



## U74AUC1G08

CMOS IC

### SINGLE 2-INPUT AND GATE

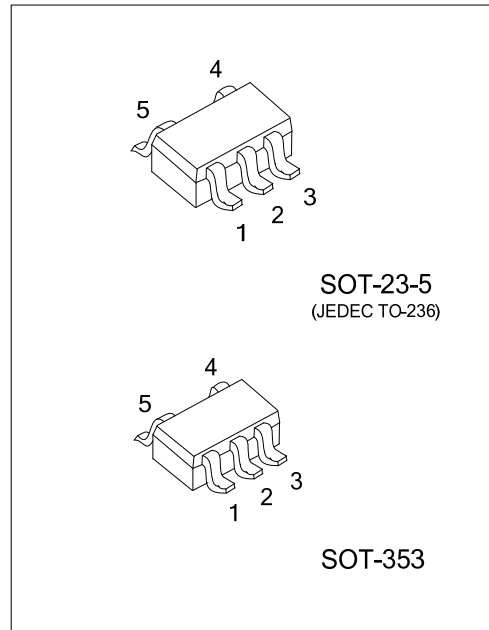
#### DESCRIPTION

The **U74AUC1G08** is a 2-input AND gate which provides the function  $Y = A \cdot B$  or  $Y = \overline{A + B}$  in positive logic.

This device has power-down protective circuit, preventing device destruction when it is powered down.

#### FEATURES

- \* Operate from 0.8V to 2.7V
- \* Low power dissipation :  $I_{CC} = 10\mu A$  (Max.)
- \*  $\pm 8mA$  Output Driver :  $V_{CC} = 1.8V$
- \*  $I_{off}$  Supports partial-Power-Down Mode Operation

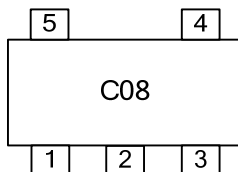


#### ORDERING INFORMATION

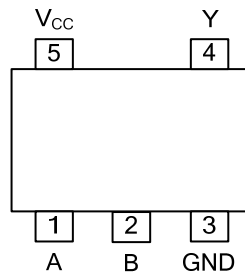
| Ordering Number   | Package  | Packing   |
|-------------------|----------|-----------|
| U74AUC1G08G-AE5-R | SOT-23-5 | Tape Reel |
| U74AUC1G08G-AL5-R | SOT-353  | Tape Reel |

|   |   |
|---|---|
| <p>U74AUC1G08G-AE5-R</p> <p>(1) Packing Type<br/>(2) Package Type<br/>(3) Green Package</p> | <p>(1) R: Tape Reel<br/>(2) AE5: SOT-23-5, AL5: SOT-353<br/>(3) G: Halogen Free and Lead Free</p> |
|---|---|

#### MARKING



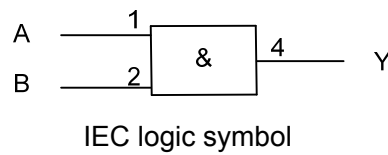
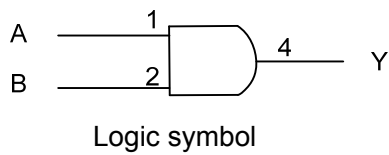
■ PIN CONFIGURATION



■ FUNCTION TABLE (each gate)

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

■ LOGIC DIAGRAM (positive logic)



## ABSOLUTE MAXIMUM RATING

| PARAMETER                 | SYMBOL    | TEST CONDITIONS                 | RATINGS               | UNIT |
|---------------------------|-----------|---------------------------------|-----------------------|------|
| Supply Voltage            | $V_{CC}$  |                                 | -0.5 ~ +3.6           | V    |
| Input Voltage             | $V_{IN}$  |                                 | -0.5 ~ +3.6           | V    |
| Output Voltage            | $V_{OUT}$ | Output in the high or low state | -0.5 ~ $V_{CC} + 0.5$ | V    |
|                           |           | Output in the power-off state   | -0.5 ~ +3.6           | V    |
| $V_{CC}$ or GND Current   | $I_{CC}$  |                                 | ±100                  | mA   |
| Continuous Output Current | $I_{OUT}$ | $V_{OUT}=0 \sim V_{CC}$         | ±20                   | mA   |
| Input Clamp Current       | $I_{IK}$  | $V_{IN}<0$                      | -50                   | mA   |
| Output Clamp Current      | $I_{OK}$  | $V_O>V_{CC}$ or $V_{OUT}<0$     | -50                   | mA   |
| Storage Temperature Range | $T_{STG}$ |                                 | -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.

## RECOMMENDED OPERATING CONDITIONS

| PARAMETER                          | SYMBOL              | TEST CONDITIONS          | MIN | TYP | MAX      | UNIT |
|------------------------------------|---------------------|--------------------------|-----|-----|----------|------|
| Supply Voltage                     | $V_{CC}$            | Operating                | 0.8 |     | 2.7      | V    |
| Input Voltage                      | $V_{IN}$            |                          | 0   |     | 3.6      | V    |
| Output Voltage                     | $V_{OUT}$           | High or low state        | 0   |     | $V_{CC}$ | V    |
| Operating Temperature              | $T_A$               |                          | -40 |     | 85       | °C   |
| Input Transition Rise or Fall Rate | $\Delta t/\Delta v$ | $V_{CC}=0.8V \sim 1.95V$ |     |     | 20       | ns/V |
|                                    |                     | $V_{CC}=2.3V \sim 2.7V$  |     |     | 10       | ns/V |

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

| PARAMETER                 | SYMBOL        | TEST CONDITIONS  | MIN                  | TYP  | MAX                  | UNIT |
|---------------------------|---------------|--|----------------------|------|----------------------|------|
| High-level Input Voltage  | $V_{IH}$      | $V_{CC}=0.8V$  | $V_{CC}$             |      |                      | V    |
|                           |               | $V_{CC}=1.1V \sim 1.95V$                                   | $0.65 \times V_{CC}$ |      |                      | V    |
|                           |               | $V_{CC}=2.3V \sim 2.7V$                                    | 1.7                  |      |                      | V    |
| Low-level Input Voltage   | $V_{IL}$      | $V_{CC}=0.8V$  |                      |      | 0                    | V    |
|                           |               | $V_{CC}=1.1V \sim 1.95V$                                   |                      |      | $0.35 \times V_{CC}$ | V    |
|                           |               | $V_{CC}=2.3V \sim 2.7V$                                    |                      |      | 0.7                  | V    |
| High-Level Output voltage | $V_{OH}$      | $V_{CC}=0.8 \sim 2.7V, I_{OH}=-100\mu A$                   | $V_{CC}-0.1$         |      |                      | V    |
|                           |               | $V_{CC}=0.8V, I_{OH}=-700\mu A$                            |                      | 0.55 |                      | V    |
|                           |               | $V_{CC}=1.1V, I_{OH}=-3mA$                                 | 0.8                  |      |                      | V    |
|                           |               | $V_{CC}=1.4V, I_{OH}=-5mA$                                 | 1                    |      |                      | V    |
|                           |               | $V_{CC}=1.65V, I_{OH}=-8mA$                                | 1.2                  |      |                      | V    |
| Low-Level Output voltage  | $V_{OL}$      | $V_{CC}=0.8 \sim 2.7V, I_{OL}=100\mu A$                    |                      |      | 0.2                  | V    |
|                           |               | $V_{CC}=0.8V, I_{OL}=700\mu A$                             |                      | 0.25 |                      | V    |
|                           |               | $V_{CC}=1.1V, I_{OL}=3mA$                                  |                      |      | 0.3                  | V    |
|                           |               | $V_{CC}=1.4V, I_{OL}=5mA$                                  |                      |      | 0.4                  | V    |
|                           |               | $V_{CC}=1.65V, I_{OL}=8mA$                                 |                      |      | 0.45                 | V    |
| Input Leakage Current     | $I_{I(LEAK)}$ | $V_{CC}=0 \sim 2.7V, V_{IN}=V_{CC}$ or GND                 |                      | ±0.1 | ±5                   | μA   |
|                           |               | $V_{CC}=0V, V_{IN}$ or $V_{OUT}=2.7V$                      |                      | ±0.1 | ±10                  | μA   |
| Quiescent Supply Current  | $I_{CC}$      | $V_{CC}=0.8V$ to $2.7V, V_{IN}=V_{CC}$ or GND, $I_{OUT}=0$ |                      | 0.1  | 10                   | μA   |
| Input Capacitance         | $C_I$         | $V_{CC}=2.5V, V_{IN}=V_{CC}$ or GND                        |                      | 3    |                      | pF   |

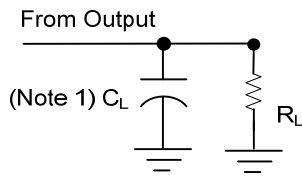
■ DYNAMIC CHARACTERISTICS (T<sub>A</sub> =25°C , unless otherwise specified)

| PARAMETER   | SYMBOL                              | TEST CONDITIONS                              | MIN                        | TYP | MAX | UNIT |    |
|---|-------------------------------------|--|----------------------------|-----|-----|------|----|
| Propagation delay from inputs (A or B) to output(Y) | t <sub>PLH</sub> / t <sub>PHL</sub> | C <sub>L</sub> =15pF,<br>R <sub>L</sub> =2KΩ | V <sub>CC</sub> =0.8V      |     | 4.7 |      | ns |
|   |                                     |  | V <sub>CC</sub> =1.2±0.1V  | 0.9 |     |      | ns |
|   |                                     |  | V <sub>CC</sub> =1.5±0.1V  | 0.6 |     |      | ns |
|   |                                     |  | V <sub>CC</sub> =1.8±0.15V | 0.4 | 1.1 |      | ns |
|   |                                     |  | V <sub>CC</sub> =2.5±0.2V  | 0.2 |     |      | ns |
|   |                                     | C <sub>L</sub> =30pF,<br>R <sub>L</sub> =1KΩ | V <sub>CC</sub> =1.8±0.15V | 0.7 | 1.4 |      | ns |
| C <sub>L</sub> =30pF,<br>R <sub>L</sub> =500Ω       | V <sub>CC</sub> =2.5±0.2V           | 0.5  |                            |     | ns  |      |    |

■ OPERATING CHARACTERISTICS (f=10MHz, T<sub>A</sub> =25°C , unless otherwise specified)

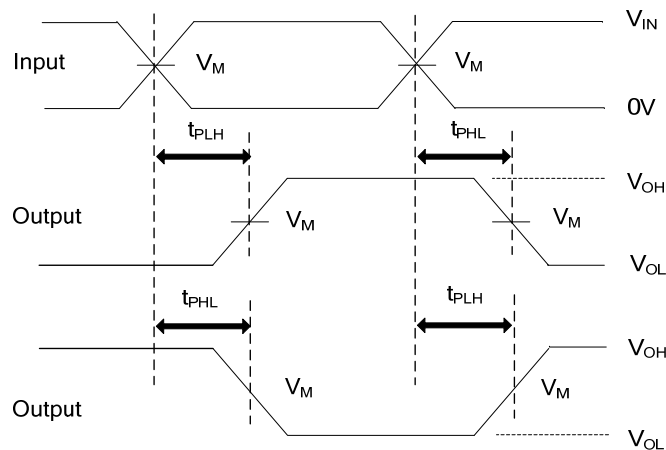
| PARAMETER                     | SYMBOL          | TEST CONDITIONS       | MIN | TYP | MAX | UNIT |
|-------------------------------|-----------------|-----------------------|-----|-----|-----|------|
| Power Dissipation Capacitance | C <sub>PD</sub> | V <sub>CC</sub> =0.8V |     | 15  |     | pF   |
|                               |                 | V <sub>CC</sub> =1.2V |     | 15  |     | pF   |
|                               |                 | V <sub>CC</sub> =1.5V |     | 15  |     | pF   |
|                               |                 | V <sub>CC</sub> =1.8V |     | 15  |     | pF   |
|                               |                 | V <sub>CC</sub> =2.5V |     | 19  |     | pF   |

■ TEST CIRCUIT AND WAVEFORMS



**TEST CIRCUIT**

| $V_{CC}$         | $C_L$ | $R_L$        | $V_M$      |
|------------------|-------|--------------|------------|
| 0.8V             | 15pF  | 2k $\Omega$  | $V_{CC}/2$ |
| 1.2V $\pm$ 0.1V  | 15pF  | 2k $\Omega$  | $V_{CC}/2$ |
| 1.5V $\pm$ 0.1V  | 15pF  | 2k $\Omega$  | $V_{CC}/2$ |
| 1.8V $\pm$ 0.15V | 15pF  | 2k $\Omega$  | $V_{CC}/2$ |
| 2.5V $\pm$ 0.2V  | 15pF  | 2k $\Omega$  | $V_{CC}/2$ |
| 1.8V $\pm$ 0.15V | 30pF  | 1k $\Omega$  | $V_{CC}/2$ |
| 2.5V $\pm$ 0.2V  | 30pF  | 500 $\Omega$ | $V_{CC}/2$ |



**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  $\leq$  10MHz,  $Z_O = 50\Omega$ .

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