TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

TC74HC14AP, TC74HC14AF, TC74HC14AFN

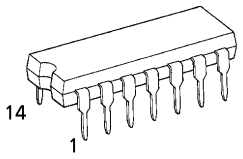
HEX SCHMITT INVERTER

The TC74HC14A is a high speed CMOS SCHMITT INVERTER fabricated with silicon gate C²MOS 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% Vcc 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.

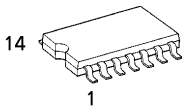
FEATURES :

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

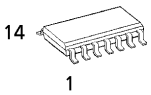
(Note) The JEDEC SOP (FN) is not available in Japan.



P (DIP14-P-300-2.54)
Weight : 0.96g (Typ.)

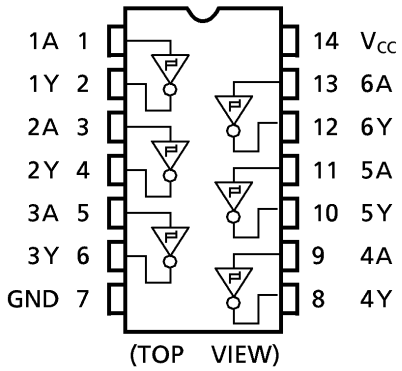


F (SOP14-P-300-1.27)
Weight : 0.18g (Typ.)

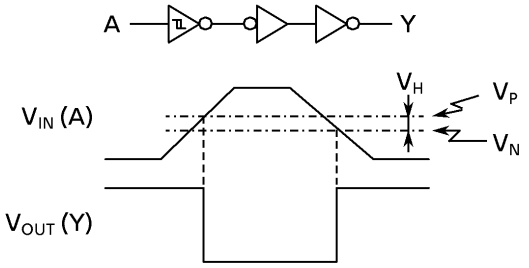


FN (SOL14-P-150-1.27)
Weight : 0.12g (Typ.)

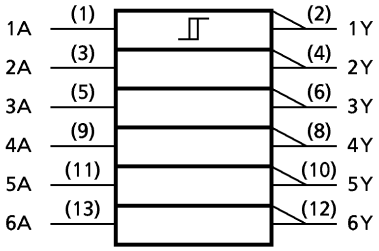
PIN ASSIGNMENT



SYSTEM DIAGRAM, WAVEFORM



IEC LOGIC SYMBOL



TRUTH TABLE

A	Y
L	H
H	L

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage Range	V_{CC}	−0.5~7	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 Ta= −40°C~65°C. From Ta=65°C to 85 °C a derating factor of −10mW/ °C shall be applied until 300mW.

RECOMMENDED OPERTING 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 CHARACTERISITCS

PARAMETER	SYMBOL	TEST CONDITION		V_{CC} (V)	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 2.70 3.50	1.50 3.15 4.20	1.0 2.3 3.0	1.50 3.15 4.20	V
Negative Threshold Voltage	V_N			2.0 4.5 6.0	0.30 1.13 1.50	0.65 1.60 2.30	0.9 2.0 2.6	0.30 0.13 1.50	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}	$V_{IN}=V_{IL}$	$I_{OH}=-20\mu A$	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 $I_{OH}=-5.2$mA	4.5 6.0	4.18 5.68	4.31 5.80	− −	4.13 5.63	− −	
Low-Level Output Voltage	V_{OL}	$V_{IN}=V_{IH}$	$I_{OL}=20\mu A$	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 $I_{OL}=5.2$mA	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, 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}		—	11	21	

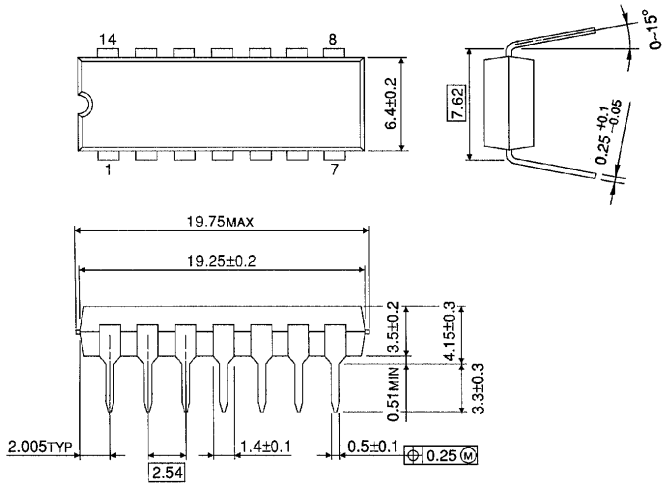
AC ELECTRICAL CHARACTERISTICS (C_L = 50pF, Input $t_r = t_f$ = 6ns)

PARAMETER	SYMBOL	TEST CONDITION		Ta = 25°C			Ta = −40~85°C		UNIT
			V_{CC} (V)	MIN.	TYP.	MAX.	MIN.	MAX.	
Output Transition Time	t_{TLH} t_{THL}		2.0 4.5 6.0	— — —	30 8 7	75 15 13	— — —	95 19 16	ns
Propagation Delay Time	t_{pLH} t_{pHL}		2.0 4.5 6.0	— — —	42 14 12	125 25 21	— — —	155 31 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:

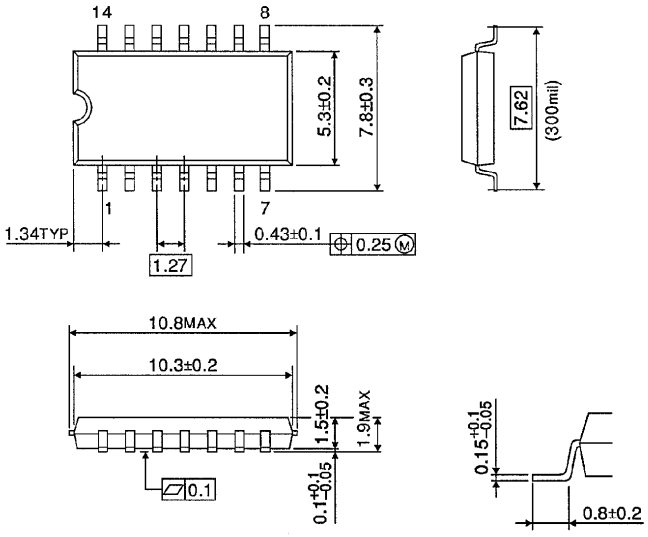
$$I_{CC}(opr) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC} / 6 \text{ (per Gate)}$$

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



Weight : 0.96g (Typ.)

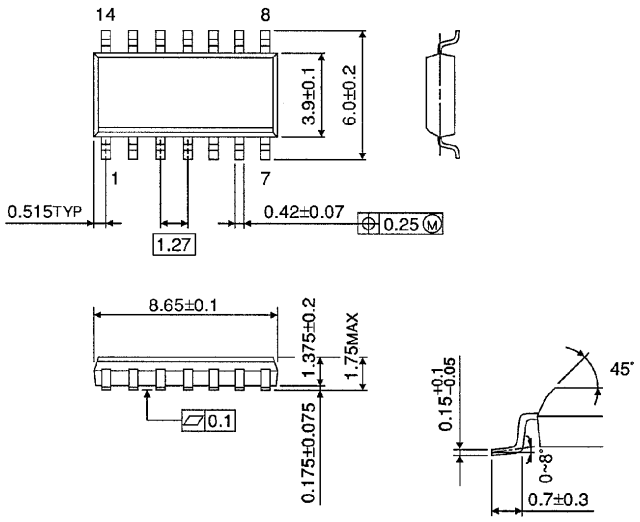
SOP 14PIN (200mil BODY) PACKAGE DIMENSIONS (SOP14-P-300-1.27) Unit in mm



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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