

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.

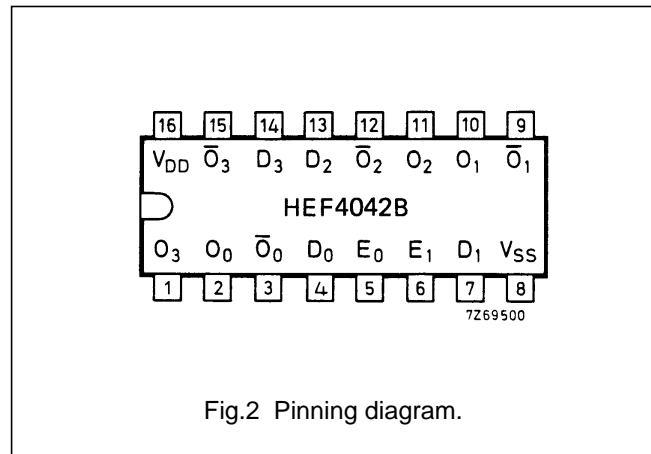


Fig.2 Pinning diagram.

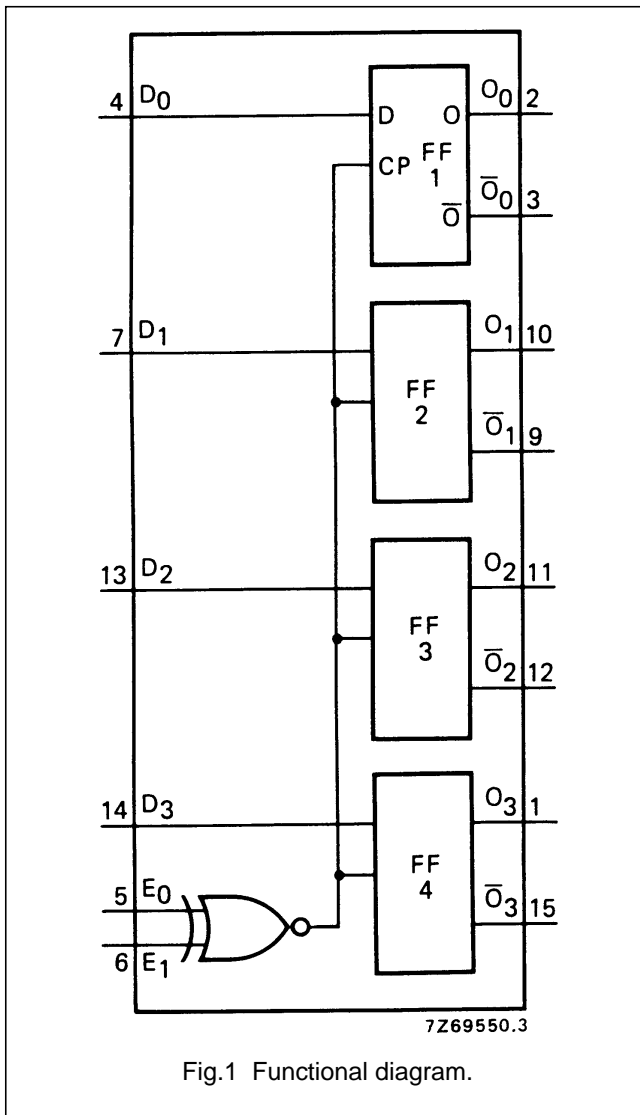


Fig.1 Functional diagram.

- 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

HEF4042B
MSI

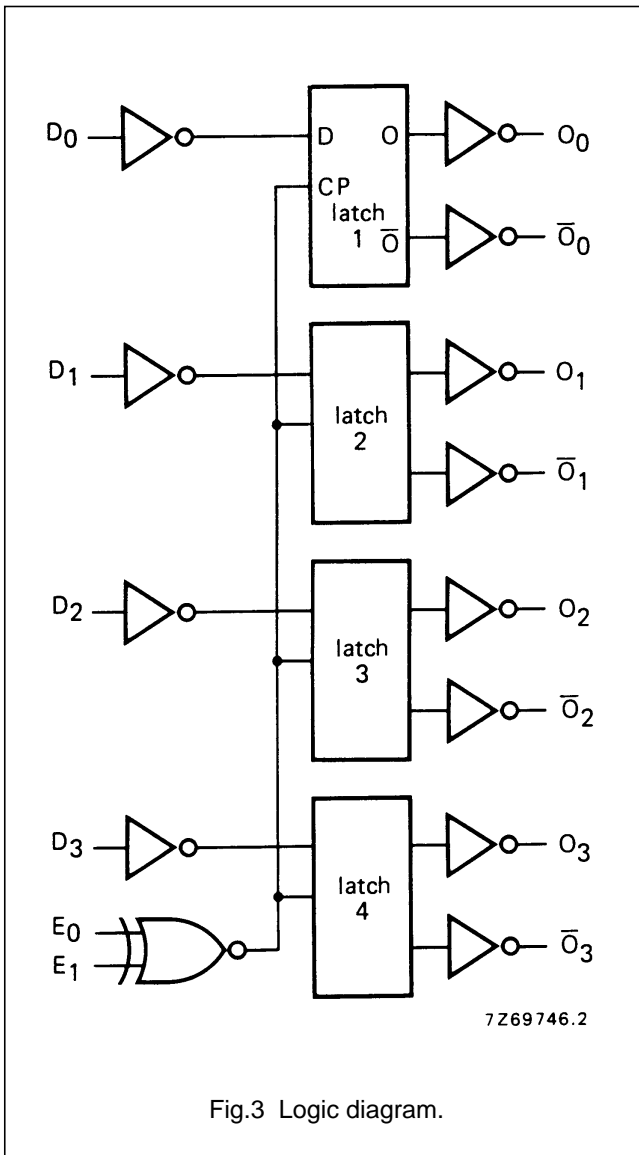


Fig.3 Logic diagram.

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).

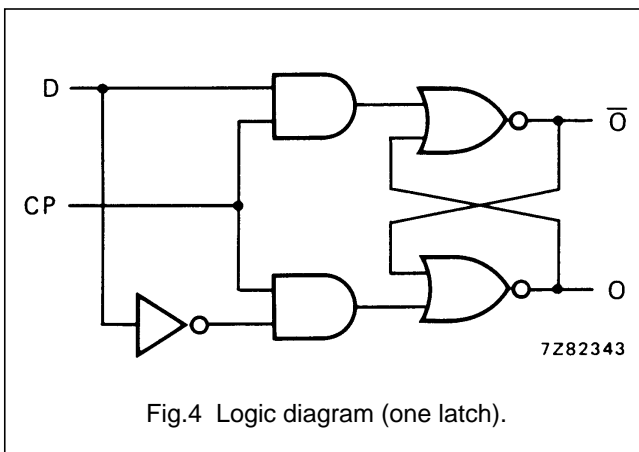


Fig.4 Logic diagram (one latch).

Quadruple D-latch

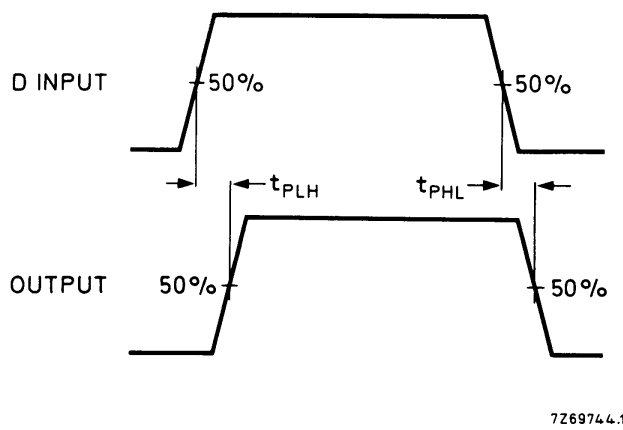
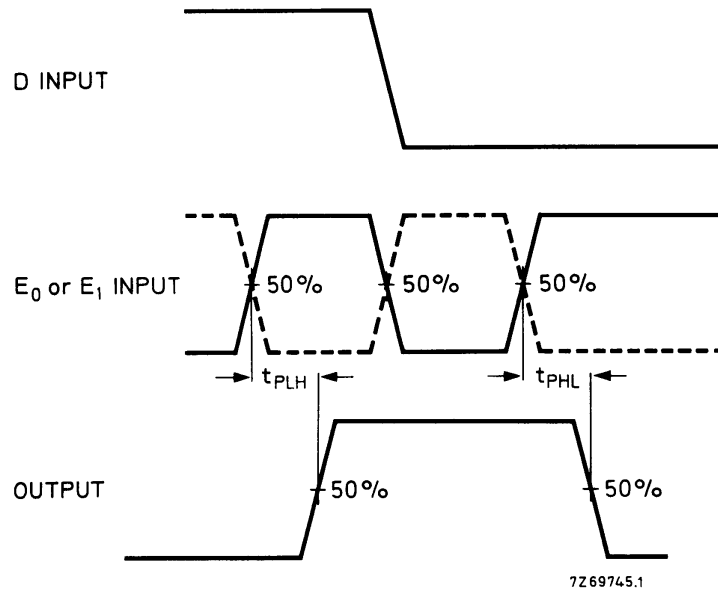
HEF4042B
MSI**AC CHARACTERISTICS** $V_{SS} = 0\text{ V}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$; $C_L = 50\text{ pF}$; input transition times $\leq 20\text{ ns}$

	V_{DD} V	SYMBOL	MIN.	TYP.	MAX.	TYPICAL EXTRAPOLATION FORMULA			
Propagation delays	5	t_{PHL}		95	190	ns	67 ns + (0,55 ns/pF) C_L		
				HIGH to LOW	40	80	ns	28 ns + (0,23 ns/pF) C_L	
					30	55	ns	22 ns + (0,16 ns/pF) C_L	
	LOW to HIGH	10	t_{PLH}		85	175	ns	57 ns + (0,55 ns/pF) C_L	
						40	75	ns	28 ns + (0,23 ns/pF) C_L
						30	60	ns	22 ns + (0,16 ns/pF) C_L
	$E \rightarrow O, \bar{O}$	15	t_{PHL}		130	260	ns	102 ns + (0,55 ns/pF) C_L	
					HIGH to LOW	50	105	ns	38 ns + (0,23 ns/pF) C_L
						35	75	ns	27 ns + (0,16 ns/pF) C_L
	LOW to HIGH	5	t_{PLH}		120	245	ns	92 ns + (0,55 ns/pF) C_L	
						50	105	ns	38 ns + (0,23 ns/pF) C_L
						35	75	ns	27 ns + (0,16 ns/pF) C_L
Output transition times	5	t_{THL}		60	120	ns	10 ns + (1,0 ns/pF) C_L		
				HIGH to LOW	30	60	ns	9 ns + (0,42 ns/pF) C_L	
					20	40	ns	6 ns + (0,28 ns/pF) C_L	
	LOW to HIGH	10	t_{TLH}		60	120	ns	10 ns + (1,0 ns/pF) C_L	
						30	60	ns	9 ns + (0,42 ns/pF) C_L
						20	40	ns	6 ns + (0,28 ns/pF) C_L
Set-up time	15	t_{su}		30	10	ns	see also waveforms Figs 5 and 6		
				$D \rightarrow E$	20	5		ns	
					20	5		ns	
Hold time	5	t_{hold}		15	-5	ns			
				$D \rightarrow E$	15	0		ns	
					15	0		ns	
Minimum enable pulse width	10	t_{WE}		90	45	ns			
					40	20		ns	
					30	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	$41\ 100 f_i + \sum (f_o C_L) \times V_{DD}^2$	

Quadruple D-latch

HEF4042B
MSI



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.

Quadruple D-latch

HEF4042B
MSI

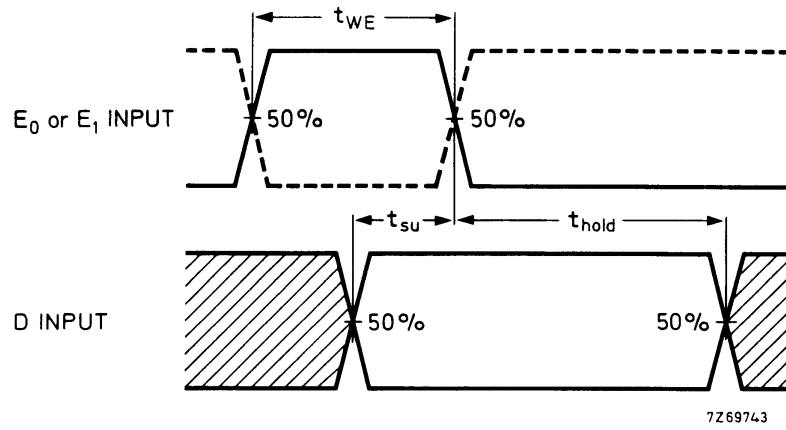


Fig.6 Waveforms showing minimum enable pulse width, set-up time and hold time for E and D. Set-up and hold-times are shown as positive values but may be specified as negative values.