

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

HEF4024B

MSI

7-stage binary counter

Product specification
File under Integrated Circuits, IC04

January 1995

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DESCRIPTION

The HEF4024B is a 7-stage binary ripple counter with a clock input (\overline{CP}), and overriding asynchronous master reset input (MR) and seven fully buffered parallel outputs (O_0 to O_6). The counter advances on the HIGH to LOW transition of \overline{CP} . A HIGH on MR clears all counter stages and forces all outputs LOW, independent of \overline{CP} . Each counter stage is a static toggle flip-flop.

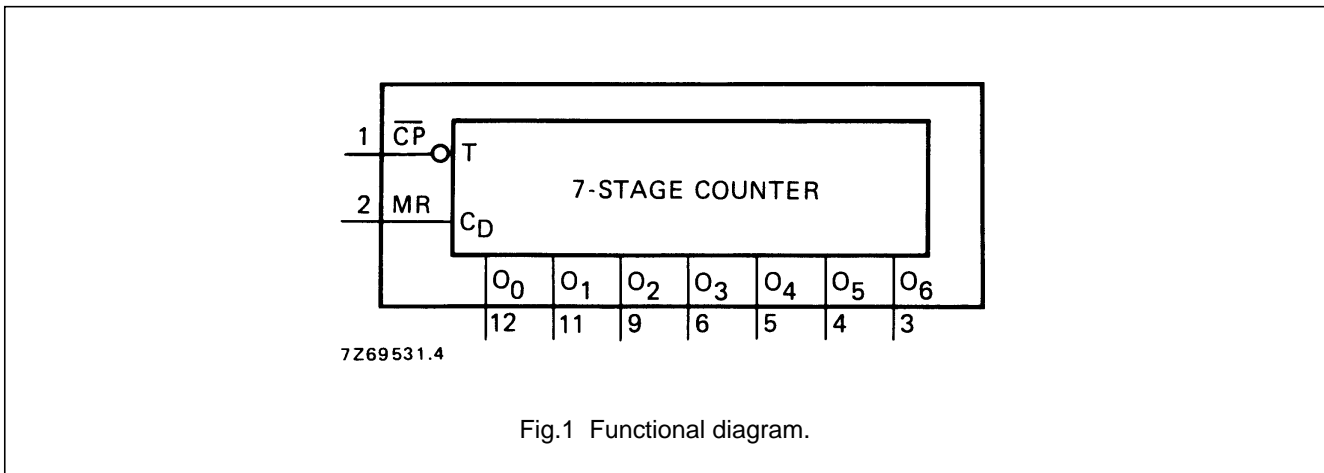


Fig.1 Functional diagram.

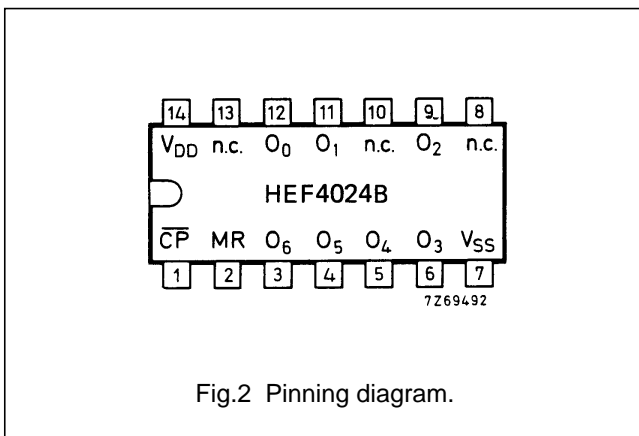


Fig.2 Pinning diagram.

PINNING

- \overline{CP} clock input (HIGH to LOW triggered)
- MR master reset input
- O_0 to O_6 buffered parallel outputs

APPLICATION INFORMATION

Some examples of applications for the HEF4024B are:

- Frequency dividers
- Time delay circuits

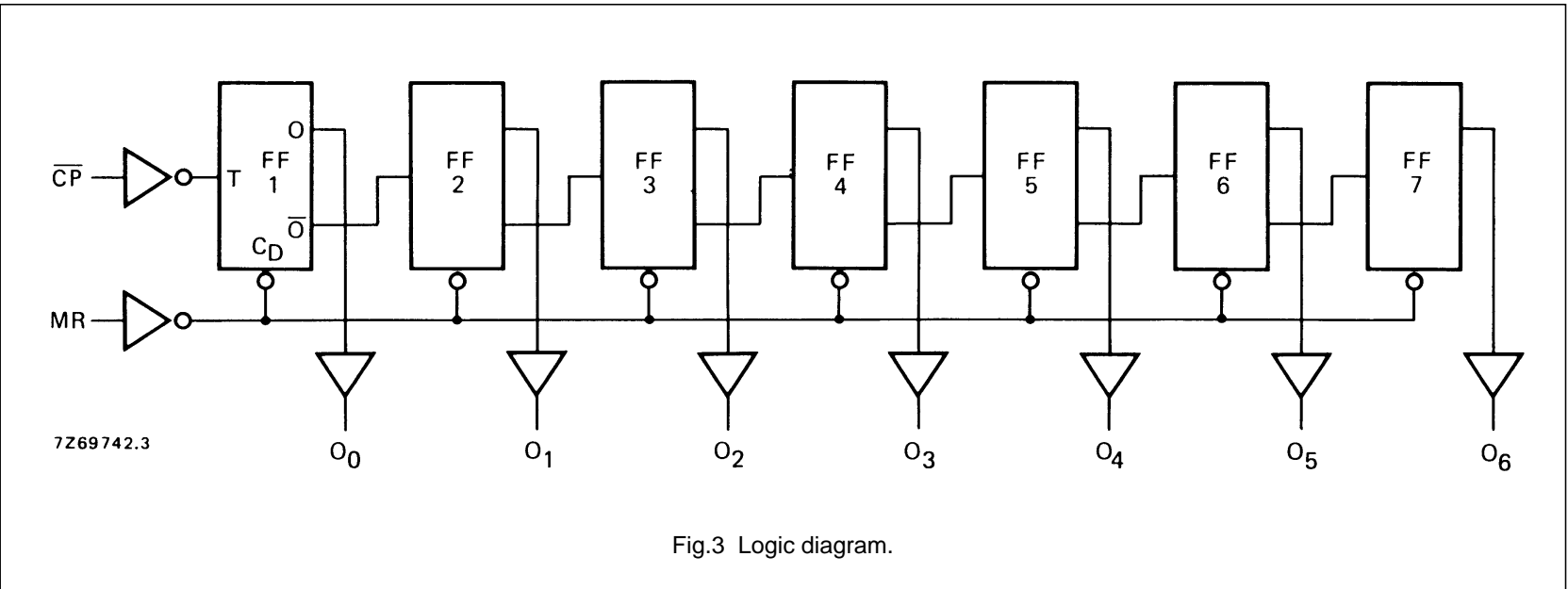
FAMILY DATA, I_{DD} LIMITS category MSI

See Family Specifications

- HEF4024BP(N): 14-lead DIL; plastic (SOT27-1)
- HEF4024BD(F): 14-lead DIL; ceramic (cerdip) (SOT73)
- HEF4024BT(D): 14-lead SO; plastic (SOT108-1)
- (): Package Designator North America

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MSI**AC CHARACTERISTICS** $V_{SS} = 0$ V; $T_{amb} = 25$ °C; $C_L = 50$ pF; input transition times ≤ 20 ns; see also waveforms Fig.4

	V_{DD} V	SYMBOL	MIN.	TYP.	MAX.	TYPICAL EXTRAPOLATION FORMULA	
Propagation delays	$\overline{CP} \rightarrow O_0$ HIGH to LOW	t_{PHL}		100	200	ns	73 ns + (0,55 ns/pF) C_L
				40	75	ns	29 ns + (0,23 ns/pF) C_L
				25	50	ns	17 ns + (0,16 ns/pF) C_L
	LOW to HIGH	t_{PLH}		105	210	ns	78 ns + (0,55 ns/pF) C_L
				45	85	ns	34 ns + (0,23 ns/pF) C_L
				30	60	ns	22 ns + (0,16 ns/pF) C_L
	$O_n \rightarrow O_{n+1}$ HIGH to LOW	t_{PHL}		60	120	ns	33 ns + (0,55 ns/pF) C_L
				25	50	ns	14 ns + (0,23 ns/pF) C_L
				20	40	ns	12 ns + (0,16 ns/pF) C_L
	LOW to HIGH	t_{PLH}		50	100	ns	23 ns + (0,55 ns/pF) C_L
				20	40	ns	9 ns + (0,23 ns/pF) C_L
				15	30	ns	7 ns + (0,16 ns/pF) C_L
MR $\rightarrow O_n$ HIGH to LOW	t_{PHL}		120	240	ns	93 ns + (0,55 ns/pF) C_L	
			45	90	ns	34 ns + (0,23 ns/pF) C_L	
			30	60	ns	22 ns + (0,16 ns/pF) C_L	
Output transition times	HIGH to LOW	t_{THL}		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
	LOW to HIGH	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
Minimum clock pulse width; HIGH	t_{WCPH}		60	30	ns		
			30	15	ns		
			20	10	ns		
Minimum MR pulse width; HIGH	t_{WMRH}		80	40	ns		
			35	20	ns		
			25	15	ns		
Recovery time for MR	t_{RMR}		20	10	ns		
			15	5	ns		
			15	5	ns		
Maximum clock pulse frequency	f_{max}		5	10	MHz		
			13	25	MHz		
			18	35	MHz		

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	V_{DD} V	TYPICAL FORMULA FOR P (μ W)	
Dynamic power dissipation per package (P)	5	$500 f_i + \sum (f_o C_L) \times V_{DD}^2$	where f_i = input freq. (MHz) f_o = output freq. (MHz) C_L = load cap. (pF) $\sum (f_o C_L)$ = sum of outputs V_{DD} = supply voltage (V)
	10	$2100 f_i + \sum (f_o C_L) \times V_{DD}^2$	
	15	$5200 f_i + \sum (f_o C_L) \times V_{DD}^2$	

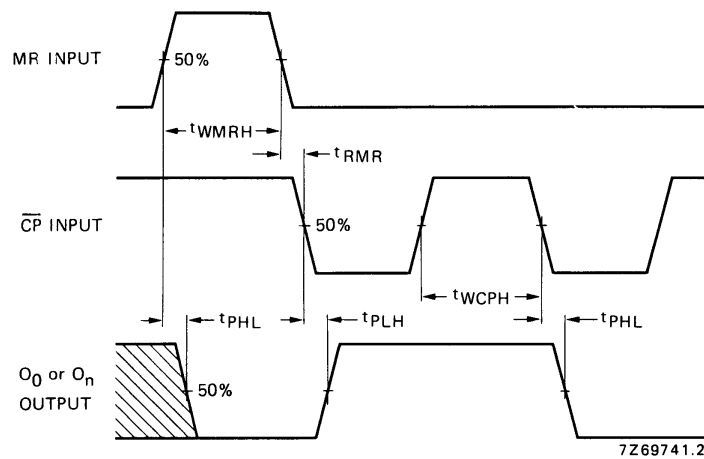


Fig.4 Waveforms showing propagation delays for MR to O_n and CP to O₀, minimum MR and CP pulse widths and recovery time for MR.