

Description

The 74AHCT1G86 is a single 2-input positive exclusive-OR gate with a standard totem pole output. The device is designed for operation with a power supply range of 4.5V to 5.5V. The gate performs the positive Boolean function:

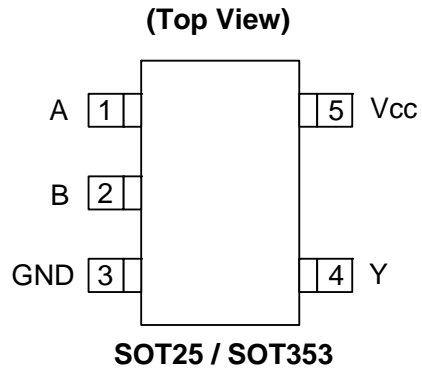
$$Y = A \oplus B \text{ or } Y = \overline{A}B + A\overline{B}$$

Features

- Supply Voltage Range from 4.5V to 5.5V
- ± 8 mA Output Drive at 5.0V
- CMOS low power consumption
- Schmitt Trigger Action at All Inputs Make the Circuit Tolerant for Slower Input Rise and Fall Time.
- ESD Protection per JESD 22
 - Exceeds 200-V Machine Model (A115-A)
 - Exceeds 2000-V Human Body Model (A114-A)
 - Exceeds 1000-V Charged Device Model (C101C)
- Latch-Up Exceeds 100mA per JESD 78, Class II
- SOT25 and SOT353: Assembled with “Green” Molding Compound (no Br, Sb)
- Lead Free Finish / RoHS Compliant (Note 1)

Notes: 1. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied. Please visit our website at http://www.diodes.com/products/lead_free.html.

Pin Assignments



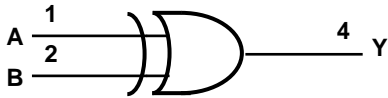
Applications

- General Purpose Logic
- Wide array of products such as:
 - PCs, networking, notebooks, netbooks, PDAs
 - Computer peripherals, hard drives, CD/DVD ROM
 - TV, DVD, DVR, set top box
 - Phones, Personal Navigation / GPS
 - MP3 players ,Cameras, Video Recorders

Pin Descriptions

| Pin Name | Pin No | Description |
|-----------------|--------|----------------|
| A | 1 | Data Input |
| B | 2 | Data Input |
| GND | 3 | Ground |
| Y | 4 | Data Output |
| V _{CC} | 5 | Supply Voltage |

Logic Diagram



Function Table

| Inputs | | Output |
|--------|---|--------|
| A | B | Y |
| H | H | L |
| L | H | H |
| H | L | H |
| L | L | L |

Absolute Maximum Ratings (Note 2)

| Symbol | Description | Rating | Unit |
|-----------|--|------------------------|-------------|
| ESD HBM | Human Body Model ESD Protection | 2 | KV |
| ESD CDM | Charged Device Model ESD Protection | 1 | KV |
| ESD MM | Machine Model ESD Protection | 200 | V |
| V_{CC} | Supply Voltage Range | -0.5 to 6.5 | V |
| V_I | Input Voltage Range | -0.5 to 6.5 | V |
| V_O | Voltage applied to output in high or low state | -0.5 to $V_{CC} + 0.5$ | V |
| I_{IK} | Input Clamp Current $V_I < 0$ | -20 | mA |
| I_{OK} | Output Clamp Current ($V_O < 0$ or $V_O > V_{CC}$) | ± 20 | mA |
| I_O | Continuous output current ($V_O = 0$ to V_{CC}) | ± 25 | mA |
| I_{CC} | Continuous current through V_{CC} | 50 | mA |
| I_{GND} | Continuous current through GND | -50 | mA |
| T_J | Operating Junction Temperature | -40 to 150 | $^{\circ}C$ |
| T_{STG} | Storage Temperature | -65 to 150 | $^{\circ}C$ |

Notes: 2. Stresses beyond the absolute maximum may result in immediate failure or reduced reliability. These are stress values and device operation should be within recommend values.

Recommended Operating Conditions (Note 3)

| Symbol | Parameter | Min | Max | Unit |
|---------------------|------------------------------------|-----|----------|-------------|
| V_{CC} | Operating Voltage | 4.5 | 5.5 | V |
| V_{IH} | High-level Input Voltage | 2.0 | | V |
| V_{IL} | Low-level input voltage | | 0.8 | V |
| V_I | Input Voltage | 0 | 5.5 | V |
| V_O | Output Voltage | 0 | V_{CC} | V |
| I_{OH} | High-level output current | | -8 | mA |
| I_{OL} | Low-level output current | | 8 | mA |
| $\Delta t/\Delta V$ | Input transition rise or fall rate | | 20 | ns/V |
| T_A | Operating free-air temperature | -40 | 125 | $^{\circ}C$ |

Notes: 3. Unused inputs should be held at V_{CC} or Ground.

Electrical Characteristics

| Symbol | Parameter | Test Conditions | V _{CC} | 25°C | | | -40°C to 85°C | | -40°C to 125°C | | Unit |
|------------------|--|---|-----------------|------|------|-------|---------------|------|----------------|------|------|
| | | | | Min | Typ. | Max | Min | Max | Min | Max | |
| V _{OH} | High Level Output Voltage | I _{OH} = -50μA | 4.5V | 4.4 | 4.5 | | 4.4 | | 4.4 | | V |
| | | I _{OH} = -8mA | 4.5V | 3.94 | | 3.8 | | 3.70 | | | |
| V _{OL} | Low Level Output Voltage | I _{OL} = 50μA | 4.5V | | 0 | 0.1 | | 0.1 | | 0.1 | V |
| | | I _{OL} = 8mA | 4.5V | | | 0.36 | | 0.44 | | 0.55 | |
| I _I | Input Current | V _I = 5.5V or GND | 0 to 5.5V | | | ± 0.1 | | ± 1 | | ± 2 | μA |
| I _{CC} | Supply Current | V _I = 5.5V or GND I _O =0 | 5.5V | | | 1 | | 10 | | 40 | μA |
| C _i | Input Capacitance | V _I = V _{CC} – or GND | 5.5V | | 2.0 | 10 | | 10 | | 10 | pF |
| ΔI _{CC} | Additional Supply Current | One input at 3.4 V Other inputs at V _{CC} or GND | 5.5V | | | 1.35 | | 1.5 | | | mA |
| θ _{JA} | Thermal Resistance Junction-to-Ambient | SOT25 | (Note 4) | | 204 | | | | | | °C/W |
| | | SOT353 | | 371 | | | | | | | |
| θ _{JC} | Thermal Resistance Junction-to-Case | SOT25 | (Note 4) | | 52 | | | | | | °C/W |
| | | SOT353 | | 143 | | | | | | | |

Note: 4. Test conditions for SOT25, and SOT353: Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.

Switching Characteristics

V_{CC} = 5V ± 0.5V (see Figure 1)

| Parameter | From (Input) | TO (OUTPUT) | | 25°C | | | -40°C to 85°C | | -40°C to 125°C | | Unit |
|-----------------|--------------|-------------|----------------------|------|------|-----|---------------|-----|----------------|------|------|
| | | | | Min | Typ. | Max | Min | Max | Min | Max | |
| t _{pd} | A or B | Y | C _L =15pF | 0.6 | 3.5 | 6.9 | 0.6 | 8.0 | 0.6 | 9.0 | ns |
| | | | C _L =50pF | 0.6 | 5.0 | 7.9 | 0.6 | 9.0 | 0.6 | 10.5 | ns |

Operating Characteristics

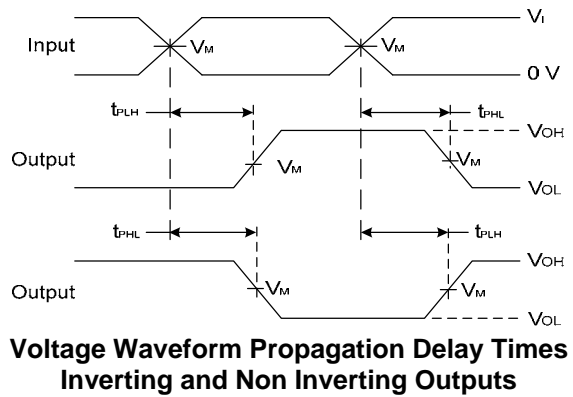
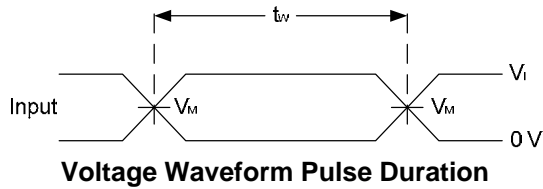
T_A = 25 °C

| Parameter | Test Conditions | V _{CC} = 5V | | Unit |
|-----------------|----------------------|----------------------|--|------|
| | | Typ. | | |
| C _{pd} | f = 1 MHz No Load | 15 | | pF |

Parameter Measurement Information

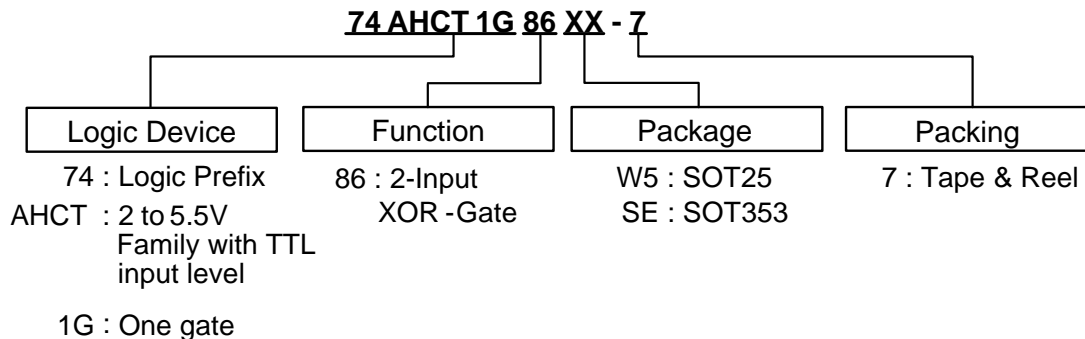


| V_{CC} | Inputs | | V_M | C_L |
|---------------|--------|------------|-------|-------|
| | V_I | t_r/t_f | | |
| $5V \pm 0.5V$ | 3V | $\leq 3ns$ | 1.5V | 15pF |
| $5V \pm 0.5V$ | 3V | $\leq 3ns$ | 1.5V | 50pF |



- Notes:
- A. Includes test lead and test apparatus capacitance.
 - B. All pulses are supplied at pulse repetition rate ≤ 1 MHz.
 - C. Inputs are measured separately one transition per measurement.
 - D. t_{PLH} and t_{PHL} are the same as t_{pd} .

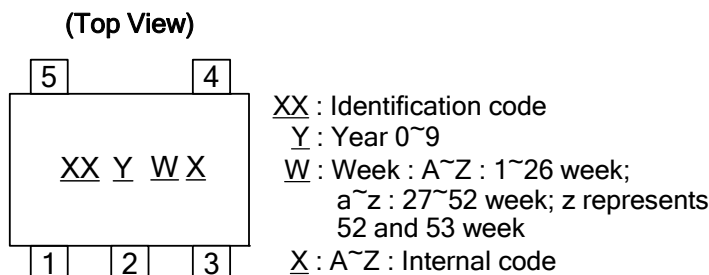
Ordering Information



| Device | Package Code | Packaging (Note 5) | 7" Tape and Reel | |
|----------------|--------------|--------------------|------------------|--------------------|
| | | | Quantity | Part Number Suffix |
| 74AHCT1G86W5-7 | W5 | SOT25 | 3000/Tape & Reel | -7 |
| 74AHCT1G86SE-7 | SE | SOT353 | 3000/Tape & Reel | -7 |

Notes: 5. Pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.

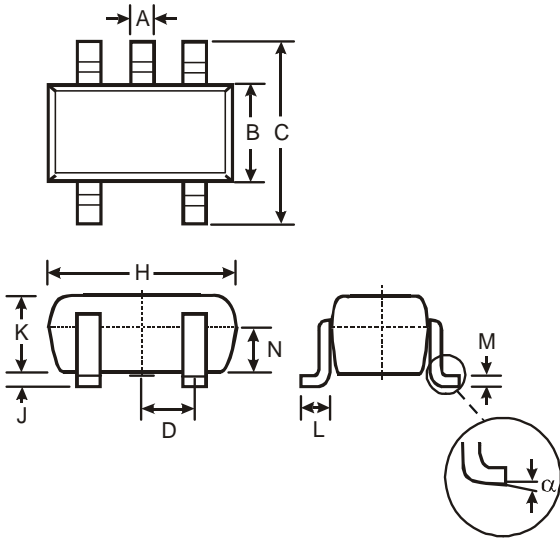
Marking Information



| Part Number | Package | Identification Code |
|--------------|---------|---------------------|
| 74AHCT1G86W5 | SOT25 | ZX |
| 74AHCT1G86SE | SOT353 | ZX |

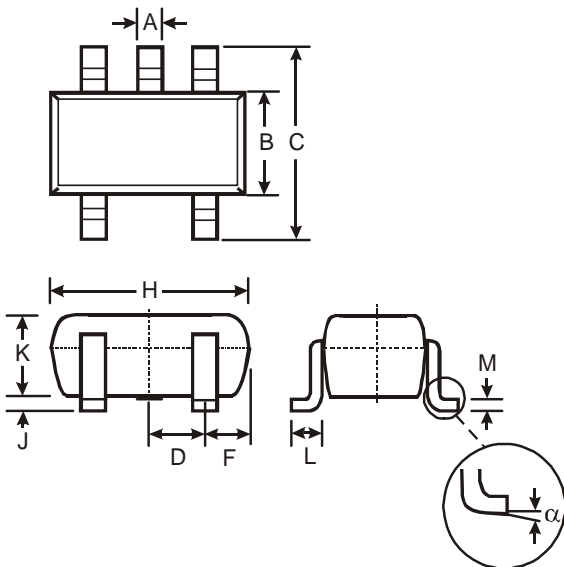
Package Outline Dimensions (All Dimensions in mm)

(1) Package Type: SOT25



| SOT25 | | | |
|----------------------|-------|------|------|
| Dim | Min | Max | Typ |
| A | 0.35 | 0.50 | 0.38 |
| B | 1.50 | 1.70 | 1.60 |
| C | 2.70 | 3.00 | 2.80 |
| D | — | — | 0.95 |
| H | 2.90 | 3.10 | 3.00 |
| J | 0.013 | 0.10 | 0.05 |
| K | 1.00 | 1.30 | 1.10 |
| L | 0.35 | 0.55 | 0.40 |
| M | 0.10 | 0.20 | 0.15 |
| N | 0.70 | 0.80 | 0.75 |
| α | 0° | 8° | — |
| All Dimensions in mm | | | |

(2) Package Type: SOT353



| SOT353 | | |
|----------------------|----------|------|
| Dim | Min | Max |
| A | 0.10 | 0.30 |
| B | 1.15 | 1.35 |
| C | 2.00 | 2.20 |
| D | 0.65 Typ | |
| F | 0.40 | 0.45 |
| H | 1.80 | 2.20 |
| J | 0 | 0.10 |
| K | 0.90 | 1.00 |
| L | 0.25 | 0.40 |
| M | 0.10 | 0.22 |
| α | 0° | 8° |
| All Dimensions in mm | | |

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