



## U74AHC20

CMOS IC

### DUAL 4-INPUT NAND GATES

#### DESCRIPTION

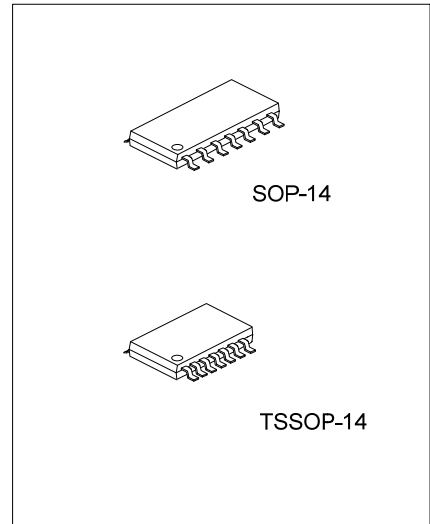
The **U74AHC20** contains two independent 4-input NAND gates.

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: 2~5.5V
- \* Low power dissipation:  $I_{CC}=2\mu A$  (Max.)
- \*  $\pm 8mA$  output drive at 5V

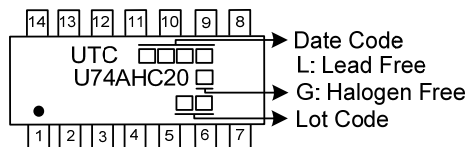


#### ORDERING INFORMATION

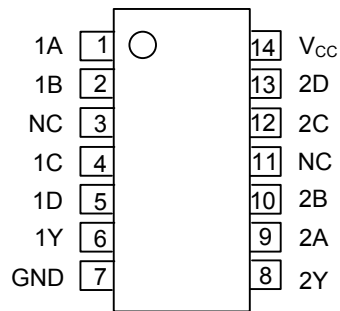
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74AHC20L-S14-R	U74AHC20G-S14-R	SOP-14	Tape Reel
U74AHC20L-P14-R	U74AHC20G-P14-R	TSSOP-14	Tape Reel

<p>U74AHC20G-S14-R</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</p>	<p>(1) R: Tape Reel</p> <p>(2) S14: SOP-14, P14: TSSOP-14</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
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#### MARKING



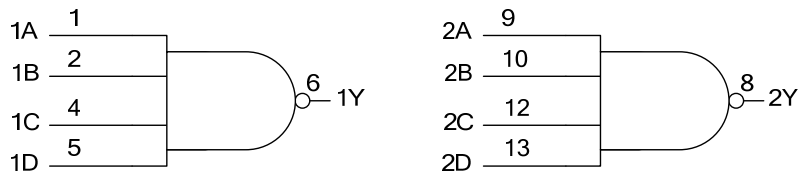
## ■ PIN CONFIGURATION



## ■ FUNCTION TABLE (each gate)

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 (T<sub>A</sub> = 25°C, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V <sub>CC</sub>	-0.5~7	V
Input Clamp Current(V <sub>I</sub> <0)	I <sub>IK</sub>	-20	mA
Output Clamp Current(V <sub>O</sub> <0 or V <sub>O</sub> >V <sub>CC</sub> )	I <sub>OK</sub>	±20	mA
Output Current	I <sub>OUT</sub>	±25	mA
V <sub>CC</sub> or GND Current	I <sub>CC</sub>	±50	mA
Storage Temperature	T <sub>STG</sub>	-65 ~ +150	°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 <sub>CC</sub>		2		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
Input Transition Rise or Fall Rate $\Delta t/\Delta V$	t <sub>R</sub> , t <sub>F</sub>	V <sub>CC</sub> =3V±0.3V			100	ns
		V <sub>CC</sub> =5V±0.5V			20	ns
Operating Temperature	T <sub>A</sub>		-40		85	°C

■ STATIC CHARACTERISTICS (T<sub>A</sub> = 25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
High-Level Input Voltage	V <sub>IH</sub>	V <sub>CC</sub> = 2 V	1.5			V
		V <sub>CC</sub> = 3V	2.1			V
		V <sub>CC</sub> = 5.5 V	3.85			V
Low-Level Input Voltage	V <sub>IL</sub>	V <sub>CC</sub> = 2 V			0.5	V
		V <sub>CC</sub> = 3V			0.9	V
		V <sub>CC</sub> = 5.5 V			1.65	V
High-Level Output Voltage	V <sub>OH</sub>	V <sub>CC</sub> = 2V, I <sub>OH</sub> = 50μA	1.9			V
		V <sub>CC</sub> = 3V, I <sub>OH</sub> = 50μA	2.9			V
		V <sub>CC</sub> = 4.5V, I <sub>OH</sub> = 50μA	4.4			V
		V <sub>CC</sub> = 3V, I <sub>OH</sub> = 4mA	2.58			V
		V <sub>CC</sub> = 4.5V, I <sub>OH</sub> = 8mA	3.94			V
Low-Level Output Voltage	V <sub>OL</sub>	V <sub>CC</sub> = 2V, I <sub>OL</sub> = 50μA			0.1	V
		V <sub>CC</sub> = 3V, I <sub>OL</sub> = 50μA			0.1	V
		V <sub>CC</sub> = 4.5V, I <sub>OL</sub> = 50μA			0.1	V
		V <sub>CC</sub> = 3V, I <sub>OL</sub> = 4mA			0.36	V
		V <sub>CC</sub> = 4.5V, I <sub>OL</sub> = 8mA			0.36	V
Input Leakage Current	I <sub>I(LEAK)</sub>	V <sub>CC</sub> = 6V, V <sub>IN</sub> = V <sub>CC</sub> or GND			±0.1	uA
Quiescent Supply Current	I <sub>CC</sub>	V <sub>CC</sub> = 5.5V, V <sub>IN</sub> = V <sub>CC</sub> or GND, I <sub>OUT</sub> = 0			2	μA
Input Capacitance	C <sub>IN</sub>	V <sub>CC</sub> =5V			4	pF

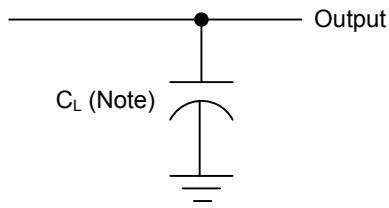
■ DYNAMIC CHARACTERISTICS ( Input: t<sub>R</sub>=t<sub>F</sub>=3ns, 25°C, unless otherwise specified )

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Propagation delay from input (A ,B,C,D) to output(Y)	t <sub>PLH</sub>	V <sub>CC</sub> =3.3±0.3V	C <sub>L</sub> =15pF	6.2	8.8	ns
			C <sub>L</sub> =50pF	8.7	12.3	ns
	t <sub>PHL</sub>	V <sub>CC</sub> =5±0.5V	C <sub>L</sub> =15pF	4.5	5.9	ns
			C <sub>L</sub> =50pF	5.8	7.9	ns

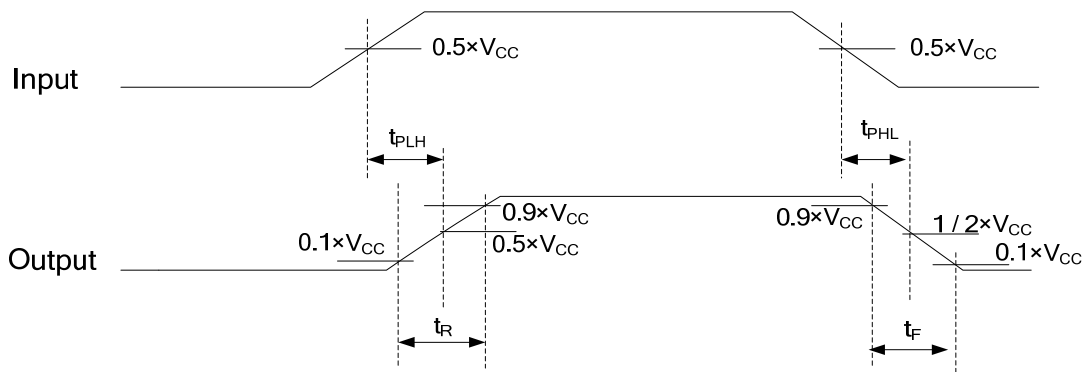
■ OPERATING CHARACTERISTICS (T<sub>A</sub>=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	C <sub>pd</sub>	No load, f=1MHz		18		pF

■ TEST CIRCUIT AND WAVEFORMS



Note :  $C_L$  includes probe and jig capacitance.



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