

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

HEF40240B **buffers**

Octal inverting buffers with 3-state outputs

Product specification
File under Integrated Circuits, IC04

January 1995

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HEF40240B buffers

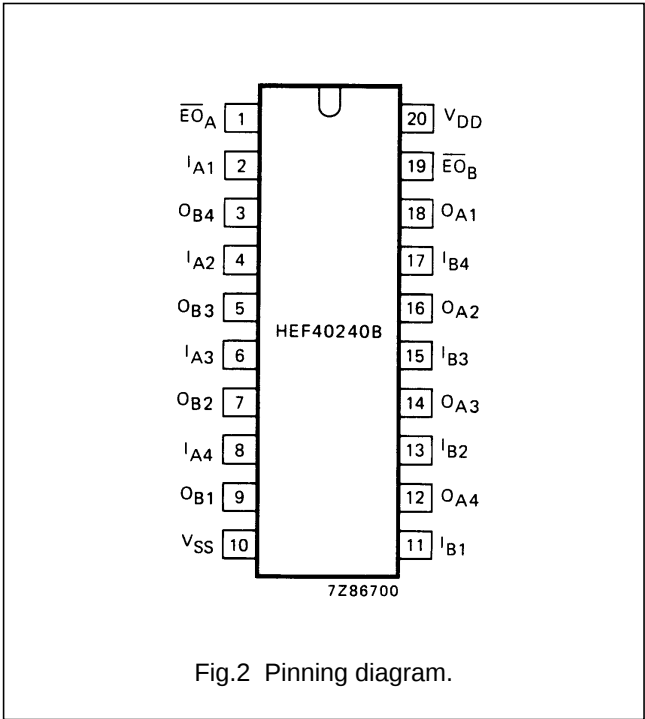
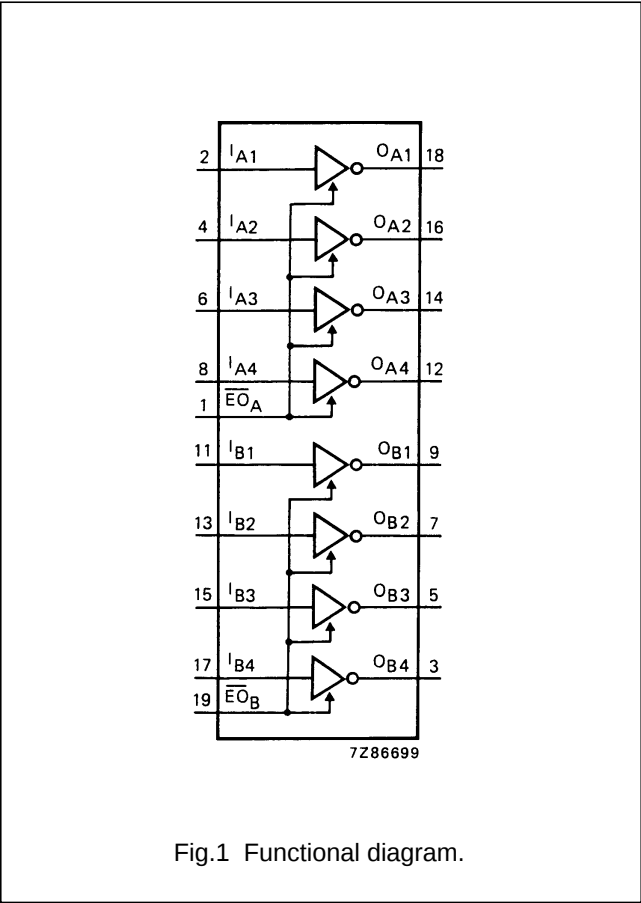
DESCRIPTION

The HEF40240B is an octal inverting buffer with 3-state outputs. It features output stages with high current output capability suitable for driving highly capacitive loads.

The 3-state outputs are controlled by the output enable inputs $\overline{EO}_A$ and $\overline{EO}_B$. A HIGH on $\overline{EO}$ causes the outputs to assume a high impedance OFF-state. The device also features hysteresis on all inputs to improve noise immunity.

Schmitt-trigger action in the inputs makes the circuit highly tolerant to slower input rise and fall times.

The HEF40240B is pin and functionally compatible with the TTL '240' device.



HEF40240BP(N): 20-lead DIL; plastic (SOT146-1)
HEF40240BD(F): 20-lead DIL; ceramic (cerdip) (SOT152)
HEF40240BT(D): 20-lead SO; plastic (SOT163-1)
(): Package Designator North America

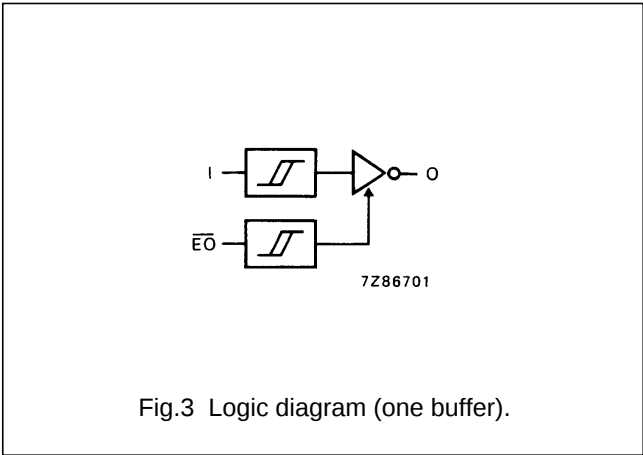
PINNING

I_{A1} to I_{A4} inputs
 I_{B1} to I_{B4} inputs
 O_{A1} to O_{A4} bus outputs
 O_{B1} to O_{B4} bus outputs
 $\overline{EO}_A$, $\overline{EO}_B$ output enable inputs (active LOW)

FAMILY DATA, I_{DD} LIMITS category buffers
See Family Specifications

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TRUTH TABLE

INPUTS		OUTPUT
I _n	$\overline{EO}$	O _n
H	L	L
L	L	H
X	H	Z

Notes

- 1. H = HIGH state (the more positive voltage)
L = LOW state (the less positive voltage)
X = state is immaterial
Z = high impedance off state

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)
See Family Specifications except for:

D.C. current into any input	$\pm I_i$	max.	10 mA
D.C. source or sink current into any output	$\pm I_o$	max.	25 mA
D.C. current into the supply terminals	$\pm I$	max.	100 mA

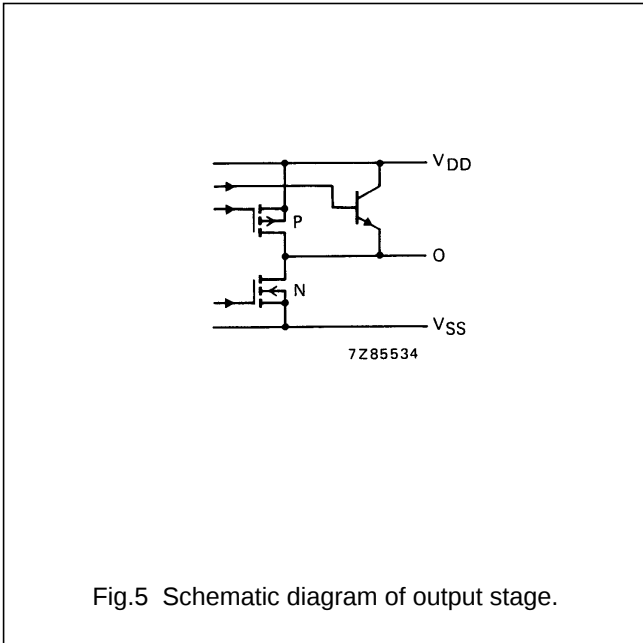
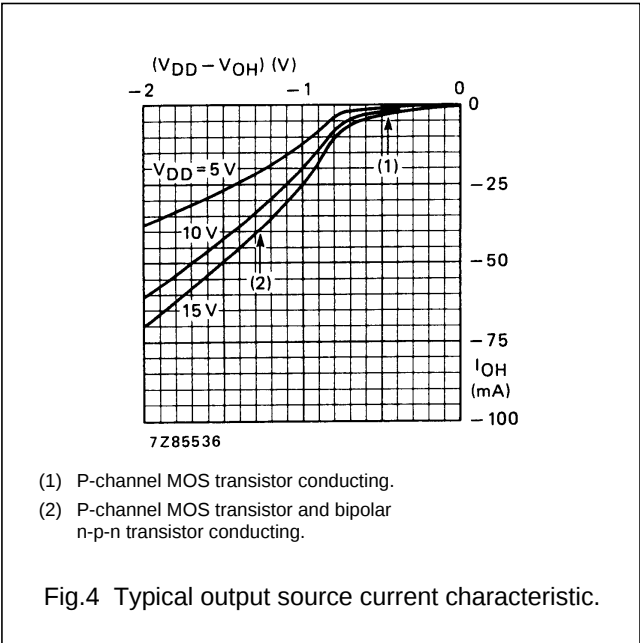
DC CHARACTERISTICS

V_{SS} = 0 V

PARAMETER	V _{DD}	V _{OH}	V _{OL}	SYMBOL	T _{amb} (°C)						UNIT
	V	V	V		−40		+25		+85		
					MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	
Output current HIGH	5	3,6	−	−I _{OH}	9,3	−	10,0	24,0	10,7	−	mA
	10	8,4	−	−I _{OH}	14,4	−	15,0	46,0	15,0	−	mA
	15	13,2	−	−I _{OH}	19,5	−	20,0	62,0	19,8	−	mA
Output current HIGH	5	4,6	−	−I _{OH}	0,75	−	0,6	1,2	0,45	—	mA
	10	9,5	−	−I _{OH}	1,85	−	1,5	3,0	1,1	−	mA
	15	13,5	−	−I _{OH}	14,5	−	15,0	50,0	15,5	−	mA
Output current LOW	5	−	0,4	I _{OL}	2,9	−	2,3	5,4	1,75	−	mA
	10	−	0,5	I _{OL}	9,5	−	7,6	17,0	5,50	−	mA
	15	−	1,5	I _{OL}	30,0	−	25,0	45,0	19,0	−	mA
Hysteresis voltage (any input)	5	−	−	V _H	−	−	−	220,0	−	−	mV
	10	−	−	V _H	−	−	−	250,0	−	−	mV
	15	−	−	V _H	−	−	−	320,0	−	−	mV

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AC CHARACTERISTICS

$V_{SS} = 0\text{ V}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$; input transition times $\leq 20\text{ ns}$

ALL BUFFERS SWITCHING	V_{DD} V	TYPICAL FORMULA FOR P (μW)	
Dynamic power	5	$4\,250 f_i + \sum (f_o C_L) \times V_{DD}^2$	where
dissipation per	10	$17\,000 f_i + \sum (f_o C_L) \times V_{DD}^2$	f_i = input freq. (MHz)
package (P)	15	$46\,000 f_i + \sum (f_o C_L) \times V_{DD}^2$	f_o = output freq. (MHz)
			C_L = load capacitance (pF)
			$\sum (f_o C_L)$ = sum of outputs
			V_{DD} = supply voltage (V)

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AC CHARACTERISTICS

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

PARAMETER	V_{DD} V	SYMBOL	MIN.	TYP.	MAX.	UNIT	TYPICAL EXTRAPOLATION FORMULA
Propagation delays							
$I_{An/Bn} \rightarrow O_{An/Bn}$ HIGH to LOW	5	t_{PHL}		95	190	ns	$83\text{ ns} + (0,24\text{ ns/pF}) C_L$
	10			40	80	ns	$35\text{ ns} + (0,10\text{ ns/pF}) C_L$
	15			30	60	ns	$26\text{ ns} + (0,07\text{ ns/pF}) C_L$
$I_{An/Bn} \rightarrow O_{An/Bn}$ LOW to HIGH	5	t_{PLH}		85	170	ns	$82\text{ ns} + (0,06\text{ ns/pF}) C_L$
	10			40	80	ns	$38\text{ ns} + (0,03\text{ ns/pF}) C_L$
	15			30	60	ns	$29\text{ ns} + (0,02\text{ ns/pF}) C_L$
Output transition times	5	t_{THL}		40	80	ns	see Fig.6
HIGH to LOW	10			20	40	ns	
	15			15	30	ns	
LOW to HIGH	5	t_{TLH}		30	60	ns	
	10			20	40	ns	
	15			15	30	ns	
3-state propagation delays							
Output disable times							
$\overline{EO} \rightarrow O_{An/Bn}$ HIGH	5	t_{PHZ}		70	140	ns	
	10			35	70	ns	
	15			30	60	ns	
LOW	5	t_{PLZ}		75	150	ns	
	10			40	80	ns	
	15			30	60	ns	
Output enable times							
$\overline{EO} \rightarrow O_{An/Bn}$ HIGH	5	t_{PZH}		80	160	ns	
	10			35	70	ns	
	15			30	60	ns	
LOW	5	t_{PZL}		90	180	ns	
	10			40	80	ns	
	15			30	60	ns	

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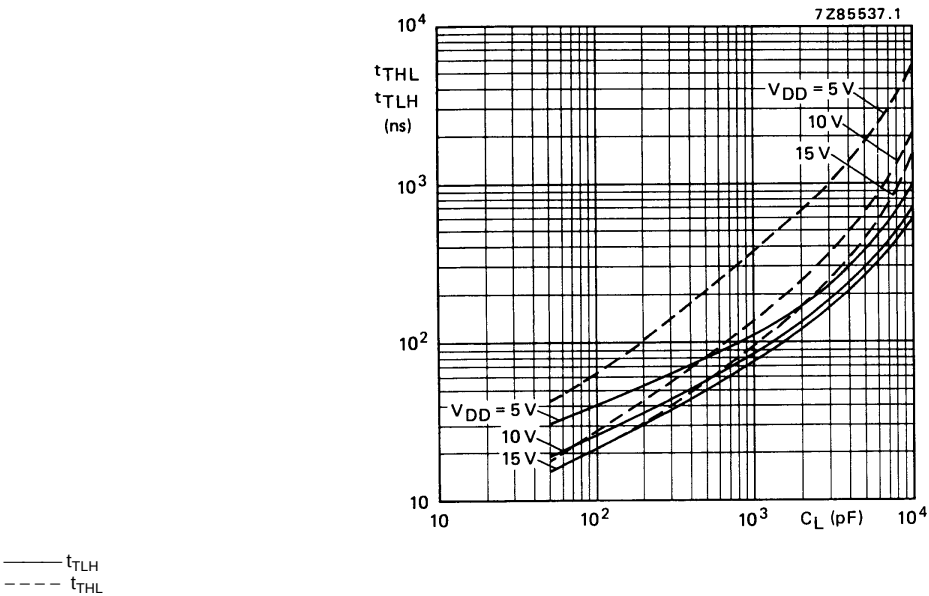


Fig.6 Output transition times as a function of the load capacitance.