

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

HEF40174B **MSI** Hex D-type flip-flop

Product specification
File under Integrated Circuits, IC04

January 1995

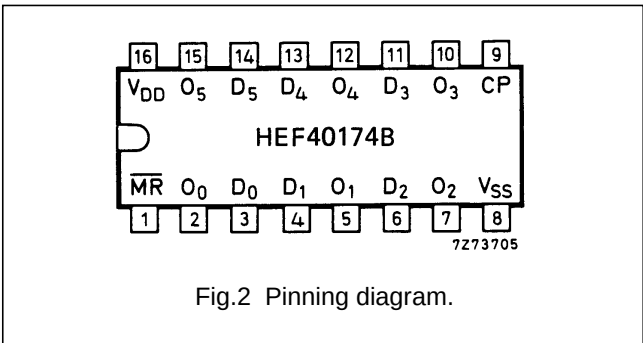
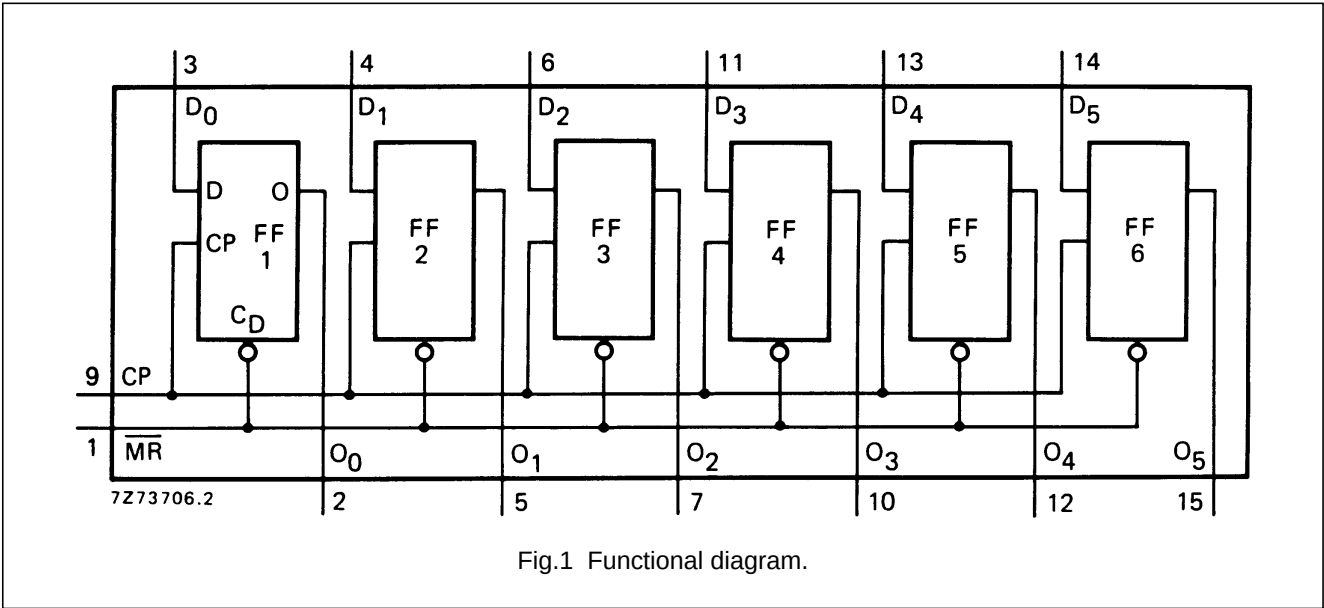
Hex D-type flip-flop

HEF40174B
MSI

DESCRIPTION

The HEF40174B is a hex edge-triggered D-type flip-flop with six data inputs (D₀ to D₅), a clock input ($\overline{\text{CP}}$), an overriding asynchronous master reset input ($\overline{\text{MR}}$), and six

buffered outputs (O₀ to O₅). Information on D₀ to D₅ is transferred to O₀ to O₅ on the LOW to HIGH transition of CP if $\overline{\text{MR}}$ is HIGH. When LOW, $\overline{\text{MR}}$ resets all flip-flops (O₀ to O₅ = LOW) independent of CP and D₀ to D₅.



HEF40174BP(N): 16-lead DIL; plastic (SOT38-1)
HEF40174BD(F): 16-lead DIL; ceramic (cerdip) (SOT74)
HEF40174BT(D): 16-lead SO; plastic (SOT109-1)
(): Package Designator North America

FAMILY DATA, I_{DD} LIMITS category MSI

See Family Specifications

PINNING

D₀ to D₅ data inputs
CP clock input (LOW to HIGH; edge-triggered)
 $\overline{\text{MR}}$ master reset input (active LOW)
O₀ to O₅ buffered outputs

FUNCTION TABLE

INPUTS			OUTPUT
CP	D	$\overline{\text{MR}}$	O
	H	H	H
	L	H	L
	X	H	no change
X	X	L	L

Notes

- H = HIGH state (the more positive voltage)
L = LOW state (the less positive voltage)
X = state is immaterial

= positive-going transition

= negative-going transition

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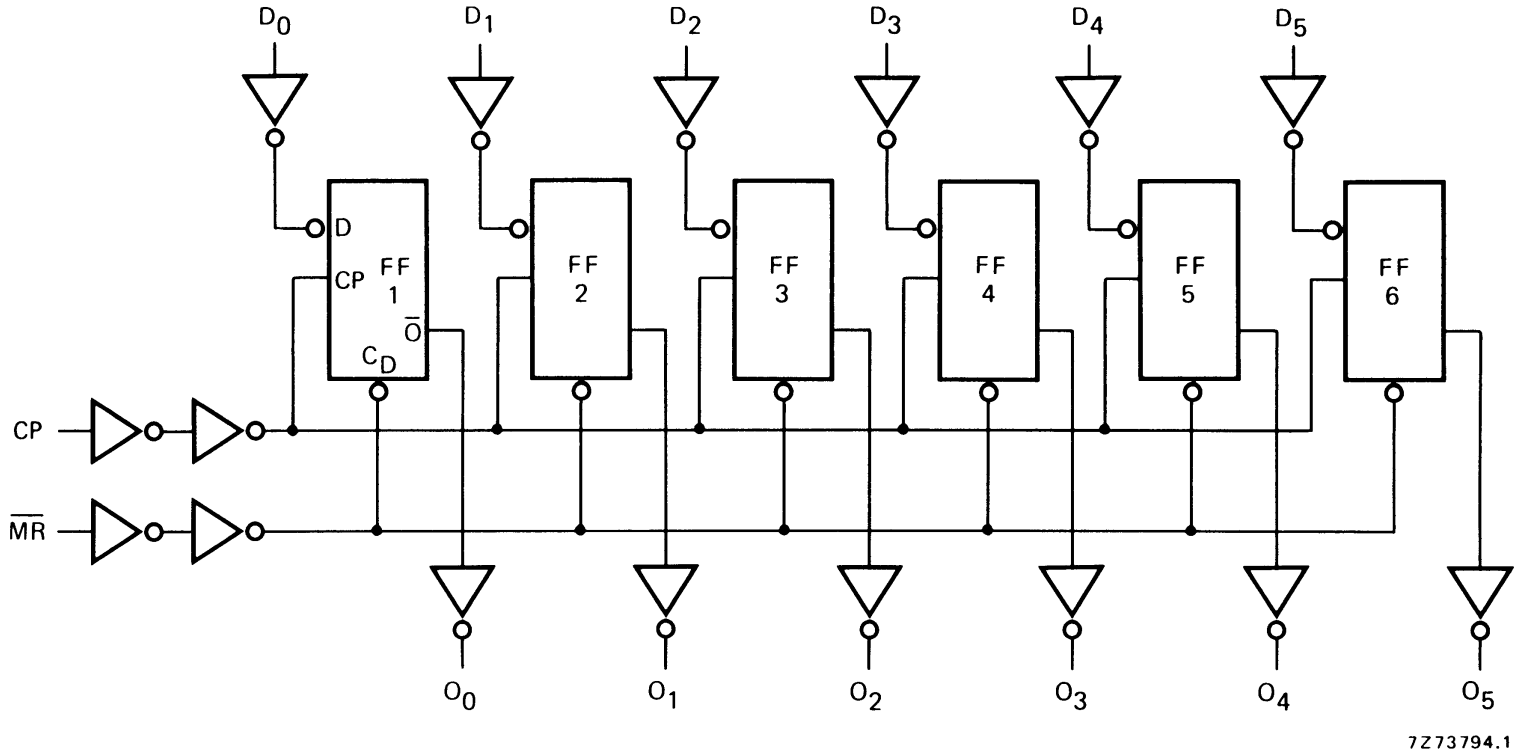


Fig.3 Logic diagram.

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AC CHARACTERISTICS

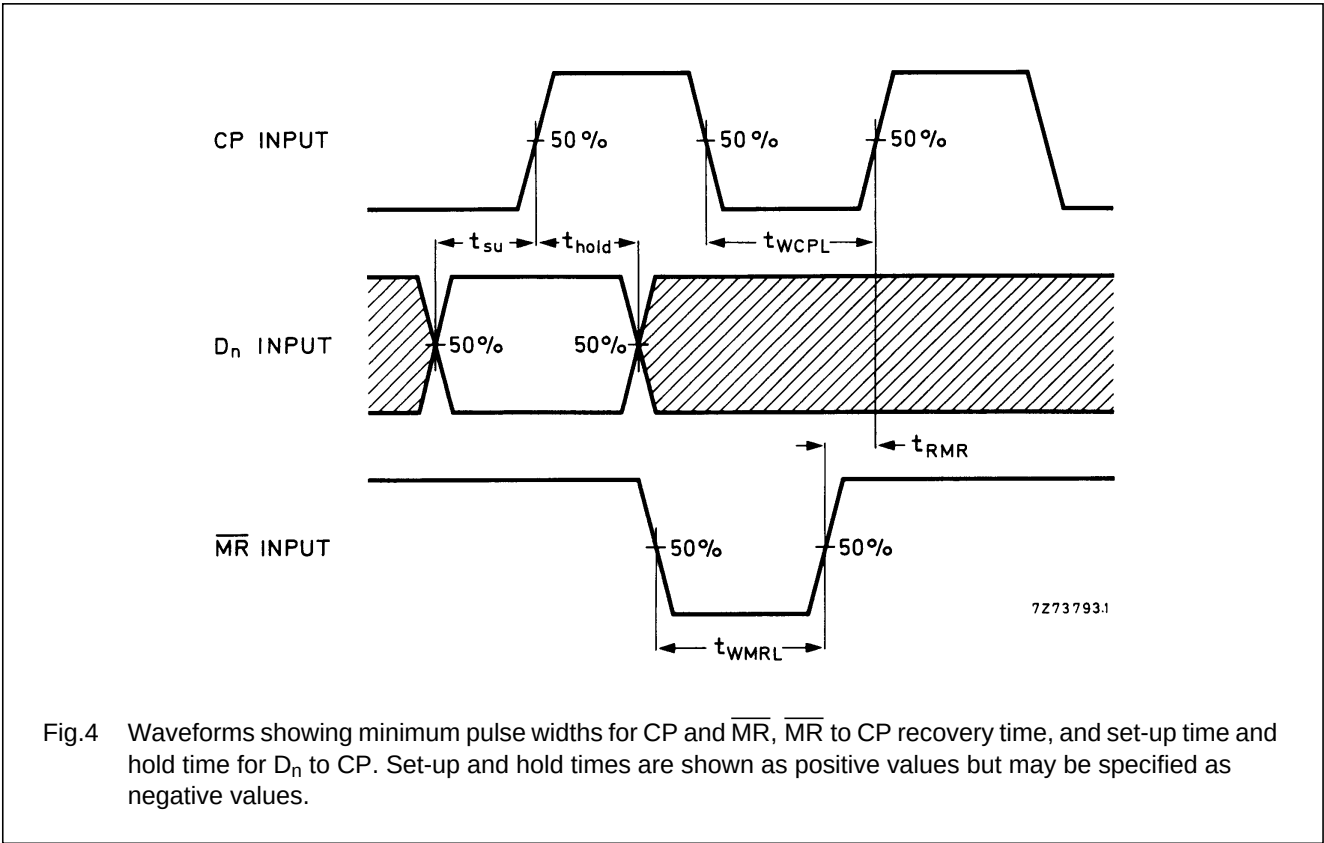
 $V_{SS} = 0$ V; $T_{amb} = 25$ °C; $C_L = 50$ pF; input transition times ≤ 20 ns

	V_{DD} V	SYMBOL	MIN.	TYP.	MAX.	TYPICAL EXTRAPOLATION FORMULA
Propagation delays CP $\rightarrow$ O _n HIGH to LOW	5 10 15	t_{PHL}		75 30 20	155 65 45 ns	48 ns + (0,55 ns/pF) C_L 19 ns + (0,23 ns/pF) C_L 12 ns + (0,16 ns/pF) C_L
LOW to HIGH	5 10 15	t_{PLH}		75 30 20	155 65 45 ns	48 ns + (0,55 ns/pF) C_L 19 ns + (0,23 ns/pF) C_L 12 ns + (0,16 ns/pF) C_L
$\overline{MR} \rightarrow$ O _n HIGH to LOW	5 10 15	t_{PHL}		85 35 25	175 70 50 ns	58 ns + (0,55 ns/pF) C_L 24 ns + (0,23 ns/pF) C_L 17 ns + (0,16 ns/pF) C_L
Output transition times HIGH to LOW	5 10 15	t_{THL}		60 30 20	120 60 40 ns	10 ns + (1,0 ns/pF) C_L 9 ns + (0,42 ns/pF) C_L 6 ns + (0,28 ns/pF) C_L
LOW to HIGH	5 10 15	t_{TLH}		60 30 20	120 60 40 ns	10 ns + (1,0 ns/pF) C_L 9 ns + (0,42 ns/pF) C_L 6 ns + (0,28 ns/pF) C_L
Set-up time D _n $\rightarrow$ CP	5 10 15	t_{su}	20 10 10	10 5 5	ns ns ns	see also waveforms Fig.4
Hold time D _n $\rightarrow$ CP	5 10 15	t_{hold}	10 5 5	0 0 0	ns ns ns	
Minimum clock pulse width; LOW	5 10 15	t_{WCPL}	70 30 20	35 15 10	ns ns ns	
Minimum $\overline{MR}$ pulse width; LOW	5 10 15	t_{WMRL}	70 35 25	35 15 10	ns ns ns	
Recovery time for $\overline{MR}$	5 10 15	t_{RMR}	45 20 15	25 10 5	ns ns ns	
Maximum clock pulse frequency	5 10 15	f_{max}	5 15 20	11 30 45	MHz MHz MHz	

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	V_{DD} V	TYPICAL FORMULA FOR P(μ W)	
Dynamic power dissipation per package (P)	5 10 15	$3500 f_i + \sum (f_o C_L) \times V_{DD}^2$ $16\,000 f_i + \sum (f_o C_L) \times V_{DD}^2$ $42\,000 f_i + \sum (f_o C_L) \times V_{DD}^2$	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)



APPLICATION INFORMATION

Some examples of applications for the HEF40174B are:

- Shift registers
- Buffer/storage register
- Pattern generator

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