

# HD74ALVC2G02

## Dual 2-input NOR Gates

REJ03D0160-0400Z  
(Previous ADE-205-611C (Z))  
Rev.4.00  
Dec.16.2003

### Description

The HD74ALVC2G02 has two-input NOR gate in an 8 pin package. Low voltage and high-speed operation is suitable for the battery powered products (e.g., notebook computers), and the low power consumption extends the battery life.

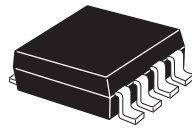
### Features

- The basic gate function is lined up as Renesas uni logic series.
- Supplied on emboss taping for high-speed automatic mounting.
- Supply voltage range : 1.2 to 3.6 V  
Operating temperature range: -40 to +85°C
- All inputs  $V_{IH}$  (Max.) = 3.6 V (@ $V_{CC}$  = 0 V to 3.6 V)  
All outputs  $V_O$  (Max.) = 3.6 V (@ $V_{CC}$  = 0 V)
- Output current      $\pm 2$  mA (@ $V_{CC}$  = 1.2 V)  
                               $\pm 4$  mA (@ $V_{CC}$  = 1.4 V to 1.6 V)  
                               $\pm 6$  mA (@ $V_{CC}$  = 1.65 V to 1.95 V)  
                               $\pm 18$  mA (@ $V_{CC}$  = 2.3 V to 2.7 V)  
                               $\pm 24$  mA (@ $V_{CC}$  = 3.0 V to 3.6 V)
- Ordering Information

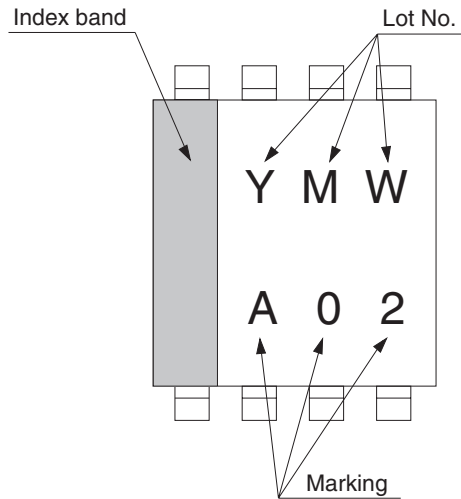
| Part Name       | Package Type | Package Code | Package Abbreviation | Taping Abbreviation (Quantity) |
|-----------------|--------------|--------------|----------------------|--------------------------------|
| HD74ALVC2G02USE | SSOP-8 pin   | TTP-8DBV     | US                   | E (3,000 pcs/reel)             |

## Outline and Article Indication

### • HD74ALVC2G02



SSOP-8



Y : Year code  
(the last digit of year)  
M : Month code  
W : Week code

## Function Table

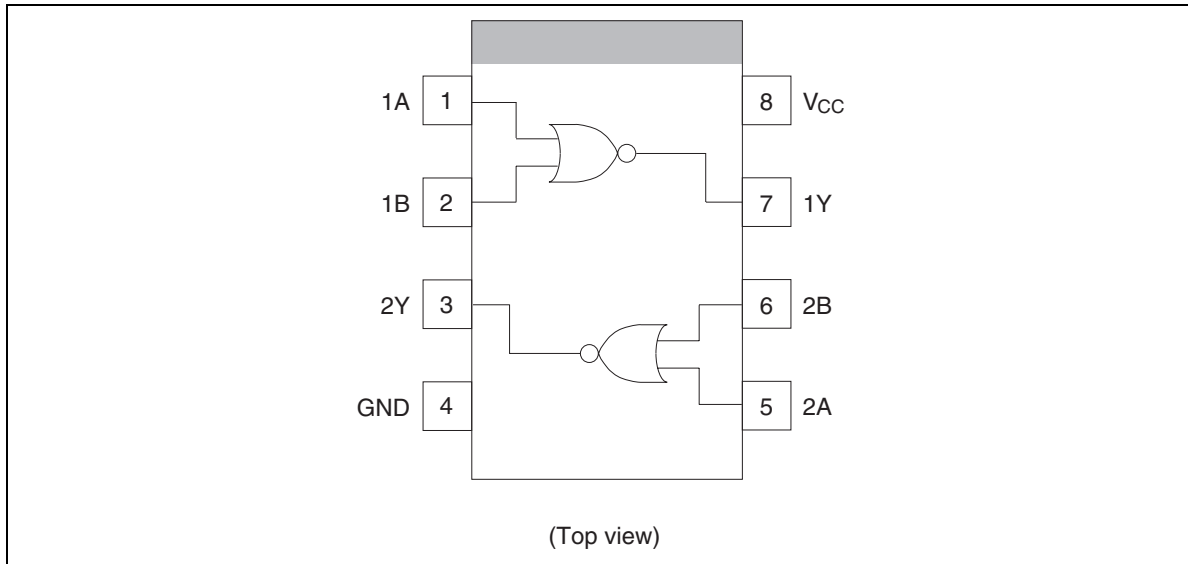
### Inputs

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

H: High level

L: Low level

## Pin Arrangement



## Absolute Maximum Ratings

| Item                                                                               | Symbol                | Ratings                             | Unit             | Conditions                        |
|------------------------------------------------------------------------------------|-----------------------|-------------------------------------|------------------|-----------------------------------|
| Supply voltage range                                                               | $V_{CC}$              | -0.5 to 4.6                         | V                |                                   |
| Input voltage range <sup>*1</sup>                                                  | $V_I$                 | -0.5 to 4.6                         | V                |                                   |
| Output voltage range <sup>*1, 2</sup>                                              | $V_O$                 | -0.5 to $V_{CC}+0.5$<br>-0.5 to 4.6 | V                | Output : H or L<br>$V_{CC}$ : OFF |
| Input clamp current                                                                | $I_{IK}$              | -50                                 | mA               | $V_I < 0$                         |
| Output clamp current                                                               | $I_{OK}$              | $\pm 50$                            | mA               | $V_O < 0$ or $V_O > V_{CC}$       |
| Continuous output current                                                          | $I_O$                 | $\pm 50$                            | mA               | $V_O = 0$ to $V_{CC}$             |
| Continuous current through $V_{CC}$ or GND                                         | $I_{CC}$ or $I_{GND}$ | $\pm 100$                           | mA               |                                   |
| Maximum power dissipation at $T_a = 25^\circ\text{C}$ (in still air) <sup>*3</sup> | $P_T$                 | 200                                 | mW               |                                   |
| Storage temperature                                                                | $T_{stg}$             | -65 to 150                          | $^\circ\text{C}$ |                                   |

- Notes:
- The absolute maximum ratings are values, which must not individually be exceeded, and furthermore, no two of which may be realized at the same time.
  - 1. The input and output voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
  - 2. This value is limited to 4.6 V maximum.
  - 3. The maximum package power dissipation was calculated using a junction temperature of  $150^\circ\text{C}$ .

**Recommended Operating Conditions**

| Item                               | Symbol                | Min | Max      | Unit   | Conditions                            |
|------------------------------------|-----------------------|-----|----------|--------|---------------------------------------|
| Supply voltage range               | $V_{CC}$              | 1.2 | 3.6      | V      |                                       |
| Input voltage range                | $V_I$                 | 0   | 3.6      | V      |                                       |
| Output voltage range               | $V_O$                 | 0   | $V_{CC}$ | V      |                                       |
| Output current                     | $I_{OH}$              | —   | −2       | mA     | $V_{CC} = 1.2\text{ V}$               |
|                                    |                       | —   | −4       |        | $V_{CC} = 1.4\text{ V}$               |
|                                    |                       | —   | −6       |        | $V_{CC} = 1.65\text{ V}$              |
|                                    |                       | —   | −18      |        | $V_{CC} = 2.3\text{ V}$               |
|                                    |                       | —   | −24      |        | $V_{CC} = 3.0\text{ V}$               |
|                                    | $I_{OL}$              | —   | 2        |        | $V_{CC} = 1.2\text{ V}$               |
|                                    |                       | —   | 4        |        | $V_{CC} = 1.4\text{ V}$               |
|                                    |                       | —   | 6        |        | $V_{CC} = 1.65\text{ V}$              |
|                                    |                       | —   | 18       |        | $V_{CC} = 2.3\text{ V}$               |
|                                    |                       | —   | 24       |        | $V_{CC} = 3.0\text{ V}$               |
| Input transition rise or fall rate | $\Delta t / \Delta v$ | 0   | 20       | ns / V | $V_{CC} = 1.2\text{ to }2.7\text{ V}$ |
|                                    |                       | 0   | 10       |        | $V_{CC} = 3.3\pm 0.3\text{ V}$        |
| Operating free-air temperature     | $T_a$                 | −40 | 85       | °C     |                                       |

Note: Unused or floating inputs must be held high or low.

**Electrical Characteristics**

(T<sub>a</sub> = -40 to 85°C)

| Item                     | Symbol           | V <sub>CC</sub> (V) * | Min                   | Typ | Max                   | Unit | Test conditions                                              |
|--------------------------|------------------|-----------------------|-----------------------|-----|-----------------------|------|--------------------------------------------------------------|
| Input voltage            | V <sub>IH</sub>  | 1.2                   | V <sub>CC</sub> ×0.75 | —   | —                     | V    |                                                              |
|                          |                  | 1.4 to 1.6            | V <sub>CC</sub> ×0.7  | —   | —                     |      |                                                              |
|                          |                  | 1.65 to 1.95          | V <sub>CC</sub> ×0.7  | —   | —                     |      |                                                              |
|                          |                  | 2.3 to 2.7            | 1.7                   | —   | —                     |      |                                                              |
|                          |                  | 3.0 to 3.6            | 2.0                   | —   | —                     |      |                                                              |
|                          | V <sub>IL</sub>  | 1.2                   | —                     | —   | V <sub>CC</sub> ×0.25 |      |                                                              |
|                          |                  | 1.4 to 1.6            | —                     | —   | V <sub>CC</sub> ×0.3  |      |                                                              |
|                          |                  | 1.65 to 1.95          | —                     | —   | V <sub>CC</sub> ×0.3  |      |                                                              |
|                          |                  | 2.3 to 2.7            | —                     | —   | 0.7                   |      |                                                              |
|                          |                  | 3.0 to 3.6            | —                     | —   | 0.8                   |      |                                                              |
| Output voltage           | V <sub>OH</sub>  | Min to Max            | V <sub>CC</sub> -0.2  | —   | —                     | V    | I <sub>OH</sub> = -100 μA                                    |
|                          |                  | 1.2                   | 0.9                   | —   | —                     |      | I <sub>OH</sub> = -2 mA                                      |
|                          |                  | 1.4                   | 1.1                   | —   | —                     |      | I <sub>OH</sub> = -4 mA                                      |
|                          |                  | 1.65                  | 1.2                   | —   | —                     |      | I <sub>OH</sub> = -6 mA                                      |
|                          |                  | 2.3                   | 1.7                   | —   | —                     |      | I <sub>OH</sub> = -18 mA                                     |
|                          |                  | 3.0                   | 2.2                   | —   | —                     |      | I <sub>OH</sub> = -24 mA                                     |
|                          | V <sub>OL</sub>  | Min to Max            | —                     | —   | 0.2                   |      | I <sub>OL</sub> = 100 μA                                     |
|                          |                  | 1.2                   | —                     | —   | 0.3                   |      | I <sub>OL</sub> = 2 mA                                       |
|                          |                  | 1.4                   | —                     | —   | 0.3                   |      | I <sub>OL</sub> = 4 mA                                       |
|                          |                  | 1.65                  | —                     | —   | 0.3                   |      | I <sub>OL</sub> = 6 mA                                       |
|                          |                  | 2.3                   | —                     | —   | 0.55                  |      | I <sub>OL</sub> = 18 mA                                      |
|                          |                  | 3.0                   | —                     | —   | 0.55                  |      | I <sub>OL</sub> = 24 mA                                      |
| Input current            | I <sub>IN</sub>  | 3.6                   | —                     | —   | ±5                    | μA   | V <sub>IN</sub> = 3.6 V or GND                               |
| Quiescent supply current | I <sub>CC</sub>  | 3.6                   | —                     | —   | 10                    | μA   | V <sub>IN</sub> = V <sub>CC</sub> or GND, I <sub>O</sub> = 0 |
| Output leakage current   | I <sub>OFF</sub> | 0                     | —                     | —   | 5                     | μA   | V <sub>IN</sub> or V <sub>O</sub> = 0 to 3.6 V               |
| Input capacitance        | C <sub>IN</sub>  | 3.3                   | —                     | 4.5 | —                     | pF   | V <sub>IN</sub> = V <sub>CC</sub> or GND                     |

Note: For conditions shown as Min or Max, use the appropriate values under recommended operating conditions.

**Switching Characteristics**

(T<sub>a</sub> = -40 to 85°C)

V<sub>CC</sub> = 1.2 V

| Item                   | Symbol                               | Min | Typ | Max | Unit | Test conditions        | FROM (Input) | TO (Output) |
|------------------------|--------------------------------------|-----|-----|-----|------|------------------------|--------------|-------------|
| Propagation delay time | t <sub>PLH</sub><br>t <sub>PHL</sub> | —   | 7.5 | —   | ns   | C <sub>L</sub> = 15 pF | A or B       | Y           |

V<sub>CC</sub> = 1.5±0.1 V

| Item                   | Symbol                               | Min | Typ | Max | Unit | Test conditions        | FROM (Input) | TO (Output) |
|------------------------|--------------------------------------|-----|-----|-----|------|------------------------|--------------|-------------|
| Propagation delay time | t <sub>PLH</sub><br>t <sub>PHL</sub> | 2.0 | —   | 7.0 | ns   | C <sub>L</sub> = 15 pF | A or B       | Y           |

V<sub>CC</sub> = 1.8±0.15 V

| Item                   | Symbol                               | Min | Typ | Max | Unit | Test conditions        | FROM (Input) | TO (Output) |
|------------------------|--------------------------------------|-----|-----|-----|------|------------------------|--------------|-------------|
| Propagation delay time | t <sub>PLH</sub><br>t <sub>PHL</sub> | 1.5 | —   | 5.0 | ns   | C <sub>L</sub> = 30 pF | A or B       | Y           |

V<sub>CC</sub> = 2.5±0.2 V

| Item                   | Symbol                               | Min | Typ | Max | Unit | Test conditions        | FROM (Input) | TO (Output) |
|------------------------|--------------------------------------|-----|-----|-----|------|------------------------|--------------|-------------|
| Propagation delay time | t <sub>PLH</sub><br>t <sub>PHL</sub> | 1.0 | —   | 3.7 | ns   | C <sub>L</sub> = 30 pF | A or B       | Y           |

V<sub>CC</sub> = 3.3±0.3 V

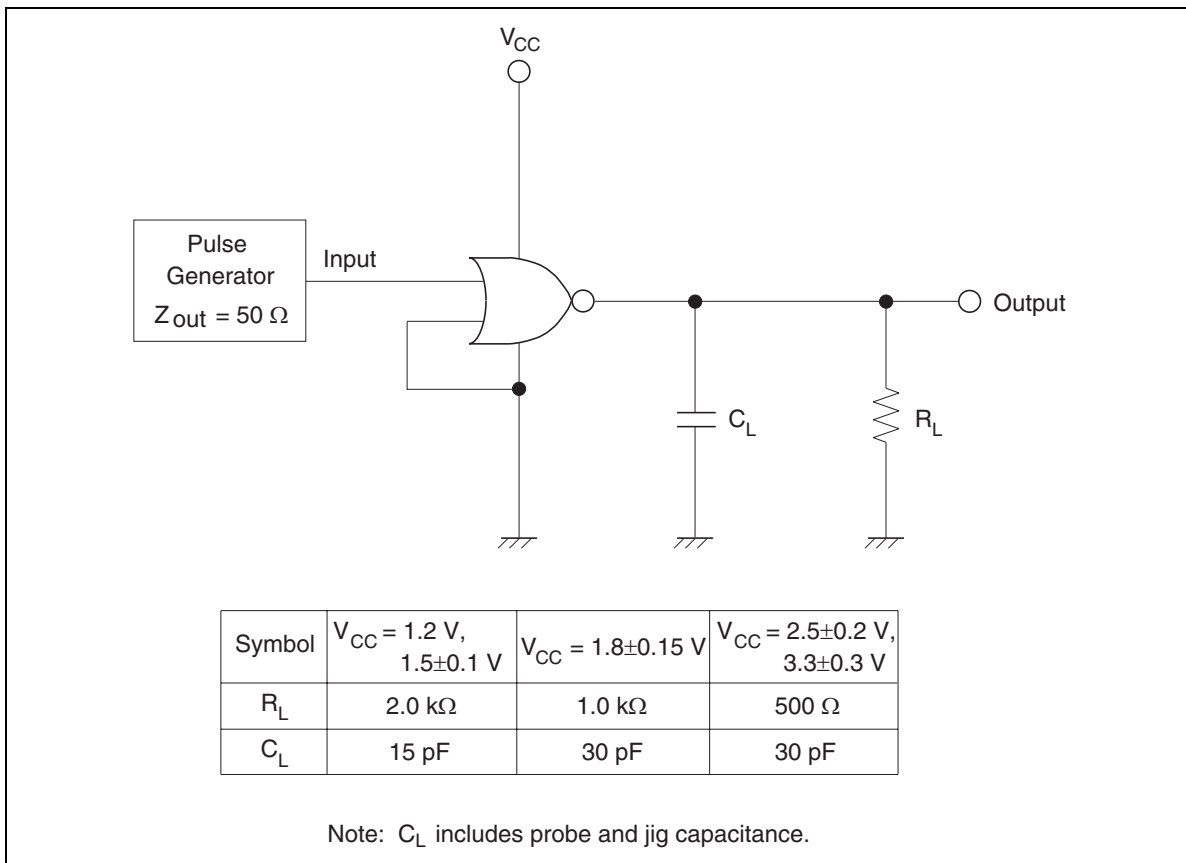
| Item                   | Symbol                               | Min | Typ | Max | Unit | Test conditions        | FROM (Input) | TO (Output) |
|------------------------|--------------------------------------|-----|-----|-----|------|------------------------|--------------|-------------|
| Propagation delay time | t <sub>PLH</sub><br>t <sub>PHL</sub> | 1.0 | —   | 2.8 | ns   | C <sub>L</sub> = 30 pF | A or B       | Y           |

## Operating Characteristics

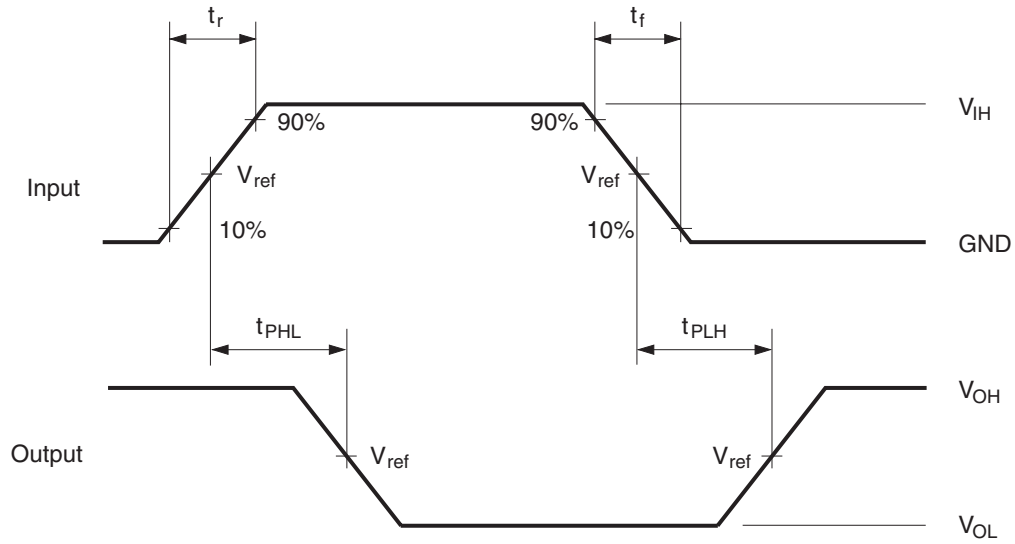
( $T_a = 25^\circ\text{C}$ )

| Item                          | Symbol   | $V_{CC}$ (V) | Min | Typ  | Max | Unit | Test conditions     |
|-------------------------------|----------|--------------|-----|------|-----|------|---------------------|
| Power dissipation capacitance | $C_{PD}$ | 1.5          | —   | 10.5 | —   | pF   | $f = 10\text{ MHz}$ |
|                               |          | 1.8          | —   | 10.5 | —   |      |                     |
|                               |          | 2.5          | —   | 10.5 | —   |      |                     |
|                               |          | 3.3          | —   | 11.5 | —   |      |                     |

## Test Circuit



## Waveforms

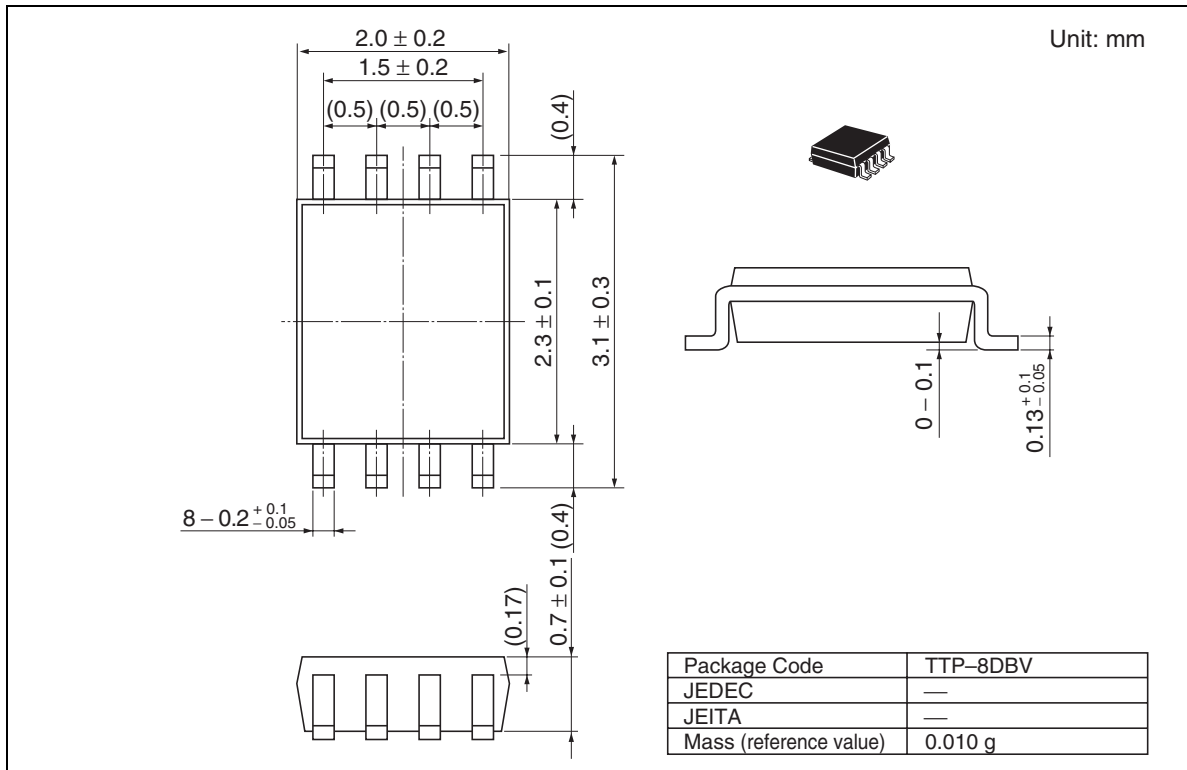


| Symbol      | $V_{CC} = 1.2\text{ V},$<br>$1.5 \pm 0.1\text{ V},$<br>$1.8 \pm 0.15\text{ V}$ | $V_{CC} = 2.5 \pm 0.2\text{ V}$ | $V_{CC} = 3.3 \pm 0.3\text{ V}$ |
|-------------|--------------------------------------------------------------------------------|---------------------------------|---------------------------------|
| $t_r / t_f$ | 2.0 ns                                                                         | 2.5 ns                          | 2.5 ns                          |
| $V_{IH}$    | $V_{CC}$                                                                       | $V_{CC}$                        | 2.7 V                           |
| $V_{ref}$   | 50%                                                                            | 50%                             | 1.5 V                           |

Note: Input waveform : PRR = 10 MHz, duty cycle 50%



## Package Dimensions



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