

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

**TC74ACT86P, TC74ACT86F, TC74ACT86FN**

**QUAD EXCLUSIVE OR GATE**

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

The TC74ACT86 is an advanced high speed CMOS QUAD EXCLUSIVE OR GATE fabricated with silicon gate and double-layer metal wiring C<sup>2</sup>MOS technology.

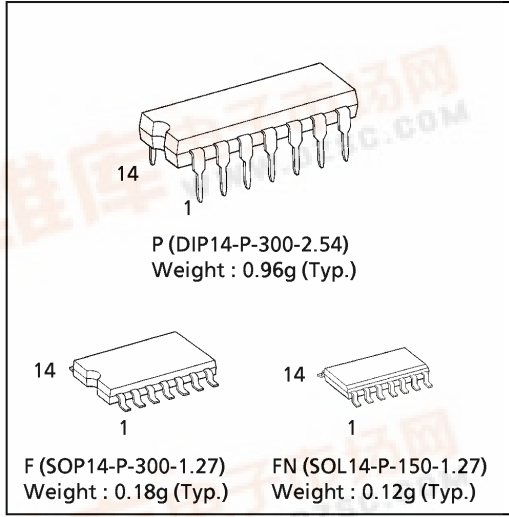
It achieves the high speed operation similar to equivalent Bipolar Schottky TTL while maintaining the CMOS low power dissipation.

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. The internal circuit includes an output buffer, which provides high noise immunity and stable output.

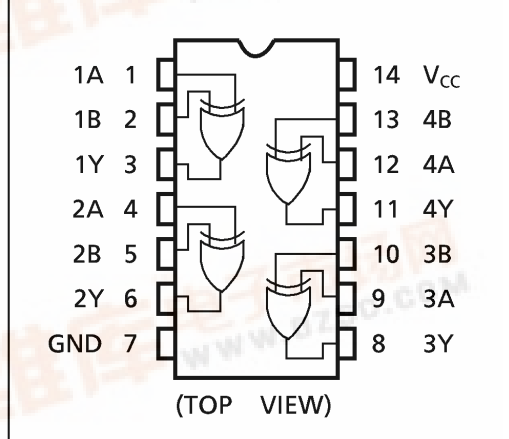
All inputs are equipped with protection circuits against static discharge or transient excess voltage.

**FEATURES :**

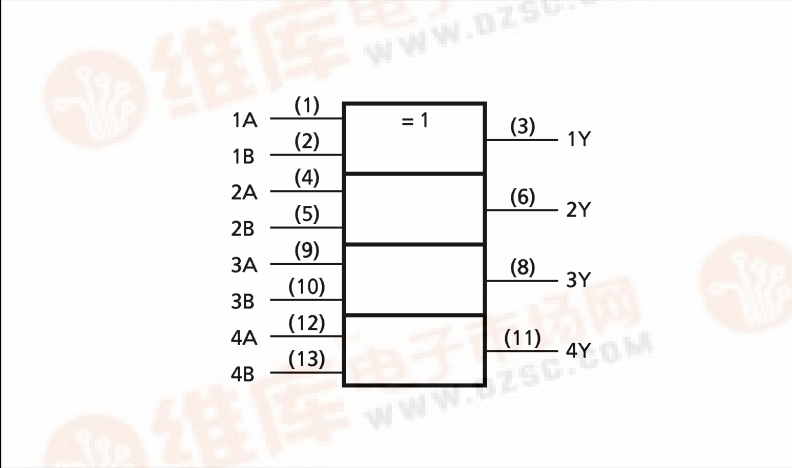
- High Speed..... $t_{pd} = 5.0ns(typ.)$  at  $V_{CC} = 5V$
- Low Power Dissipation..... $I_{CC} = 4\mu A(Max.)$  at  $T_a = 25^{\circ}C$
- Compatible with TTL outputs ...  $V_{IL} = 0.8V (Max.)$   
 $V_{IH} = 2.0V (Min.)$
- Symmetrical Output Impedance...  $|I_{OH}| = I_{OL} = 24mA (Min.)$   
Capability of driving  $50\Omega$  transmission lines.
- Balanced Propagation Delays..... $t_{pLH} \approx t_{pHL}$
- Pin and Function Compatible with 74F86



**PIN ASSIGNMENT**



**IEC LOGIC SYMBOL**



**TRUTH TABLE**

A	B	Y
L	L	L
L	H	H
H	L	H
H	H	L

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**ABSOLUTE MAXIMUM RATINGS**

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage Range	V <sub>CC</sub>	-0.5~7.0	V
DC Input Voltage	V <sub>IN</sub>	-0.5~V <sub>CC</sub> +0.5	V
DC Output Voltage	V <sub>OUT</sub>	-0.5~V <sub>CC</sub> +0.5	V
Input Diode Current	I <sub>IK</sub>	± 20	mA
Output Diode Current	I <sub>OK</sub>	± 50	mA
DC Output Current	I <sub>OUT</sub>	± 50	mA
DC V <sub>CC</sub> /Ground Current	I <sub>CC</sub>	± 100	mA
Power Dissipation	P <sub>D</sub>	500 (DIP)* / 180 (SOP)	mW
Storage Temperature	T <sub>stg</sub>	-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 <sub>CC</sub>	4.5~5.5	V
Input Voltage	V <sub>IN</sub>	0~V <sub>CC</sub>	V
Output Voltage	V <sub>OUT</sub>	0~V <sub>CC</sub>	V
Operating Temperature	T <sub>opr</sub>	-40~85	°C
Input Rise and Fall Time	dt / dV	0~10	ns / V

**DC ELECTRICAL CHARACTERISTICS**

PARAMETER	SYMBOL	TEST CONDITION	V <sub>CC</sub> (V)	Ta = 25°C			Ta = -40~85°C		UNIT	
				MIN.	TYP.	MAX.	MIN.	MAX.		
High - Level Input Voltage	V <sub>IH</sub>		4.5 } 5.5	2.0	—	—	2.0	—	V	
Low - Level Input Voltage	V <sub>IL</sub>		4.5 } 5.5	—	—	0.8	—	0.8	V	
High - Level Output Voltage	V <sub>OH</sub>	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = -50μA	4.5	4.4	4.5	—	4.4	—	V
			I <sub>OH</sub> = -24mA	4.5	3.94	—	—	3.80	—	
			I <sub>OH</sub> = -75mA*	5.5	—	—	—	3.85	—	
Low - Level Output Voltage	V <sub>OL</sub>	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> = 50μA	4.5	—	0.0	0.1	—	0.1	V
			I <sub>OL</sub> = 24mA	4.5	—	—	0.36	—	0.44	
			I <sub>OL</sub> = 75mA*	5.5	—	—	—	—	1.65	
Input Leakage Current	I <sub>IN</sub>	V <sub>IN</sub> = V <sub>CC</sub> or GND	5.5	—	—	± 0.1	—	± 1.0	μA	
Quiescent Supply Current	I <sub>CC</sub>	V <sub>IN</sub> = V <sub>CC</sub> or GND	5.5	—	—	4.0	—	40.0		
		I <sub>C</sub>	PER INPUT : V <sub>IN</sub> = 3.4V OTHER INPUT : V <sub>CC</sub> 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.

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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	$t_{pLH}$ $t_{pHL}$		5.0 ± 0.5	—	5.7	10.5	1.0	12.0	ns
Input Capacitance	C <sub>IN</sub>			—	5	10	—	10	pF
Power Dissipation Capacitance	C <sub>PD</sub> (1)			—	23	—	—	—	

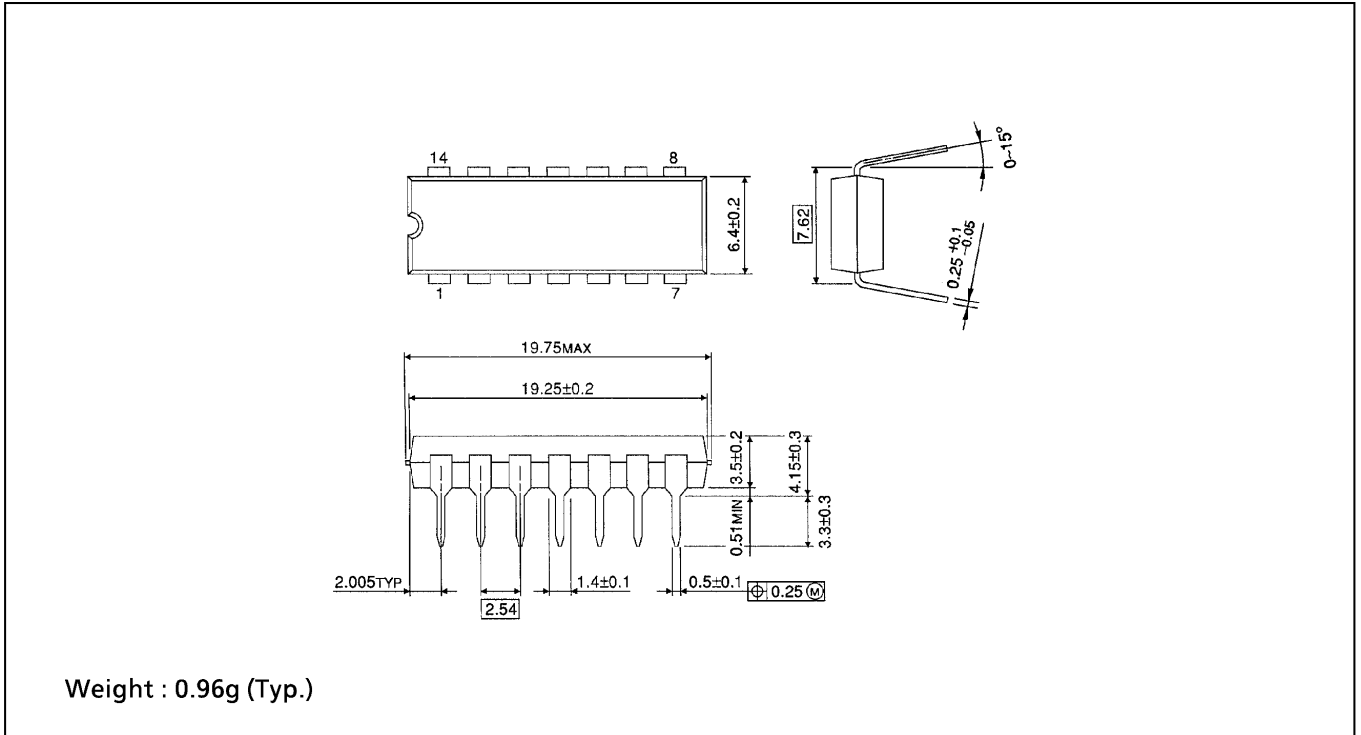
Note(1) C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

Average operating current can be obtained by the equation :

$$I_{CC}(\text{opr.}) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC} / 4 \text{ ( per Gate )}$$

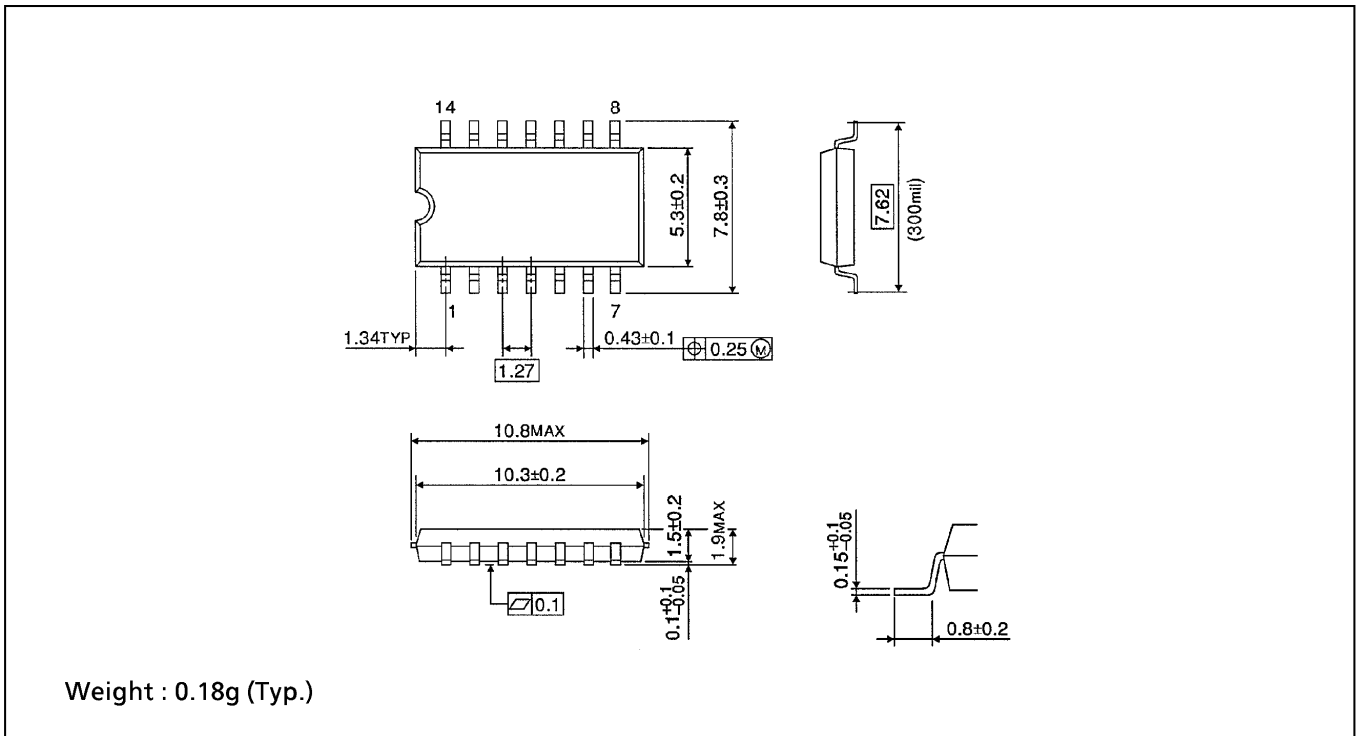
**DIP 14PIN OUTLINE DRAWING (DIP14-P-300-2.54)**

Unit in mm



**SOP 14PIN (200mil BODY) OUTLINE DRAWING (SOP14-P-300-1.27)**

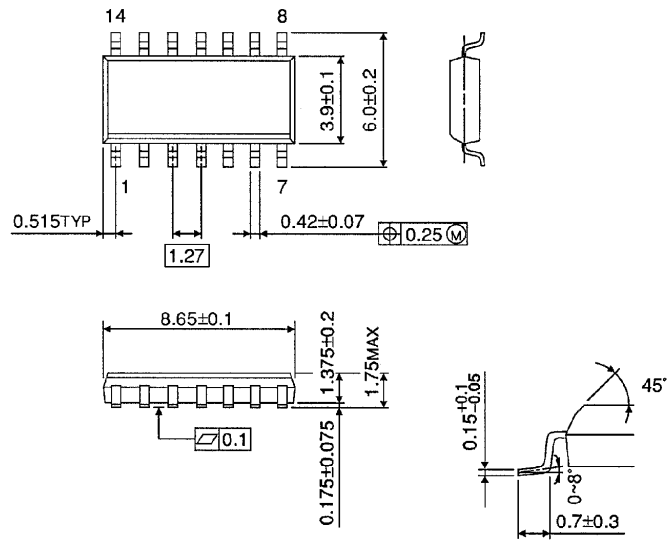
Unit in mm



**SOP 14PIN (150mil BODY) OUTLINE DRAWING (SOL14-P-150 -1.27)**

Unit in mm

(Note) This package is not available in Japan.



Weight : 0.12g (Typ.)