

INTEGRATED CIRCUITS

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

HEF4094B

MSI

8-stage shift-and-store bus register

Product specification
File under Integrated Circuits, IC04

January 1995

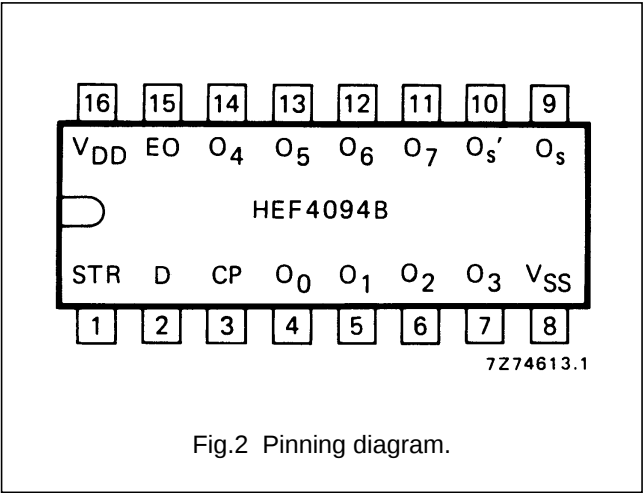
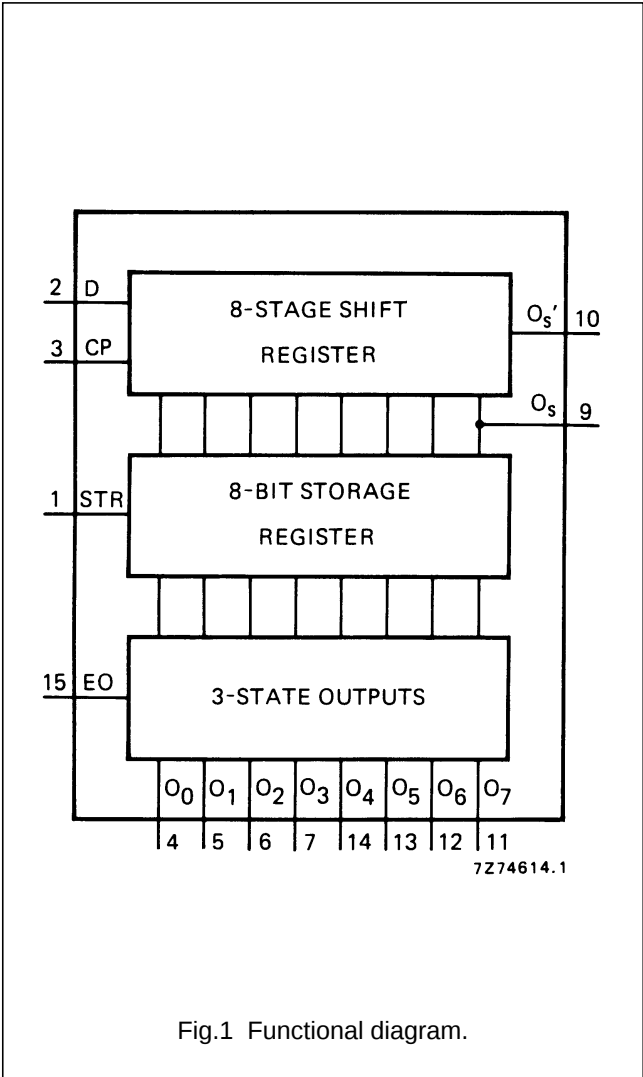
8-stage shift-and-store bus register

HEF4094B
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DESCRIPTION

The HEF4094B is an 8-stage serial shift register having a storage latch associated with each stage for strobing data from the serial input to parallel buffered 3-state outputs O_0 to O_7 . The parallel outputs may be connected directly to common bus lines. Data is shifted on positive-going clock transitions. The data in each shift register stage is transferred to the storage register when the strobe (STR) input is HIGH. Data in the storage register appears at the outputs whenever the output enable (EO) signal is HIGH.

Two serial outputs (O_s and O'_s) are available for cascading a number of HEF4094B devices. Data is available at O_s on positive-going clock edges to allow high-speed operation in cascaded systems in which the clock rise time is fast. The same serial information is available at O'_s on the next negative-going clock edge and provides cascading HEF4094B devices when the clock rise time is slow.



- HEF4094BP(N): 16-lead DIL; plastic (SOT38-1)
- HEF4094BD(F): 16-lead DIL; ceramic (cerdip) (SOT74)
- HEF4094BT(D): 16-lead SO; plastic (SOT109-1)
- (): Package Designator North America

PINNING

D	data input	EO	output enable input
CP	clock input	O_s, O'_s	serial outputs
STR	strobe input	O_0 to O_7	parallel outputs

FAMILY DATA, I_{DD} LIMITS category MSI
See Family Specifications

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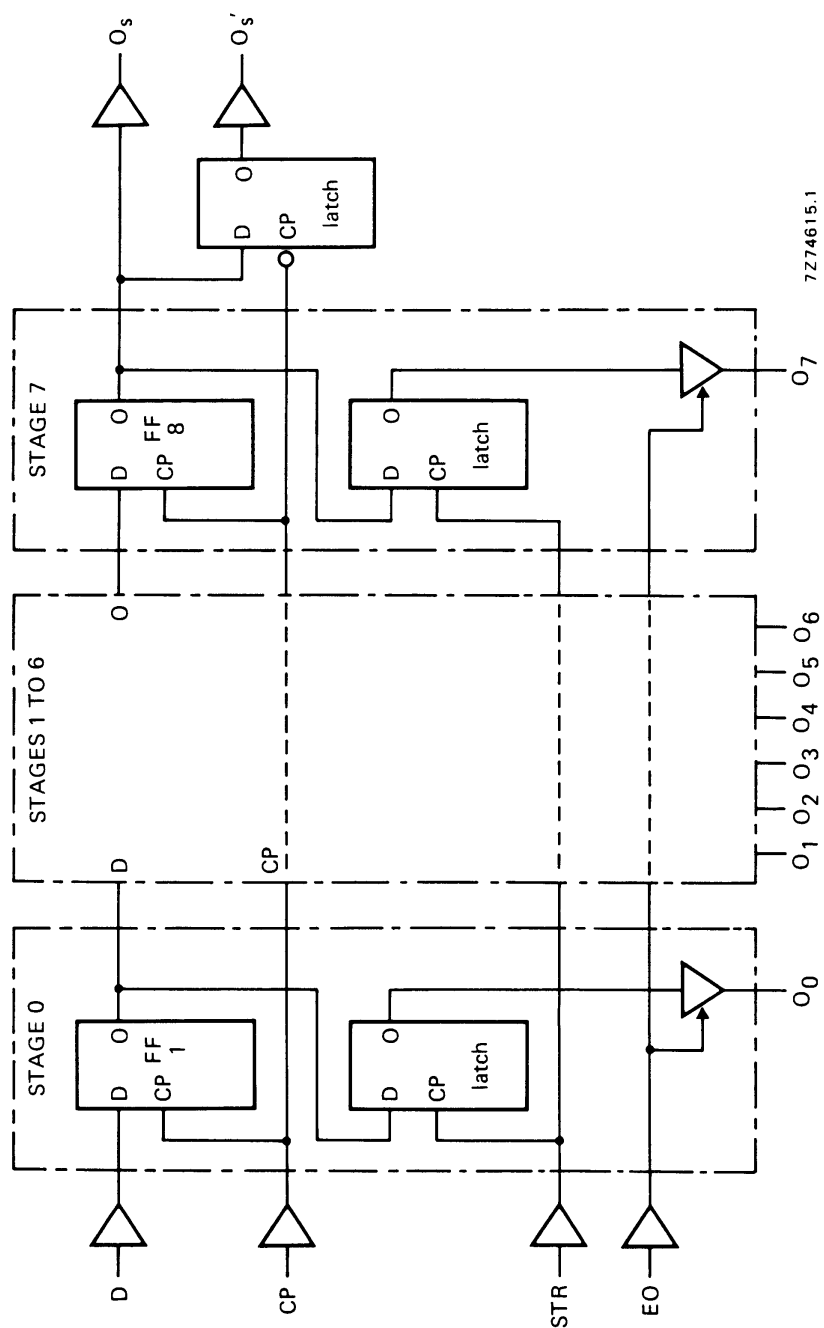


Fig.3 Logic diagram.

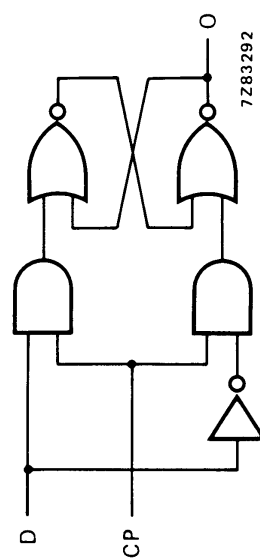


Fig.4 One D-latch.

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FUNCTION TABLE

INPUTS				PARALLEL OUTPUTS		SERIAL OUTPUTS	
CP	EO	STR	D	O ₀	O _n	O _s	O' _s
↗	L	X	X	Z	Z	O' ₆	nc
↘	L	X	X	Z	Z	nc	O ₇
↗	H	L	X	nc	nc	O' ₆	nc
↗	H	H	L	L	O _{n-1}	O' ₆	nc
↗	H	H	H	H	O _{n-1}	O' ₆	nc
↘	H	H	H	nc	nc	nc	O ₇

Notes

1. H = HIGH state (the more positive voltage)
2. L = LOW state (the less positive voltage)
3. X = state is immaterial
4. ↗ = positive-going transition
5. ↘ = negative-going transition
6. Z = high impedance off state
7. nc = no change
8. O'₆ = the information in the seventh shift register stage

At the positive clock edge the information in the 7th register stage is transferred to the 8th register stage and the O_s output.

AC CHARACTERISTICS

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

	V _{DD} V	TYPICAL FORMULA FOR P (μW)	
Dynamic power dissipation per package (P)	5 10 15	2100 f _i + ∑ (f _o C _L) × V _{DD} ² 9700 f _i + ∑ (f _o C _L) × V _{DD} ² 26 000 f _i + ∑ (f _o C _L) × V _{DD} ²	where f _i = input freq. (MHz) f _o = output freq. (MHz) C _L = load capacitance (pF) ∑ (f _o C _L) = sum of outputs V _{DD} = supply voltage (V)

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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	TYP.	MAX.		TYPICAL EXTRAPOLATION FORMULA
Propagation delays						
CP $\rightarrow$ O _s	5		135	270	ns	108 ns + (0,55 ns/pF) C _L
HIGH to LOW	10	t _{PHL}	65	130	ns	54 ns + (0,23 ns/pF) C _L
	15		50	100	ns	42 ns + (0,16 ns/pF) C _L
LOW to HIGH	5	t _{PLH}	105	210	ns	78 ns + (0,55 ns/pF) C _L
	10		50	100	ns	39 ns + (0,23 ns/pF) C _L
	15		40	80	ns	32 ns + (0,16 ns/pF) C _L
CP $\rightarrow$ O' _s	5		105	210	ns	78 ns + (0,55 ns/pF) C _L
HIGH to LOW	10	t _{PHL}	50	100	ns	39 ns + (0,23 ns/pF) C _L
	15		40	80	ns	32 ns + (0,16 ns/pF) C _L
LOW to HIGH	5	t _{PLH}	105	210	ns	78 ns + (0,55 ns/pF) C _L
	10		50	100	ns	39 ns + (0,23 ns/pF) C _L
	15		40	80	ns	32 ns + (0,16 ns/pF) C _L
CP $\rightarrow$ O _n	5		165	330	ns	138 ns + (0,55 ns/pF) C _L
HIGH to LOW	10	t _{PHL}	75	150	ns	64 ns + (0,23 ns/pF) C _L
	15		55	110	ns	47 ns + (0,16 ns/pF) C _L
LOW to HIGH	5	t _{PLH}	150	300	ns	123 ns + (0,55 ns/pF) C _L
	10		70	140	ns	59 ns + (0,23 ns/pF) C _L
	15		55	110	ns	47 ns + (0,16 ns/pF) C _L
STR $\rightarrow$ O _n	5		110	220	ns	83 ns + (0,55 ns/pF) C _L
HIGH to LOW	10	t _{PHL}	50	100	ns	39 ns + (0,23 ns/pF) C _L
	15		35	70	ns	27 ns + (0,16 ns/pF) C _L
LOW to HIGH	5	t _{PLH}	100	200	ns	73 ns + (0,55 ns/pF) C _L
	10		45	90	ns	34 ns + (0,23 ns/pF) C _L
	15		35	70	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
LOW to HIGH	5	t _{TLH}	60	120	ns	10 ns + (1,0 ns/pF) C _L
	10		30	60	ns	9 ns + (0,42 ns/pF) C _L
	15		20	40	ns	6 ns + (0,28 ns/pF) C _L

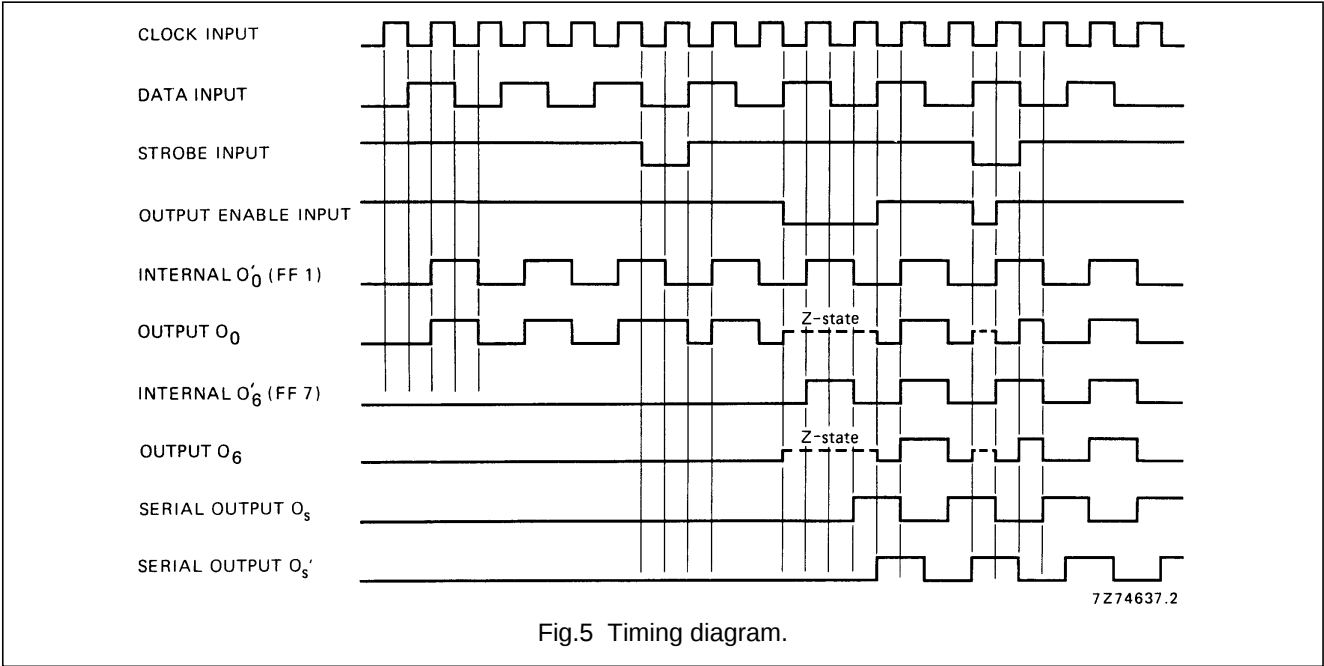
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HEF4094B
MSI**AC CHARACTERISTICS** $V_{SS} = 0\text{ V}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$; $C_L = 50\text{ pF}$; input transition times $\leq 20\text{ ns}$

	V_{DD} V	SYMBOL	MIN.	TYP.	MAX.	
3-state propagation delays						
Output enable times	5			40	80	ns
EO $\rightarrow$ O _n	10	t_{PZH}		25	50	ns
HIGH	15			20	40	ns
LOW	5	t_{PZL}		40	80	ns
	10			25	50	ns
	15			20	40	ns
Output disable times	5			75	150	ns
EO $\rightarrow$ O _n	10	t_{PHZ}		40	80	ns
HIGH	15			30	60	ns
LOW	5	t_{PLZ}		80	160	ns
	10			40	80	ns
	15			30	60	ns
Minimum clock pulse width	5	t_{WCPL}	60	30		ns
LOW	10		30	15		ns
	15		24	12		ns
Minimum strobe pulse width	5	t_{WSTRH}	40	20		ns
HIGH	10		30	15		ns
	15		24	12		ns
Set-up times	5	t_{su}	60	30		ns
D $\rightarrow$ CP	10		20	10		ns
	15		15	5		ns
Hold times	5	t_{hold}	5	-15		ns
D $\rightarrow$ CP	10		20	5		ns
	15		20	5		ns
Maximum clock pulse frequency	5	f_{max}	5	10		MHz
	10		11	22		MHz
	15		14	28		MHz

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APPLICATION INFORMATION

Some examples of applications for the HEF4094B are:

- Serial-to-parallel data conversion
- Remote control holding register

