HD74LS04/HD74LS05: Hex Inverters
Hex Inverters (with Open Collector Outputs)

CIRCUIT SCHEMATIC

HD74LS04

HD74LS05

PIN ARRANGEMENT

HD74LS05 RECOMMENDED OPERATING CONDITIONS

<table>
<thead>
<tr>
<th>Item</th>
<th>Symbol</th>
<th>min</th>
<th>typ</th>
<th>max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>High level output voltage</td>
<td>$V_{OH}$</td>
<td>5.5</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Low level output current</td>
<td>$I_{OL}$</td>
<td>8</td>
<td></td>
<td></td>
<td>mA</td>
</tr>
</tbody>
</table>

ELECTRICAL CHARACTERISTICS ($T_a = -20 \sim 75^\circ C$)

<table>
<thead>
<tr>
<th>Item</th>
<th>Symbol</th>
<th>Test Conditions</th>
<th>HD74LS04</th>
<th>HD74LS05</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input voltage</td>
<td>$V_{IH}$</td>
<td>$V_{CC}=4.75V, V_{IL}=0.8V, I_{IN}=-400\mu A$</td>
<td>2.0</td>
<td>2.0</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>$V_{IL}$</td>
<td></td>
<td>-</td>
<td>0.8</td>
<td>V</td>
</tr>
<tr>
<td>Output voltage</td>
<td>$V_{OH}$</td>
<td>$V_{CC}=4.75V, V_{IN}=2V$</td>
<td>2.7</td>
<td>0.8</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>$V_{OL}$</td>
<td>$I_{OL}=8mA$</td>
<td>-</td>
<td>0.5</td>
<td>V</td>
</tr>
<tr>
<td>Output current</td>
<td>$I_{OH}$</td>
<td>$V_{CC}=4.75V, V_{IL}=0.8V, V_{OH}=5.5V$</td>
<td>-</td>
<td>0.4</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>$I_{IH}$</td>
<td>$V_{CC}=5.25V, V_{IL}=2.7V$</td>
<td>-</td>
<td>-0.4</td>
<td>100 $\mu A$</td>
</tr>
<tr>
<td></td>
<td>$I_{IL}$</td>
<td>$V_{CC}=5.25V, V_{IL}=0.4V$</td>
<td>-</td>
<td>-0.4</td>
<td>-0.4 $mA$</td>
</tr>
<tr>
<td></td>
<td>$I_{I}$</td>
<td>$V_{CC}=5.25V, V_{IL}=7V$</td>
<td>-</td>
<td>-0.1</td>
<td>-0.1 $mA$</td>
</tr>
<tr>
<td>Short-circuit output current</td>
<td>$I_{OS}$</td>
<td>$V_{CC}=5.25V$</td>
<td>-20</td>
<td>-100</td>
<td>- $mA$</td>
</tr>
<tr>
<td>Supply current</td>
<td>$I_{CCM}$</td>
<td>$V_{CC}=5.25V$</td>
<td>-1.2</td>
<td>2.4</td>
<td>1.2 $mA$</td>
</tr>
<tr>
<td></td>
<td>$I_{CCL}$</td>
<td></td>
<td>-3.6</td>
<td>6.6</td>
<td>3.6 $mA$</td>
</tr>
<tr>
<td>Input clamp voltage</td>
<td>$V_{IE}$</td>
<td>$V_{CC}=4.75V, I_{IN}=-18mA$</td>
<td>-</td>
<td>-1.5</td>
<td>- $V$</td>
</tr>
</tbody>
</table>

* $V_{CC}=5V, T_a=25^\circ C$

SWITCHING CHARACTERISTICS ($V_{CC}=5V, T_a=25^\circ C$)

<table>
<thead>
<tr>
<th>Item</th>
<th>Symbol</th>
<th>Test Conditions</th>
<th>HD74LS04</th>
<th>HD74LS05</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propagation delay time</td>
<td>$t_{PLH}$</td>
<td>$C_L=15pF, R_L=2k\Omega$</td>
<td>-</td>
<td>9</td>
<td>15 ns</td>
</tr>
<tr>
<td></td>
<td>$t_{PHL}$</td>
<td></td>
<td>-</td>
<td>10</td>
<td>15 ns</td>
</tr>
</tbody>
</table>

Note: Refer to Test Circuit and Waveform of the Common Item
**Hitachi Code**: DP-14

**JEDEC**: Conforms

**EIAJ**: Conforms

**Weight (reference value)**: 0.97 g

Unit: mm

- 19.20 ± 0.25
- 20.32 Max
- 7.62
- 0.25
- 0° – 15°
- 19.20
- 20.32 Max
- 7.62
- 0.25
- 0° – 15°

### Dimensions

- **Height**:
  - 6.30 ± 0.10
  - 7.40 Max
  - 5.06 Min
- **Width**:
  - 19.20 ± 0.25
  - 20.32 Max
  - 7.62
- **Footprint**:
  - 2.54 ± 0.25
  - 0.48 ± 0.10

### Notes

- **Weight (reference value)**: 0.97 g
Hitachi Code: FP-14DN
JEDEC: Conforms
EIAJ: Conforms
Weight (reference value): 0.13 g

*Pd plating
Cautions

1. Hitachi neither warrants nor grants licenses of any rights of Hitachi’s or any third party’s patent, copyright, trademark, or other intellectual property rights for information contained in this document. Hitachi bears no responsibility for problems that may arise with third party’s rights, including intellectual property rights, in connection with use of the information contained in this document.

2. Products and product specifications may be subject to change without notice. Confirm that you have received the latest product standards or specifications before final design, purchase or use.

3. Hitachi makes every attempt to ensure that its products are of high quality and reliability. However, contact Hitachi’s sales office before using the product in an application that demands especially high quality and reliability or where its failure or malfunction may directly threaten human life or cause risk of bodily injury, such as aerospace, aeronautics, nuclear power, combustion control, transportation, traffic, safety equipment or medical equipment for life support.

4. Design your application so that the product is used within the ranges guaranteed by Hitachi particularly for maximum rating, operating supply voltage range, heat radiation characteristics, installation conditions and other characteristics. Hitachi bears no responsibility for failure or damage when used beyond the guaranteed ranges. Even within the guaranteed ranges, consider normally foreseeable failure rates or failure modes in semiconductor devices and employ systemic measures such as fail-safes, so that the equipment incorporating Hitachi product does not cause bodily injury, fire or other consequential damage due to operation of the Hitachi product.

5. This product is not designed to be radiation resistant.

6. No one is permitted to reproduce or duplicate, in any form, the whole or part of this document without written approval from Hitachi.

7. Contact Hitachi’s sales office for any questions regarding this document or Hitachi semiconductor products.