



## U74AHCT02

CMOS IC

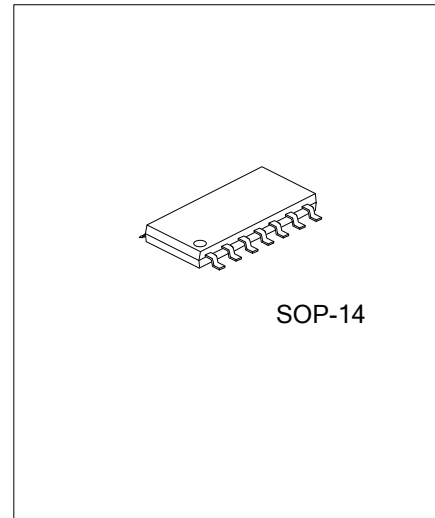
### QUADRUPLE 2-INPUT POSITIVE-NOR GATES

#### DESCRIPTION

The **U74AHCT02** contains four independent 2-input NOR gates. Each gate provides the function  $Y = \overline{A+B}$  in positive logic.

#### FEATURES

- \* Inputs Are TTL-Voltage Compatible
- \* Low Power Dissipation
- \* Balanced Propagation Delays

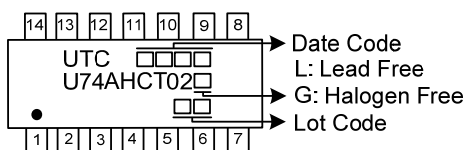


#### ORDERING INFORMATION

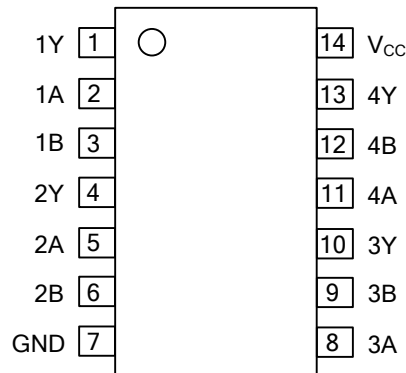
| Ordering Number  |                  | Package | Packing   |
|------------------|------------------|---------|-----------|
| Lead Free        | Halogen Free     |         |           |
| U74AHCT02L-S14-R | U74AHCT02G-S14-R | SOP-14  | Tape Reel |

|  |   |
|--|---|
| <p>U74AHCT02G-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</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p> |
|--|---|

#### MARKING



■ PIN CONFIGURATION

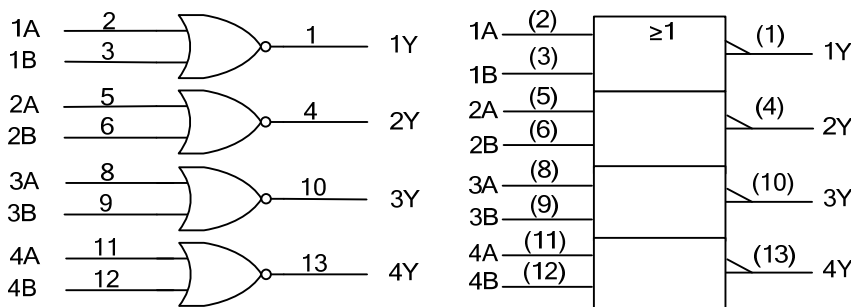


■ FUNCTION TABLE (Each Gate)

| INPUTS A | INPUTS B | OUTPUT Y |
|----------|----------|----------|
| L        | L        | H        |
| L        | H        | L        |
| H        | L        | L        |
| H        | H        | L        |

Note: H: HIGH voltage level; L: LOW voltage level.

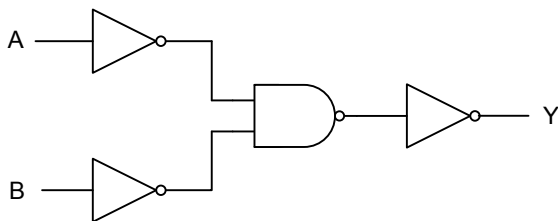
■ LOGIC SYMBOL (Positive Logic)



Logic Symbol

IEC Logic Symbol

■ LOGIC DIAGRAM (One Gate)



## ■ ABSOLUTE MAXIMUM RATING

| PARAMETER   | SYMBOL    | RATINGS               | UNIT |
|---|-----------|-----------------------|------|
| Supply Voltage  | $V_{CC}$  | -0.5 ~ +7             | V    |
| Input Voltage   | $V_{IN}$  | -0.5 ~ +7             | V    |
| Output Voltage  | $V_{OUT}$ | -0.5 ~ $V_{CC} + 0.5$ | V    |
| $V_{CC}$ or GND Current   | $I_{CC}$  | ±50                   | mA   |
| Output Current ( $V_{OUT}=0 \sim V_{CC}$ )                      | $I_{OUT}$ | ±25                   | mA   |
| Input Clamping Current ( $V_{IN} < 0V$ )                        | $I_{IK}$  | -20                   | mA   |
| Output Clamping Current ( $V_{OUT} < 0$ or $V_{OUT} > V_{CC}$ ) | $I_{OK}$  | ±20                   | mA   |
| Storage Temperature   | $T_{STG}$ | -65 ~ + 150           | °C   |

Notes: 1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.  
 2. 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 | $\theta_{JA}$ | 76      | °C/W |

## ■ RECOMMENDED OPERATING CONDITIONS

| PARAMETER                          | SYMBOL      | CONDITIONS                | MIN | TYP | MAX      | UNIT |
|------------------------------------|-------------|---------------------------|-----|-----|----------|------|
| Supply Voltage                     | $V_{CC}$    |                           | 4.5 | 5.0 | 5.5      | V    |
| Input Voltage                      | $V_{IN}$    |                           | 0   |     | 5.5      | V    |
| Output Voltage                     | $V_{OUT}$   |                           | 0   |     | $V_{CC}$ | V    |
| High-Level Input Voltage           | $V_{IH}$    | $V_{CC} = 4.5V$ to $5.5V$ | 2.0 |     |          | V    |
| Low-Level Input Voltage            | $V_{IL}$    | $V_{CC} = 4.5V$ to $5.5V$ |     |     | 0.8      | V    |
| High-Level Input Current           | $I_{OH}$    |                           |     |     | -8       | mA   |
| Low-Level Input Current            | $I_{OL}$    |                           |     |     | 8        | mA   |
| Input Transition Rise or Fall Rate | $t_R / t_F$ | $V_{CC} = 5.0 \pm 0.5V$   |     |     | 20       | ns/V |
| Ambient Operating Temperature      | $T_{OPR}$   |                           | -40 |     | +85      | °C   |

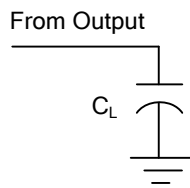
## ■ STATIC CHARACTERISTICS ( $T_A = 25^\circ C$ )

| PARAMETER   | SYMBOL        | TEST CONDITIONS   | MIN  | TYP | MAX  | UNIT |
|---|---------------|---|------|-----|------|------|
| High-Level Output Voltage                         | $V_{OH}$      | $I_{OH} = -50\mu A$ , $V_{CC} = 4.5V$   | 4.4  | 4.5 |      | V    |
|   |               | $I_{OH} = -8mA$ , $V_{CC} = 4.5V$   | 3.94 |     |      | V    |
| Low-Level Output Voltage                          | $V_{OL}$      | $I_{OL} = 50\mu A$ , $V_{CC} = 4.5V$  |      |     | 0.1  | V    |
|   |               | $I_{OL} = 8mA$ , $V_{CC} = 4.5V$  |      |     | 0.36 | V    |
| Input Leakage Current                             | $I_{I(LEAK)}$ | $V_{IN} = V_{CC}$ or GND, $V_{CC} = 0V$ to $5.5V$                                   |      |     | ±0.1 | μA   |
| Quiescent Supply Current                          | $I_Q$         | $V_{IN} = V_{CC}$ or GND, $I_{OUT} = 0$ , $V_{CC} = 5.5V$                           |      |     | 2    | μA   |
| Additional Quiescent Supply Current Per Input Pin | $\Delta I_Q$  | One input at 3.4V, other inputs at $V_{CC}$ or GND, $I_{OUT} = 0$ , $V_{CC} = 5.5V$ |      |     | 1.35 | mA   |
| Input Capacitance                                 | $C_{IN}$      | $V_{IN} = V_{CC}$ or GND, $V_{CC} = 5V$   |      | 4   | 10   | pF   |

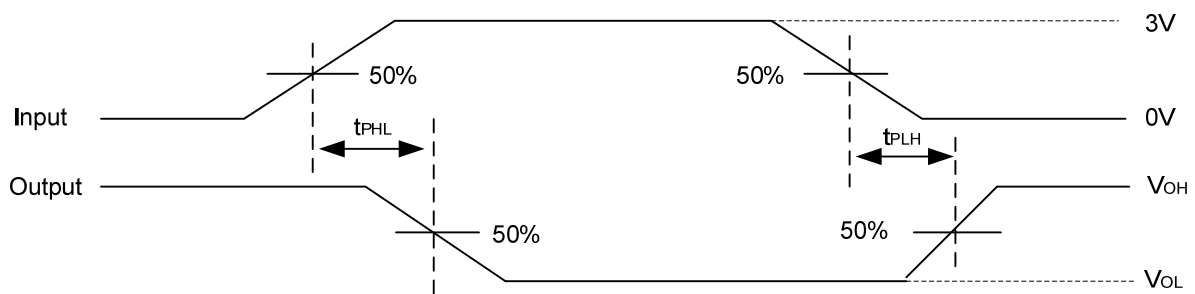
## ■ SWITCHING CHARACTERISTICS ( $T_A = 25^\circ C$ )

| PARAMETER   | SYMBOL              | TEST CONDITIONS        | MIN | TYP | MAX           | UNIT |
|---|---------------------|------------------------|-----|-----|---------------|------|
| Propagation Delay, From Input(A and B) To Output(Y) | $t_{PLH} / t_{PHL}$ | $V_{CC} = 5 \pm 0.5 V$ |     |     | 5.5           | ns   |
|   |                     |                        |     |     | $C_L = 15 pF$ |      |
| Power Dissipation Capacitance                       | $C_{PD}$            | $f = 1MHz$ , No load   |     | 17  | 7.5           | pF   |
|   |                     |                        |     |     | $C_L = 50 pF$ |      |

■ TEST CIRCUIT AND WAVEFORMS



Test circuit for measuring propagation delay



Waveforms showing the Input(A and B) to Output(Y) propagation delays

- Notes: 1.  $C_L$  includes probe and jig capacitance.  
 2. All input pulses are supplied by generators having the following characteristics: PRR  $\leq 1$ MHz,  $Z_o = 50\Omega$ ,  $t_R \leq 3$ ns,  $t_F \leq 3$ ns.

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