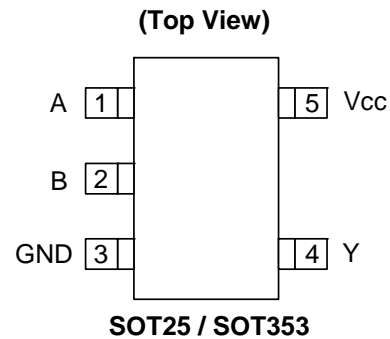


## Description

The 74AHCT1G02 is a single 2-input positive NOR 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:

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

## Pin Assignments



## 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)

## Applications

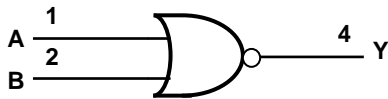
- General Purpose Logic
- Wide array of products such as:
  - PCs, networking, notebooks, netbooks, PDAs
  - Computer peripherals, hard drives, CD/DVD ROM
  - TV, DVD, DVR, set top box
  - Phones, Personal Navigation / GPS
  - MP3 players ,Cameras, Video Recorders

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](http://www.diodes.com/products/lead_free.html).

**Pin Descriptions**

| Pin Name        | Pin No. | Description    |
|-----------------|---------|----------------|
| A               | 1       | Data Input     |
| B               | 2       | Data Input     |
| GND             | 3       | Ground         |
| Y               | 4       | Data Output    |
| V <sub>CC</sub> | 5       | Supply Voltage |

**Logic Diagram**



**Function Table**

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

### 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 $V_O > V_{CC}$ ) | $\pm 20$               | mA          |
| $I_O$     | Continuous output current ( $V_O = 0$ to $V_{CC}$ )  | $\pm 25$               | 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 <sub>CC</sub> | 25°C |      |       | -40°C to 85°C |      | -40°C to 125°C |      | Unit |
|------------------|--|---|-----------------|------|------|-------|---------------|------|----------------|------|------|
|                  |  |   |                 | Min  | Typ. | Max   | Min           | Max  | Min            | Max  |      |
| V <sub>OH</sub>  | High Level Output Voltage              | I <sub>OH</sub> = -50μA                                   | 4.5V            | 4.4  | 4.5  |       | 4.4           |      | 4.4            |      | V    |
|                  |  | I <sub>OH</sub> = -8mA                                    | 4.5V            | 3.94 |      |       | 3.8           |      | 3.70           |      |      |
| V <sub>OL</sub>  | Low Level Output Voltage               | I <sub>OL</sub> = 50μA                                    | 4.5V            |      | 0    | 0.1   |               | 0.1  |                | 0.1  | V    |
|                  |  | I <sub>OL</sub> = 8mA                                     | 4.5V            |      |      | 0.36  |               | 0.44 |                | 0.55 |      |
| I <sub>I</sub>   | Input Current                          | V <sub>I</sub> = 5.5V or GND                              | 0 to 5.5V       |      |      | ± 0.1 |               | ± 1  |                | ± 2  | μA   |
| I <sub>CC</sub>  | Supply Current                         | V <sub>I</sub> = 5.5V or GND<br>I <sub>O</sub> = 0        | 5.5V            |      |      | 1     |               | 10   |                | 40   | μA   |
| C <sub>i</sub>   | Input Capacitance                      | V <sub>I</sub> = V <sub>CC</sub> – or GND                 | 5.5V            |      | 2.0  | 10    |               | 10   |                | 10   | pF   |
| ΔI <sub>CC</sub> | Additional Supply Current              | One input at 3.4 V Other inputs at V <sub>CC</sub> or GND | 5.5V            |      |      | 1.35  |               | 1.5  |                |      | mA   |
| θ <sub>JA</sub>  | Thermal Resistance Junction-to-Ambient | SOT25   | (Note 4)        |      | 204  |       |               |      |                |      | °C/W |
|                  |  | SOT353  |                 |      | 371  |       |               |      |                |      |      |
| θ <sub>JC</sub>  | 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<sub>CC</sub> = 5V ± 0.5V (see Figure 1)

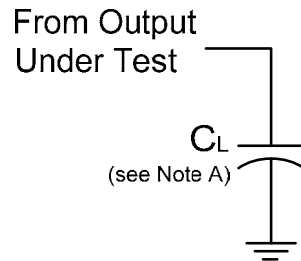
| Parameter       | From (Input) | TO (OUTPUT) |                       | 25°C |      |     | -40°C to 85°C |     | -40°C to 125°C |     | Unit |
|-----------------|--------------|-------------|-----------------------|------|------|-----|---------------|-----|----------------|-----|------|
|                 |              |             |                       | Min  | Typ. | Max | Min           | Max | Min            | Max |      |
| t <sub>pd</sub> | A or B       | Y           | C <sub>L</sub> = 15pF | 0.6  | 3.5  | 5.5 | 0.6           | 6.5 | 0.6            | 7.0 | ns   |
|                 |              |             | C <sub>L</sub> = 50pF | 0.6  | 4.9  | 7.5 | 0.6           | 8.5 | 0.6            | 9.5 | ns   |

### Operating Characteristics

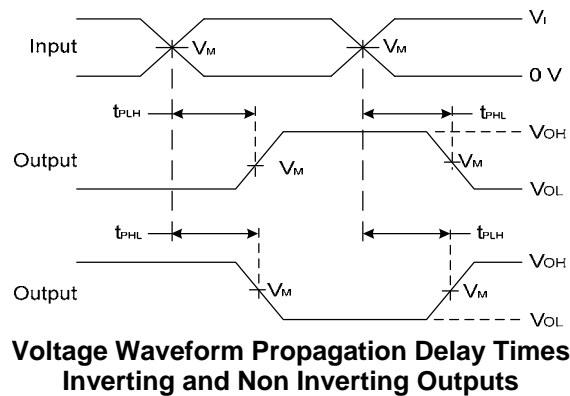
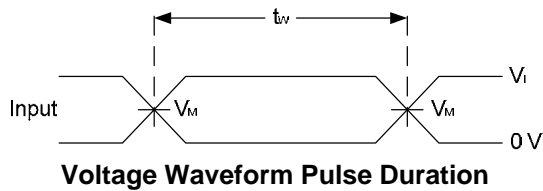
T<sub>A</sub> = 25 °C

| Parameter       |                               | Test Conditions      | V <sub>CC</sub> = 5V |  | Unit |
|-----------------|-------------------------------|----------------------|----------------------|--|------|
|                 |                               |                      | Typ.                 |  |      |
| C <sub>pd</sub> | Power dissipation capacitance | f = 1 MHz<br>No Load | 15                   |  | pF   |

**Parameter Measurement Information**

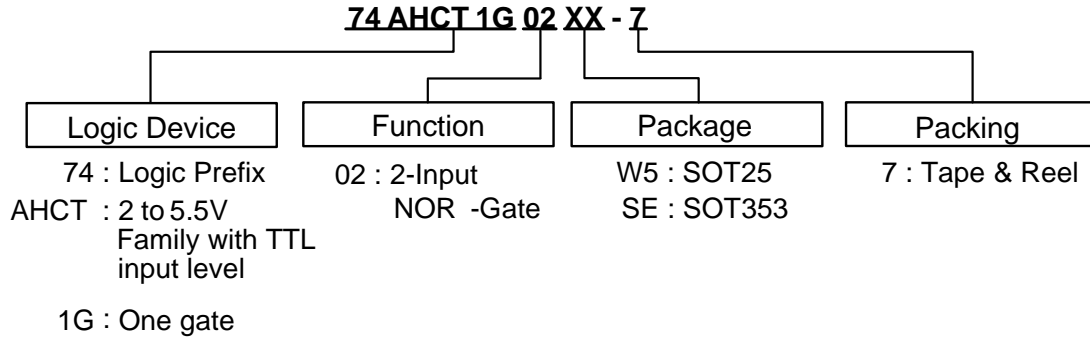


| $V_{CC}$      | Inputs |            | $V_M$ | $C_L$ |
|---------------|--------|------------|-------|-------|
|               | $V_I$  | $t_r/t_f$  |       |       |
| $5V \pm 0.5V$ | 3 V    | $\leq 3ns$ | 1.5V  | 15pF  |
| $5V \pm 0.5V$ | 3 V    | $\leq 3ns$ | 1.5V  | 50pF  |



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

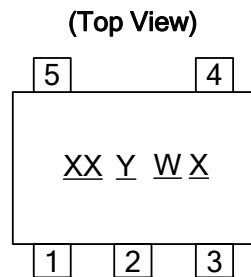
**Ordering Information**



| Device         | Package Code | Packaging (Note 5) | 7" Tape and Reel |                    |
|----------------|--------------|--------------------|------------------|--------------------|
|                |              |                    | Quantity         | Part Number Suffix |
| 74AHCT1G02W5-7 | W5           | SOT25              | 3000/Tape & Reel | -7                 |
| 74AHCT1G02SE-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**

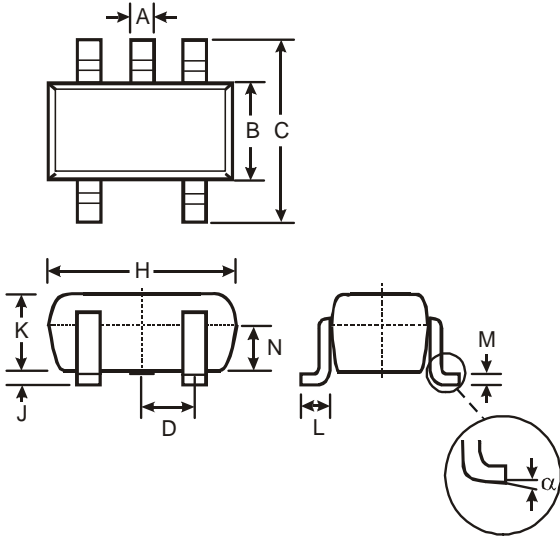


XX : Identification code  
 Y : Year 0~9  
 W : Week : A~Z : 1~26 week;  
       a~z : 27~52 week; z represents  
       52 and 53 week  
 X : A~Z : Internal code

| Part Number  | Package | Identification Code |
|--------------|---------|---------------------|
| 74AHCT1G02W5 | SOT25   | ZS                  |
| 74AHCT1G02SE | SOT353  | ZS                  |

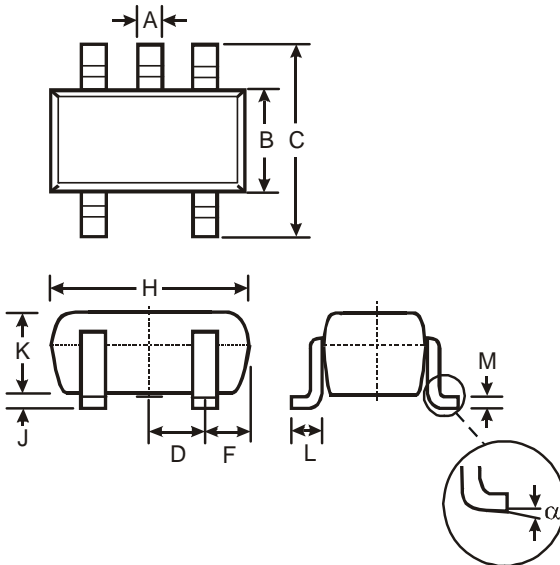
**Package Outline Dimensions (All Dimensions in mm)**

**(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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