

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

HEF4514B

MSI

1-of-16 decoder/demultiplexer with input latches

Product specification
File under Integrated Circuits, IC04

January 1995

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DESCRIPTION

The HEF4514B is a 1-of-16 decoder/demultiplexer, having four binary weighted address inputs (A_0 to A_3), a latch enable input (EL), and an active LOW enable input (\bar{E}). The 16 outputs (O_0 to O_{15}) are mutually exclusive active HIGH. When EL is HIGH, the selected output is determined by the data on A_n . When EL goes LOW, the

last data present at A_n are stored in the latches and the outputs remain stable. When \bar{E} is LOW, the selected output, determined by the contents of the latch, is HIGH. At \bar{E} HIGH, all outputs are LOW. The enable input (\bar{E}) does not affect the state of the latch. When the HEF4514B is used as a demultiplexer, \bar{E} is the data input and A_0 to A_3 are the address inputs.

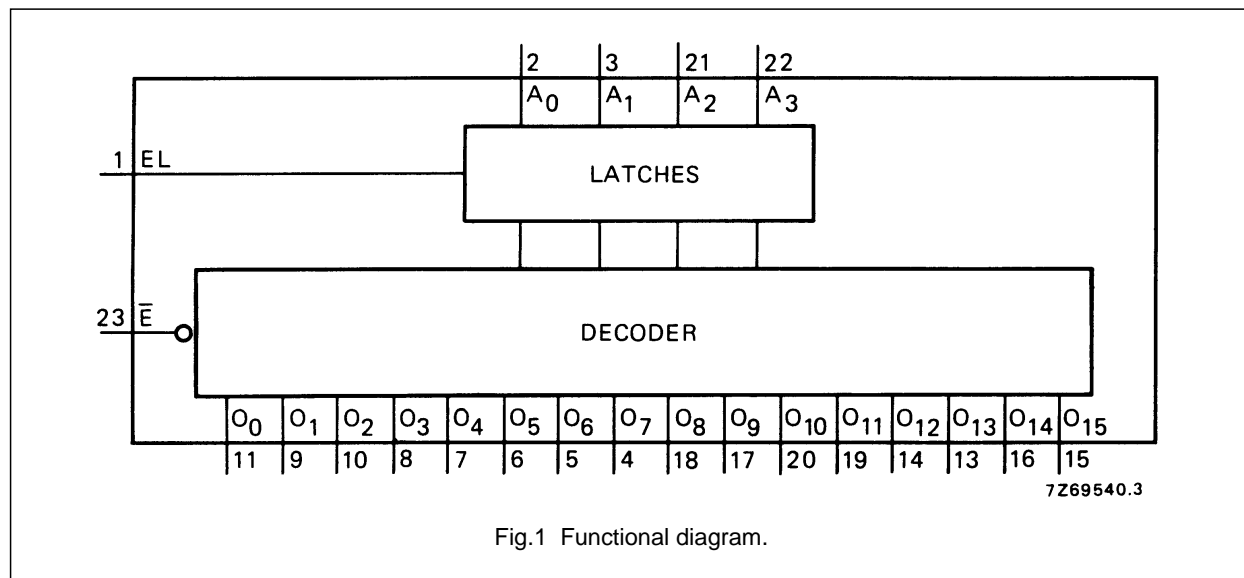


Fig.1 Functional diagram.

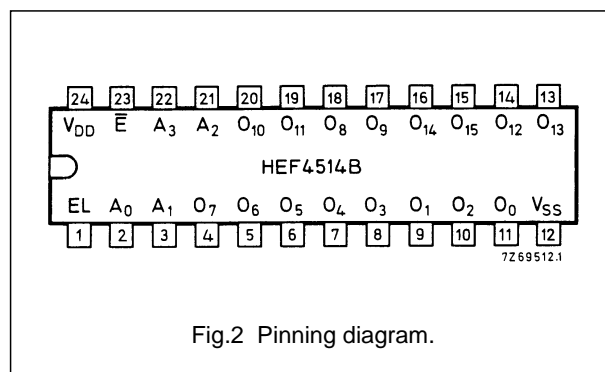


Fig.2 Pinning diagram.

PINNING

- A_0 to A_3 address inputs
- \bar{E} enable input (active LOW)
- EL latch enable input
- O_0 to O_{15} outputs (active HIGH)

- HEF4514BP(N): 24-lead DIL; plastic (SOT101-1)
- HEF4514BD(F): 24-lead DIL; ceramic (cerdip) (SOT94)
- HEF4514BT(D): 24-lead SO; plastic (SOT137-1)
- (): Package Designator North America

APPLICATION INFORMATION

Some examples of applications for the HEF4514B are:

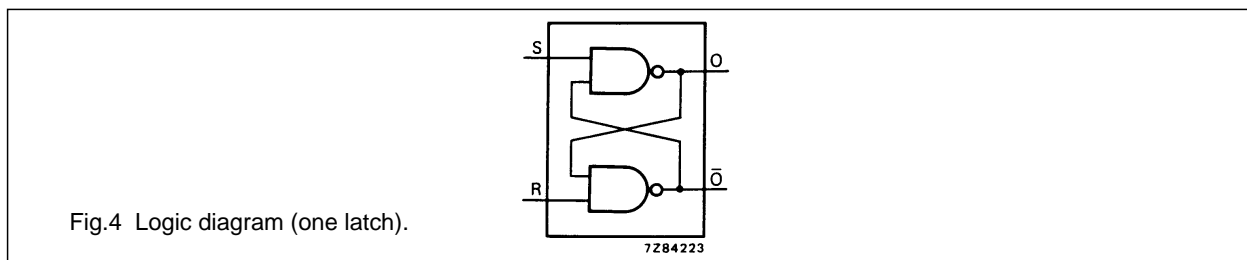
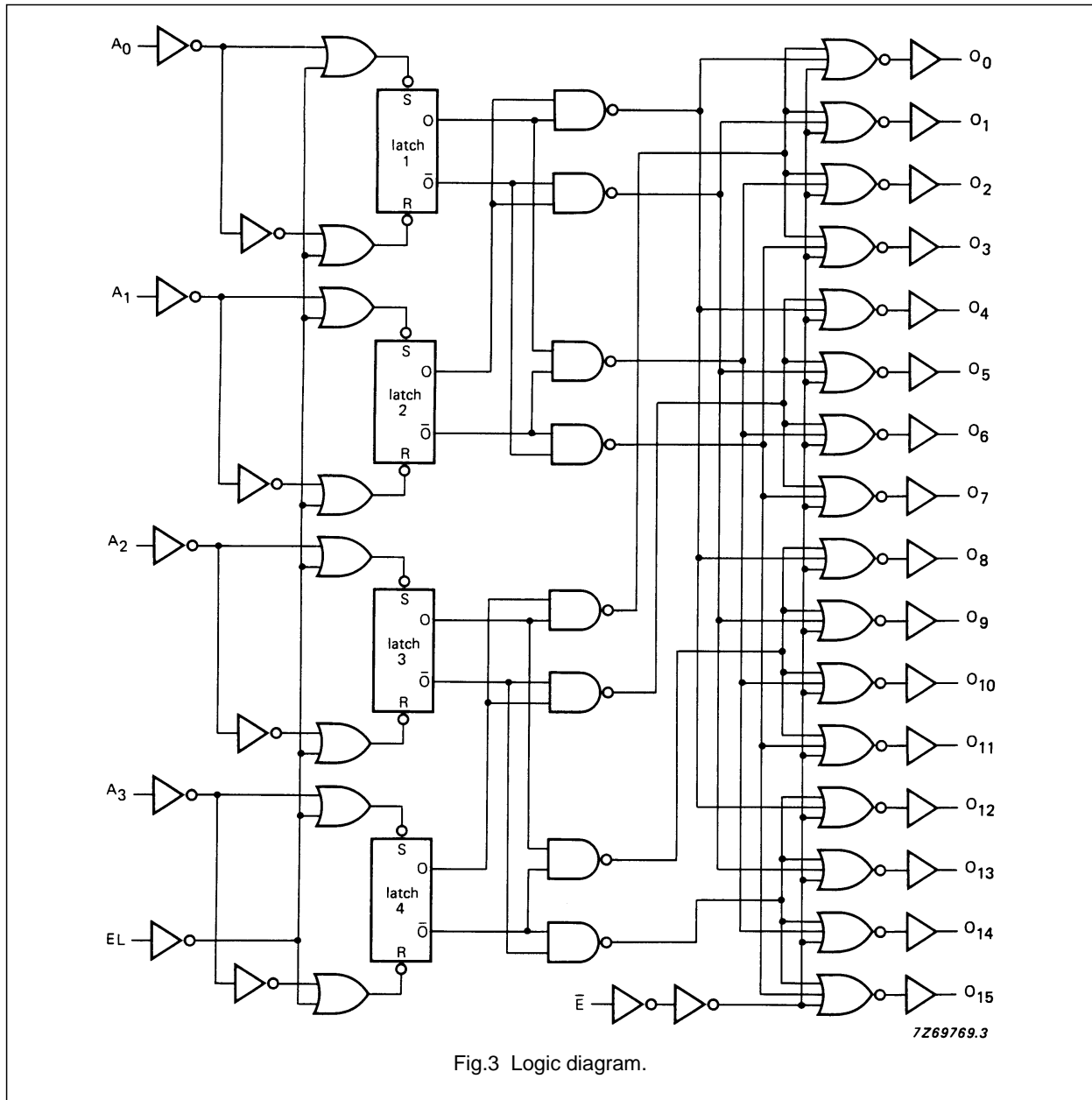
- Digital multiplexing.
- Address decoding.
- Hexadecimal/BCD decoding.

FAMILY DATA, I_{DD} LIMITS category MSI

See Family Specifications

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TRUTH TABLE

INPUTS					OUTPUTS																
\bar{E}	A ₀	A ₁	A ₂	A ₃	O ₀	O ₁	O ₂	O ₃	O ₄	O ₅	O ₆	O ₇	O ₈	O ₉	O ₁₀	O ₁₁	O ₁₂	O ₁₃	O ₁₄	O ₁₅	
H	X	X	X	X	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
L	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
L	H	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
L	L	H	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L
L	H	H	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L
L	L	L	H	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L
L	H	L	H	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L
L	L	H	H	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L
L	H	H	H	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L
L	L	L	L	H	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L
L	H	L	L	H	L	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L
L	H	H	L	H	L	L	L	L	L	L	L	L	L	L	L	H	L	L	L	L	L
L	L	L	H	H	L	L	L	L	L	L	L	L	L	L	L	H	L	L	L	L	L
L	H	L	H	H	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L	L	L
L	L	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L	L
L	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H

Notes

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

AC CHARACTERISTICS

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

	V _{DD} V	SYMBOL	TYP.	MAX.		TYPICAL EXTRAPOLATION FORMULA
Propagation delays						
A _n , EL → O _n	5		260	520	ns	233 ns + (0,55 ns/pF) C _L
HIGH to LOW	10	t _{PHL}	95	190	ns	84 ns + (0,23 ns/pF) C _L
	15		65	130	ns	57 ns + (0,16 ns/pF) C _L
LOW to HIGH	5		270	550	ns	243 ns + (0,55 ns/pF) C _L
	10	t _{PLH}	95	190	ns	84 ns + (0,23 ns/pF) C _L
	15		65	130	ns	57 ns + (0,16 ns/pF) C _L
\bar{E} → O _n	5		175	350	ns	148 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		45	90	ns	37 ns + (0,16 ns/pF) C _L
LOW to HIGH	5		200	400	ns	173 ns + (0,55 ns/pF) C _L
	10	t _{PLH}	70	140	ns	59 ns + (0,23 ns/pF) C _L
	15		50	100	ns	42 ns + (0,16 ns/pF) C _L

1-of-16 decoder/demultiplexer with input latches

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

	V_{DD} V	SYMBOL	MIN.	TYP.	MAX.	TYPICAL EXTRAPOLATION FORMULA
Output transition times HIGH to LOW LOW to HIGH	5	t_{THL}	90	180	ns	$40\text{ ns} + (1,0\text{ ns/pF}) C_L$
	10		35	65	ns	$14\text{ ns} + (0,42\text{ ns/pF}) C_L$
	15		25	50	ns	$11\text{ ns} + (0,28\text{ ns/pF}) C_L$
	5	t_{TLH}	85	170	ns	$35\text{ ns} + (1,0\text{ ns/pF}) C_L$
	10		35	70	ns	$14\text{ ns} + (0,42\text{ ns/pF}) C_L$
	15		25	50	ns	$11\text{ ns} + (0,28\text{ ns/pF}) C_L$
Set-up time $A_n \rightarrow EL$	5	t_{su}	120	60	ns	see also waveforms Fig.5
	10		40	20	ns	
	15		30	15	ns	
Hold time $A_n \rightarrow EL$	5	t_{hold}	0	60	ns	
	10		0	20	ns	
	15		0	15	ns	
Minimum EL pulse width; HIGH	5	t_{WELH}	120	60	ns	
	10		40	20	ns	
	15		30	15	ns	

	V_{DD} V	TYPICAL FORMULA FOR P (μW)	
Dynamic power dissipation per package (P)	5	$1100 f_i + \sum (f_o C_L) \times V_{DD}^2$	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	$5500 f_i + \sum (f_o C_L) \times V_{DD}^2$	
	15	$16\ 000 f_i + \sum (f_o C_L) \times V_{DD}^2$	

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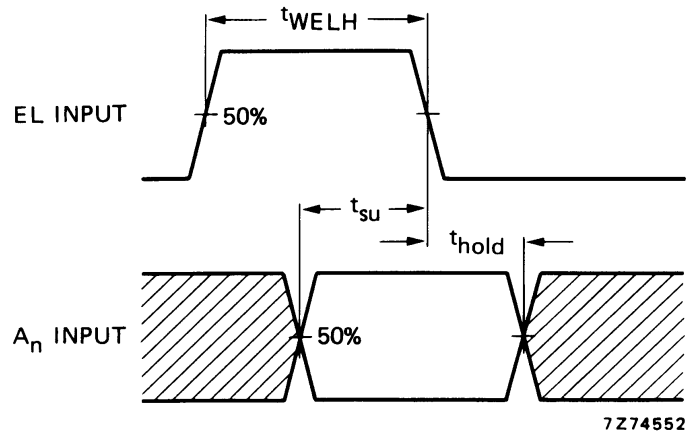
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Fig.5 Waveforms showing minimum pulse width for EL, set-up and hold times for A_n to EL. Set-up and hold times are shown as positive values but may be specified as negative values.