To our customers,

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Renesas Electronics website: http://www.renesas.com

April 1st, 2010
Renesas Electronics Corporation



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# HD74AC368

## Hex Inverter Buffer with 3-State Output

REJ03D0272–0200Z
(Previous ADE-205-393 (Z))
Rev.2.00
Jul.16.2004

### Features

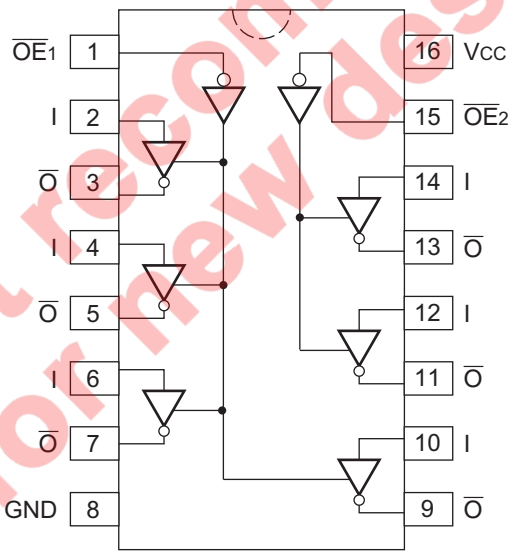
- 3-State Outputs Drive Bus Lines or Buffer Memory Address Registers
- Outputs Source/Sink 24 mA
- Ordering Information

| Part Name | Package Type | Package Code | Package Abbreviation | Taping Abbreviation (Quantity) |
|---|---|---|---|---|
| HD74AC368FPEL | SOP-16 pin (JEITA) | FP-16DAV | FP | EL (2,000 pcs/reel) |
| HD74AC368RPEL | SOP-16 pin (JEDEC) | FP-16DNV | RP | EL (2,500 pcs/reel) |

Notes: 1. Please consult the sales office for the above package availability.
2. The packages with lead-free pins are distinguished from the conventional products by adding V at the end of the package code.

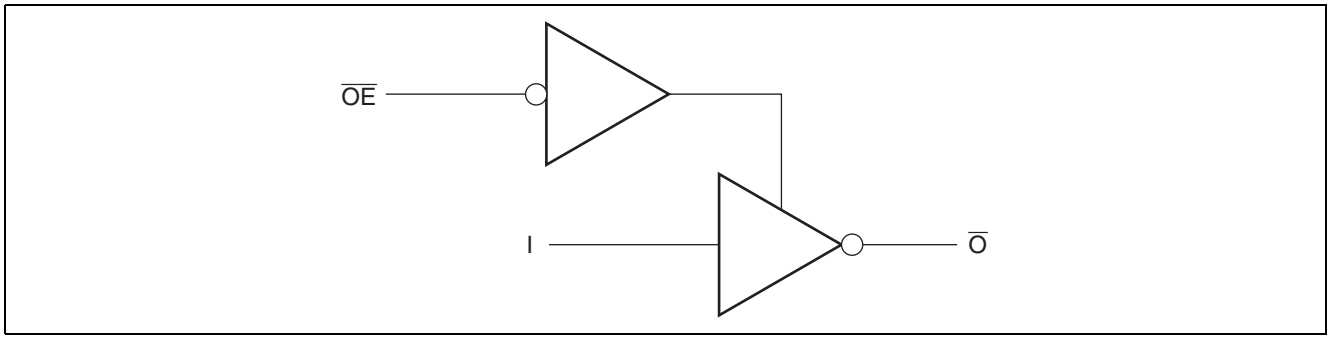


### Pin Arrangement




(Top view)

## Logic Symbol




## Pin Names

| | |
|---|---|
| $\overline{OE}_1$, $\overline{OE}_2$ | 3-State Output: Enable Input (Active Low) |
| I | Inputs |
| O | Outputs |

## Truth Table

| Inputs | | Output |
|---|---|---|
| $\overline{OE}$ | I | $\overline{O}$ |
| L | L | H |
| L | H | L |
| H | X | Z |

H : High Voltage Level
L : Low Voltage Level
X : Immaterial
Z : High Impedance



## Absolute Maximum Ratings

| Item | Symbol | Ratings | Unit | Condition |
|---|---|---|---|---|
| Supply voltage | $V_{CC}$ | –0.5 to 7 | V | |
| DC input diode current | $I_{IK}$ | –20 | mA | $V_I$ = –0.5V |
| | | 20 | mA | $V_I$ = Vcc+0.5V |
| DC input voltage | $V_I$ | –0.5 to Vcc+0.5 | V | |
| DC output diode current | $I_{OK}$ | –50 | mA | $V_O$ = –0.5V |
| | | 50 | mA | $V_O$ = Vcc+0.5V |
| DC output voltage | $V_O$ | –0.5 to Vcc+0.5 | V | |
| DC output source or sink current | $I_O$ | ±50 | mA | |
| DC $V_{CC}$ or ground current per output pin | $I_{CC}$, $I_{GND}$ | ±50 | mA | |
| Storage temperature | Tstg | –65 to +150 | °C | |

## Recommended Operating Conditions

| Item | Symbol | Ratings | Unit | Condition |
|---|---|---|---|---|
| Supply voltage | $V_{CC}$ | 2 to 6 | V | |
| Input and Output voltage | $V_I$, $V_O$ | 0 to $V_{CC}$ | V | |
| Operating temperature | Ta | –40 to +85 | °C | |
| Input rise and fall time (except Schmitt inputs) $V_{IN}$ 30% to 70% $V_{CC}$ | tr, tf | 8 | ns/V | $V_{CC}$ = 3.0V |
| | | | | $V_{CC}$ = 4.5 V |
| | | | | $V_{CC}$ = 5.5 V |

## DC Characteristics

| Item | Sym-bol | Vcc (V) | Ta = 25°C | | | Ta = –40 to +85°C | | Unit | Condition | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | min. | typ. | max. | min. | max. | | | |
| Input Voltage | $V_{IH}$ | 3.0 | 2.1 | 1.5 | — | 2.1 | — | V | $V_{OUT}$ = 0.1 V or $V_{CC}$ –0.1 V | |
| | | 4.5 | 3.15 | 2.25 | — | 3.15 | — | | | |
| | | 5.5 | 3.85 | 2.75 | — | 3.85 | — | | | |
| | $V_{IL}$ | 3.0 | — | 1.50 | 0.9 | — | 0.9 | | $V_{OUT}$ = 0.1 V or $V_{CC}$ –0.1 V | |
| | | 4.5 | — | 2.25 | 1.35 | — | 1.35 | | | |
| | | 5.5 | — | 2.75 | 1.65 | — | 1.65 | | | |
| Output voltage | $V_{OH}$ | 3.0 | 2.9 | 2.99 | — | 2.9 | — | V | $V_{IN}$ = $V_{IL}$ or $V_{IH}$<br>$I_{OUT}$ = –50 µA | |
| | | 4.5 | 4.4 | 4.49 | — | 4.4 | — | | | |
| | | 5.5 | 5.4 | 5.49 | — | 5.4 | — | | | |
| | | 3.0 | 2.58 | — | — | 2.48 | — | | $V_{IN}$ = $V_{IL}$ or $V_{IH}$ | $I_{OH}$ = –12 mA |
| | | 4.5 | 3.94 | — | — | 3.80 | — | | | $I_{OH}$ = –24 mA |
| | | 5.5 | 4.94 | — | — | 4.80 | — | | | $I_{OH}$ = –24 mA |
| | $V_{OL}$ | 3.0 | — | 0.002 | 0.1 | — | 0.1 | | $V_{IN}$ = $V_{IL}$ or $V_{IH}$<br>$I_{OUT}$ = 50 µA | |
| | | 4.5 | — | 0.001 | 0.1 | — | 0.1 | | | |
| | | 5.5 | — | 0.001 | 0.1 | — | 0.1 | | | |
| | | 3.0 | — | — | 0.32 | — | 0.37 | | $V_{IN}$ = $V_{IL}$ or $V_{IH}$ | $I_{OL}$ = 12 mA |
| | | 4.5 | — | — | 0.32 | — | 0.37 | | | $I_{OL}$ = 24 mA |
| | | 5.5 | — | — | 0.32 | — | 0.37 | | | $I_{OL}$ = 24 mA |
| Input leakage current | $I_{IN}$ | 5.5 | — | — | ±0.1 | — | ±1.0 | µA | $V_{IN}$ = $V_{CC}$ or GND | |
| 3 State current | $I_{OZ}$ | 5.5 | — | — | ±0.5 | — | ±5.0 | µA | $V_{IN(OE)}$ = $V_{IL}$, $V_{IH}$<br>$V_{IN}$ = $V_{CC}$ or GND<br>$V_{OUT}$ = $V_{CC}$ or GND | |
| Dynamic output current* | $I_{OLD}$ | 5.5 | — | — | — | 86 | — | mA | $V_{OLD}$ = 1.1 V | |
| | $I_{OHD}$ | 5.5 | — | — | — | –75 | — | mA | $V_{OHD}$ = 3.85 V | |
| Quiescent supply current | $I_{CC}$ | 5.5 | — | — | 8.0 | — | 80 | µA | $V_{IN}$ = $V_{CC}$ or ground | |

*Maximum test duration 2.0 ms, one output loaded at a time.

## AC Characteristics

| Item | Symbol | $V_{CC}$ (V)*[1] | Ta = +25°C $C_L$ = 50 pF | | | Ta = –40°C to +85°C $C_L$ = 50 pF | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Max | |
| Propagation delay | $t_{PLH}$ | 3.3 | 1.0 | 7.0 | 9.0 | 1.0 | 10.0 | ns |
| | | 5.0 | 1.0 | 5.0 | 7.0 | 1.0 | 7.5 | |
| Propagation delay | $t_{PHL}$ | 3.3 | 1.0 | 7.0 | 9.0 | 1.0 | 10.0 | ns |
| | | 5.0 | 1.0 | 4.5 | 7.0 | 1.0 | 7.5 | |
| Enable time | $t_{ZH}$ | 3.3 | 1.0 | 9.0 | 13.0 | 1.0 | 13.5 | ns |
| | | 5.0 | 1.0 | 7.0 | 9.5 | 1.0 | 10.0 | |
| Enable time | $t_{ZL}$ | 3.3 | 1.0 | 10.0 | 12.5 | 1.0 | 13.5 | ns |
| | | 5.0 | 1.0 | 7.5 | 10.0 | 1.0 | 10.5 | |
| Disable time | $t_{HZ}$ | 3.3 | 1.0 | 9.5 | 12.0 | 1.0 | 12.5 | ns |
| | | 5.0 | 1.0 | 7.5 | 10.0 | 1.0 | 10.5 | |
| Disable time | $t_{LZ}$ | 3.3 | 1.0 | 9.0 | 12.5 | 1.0 | 13.5 | ns |
| | | 5.0 | 1.0 | 7.0 | 10.0 | 1.0 | 10.5 | |

Note: 1. Voltage Range 3.3 is 3.3 V ± 0.3 V
Voltage Range 5.0 is 5.0 V ± 0.5 V

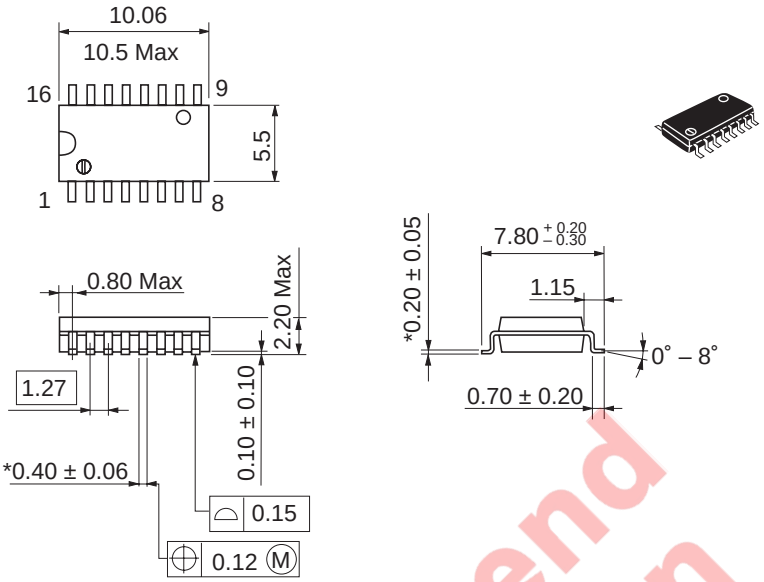
## Capacitance

| Item | Symbol | Typ | Unit | Condition |
|---|---|---|---|---|
| Input capacitance | $C_{IN}$ | 4.5 | pF | $V_{CC}$ = 5.5 V |
| Power dissipation capacitance | $C_{PD}$ | 40.0 | pF | $V_{CC}$ = 5.0 V |

## Package Dimensions

As of January, 2003

Unit: mm

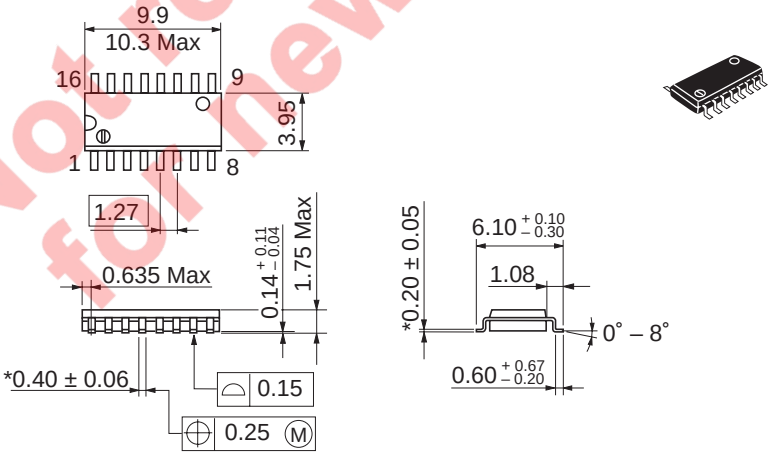



| | |
|---|---|
| Package Code | FP-16DAV |
| JEDEC | — |
| JEITA | Conforms |
| Mass (reference value) | 0.24 g |

*Ni/Pd/Au plating

As of January, 2003

Unit: mm




| | |
|---|---|
| Package Code | FP-16DNV |
| JEDEC | Conforms |
| JEITA | Conforms |
| Mass (reference value) | 0.15 g |

*Ni/Pd/Au plating

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