



U74HC20

CMOS IC

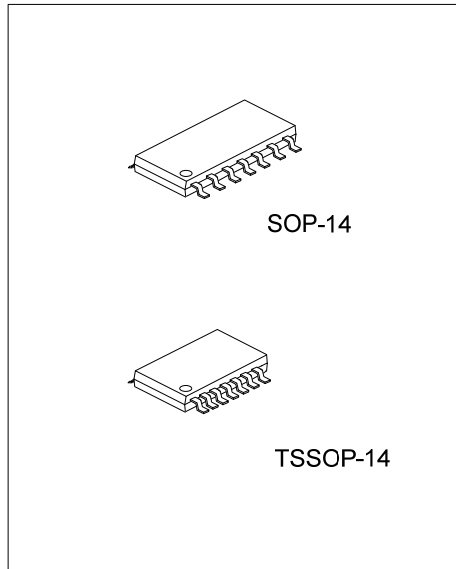
DUAL 4-INPUT NAND GATES

DESCRIPTION

The **U74HC20** contains two independent 4-input NAND gates. They perform the Boolean function $Y=A \cdot B \cdot C \cdot D$ or $Y=\overline{A+B+C+D}$ in positive logic.

FEATURES

- * Operation voltage range: 2~6V
- * Low Quiescent Current: $I_{CC}=2\mu A$ (Max.)
- * High speed: $t_{PD}=11ns$ (Typ.)
- * Low input current: 100nA (Max.)

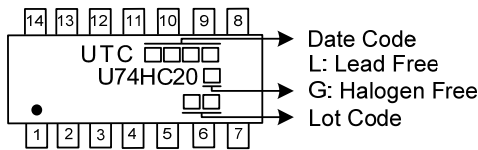


ORDERING INFORMATION

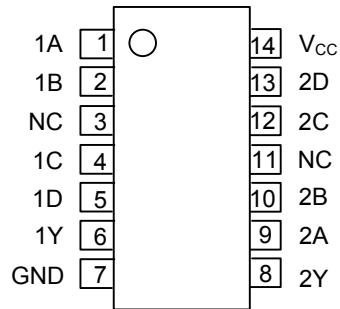
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74HC20L-S14-R	U74HC20G-S14-R	SOP-14	Tape Reel
U74HC20L-P14-R	U74HC20G-P14-R	TSSOP-14	Tape Reel

<p>U74HC20G-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



■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{CC}	-0.5 ~ 7	V
Input Clamp Current	I_{IK}	±20	mA
Output Clamp Current	I_{OK}	±20	mA
Output Current	I_{OUT}	±25	mA
V_{CC} or GND Current	I_{CC}	±50	mA
Storage Temperature	T_{STG}	-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.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	SOP-14	76	°C/W
	TSSOP-14	113	°C/W

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}		2		6	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	$V_{CC}=2V$			1000	ns
		$V_{CC}=4.5V$			500	ns
		$V_{CC}=6V$			400	ns
Operating Temperature	T_A		-40		+125	°C

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
High-Level Input Voltage	V_{IH}	$V_{CC}=2V$	1.5			V
		$V_{CC}=4.5V$	3.15			V
		$V_{CC}=6V$	4.2			V
Low-Level Input Voltage	V_{IL}	$V_{CC}=2V$			0.5	V
		$V_{CC}=4.5V$			1.35	V
		$V_{CC}=6V$			1.8	V
High-Level Output Voltage	V_{OH}	$V_{CC}=2V, I_{OH}=20\mu A$	1.9	1.998		V
		$V_{CC}=4.5V, I_{OH}=20\mu A$	4.4	4.499		V
		$V_{CC}=6V, I_{OH}=20\mu A$	5.9	5.999		V
		$V_{CC}=4.5V, I_{OH}=4mA$	3.98	4.3		V
		$V_{CC}=6V, I_{OH}=5.2mA$	5.48	5.8		V
Low-Level Output Voltage	V_{OL}	$V_{CC}=2V, I_{OL}=20\mu A$		0.002	0.1	V
		$V_{CC}=4.5V, I_{OL}=20\mu A$		0.001	0.1	V
		$V_{CC}=6V, I_{OL}=20\mu A$		0.001	0.1	V
		$V_{CC}=4.5V, I_{OL}=4mA$		0.17	0.26	V
		$V_{CC}=6V, I_{OL}=5.2mA$		0.15	0.26	V
Input Leakage Current	$I_{(LEAK)}$	$V_{CC}=6V, V_{IN}=V_{CC}$ or GND		±0.1	±100	nA
Quiescent Supply Current	I_Q	$V_{CC}=6V, V_{IN}=V_{CC}$ or GND, $I_{OUT}=0$			2	μA
Input Capacitance	C_{IN}	$V_{CC}=2V\sim 6V$		3	10	pF

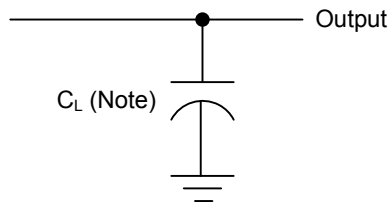
■ DYNAMIC CHARACTERISTICS ($T_A=25^\circ\text{C}$, Input: $t_R=t_F=6\text{ns}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation delay from Input(A, B, C or D) to Output(Y)	t_{PLH}, t_{PHL}	$V_{CC}=2\text{V}, C_L=50\text{pF}$		45	110	ns
		$V_{CC}=4.5\text{V}, C_L=50\text{pF}$		14	22	ns
		$V_{CC}=6\text{V}, C_L=50\text{pF}$		11	19	ns
Output Transition Time	t_T	$V_{CC}=2\text{V}, C_L=50\text{pF}$		27	75	ns
		$V_{CC}=4.5\text{V}, C_L=50\text{pF}$		9	15	ns
		$V_{CC}=6\text{V}, C_L=50\text{pF}$		7	13	ns

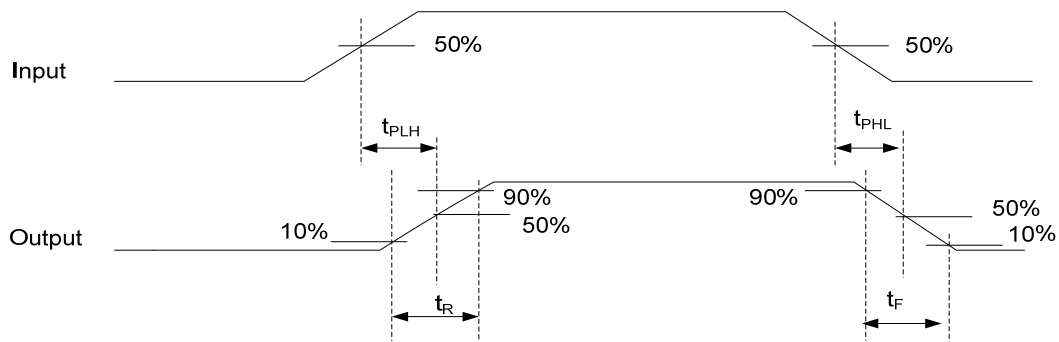
■ OPERATING CHARACTERISTICS ($T_A=25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	C_{PD}	No load		25		pF

TEST CIRCUIT AND WAVEFORMS



Note : C_L includes probe and jig capacitance.



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