

# TC74AC14P, TC74AC14F, TC74AC14FN, TC74AC14FT

## HEX SCHMITT INVERTER

The TC74AC14 is an advanced high speed CMOS SCHMITT INVERTER fabricated with silicon gate and double-layer metal wiring C<sup>2</sup>MOS technology.

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

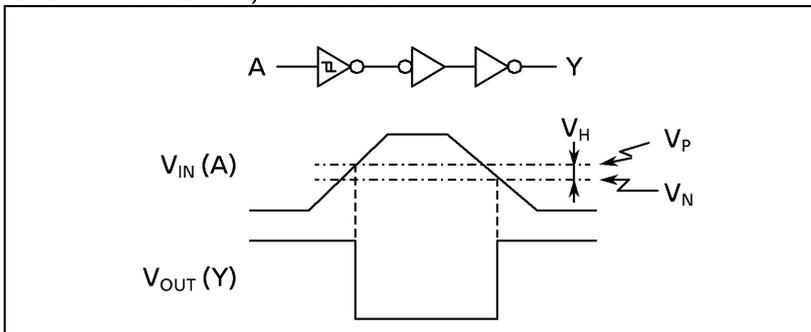
Pin configuration and function are the same as the TC74AC04 but the inputs have hysteresis and with its schmitt trigger function, the TC74AC14 can be used as a line receivers which will receive slow input signals.

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

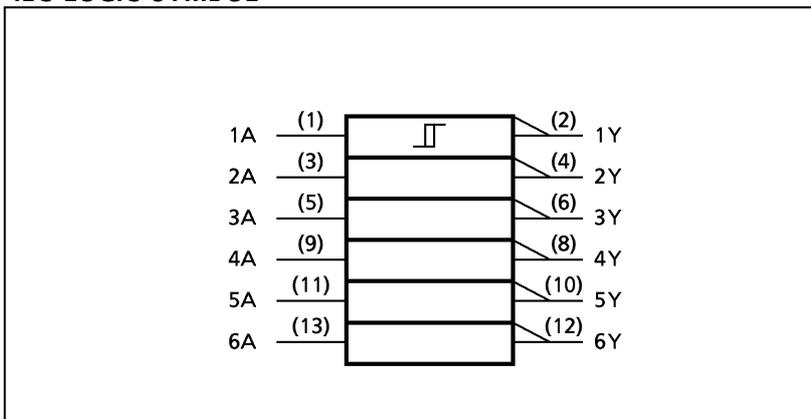
### FEATURES:

- High Speed..... $t_{pd} = 5.3ns$  (typ.) at  $V_{CC} = 5V$
- Low Power Dissipation..... $I_{CC} = 4\mu A$  (Max.) at  $T_a = 25^\circ C$
- Symmetrical Output Impedance...  $|I_{OH}| = I_{OL} = 24mA$  (Min.)  
Capability of driving  $50\Omega$  transmission lines.
- Balanced Propagation Delays..... $t_{pLH} \approx t_{pHL}$
- Wide Operating Voltage Range..... $V_{CC}$  (opr) =  $2V \sim 5.5V$
- Pin and Function Compatible with 74F14

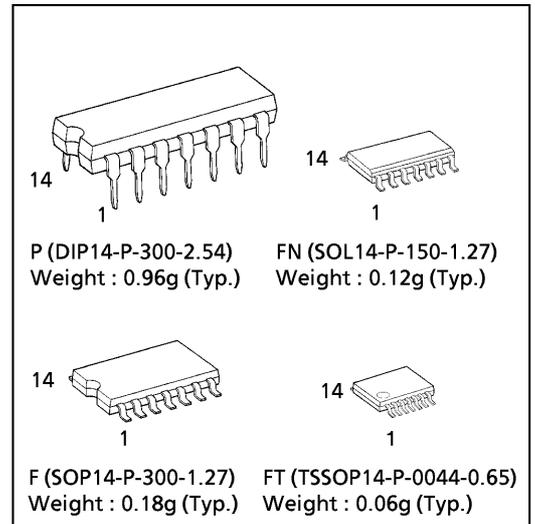
### SYSTEM DIAGRAM, WAVEFORM



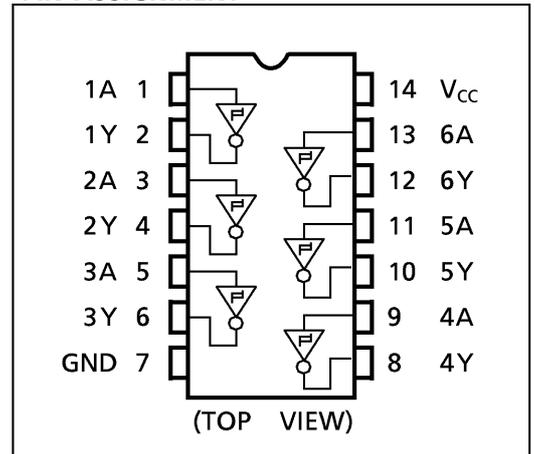
### IEC LOGIC SYMBOL



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



### PIN ASSIGNMENT



### TRUTH TABLE

A	Y
L	H
H	L

**ABSOLUTE MAXIMUM RATINGS**

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage Range	$V_{CC}$	-0.5~7.0	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	$I_{OK}$	± 50	mA
DC Output Current	$I_{OUT}$	± 50	mA
DC $V_{CC}$ /Ground Current	$I_{CC}$	± 150	mA
Power Dissipation	$P_D$	500 (DIP)* / 180 (SOP/TSSOP)	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  $-10\text{mW}/^{\circ}\text{C}$  should be applied up to 300mW.

**RECOMMENDED OPERATING CONDITIONS**

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage	$V_{CC}$	2.0~5.5	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	$V_P$		3.0	—	—	2.2	—	2.2	V
			4.5	—	—	3.2	—	3.2	
			5.5	—	—	3.9	—	3.9	
Negative Threshold Voltage	$V_N$		3.0	0.5	—	—	0.5	—	V
			4.5	0.9	—	—	0.9	—	
			5.5	1.1	—	—	1.1	—	
Hysteresis Voltage	$V_H$		3.0	0.3	—	1.2	0.3	1.2	V
			4.5	0.4	—	1.4	0.4	1.4	
			5.5	0.5	—	1.6	0.5	1.6	
High - Level Output Voltage	$V_{OH}$	$V_{IN} = V_{IL}$	$I_{OH} = -50\mu\text{A}$	2.0	1.9	2.0	—	1.9	V
				3.0	2.9	3.0	—	2.9	
				4.5	4.4	4.5	—	4.4	
				5.5	—	—	—	—	
			$I_{OH} = -4\text{mA}$	3.0	2.58	—	—	2.48	V
				4.5	3.94	—	—	3.80	
				5.5	—	—	—	3.85	
				5.5	—	—	—	—	
			$I_{OH} = -24\text{mA}$	3.0	—	—	—	—	V
				4.5	—	—	—	—	
				5.5	—	—	—	—	
				5.5	—	—	—	—	
			$I_{OH} = -75\text{mA}^*$	3.0	—	—	—	—	V
				4.5	—	—	—	—	
				5.5	—	—	—	—	
				5.5	—	—	—	—	
Low - Level Output Voltage	$V_{OL}$	$V_{IN} = V_{IH}$	$I_{OL} = 50\mu\text{A}$	2.0	—	0.0	0.1	—	V
				3.0	—	0.0	0.1	—	
				4.5	—	0.0	0.1	—	
				5.5	—	—	—	—	
			$I_{OL} = 12\text{mA}$	3.0	—	—	0.36	—	V
				4.5	—	—	0.36	—	
				5.5	—	—	—	—	
				5.5	—	—	—	—	
			$I_{OL} = 24\text{mA}$	3.0	—	—	—	0.44	V
				4.5	—	—	—	0.44	
				5.5	—	—	—	1.65	
				5.5	—	—	—	—	
Input Leakage Current	$I_{IN}$	$V_{IN} = V_{CC}$ or GND	5.5	—	—	± 0.1	—	± 1.0	$\mu\text{A}$
				—	—	4.0	—	40.0	
Quiescent Supply Current	$I_{CC}$	$V_{IN} = V_{CC}$ or GND	5.5	—	—	4.0	—	40.0	$\mu\text{A}$

\* : This spec indicates the capability of driving 50Ω transmission lines.  
One output should be tested at a time for a 10ms maximum duration.

AC ELECTRICAL CHARACTERISTICS (  $C_L = 50\text{pF}$ ,  $R_L = 500\ \Omega$ , Input  $t_r = t_f = 3\text{ns}$  )

PARAMETER	SYMBOL	TEST CONDITION	Ta = 25°C			Ta = -40~85°C		UNIT	
			V <sub>CC</sub> (V)	MIN.	TYP.	MAX.	MIN.		MAX.
Propagation Delay Time	t <sub>pLH</sub> t <sub>pHL</sub>		3.3 ± 0.3	—	8.1	13.2	1.0	15.0	ns
			5.0 ± 0.5	—	6.0	9.7	1.0	11.0	
Input Capacitance	C <sub>IN</sub>		—	5	10	—	10	pF	
Power Dissipation Capacitance	C <sub>PD</sub> (1)		—	29	—	—	—		

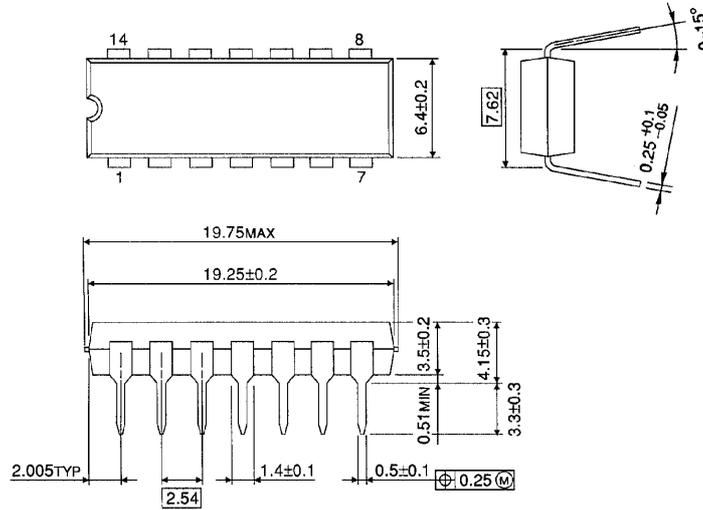
Note (1) C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

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)

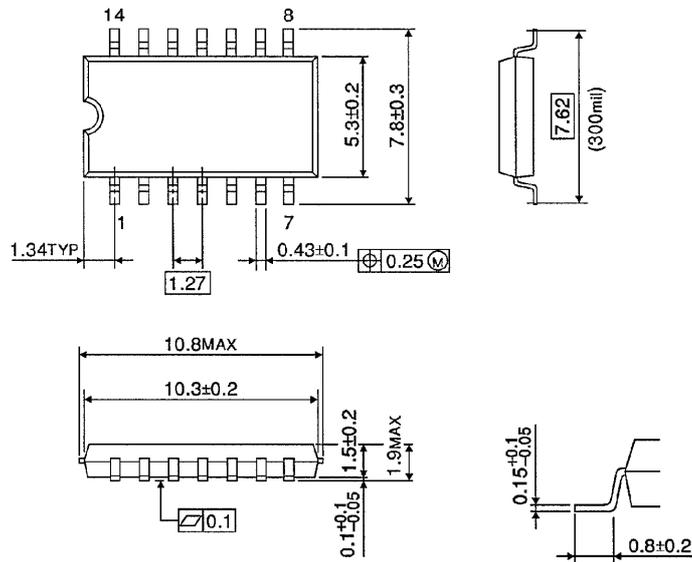
Unit in mm



Weight : 0.96g (Typ.)

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

Unit in mm

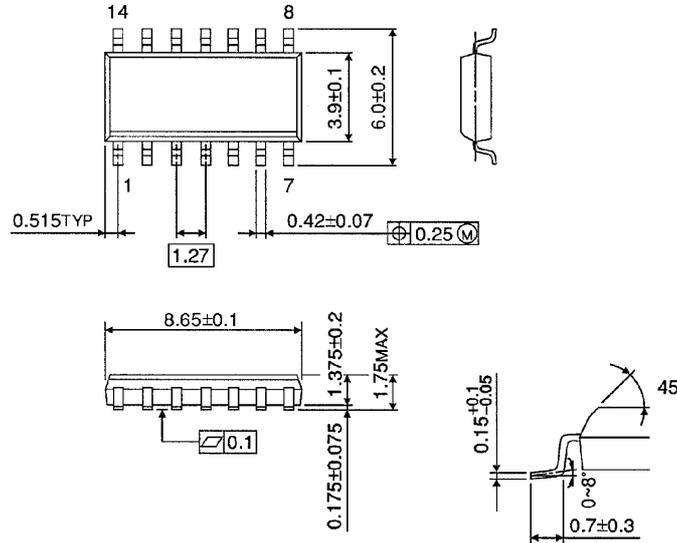


Weight : 0.18g (Typ.)

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

Unit in mm

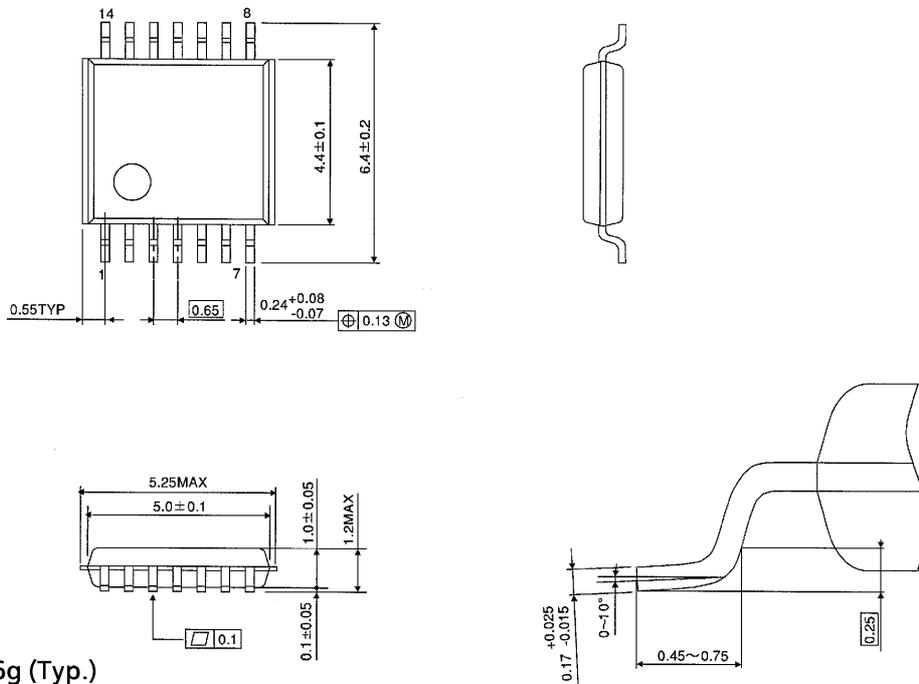
(Note) This package is not available in Japan.



Weight : 0.12g (Typ.)

**TSSOP 14PIN (170mil BODY) PACKAGE DIMENSIONS (TSSOP14-P-0044-0.65)**

Unit in mm



Weight : 0.06g (Typ.)

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