

TC74ACT04P, TC74ACT04F, TC74ACT04FN, TC74ACT04FT

HEX INVERTER

The TC74ACT04 is an advanced high speed CMOS INVERTER fabricated with silicon gate and double - layer metal wiring C²MOS technology.

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

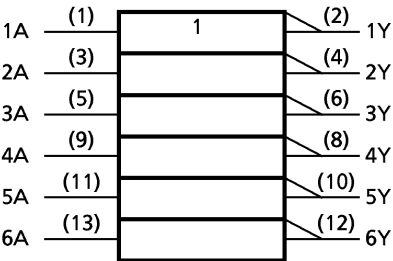
This device may be used as a level converter for interfacing TTL or NMOS to High Speed CMOS. The inputs are compatible with TTL , NMOS and CMOS output voltage levels.

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

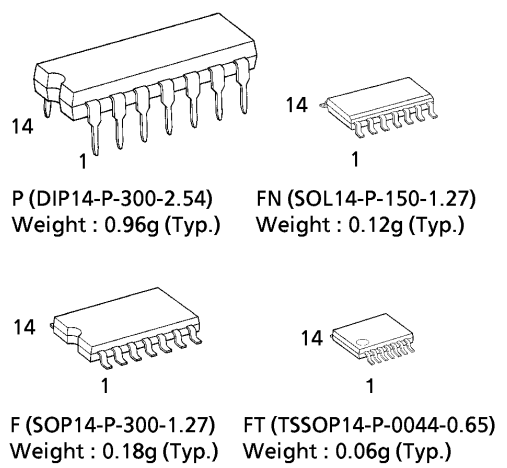
FEATURES :

- High Speed..... $t_{pd} = 4.6\text{ns}(\text{typ.})$ at $V_{CC} = 5\text{V}$
- Low Power Dissipation..... $I_{CC} = 4\mu\text{A}(\text{Max.})$ at $T_a = 25^{\circ}\text{C}$
- Compatible with TTL outputs ... $V_{IL} = 0.8\text{V}(\text{Max.})$
 $V_{IH} = 2.0\text{V}(\text{Min.})$
- Symmetrical Output Impedance... $|I_{OH}| = I_{OL} = 24\text{mA}(\text{Min.})$
Capability of driving 50Ω transmission lines.
- Balanced Propagation Delays..... $t_{pLH} \approx t_{pHL}$
- Pin and Function Compatible with 74F04

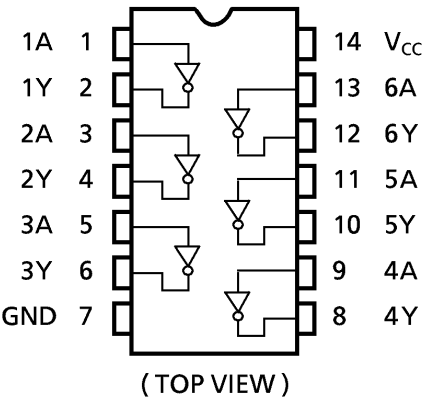
IEC LOGIC SYMBOL



(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}	$-0.5 \sim 7.0$	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}	± 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}	$-65 \sim 150$	°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 $-10\text{mW}/^\circ\text{C}$ should be applied up to 300mW.

RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage	V_{CC}	4.5~5.5	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
Input Rise and Fall Time	dt/dV	0~10	ns/V

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.	
High - Level Input Voltage	V_{IH}		4.5 5.5	2.0	—	—	2.0	—	V
Low - Level Input Voltage	V_{IL}		4.5 5.5	—	—	0.8	—	0.8	V
High - Level Output Voltage	V_{OH}	$V_{IN} = V_{IL}$	$I_{OH} = -50\mu\text{A}$	4.5	4.4	4.5	—	4.4	V
			$I_{OH} = -24\text{mA}$	4.5	3.94	—	—	3.80	
			$I_{OH} = -75\text{mA}^*$	5.5	—	—	—	3.85	
Low - Level Output Voltage	V_{OL}	$V_{IN} = V_{IH}$	$I_{OL} = 50\mu\text{A}$	4.5	—	0.0	0.1	—	V
			$I_{OL} = 24\text{mA}$	4.5	—	—	—	0.44	
			$I_{OL} = 75\text{mA}^*$	5.5	—	—	—	1.65	
Input Leakage Current	I_{IN}	$V_{IN} = V_{CC}$ or GND	5.5	—	—	± 0.1	—	± 1.0	μA
Quiescent Supply Current	I_{CC}	$V_{IN} = V_{CC}$ or GND	5.5	—	—	4.0	—	40.0	
	I_C	PER INPUT : $V_{IN} = 3.4\text{V}$ OTHER INPUT : V_{CC} or GND	5.5	—	—	1.35	—	1.5	mA

* : 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 _{CC} (V)	MIN.	TYP.	MAX.	MIN.	MAX.	
Propagation Delay Time	t _p LH t _p HL		5.0 ± 0.5	—	5.5	7.9	1.0	9.0	ns
Input Capacitance	C _{IN}			—	5	10	—	10	pF
Power Dissipation Capacitance	C _{PD} (1)			—	19	—	—	—	

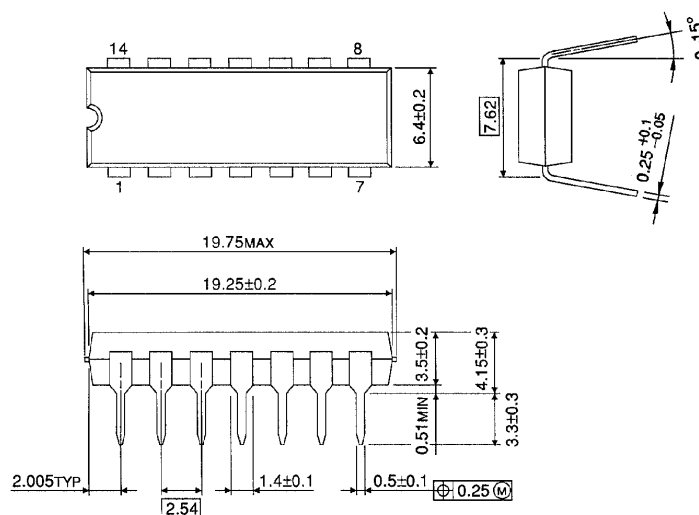
Note (1) C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

Average operating current can be obtained by the equation :

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

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

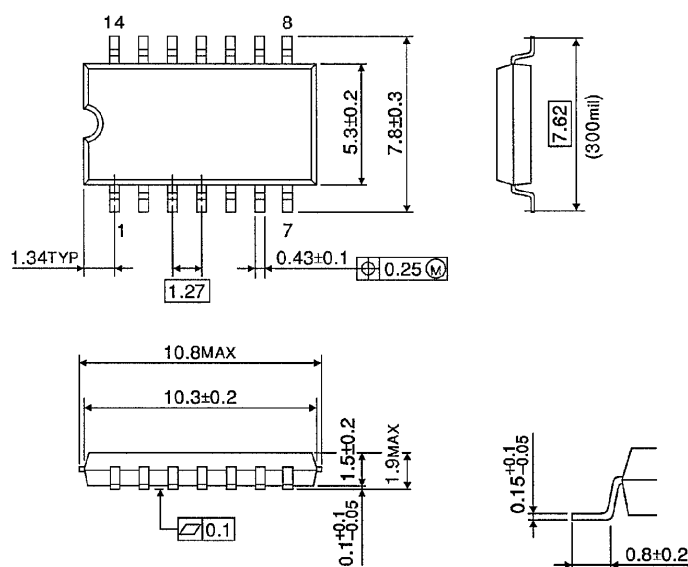
Unit in mm



Weight : 0.96g (Typ.)

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

Unit in mm

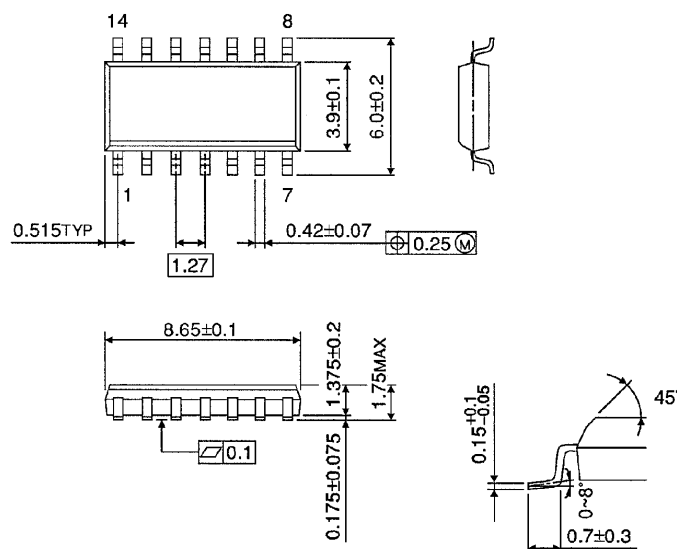


Weight : 0.18g (Typ.)

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

Unit in mm

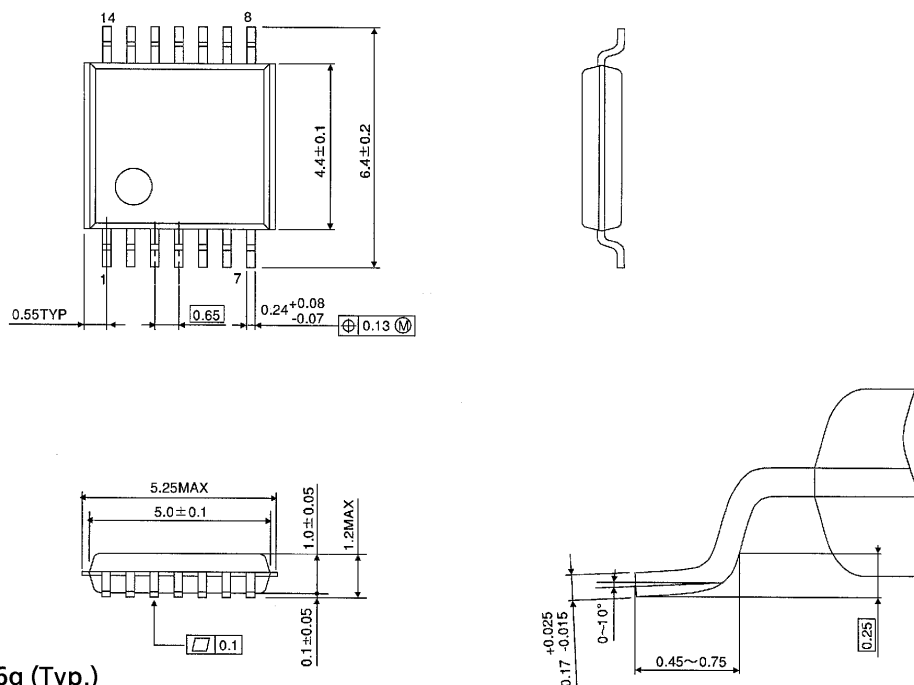
(Note) This package is not available in Japan.



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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