



## U74HCT20

CMOS IC

### DUAL 4-INPUT NAND GATES

#### DESCRIPTION

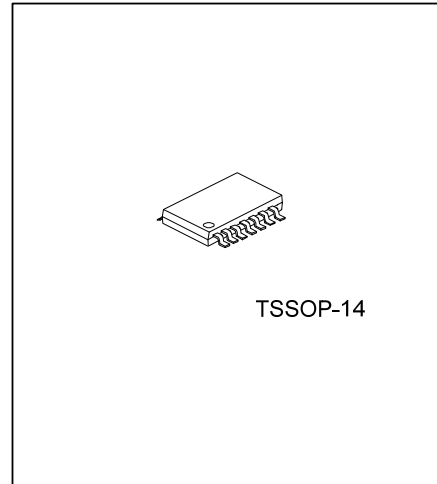
The **U74HCT20** contains two independent 4-input NAND gates.

They perform the Boolean function  $Y=A \bullet B \bullet C \bullet D$  or

$Y=\overline{A} + \overline{B} + \overline{C} + \overline{D}$  in positive logic.

#### FEATURES

- \* Operation Voltage Range: 4.5V~5.5V
- \* Low Quiescent Current:  $I_{CC}=2\mu A(\text{Max})$
- \* High Speed:  $t_{PD}=16\text{ns @ } 4.5\text{V}(\text{Typ})$
- \* Low Input Current: 100nA Max
- \* Inputs are TTL Voltage Compatible

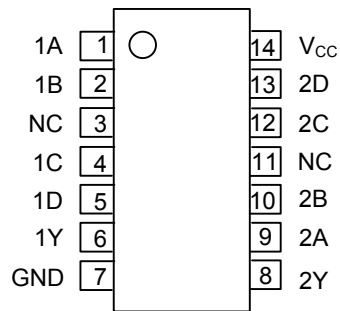


#### ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74HCT20L-P14-T	U74HCT20G-P14-T	TSSOP-14	Tube
U74HCT20L-P14-R	U74HCT20G-P14-R	TSSOP-14	Tape Reel

<p>U74HCT20L-P14-T</p> <p>(1)Packing Type (2)Package Type (3)Lead Free</p>	<p>(1) R: Tape Reel, T: Tube (2) P14: TSSOP-14 (3) G: Halogen Free, L: Lead Free</p>
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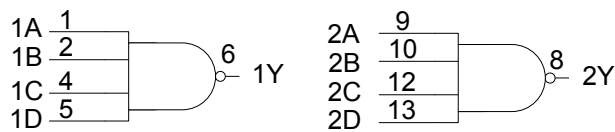
■ PIN CONFIGURATION



■ FUNCTION TABLE

INPUT(A)	INPUT(B)	INPUT(C)	INPUT(D)	OUTPUT(Y)
H	H	H	H	L
L	X	X	X	H
X	L	X	X	H
X	X	L	X	H
X	X	X	L	H

■ LOGIC DIAGRAM (positive logic)



■ ABSOLUTE MAXIMUM RATING (unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V_{CC}$	-0.5~7	V
Input Clamp Current	$I_{IK}$	-20	mA
Output Clamp Current	$I_{OK}$	$\pm 20$	mA
Output Current	$I_{OUT}$	$\pm 25$	mA
$V_{CC}$ or GND Current	$I_{CC}$	$\pm 50$	mA
Storage Temperature	$T_{STG}$	-65 ~ +150	$^{\circ}C$

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.  
 Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	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
Input Transition Rise or Fall Rate	$t_R, t_F$	$V_{CC}=4.5V$			500	ns
Operating Temperature	$T_A$		-40		85	$^{\circ}C$

■ STATIC CHARACTERISTICS ( $T_A = 25^{\circ}C$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
High-Level Input Voltage	$V_{IH}$	$V_{CC} = 4.5V$ to $5.5V$	2.0			V
Low-Level Input Voltage	$V_{IL}$	$V_{CC} = 4.5V$ to $5.5V$			0.8	V
High-Level Output Voltage	$V_{OH}$	$V_{CC} = 4.5V, I_O = -20\mu A$	4.4	4.999		V
		$V_{CC} = 4.5V, I_O = -4mA$	3.98	4.3		
Low-Level Output Voltage	$V_{OL}$	$V_{CC} = 4.5V, I_O = 20\mu A$		0.001	0.1	V
		$V_{CC} = 4.5V, I_O = 4mA$		0.17	0.26	
Input Leakage Current	$I_{I(LEAK)}$	$V_{CC} = 5.5V, V_{IN} = V_{CC}$ or GND		$\pm 0.1$	$\pm 100$	nA
Quiescent Supply Current	$I_{CC}$	$V_{CC} = 5.5V, V_{IN} = V_{CC}$ or GND, $I_O = 0$			2	$\mu A$
Additional Quiescent Supply Current	$\Delta I_{CC}$	One input at $V_{CC} - 2.1V$ , other inputs at 0 or $V_{CC}$		100	360	$\mu A$
Input Capacitance	$C_{IN}$	$V_{CC} = 4.5V \sim 5.5V$		3	10	pF

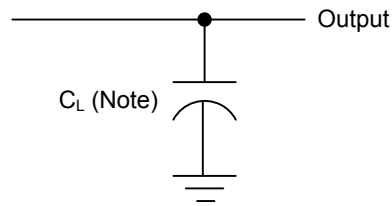
■ DYNAMIC CHARACTERISTICS ( $T_A = 25^{\circ}C$ , Input:  $t_R = t_F = 6ns$ , unless otherwise specified )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation delay from Input(A or B) to Output(Y)	$t_{PLH}, t_{PHL}$	$V_{CC} = 4.5V, C_L = 50pF$		16	28	ns
Output Transition Time	$t_t$	$V_{CC} = 4.5V, C_L = 50pF$		7	15	ns

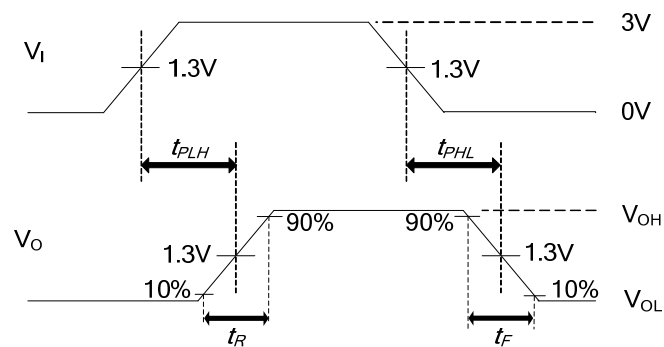
■ OPERATING CHARACTERISTICS ( $T_A = 25^{\circ}C$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	RATINGS	UNIT
Power Dissipation Capacitance	$C_{PD}$	No Load	38	pF

## ■ TEST CIRCUIT AND WAVEFORMS



Note : C<sub>L</sub> includes probe and jig capacitance.



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