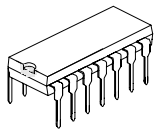
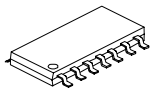
# U74HC00

**CMOS IC**

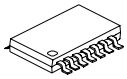
## QUADRUPLE 2-INPUT POSITIVE-NAND GATES



DIP-14



SOP-14



TSSOP-14

*Pb-free plating product number: U74HC00L

## ■ DESCRIPTION

The UTC **U74HC00** devices contain four independent 2-input NAND gates. They perform the Boolean function $Y = \overline{A \cdot B}$ or $Y = \overline{A} + \overline{B}$ in positive logic. The output Y is high when either of inputs A or B is low, or if neither is high.

## ■ FEATURES

* Operation Voltage Range: 1.0 V ~7.0 V
* Low Power Dissipation: $I_{CC}$=20μA(Max)
* High Speed: tpd=16ns(Typ)

## ■ ORDERING INFORMATION

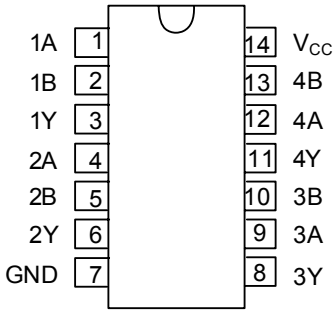
| Order Number | | Package | Packing |
|---|---|---|---|
| Normal | Lead Free Plating | | |
| U74HC00-D14-T | U74HC00L-D14-T | DIP-14 | Tube |
| U74HC00-S14-T | U74HC00L-S14-T | SOP-14 | Tube |
| U74HC00-S14-R | U74HC00L-S14-R | SOP-14 | Tape Reel |
| U74HC00-P14-T | U74HC00L-P14-T | TSSOP-14 | Tube |



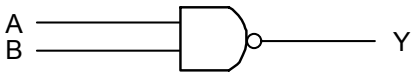
U74HC00L-D14-T
(1)Packing Type
(2)Package Type
(3)Lead Plating

(1) R: Tape Reel, T: Tube
(2) D14: DIP-14, S14: SOP-14, P14: TSSOP-14
(3) L: Lead Free Plating, Blank: Pb/Sn

## ■ PIN CONFIGURATION




## ■ LOGIC DIAGRAM (positive logic)




## ■ FUNCTION TABLE (each inverter)

| INPUT | | OUTPUT |
|---|---|---|
| A | B | Y |
| H | H | L |
| L | X | H |
| X | L | H |

## ■ ABSOLUTE MAXIMUM RATING (unless otherwise specified)

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---|---|---|---|
| Supply Voltage Range | $V_{CC}$ | 1.0 ~ 7.0 | V |
| Input Clamp Current | $I_{IK}$ ($V_{IN}$ < 0 or $V_{IN}$ > $V_{CC}$ (see Note 1) | ±20 | mA |
| Output Clamp Current | $I_{OK}$ ($V_{OUT}$< 0 or $V_{OUT}$ > $V_{CC}$(see Note 1) | ±20 | mA |
| Continuous Output Current | $I_O$($V_{OUT}$ = 0 to $V_{CC}$) | ±25 | mA |
| Continuous Current Through | $V_{CC}$ or GND | ±50 | mA |
| Storage Temperature | $T_{STG}$ | -65 ~ +150 | ℃ |

Note : 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 |
|---|---|---|---|---|
| Thermal Resistance Junction Ambient | SOP-14 | $\theta_{JA}$ | 86 | °C/W |
| | DIP-14 | | 80 | °C/W |
| | TSSOP-14 | | 113 | °C/W |

## ■ RECOMMENDED OPERATING CONDITIONS

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Supply Voltage | $V_{CC}$ | | 2 | 4.5 | 6 | V |
| High-Level Input Voltage | $V_{IH}$ | $V_{CC}$ = 2 V | 1.4 | | | V |
| | | $V_{CC}$ = 4.5V | 3.0 | | | |
| | | $V_{CC}$ = 6 V | 4.2 | | | |
| Low-Level Input Voltage | $V_{IL}$ | $V_{CC}$ = 2 V | | | 0.7 | V |
| | | $V_{CC}$ = 4.5 V | | | 1.5 | |
| | | $V_{CC}$ = 6 V | | | 2 | |
| Input Voltage | $V_{IN}$ | | 0 | | $V_{CC}$ | V |
| Output Voltage | $V_{OUT}$ | | 0 | | $V_{CC}$ | V |
| Input Transition Rise or Fall Rate | dt/dv | $V_{CC}$ = 4.5V | | | 500 | ns |
| Operating Free-Air Temperature | $T_A$ | | -40 | | 85 | ℃ |

Note: All unused inputs of the device must be held at $V_{CC}$ or GND to ensure proper device operation.

## ■ ELECTRICAL CHARACTERISTICS (Ta = 25°C, unless otherwise specified)

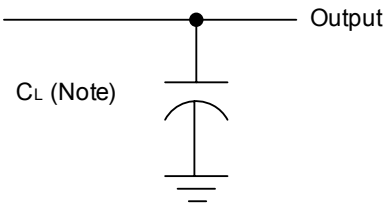
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| High-Level Output Voltage | $V_{OH}$ | $V_{CC}$= 4.5V, $V_{IN}$ = $V_{IH}$ or $V_{IL}$, $I_{OH}$ = −20 μA | 4.4 | 4.5 | | V |
| | | $V_{CC}$= 4.5V, $V_{IN}$ = $V_{IH}$ or $V_{IL}$, $I_{OH}$ = −4 mA | 3.98 | 4.3 | | |
| Low-Level Output Voltage | $V_{OL}$ | $V_{CC}$= 4.5V, $V_{IN}$ = $V_{IH}$ or $V_{IL}$, $I_{OL}$ = 20 μA | | 0.001 | 0.1 | V |
| | | $V_{CC}$= 4.5V, $V_{IN}$ = $V_{IH}$ or $V_{IL}$, $I_{OL}$ = 4 mA | | 0.17 | 0.26 | |
| Input Current | $I_{IN}$ | $V_{CC}$= 6V, $V_{IN}$ = $V_{CC}$ or 0 | | ±0.1 | ±100 | nA |
| Quiescent Supply Current | $I_{CC}$ | $V_{CC}$= 6V, $V_{IN}$ = $V_{CC}$ or 0, $I_{OUT}$ = 0 | | | 20 | μA |
| **Operating Characteristics** | | | | | | |
| Power Dissipation Capacitance Per Gate | Cpd | No load | | 20 | | pF |

Note: All unused inputs of the device must be held at $V_{CC}$ or GND to ensure proper device operation.

■ SWITCHING CHARACTERISTICS OVER RECOMMENDED OPERATING FREE-AIR TEMPERATURE RANGE (Ta = 25°C, $C_L$ = 50 pF, unless otherwise specified)

| PARAMETER | SYMBOL | FROM(INPUT) | TO(OUTPUT) | $V_{CC}$ | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|---|
| Propagation Delay from A or B to Y | $t_{pd}$ | A or B | Y | 2V | | | 35 | ns |
| | | | | 4.5V | | | 15 | |
| | | | | 6V | | | 12 | |
| Output Rise and Fall Time | $t_T$ | | Y | 2V | | | 30 | ns |
| | | | | 4.5V | | | 19 | |
| | | | | 6V | | | 17 | |

## ■ TEST CIRCUIT AND WAVEFORMS




Note: $C_L$ includes probe and jig capacitance.