

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

HEF4508B **MSI** Dual 4-bit latch

Product specification
File under Integrated Circuits, IC04

January 1995

Dual 4-bit latch

HEF4508B
MSI

DESCRIPTION

The HEF4508B is a dual 4-bit latch, which consists of two identical independent 4-bit latches with separate strobe (ST), master reset (MR), output-enable input (\overline{EO}) and 3-state outputs (O).

With the ST input in the HIGH state, the data on the D inputs appear at the corresponding outputs provided \overline{EO} is LOW. Changing the ST input to the LOW state locks the

data into the latch. A HIGH on the reset line forces the outputs to a LOW level regardless of the state of the ST input. The 3-state outputs are controlled by the output-enable input. A HIGH on \overline{EO} causes the outputs to assume a high impedance OFF-state regardless of other input conditions. This allows the outputs to interface directly with bus orientated systems. When \overline{EO} is LOW the contents of the latches are available at the outputs.

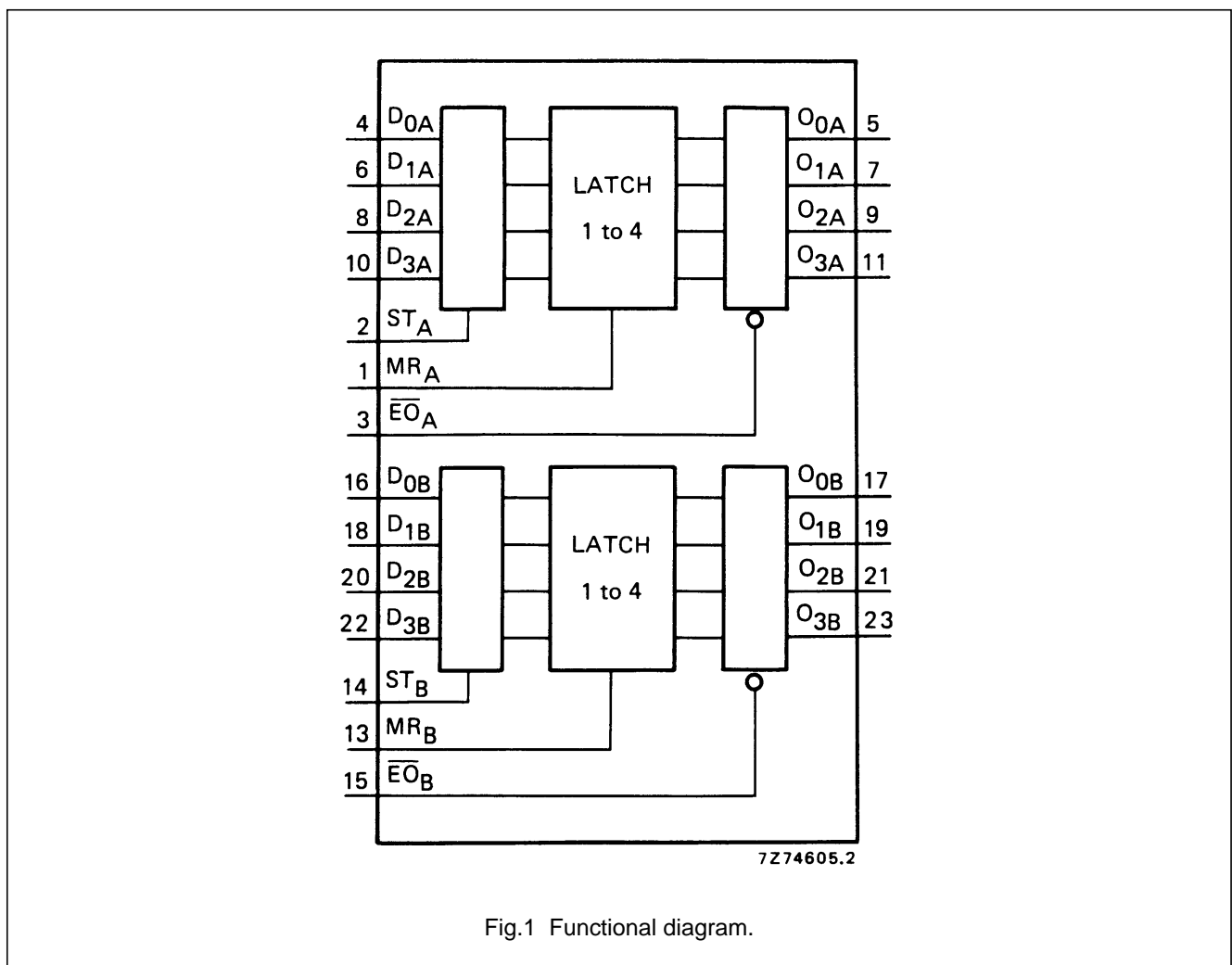


Fig.1 Functional diagram.

FAMILY DATA, I_{DD} LIMITS category MSI

See Family Specifications

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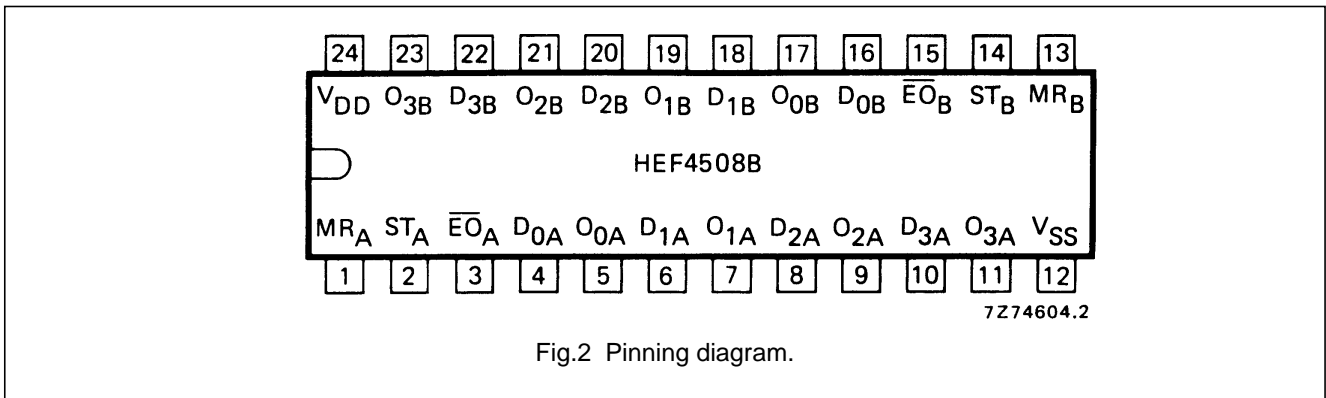


Fig.2 Pinning diagram.

- HEF4508BP(N): 24-lead DIL; plastic (SOT101-1)
 - HEF4508BD(F): 24-lead DIL; ceramic (cerdip) (SOT94)
 - HEF4508BT(D): 24-lead SO; plastic (SOT137-1)
- (): Package Designator North America

PINNING

- D_{0A} to D_{3A}, D_{0B} to D_{3B} data inputs
- ST_A, ST_B strobe inputs
- MR_A, MR_B master reset inputs
- \overline{EO}_A , \overline{EO}_B output enable inputs
- O_{0A} to O_{3A}, O_{0B} to O_{3B} 3-state outputs

FUNCTION TABLE

INPUTS				OUTPUT
MR	ST	\overline{EO}	D _n	O _n
L	H	L	H	H
L	H	L	L	L
L	L	L	X	latched
H	X	L	X	L
X	X	H	X	Z

Notes

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

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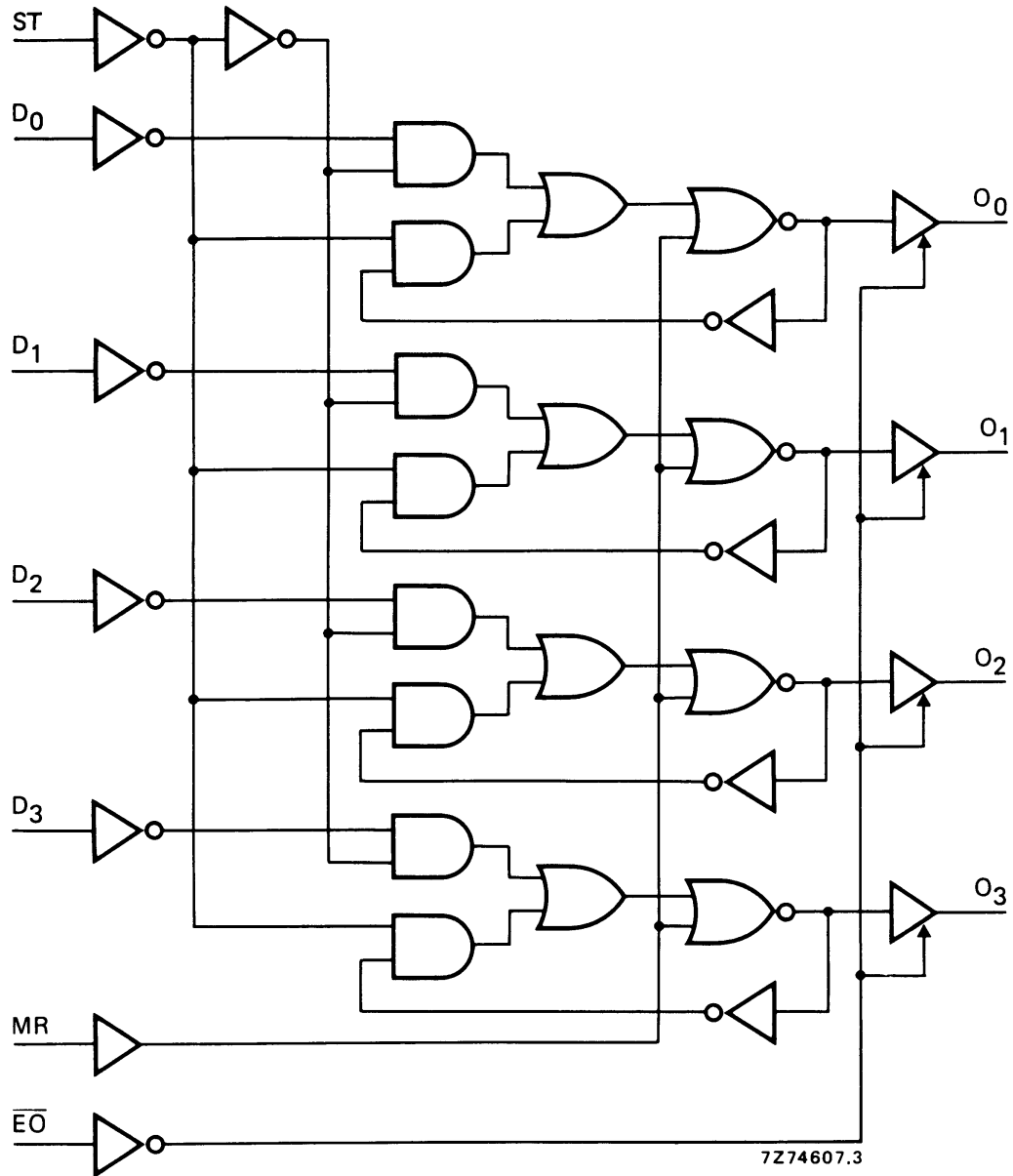


Fig.3 Logic diagram (one 4-bit latch).

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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	5	t_{PHL}		115	230	ns	$88 \text{ ns} + (0,55 \text{ ns/pF}) C_L$		
				ST \rightarrow O_n	50	100		ns	$39 \text{ ns} + (0,23 \text{ ns/pF}) C_L$
				HIGH to LOW	35	70		ns	$27 \text{ ns} + (0,16 \text{ ns/pF}) C_L$
	5	t_{PLH}		115	230	ns	$88 \text{ ns} + (0,55 \text{ ns/pF}) C_L$		
				LOW to HIGH	50	100		ns	$39 \text{ ns} + (0,23 \text{ ns/pF}) C_L$
					35	70		ns	$27 \text{ ns} + (0,16 \text{ ns/pF}) C_L$
	5	t_{PHL}		95	190	ns	$68 \text{ ns} + (0,55 \text{ ns/pF}) C_L$		
				$D_n \rightarrow O_n$	40	80		ns	$29 \text{ ns} + (0,23 \text{ ns/pF}) C_L$
				HIGH to LOW	30	60		ns	$22 \text{ ns} + (0,16 \text{ ns/pF}) C_L$
	5	t_{PLH}		95	190	ns	$68 \text{ ns} + (0,55 \text{ ns/pF}) C_L$		
				LOW to HIGH	40	80		ns	$29 \text{ ns} + (0,23 \text{ ns/pF}) C_L$
					30	60		ns	$22 \text{ ns} + (0,16 \text{ ns/pF}) C_L$
5	t_{PHL}		100	200	ns	$73 \text{ ns} + (0,55 \text{ ns/pF}) C_L$			
			MR $\rightarrow O_n$	40	80		ns	$29 \text{ ns} + (0,23 \text{ ns/pF}) C_L$	
			HIGH to LOW	30	60		ns	$22 \text{ ns} + (0,16 \text{ ns/pF}) C_L$	
Output transition times	5	t_{THL}		60	120	ns	$10 \text{ ns} + (1,0 \text{ ns/pF}) C_L$		
				HIGH to LOW	30	60		ns	$9 \text{ ns} + (0,42 \text{ ns/pF}) C_L$
					20	40		ns	$6 \text{ ns} + (0,28 \text{ ns/pF}) C_L$
	5	t_{TLH}		60	120	ns	$10 \text{ ns} + (1,0 \text{ ns/pF}) C_L$		
				LOW to HIGH	30	60		ns	$9 \text{ ns} + (0,42 \text{ ns/pF}) C_L$
					20	40		ns	$6 \text{ ns} + (0,28 \text{ ns/pF}) C_L$
3-state propagation delays	5	t_{PZH}		45	90	ns			
				Output enable times	20	40		ns	
				$\overline{E}O \rightarrow O_n$	18	36		ns	
	5	t_{PZL}		45	90	ns			
				LOW	20	40		ns	
					18	36		ns	
	5	t_{PHZ}		35	70	ns			
				Output disable times	20	40		ns	
				$\overline{E}O \rightarrow O_n$	18	36		ns	
	5	t_{PLZ}		45	90	ns			
				LOW	20	40		ns	
					18	36		ns	

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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.	
Minimum ST pulse width; HIGH	5	t_{WSTH}	50	25	ns	see also waveforms Fig.4
	10		30	15	ns	
	15		20	10	ns	
Minimum MR pulse width; HIGH	5	t_{WMRH}	40	20	ns	
	10		24	12	ns	
	15		20	10	ns	
Recovery time for MR	5	t_{RMR}	20	0	ns	
	10		20	0	ns	
	15		15	0	ns	
Set-up times $D_n \rightarrow ST$	5	t_{su}	35	10	ns	
	10		25	5	ns	
	15		20	0	ns	
Hold times $D_n \rightarrow ST$	5	t_{hold}	20	0	ns	
	10		20	0	ns	
	15		15	0	ns	

	V_{DD} V	TYPICAL FORMULA FOR P (μW)	
Dynamic power dissipation per package (P)	5	$2\,000 f_i + \sum (f_o C_L) \times V_{DD}^2$	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)
	10	$9\,000 f_i + \sum (f_o C_L) \times V_{DD}^2$	
	15	$25\,000 f_i + \sum (f_o C_L) \times V_{DD}^2$	

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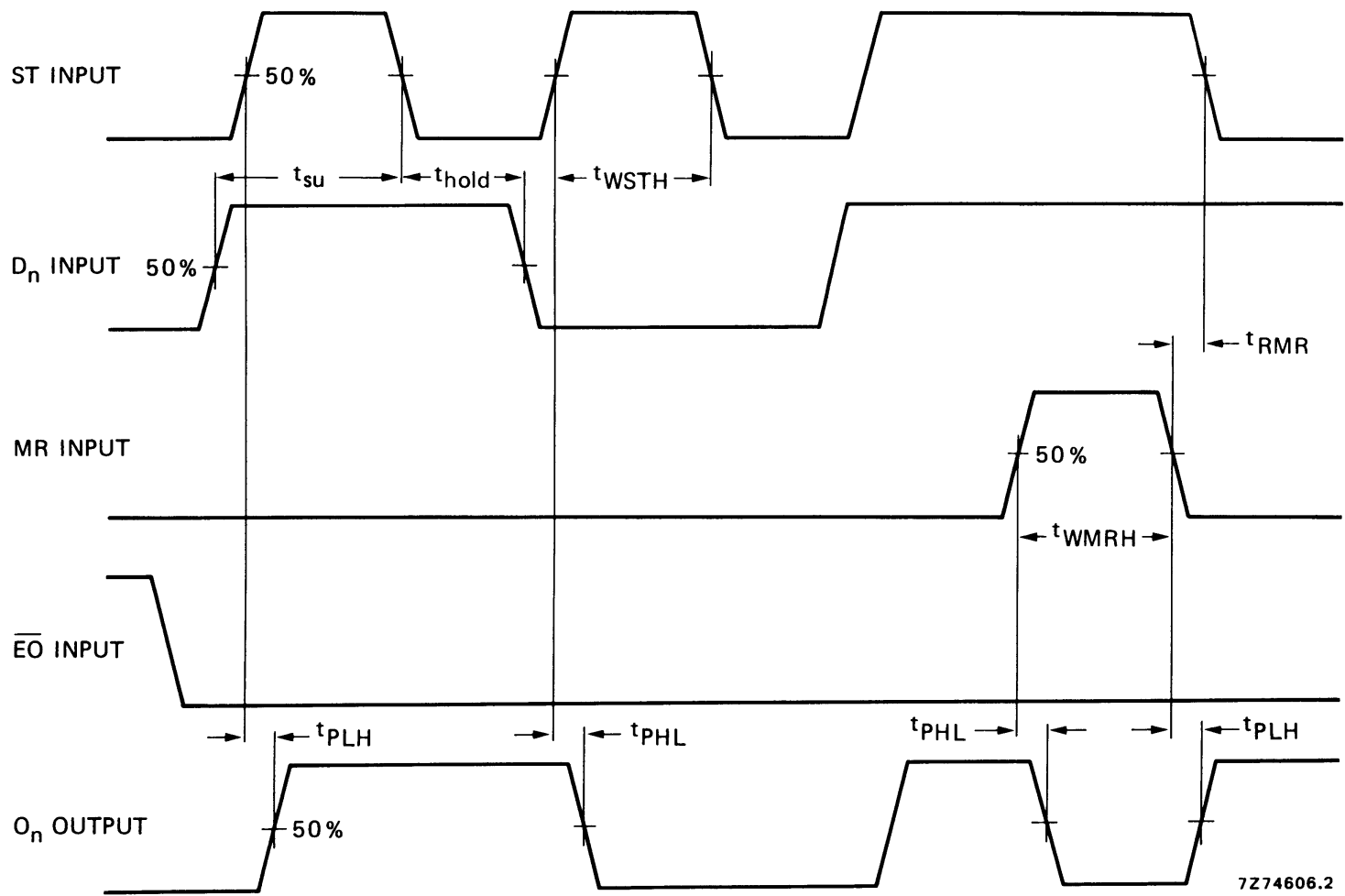


Fig.4 Waveforms showing minimum ST and MR pulse widths, set-up and hold times for D_n to ST, recovery time for MR and propagation delays from ST to O_n, to D_n to O_n and MR to O_n.

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APPLICATION INFORMATION

Some examples of application for the HEF4508B are:

- Buffer storage
- Holding registers
- Data storage and multiplexing

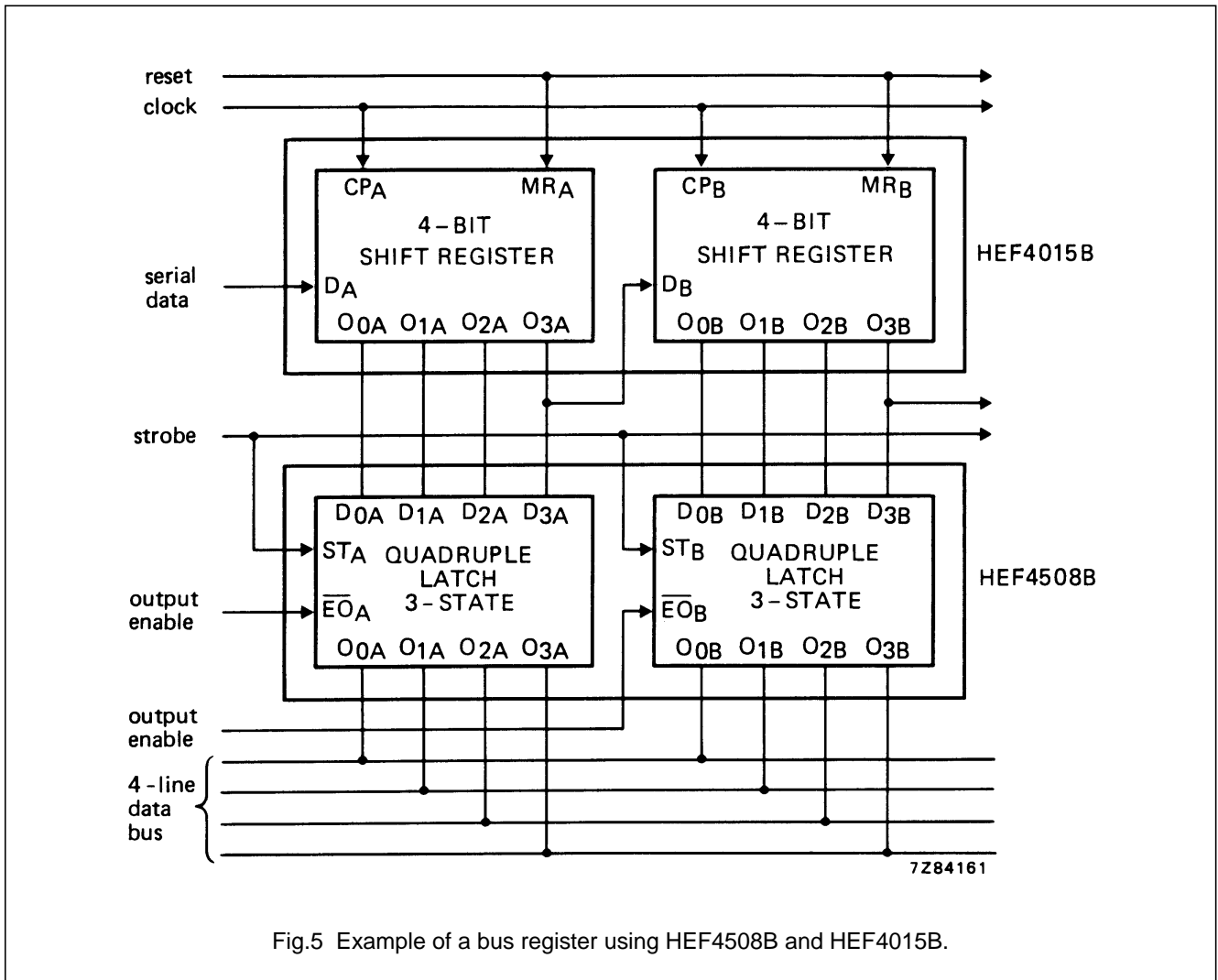


Fig.5 Example of a bus register using HEF4508B and HEF4015B.

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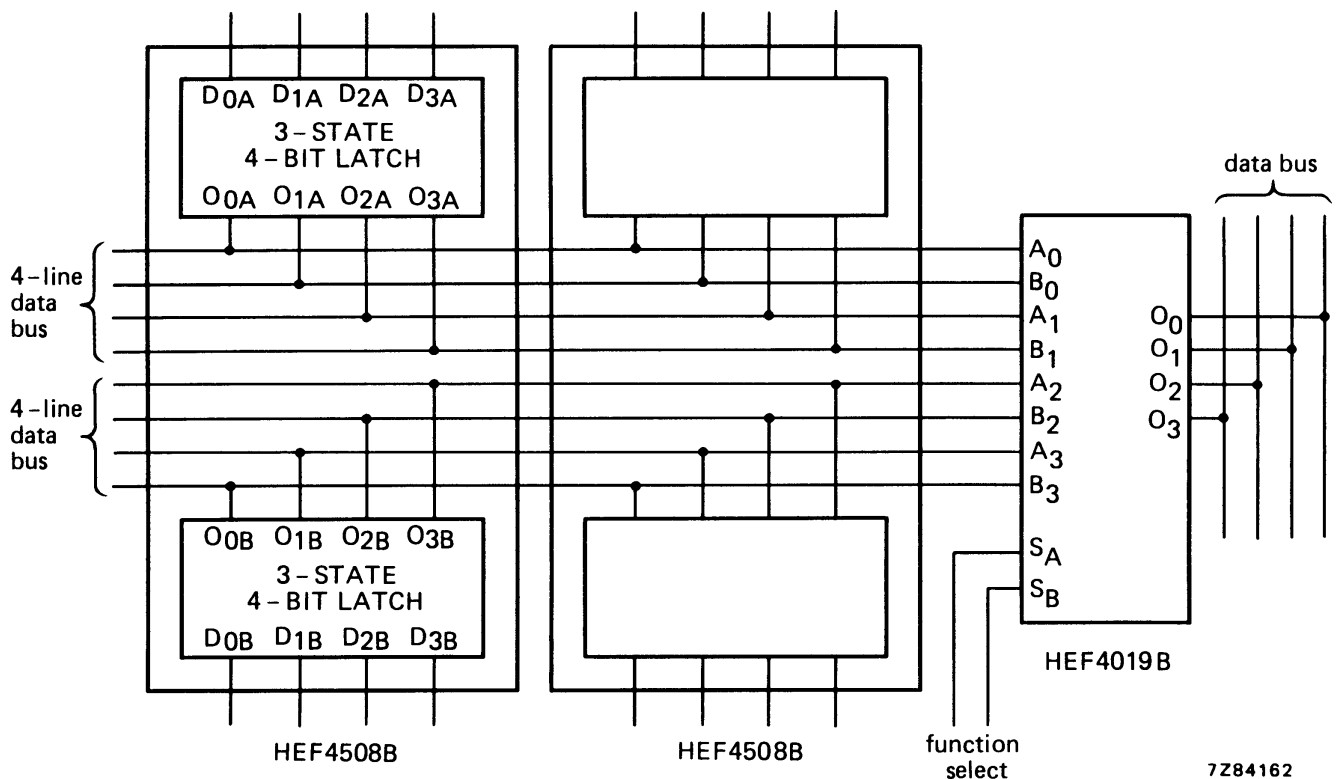


Fig.6 Example of a dual multiplexed bus register with function select using two HEF4508B and one HEF4019B.

FUNCTION SELECT

S _A	S _B	FUNCTION
L	L	inhibit (all L)
H	L	select A bus
L	H	select B bus
H	H	A ₁ + B ₁