

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.

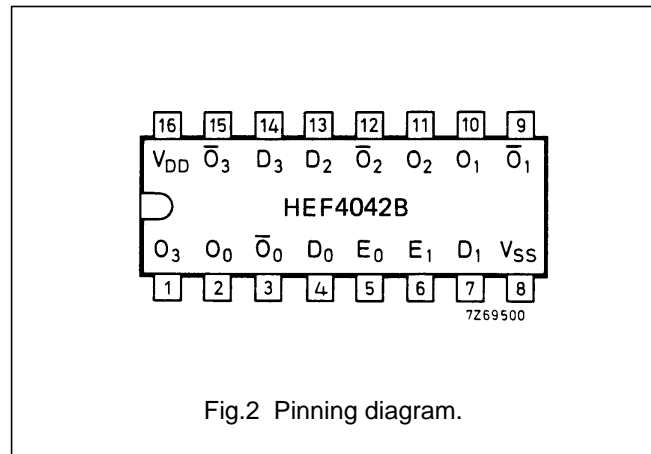


Fig.2 Pinning diagram.

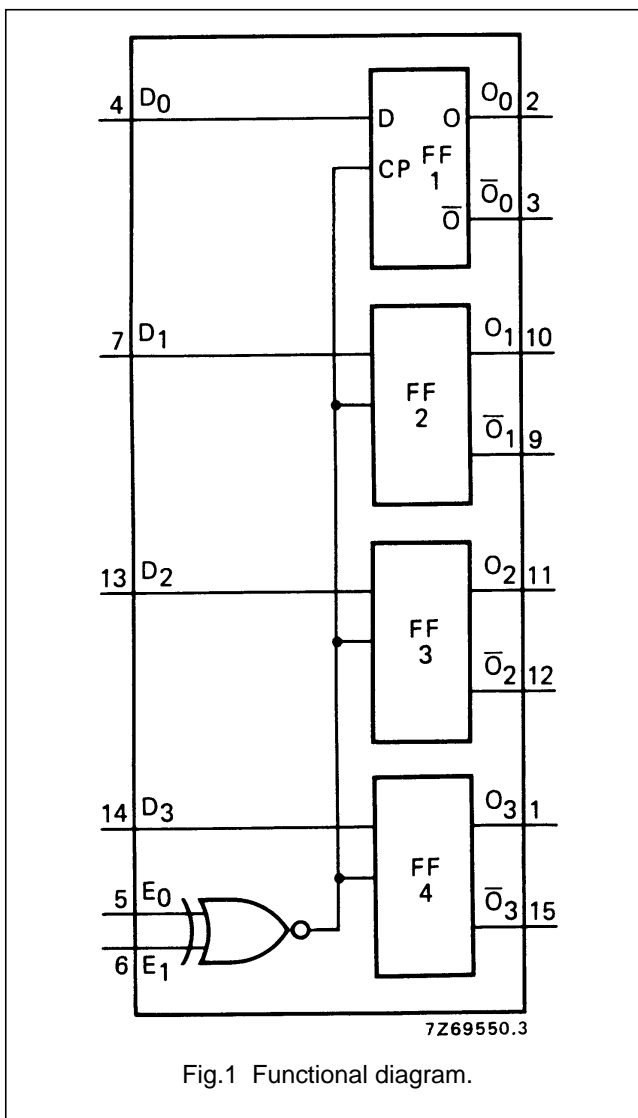


Fig.1 Functional diagram.

- 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:

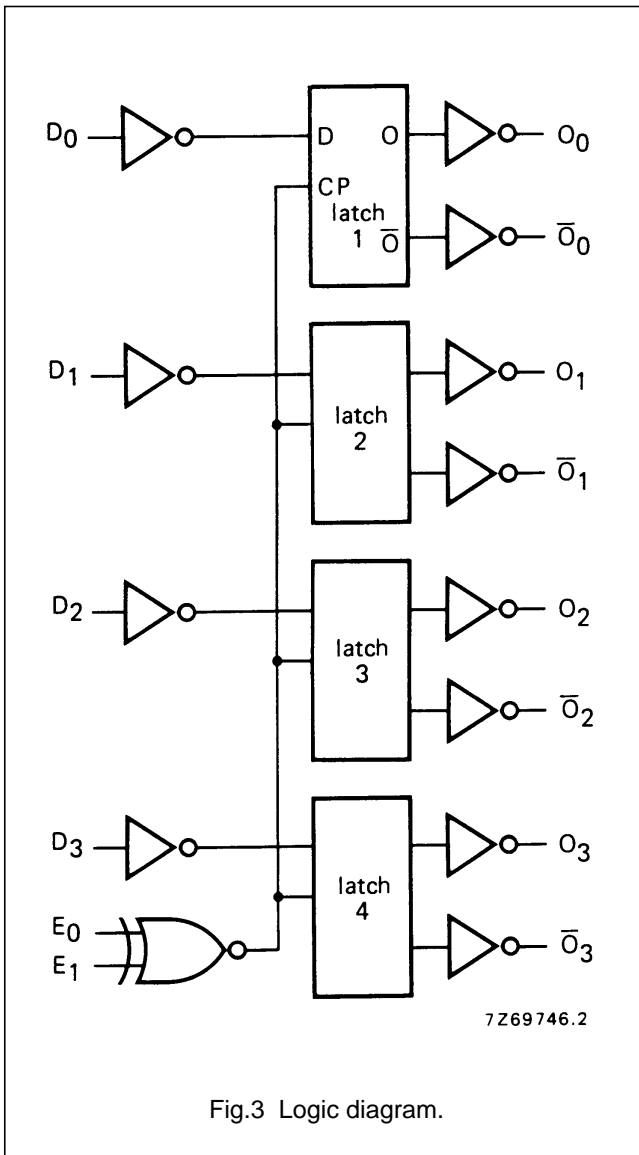
- Buffer storage
- Holding register

FAMILY DATA, I_{DD} LIMITS category MSI

See Family Specifications

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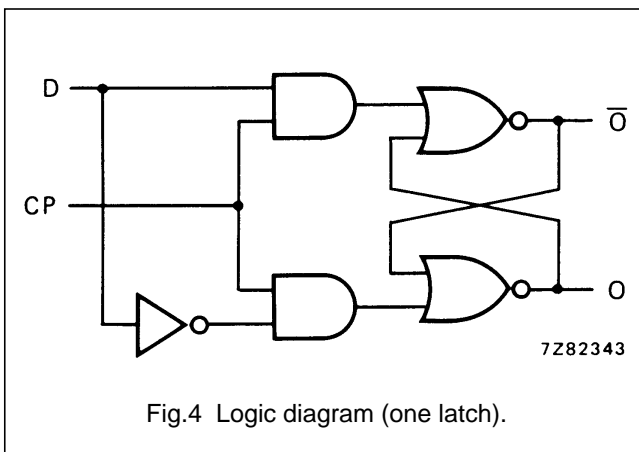


FUNCTION TABLE

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).



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AC CHARACTERISTICS

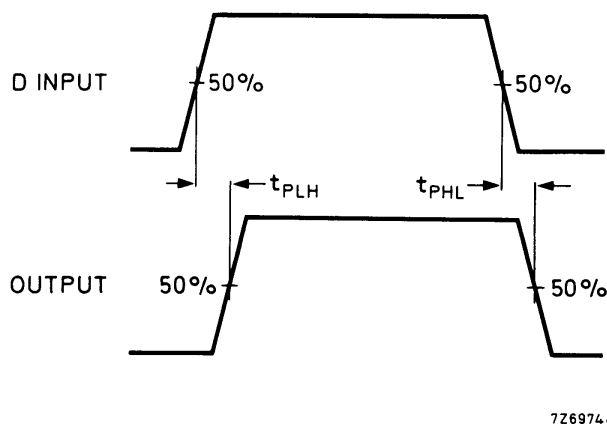
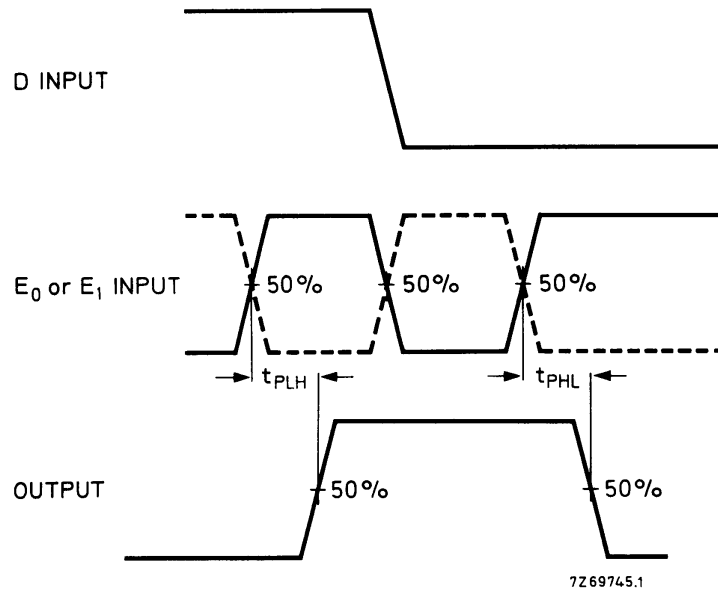
$V_{SS} = 0\text{ V}$; $T_{amb} = 25\text{ }^\circ\text{C}$; $C_L = 50\text{ pF}$; input transition times $\leq 20\text{ ns}$

	V_{DD} V	SYMBOL	MIN.	TYP.	MAX.	TYPICAL EXTRAPOLATION FORMULA		
Propagation delays	5	t_{PHL}		95	190	ns	$67\text{ ns} + (0,55\text{ ns/pF}) C_L$	
				40	80	ns		$28\text{ ns} + (0,23\text{ ns/pF}) C_L$
				30	55	ns		$22\text{ ns} + (0,16\text{ ns/pF}) C_L$
	HIGH to LOW	10	t_{PLH}		85	175	ns	$57\text{ ns} + (0,55\text{ ns/pF}) C_L$
					40	75	ns	$28\text{ ns} + (0,23\text{ ns/pF}) C_L$
					30	60	ns	$22\text{ ns} + (0,16\text{ ns/pF}) C_L$
	LOW to HIGH	15	t_{PHL}		130	260	ns	$102\text{ ns} + (0,55\text{ ns/pF}) C_L$
					50	105	ns	$38\text{ ns} + (0,23\text{ ns/pF}) C_L$
					35	75	ns	$27\text{ ns} + (0,16\text{ ns/pF}) C_L$
	$E \rightarrow O, \bar{O}$	5	t_{PLH}		120	245	ns	$92\text{ ns} + (0,55\text{ ns/pF}) C_L$
					50	105	ns	$38\text{ ns} + (0,23\text{ ns/pF}) C_L$
					35	75	ns	$27\text{ ns} + (0,16\text{ ns/pF}) C_L$
HIGH to LOW	10	t_{PHL}		130	260	ns	$102\text{ ns} + (0,55\text{ ns/pF}) C_L$	
				50	105	ns	$38\text{ ns} + (0,23\text{ ns/pF}) C_L$	
				35	75	ns	$27\text{ ns} + (0,16\text{ ns/pF}) C_L$	
LOW to HIGH	15	t_{PLH}		120	245	ns	$92\text{ ns} + (0,55\text{ ns/pF}) C_L$	
				50	105	ns	$38\text{ ns} + (0,23\text{ ns/pF}) C_L$	
				35	75	ns	$27\text{ ns} + (0,16\text{ ns/pF}) C_L$	
Output transition times	5	t_{THL}		60	120	ns	$10\text{ ns} + (1,0\text{ ns/pF}) C_L$	
				30	60	ns	$9\text{ ns} + (0,42\text{ ns/pF}) C_L$	
				20	40	ns	$6\text{ ns} + (0,28\text{ ns/pF}) C_L$	
	HIGH to LOW	10	t_{TLH}		60	120	ns	$10\text{ ns} + (1,0\text{ ns/pF}) C_L$
					30	60	ns	$9\text{ ns} + (0,42\text{ ns/pF}) C_L$
					20	40	ns	$6\text{ ns} + (0,28\text{ ns/pF}) C_L$
LOW to HIGH	15	t_{TLH}		60	120	ns	$10\text{ ns} + (1,0\text{ ns/pF}) C_L$	
				30	60	ns	$9\text{ ns} + (0,42\text{ ns/pF}) C_L$	
				20	40	ns	$6\text{ ns} + (0,28\text{ ns/pF}) C_L$	
Set-up time	5	t_{su}		30	10	ns	see also waveforms Figs 5 and 6	
				10	5	ns		
				15	5	ns		
$D \rightarrow E$	10	t_{su}		20	5	ns		
				10	5	ns		
				15	5	ns		
Hold time	5	t_{hold}		15	-5	ns		
				15	0	ns		
				15	0	ns		
$D \rightarrow E$	10	t_{hold}		15	0	ns		
				15	0	ns		
				15	0	ns		
Minimum enable pulse width	5	t_{WE}		90	45	ns		
				10	20	ns		
				15	15	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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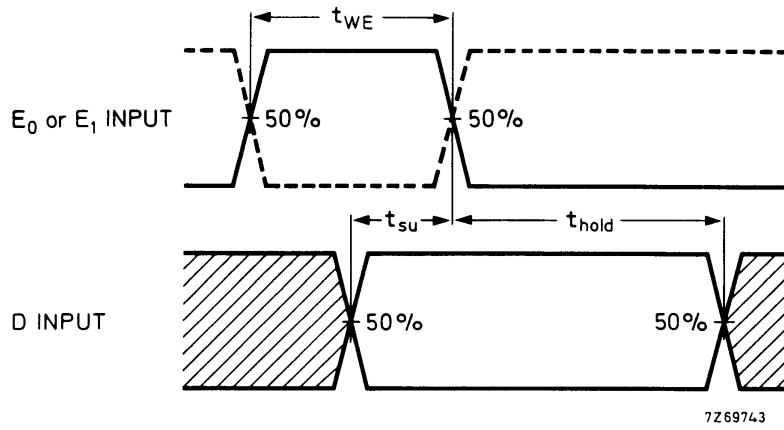


Fig.6 Waveforms showing minimum enable pulse width, set-up time and hold time for E and D. Set-up and hold-times are shown as positive values but may be specified as negative values.