

# 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

## **HEF4049B** **buffers** **HEX inverting buffers**

Product specification  
File under Integrated Circuits, IC04

January 1995

# HEX inverting buffers

# HEF4049B buffers

**DESCRIPTION**

The HEF4049B provides six 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.

HEF4049BP(N): 16-lead DIL; plastic (SOT38-1)  
 HEF4049BD(F): 16-lead DIL; ceramic (cerdip) (SOT74)  
 HEF4049BT(D): 16-lead SO; plastic (SOT109-1)  
 ( ) : Package Designator North America

**Guaranteed fan-out in common logic families**

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

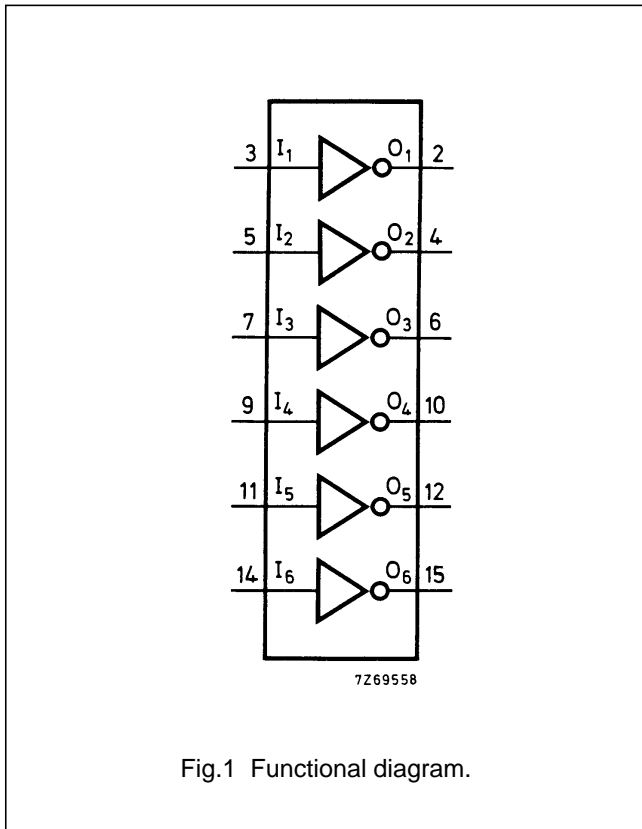


Fig.1 Functional diagram.

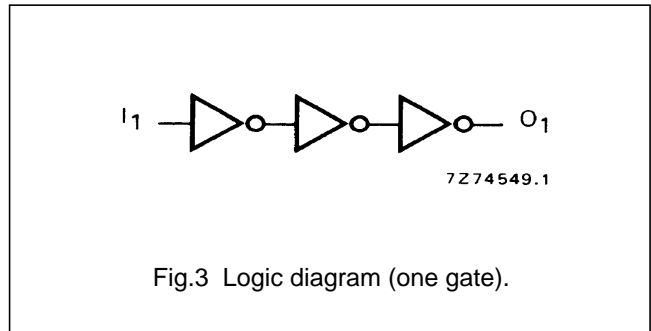


Fig.3 Logic diagram (one gate).

**APPLICATION INFORMATION**

Some examples of applications for the HEF4049B are:

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

**Input protection**

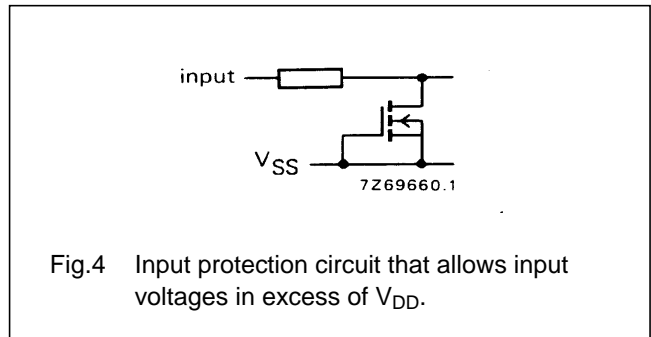


Fig.4 Input protection circuit that allows input voltages in excess of V<sub>DD</sub>.

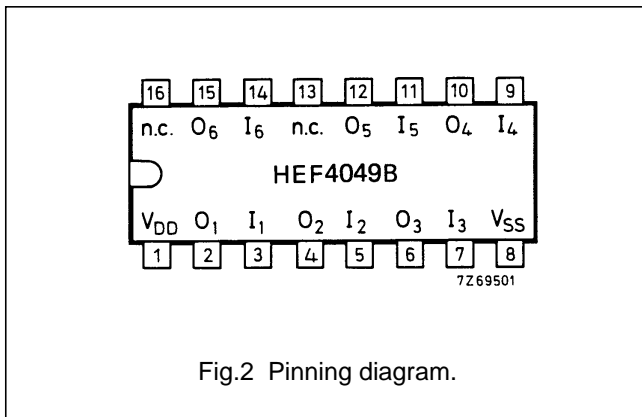


Fig.2 Pinning diagram.

**FAMILY DATA, I<sub>DD</sub> LIMITS category BUFFERS**

See Family Specifications

## HEX inverting buffers

HEF4049B  
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

	$V_{DD}$ V	SYMBOL	TYP.	MAX.		TYPICAL EXTRAPOLATION	
						FORMULA	
Propagation delays $I_n \rightarrow O_n$ HIGH to LOW	5	$t_{PHL}$	35	70	ns	26 ns + (0,18 ns/pF) $C_L$	
	10		15	30	ns	11 ns + (0,08 ns/pF) $C_L$	
	15		12	25	ns	9 ns + (0,05 ns/pF) $C_L$	
	LOW to HIGH	5	$t_{PLH}$	50	100	ns	23 ns + (0,55 ns/pF) $C_L$
		10		25	50	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	5	$t_{THL}$	20	40	ns	3 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) $C_L$	
	LOW to HIGH	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) $C_L$

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HEF4049B  
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	$V_{DD}$ V	TYPICAL FORMULA FOR P ( $\mu$ W)	
Dynamic power dissipation per package (P)	5 10 15	$2\,500 f_i + \sum (f_o C_L) \times V_{DD}^2$ $11\,000 f_i + \sum (f_o C_L) \times V_{DD}^2$ $35\,000 f_i + \sum (f_o C_L) \times V_{DD}^2$	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)