

DATA SHEET

For a complete data sheet, please also download:

- The IC04 LOCMOS HE4000B Logic Family Specifications HEF, HEC
- The IC04 LOCMOS HE4000B Logic Package Outlines/Information HEF, HEC

HEF4050B **buffers** HEX non-inverting buffers

Product specification
File under Integrated Circuits, IC04

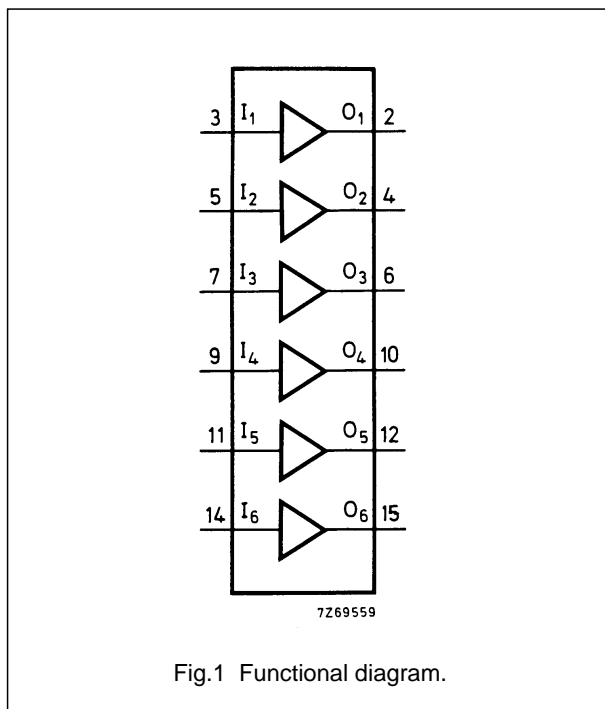
January 1995

HEX non-inverting buffers

HEF4050B buffers

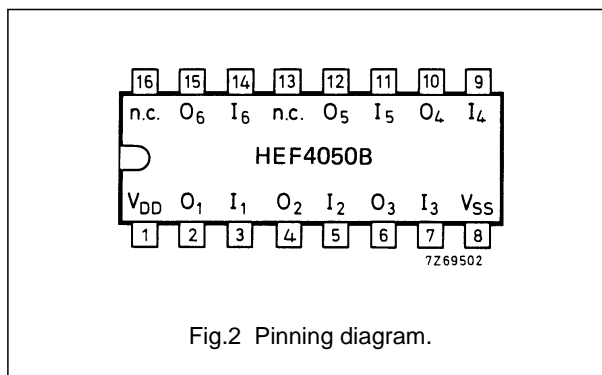
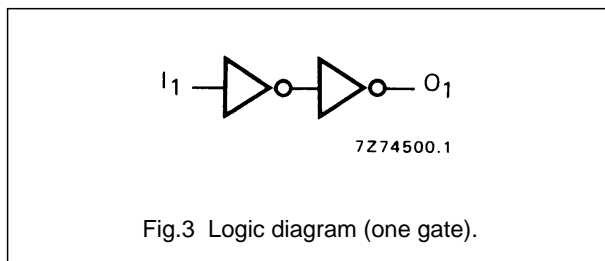
DESCRIPTION

The HEF4050B provides six non-inverting buffers with high current output capability suitable for driving TTL or high capacitive loads. Since input voltages in excess of the buffers' supply voltage are permitted, the buffers may also be used to convert logic levels of up to 15 V to standard TTL levels. Their guaranteed fan-out into common bipolar logic elements is shown in the table below.



Guaranteed fan-out in common logic families

| DRIVEN ELEMENT | GUARANTEED FAN-OUT |
|----------------|--------------------|
| standard TTL | 2 |
| 74 LS | 9 |
| 74 L | 16 |



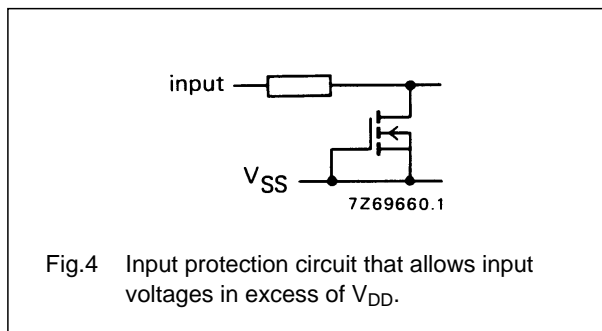
- HEF4050BP(N): 16-lead DIL; plastic (SOT38-1)
- HEF4050BD(F): 16-lead DIL; ceramic (cerdip) (SOT74)
- HEF4050BT(D): 16-lead SO; plastic (SOT109-1)
- (): Package Designator North America

APPLICATION INFORMATION

Some examples of applications for the HEF4050B are:

- LOCMOS to DTL/TTL converter
- HIGH sink current for driving 2 TTL loads
- HIGH-to-LOW level logic conversion

Input protection



FAMILY DATA, I_{DD} LIMITS category BUFFERS

See Family Specifications

HEX non-inverting buffers

HEF4050B
buffers

DC CHARACTERISTICS

 $V_{SS} = 0\text{ V}$; $V_I = V_{SS}$ or V_{DD}

| HEF | V_{DD} V | V_O V | SYMBOL | T_{amb} (°C) | | | | | | |
|---------------------------------|---------------|------------|-----------|----------------|------|------|------|------|------|----|
| | | | | -40 | | +25 | | +85 | | |
| | | | | MIN. | MAX. | MIN. | MAX. | MIN. | MAX. | |
| Output (sink) current LOW | 4,75 | 0,4 | I_{OL} | 3,5 | – | 2,9 | – | 2,3 | – | mA |
| | 10 | 0,5 | | 12,0 | – | 10,0 | – | 8,0 | – | mA |
| | 15 | 1,5 | | 24,0 | – | 20,0 | – | 16,0 | – | mA |
| Output (source) current HIGH | 5 | 4,6 | $-I_{OH}$ | 0,52 | – | 0,44 | – | 0,36 | – | mA |
| | 10 | 9,5 | | 1,3 | – | 1,1 | – | 0,9 | – | mA |
| | 15 | 13,5 | | 3,6 | – | 3,0 | – | 2,4 | – | mA |
| Output (source) current HIGH | 5 | 2,5 | $-I_{OH}$ | 1,7 | – | 1,4 | – | 1,1 | – | mA |

| HEC | V_{DD} V | V_O V | SYMBOL | T_{amb} (°C) | | | | | | |
|---------------------------------|---------------|------------|-----------|----------------|------|------|------|------|------|----|
| | | | | -55 | | +25 | | +125 | | |
| | | | | MIN. | MAX. | MIN. | MAX. | MIN. | MAX. | |
| Output (sink) current LOW | 4,75 | 0,4 | I_{OL} | 3,6 | – | 2,9 | – | 1,9 | – | mA |
| | 10 | 0,5 | | 12,5 | – | 10,0 | – | 6,7 | – | mA |
| | 15 | 1,5 | | 25,0 | – | 20,0 | – | 13,0 | – | mA |
| Output (source) current HIGH | 5 | 4,6 | $-I_{OH}$ | 0,52 | – | 0,44 | – | 0,36 | – | mA |
| | 10 | 9,5 | | 1,3 | – | 1,1 | – | 0,9 | – | mA |
| | 15 | 13,5 | | 3,6 | – | 3,0 | – | 2,4 | – | mA |

HEX non-inverting buffers

HEF4050B
buffers**AC CHARACTERISTICS**

$V_{SS} = 0$ V; $T_{amb} = 25$ °C; $C_L = 50$ pF; input transition times ≤ 20 ns

| | V_{DD} V | SYMBOL | TYP. | MAX. | | TYPICAL EXTRAPOLATION FORMULA |
|---|---------------|-----------|------|------|----|----------------------------------|
| Propagation delays I_n O_n HIGH to LOW LOW to HIGH | 5 | t_{PHL} | 35 | 70 | ns | 26 ns + (0,18 ns/pF) C_L |
| | 10 | | 20 | 35 | ns | 16 ns + (0,08 ns/pF) C_L |
| | 15 | | 15 | 30 | ns | 12 ns + (0,05 ns/pF) C_L |
| | 5 | t_{PLH} | 55 | 110 | ns | 28 ns + (0,55 ns/pF) C_L |
| | 10 | | 25 | 55 | ns | 14 ns + (0,23 ns/pF) C_L |
| | 15 | | 20 | 40 | ns | 12 ns + (0,16 ns/pF) C_L |
| Output transition times HIGH to LOW LOW to HIGH | 5 | t_{THL} | 25 | 50 | ns | 7 ns + (0,35 ns/pF) C_L |
| | 10 | | 10 | 20 | ns | 3 ns + (0,14 ns/pF) C_L |
| | 15 | | 7 | 14 | ns | 2 ns + (0,09 ns/pF) C_L |
| | 5 | t_{TLH} | 60 | 120 | ns | 10 ns + (1,0 ns/pF) C_L |
| | 10 | | 30 | 60 | ns | 9 ns + (0,42 ns/pF) C_L |
| | 15 | | 20 | 40 | ns | 6 ns + (0,28 ns/pF) C_L |

| | V_{DD} V | TYPICAL FORMULA FOR P (μ W) | |
|---|---------------|--|---|
| Dynamic power dissipation per package (P) | 5 | $3\ 800 f_i + \sum (f_o C_L) \times V_{DD}^2$ | where f_i = input freq. (MHz) f_o = output freq. (MHz) C_L = load capacitance (pF) $\sum (f_o C_L)$ = sum of outputs V_{DD} = supply voltage (V) |
| | 10 | $11\ 600 f_i + \sum (f_o C_L) \times V_{DD}^2$ | |
| | 15 | $65\ 900 f_i + \sum (f_o C_L) \times V_{DD}^2$ | |