

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

HEF4042B **MSI** Quadruple D-latch

Product specification
File under Integrated Circuits, IC04

January 1995

Quadruple D-latch

HEF4042B MSI

DESCRIPTION

The HEF4042B is a 4-bit latch with four data inputs (D_0 to D_3), four buffered latch outputs (O_0 to O_3), four buffered complementary latch outputs (\bar{O}_0 to \bar{O}_3) and two common enable inputs (E_0 and E_1). Information on D_0 to D_3 is transferred to O_0 to O_3 while both E_0 and E_1 are in the same state, either HIGH or LOW. O_0 to O_3 follow D_0 to D_3 as long as both E_0 and E_1 remain in the same state. When E_0 and E_1 are different, D_0 to D_3 do not affect O_0 to O_3 and the information in the latch is stored. \bar{O}_0 to \bar{O}_3 are always the complement of O_0 to O_3 . The exclusive-OR input structure allows the choice of either polarity for E_0 and E_1 . With one enable input HIGH, the other enable input is active HIGH; with one enable input LOW, the other enable input is active LOW.

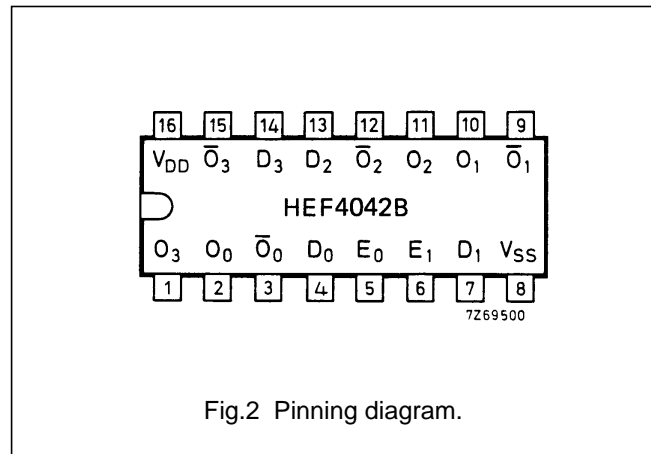


Fig.2 Pinning diagram.

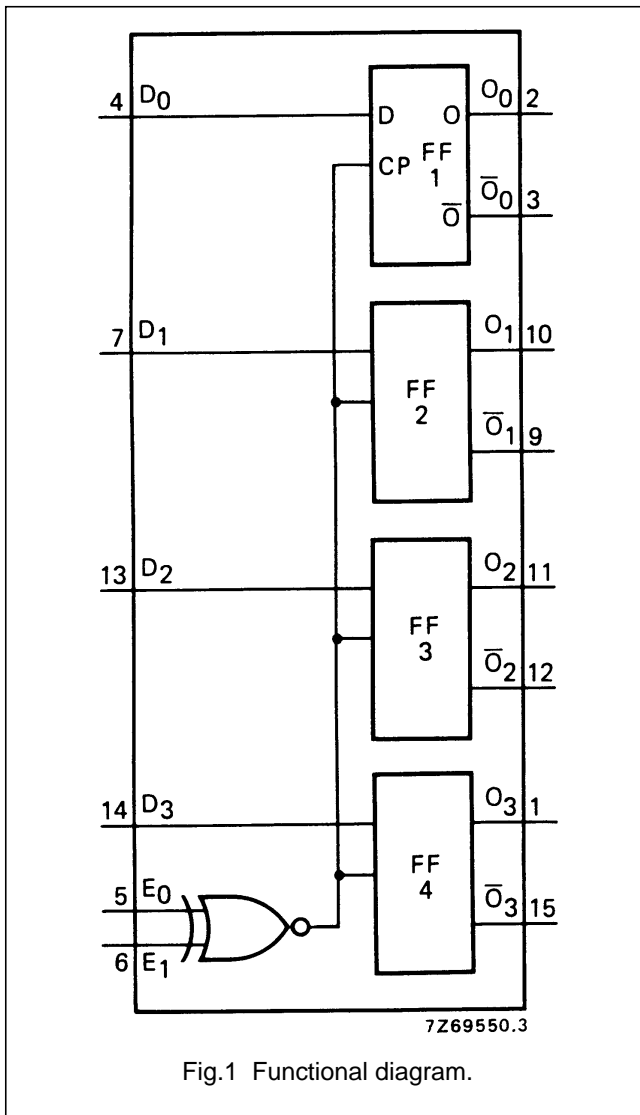


Fig.1 Functional diagram.

- HEF4042BP(N): 16-lead DIL; plastic (SOT38-1)
- HEF4042BD(F): 16-lead DIL; ceramic (cerdip) (SOT74)
- HEF4042BT(D): 16-lead SO; plastic (SOT109-1)
- (): Package Designator North America

PINNING

- D_0 to D_3 data inputs
- E_0 and E_1 enable inputs
- O_0 to O_3 parallel latch outputs
- \bar{O}_0 to \bar{O}_3 complementary parallel latch outputs

APPLICATION INFORMATION

Some examples of applications for the HEF4042B are:

- Buffer storage
- Holding register

FAMILY DATA, I_{DD} LIMITS category MSI

See Family Specifications

Quadruple D-latch

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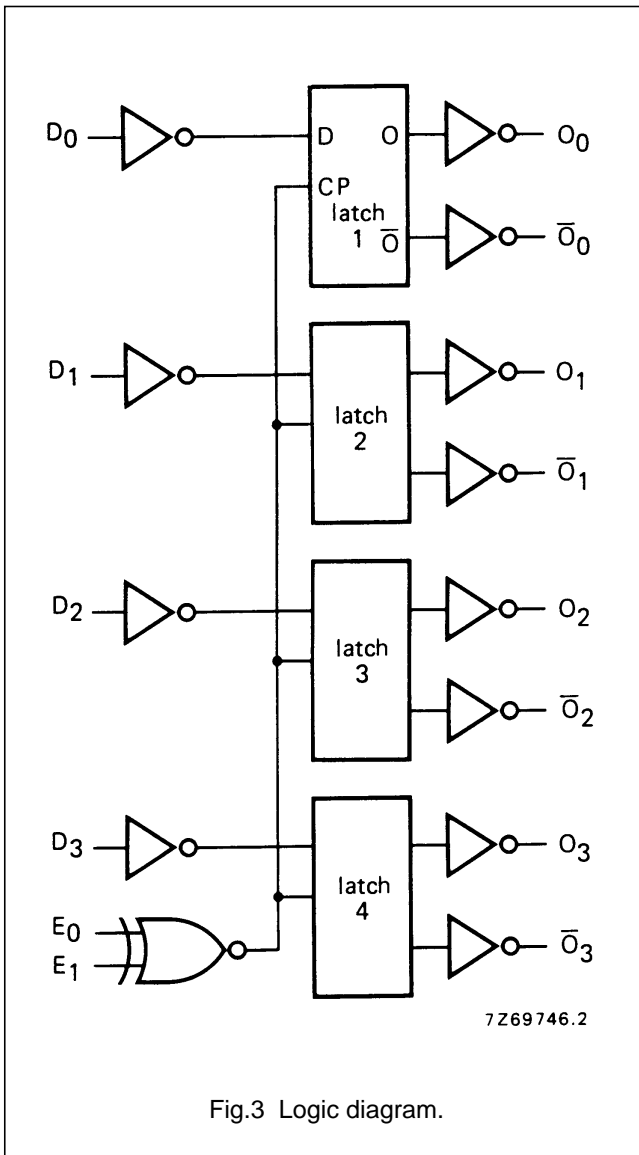


Fig.3 Logic diagram.

FUNCTION TABLE

E ₀	E ₁	OUTPUT O _n
L	L	D _n
L	H	latched
H	L	latched
H	H	D _n

Note

1. H = HIGH state (the more positive voltage)
L = LOW state (the less positive voltage).

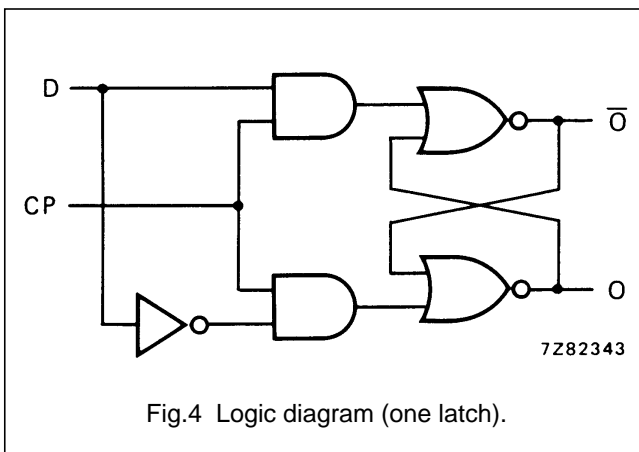


Fig.4 Logic diagram (one latch).

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AC CHARACTERISTICS

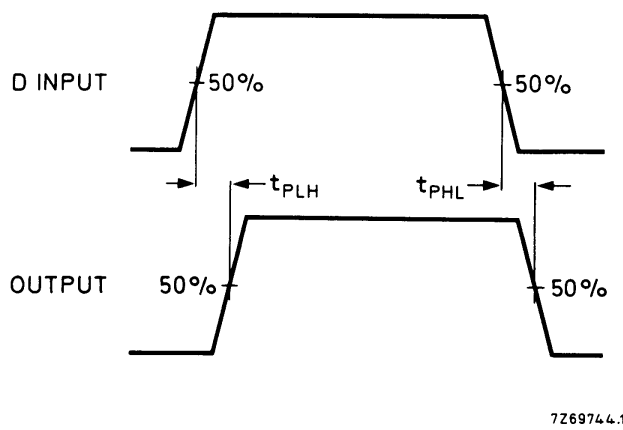
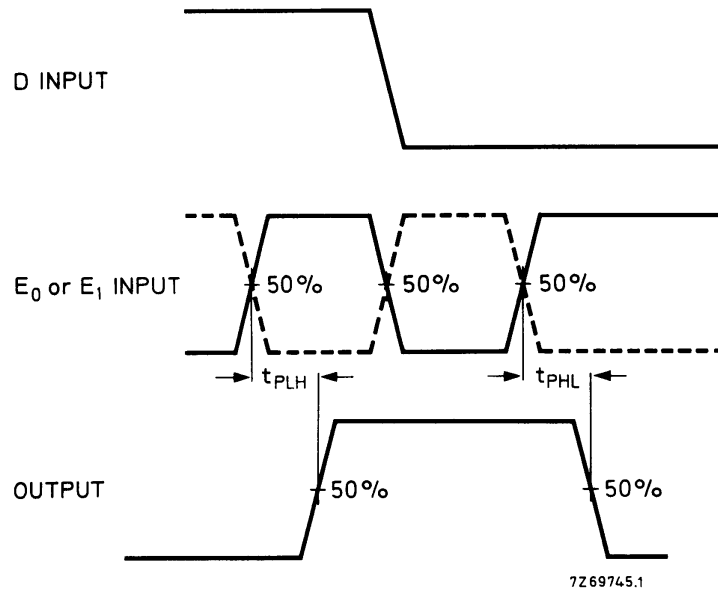
 $V_{SS} = 0$ V; $T_{amb} = 25$ °C; $C_L = 50$ pF; input transition times ≤ 20 ns

	V_{DD} V	SYMBOL	MIN.	TYP.	MAX.	TYPICAL EXTRAPOLATION FORMULA			
Propagation delays	5	t_{PHL}		95	190	ns	$67 \text{ ns} + (0,55 \text{ ns/pF}) C_L$		
				D \rightarrow O, \bar{O}					
				HIGH to LOW					
	LOW to HIGH	10	t_{PLH}		40	80	ns	$28 \text{ ns} + (0,23 \text{ ns/pF}) C_L$	
					15	55	ns		$22 \text{ ns} + (0,16 \text{ ns/pF}) C_L$
					5	85	175		
	E \rightarrow O, \bar{O}	10	t_{PHL}		40	75	ns	$57 \text{ ns} + (0,55 \text{ ns/pF}) C_L$	
					15	60	ns		$28 \text{ ns} + (0,23 \text{ ns/pF}) C_L$
					5	130	260		
	HIGH to LOW	15	t_{PHL}		50	105	ns	$102 \text{ ns} + (0,55 \text{ ns/pF}) C_L$	
					35	75	ns		$38 \text{ ns} + (0,23 \text{ ns/pF}) C_L$
					5	120	245		
LOW to HIGH	10	t_{PLH}		50	105	ns	$92 \text{ ns} + (0,55 \text{ ns/pF}) C_L$		
				15	75	ns		$38 \text{ ns} + (0,23 \text{ ns/pF}) C_L$	
				5	35	75			ns
Output transition times	5	t_{THL}		60	120	ns	$10 \text{ ns} + (1,0 \text{ ns/pF}) C_L$		
				HIGH to LOW					
				10	30	60		ns	
	LOW to HIGH	15	t_{TLH}		20	40	ns	$9 \text{ ns} + (0,42 \text{ ns/pF}) C_L$	
					5	60	120		ns
					10	30	60		ns
Set-up time	15	t_{su}		20	5	ns	$6 \text{ ns} + (0,28 \text{ ns/pF}) C_L$		
				D \rightarrow E					
				10	20	5		ns	
Hold time	5	t_{hold}		15	-5	ns	see also waveforms Figs 5 and 6		
				D \rightarrow E					
				10	15	0		ns	
Minimum enable pulse width	15	t_{WE}		15	0	ns			
				10	40	20		ns	
				5	90	45		ns	

	V_{DD} V	TYPICAL FORMULA FOR P (W)	
Dynamic power dissipation per package (P)	5	$3800 f_i + \sum (f_o C_L) \times V_{DD}^2$	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	$15\,700 f_i + \sum (f_o C_L) \times V_{DD}^2$	
	15	$41\,100 f_i + \sum (f_o C_L) \times V_{DD}^2$	

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Either E₀ or E₁ is held HIGH or LOW while the other enable input is pulsed as the function table shows.

Fig.5 Waveforms showing propagation delays for D to O, with latch enabled.

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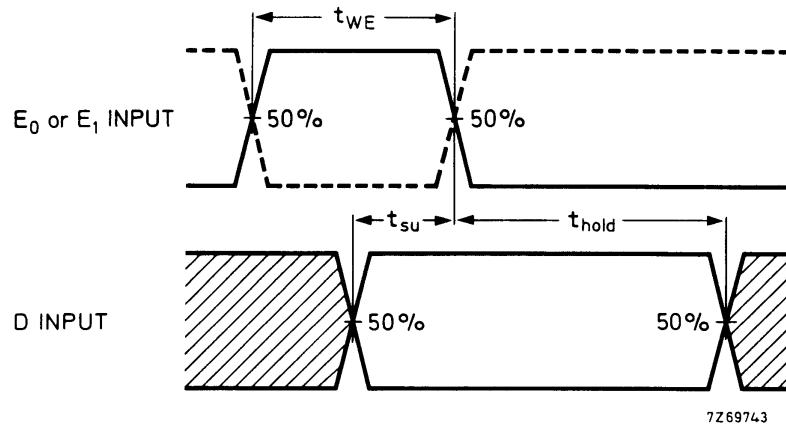


Fig.6 Waveforms showing minimum enable pulse width, set-up time and hold time for E and D. Set-up and hold-times are shown as positive values but may be specified as negative values.