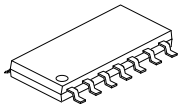
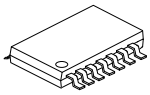
U74HC20

CMOS IC

DUAL 4-INPUT NAND GATES



SOP-14



TSSOP-14

■ DESCRIPTION

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

■ FEATURES

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

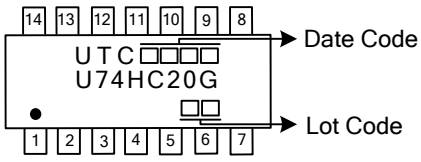
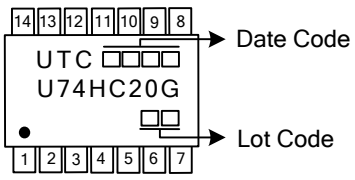
■ ORDERING INFORMATION

Ordering Number	Package	Packing
U74HC20G-S14-R	SOP-14	Tape Reel
U74HC20G-P14-R	TSSOP-14	Tape Reel

U74HC20G-P14-R
(1)Packing Type
(2)Package Type
(3)Green Package

(1) R: Tape Reel
(2) S14: SOP-14, P14: TSSOP-14
(3) G: Halogen Free and Lead Free

■ MARKING

SOP-14	TSSOP-14
	

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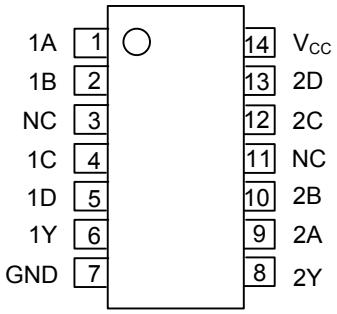
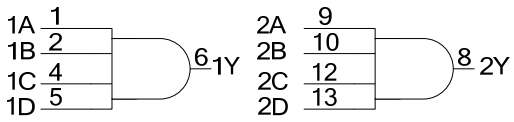
■ PIN CONFIGURATION



■ 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 (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}	±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.

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}		2		6	V
Input Voltage	V_{IN}		0		Vcc	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	
		V_{CC}=6V			400	
Operating Temperature	T_A		-40		85	°C

■ THERMAL DATA

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

■ STATIC CHARACTERISTICS (T_A = 25°C)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
High-Level Input Voltage	V_{IH}	V_{CC}= 2 V	1.5			V
		V_{CC}= 4.5V	3.15			
		V_{CC}= 6 V	4.2			
Low-Level Input Voltage	V_{IL}	V_{CC}= 2 V			0.5	V
		V_{CC}= 4.5 V			1.35	
		V_{CC}= 6 V			1.8	
High-Level Output Voltage	V_{OH}	V_{CC}= 2V, I_{OH} = 20μA	1.9	1.998		V
		V_{CC}= 4.5V, I_{OH} = 20μA	4.4	4.999		
		V_{CC}= 6V, I_{OH} = 20μA	5.9	5.999		
		V_{CC}= 4.5V, I_{OH} = 4mA	3.98	4.3		
		V_{CC}= 6V, I_{OH} = 5.2mA	5.48	5.8		
Low-Level Output Voltage	V_{OL}	V_{CC}= 2V, I_{OL} = 20μA		0.002	0.1	V
		V_{CC}= 4.5V, I_{OL} = 20μA		0.001	0.1	
		V_{CC}= 6V, I_{OL} = 20μA		0.001	0.1	
		V_{CC}= 4.5V, I_{OL} = 4mA		0.17	0.26	
		V_{CC}= 6V, I_{OL} = 5.2mA		0.15	0.26	
Input Leakage Current	$I_{I(LEAK)}$	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~6V		3	10	pF

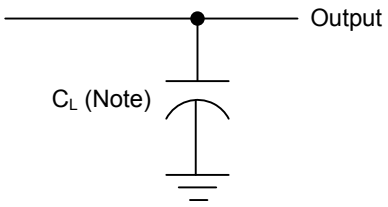
■ DYNAMIC CHARACTERISTICS (T_A=25°C, Input: t_R=t_F=6ns, unless otherwise specified)

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}=2V, C_L=50pF		45	110	ns
		V_{CC}=4.5V, C_L=50pF		14	22	
		V_{CC}=6V, C_L=50pF		11	19	
Output Transition Time	t_T	V_{CC}=2V, C_L=50pF		27	75	ns
		V_{CC}=4.5V, C_L=50pF		9	15	
		V_{CC}=6V, C_L=50pF		7	13	

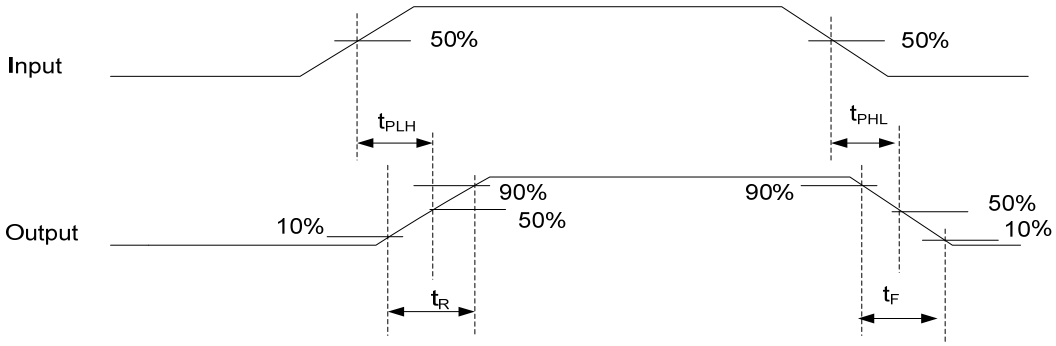
■ OPERATING CHARACTERISTICS (T_A=25°C, unless otherwise specified)

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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