

# HD74HC04

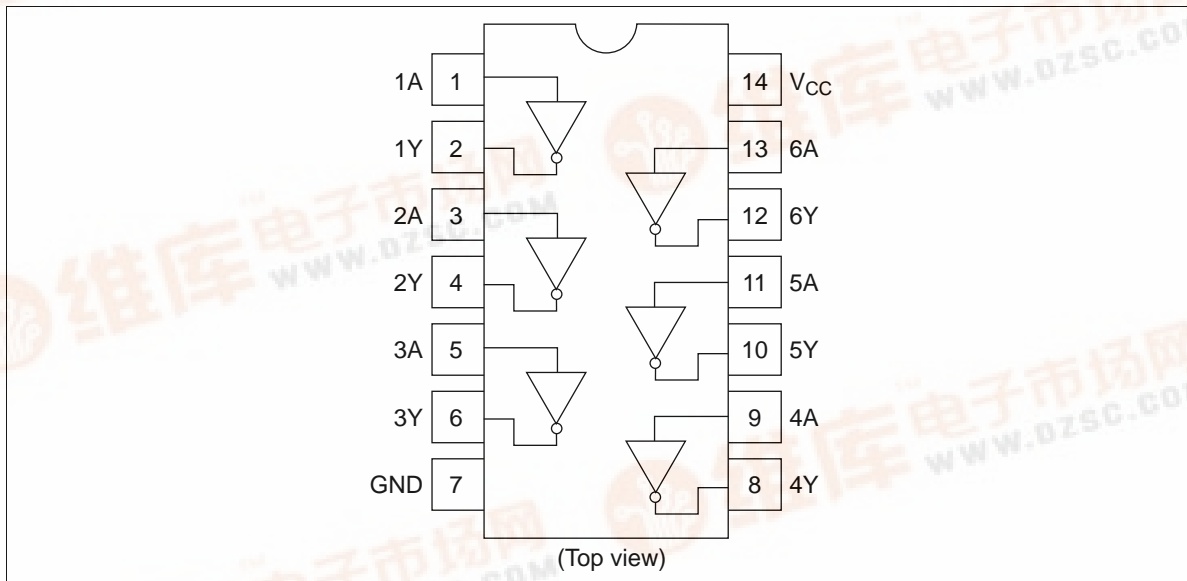
Hex Inverters

# HITACHI

## Features

- High Speed Operation:  $t_{pd} = 7.5 \text{ ns typ}$  ( $C_L = 50 \text{ pF}$ )
- 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



## HD74HC04

### DC Characteristics

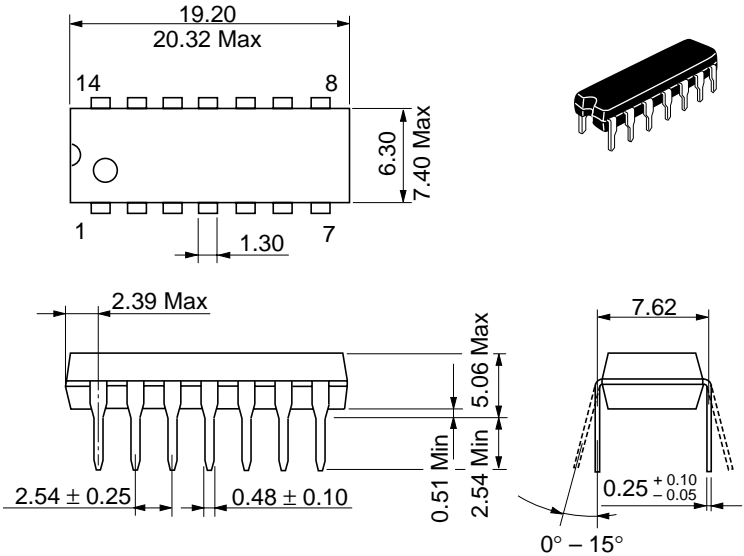
| Item                     | Symbol          | V <sub>CC</sub> (V) | Ta = 25°C |     |      | Ta = -40 to +85°C |      | Unit | Test Conditions   |  |                          |
|--------------------------|-----------------|---------------------|-----------|-----|------|-------------------|------|------|---|--|--------------------------|
|                          |                 |                     | 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** ( $C_L = 50$  pF, Input  $t_r = t_f = 6$  ns)

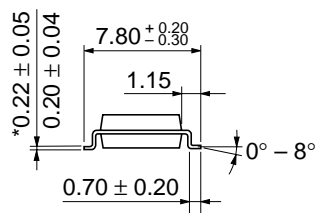
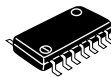
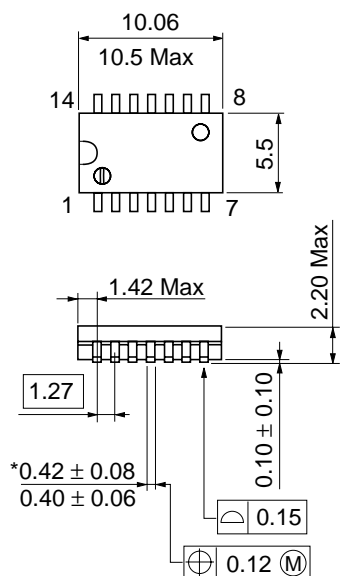
| Item                      | Symbol    | $V_{CC}$ (V) | $T_a = 25^\circ\text{C}$ |     |     | $T_a = -40$ to $+85^\circ\text{C}$ |     | Unit | Test Conditions |
|---------------------------|-----------|--------------|--------------------------|-----|-----|------------------------------------|-----|------|-----------------|
|                           |           |              | Min                      | Typ | Max | Min                                | Max |      |                 |
| Propagation delay<br>time | $t_{PLH}$ | 2.0          | —                        | —   | 90  | —                                  | 115 | ns   |                 |
|                           |           | 4.5          | —                        | 7   | 18  | —                                  | 23  |      |                 |
|                           |           | 6.0          | —                        | —   | 15  | —                                  | 20  |      |                 |
|                           | $t_{PHL}$ | 2.0          | —                        | —   | 90  | —                                  | 115 |      |                 |
|                           |           | 4.5          | —                        | 8   | 18  | —                                  | 23  |      |                 |
|                           |           | 6.0          | —                        | —   | 15  | —                                  | 20  |      |                 |
| Output rise time          | $t_{TLH}$ | 2.0          | —                        | —   | 75  | —                                  | 95  | ns   |                 |
|                           |           | 4.5          | —                        | 5   | 15  | —                                  | 19  |      |                 |
|                           |           | 6.0          | —                        | —   | 13  | —                                  | 16  |      |                 |
| Output fall time          | $t_{THL}$ | 2.0          | —                        | —   | 75  | —                                  | 95  | ns   |                 |
|                           |           | 4.5          | —                        | 5   | 15  | —                                  | 19  |      |                 |
|                           |           | 6.0          | —                        | —   | 13  | —                                  | 16  |      |                 |
| Input capacitance         | $C_{in}$  | —            | —                        | 5   | 10  | —                                  | 10  | pF   |                 |

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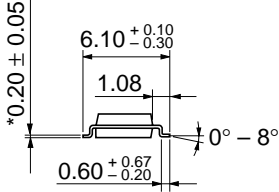
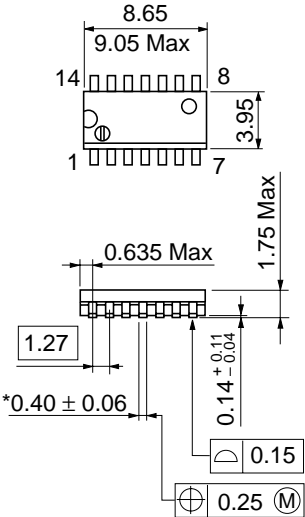
Unit: mm



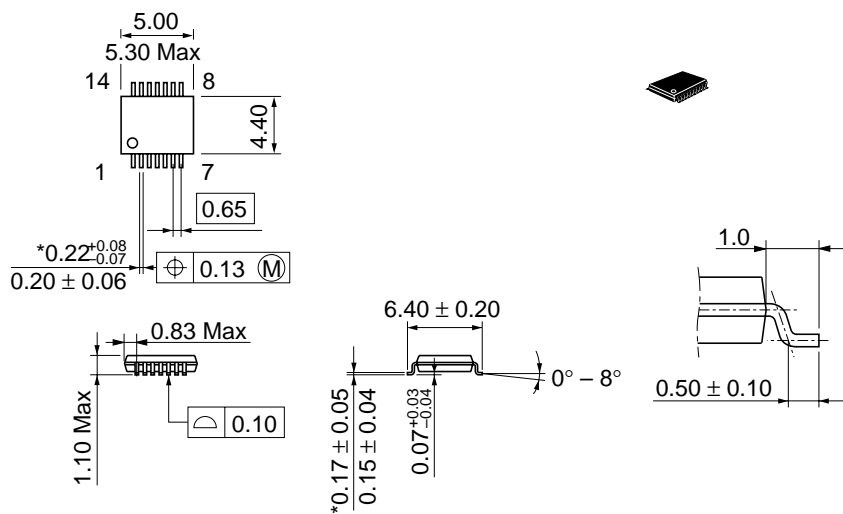
Unit: mm



Unit: mm



Unit: mm



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