



# U74HC02

**CMOS IC**

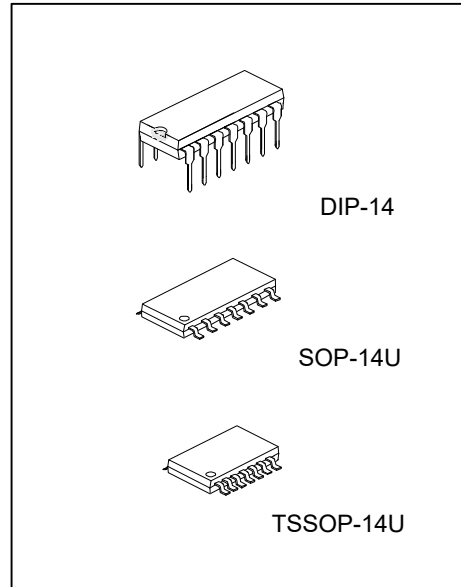
## QUADRUPLE 2-INPUT NOR GATES

### DESCRIPTION

The **U74HC02** contains four independent 2-input NOR gates, which provides the Function  $Y=A+B$  in positive logic.

### FEATURES

- \* Operation voltage range: 2~6V
- \* Low Quiescent Current:  $I_{CC}=2\mu A(\text{Max})$
- \* High speed:  $t_{PD}=8\text{ns}(\text{Typ.}) V_{CC}=6\text{V}$
- \* Low input current: 100nA Max



### ORDERING INFORMATION

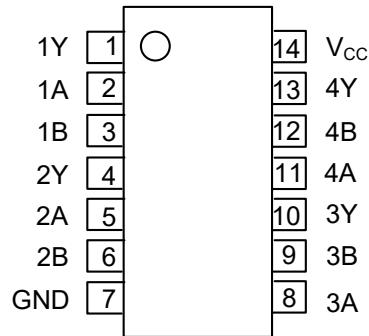
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74HC02L-D14-T	U74HC02G-D14-T	DIP-14	Tube
U74HC02L-UEA-R	U74HC02G-UEA-R	SOP-14U	Tape Reel
U74HC02L-UEB-R	U74HC02G-UEB-R	TSSOP-14U	Tape Reel

<p>U74HC02G-D14-T</p> <ul style="list-style-type: none"> <li>(1) Packing Type</li> <li>(2) Package Type</li> <li>(3) Green Package</li> </ul>	<ul style="list-style-type: none"> <li>(1) T: Tube, R: Tape Reel</li> <li>(2) D14: DIP-14, UEA: SOP-14U, UEB: TSSOP-14U</li> <li>(3) G: Halogen Free and Lead Free, L: Lead Free</li> </ul>
---	---

### MARKING

DIP-14	SOP-14U / TSSOP-14U
<ul style="list-style-type: none"> <li>Date Code</li> <li>L: Lead Free</li> <li>G: Halogen Free</li> <li>Lot Code</li> </ul>	<ul style="list-style-type: none"> <li>Date Code</li> <li>L: Lead Free</li> <li>G: Halogen Free</li> <li>Lot Code</li> </ul>

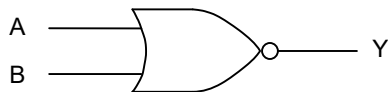
■ PIN CONFIGURATION



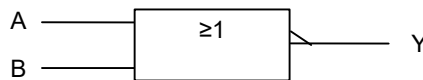
■ FUNCTION TABLE

INPUT(A)	INPUT(B)	OUTPUT(Y)
L	L	H
L	H	L
H	L	L
H	H	L

■ LOGIC DIAGRAM



Logic Diagram  
(Positive Logic)



Logic Symbol

## ■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V <sub>CC</sub>	-0.5 ~ 7	V
Input Clamp Current	I <sub>IK</sub>	±20	mA
Output Clamp Current	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.

## ■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	DIP-14	75	°C/W
	SOP-14U	95	°C/W
	TSSOP-14U	120	°C/W

## ■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V <sub>CC</sub>		2		6	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	t <sub>R</sub> , t <sub>F</sub>	V <sub>CC</sub> =2V			1000	ns
		V <sub>CC</sub> =4.5V			500	ns
		V <sub>CC</sub> =6V			400	ns
Operating Temperature	T <sub>A</sub>		-40		+125	°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> =2V	1.5			V
		V <sub>CC</sub> =4.5V	3.15			V
		V <sub>CC</sub> =6V	4.2			V
Low-Level Input Voltage	V <sub>IL</sub>	V <sub>CC</sub> =2V			0.5	V
		V <sub>CC</sub> =4.5V			1.35	V
		V <sub>CC</sub> =6V			1.8	V
High-Level Output Voltage	V <sub>OH</sub>	V <sub>CC</sub> =2V, I <sub>OH</sub> =20μA	1.9	1.998		V
		V <sub>CC</sub> =4.5V, I <sub>OH</sub> =20μA	4.4	4.499		V
		V <sub>CC</sub> =6V, I <sub>OH</sub> =20μA	5.9	5.999		V
		V <sub>CC</sub> =4.5V, I <sub>OH</sub> =4mA	3.98	4.3		V
		V <sub>CC</sub> =6V, I <sub>OH</sub> =5.2mA	5.48	5.8		V
Low-Level Output Voltage	V <sub>OL</sub>	V <sub>CC</sub> =2V, I <sub>OL</sub> =20μA		0.002	0.1	V
		V <sub>CC</sub> =4.5V, I <sub>OL</sub> =20μA		0.001	0.1	V
		V <sub>CC</sub> =6V, I <sub>OL</sub> =20μA		0.001	0.1	V
		V <sub>CC</sub> =4.5V, I <sub>OL</sub> =4mA		0.17	0.26	V
		V <sub>CC</sub> =6V, I <sub>OL</sub> =5.2mA		0.15	0.26	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	±100	nA
Quiescent Supply Current	I <sub>Q</sub>	V <sub>CC</sub> =6V, 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> =2V~6V		3	10	pF

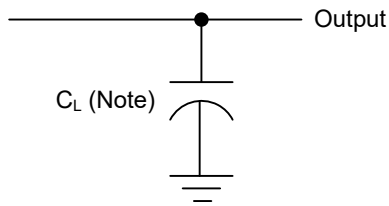
■ DYNAMIC CHARACTERISTICS ( $T_A=25^\circ\text{C}$ , Input:  $t_R=t_F=6\text{ns}$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation delay from Input(A or B) to Output(Y)	$t_{PLH}, t_{PHL}$	$V_{CC}=2\text{V}, C_L=50\text{pF}$		45	90	ns
		$V_{CC}=4.5\text{V}, C_L=50\text{pF}$		9	18	ns
		$V_{CC}=6\text{V}, C_L=50\text{pF}$		8	15	ns
Output Transition Time	$t_T$	$V_{CC}=2\text{V}$		38	75	ns
		$V_{CC}=4.5\text{V}$		8	15	ns
		$V_{CC}=6\text{V}$		6	13	ns

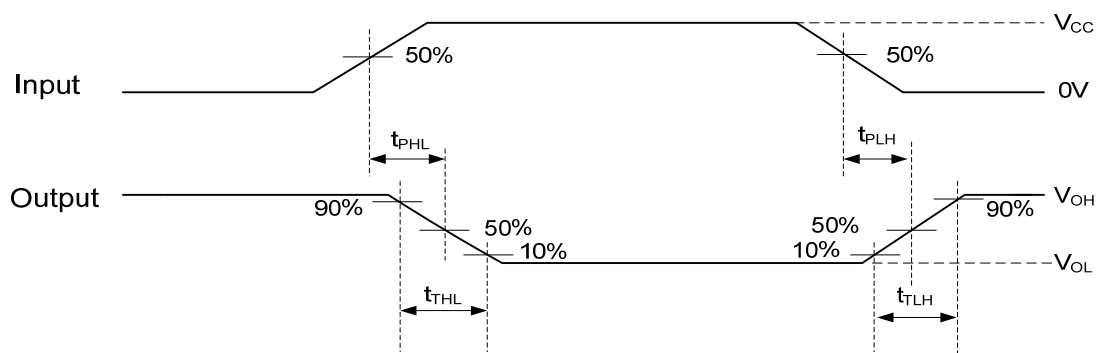
■ OPERATING CHARACTERISTICS ( $T_A=25^\circ\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	RATINGS	UNIT
Power Dissipation Capacitance	$C_{PD}$	No Load	22	pF

■ TEST CIRCUIT AND WAVEFORMS



Note :  $C_L$  includes probe and jig capacitance.



UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. UTC reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.