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

HEF40373B
MSI
Octal transparent latch with 3-state outputs

Product specification
File under Integrated Circuits, IC04

January 1995

Philips Semiconductors

Octal transparent latch with 3-state outputs

HEF40373B
MSI

DESCRIPTION

The HEF40373B is an 8-bit transparent latch with 3-state buffered outputs. The output stages have high current output capability suitable for driving highly capacitive loads. The latch outputs follow the data inputs when the latch enable (E) is HIGH. When E is LOW, the data that meets the set-up times is latched. The 3-state outputs are controlled by the output enable input $\overline{EO}$. A HIGH on $\overline{EO}$ causes the outputs to assume a high impedance OFF-state. The device features hysteresis on the E input to improve noise rejection.
Schmitt-trigger action in the E input makes the circuit highly tolerant to slower input rise and fall times.

The HEF40373B is pin and functionally compatible with the TTL '373' device.
Supply voltage range: 3 to 15 V.

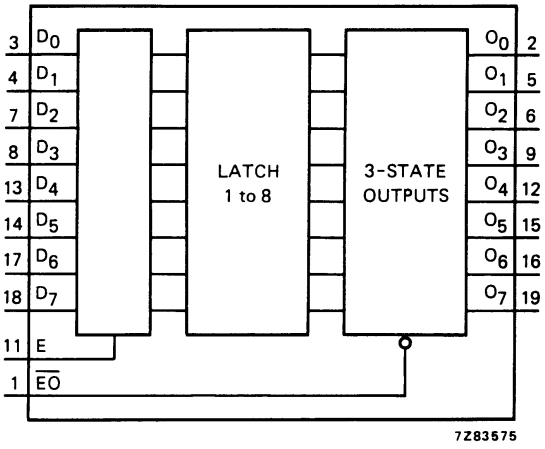


Fig.1 Functional diagram.

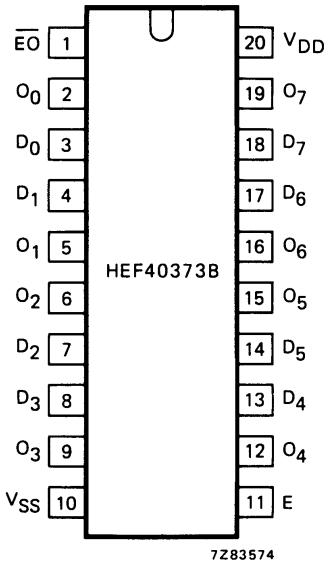


Fig.2 Pinning diagram.

HEF40373BP(N): 20-lead DIL; plastic (SOT146-1)
HEF40373BD(F): 20-lead DIL; ceramic (cerdip) (SOT152)
HEF40373BT(D): 20-lead SO; plastic (SOT163-1)
( ): Package Designator North America

PINNING

D_0 to D_7	data inputs
E	latch enable input
$\overline{EO}$	output enable input (active LOW)
O_0 to O_7	3-state buffered outputs

FAMILY DATA, I_{DD} LIMITS category MSI

See Family Specifications

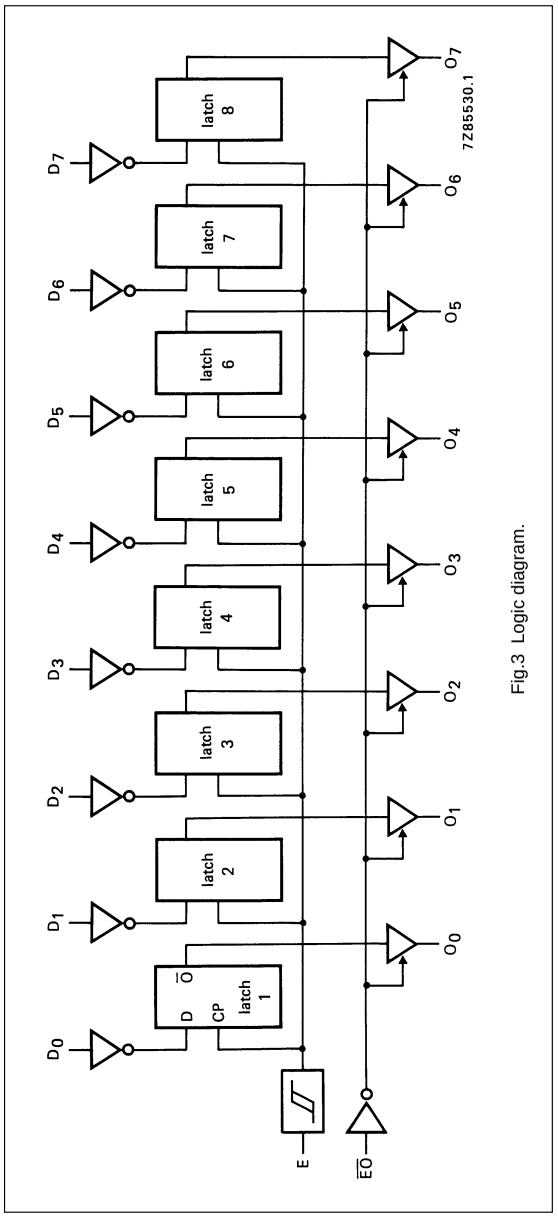


Fig.3 Logic diagram.

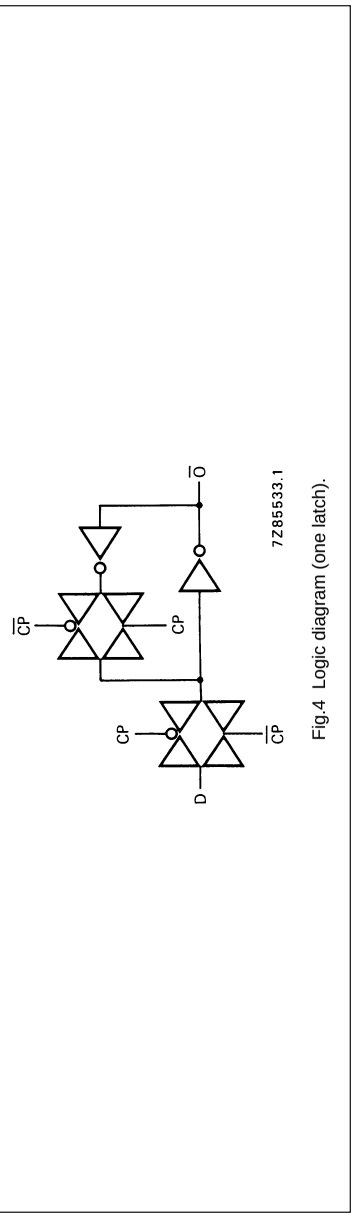


Fig.4 Logic diagram (one latch).

FUNCTION TABLE

OPERATING MODES	INPUTS			INTERNAL REGISTER	OUTPUTS O_0 TO O_7
	$\overline{EO}$	E	D_n		
enable & read register	L	H	L	L	L
	L	H	H	H	H
latch & read register	L	L	l	L	L
	L	L	h	H	H
latch register & disable outputs	H	L	l	L	Z
	H	L	h	H	Z

Notes

1. H = HIGH state (the more positive voltage)
   h = HIGH state (one set-up time prior to the HIGH-to-LOW enable transition)
   L = LOW state (the less positive voltage)
   l = LOW state (one set-up time prior to the HIGH-to-LOw enable transition)
   Z = high impedance OFF-state

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)
See Family Specifications, except for:

D.C. current into any input	$\pm I_I$	max.	10	mA
D.C. source or sink current into any output	$\pm I_O$	max.	25	mA
D.C. current into the supply terminals	$\pm I$	max.	100	mA

DC CHARACTERISTICS

V_{SS} = 0 V

	V_{DD} V	V_{OH} V	V_{OL} V	SYMBOL	T_{amb} (°C)						
					−40		+ 25		+ 85		
					MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	
Output current	5	4,6			0,75		0,6	1,2	0,45		mA
HIGH	10	9,5		$-I_{OH}$	1,85		1,5	3,0	1,1		mA
	15	13,5			14,5		15	50	15,5		mA
Output current	5	3,6			9,3		10	24	10,7		mA
HIGH	10	8,4		$-I_{OH}$	14,4		15	46	15,0		mA
	15	13,2			19,5		20	62	19,8		mA
Output current	5		0,4		2,9		2,3	5,4	1,75		mA
LOW	10		0,5	I_{OL}	9,5		7,6	17	5,50		mA
	15		1,5		30,0		25	45	19,0		mA
Hysteresis	5							220			mV
voltage at	10			V_H				250			mV
enable input (E)	15							320			mV

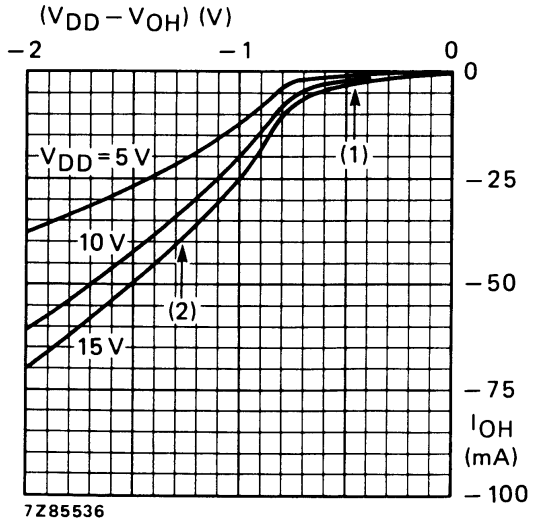
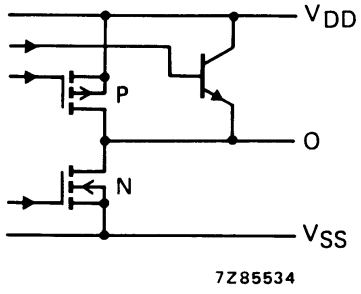


Fig.5 Typical output source current characteristic.



(1) P-channel MOS transistor conducting.
(2) P-channel MOS transistor and bipolar n-p-n transistor conducting.

Fig.6 Schematic diagram of output stage.

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							
$E \rightarrow O_n$	5			150	300	ns	138 ns + (0,24 ns/pF) C_L
HIGH to LOW	10	t_{PHL}		60	120	ns	59 ns + (0,01 ns/pF) C_L
	15			40	80	ns	36 ns + (0,07 ns/pF) C_L
$E \rightarrow O_n$	5			125	250	ns	122 ns + (0,06 ns/pF) C_L
LOW to HIGH	10	t_{PLH}		50	100	ns	48 ns + (0,03 ns/pF) C_L
	15			40	80	ns	39 ns + (0,02 ns/pF) C_L
Output transition	5			40	80	ns	see Fig.7
times	10	t_{THL}		20	40	ns	
HIGH to LOW	15			15	30	ns	
	5			30	60	ns	
LOW to HIGH	10	t_{TLH}		20	40	ns	
	15			15	30	ns	
3-state propagation delays							
Output disable times							
$\overline{EO} \rightarrow O_n$	5			65	130	ns	
HIGH	10	t_{PHZ}		30	60	ns	
	15			25	50	ns	
	5			75	150	ns	
LOW	10	t_{PLZ}		40	80	ns	
	15			30	60	ns	
Output enable times							
$\overline{EO} \rightarrow O_n$	5			65	130	ns	
HIGH	10	t_{PZH}		30	60	ns	
	15			25	50	ns	
	5			85	170	ns	
LOW	10	t_{PZL}		35	70	ns	
	15			25	50	ns	
Set-up time	5		15	7		ns	
$D_n \rightarrow E$	10	t_{su}	10	5		ns	
	15		10	5		ns	
Hold time	5		25	15		ns	
$D_n \rightarrow E$	10	t_{hold}	15	4		ns	
	15		10	3		ns	
Minimum latch enable	5		60	30		ns	
pulse width LOW	10	t_{WEL}	30	15		ns	
	15		20	10		ns	

AC CHARACTERISTICS

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

	V_{DD} V	TYPICAL FORMULA FOR P (μW)	
Dynamic power dissipation per package (P)	5	3 325 $f_i + \sum (f_o C_L) \times V_{DD}^2$	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	14 200 $f_i + \sum (f_o C_L) \times V_{DD}^2$	
	15	37 425 $f_i + \sum (f_o C_L) \times V_{DD}^2$	

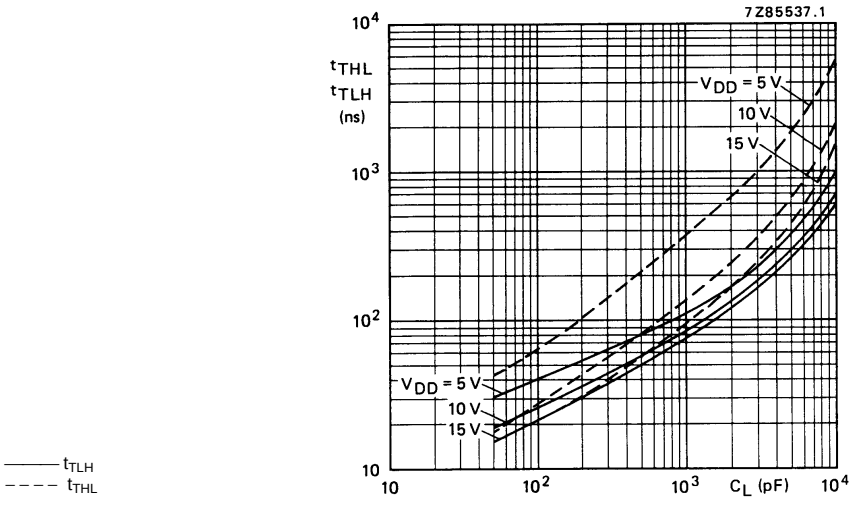


Fig.7 Output transition times as a function of the load capacitance. .