

# 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

## **HEF40098B** **buffers** 3-state hex inverting buffer

Product specification  
File under Integrated Circuits, IC04

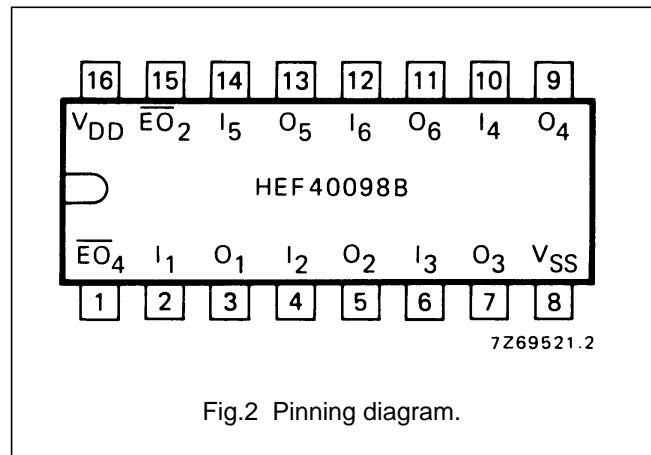
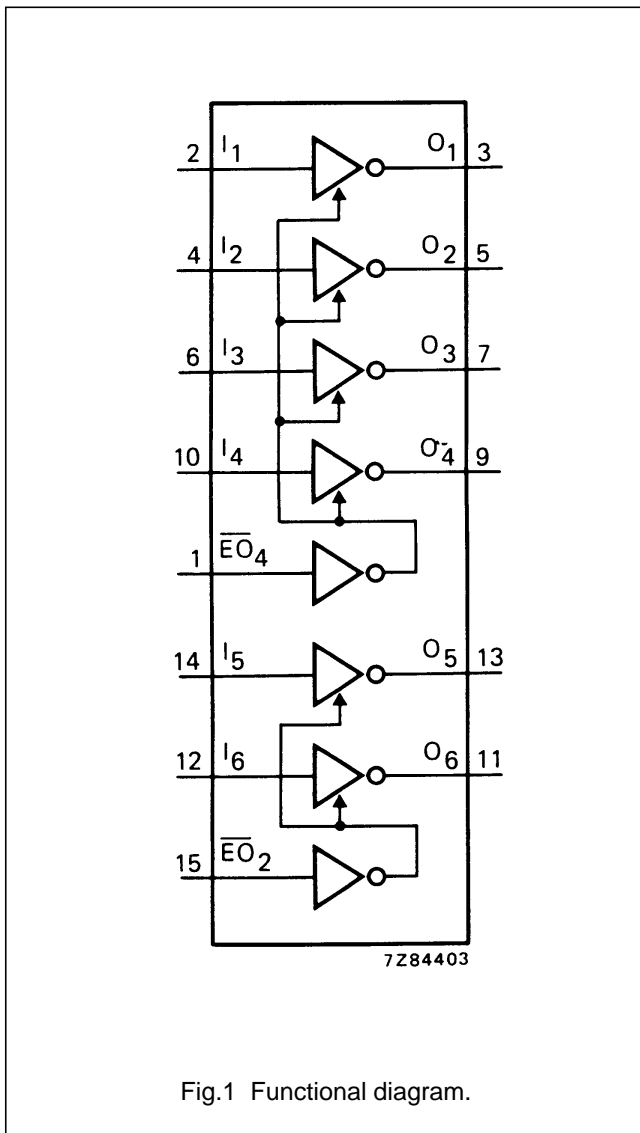
January 1995

### 3-state hex inverting buffer

## HEF40098B buffers

**DESCRIPTION**

The HEF40098B is a hex inverting buffer with 3-state outputs. The 3-state outputs are controlled by two enable inputs ( $\overline{EO}_4$  and  $\overline{EO}_2$ ). A HIGH on  $\overline{EO}_4$  causes four of the six buffer elements to assume a high impedance or OFF-state regardless of the other input conditions and a HIGH on  $\overline{EO}_2$  causes the outputs of the remaining two buffer elements to assume a high impedance or OFF-state regardless of the other input conditions.



- HEF40098BP(N): 16-lead DIL; plastic (SOT38-1)
- HEF40098BD(F): 16-lead DIL; ceramic (cerdip) (SOT74)
- HEF40098BT(D): 16-lead SO; plastic (SOT109-1)
- ( ): Package Designator North America

**PINNING**

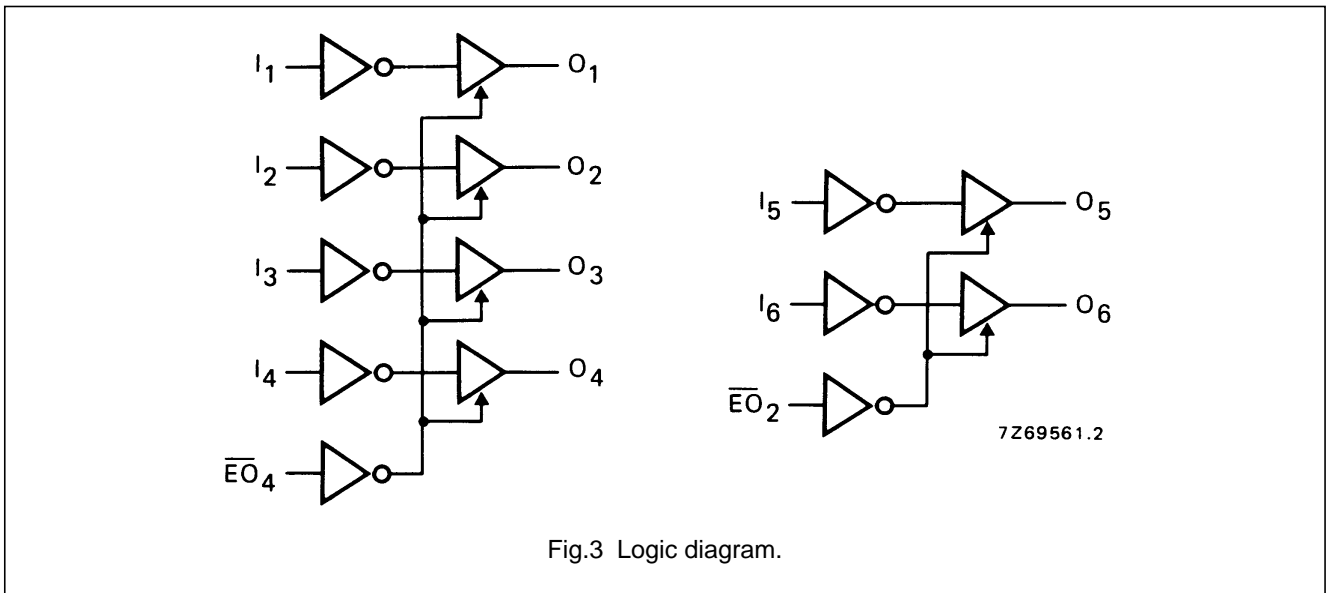
- $I_1$  to  $I_6$  buffer inputs
- $\overline{EO}_4, \overline{EO}_2$  enable inputs (active LOW)
- $O_1$  to  $O_6$  buffer outputs (active LOW)

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

See Family Specifications

3-state hex inverting buffer

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DC CHARACTERISTICS

V<sub>SS</sub> = 0 V

HEF	V <sub>DD</sub> V	V <sub>OH</sub> V	V <sub>OL</sub> V	SYMBOL	T <sub>amb</sub> (°C)						
					-40		+25		+85		
					MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	
Output current HIGH	5	4,6		-I <sub>OH</sub>	1,2		1,0		0,8		mA
	10	9,5			3,8		3,2		2,5		mA
	15	13,5			12,0		10,0		8,0		mA
HIGH	5	2,5		-I <sub>OH</sub>	3,8		3,2		2,5		mA
Output current LOW	4,75		0,4	I <sub>OL</sub>	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

HEC	V <sub>DD</sub> V	V <sub>OH</sub> V	V <sub>OL</sub> V	SYMBOL	T <sub>amb</sub> (°C)						
					-55		+25		+125		
					MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	
Output current HIGH	5	4,6		-I <sub>OH</sub>	1,25		1,0		0,6		mA
	10	9,5			4,0		3,2		2,1		mA
	15	12,5			12,5		10,0		6,7		mA
HIGH	5	2,5		-I <sub>OH</sub>	4,0		3,2		2,1		mA
Output current LOW	4,75		0,4	I <sub>OL</sub>	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

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## AC CHARACTERISTICS

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

	$V_{DD}$ V	SYMBOL	TYP.	MAX.		TYPICAL EXTRAPOLATION FORMULA
Propagation delays $I_n \rightarrow O_n$ HIGH to LOW	5	$t_{PHL}$	80	160	ns	$70 \text{ ns} + (0,20 \text{ ns/pF}) C_L$
	10		35	70	ns	$31 \text{ ns} + (0,08 \text{ ns/pF}) C_L$
	15		25	50	ns	$22 \text{ ns} + (0,06 \text{ ns/pF}) C_L$
LOW to HIGH	5	$t_{PLH}$	65	130	ns	$50 \text{ ns} + (0,30 \text{ ns/pF}) C_L$
	10		30	60	ns	$24 \text{ ns} + (0,13 \text{ ns/pF}) C_L$
	15		25	50	ns	$23 \text{ ns} + (0,05 \text{ ns/pF}) C_L$
Output transition times HIGH to LOW	5	$t_{THL}$	30	60	ns	$15 \text{ ns} + (0,30 \text{ ns/pF}) C_L$
	10		15	30	ns	$10 \text{ ns} + (0,11 \text{ ns/pF}) C_L$
	15		10	20	ns	$7 \text{ ns} + (0,07 \text{ ns/pF}) C_L$
LOW to HIGH	5	$t_{TLH}$	35	70	ns	$10 \text{ ns} + (0,50 \text{ ns/pF}) C_L$
	10		20	40	ns	$8 \text{ ns} + (0,24 \text{ ns/pF}) C_L$
	15		15	30	ns	$6 \text{ ns} + (0,18 \text{ ns/pF}) C_L$
3-state propagation delays Output disable times $\overline{EO}_2, \overline{EO}_4 \rightarrow O_n$ HIGH	5	$t_{PHZ}$	45	85	ns	
	10		35	65	ns	
	15		30	60	ns	
LOW	5	$t_{PLZ}$	65	135	ns	
	10		40	80	ns	
	15		35	70	ns	
Output enable times $\overline{EO}_2, \overline{EO}_4 \rightarrow O_n$ HIGH	5	$t_{PZH}$	70	140	ns	
	10		35	75	ns	
	15		30	65	ns	
LOW	5	$t_{PZL}$	90	185	ns	
	10		40	85	ns	
	15		35	70	ns	

	$V_{DD}$ V	TYPICAL FORMULA FOR P ( $\mu$ W)	
Dynamic power dissipation per package (P)	5	$5\,000 f_i + \sum (f_o C_L) \times V_{DD}^2$	where $f_i$ = input freq. (MHz) $f_o$ = output freq. (MHz) $C_L$ = load cap. (pF) $\sum (f_o C_L)$ = sum of outputs $V_{DD}$ = supply voltage (V)
	10	$22\,800 f_i + \sum (f_o C_L) \times V_{DD}^2$	
	15	$81\,000 f_i + \sum (f_o C_L) \times V_{DD}^2$	