_{CC}$ or GND	6.0	—	—	1.0	—	10.0	$\mu\text{A}$	

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	$t_{TLH}$		—	4	8	ns
	$t_{THL}$					
Propagation Delay Time	$t_{pLH}$		—	11	21	
	$t_{pHL}$					

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

PARAMETER	SYMBOL	TEST CONDITION	$T_a = 25^\circ\text{C}$			$T_a = -40\sim 85^\circ\text{C}$		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	—	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	—	—	—		

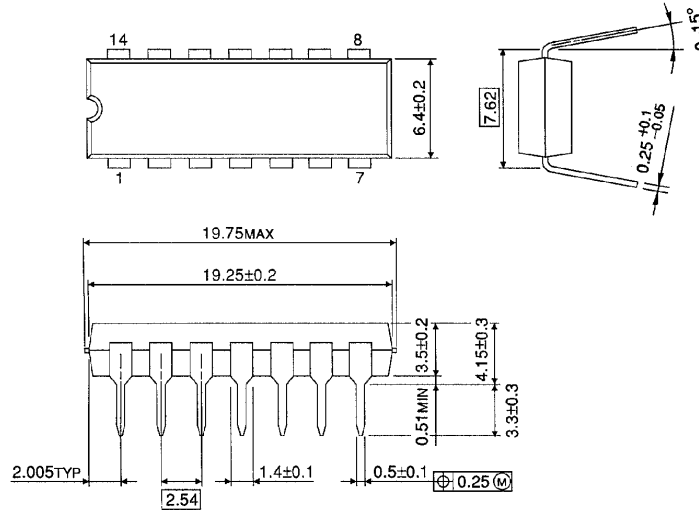
Note (1)  $C_{PD}$  is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

Average operating current can be obtained by the equation :

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

**DIP 14PIN PACKAGE DIMENSIONS ( DIP14-P-300-2.54 )**

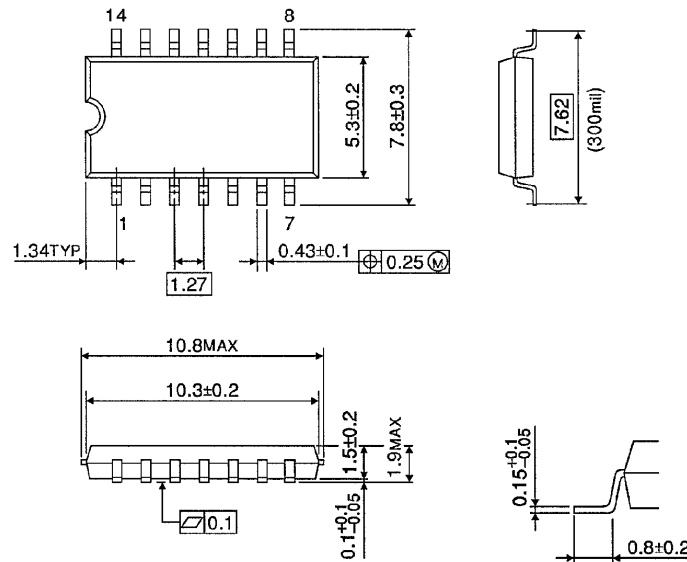
Unit in mm



Weight : 0.96g (Typ.)

**SOP 14PIN ( 200mil BODY ) PACKAGE DIMENSIONS ( SOP14-P-300-1.27 )**

Unit in mm

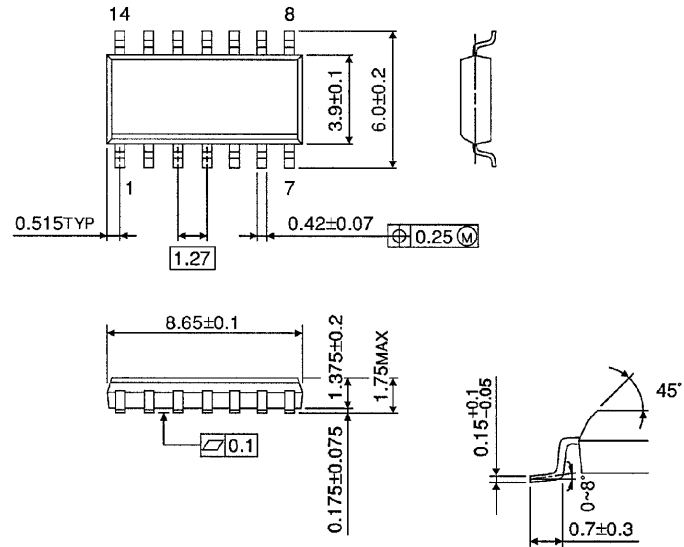


Weight : 0.18g (Typ.)

**SOP 14PIN ( 150mil BODY ) PACKAGE DIMENSIONS ( SOL14-P-150 -1.27)**

Unit in mm

(Note) This package is not available in Japan.



Weight : 0.12g (Typ.)

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