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

HEF4044B
MSI
Quadruple R/S latch with 3-state outputs

Product specification
File under Integrated Circuits, IC04

January 1995

Philips Semiconductors

PHILIPS

Quadruple R/S latch with 3-state outputs

HEF4044B
MSI

The HEF4044B is a quadruple R/S latch with 3-state outputs with a common output enable input (EO). Each latch has an active LOW set input ($\overline{S}_0$ to $\overline{S}_3$), an active LOW reset input ($\overline{R}_0$ to $\overline{R}_3$) and an active HIGH 3-state output (O_0 to O_3).

When EO is HIGH, the state of the latch output (O_n) can be determined from the function table below. When EO is LOW, the latch outputs are in the high impedance OFF-state. EO does not affect the state of the latch.

The high impedance off-state feature allows common busing of the outputs.

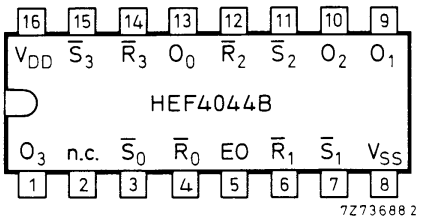

Fig.2 Pinning diagram.

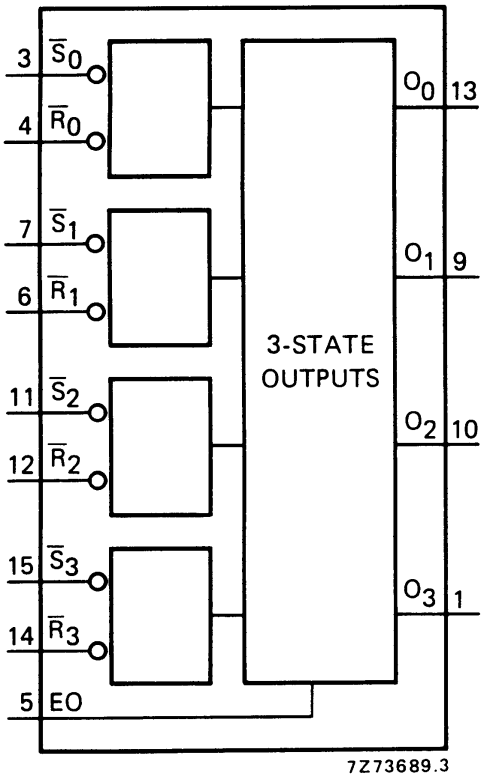

Fig.1 Functional diagram.

HEF4044BP(N): 16-lead DIL; plastic (SOT38-1)
HEF4044BD(F): 16-lead DIL; ceramic (cerdip) (SOT74)
HEF4044BT(D): 16-lead SO; plastic (SOT109-1)
( ): Package Designator North America

PINNING

EO	common output enable input
$\overline{S}_0$ to $\overline{S}_3$	set inputs (active LOW)
$\overline{R}_0$ to $\overline{R}_3$	reset inputs (active LOW)
O_0 to O_3	3-state buffered latch outputs

FUNCTION TABLE

INPUTS			OUTPUT
EO	$\overline{S}_n$	$\overline{R}_n$	O_n
L	X	X	Z
H	L	H	H
H	X	L	L
H	H	H	latched

Notes

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

FAMILY DATA, I_{DD} LIMITS category MSI

See Family Specifications

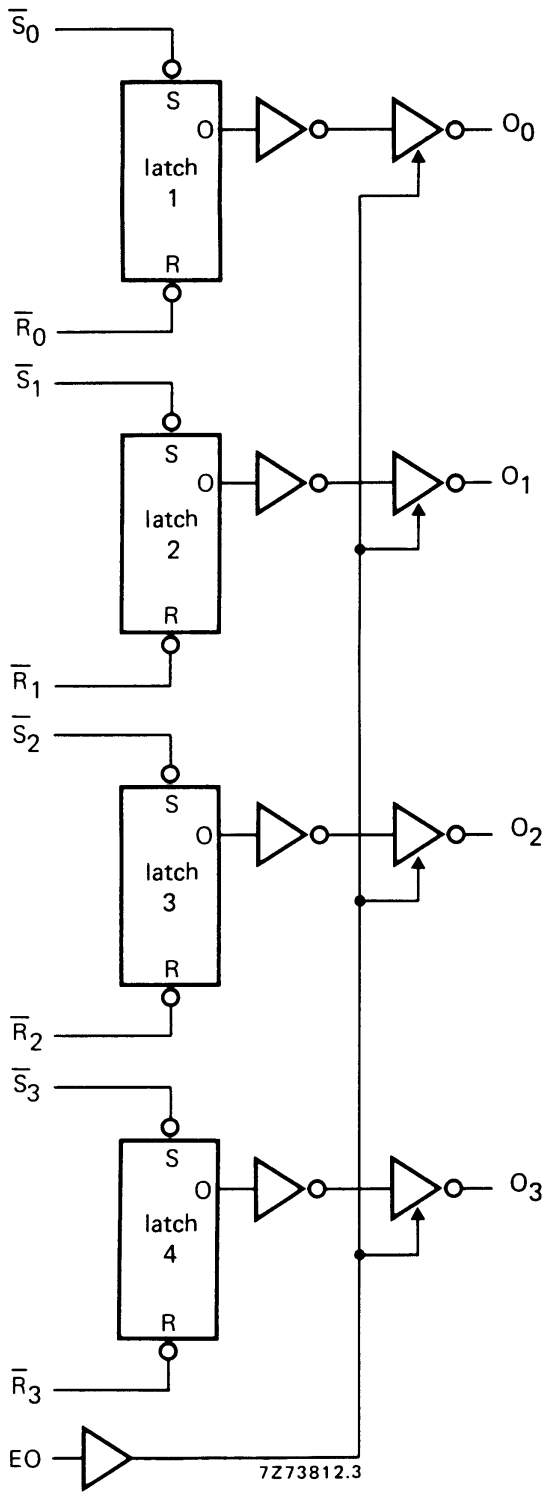

Fig.3 Logic diagram.

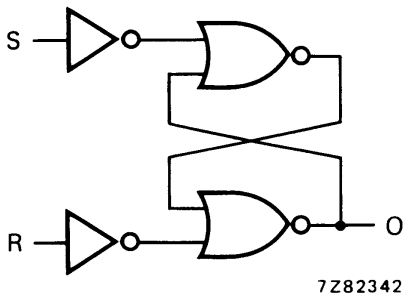

Fig.4 Logic diagram (one latch).

AC CHARACTERISTICS

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

	V_{DD} V	SYMBOL	MIN.	TYP.	MAX.		TYPICAL EXTRAPOLATION FORMULA
Propagation delays							
$\overline{R}_n \rightarrow O_n$	5			90	185	ns	63 ns + (0,55 ns/pF) C_L
HIGH to LOW	10	t_{PHL}		40	80	ns	29 ns + (0,23 ns/pF) C_L
	15			30	60	ns	22 ns + (0,16 ns/pF) C_L
$\overline{S}_n \rightarrow O_n$	5			90	180	ns	63 ns + (0,55 ns/pF) C_L
LOW to HIGH	10	t_{PLH}		40	80	ns	29 ns + (0,23 ns/pF) C_L
	15			30	60	ns	22 ns + (0,16 ns/pF) C_L
Output transition	5			60	120	ns	10 ns + (1,0 ns/pF) C_L
times	10	t_{THL}		30	60	ns	9 ns + (0,42 ns/pF) C_L
HIGH to LOW	15			20	40	ns	6 ns + (0,28 ns/pF) C_L
	5			60	120	ns	10 ns + (1,0 ns/pF) C_L
LOW to HIGH	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
3-state propagation delays							
Output disable times							
$EO \rightarrow O_n$	5			50	100	ns	
HIGH	10	t_{PHZ}		30	60	ns	
	15			25	50	ns	
	5			30	60	ns	
LOW	10	t_{PLZ}		25	45	ns	
	15			20	40	ns	
Output enable times							
$EO \rightarrow O_n$	5			50	100	ns	
HIGH	10	t_{PZH}		25	50	ns	
	15			20	40	ns	
	5			50	95	ns	
LOW	10	t_{PZL}		25	45	ns	
	15			20	35	ns	
Minimum $\overline{S}_n$	5		30	15		ns	
pulse width; LOW	10	t_{WSL}	20	10		ns	
	15		16	8		ns	see also waveforms Fig.5
Minimum $\overline{R}_n$	5		30	15		ns	
pulse width; LOW	10	t_{WRL}	20	10		ns	
	15		16	8		ns	

	V_{DD} V	TYPICAL FORMULA FOR P (μW)	
Dynamic power dissipation per package (P)	5	$1300\ f_i + \sum (f_o CL) \times V_{DD}^2$	where
	10	$5200\ f_i + \sum (f_o CL) \times V_{DD}^2$	f_i = input freq. (MHz)
	15	$12\,900\ f_i + \sum (f_o CL) \times V_{DD}^2$	f_o = output freq. (MHz)
			C_L = total load capacitance (pF)
			$\sum (f_o C_L)$ = sum of outputs
			V_{DD} = supply voltage (V)

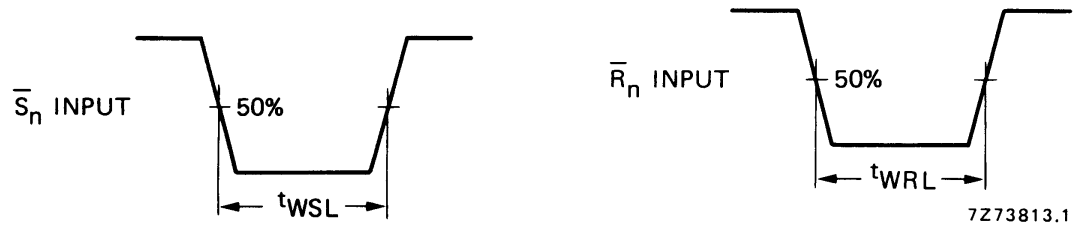

Fig.5 Waveforms showing minimum $\overline{S}_n$ and $\overline{R}_n$ pulse widths.

APPLICATION INFORMATION

An example of application for the HEF4044B is:

- Four-bit storage with output enable