TECH PUBLIC
台舟电子

# 74AHC1G86 Series

## 2-INPUT EXCLUSIVE-OR GATE

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## Features

- Operation voltage range: 2 ~ 5.5V
- Low power current: $I_{CC}$=10Ma (Max)
- High speed: $t_{PD}$=4.3ns(Typ)
- ESD Protection Exceeds JESD 22
  - 2000-V Human-Body Model (A114-A)
  - 1000-V Charged-Device Model (C101)
- SOT23-5 Package Available
- SOT353 Package Available

## Applications

- Voltage Level Shifting
- General Purpose Logic
- Power Down Signal Isolation
- Wide array of products such as:
  - PCs, Networking, Notebooks, Netbooks, PDAs
  - Tablet Computers, E-readers
  - Computer Peripherals, Hard Drives, CD/DVD ROM
  - TV, DVD, DVR, Set-Top Box
  - Cell Phones, Personal Navigation / GPS
  - MP3 Players, Cameras, Video Recorders

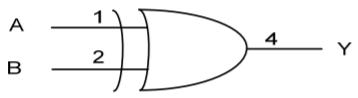
## General Description

The 74AHC1G86 2-input EXCLUSIVE-OR gate, it provides the Function Y=A⊕B.

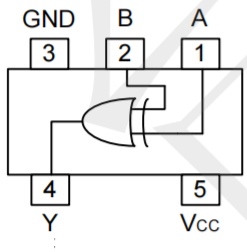
## Ordering Information

| ORDER NUMBER | PACKAGE DESCRIPTION | PACKAGE OPTION |
|---|---|---|
| 74AHC1G86GV-TP | SOT23-5 | Tape and Reel,3000 |
| 74AHC1G86GW-TP | SOT353 | Tape and Reel,3000 |

## Logic Diagram




## Pin Configuration




SOT23-5/ SOT353

## Function Table

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

## Absolute Maximum Ratings

| 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 | $I_{OK}$ | ±20 | mA |
| Output Current | $I_{OUT}$ | ±25 | mA |
| $V_{CC}$ or GND Current | $I_{CC}$ | ±50 | mA |
| Storage Temperature | $T_{STG}$ | -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.

## Thermal Data

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---|---|---|---|---|
| Junction to Ambient | SOT-23-5 | $\theta_{JC}$ | 280 | °C/W |
| | SOT-353 | | 350 | |

## 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 | $\Delta t/\Delta v$ | $V_{CC}$=3.3+0.3V | | | 100 | ns/V |
| | | $V_{CC}$=5.0+0.5V | | | 20 | |
| Operating Temperature | $T_A$ | | -40 | | +125 | °C |

## Electrical Characteristics

| 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, $I_{OH}$=-50μA | 1.9 | 2.0 | | V |
| | | $V_{CC}$=3.0V, $I_{OH}$=-50μA | 2.9 | 3.0 | | |
| | | $V_{CC}$=4.5V, $I_{OH}$=-50μA | 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, $I_{OL}$=50μA | | | 0.1 | V |
| | | $V_{CC}$=3.0V, $I_{OL}$=50μA | | | 0.1 | |
| | | $V_{CC}$=4.5V, $I_{OL}$=50μA | | | 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 ~ 5.5V, $V_{IN}$=$V_{CC}$ or GND | | | ±0.1 | μA |
| Quiescent Supply Current | $I_Q$ | $V_{CC}$=5.5V, $V_{IN}$=$V_{CC}$ or GND, $I_{OUT}$=0 | | | 1 | μA |
| Input Capacitance | $C_{IN}$ | $V_{CC}$=5.0V, $V_{IN}$=$V_{CC}$ or GND | | 4 | 10 | pF |

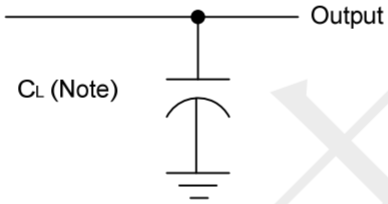
## Dynamic Characteristics (Input: $t_R$, $t_F$≤3ns; $P_{RR}$≤1MHz)

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

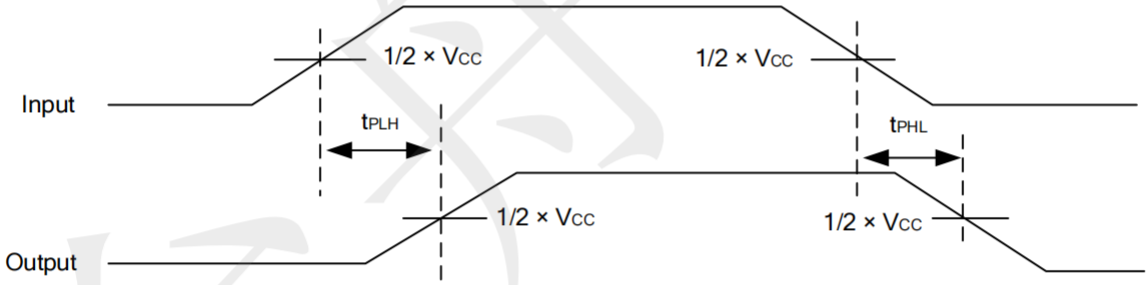
## Operating Characteristics

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

## Test Circuit And Waveforms

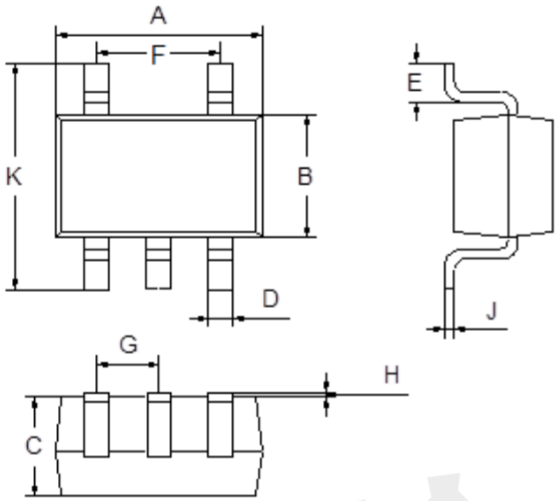



Note: $C_L$ includes probe and jig capacitance.



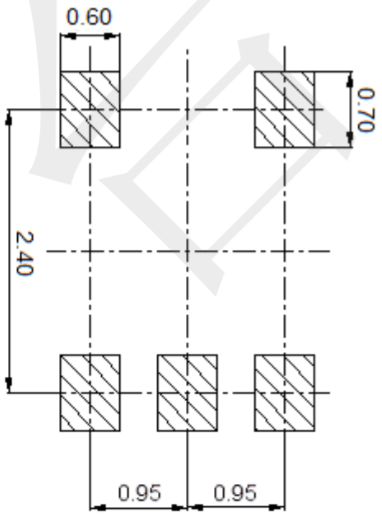
## Package Outline Dimensions (Unit: mm)

**SOT23-5**



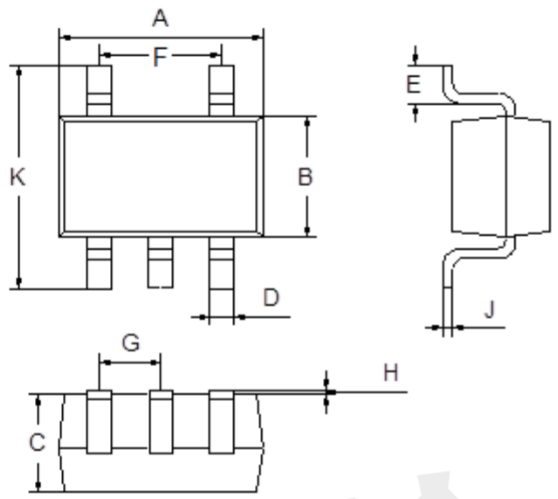

| Dimension | Min. | Max. |
|---|---|---|
| A | 2.80 | 3.00 |
| B | 1.50 | 1.70 |
| C | 1.00 | 1.20 |
| D | 0.35 | 0.45 |
| E | 0.35 | 0.55 |
| F | 1.80 | 2.00 |
| G | 0.90 | 1.00 |
| H | 0.02 | 0.10 |
| J | 0.10 | 0.20 |
| K | 2.60 | 3.00 |

## Mounting Pad Layout (Unit: mm)



## Package Outline Dimensions (Unit: mm)

**SOT353**




| Dimension | Min. | Max. |
|---|---|---|
| A | 2.00 | 2.20 |
| B | 1.15 | 1.35 |
| C | 0.85 | 1.05 |
| D | 0.15 | 0.35 |
| E | 0.25 | 0.40 |
| F | 1.20 | 1.40 |
| G | 0.60 | 0.70 |
| H | 0.02 | 0.10 |
| J | 0.05 | 0.15 |
| K | 2.20 | 2.40 |

## Mounting Pad Layout (Unit: mm)

