



## U74HC21

CMOS IC

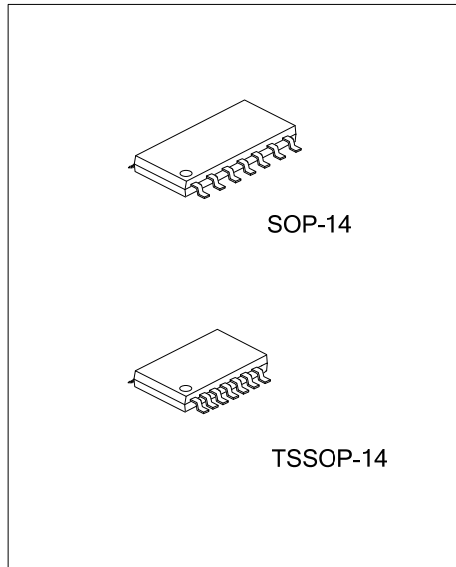
### DUAL 4-INPUT AND GATES

#### DESCRIPTION

The **U74HC21** contains two independent 4-input AND 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:  $I_{CC}=2\mu A(\text{Max})$
- \* High Speed:  $t_{PD}=11\text{ns}(\text{Typ})$
- \* Low Input Current: 100nA Max



#### ORDERING INFORMATION

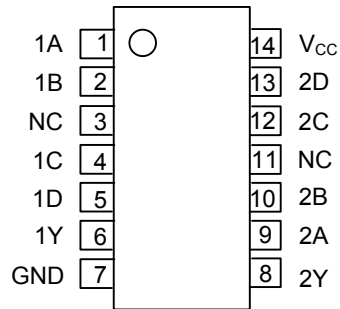
Ordering Number	Package	Packing
U74HC21G-S14-R	SOP-14	Tape Reel
U74HC21G-P14-R	TSSOP-14	Tape Reel

<p>U74HC21G-P14-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) R: Tape Reel (2) S14: SOP-14, P14: TSSOP-14 (3) G: Halogen Free and Lead Free</p>
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#### MARKING

SOP-14	TSSOP-14
<p>Date Code</p> <p>UTC <input type="checkbox"/><input type="checkbox"/><input type="checkbox"/><input type="checkbox"/> U74HC21G</p> <p>Lot Code</p>	<p>Date Code</p> <p>UTC <input type="checkbox"/><input type="checkbox"/><input type="checkbox"/><input type="checkbox"/> U74HC21G</p> <p>Lot Code</p>

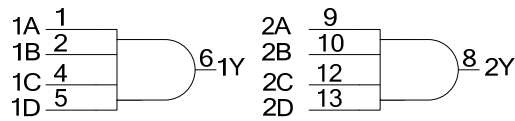
■ PIN CONFIGURATION



■ FUNCTION TABLE

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

■ LOGIC DIAGRAM



■ ABSOLUTE MAXIMUM RATING ( $T_A = 25^\circ\text{C}$ , 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	$^\circ\text{C}$

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		$V_{CC}$	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	
		$V_{CC}=6V$			400	
Operating Temperature	$T_A$		-40		85	$^\circ\text{C}$

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	SOP-14	76	$^\circ\text{C/W}$
	TSSOP-14	113	

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

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			
		$V_{CC} = 6V$	4.2			
Low-Level Input Voltage	$V_{IL}$	$V_{CC} = 2V$			0.5	V
		$V_{CC} = 4.5V$			1.35	
		$V_{CC} = 6V$			1.8	
High-Level Output Voltage	$V_{OH}$	$V_{CC} = 2V, I_{OH} = 20\mu\text{A}$	1.9	1.998		V
		$V_{CC} = 4.5V, I_{OH} = 20\mu\text{A}$	4.4	4.999		
		$V_{CC} = 6V, I_{OH} = 20\mu\text{A}$	5.9	5.999		
		$V_{CC} = 4.5V, I_{OH} = 4\text{mA}$	3.98	4.3		
		$V_{CC} = 6V, I_{OH} = 5.2\text{mA}$	5.48	5.8		
Low-Level Output Voltage	$V_{OL}$	$V_{CC} = 2V, I_{OL} = 20\mu\text{A}$		0.002	0.1	V
		$V_{CC} = 4.5V, I_{OL} = 20\mu\text{A}$		0.001	0.1	
		$V_{CC} = 6V, I_{OL} = 20\mu\text{A}$		0.001	0.1	
		$V_{CC} = 4.5V, I_{OL} = 4\text{mA}$		0.17	0.26	
		$V_{CC} = 6V, I_{OL} = 5.2\text{mA}$		0.15	0.26	
Input Leakage Current	$I_{I(LEAK)}$	$V_{CC} = 6V, V_{IN} = V_{CC}$ or GND		$\pm 0.1$	$\pm 100$	nA
Quiescent Supply Current	$I_Q$	$V_{CC} = 6V, V_{IN} = V_{CC}$ or GND, $I_{OUT} = 0$			2	$\mu\text{A}$
Input Capacitance	$C_{IN}$	$V_{CC}=2V\sim 6V$		3	10	pF

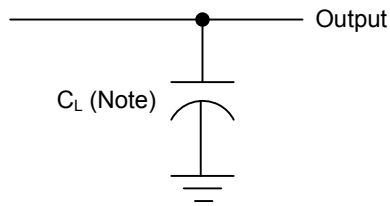
■ DYNAMIC CHARACTERISTICS ( $T_A=25^\circ\text{C}$ , Input:  $t_R=t_F=6\text{ns}$ , unless otherwise specified )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation delay from Input(A, B, C or D) to Output(Y)	$t_{PLH} / t_{PHL}$	$V_{CC}=2\text{V}, C_L=50\text{pF}$		44	110	ns
		$V_{CC}=4.5\text{V}, C_L=50\text{pF}$		14	22	
		$V_{CC}=6\text{V}, C_L=50\text{pF}$		11	19	
Output Transition Time	$t_T$	$V_{CC}=2\text{V}, C_L=50\text{pF}$		29	75	ns
		$V_{CC}=4.5\text{V}, C_L=50\text{pF}$		10	15	
		$V_{CC}=6\text{V}, C_L=50\text{pF}$		8	13	

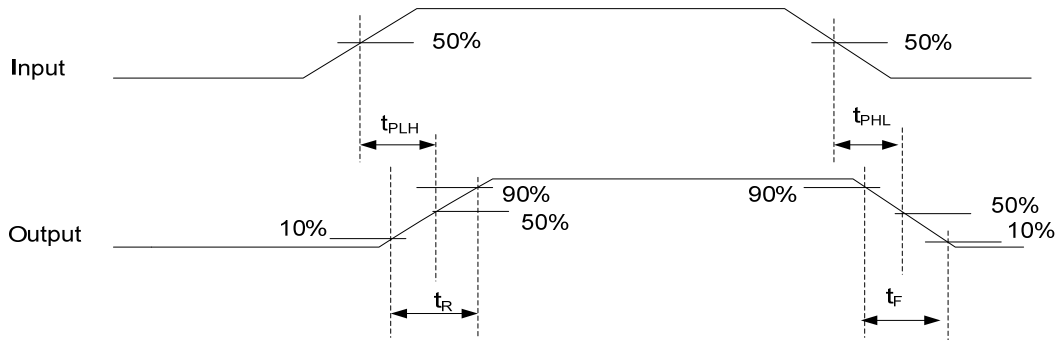
■ OPERATING CHARACTERISTICS ( $T_A=25^\circ\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	RATINGS	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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