TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

TC74ACT14P,TC74ACT14F,TC74ACT14FN,TC74ACT14FT

Hex Schmitt Inverter

The TC74ACT14 is an advanced high speed CMOS SCHMITT 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.

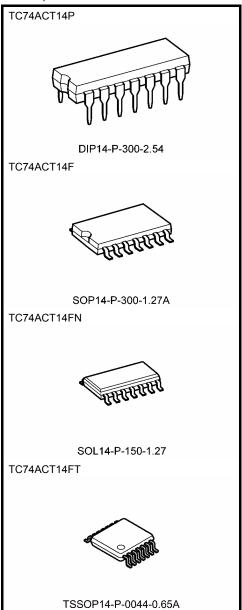
Pin configuration and function are the same as the TC74ACT04 but the inputs have hysteresis and with its schmitt trigger function, the TC74ACT14 can be used as a line receivers which will receive slow input signals.

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

Features

- High speed: $t_{pd} = 6.5$ ns (typ.) at $V_{CC} = 5$ V
- Low power dissipation: $I_{CC} = 4 \mu A \text{ (max)}$ at $T_{a} = 25 \text{°C}$
- Compatible with TTL outputs: $V_{IL} = 0.8 \text{ V (max)}$ $V_{IH} = 2.0 \text{ V (min)}$
- Symmetrical output impedance: $|I_{OH}| = I_{OL} = 24$ mA (min) Capability of driving 50 Ω transmission lines.
- Balanced propagation delays: $t_{pLH} \simeq t_{pHL}$
- Wide operating voltage range: $V_{CC (opr)} = 2 V \text{ to } 5.5 V$
- Pin and function compatible with 74F14

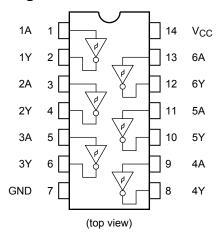
Note: xxxFN (JEDEC SOP) is not available in Japan.



Weight

DIP14-P-300-2.54 : 0.96 g (typ.) SOP14-P-300-1.27A : 0.18 g (typ.) SOL14-P-150-1.27 : 0.12 g (typ.) TSSOP14-P-0044-0.65A : 0.06 g (typ.)

Pin Assignment



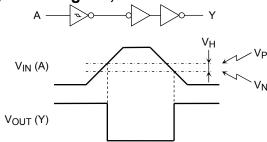
IEC Logic Symbol

1A(1)	I	(2) 1Y
2A(3)		(4) 2Y
3A(5)		(6) 3Y
4A(9)		(8) 4Y
5A (11)		(10) ₅ Y
6A (13)		(12) 6Y

Truth Table

Α	Y
L	Н
Н	L

System Diagram, Waveform



Absolute Maximum Ratings (Note 1)

Characteristics	Symbol	Rating	Unit
Supply voltage range	V _{CC}	−0.5 to 7.0	V
DC input voltage	V _{IN}	-0.5 to V _{CC} + 0.5	V
DC output voltage	Vout	-0.5 to V _{CC} + 0.5	V
Input diode current	lık	±20	mA
Output diode current	lok	±50	mA
DC output current	lout	±50	mA
DC V _{CC} /ground current	Icc	±150	mA
Power dissipation	PD	500 (DIP) (Note 2)/180 (SOP/TSSOP)	mW
Storage temperature	T _{stg}	-65 to 150	°C

Note 1: Exceeding any of the absolute maximum ratings, even briefly, lead to deterioration in IC performance or even destruction.

Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings and the operating ranges.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 2: 500 mW in the range of Ta = -40° C to 65°C. From Ta = 65°C to 85°C a derating factor of -10 mW/°C should be applied up to 300 mW.



Operating Ranges (Note)

Characteristics	Symbol	Rating	Unit
Supply voltage	V _{CC}	4.5 to 5.5	V
Input voltage	V _{IN}	0 to V _{CC}	V
Output voltage	V _{OUT}	0 to V _{CC}	V
Operating temperature	T _{opr}	-40 to 85	°C

Note: The operating ranges must be maintained to ensure the normal operation of the device.

Unused inputs must be tied to either VCC or GND.

Electrical Characteristics

DC Characteristics

Characteristics	Symbol		Test Condition		Ta = 25°C			Ta = −40 to 85°C		Unit		
Characteristics	Symbol				V _{CC} (V)	Min	Тур.	Max	Min	Max	Offile	
Positive threshold voltage	V _P		_			_	_	2.0	ı	2.0	٧	
Negative threshold voltage	V _N	_		4.5	0.8	_	ı	0.8	ı	>		
Hysteresis voltage	V _H		_		4.5	0.4	_	1.2	0.4	1.2	>	
	V _{ОН}	V _{IN} = V _{IL}	I _{OH} = -50 μA		4.5	4.4	4.5	_	4.4	_		
High-level output voltage			I _{OH} = −24 mA		4.5	3.94	_	_	3.80	_	V	
			$I_{OH} = -75 \text{ mA}$	(Note)	5.5	_	_	-	3.85	_		
	V _{OL} V _{IN} = V _{IH}	V _{IN}	I _{OL} = 50 μA		4.5	_	0.0	0.1	_	0.1		
Low-level output voltage			I _{OL} = 24 mA		4.5	_	_	0.36	_	0.44	V	
			I _{OL} = 75 mA	(Note)	5.5	_	_	-	-	1.65		
Input leakage current	I _{IN}	V _{IN} = V _{CC} or GND			5.5	_	_	±0.1	-	±1.0	μΑ	
Quiescent supply current	Icc	V _{IN} = V _{CC} or GND			5.5	_	_	4.0	١	40.0	μΑ	
	IC	Per input: V _{IN} = 3.4 V Other input: V _{CC} or GND			5.5	_	_	1.35	-	1.5	mA	

Note: This spec indicates the capability of driving 50 Ω transmission lines.

One output should be tested at a time for a 10 ms maximum duration.

AC Characteristics ($C_L = 50 \text{ pF}$, $R_L = 500 \Omega$, input: $t_r = t_f = 3 \text{ ns}$)

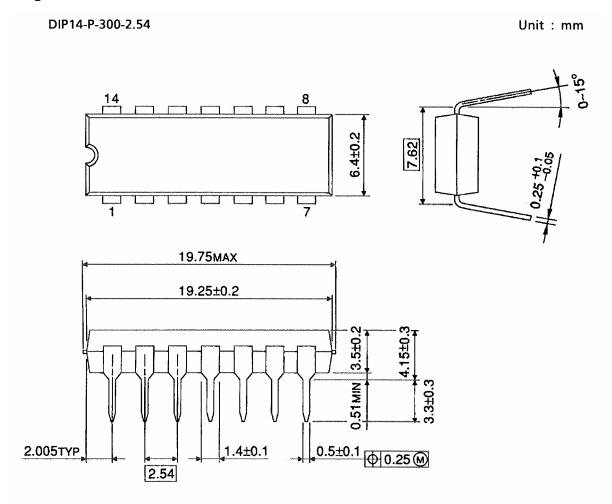
Characteristics	Symbol	Test Condition		Ta = 25°C			Ta = -40 to 85°C		Unit
			V _{CC} (V)	Min	Тур.	Max	Min	Max	
Propagation delay time	t _{pLH} t _{pHL}	_	5.0 ± 0.5	_	7.2	11.4	1.0	13.0	ns
Input capacitance	C _{IN}	_		_	5	10	_	10	pF
Power dissipation capacitance	C _{PD}		(Note)		30	_	_		pF

Note: 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:

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

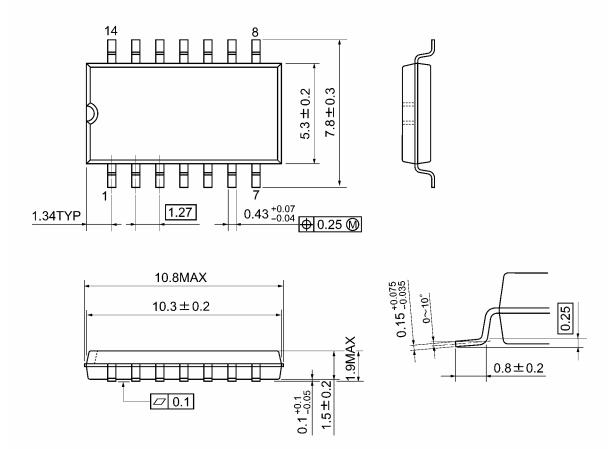
Package Dimensions



Weight: 0.96 g (typ.)

Package Dimensions

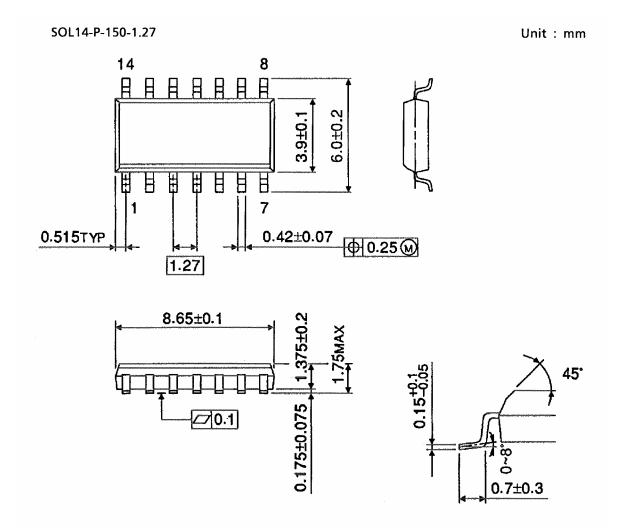
SOP14-P-300-1.27A Unit: mm



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Weight: 0.18 g (typ.)

Package Dimensions (Note)

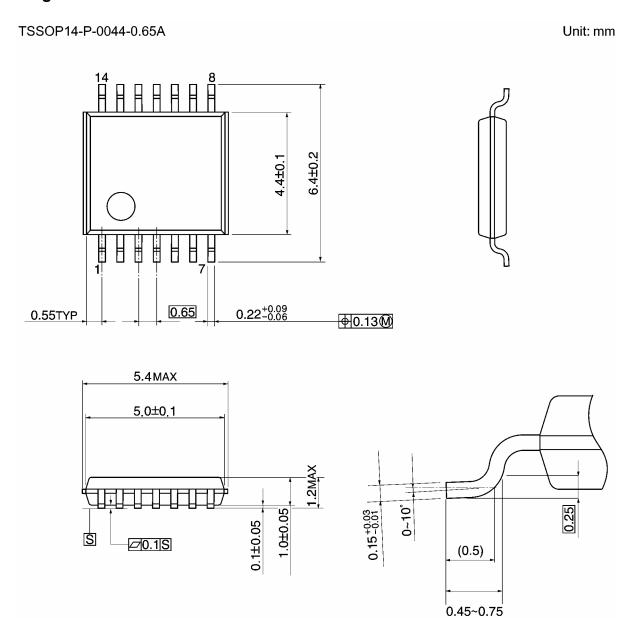


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Note: This package is not available in Japan.

Weight: 0.12 g (typ.)

Package Dimensions



Weight: 0.06 g (typ.)

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20070701-EN GENERAL

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