# HD74ALVC1G14

## Schmitt-trigger Inverter Buffer

REJ03D0111–0300Z
(Previous ADE-205-627B (Z))
Rev.3.00
Nov.12.2003

### Description

The HD74ALVC1G14 has an inverter with schmitt-trigger input in a 5 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.

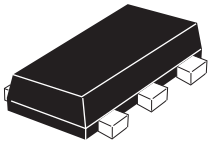
### Features

- 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 ±2 mA (@$V_{CC}$ = 1.2)
  ±4 mA (@$V_{CC}$ = 1.4 V to 1.6 V)
  ±6 mA (@$V_{CC}$ = 1.65 V to 1.95 V)
  ±18 mA (@$V_{CC}$ = 2.3 V to 2.7 V)
  ±24 mA (@$V_{CC}$ = 3.0 V to 3.6 V)
- All the logical input has hysteresis voltage for the slow transition.
- Ordering Information

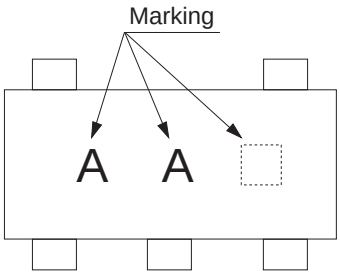
| Part Name | Package Type | Package Code | Package Abbreviation | Taping Abbreviation (Quantity) |
|---|---|---|---|---|
| HD74ALVC1G14VSE | VSON-5 pin | TNP-5DV | VS | E (3,000 pcs/reel) |

## Outline and Article Indication

- HD74ALVC1G14



VSON-5



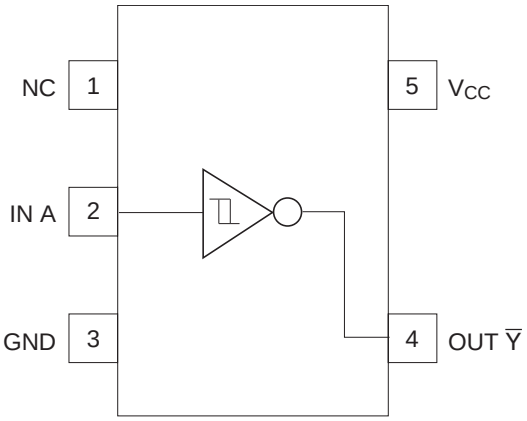

= Control code

## Function Table

| Input A | Output $\overline{Y}$ |
|---|---|
| H | L |
| L | H |

H: High level
L: Low level

## Pin Arrangement




(Top view)

## Absolute Maximum Ratings

| Item | Symbol | Ratings | Unit | Conditions |
|---|---|---|---|---|
| Supply voltage range | $V_{CC}$ | –0.5 to 4.6 | V | |
| Input voltage range [*1] | $V_I$ | –0.5 to 4.6 | V | |
| Output voltage range [*1, 2] | $V_O$ | –0.5 to $V_{CC}$+0.5 | V | Output : H or L |
| | | –0.5 to 4.6 | | $V_{CC}$ : OFF |
| Input clamp current | $I_{IK}$ | –50 | mA | $V_I < 0$ |
| Output clamp current | $I_{OK}$ | ±50 | mA | $V_O < 0$ or $V_O > V_{CC}$ |
| Continuous output current | $I_O$ | ±50 | mA | $V_O$ = 0 to $V_{CC}$ |
| Continuous current through $V_{CC}$ or GND | $I_{CC}$ or $I_{GND}$ | ±100 | mA | |
| Maximum power dissipation at Ta = 25°C (in still air) [*3] | $P_T$ | 200 | mW | |
| Storage temperature | Tstg | –65 to 150 | °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°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 V |
| | | — | –4 | | $V_{CC}$ = 1.4 V |
| | | — | –6 | | $V_{CC}$ = 1.65 V |
| | | — | –18 | | $V_{CC}$ = 2.3 V |
| | | — | –24 | | $V_{CC}$ = 3.0 V |
| | $I_{OL}$ | — | 2 | | $V_{CC}$ = 1.2 V |
| | | — | 4 | | $V_{CC}$ = 1.4 V |
| | | — | 6 | | $V_{CC}$ = 1.65 V |
| | | — | 18 | | $V_{CC}$ = 2.3 V |
| | | — | 24 | | $V_{CC}$ = 3.0 V |
| Operating free-air temperature | Ta | –40 | 85 | °C | |

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

## Electrical Characteristics

(Ta = –40 to 85°C)

| Item | Symbol | $V_{CC}$ (V) * | Min | Typ | Max | Unit | Test conditions |
|---|---|---|---|---|---|---|---|
| Threshold voltage | $V_T^+$ | 1.2 | — | — | $V_{CC}$×0.8 | V | |
| | | 1.4 to 1.6 | — | — | $V_{CC}$×0.75 | | |
| | | 1.65 to 1.95 | — | — | $V_{CC}$×0.7 | | |
| | | 2.3 to 2.7 | — | — | 1.7 | | |
| | | 3.0 to 3.6 | — | — | 2.0 | | |
| | $V_T^-$ | 1.2 | $V_{CC}$×0.2 | — | — | | |
| | | 1.4 to 1.6 | $V_{CC}$×0.25 | — | — | | |
| | | 1.65 to 1.95 | $V_{CC}$×0.3 | — | — | | |
| | | 2.3 to 2.7 | 0.7 | — | — | | |
| | | 3.0 to 3.6 | 0.8 | — | — | | |
| | $\Delta V_T$ | 1.2 | 0.1 | — | 0.4 | | |
| | | 1.4 to 1.6 | 0.1 | — | 0.6 | | |
| | | 1.65 to 1.95 | 0.15 | — | 0.8 | | |
| | | 2.3 to 2.7 | 0.25 | — | 1.0 | | |
| | | 3.0 to 3.6 | 0.25 | — | 1.2 | | |
| Output voltage | $V_{OH}$ | Min to Max | $V_{CC}$–0.2 | — | — | V | $I_{OH}$ = –100 µA |
| | | 1.2 | 0.9 | — | — | | $I_{OH}$ = –2 mA |
| | | 1.4 | 1.1 | — | — | | $I_{OH}$ = –4 mA |
| | | 1.65 | 1.2 | — | — | | $I_{OH}$ = –6 mA |
| | | 2.3 | 1.7 | — | — | | $I_{OH}$ = –18 mA |
| | | 3.0 | 2.2 | — | — | | $I_{OH}$ = –24 mA |
| | $V_{OL}$ | Min to Max | — | — | 0.2 | | $I_{OL}$ = 100 µA |
| | | 1.2 | — | — | 0.3 | | $I_{OL}$ = 2 mA |
| | | 1.4 | — | — | 0.3 | | $I_{OL}$ = 4 mA |
| | | 1.65 | — | — | 0.3 | | $I_{OL}$ = 6 mA |
| | | 2.3 | — | — | 0.55 | | $I_{OL}$ = 18 mA |
| | | 3.0 | — | — | 0.55 | | $I_{OL}$ = 24 mA |
| Input current | $I_{IN}$ | 3.6 | — | — | ±5 | µA | $V_{IN}$ = 3.6 V or GND |
| Quiescent supply current | $I_{CC}$ | 3.6 | — | — | 10 | µA | $V_{IN}$ = $V_{CC}$ or GND, $I_O$ = 0 |
| Output leakage current | $I_{OFF}$ | 0 | — | — | 5 | µA | $V_{IN}$ or $V_{OUT}$ = 0 to 3.6 V |
| Input capacitance | $C_{IN}$ | 3.3 | — | 4.5 | — | pF | $V_{IN}$ = $V_{CC}$ or GND |

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

## Switching Characteristics

(Ta = –40 to 85°C)

$V_{CC}$ = 1.2 V

| Item | Symbol | Min | Typ | Max | Unit | Test conditions | FROM (Input) | TO (Output) |
|---|---|---|---|---|---|---|---|---|
| Propagation delay time | $t_{PLH}$<br>$t_{PHL}$ | — | 7.0 | — | ns | $C_L$ = 15 pF | A | $\overline{Y}$ |

$V_{CC}$ = 1.5±0.1 V

| Item | Symbol | Min | Typ | Max | Unit | Test conditions | FROM (Input) | TO (Output) |
|---|---|---|---|---|---|---|---|---|
| Propagation delay time | $t_{PLH}$<br>$t_{PHL}$ | 2.0 | — | 8.0 | ns | $C_L$ = 15 pF | A | $\overline{Y}$ |

$V_{CC}$ = 1.8±0.15 V

| Item | Symbol | Min | Typ | Max | Unit | Test conditions | FROM (Input) | TO (Output) |
|---|---|---|---|---|---|---|---|---|
| Propagation delay time | $t_{PLH}$<br>$t_{PHL}$ | 1.5 | — | 6.0 | ns | $C_L$ = 30 pF | A | $\overline{Y}$ |

$V_{CC}$ = 2.5±0.2 V

| Item | Symbol | Min | Typ | Max | Unit | Test conditions | FROM (Input) | TO (Output) |
|---|---|---|---|---|---|---|---|---|
| Propagation delay time | $t_{PLH}$<br>$t_{PHL}$ | 1.0 | — | 4.5 | ns | $C_L$ = 30 pF | A | $\overline{Y}$ |

$V_{CC}$ = 3.3±0.3 V

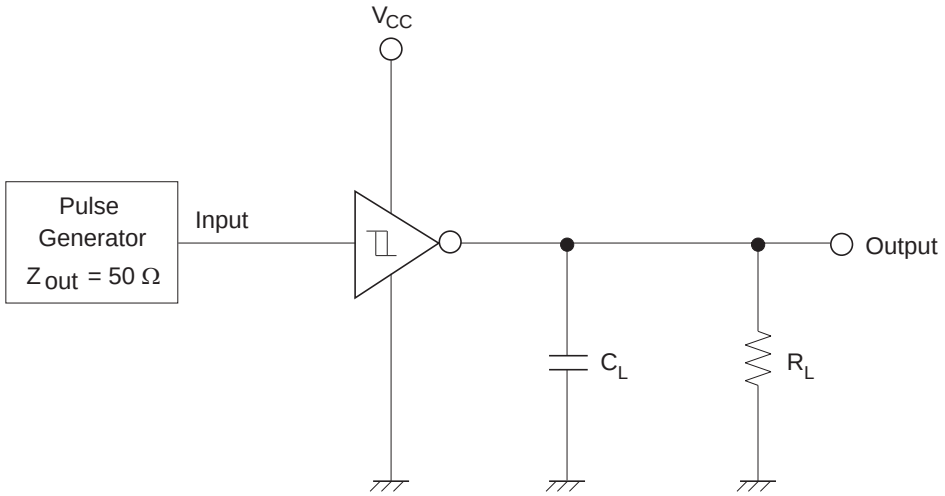
| Item | Symbol | Min | Typ | Max | Unit | Test conditions | FROM (Input) | TO (Output) |
|---|---|---|---|---|---|---|---|---|
| Propagation delay time | $t_{PLH}$<br>$t_{PHL}$ | 1.0 | — | 3.5 | ns | $C_L$ = 30 pF | A | $\overline{Y}$ |

## Operating Characteristics

(Ta = 25°C)

| Item | Symbol | $V_{CC}$ (V) | Min | Typ | Max | Unit | Test conditions |
|---|---|---|---|---|---|---|---|
| Power dissipation capacitance | $C_{PD}$ | 1.5 | — | 10.5 | — | pF | f = 10 MHz |
| | | 1.8 | — | 10.5 | — | | |
| | | 2.5 | — | 11.0 | — | | |
| | | 3.3 | — | 11.5 | — | | |

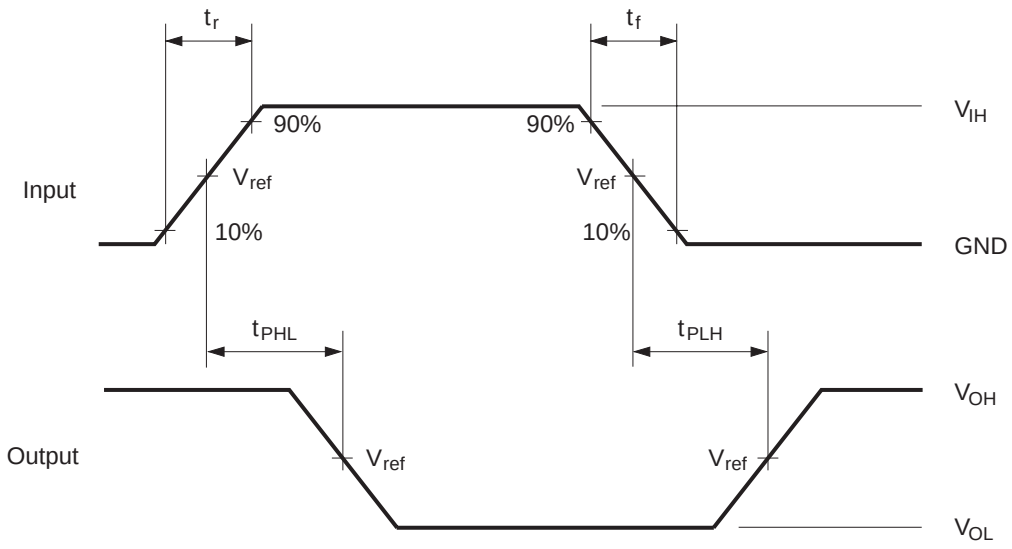
## Test Circuit




| Symbol | $V_{CC}$ = 1.2 V, 1.5±0.1 V | $V_{CC}$ = 1.8±0.15 V | $V_{CC}$ = 2.5±0.2 V, 3.3±0.3 V |
|---|---|---|---|
| $R_L$ | 2.0 kΩ | 1.0 kΩ | 500 Ω |
| $C_L$ | 15 pF | 30 pF | 30 pF |

Note: $C_L$ includes probe and jig capacitance.

**Waveforms**

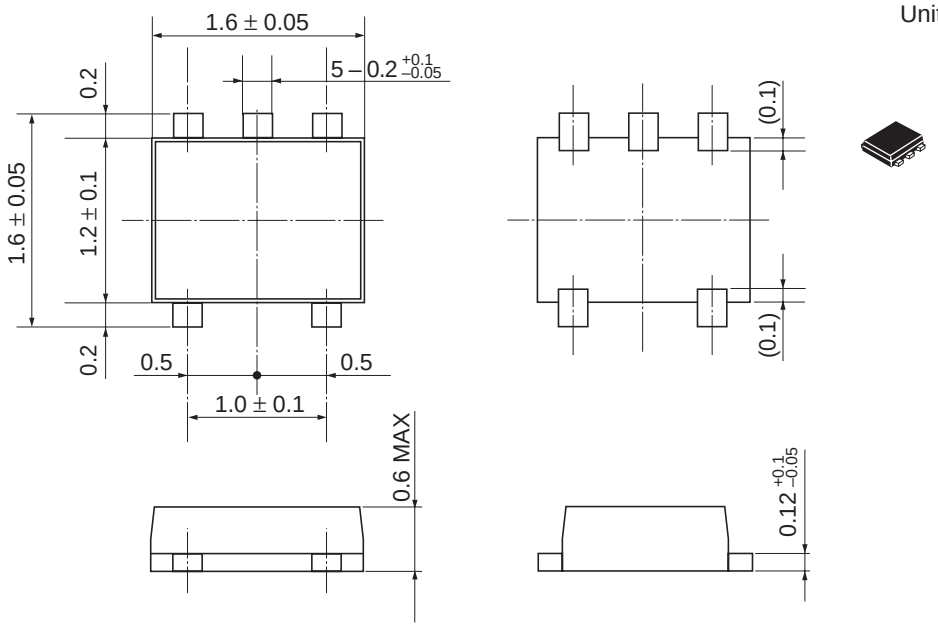



| Symbol | $V_{CC}$ = 1.2 V, 1.5±0.1 V, 1.8±0.15 V | $V_{CC}$ = 2.5±0.2 V | $V_{CC}$ = 3.3±0.3 V |
|---|---|---|---|
| $t_r$ / $t_f$ | 2.0 ns | 2.5 ns | 2.5 ns |
| $V_{IH}$ | $V_{CC}$ | $V_{CC}$ | 2.7 V |
| $V_{ref}$ | 50% | 50% | 1.5 V |

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

## Package Dimensions

Unit: mm




| | |
|---|---|
| Package Code | TNP–5DV |
| JEDEC | — |
| JEITA | — |
| Mass (reference value) | 0.002 g |

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