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

Philips Semiconductors

PHILIPS

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 ($\overline{O}_0$ to $\overline{O}_3$) 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.
$\overline{O}_0$ to $\overline{O}_3$ 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.

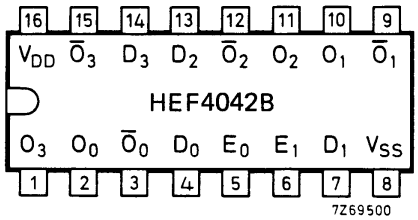


Fig.2 Pinning diagram.

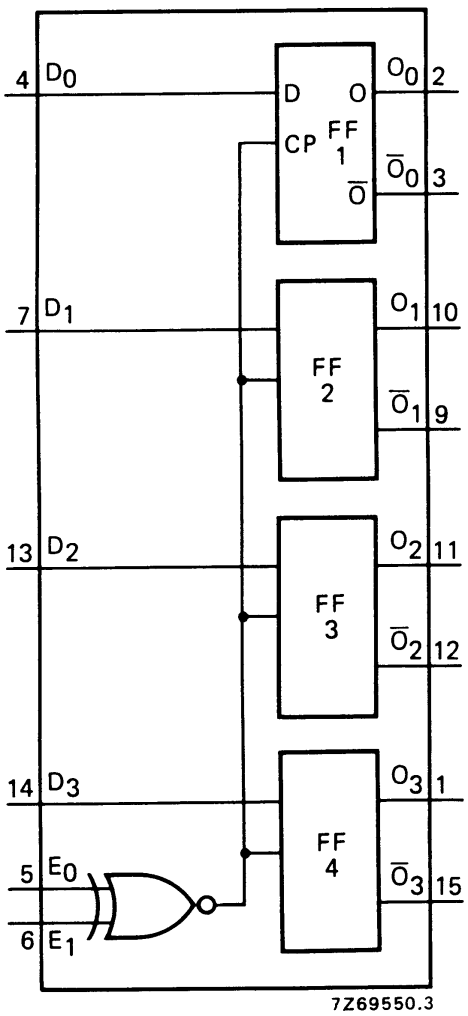


Fig.1 Functional diagram.

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
$\overline{O}_0$ to $\overline{O}_3$	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

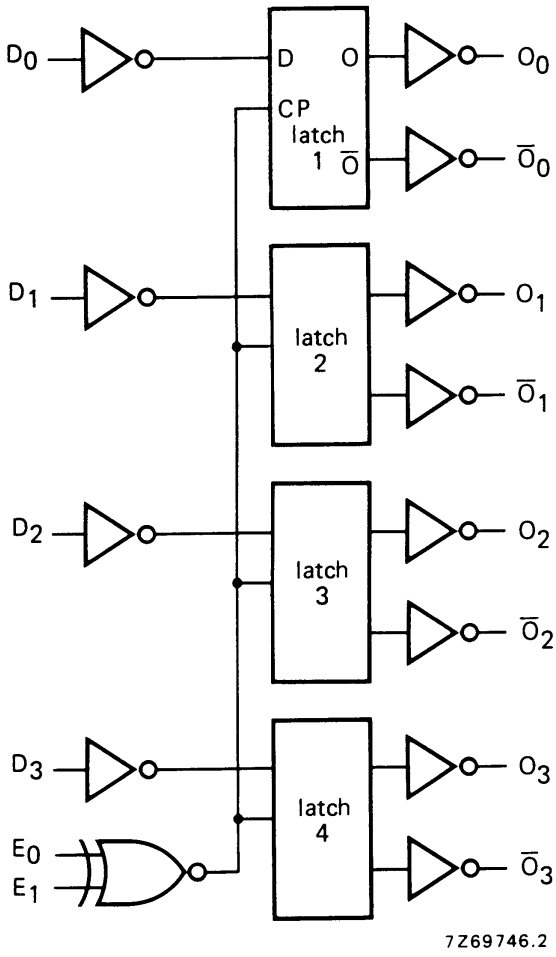


Fig.3 Logic diagram.

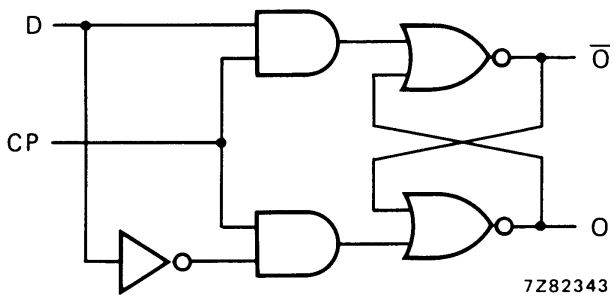


Fig.4 Logic diagram (one latch).

FUNCTION TABLE

E_0	E_1	OUTPUT O_n
L	L	D_n
L	H	latched
H	L	latched
H	H	D_n

Note

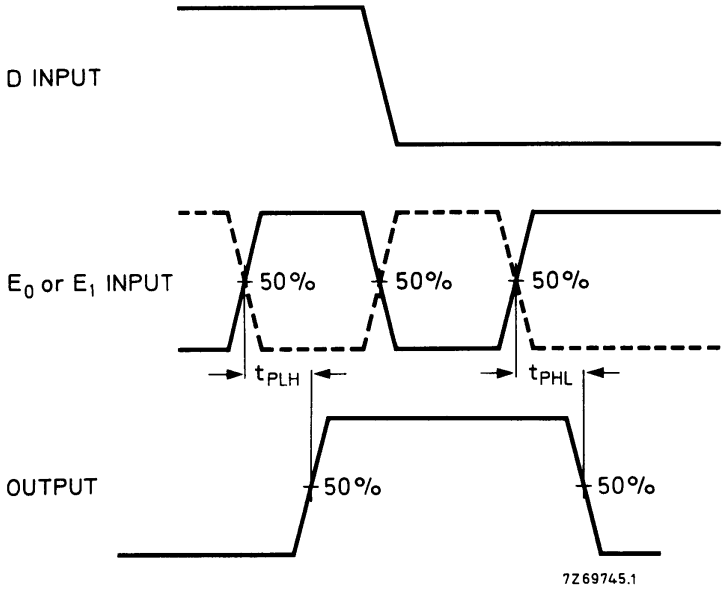
1. H = HIGH state (the more positive voltage)
   L = LOW state (the less positive voltage).

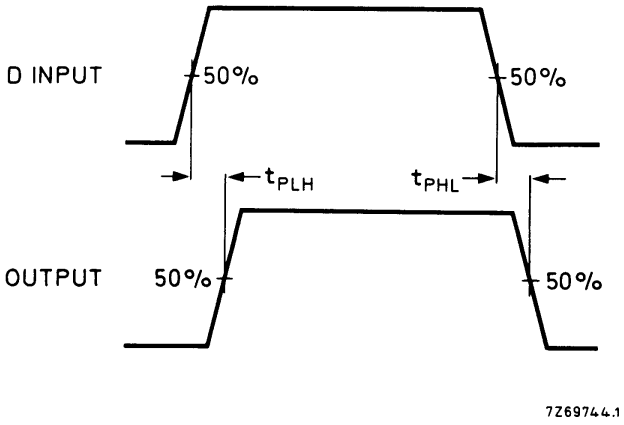
AC CHARACTERISTICS

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

	V_{DD} V	TYPICAL FORMULA FOR P (W)	
Dynamic power	5	$3800\ f_i + \sum (f_o C_L) \times V_{DD}^2$	where
dissipation per	10	$15\ 700\ f_i + \sum (f_o C_L) \times V_{DD}^2$	f_i = input freq. (MHz)
package (P)	15	$41\ 100\ f_i + \sum (f_o C_L) \times V_{DD}^2$	f_o = output freq. (MHz)
			C_L = load capacitance (pF)
			$\sum (f_o C_L)$ = sum of outputs
			V_{DD} = supply voltage (V)





Either E_0 or E_1 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.

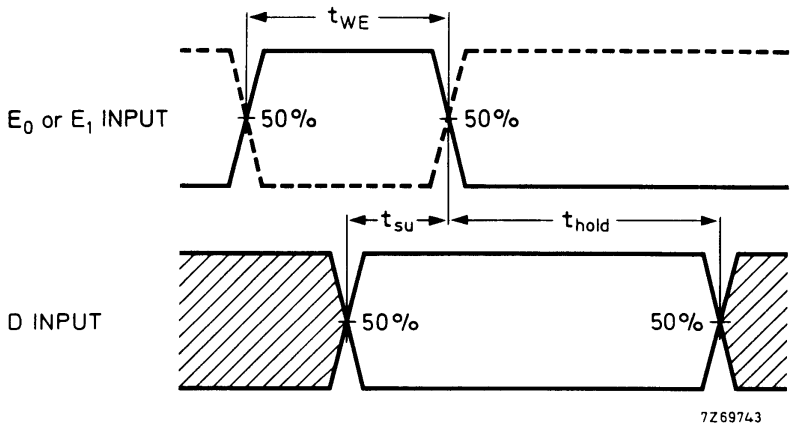


Fig.6 Waveforms showing minimum enable pulse width, set-up time and hold time for E and D. Set-up and hold-times are shown as positive values but may be specified as negative values.