

# 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

## HEF4515B

### 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

**HEF4515B**  
**MSI**

**DESCRIPTION**

The HEF4515B 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 ( $\bar{O}_0$  to  $\bar{O}_{15}$ ) are mutually exclusive active LOW. 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 LOW. At  $\bar{E}$  HIGH, all outputs are HIGH. The enable input ( $\bar{E}$ ) does not affect the state of the latch. When the HEF4515B is used as a demultiplexer,  $\bar{E}$  is the data input and  $A_0$  to  $A_3$  are the address inputs.

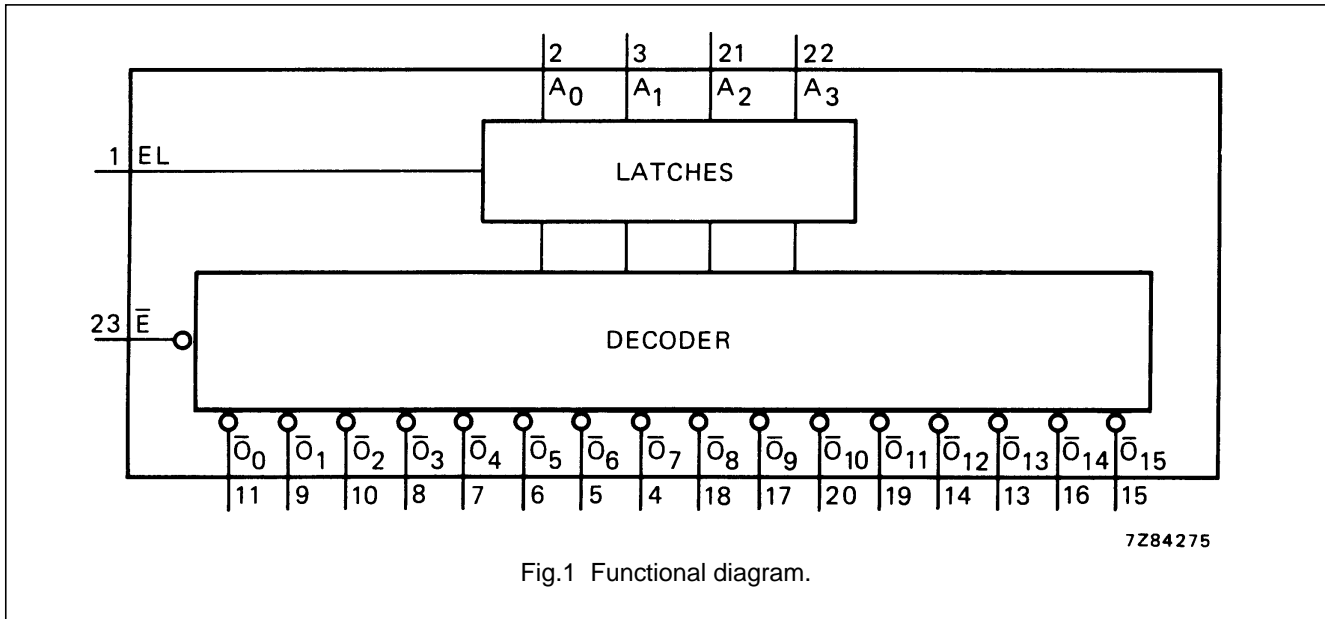


Fig.1 Functional diagram.

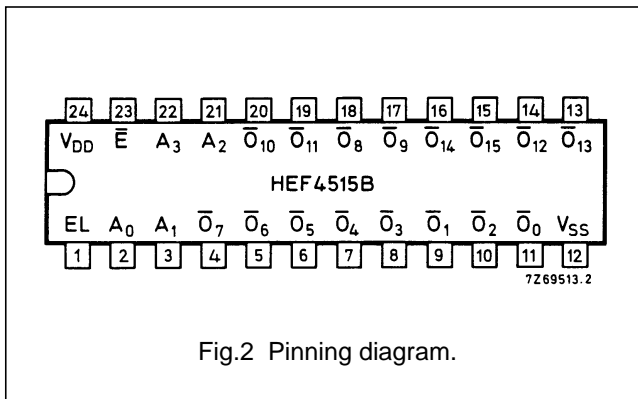


Fig.2 Pinning diagram.

**PINNING**

- $A_0$  to  $A_3$  address inputs
- $\bar{E}$  enable input (active LOW)
- EL latch enable input
- $\bar{O}_0$  to  $\bar{O}_{15}$  outputs (active LOW)

- HEF4515BP(N): 24-lead DIL; plastic (SOT101-1)
- HEF4515BD(F): 24-lead DIL; ceramic (cerdip) (SOT94)
- HEF4515BT(D): 24-lead SO; plastic (SOT137-1)
- ( ): Package Designator North America

**APPLICATION INFORMATION**

Some examples of applications for the HEF4515B are:

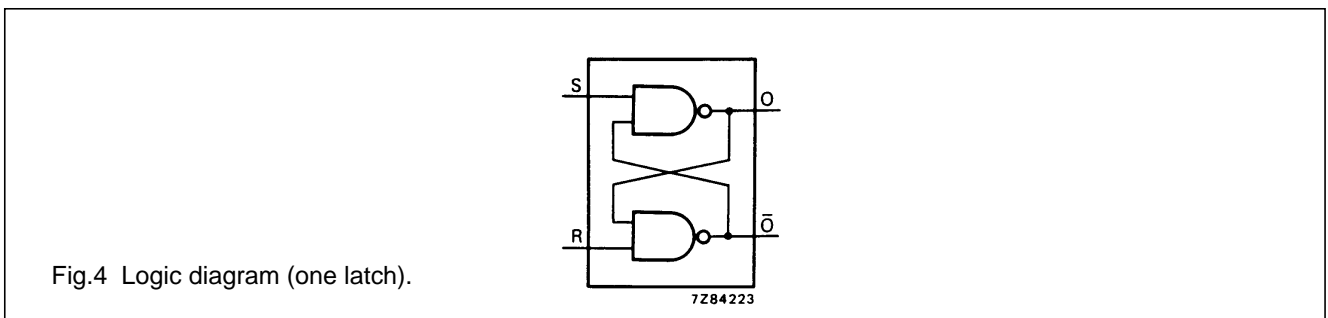
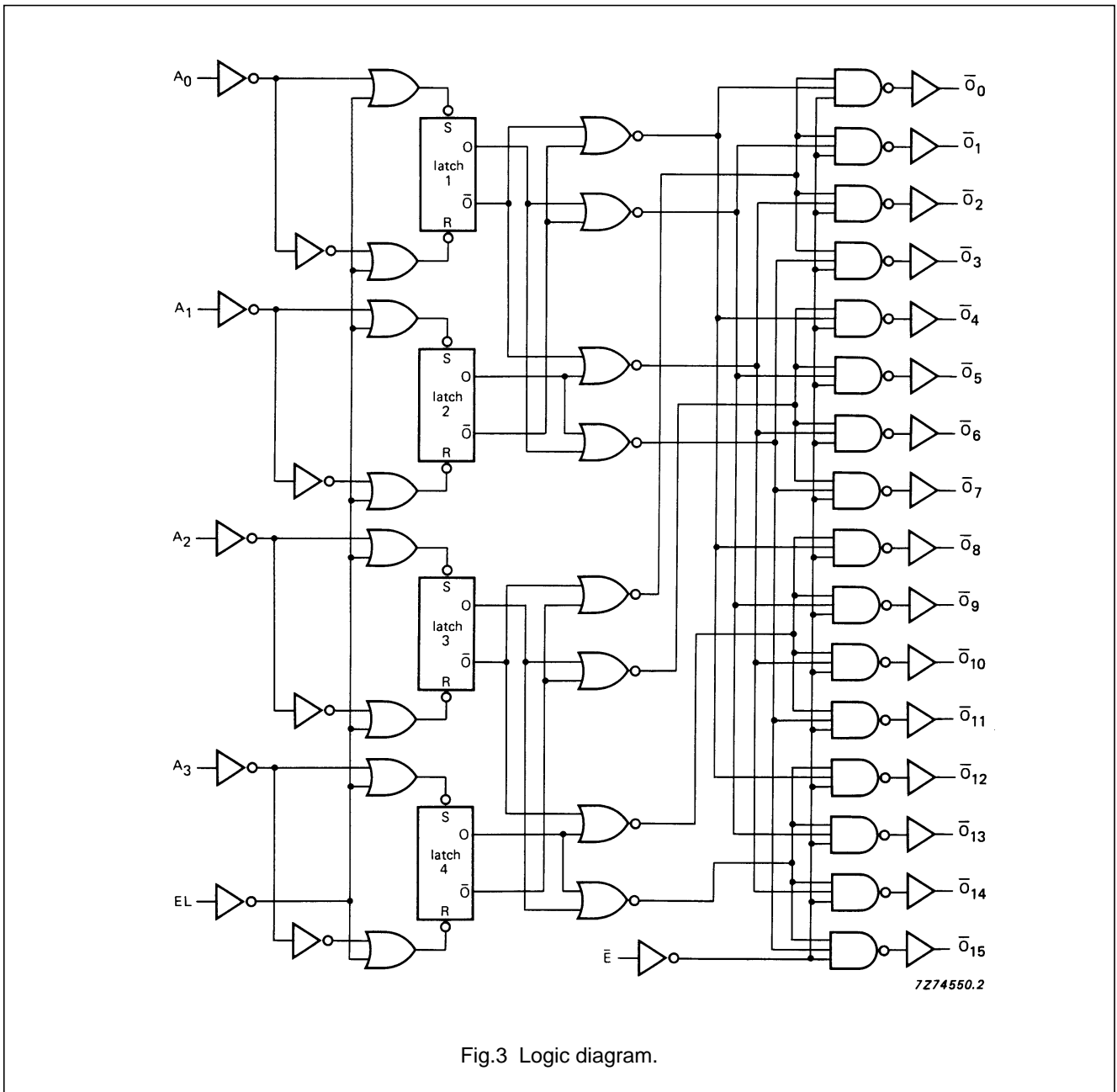
- Digital multiplexing.
- Address decoding.
- Hexadecimal/BCD decoding.

**FAMILY DATA, I<sub>DD</sub> LIMITS category MSI**

See Family Specifications

1-of-16 decoder/demultiplexer with input latches

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## TRUTH TABLE

INPUTS					OUTPUTS																
$\bar{E}$	$A_0$	$A_1$	$A_2$	$A_3$	$\bar{O}_0$	$\bar{O}_1$	$\bar{O}_2$	$\bar{O}_3$	$\bar{O}_4$	$\bar{O}_5$	$\bar{O}_6$	$\bar{O}_7$	$\bar{O}_8$	$\bar{O}_9$	$\bar{O}_{10}$	$\bar{O}_{11}$	$\bar{O}_{12}$	$\bar{O}_{13}$	$\bar{O}_{14}$	$\bar{O}_{15}$	
H	X	X	X	X	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
L	L	L	L	L	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
L	H	L	L	L	H	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
L	L	H	L	L	H	H	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H
L	H	H	L	L	H	H	H	L	H	H	H	H	H	H	H	H	H	H	H	H	H
L	L	L	H	L	H	H	H	H	L	H	H	H	H	H	H	H	H	H	H	H	H
L	H	L	H	L	H	H	H	H	H	L	H	H	H	H	H	H	H	H	H	H	H
L	L	H	H	L	H	H	H	H	H	L	H	H	H	H	H	H	H	H	H	H	H
L	H	H	H	L	H	H	H	H	H	H	L	H	H	H	H	H	H	H	H	H	H
L	L	L	L	H	H	H	H	H	H	H	H	L	H	H	H	H	H	H	H	H	H
L	H	L	L	H	H	H	H	H	H	H	H	H	L	H	H	H	H	H	H	H	H
L	L	H	L	H	H	H	H	H	H	H	H	H	H	L	H	H	H	H	H	H	H
L	H	H	L	H	H	H	H	H	H	H	H	H	H	H	L	H	H	H	H	H	H
L	L	L	H	H	H	H	H	H	H	H	H	H	H	H	H	L	H	H	H	H	H
L	H	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H	L	H	H	H	H
L	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	L	H	H	H
L	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	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

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

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

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

HEF4515B  
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	5 10 15	$t_{THL}$		90	180	ns	$40\text{ ns} + (1,0\text{ ns/pF}) C_L$		
				HIGH to LOW	35	65	ns	$14\text{ ns} + (0,42\text{ ns/pF}) C_L$	
					25	50	ns	$11\text{ ns} + (0,28\text{ ns/pF}) C_L$	
	LOW to HIGH	5 10 15	$t_{TLH}$		85	170	ns	$35\text{ ns} + (1,0\text{ ns/pf}) C_L$	
						35	70	ns	$14\text{ ns} + (0,42\text{ ns/pF}) C_L$
						25	50	ns	$11\text{ ns} + (0,28\text{ ns/pF}) C_L$
Set-up time $A_n \rightarrow \text{EL}$	5 10 15	$t_{su}$		120	60	ns	see also waveforms Fig.5		
					40	20		ns	
					30	15		ns	
Hold time $A_n \rightarrow \text{EL}$	5 10 15	$t_{hold}$		0	60	ns			
					0	20		ns	
					0	15		ns	
Minimum EL pulse width; HIGH	5 10 15	$t_{WELH}$		120	60	ns			
					40	20	ns		
					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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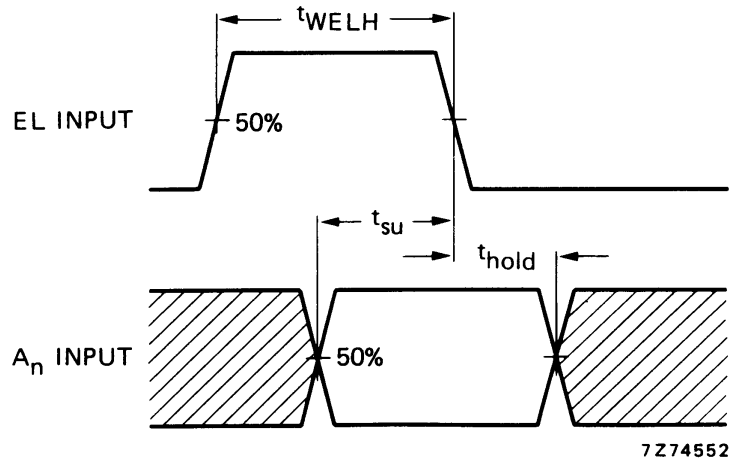


Fig.5 Waveforms showing minimum pulse width for EL, set-up and hold times for  $A_n$  to EL. Set-up and hold times are shown as positive values but may be specified as negative values.