



# U74AHC1G86

CMOS IC

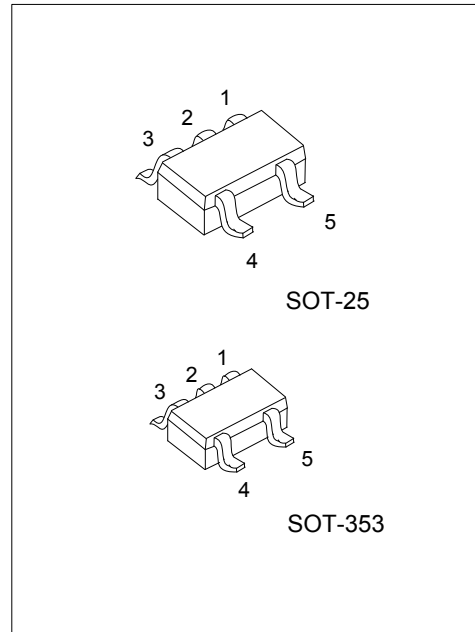
## 2-INPUT EXCLUSIVE-OR GATE

### DESCRIPTION

The U74AHC1G86 is a 2-input EXCLUSIVE-OR gate, it provides the Function  $Y=A \oplus B$ .

### FEATURES

- \* Operation voltage range: 2 ~ 5.5V
- \* Low power dissipation:  $I_{CC}=10\mu A(\text{Max})$
- \* High speed:  $t_{PD}=4.3ns(\text{Typ})$

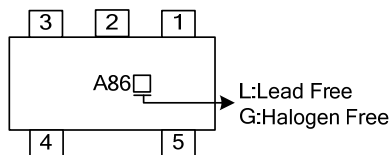


### ORDERING INFORMATION

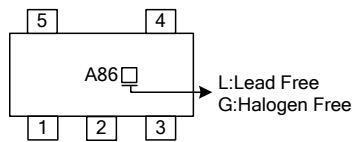
| Ordering Number   |                   | Package | Packing   |
|-------------------|-------------------|---------|-----------|
| Lead Free Plating | Halogen Free      |         |           |
| U74AHC1G86L-AF5-R | U74AHC1G86G-AF5-R | SOT-25  | Tape Reel |
| U74AHC1G86L-AL5-R | U74AHC1G86G-AL5-R | SOT-353 | Tape Reel |

|  |  |
|--|--|
| <p>U74AHC1G86L-AF5-R</p> <p>(1)Packing Type<br/>(2)Package Type<br/>(3)Lead Free</p> | <p>(1) R: Tape Reel<br/>(2) AF5: SOT-25, AL5: SOT-353<br/>(3) L: Lead Free, G:Halogen Free</p> |
|--|--|

### MARKING

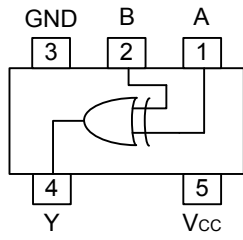


SOT-25



SOT-353

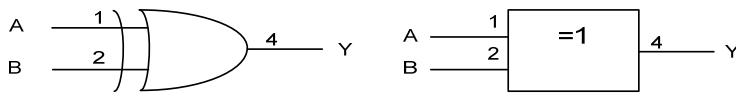
■ PIN CONFIGURATION



■ FUNCTION TABLE (Each Gate)

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

■ LOGIC DIAGRAM (Positive Logic)



### ■ ABSOLUTE MAXIMUM RATINGS (Note 1)

| 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    |
| Input Clamp Current     | $I_{IK}$  | -20                | mA   |
| Output Clamp Current    | $I_{OK}$  | $\pm 20$           | mA   |
| Output Current          | $I_{OUT}$ | $\pm 25$           | mA   |
| $V_{CC}$ or GND Current | $I_{CC}$  | $\pm 50$           | mA   |
| Storage Temperature     | $T_{STG}$ | -65 ~ +150         | °C   |

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.

### ■ RECOMMENDED OPERATING CONDITIONS

| PARAMETER                          | SYMBOL     | CONDITIONS        | MIN | TYP | MAX      | UNIT |
|------------------------------------|------------|-------------------|-----|-----|----------|------|
| Supply Voltage                     | $V_{CC}$   |                   | 2   |     | 5.5      | V    |
| Input Voltage                      | $V_{IN}$   |                   | 0   |     | 5.5      | V    |
| Output Voltage                     | $V_{OUT}$  |                   | 0   |     | $V_{CC}$ | V    |
| Input Transition Rise or Fall Rate | $t_R, t_F$ | $V_{CC}=3.3+0.3V$ |     |     | 100      | ns/V |
|                                    |            | $V_{CC}=5.0+0.5V$ |     |     | 20       |      |
| 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 Input Voltage  | $V_{IH}$      | $V_{CC}=2.0V$                                    | 1.5  |     |           | V       |
|                           |               | $V_{CC}=3.0V$                                    | 2.1  |     |           |         |
|                           |               | $V_{CC}=5.5V$                                    | 3.85 |     |           |         |
| Low-Level Input Voltage   | $V_{IL}$      | $V_{CC}=2.0V$                                    |      |     | 0.5       | V       |
|                           |               | $V_{CC}=3.0V$                                    |      |     | 0.9       |         |
|                           |               | $V_{CC}=5.5V$                                    |      |     | 1.65      |         |
| High-Level Output Voltage | $V_{OH}$      | $V_{CC}=2.0V, I_{OH}=-50\mu A$                   | 1.9  | 2.0 |           | V       |
|                           |               | $V_{CC}=3.0V, I_{OH}=-50\mu A$                   | 2.9  | 3.0 |           |         |
|                           |               | $V_{CC}=4.5V, I_{OH}=-50\mu A$                   | 4.4  | 4.5 |           |         |
|                           |               | $V_{CC}=3.0V, I_{OH}=-4mA$                       | 2.58 |     |           |         |
|                           |               | $V_{CC}=4.5V, I_{OH}=-8mA$                       | 3.94 |     |           |         |
| Low-Level Output Voltage  | $V_{OL}$      | $V_{CC}=2.0V, I_{OL}=50\mu A$                    |      |     | 0.1       | V       |
|                           |               | $V_{CC}=3.0V, I_{OL}=50\mu A$                    |      |     | 0.1       |         |
|                           |               | $V_{CC}=4.5V, I_{OL}=50\mu A$                    |      |     | 0.1       |         |
|                           |               | $V_{CC}=3.0V, I_{OL}=4mA$                        |      |     | 0.36      |         |
|                           |               | $V_{CC}=4.5V, I_{OL}=8mA$                        |      |     | 0.36      |         |
| Input Leakage Current     | $I_{I(LEAK)}$ | $V_{CC}=0 \sim 5.5V, V_{IN}=V_{CC}$ or GND       |      |     | $\pm 0.1$ | $\mu A$ |
| Quiescent Supply Current  | $I_Q$         | $V_{CC}=5.5V, V_{IN}=V_{CC}$ or GND, $I_{OUT}=0$ |      |     | 1         | $\mu A$ |
| Input Capacitance         | $C_{IN}$      | $V_{CC}=5.0V, V_{IN}=V_{CC}$ or GND              |      | 4   | 10        | pF      |

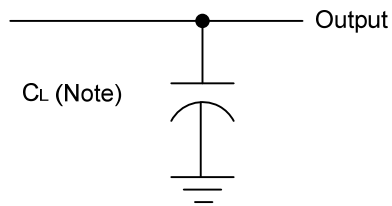
■ DYNAMIC CHARACTERISTICS ( $T_A=25^\circ\text{C}$ , Input:  $t_R, t_F \leq 3\text{ns}$ ;  $\text{PRR} \leq 1\text{MHz}$ )

| PARAMETER   | SYMBOL    | TEST CONDITIONS   | MIN | TYP | MAX  | UNIT |
|---|-----------|---|-----|-----|------|------|
| Propagation delay from input (A and B) to output(Y) | $t_{PLH}$ | $V_{CC} = 3.3\text{V} \pm 0.3\text{V}, C_L = 15\text{pF}$ |     | 7   | 11   | ns   |
|   | $t_{PHL}$ |   |     | 7   | 11   |      |
|   | $t_{PLH}$ | $V_{CC} = 3.3\text{V} \pm 0.3\text{V}, C_L = 50\text{pF}$ |     | 9.5 | 14.5 |      |
|   | $t_{PHL}$ |   |     | 9.5 | 14.5 |      |
| Propagation delay from input (A and B) to output(Y) | $t_{PLH}$ | $V_{CC} = 5\text{V} \pm 0.5\text{V}, C_L = 15\text{pF}$   |     | 4.8 | 6.8  | ns   |
|   | $t_{PHL}$ |   |     | 4.8 | 6.8  |      |
|   | $t_{PLH}$ | $V_{CC} = 5\text{V} \pm 0.5\text{V}, C_L = 50\text{pF}$   |     | 6.3 | 8.8  |      |
|   | $t_{PHL}$ |   |     | 6.3 | 8.8  |      |

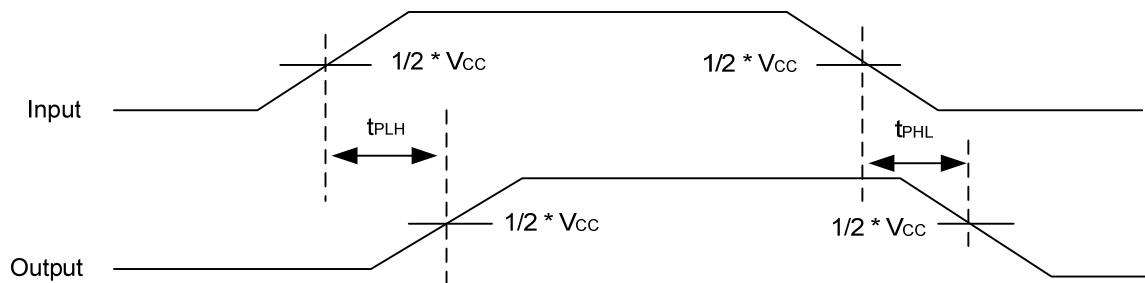
■ OPERATING CHARACTERISTICS ( $T_A=25^\circ\text{C}$ )

| PARAMETER                     | SYMBOL   | TEST CONDITIONS                            | MIN | TYP | MAX | UNIT |
|-------------------------------|----------|--|-----|-----|-----|------|
| Power Dissipation Capacitance | $C_{PD}$ | No load, $f=1\text{MHz}, V_{CC}=5\text{V}$ |     | 18  |     | pF   |

## ■ TEST CIRCUIT AND WAVEFORMS



Note:  $C_L$  includes probe and jig capacitance.



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