

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

HEF4517B

LSI

Dual 64-bit static shift register

Product specification
File under Integrated Circuits, IC04

January 1995

Dual 64-bit static shift register

HEF4517B

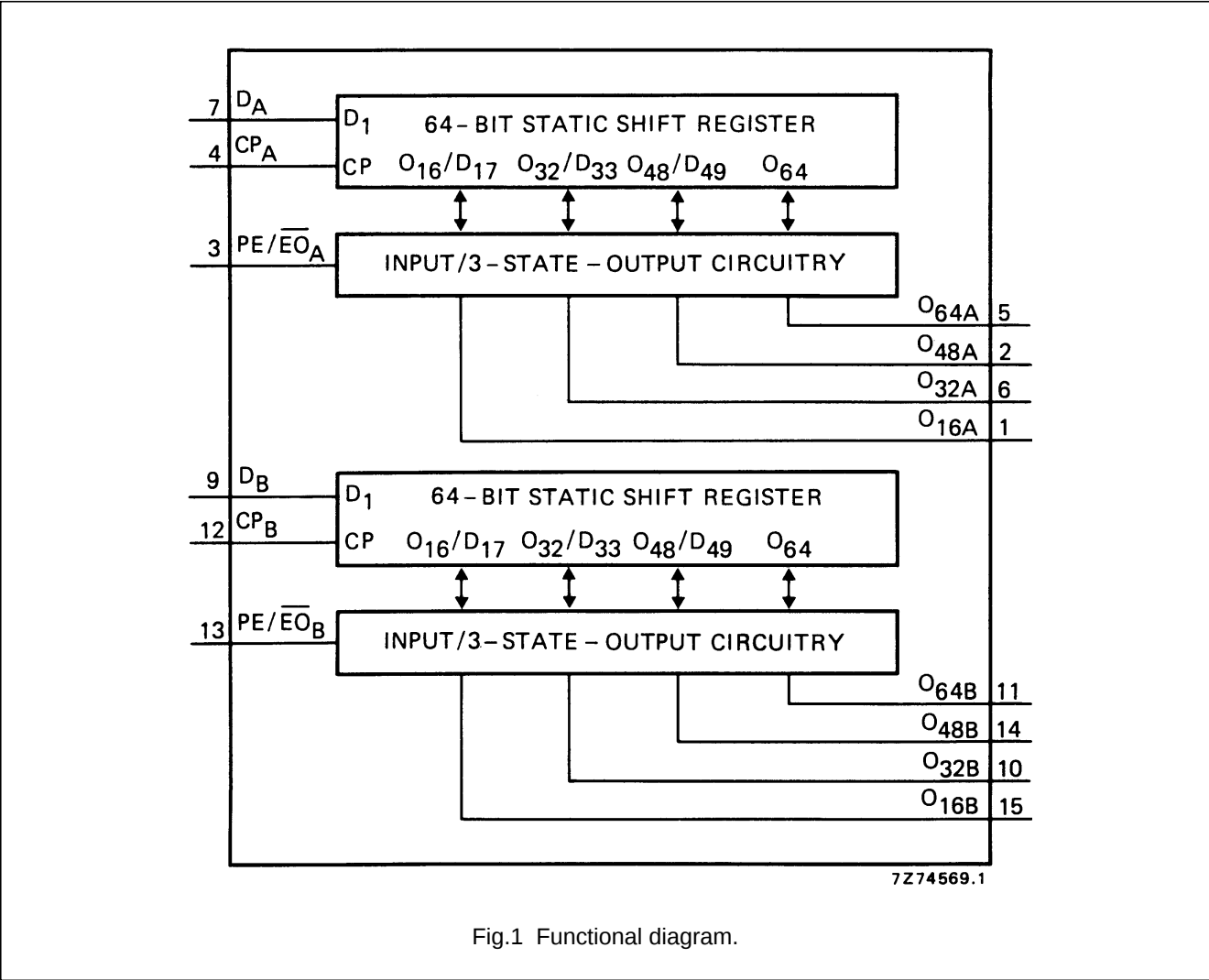
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DESCRIPTION

The HEF4517B consists of two identical, independent 64-bit static shift registers. Each register has separate clock (CP), data input (D), parallel input-enable/output-enable ($PE/\overline{EO}$) and four 3-state outputs of the 16th, 32nd, 48th and 64th bit positions (O_{16} to O_{64}). Data at the D input is entered into the first bit on the LOW to HIGH transition of the clock, regardless of the state of $PE/\overline{EO}$.

When $PE/\overline{EO}$ is LOW the outputs are enabled and the device is in the 64-bit serial mode.

When $PE/\overline{EO}$ is HIGH the outputs are disabled (high impedance OFF-state), the 64-bit shift register is divided into four 16-bit shift registers with D, O_{16} , O_{32} and O_{48} as data inputs of the 1st, 17th, 33rd, and 49th bit respectively. Schmitt-trigger action in the clock input makes the circuit highly tolerant to slower clock rise and fall times.



FAMILY DATA, I_{DD} LIMITS category LSI

See Family Specifications

Dual 64-bit static shift register

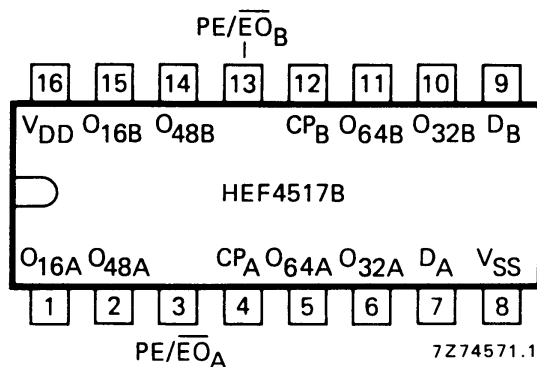
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Fig.2 Pinning diagram.

HEF4517BP(N): 16-lead DIL; plastic (SOT38-1)

HEF4517BD(F): 16-lead DIL; ceramic (cerdip) (SOT74)

HEF4517BT(D): 16-lead SO; plastic (SOT109-1)

(): Package Designator North America

PINNING

CP_A, CP_B	clock inputs
$PE/\overline{EO}_A, PE/\overline{EO}_B$	parallel input-enable/output-enable inputs
D_A, D_B	data inputs
$O_{16A}, O_{32A}, O_{48A}$	3-state outputs/inputs
$O_{16B}, O_{32B}, O_{48B}$	3-state outputs/inputs
O_{64A}, O_{64B}	3-state outputs

Dual 64-bit static shift register

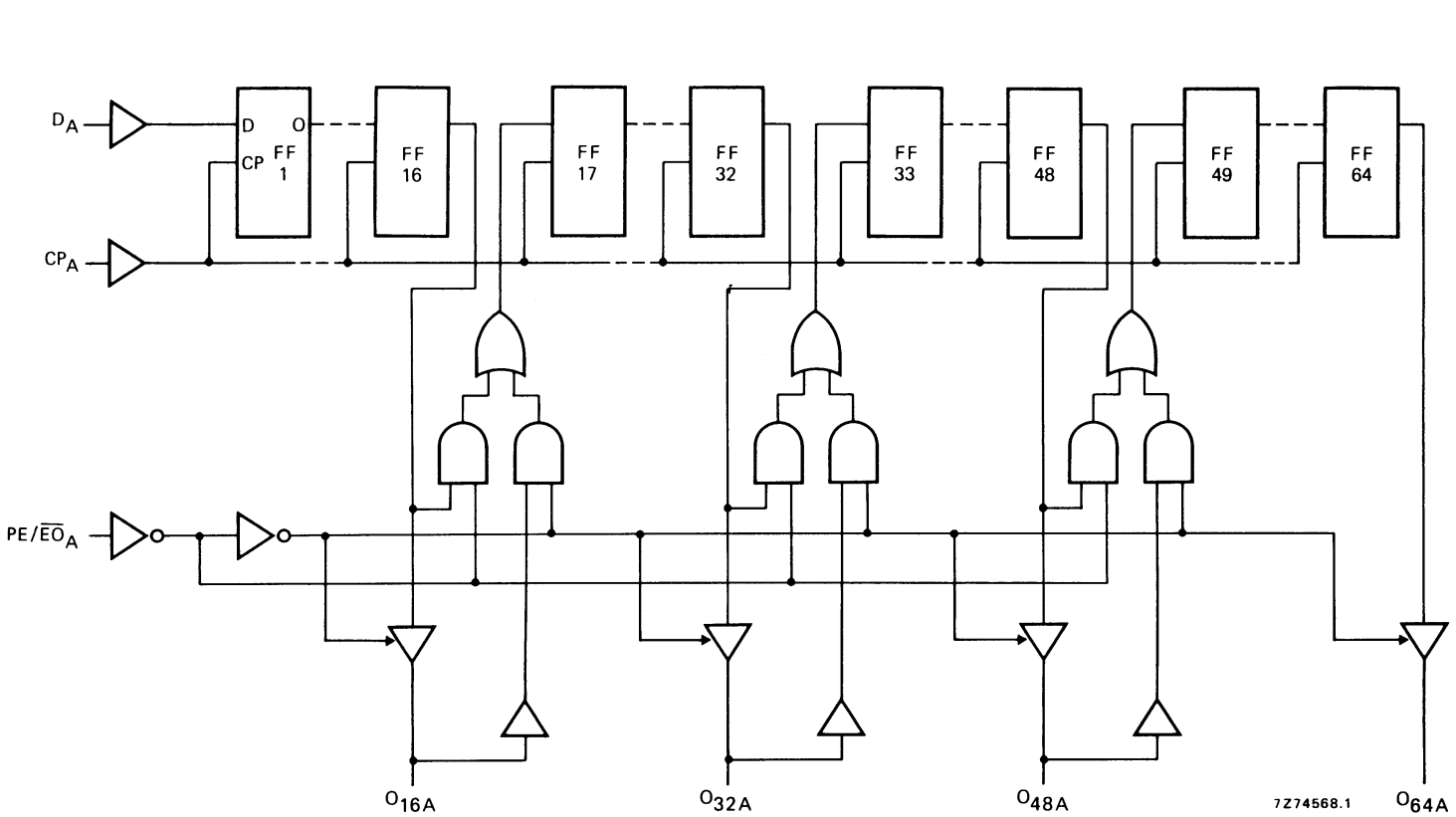
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Fig.3 Logic diagram (one shift register).

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FUNCTION TABLE

INPUTS			INPUTS/OUTPUTS				MODE
CP	D	PE/ $\overline{\text{EO}}$	O ₁₆	O ₃₂	O ₄₈	O ₆₄	
	data entered into 1st bit	L	content of 16th bit displayed	content of 32nd bit displayed	content of 48th bit displayed	content of 64th bit displayed	One 64-bit shift register. The content of the shift register is shifted over one stage
	data entered into 1st bit	H	data at O ₁₆ entered into 17th bit	data at O ₃₂ entered into 33rd bit	data at O ₄₈ entered into 49th bit	remains in 'Z' state	Four 16-bit shift register. The content of the shift registers is shifted over one stage.
	X	L	no change	no change	no change	no change	no change
	X	H	Z	Z	Z	Z	no change

Notes

- 1. H = HIGH state (the more positive voltage)
L = LOW state (the less positive voltage)
X = state is immaterial
Z = high impedance state
 = positive-going transition
 = negative-going transition

Dual 64-bit static shift register

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	V_{DD} V	TYPICAL FORMULA FOR P (μW)	
Dynamic power dissipation per package (P)	5 10 15	$7\,000 f_i + \sum (f_o C_L) \times V_{DD}^2$ $28\,000 f_i + \sum (f_o C_L) \times V_{DD}^2$ $70\,000 f_i + \sum (f_o C_L) \times V_{DD}^2$	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)

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						
CP $\rightarrow$ O _n	5			220	440 ns	193 ns + (0,55 ns/pF) C_L
HIGH to LOW	10	t_{PHL}		85	170 ns	74 ns + (0,23 ns/pF) C_L
	15			60	120 ns	52 ns + (0,16 ns/pF) C_L
LOW to HIGH	5			190	380 ns	163 ns + (0,55 ns/pF) C_L
	10	t_{PLH}		75	150 ns	64 ns + (0,23 ns/pF) C_L
	15			50	100 ns	42 ns + (0,16 ns/pF) C_L
Output transition times						
HIGH to LOW	5			60	120 ns	10 ns + (1,0 ns/pF) C_L
	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			60	120 ns	10 ns + (1,0 ns/pF) C_L
	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

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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	MIN.	TYP.	MAX.	
Minimum clock pulse width; LOW	5 10 15	t_{WCPL}		95 40 30	190 80 60	ns
Set-up times $O_n, D \rightarrow CP$	5 10 15	t_{su}	30 25 20	10 5 5		ns
Hold time $O_n, D \rightarrow CP$	5 10 15	t_{hold}	45 30 25	15 10 10		ns
3-state propagation delays						
Output disable times $PE/\overline{EO} \rightarrow O_n$ HIGH	5 10 15	t_{PHZ}		40 30 25	80 60 50	ns
LOW	5 10 15	t_{PLZ}		50 30 25	100 60 50	ns
Output enable times $PE/\overline{EO} \rightarrow O_n$ HIGH	5 10 15	t_{PZH}		45 25 20	90 50 40	ns
LOW	5 10 15	t_{PZL}		60 30 25	120 60 50	ns
Maximum clock pulse frequency	5 10 15	f_{max}	2 6 8	5 12 16		MHz

see also waveforms
Fig.4.

Dual 64-bit static shift register

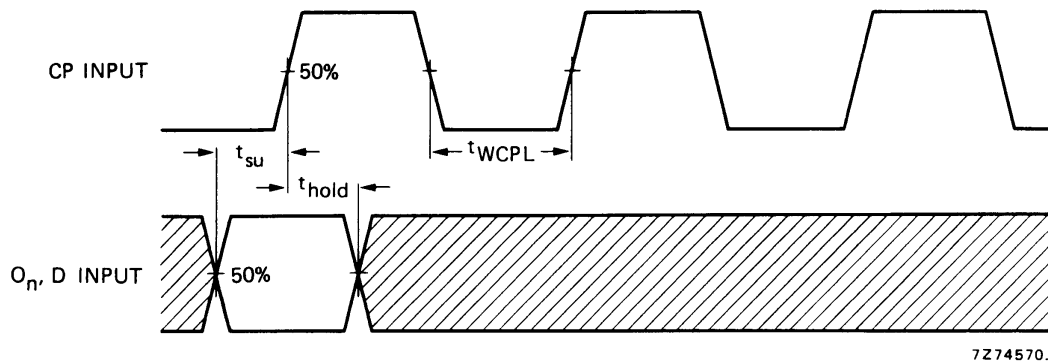
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Fig.4 Waveforms showing minimum clock pulse width, set-up and hold times for O_n (as data input) and D to CP.