

**TC74AC20P, TC74AC20F, TC74AC20FN****DUAL 4-INPUT NAND GATE**

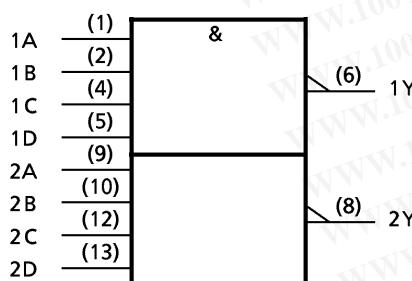
The TC74AC20 is an advanced high speed CMOS 4-INPUT NAND GATE fabricated with silicon gate and double - layer metal wiring C<sup>2</sup>MOS technology.

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

The internal circuit is composed of 3 stages including buffer output, which provide high noise immunity and stable output. All inputs are equipped with protection circuits against static discharge or transient excess voltage.

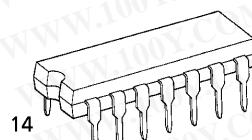
**FEATURES :**

- High Speed..... $t_{pd} = 4.1\text{ns}(\text{typ.})$  at  $V_{CC} = 5\text{V}$
- Low Power Dissipation..... $I_{CC} = 4\mu\text{A}(\text{Max.})$  at  $T_a = 25^\circ\text{C}$
- High Noise Immunity..... $V_{NIH} = V_{NIL} = 28\% V_{CC}$  (Min.)
- Symmetrical Output Impedance..... $|I_{OH}| = |I_{OL}| = 24\text{mA}(\text{Min.})$   
Capability of driving  $50\Omega$  transmission lines.
- Balanced Propagation Delays..... $t_{PLH} \approx t_{PHL}$
- Wide Operating Voltage Range..... $V_{CC} (\text{opr}) = 2\text{V} \sim 5.5\text{V}$
- Pin and Function Compatible with 74F20

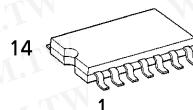
**IEC LOGIC SYMBOL**

勝特力材料 886-3-5753170  
 胜特力电子(上海) 86-21-54151736  
 胜特力电子(深圳) 86-755-83298787  
[Http://www.100y.com.tw](http://www.100y.com.tw)

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



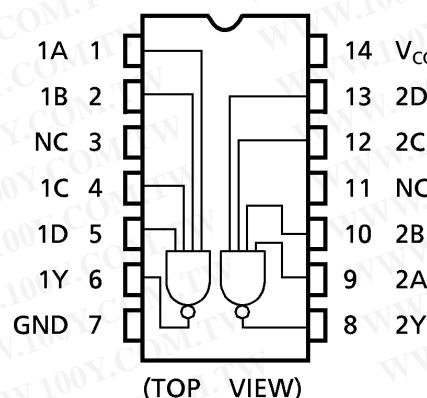
P (DIP14-P-300-2.54)  
 Weight : 0.96g (Typ.)



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



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

**PIN ASSIGNMENT****TRUTH TABLE**

A	B	C	D	Y
L	X	X	X	H
X	L	X	X	H
X	X	L	X	H
X	X	X	L	H
H	H	H	H	L

X : Don't Care

## 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	$I_{IK}$	$\pm 20$	mA
Output Diode Current	$I_{OK}$	$\pm 50$	mA
DC Output Current	$I_{OUT}$	$\pm 50$	mA
DC $V_{CC}$ /Ground Current	$I_{CC}$	$\pm 100$	mA
Power Dissipation	$P_D$	500 (DIP)* / 180 (SOP)	mW
Storage Temperature	$T_{STG}$	-65~150	°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  $85^{\circ}\text{C}$  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	$V_{CC}$	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
Input Rise and Fall Time	$dt/dV$	0~ 100 ( $V_{CC} = 3.3 \pm 0.3\text{V}$ ) 0~ 20 ( $V_{CC} = 5 \pm 0.5\text{V}$ )	ns/V

## DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITION	$V_{CC}$ (V)	Ta = 25°C			Ta = -40~85°C		UNIT
				MIN.	Typ.	MAX.	MIN.	MAX.	
High - Level Input Voltage	$V_{IH}$		2.0	1.50	—	—	1.50	—	V
			3.0	2.10	—	—	2.10	—	
			5.5	3.85	—	—	3.85	—	
Low - Level Input Voltage	$V_{IL}$		2.0	—	—	0.50	—	0.50	V
			3.0	—	—	0.90	—	0.90	
			5.5	—	—	1.65	—	1.65	
High - Level Output Voltage	$V_{OH}$	$V_{IN} = V_{IH}$ or $V_{IL}$	$I_{OH} = -50\mu\text{A}$	2.0	1.9	2.0	—	1.9	V
			$I_{OH} = -4\text{mA}$	3.0	2.9	3.0	—	2.9	
			$I_{OH} = -24\text{mA}$	4.5	4.4	4.5	—	4.4	
			$I_{OH} = -75\text{mA}^*$	5.5	—	—	—	—	
Low - Level Output Voltage	$V_{OL}$	$V_{IN} = V_{IH}$	$I_{OL} = 50\mu\text{A}$	2.0	—	0.0	0.1	—	V
			$I_{OL} = 12\text{mA}$	3.0	—	0.0	0.1	—	
			$I_{OL} = 24\text{mA}$	4.5	—	0.0	0.1	—	
			$I_{OL} = 75\text{mA}^*$	5.5	—	—	—	—	
Input Leakage Current	$I_{IN}$	$V_{IN} = V_{CC}$ or GND	5.5	—	—	$\pm 0.1$	—	$\pm 1.0$	$\mu\text{A}$
Quiescent Supply Current	$I_{CC}$	$V_{IN} = V_{CC}$ or GND	5.5	—	—	4.0	—	40.0	

\* : This spec indicates the capability of driving  $50\Omega$  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.	
Propagation Delay Time	$t_{pLH}$ $t_{pHL}$		$3.3 \pm 0.3$ $5.0 \pm 0.5$	—	6.0 4.8	10.0 7.0	1.0 1.0	11.4 8.0
Input Capacitance	C <sub>IN</sub>			—	5	10	—	10
Power Dissipation Capacitance	C <sub>PD</sub> (1)			—	66	—	—	pF

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 :

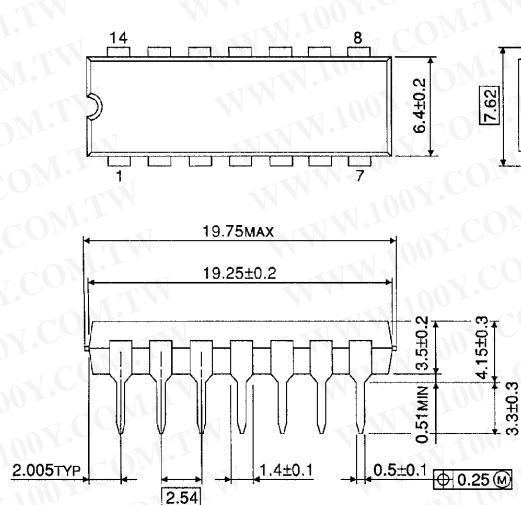
$$I_{CC}(\text{opr.}) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/2 \text{ (per Gate)}$$

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

Unit in mm



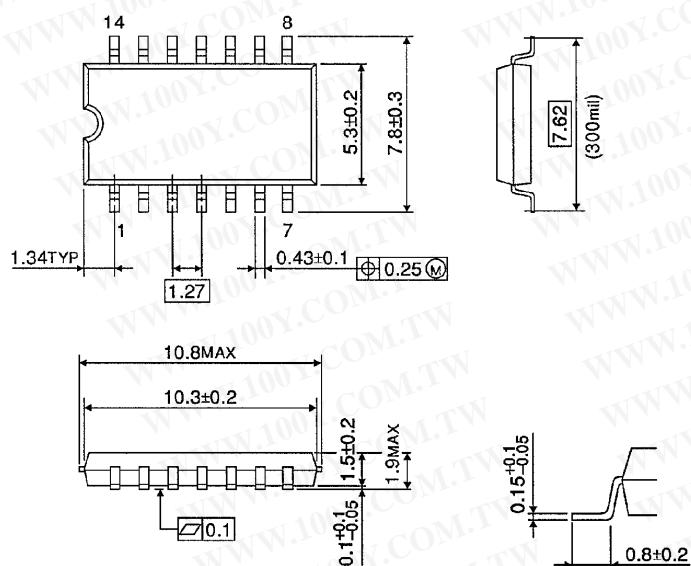
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Weight : 0.96g (Typ.)

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

Unit in mm

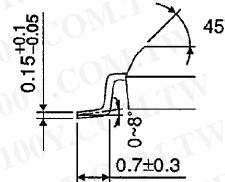
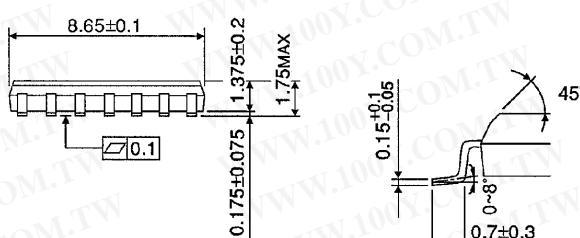
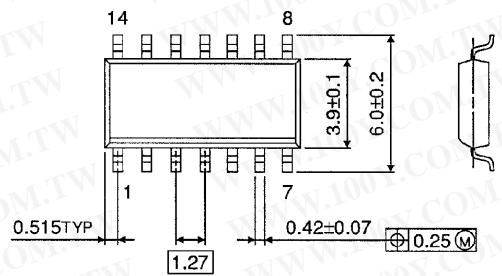


Weight : 0.18g (Typ.)

**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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