

# 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

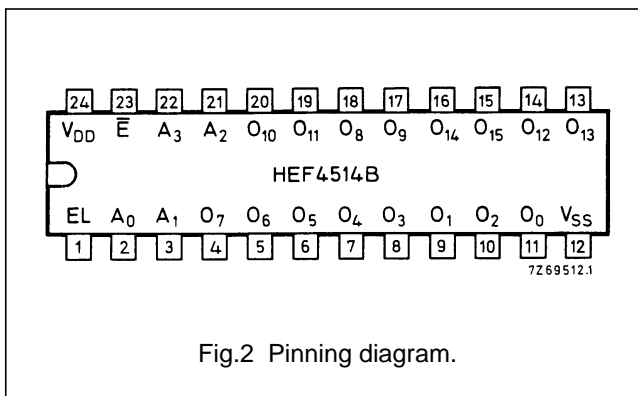
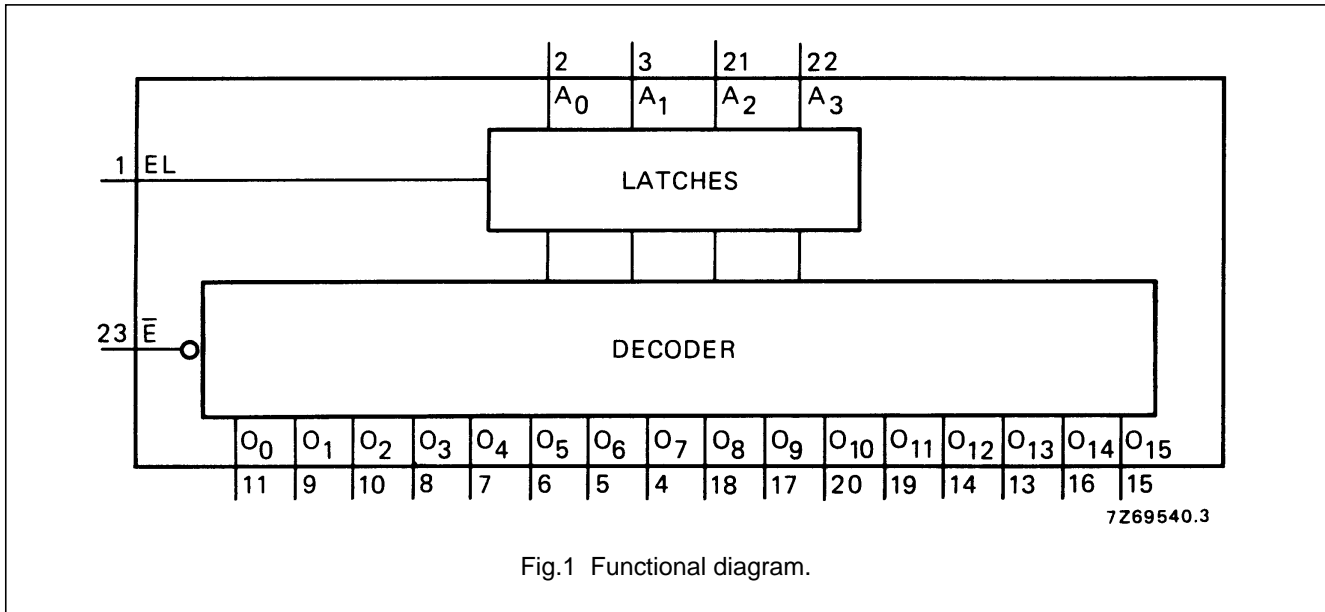
1-of-16 decoder/demultiplexer with input latches

HEF4514B  
MSI

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.



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:

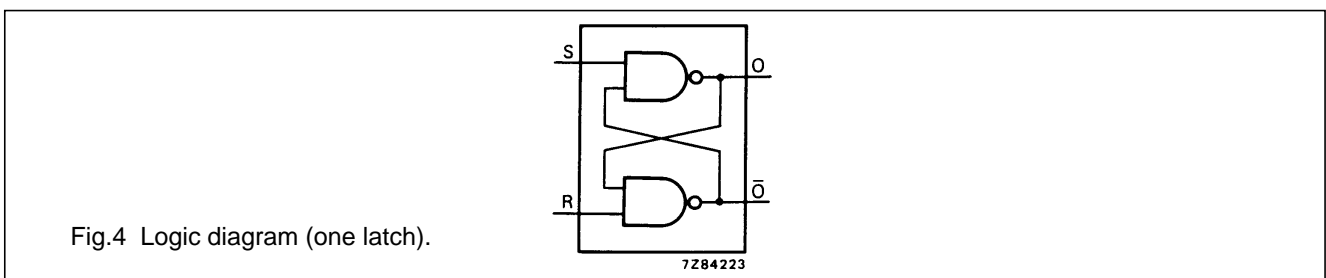
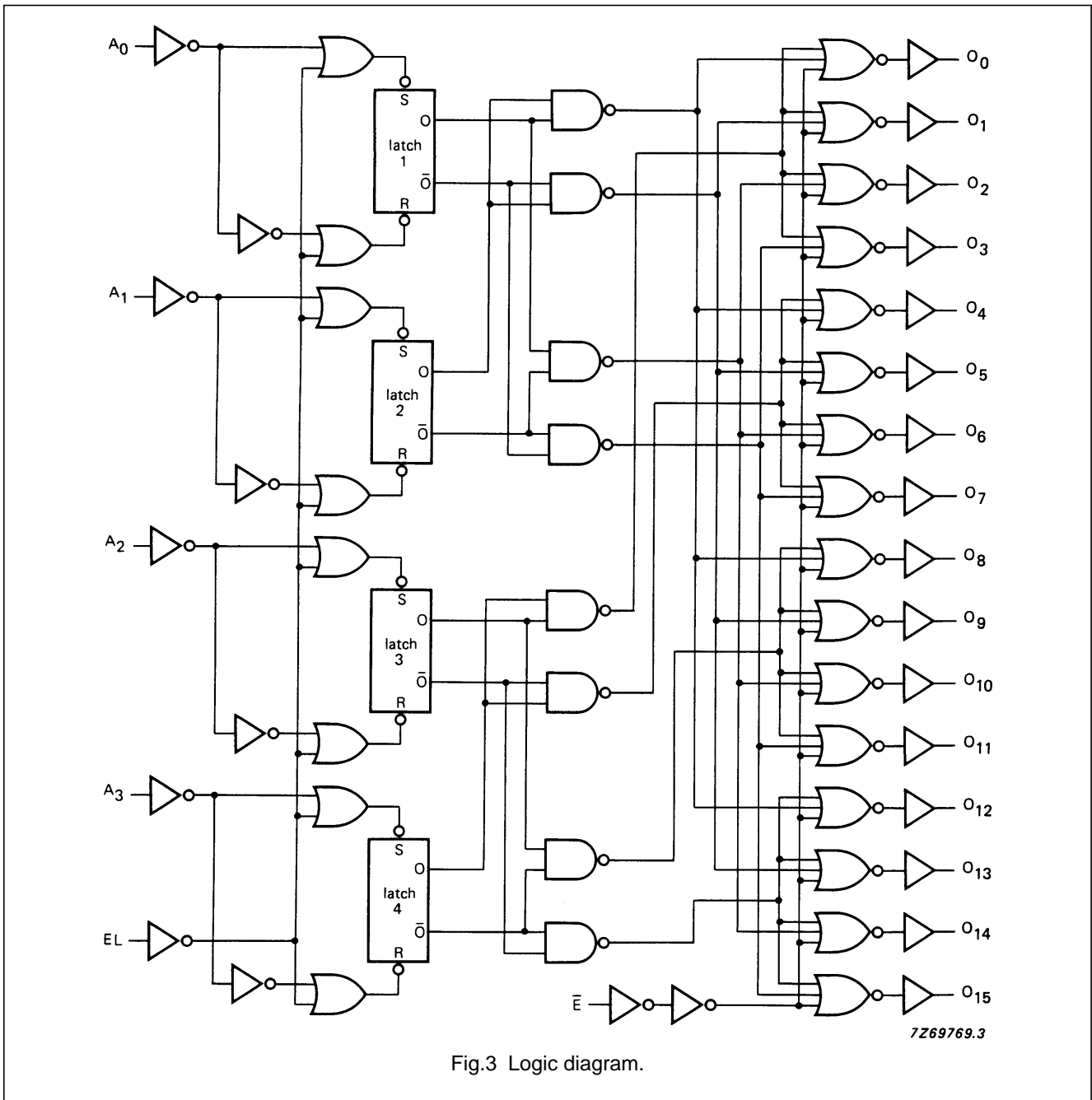
- Digital multiplexing.
- Address decoding.
- Hexadecimal/BCD decoding.

FAMILY DATA,  $I_{DD}$  LIMITS category MSI

See Family Specifications

1-of-16 decoder/demultiplexer with input latches

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TRUTH TABLE

INPUTS					OUTPUTS															
$\bar{E}$	A <sub>0</sub>	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	O <sub>0</sub>	O <sub>1</sub>	O <sub>2</sub>	O <sub>3</sub>	O <sub>4</sub>	O <sub>5</sub>	O <sub>6</sub>	O <sub>7</sub>	O <sub>8</sub>	O <sub>9</sub>	O <sub>10</sub>	O <sub>11</sub>	O <sub>12</sub>	O <sub>13</sub>	O <sub>14</sub>	O <sub>15</sub>
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	H	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	H	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	H	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	H	L	H	L	L	L	L	L	L	H	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	H	H	H	L	L	L	L	L	L	L	H	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	H	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	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L
L	H	H	H	H	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<sub>SS</sub> = 0 V; T<sub>amb</sub> = 25 °C; C<sub>L</sub> = 50 pF; input transition times ≤ 20 ns

	V <sub>DD</sub> V	SYMBOL	TYP.	MAX.		TYPICAL EXTRAPOLATION FORMULA	
Propagation delays A <sub>n</sub> , EL → O <sub>n</sub> HIGH to LOW	5	t <sub>PHL</sub>	260	520	ns	233 ns + (0,55 ns/pF) C <sub>L</sub>	
	10		95	190	ns	84 ns + (0,23 ns/pF) C <sub>L</sub>	
	15		65	130	ns	57 ns + (0,16 ns/pF) C <sub>L</sub>	
	LOW to HIGH	5	t <sub>PLH</sub>	270	550	ns	243 ns + (0,55 ns/pF) C <sub>L</sub>
		10		95	190	ns	84 ns + (0,23 ns/pF) C <sub>L</sub>
		15		65	130	ns	57 ns + (0,16 ns/pF) C <sub>L</sub>
$\bar{E}$ → O <sub>n</sub> HIGH to LOW	5	t <sub>PHL</sub>	175	350	ns	148 ns + (0,55 ns/pF) C <sub>L</sub>	
	10		65	130	ns	54 ns + (0,23 ns/pF) C <sub>L</sub>	
	15		45	90	ns	37 ns + (0,16 ns/pF) C <sub>L</sub>	
	LOW to HIGH	5	t <sub>PLH</sub>	200	400	ns	173 ns + (0,55 ns/pF) C <sub>L</sub>
		10		70	140	ns	59 ns + (0,23 ns/pF) C <sub>L</sub>
		15		50	100	ns	42 ns + (0,16 ns/pF) C <sub>L</sub>

## 1-of-16 decoder/demultiplexer with input latches

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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.	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 $A_n \rightarrow \text{EL}$	5	$t_{su}$	120	60	ns	see also waveforms Fig.5
	10		40	20	ns	
	15		30	15	ns	
Hold time $A_n \rightarrow \text{EL}$	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 ( $\mu\text{W}$ )	
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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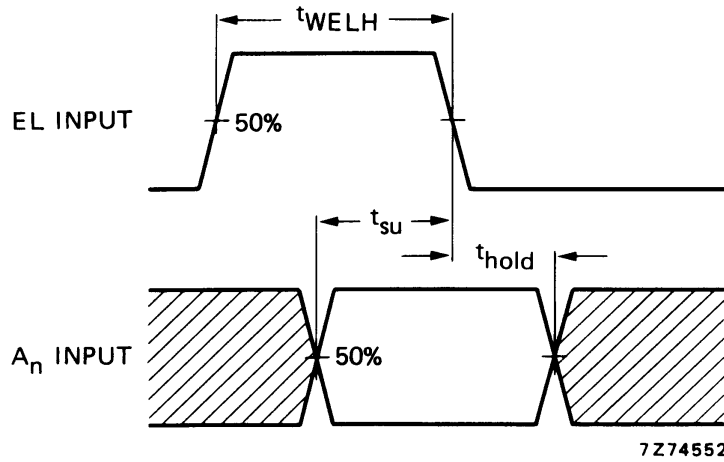


Fig.5 Waveforms showing minimum pulse width for EL, set-up and hold times for  $A_n$  to EL. Set-up and hold times are shown as positive values but may be specified as negative values.