

To all our customers

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Renesas Technology Corp.  
Customer Support Dept.  
April 1, 2003

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# HD74HC02

Quad. 2-input NOR Gates

**RENESAS**

ADE-205-405 (Z)

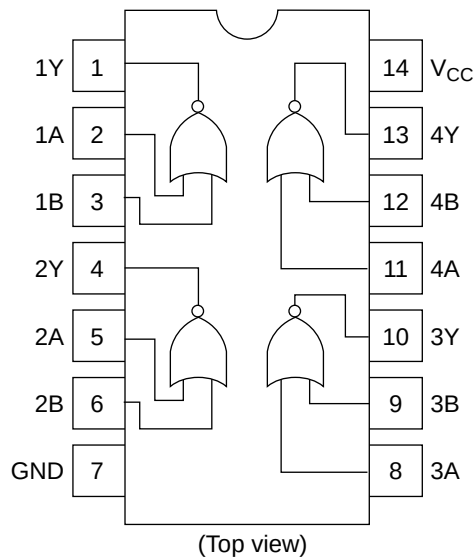
1st. Edition

Sep. 2000

## Features

- High Speed Operation:  $t_{pd} = 6.5 \text{ ns typ}$  ( $C_L = 50 \text{ pF}$ )
- High Output Current: Fanout of 10 LSTTL Loads
- Wide Operating Voltage:  $V_{CC} = 2 \text{ to } 6 \text{ V}$
- Low Input Current:  $1 \mu\text{A max}$
- Low Quiescent Supply Current:  $I_{CC}(\text{static}) = 1 \mu\text{A max}$  ( $T_a = 25^\circ\text{C}$ )

## Pin Arrangement



DC Characteristics

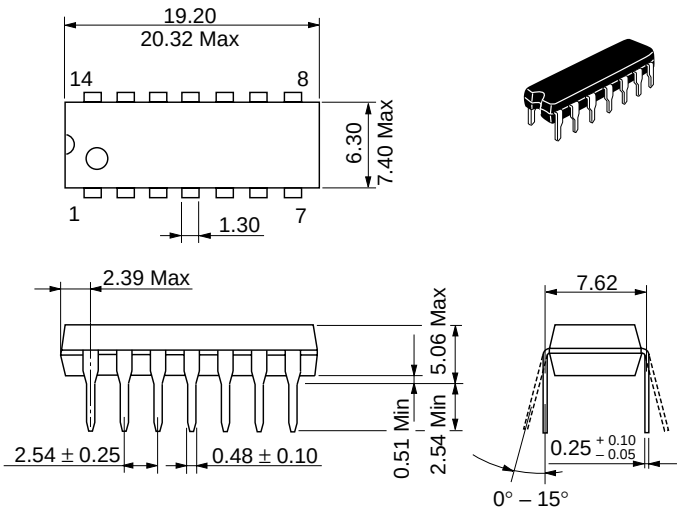
| Item                     | Symbol          | V <sub>CC</sub> (V) | Ta = 25°C |     |      | Ta = -40 to +85°C |      | Unit | Test Conditions                                                   |                           |
|--------------------------|-----------------|---------------------|-----------|-----|------|-------------------|------|------|-------------------------------------------------------------------|---------------------------|
|                          |                 |                     | Min       | Typ | Max  | Min               | Max  |      |                                                                   |                           |
| Input voltage            | V <sub>IH</sub> | 2.0                 | 1.5       | —   | —    | 1.5               | —    | V    |                                                                   |                           |
|                          |                 | 4.5                 | 3.15      | —   | —    | 3.15              | —    |      |                                                                   |                           |
|                          |                 | 6.0                 | 4.2       | —   | —    | 4.2               | —    |      |                                                                   |                           |
|                          | V <sub>IL</sub> | 2.0                 | —         | —   | 0.5  | —                 | 0.5  | V    |                                                                   |                           |
|                          |                 | 4.5                 | —         | —   | 1.35 | —                 | 1.35 |      |                                                                   |                           |
|                          |                 | 6.0                 | —         | —   | 1.8  | —                 | 1.8  |      |                                                                   |                           |
| Output voltage           | V <sub>OH</sub> | 2.0                 | 1.9       | 2.0 | —    | 1.9               | —    | V    | Vin = V <sub>IH</sub> or V <sub>IL</sub> I <sub>OH</sub> = -20 μA |                           |
|                          |                 | 4.5                 | 4.4       | 4.5 | —    | 4.4               | —    |      |                                                                   |                           |
|                          |                 | 6.0                 | 5.9       | 6.0 | —    | 5.9               | —    |      |                                                                   |                           |
|                          |                 | 4.5                 | 4.18      | —   | —    | 4.13              | —    |      |                                                                   | I <sub>OH</sub> = -4 mA   |
|                          |                 | 6.0                 | 5.68      | —   | —    | 5.63              | —    |      |                                                                   | I <sub>OH</sub> = -5.2 mA |
|                          | V <sub>OL</sub> | 2.0                 | —         | 0.0 | 0.1  | —                 | 0.1  | V    | Vin = V <sub>IH</sub> or V <sub>IL</sub> I <sub>OL</sub> = 20 μA  |                           |
|                          |                 | 4.5                 | —         | 0.0 | 0.1  | —                 | 0.1  |      |                                                                   |                           |
|                          |                 | 6.0                 | —         | 0.0 | 0.1  | —                 | 0.1  |      |                                                                   |                           |
|                          |                 | 4.5                 | —         | —   | 0.26 | —                 | 0.33 |      |                                                                   | I <sub>OL</sub> = 4 mA    |
|                          |                 | 6.0                 | —         | —   | 0.26 | —                 | 0.33 |      |                                                                   | I <sub>OL</sub> = 5.2 mA  |
| Input current            | I <sub>in</sub> | 6.0                 | —         | —   | ±0.1 | —                 | ±1.0 | μA   | Vin = V <sub>CC</sub> or GND                                      |                           |
| Quiescent supply current | I <sub>CC</sub> | 6.0                 | —         | —   | 1.0  | —                 | 10   | μA   | Vin = V <sub>CC</sub> or GND, I <sub>out</sub> = 0 μA             |                           |

AC Characteristics ( $C_L = 50 \text{ pF}$ , Input  $t_r = t_f = 6 \text{ ns}$ )

| Item                   | Symbol           | V <sub>CC</sub> (V) | Ta = 25°C |     |     | Ta = −40 to +85°C |     | Unit | Test Conditions |
|------------------------|------------------|---------------------|-----------|-----|-----|-------------------|-----|------|-----------------|
|                        |                  |                     | Min       | Typ | Max | Min               | Max |      |                 |
| Propagation delay time | t <sub>PLH</sub> | 2.0                 | —         | —   | 90  | —                 | 115 | ns   |                 |
|                        |                  | 4.5                 | —         | 7   | 18  | —                 | 23  |      |                 |
|                        |                  | 6.0                 | —         | —   | 15  | —                 | 20  |      |                 |
|                        | t <sub>PHL</sub> | 2.0                 | —         | —   | 90  | —                 | 115 | ns   |                 |
|                        |                  | 4.5                 | —         | 6   | 18  | —                 | 23  |      |                 |
|                        |                  | 6.0                 | —         | —   | 15  | —                 | 20  |      |                 |
| Output rise time       | t <sub>TLH</sub> | 2.0                 | —         | —   | 75  | —                 | 95  | ns   |                 |
|                        |                  | 4.5                 | —         | 5   | 15  | —                 | 19  |      |                 |
|                        |                  | 6.0                 | —         | —   | 13  | —                 | 16  |      |                 |
| Output fall time       | t <sub>THL</sub> | 2.0                 | —         | —   | 75  | —                 | 95  | ns   |                 |
|                        |                  | 4.5                 | —         | 5   | 15  | —                 | 19  |      |                 |
|                        |                  | 6.0                 | —         | —   | 13  | —                 | 16  |      |                 |
| Input capacitance      | C <sub>in</sub>  | —                   | —         | 5   | 10  | —                 | 10  | pF   |                 |

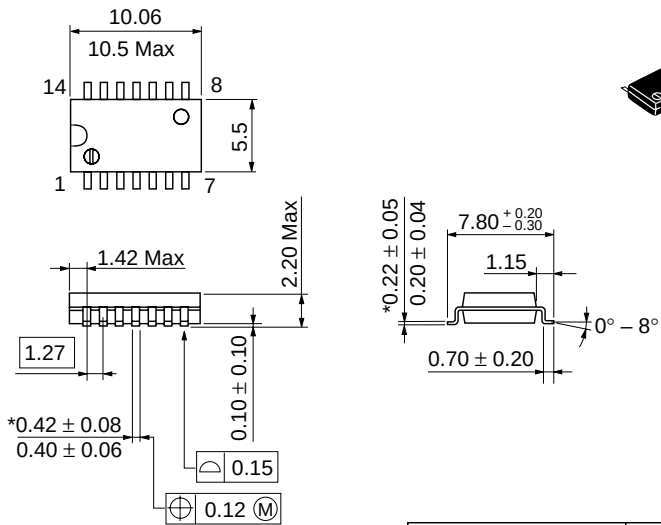
Package Dimensions

Unit: mm



|                        |          |
|------------------------|----------|
| Hitachi Code           | DP-14    |
| JEDEC                  | Conforms |
| EIAJ                   | Conforms |
| Mass (reference value) | 0.97 g   |

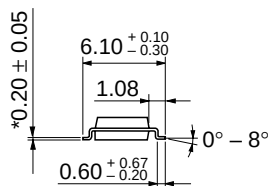
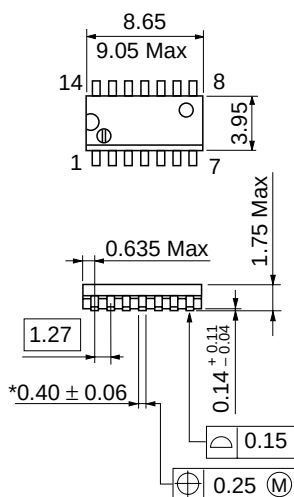
Unit: mm



\*Dimension including the plating thickness  
Base material dimension

|                        |          |
|------------------------|----------|
| Hitachi Code           | FP-14DA  |
| JEDEC                  | —        |
| EIAJ                   | Conforms |
| Mass (reference value) | 0.23 g   |

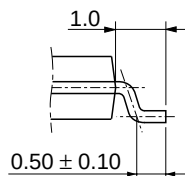
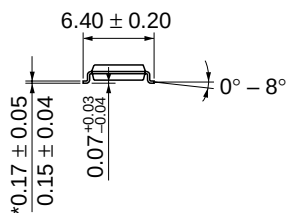
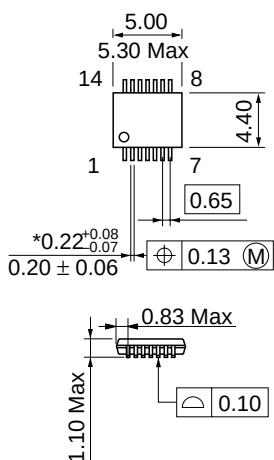
Unit: mm



\*Pd plating

|                        |          |
|------------------------|----------|
| Hitachi Code           | FP-14DN  |
| JEDEC                  | Conforms |
| EIAJ                   | Conforms |
| Mass (reference value) | 0.13 g   |

Unit: mm



\*Dimension including the plating thickness  
Base material dimension

|                        |         |
|------------------------|---------|
| Hitachi Code           | TTP-14D |
| JEDEC                  | —       |
| EIAJ                   | —       |
| Mass (reference value) | 0.05 g  |

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