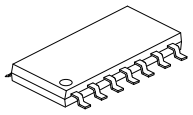
# QUADRUPLE 2-INPUT POSITIVE-AND GATES



SOP-14

## ■ DESCRIPTION

The **U74AC08** are quadruple 2-input positive-AND gates. The devices perform the Boolean function Y=A • B or $Y=\overline{A}+\overline{B}$ in positive logic.

## ■ FEATURES

* Operation Voltage Range: 2~6V
* Inputs Accept Voltages to 6V
* Max $t_{pd}$ of 7.5 ns at 5V

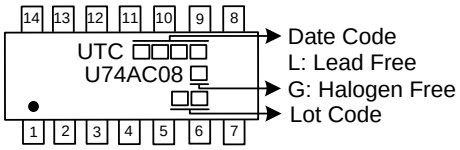
## ■ ORDERING INFORMATION

| Ordering Number | | Package | Packing |
|---|---|---|---|
| Lead Free | Halogen Free | | |
| U74AC08L-S14-R | U74AC08G-S14-R | SOP-14 | Tape Reel |

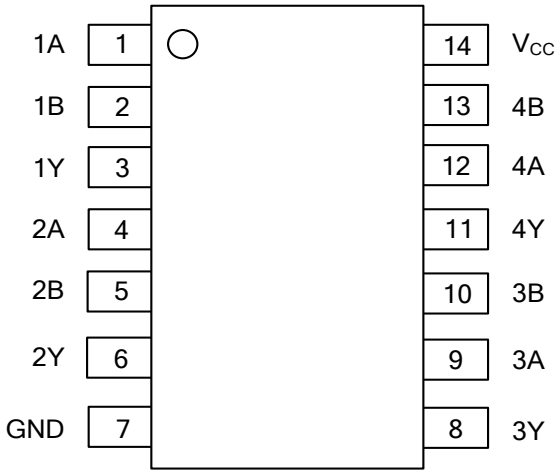
U74AC08G-S14-R

| | |
|---|---|
| (1)Packing Type | (1) R: Tape Reel |
| (2)Package Type | (2) S14: SOP-14 |
| (3)Green Package | (3) G: Halogen Free and Lead Free, L: Lead Free |

## ■ MARKING



## ■ PIN CONFIGURATION

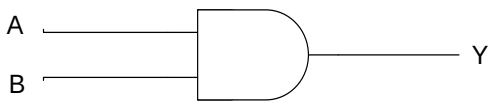



## ■ FUNCTION TABLE(EACH GATE)

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

L: low voltage level; H: high voltage level; X**:** don't care

## ■ LOGIC DIAGRAM (positive logic)




Logic symbol


IEC logic symbol

## ■ ABSOLUTE MAXIMUM RATING ($T_A$=25°C, unless otherwise specified) (Note 2)

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---|---|---|---|
| Supply Voltage | $V_{CC}$ | -0.5 ~ 7 | V |
| Input Voltage (Note 2) | $V_{IN}$ | -0.5 ~ $V_{CC}$+0.5 | V |
| Output Voltage (Note 2) | $V_{OUT}$ | -0.5 ~ $V_{CC}$+0.5 | V |
| Continuous Output Current | $I_{OUT}$ | ±50 | mA |
| Continuous Current Through $V_{CC}$ or GND | | ±200 | mA |
| Input Clamp Current | $I_{IK}$ | ±20 | mA |
| Output Clamp Current | $I_{OK}$ | ±20 | mA |
| Storage Temperature Range | $T_{STG}$ | -65 ~ +150 | °C |

Notes: 1. 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.
2. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

## ■ RECOMMENDED OPERATING CONDITIONS

| PARAMETER | SYMBOL | 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 |
| Operating free-air temperature | $T_A$ | -40 | | +85 | °C |
| Input Transition Rise or Fall Rate | Δt/Δv | | | 8 | ns/V |

## ■ THERMAL DATA

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---|---|---|---|
| Junction to Ambient | $\theta_{JA}$ | 86 | °C/W |

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

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| HIGH-level input voltage | $V_{IH}$ | $V_{CC}$=3V | 2.1 | | | V |
| | | $V_{CC}$=4.5V | 3.15 | | | |
| | | $V_{CC}$=5.5V | 3.85 | | | |
| LOW-lever output voltage | $V_{IL}$ | $V_{CC}$=3V | | | 0.9 | V |
| | | $V_{CC}$=4.5V | | | 1.35 | |
| | | $V_{CC}$=5.5V | | | 1.65 | |
| High-Level Output Voltage | $V_{OH}$ | $V_{CC}$=3V, $I_{OH}$=-50μA | 2.9 | | | V |
| | | $V_{CC}$=4.5V, $I_{OH}$=-50μA | 4.4 | | | |
| | | $V_{CC}$=5.5V, $I_{OH}$=-50μA | 5.4 | | | |
| | | $V_{CC}$=3V, $I_{OH}$=-12mA | 2.56 | | | |
| | | $V_{CC}$=4.5V, $I_{OH}$=-24mA | 3.86 | | | |
| | | $V_{CC}$=5.5V, $I_{OH}$=-24mA | 4.86 | | | |
| Low-Level Output Voltage | $V_{OL}$ | $V_{CC}$=3V, $I_{OL}$=50μA | | 0.002 | 0.1 | V |
| | | $V_{CC}$=4.5V, $I_{OL}$=50μA | | 0.001 | 0.1 | |
| | | $V_{CC}$=5.5V, $I_{OL}$=50μA | | 0.001 | 0.1 | |
| | | $V_{CC}$=3V, $I_{OL}$=12mA | | | 0.36 | |
| | | $V_{CC}$=4.5V, $I_{OL}$=24mA | | | 0.36 | |
| | | $V_{CC}$=5.5V, $I_{OL}$=24mA | | | 0.36 | |
| Input Leakage Current (A or B Ports) | $I_I$ | $V_{CC}$=5.5V, $V_I$=$V_{CC}$ or GND | | | ±0.1 | μA |
| Quiescent Supply Current | $I_{CC}$ | $V_{CC}$=5.5V, $V_I$= $V_{CC}$ or GND, $I_O$=0 | | | 2 | μA |
| Input Capacitance | $C_I$ | $V_{CC}$=5V, $V_I$=$V_{CC}$ or GND | | 4.5 | | pF |

## ■ DYNAMIC CHARACTERISTICS

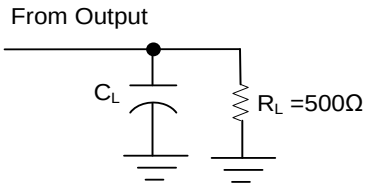
($C_L$=50pF, $R_L$=500Ω, $T_A$=25°C, unless otherwise specified) (see Figure 1)

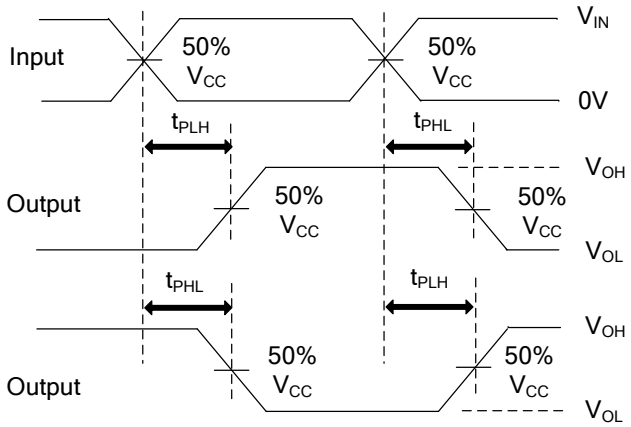
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Propagation delay from Input(A or B) to Output(Y) | $t_{PLH}$ | $V_{CC}$=3.3V±0.3V | 1.5 | 7.5 | 9.5 | ns |
| | | $V_{CC}$=5V±0.5V | 1.5 | 5.5 | 7.5 | ns |
| | $t_{PHL}$ | $V_{CC}$=3.3V±0.3V | 1.5 | 7.0 | 8.5 | ns |
| | | $V_{CC}$=5V±0.5V | 1.5 | 5.5 | 7.0 | ns |

## ■ OPERATING CHARACTERISTICS ($V_{CC}$=5V,$T_A$=25°C, unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Power Dissipation Capacitance | $C_{PD}$ | $C_L$=50pF, f =1MHz | | 20 | | pF |

## ■ TEST CIRCUIT AND WAVEFORMS




PROPAGATION DELAY TIMES

Notes: 1. $C_L$ includes probe and jig capacitance.
2. All input pulses are supplied by generators having the following characteristics: PRR≤1MHZ, $Z_O$=50Ω, tr≤2.5ns,tf≤2.5ns.
3. The outputs are measured one at a time with one input transition per measurement.

**Figure 1. Load Circuit and Voltage Waveforms**