TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

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^2MOS technology.

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

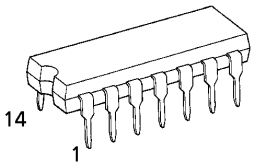
Pin configuration and function are the same as the TC74AC04 but the inputs have hysteresis and with its schmitt trigger function, the TC74AC14 can be used as a line receivers which will receive slow input signals.

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

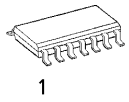
FEATURES :

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

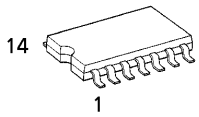
(Note) The JEDEC SOP (FN) is not available in Japan.



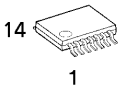
P (DIP14-P-300-2.54)
Weight : 0.96g (Typ.)



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

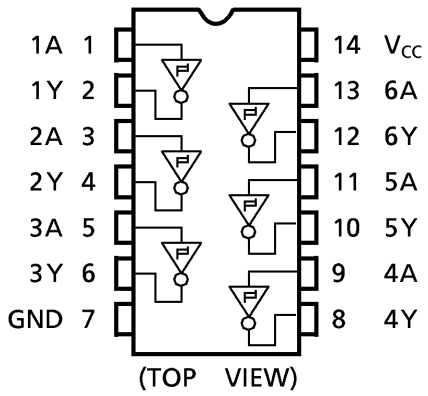


F (SOP14-P-300-1.27)
Weight : 0.18g (Typ.)

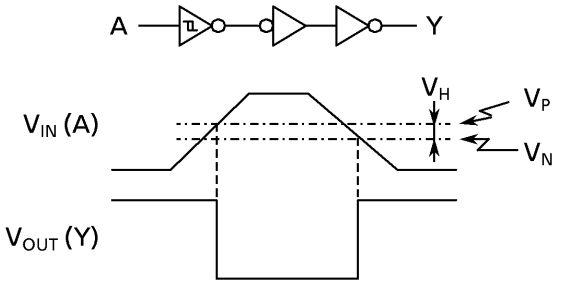


FT (TSSOP14-P-0044-0.65)
Weight : 0.06g (Typ.)

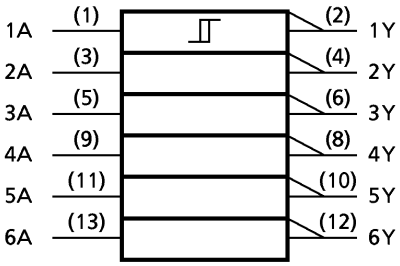
PIN ASSIGNMENT



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}	−0.5~7.0	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 Ta = −40°C~65°C. From Ta = 65°C to 85°C a derating factor of −10mW/°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)	Ta = 25°C			Ta = −40~85°C		UNIT
					MIN.	TYP.	MAX.	MIN.	MAX.	
Positive Threshold Voltage	V_P			3.0 4.5 5.5	− − −	− − −	2.2 3.2 3.9	− − −	2.2 3.2 3.9	V
Negative Threshold Voltage	V_N			3.0 4.5 5.5	0.5 0.9 1.1	− − −	− − −	0.5 0.9 1.1	− − −	V
Hysteresis Voltage	V_H			3.0 4.5 5.5	0.3 0.4 0.5	− − −	1.2 1.4 1.6	0.3 0.4 0.5	1.2 1.4 1.6	V
High - Level Output Voltage	V_{OH}	$V_{IN} = V_{IL}$	$I_{OH} = -50\mu A$	2.0 3.0 4.5	1.9 2.9 4.4	2.0 3.0 4.5	− − −	1.9 2.9 4.4	− − −	V
			$I_{OH} = -4mA$ $I_{OH} = -24mA$ $I_{OH} = -75mA$*	3.0 4.5 5.5	2.58 3.94 −	− − −	− − −	2.48 3.80 3.85	− − −	
Low - Level Output Voltage	V_{OL}	$V_{IN} = V_{IH}$	$I_{OL} = 50\mu A$	2.0 3.0 4.5	− − −	0.0 0.0 0.0	0.1 0.1 0.1	− − −	0.1 0.1 0.1	V
			$I_{OL} = 12mA$ $I_{OL} = 24mA$ $I_{OL} = 75mA$*	3.0 4.5 5.5	− − −	− − −	0.36 0.36 −	− − −	0.44 0.44 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	

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

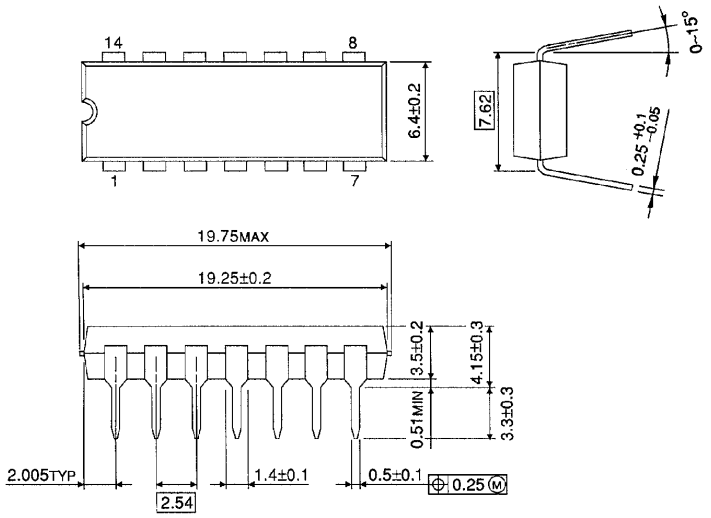
AC ELECTRICAL CHARACTERISTICS (C_L = 50pF , R_L = 500 Ω , Input $t_r = t_f$ = 3ns)

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

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:

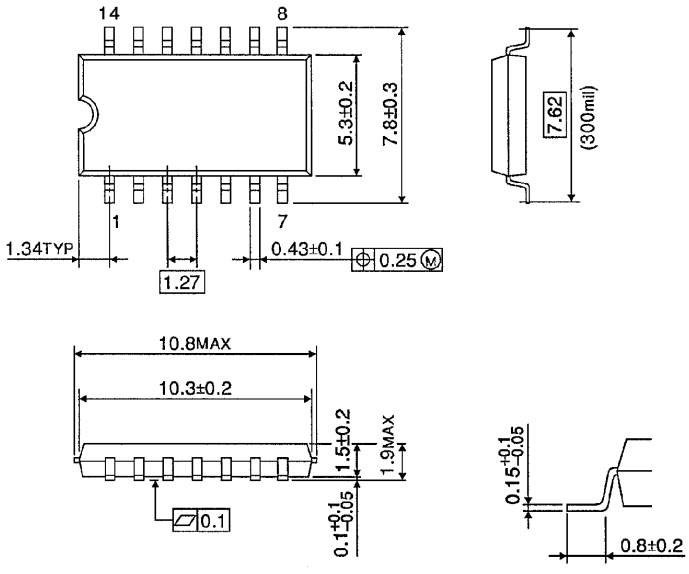
$$I_{CC}(opr.) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC} / 6 \text{ (per Gate)}$$

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



Weight : 0.96g (Typ.)

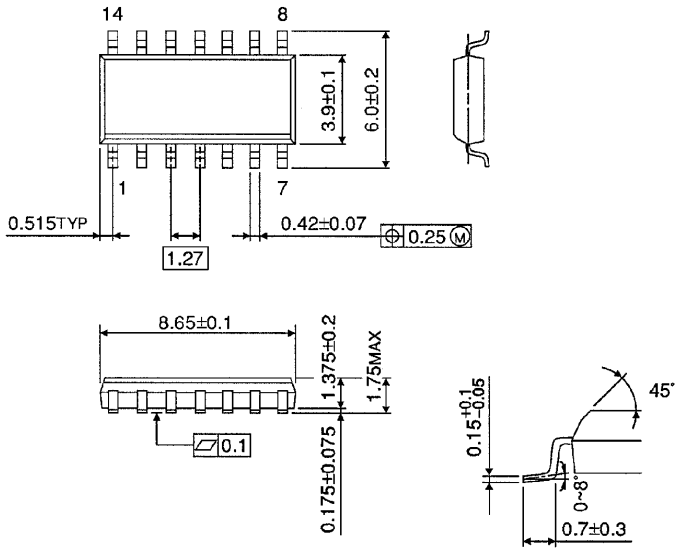
SOP 14PIN (200mil BODY) PACKAGE DIMENSIONS (SOP14-P-300-1.27) Unit in mm



Weight : 0.18g (Typ.)

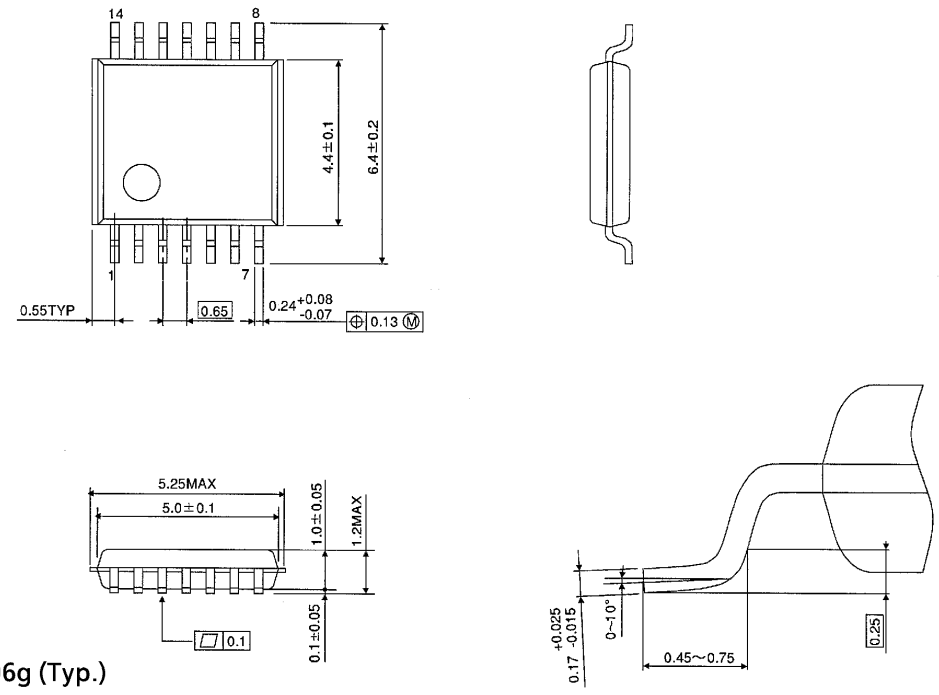
SOP 14PIN (150mil BODY) PACKAGE DIMENSIONS (SOL14-P-150-1.27) Unit in mm

(Note) This package is not available in Japan.



Weight : 0.12g (Typ.)

TSSOP 14PIN (170mil BODY) PACKAGE DIMENSIONS (TSSOP14-P-0044-0.65) Unit in mm



Weight : 0.06g (Typ.)

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000707EBA

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