

TC74HCT02AP, TC74HCT02AF, TC74HCT02AFN

QUAD 2-INPUT NOR GATE

The TC74HCT02A is a high speed CMOS 2-INPUT NOR GATE fabricated with silicon gate C²MOS technology.

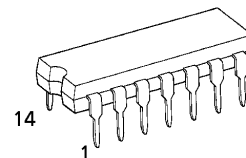
It achieves the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation. This device may be used as a level converter for interfacing TTL or NMOS to High Speed CMOS. The inputs are compatible with TTL, NMOS and CMOS output voltage levels.

The internal circuit 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.

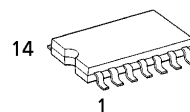
FEATURES :

- High Speed..... $t_{pd} = 9ns(\text{typ.})$ at $V_{CC} = 5V$
- Low Power Dissipation..... $I_{CC} = 1\mu A(\text{Max.})$ at $T_a = 25^\circ C$
- Compatible with TTL outputs... $V_{IH} = 2V(\text{Min.})$
 $V_{IL} = 0.8V(\text{Max.})$
- Wide Interfacing ability.....LSTTL, NMOS, CMOS
- Output Drive Capability.....10 LSTTL Loads
- Symmetrical Output Impedance... $|I_{OH}| = I_{OL} = 4mA(\text{Min.})$
- Balanced Propagation Delays..... $t_{pLH} \approx t_{pHL}$
- Pin and Function Compatible with 74LS02

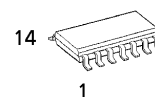
(Note) The JEDEC SOP (FN) is not available in Japan.



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

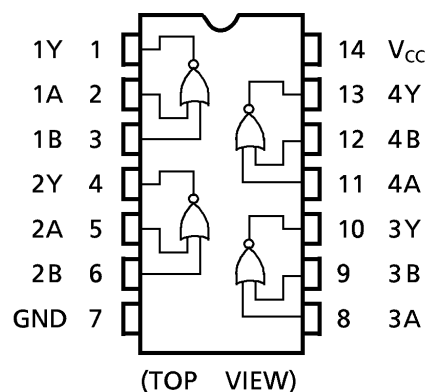


F (SOP14-P-300-1.27)
Weight : 0.18g (Typ.)

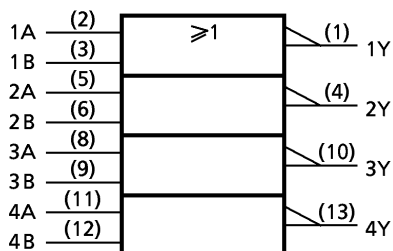


FN (SOL14-P-150-1.27)
Weight : 0.12g (Typ.)

PIN ASSIGNMENT



IEC LOGIC SYMBOL



TRUTH TABLE

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

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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 $T_a = -40^\circ\text{C} \sim 65^\circ\text{C}$. From $T_a = 65^\circ\text{C}$ to 85°C a derating factor of $-10\text{mW}/^\circ\text{C}$ shall be applied until 300mW.

RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage	V_{CC}	4.5~5.5	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	t_r, t_f	0~500	ns

DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITION	V_{CC} (V)	$T_a = 25^\circ\text{C}$			$T_a = -40 \sim 85^\circ\text{C}$		UNIT	
				MIN.	TYP.	MAX.	MIN.	MAX.		
High - Level Input Voltage	V_{IH}		4.5 ┆ 5.5	2.0	—	—	2.0	—	V	
Low - Level Input Voltage	V_{IL}		4.5 ┆ 5.5	—	—	0.8	—	0.8	V	
High - Level Output Voltage	V_{OH}	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OH} = -20 \mu\text{A}$	4.5	4.4	4.5	—	4.4	—	V
			$I_{OH} = -4 \text{ mA}$	4.5	4.18	4.31	—	4.13	—	
Low - Level Output Voltage	V_{OL}	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OL} = 20 \mu\text{A}$	4.5	—	0.0	0.1	—	0.1	V
			$I_{OL} = 4 \text{ mA}$	4.5	—	0.17	0.26	—	0.33	
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	—	—	1.0	—	10.0		
		I_C	PER INPUT: $V_{IN} = 0.5\text{V}$ or 2.4V OTHER INPUT: V_{CC} or GND	5.5	—	—	2.0	—	2.9	mA

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AC ELECTRICAL CHARACTERISTICS ($C_L = 15\text{pF}$, $V_{CC} = 5\text{V}$, $T_a = 25^\circ\text{C}$, Input $t_r = t_f = 6\text{ns}$)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Transition Time	t_{TLH}		—	6	12	ns
	t_{THL}					
Propagation Delay Time	t_{PLH}		—	9	15	
	t_{PHL}					

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

PARAMETER	SYMBOL	TEST CONDITION	$T_a = 25^\circ\text{C}$			$T_a = -40\sim 85^\circ\text{C}$		UNIT
			V_{CC} (V)	MIN.	TYP.	MAX.	MIN.	
Output Transition Time	t_{TLH}		4.5	—	8	15	—	ns
	t_{THL}		5.5	—	7	13	—	
Propagation Delay Time	t_{PLH}		4.5	—	12	18	—	23
	t_{PHL}		5.5	—	11	16	—	
Input Capacitance	C_{IN}		—	5	10	—	10	pF
Power Dissipation Capacitance	C_{PD} (1)		—	18	—	—	—	

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 :

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

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

Unit in mm



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

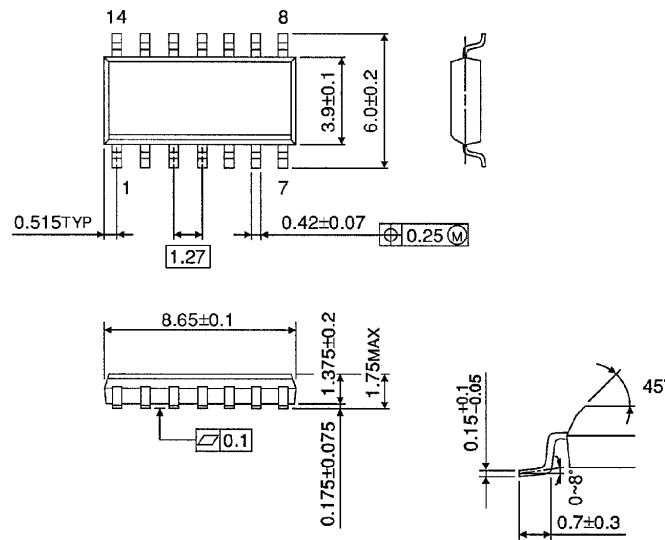
Unit in mm



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.)