

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

Quadruple R/S latch with 3-state outputs

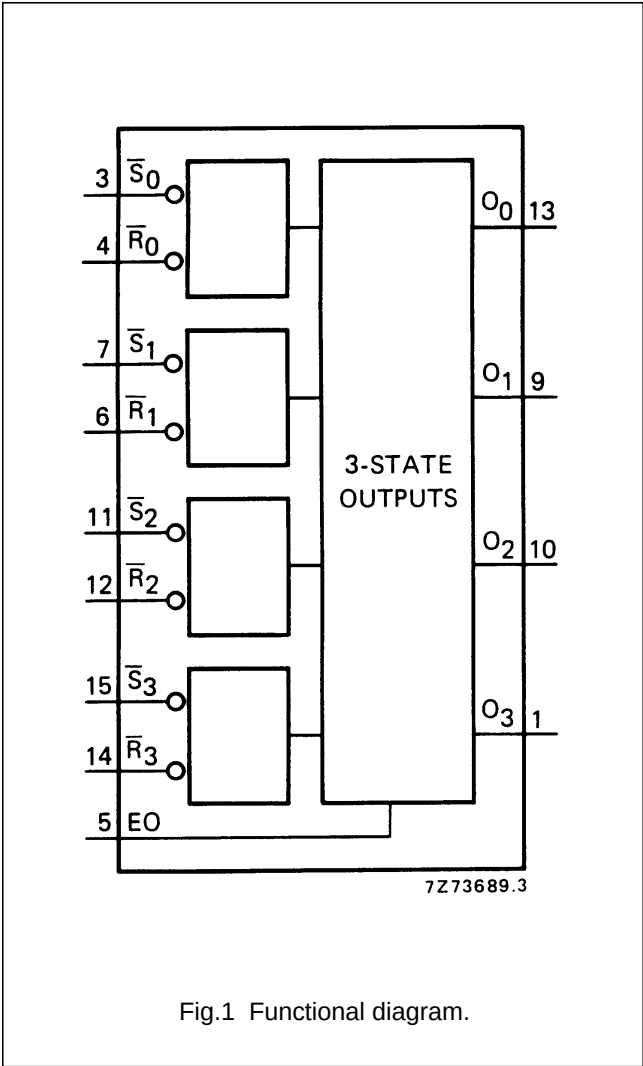
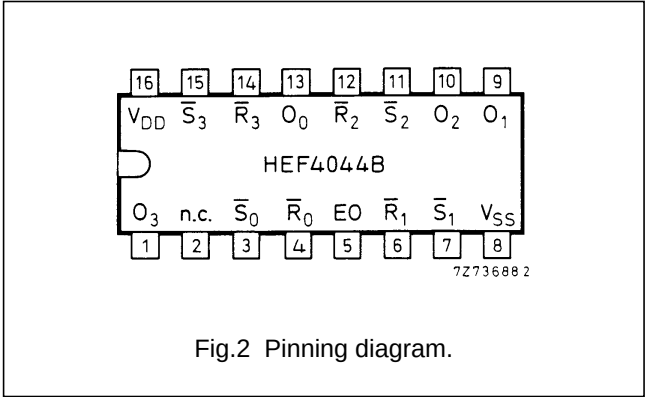
HEF4044B

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 bussing of the outputs.



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

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

Notes

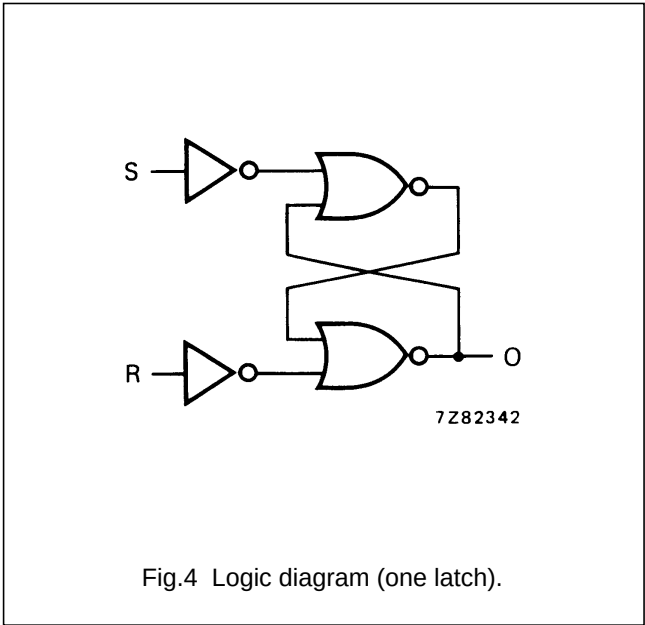
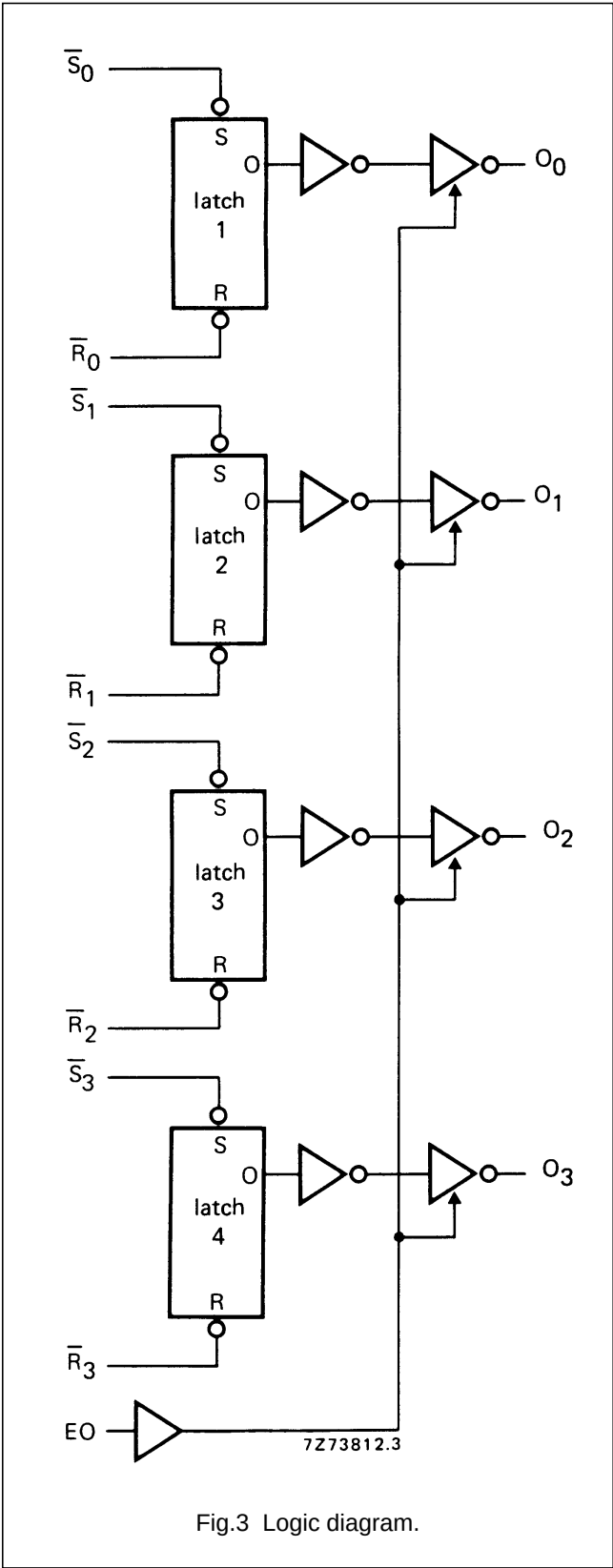
1. H = HIGH state (the more positive voltage)
L = LOW state (the less positive voltage)
X = state immaterial
Z = high impedance OFF-state

FAMILY DATA, I_{DD} LIMITS category MSI

See Family Specifications

Quadruple R/S latch with 3-state outputs

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AC CHARACTERISTICS

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

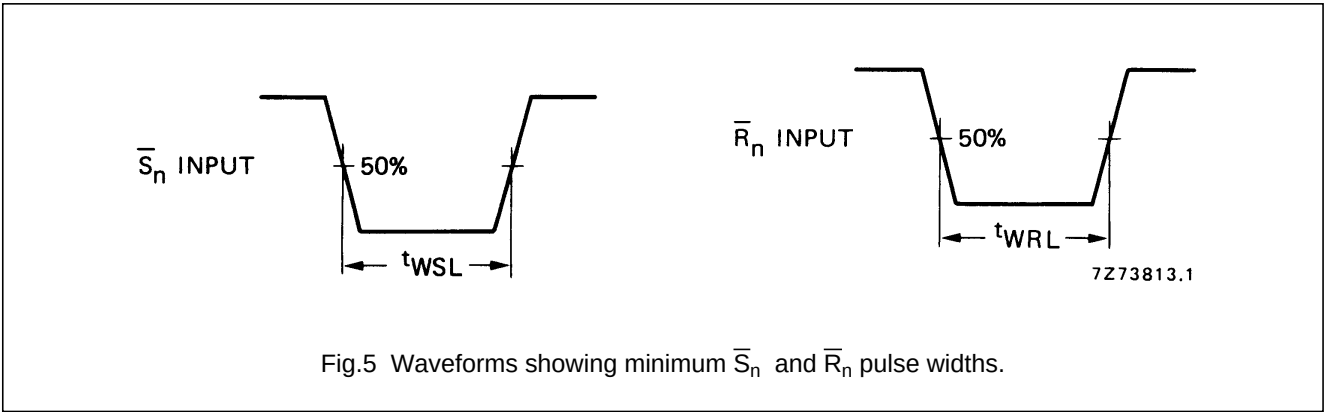
	V_{DD} V	SYMBOL	MIN.	TYP.	MAX.	TYPICAL EXTRAPOLATION FORMULA
Propagation delays						
$\bar{R}_n \rightarrow O_n$	5			90	185 ns	$63 \text{ ns} + (0,55 \text{ ns/pF}) C_L$
HIGH to LOW	10	t_{PHL}		40	80 ns	$29 \text{ ns} + (0,23 \text{ ns/pF}) C_L$
	15			30	60 ns	$22 \text{ ns} + (0,16 \text{ ns/pF}) C_L$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

see also waveforms
Fig.5

Quadruple R/S latch with 3-state outputs

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



APPLICATION INFORMATION

An example of application for the HEF4044B is:

- Four-bit storage with output enable