

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

HEF4008B **MSI** 4-bit binary full adder

Product specification
File under Integrated Circuits, IC04

January 1995

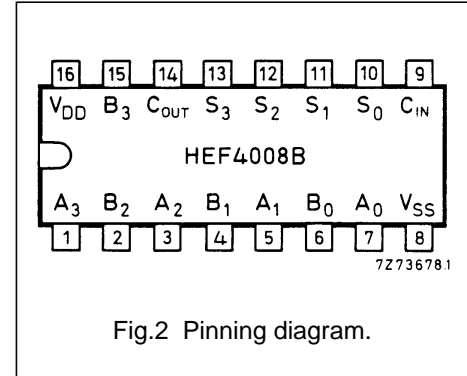
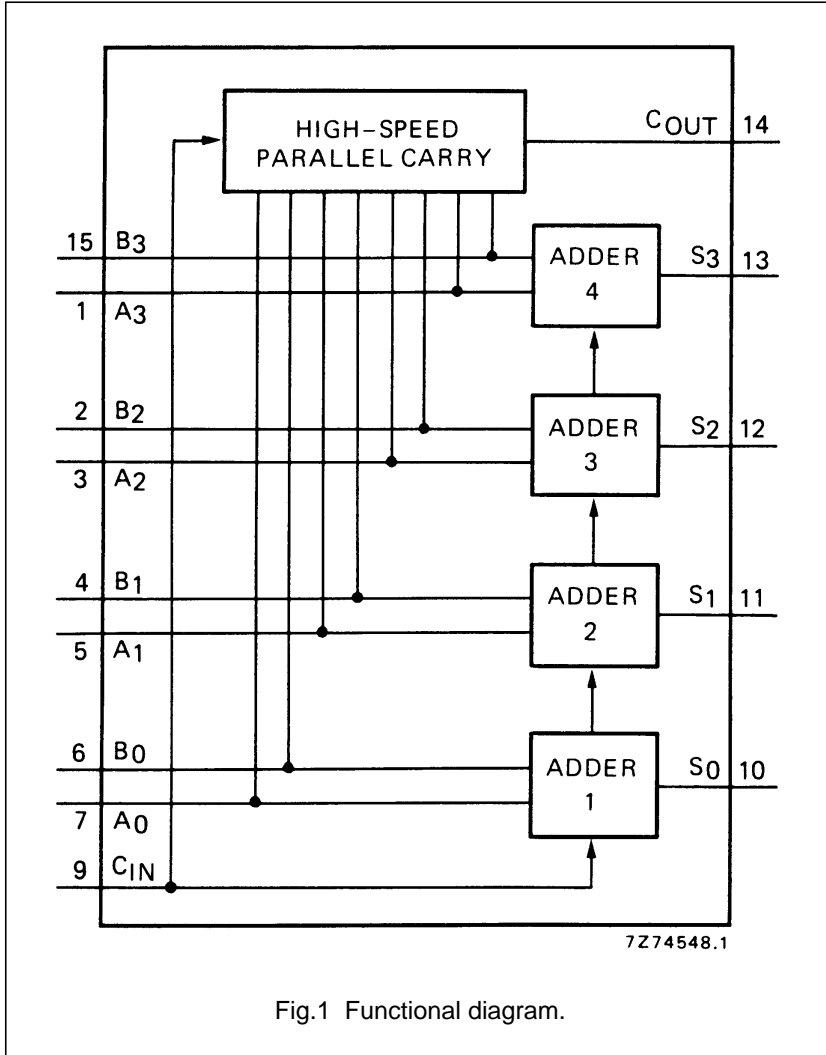
4-bit binary full adder

HEF4008B MSI

DESCRIPTION

The HEF4008B is a 4-bit binary full adder with two 4-bit data inputs (A_0 to A_3 , B_0 to B_3), a carry input (C_{IN}), four sum outputs (S_0 to S_3), and a carry

output (C_{OUT}). The IC uses full look-ahead across 4-bits to generate C_{OUT} . This minimizes the necessity for extensive look-ahead and carry-cascading circuits.



PINNING

- A_0 to A_3 data inputs
- B_0 to B_3 data inputs
- S_0 to S_3 sum outputs
- C_{IN} carry input
- C_{OUT} carry output

TRUTH TABLE (one adder)

C_{IN}	A	B	C_{OUT}	S
L	L	L	L	L
L	L	H	L	H
L	H	L	L	H
L	H	H	H	L
H	L	L	L	H
H	L	H	H	L
H	H	L	H	L
H	H	H	H	H

- HEF4008BP(N): 16-lead DIL; plastic (SOT38-1)
- HEF4008BD(F): 16-lead DIL; ceramic (cerdip) (SOT74)
- HEF4008BT(D): 16-lead SO; plastic (SOT109-1)
- (): Package Designator North America

FAMILY DATA, I_{DD} LIMITS category MSI

See Family Specifications

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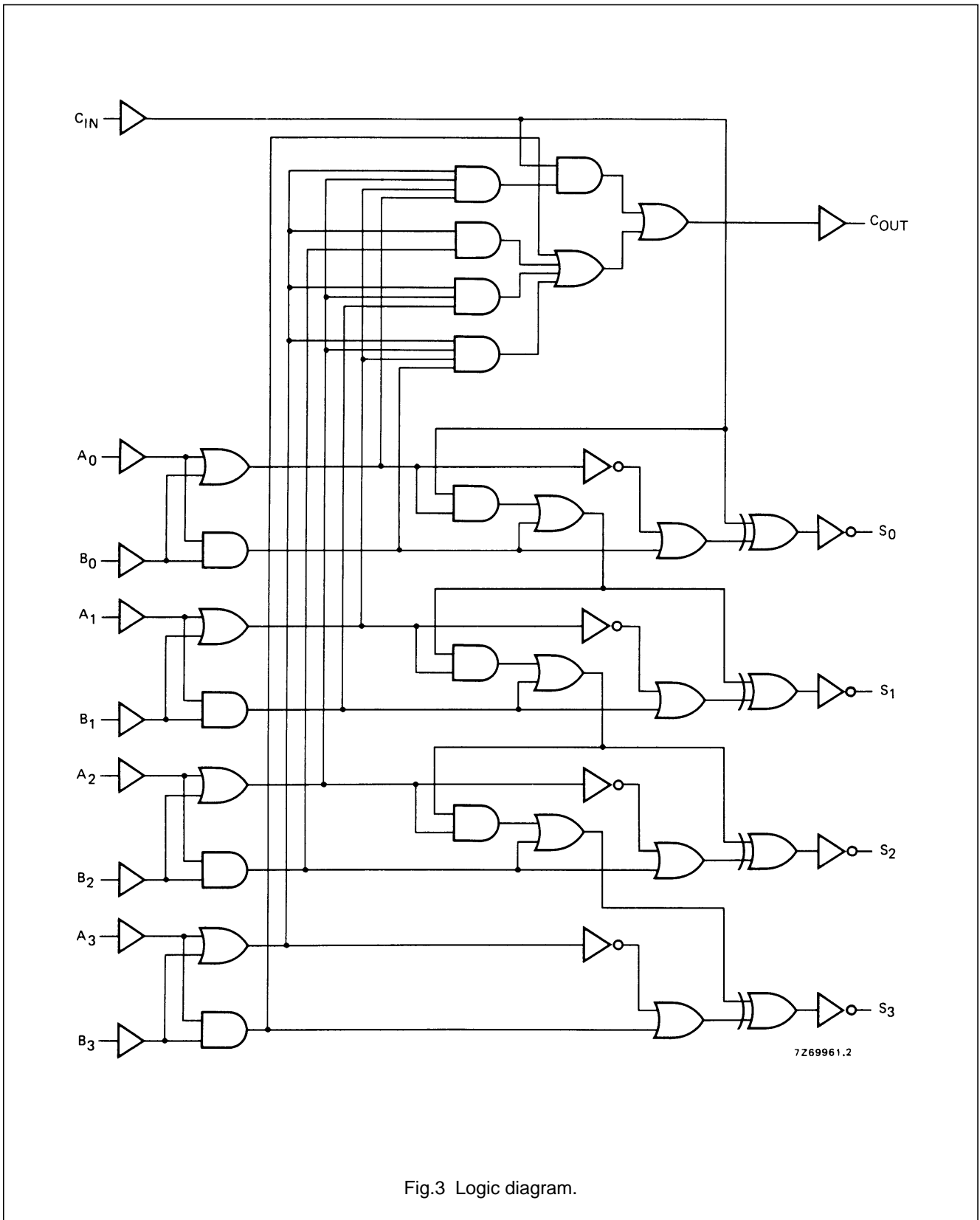


Fig.3 Logic diagram.

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MSI**AC CHARACTERISTICS** $V_{SS} = 0\text{ V}$; $T_{amb} = 25\text{ °C}$; $C_L = 50\text{ pF}$; input transition times $\leq 20\text{ ns}$

	V_{DD} V	SYMBOL	MIN.	TYP.	MAX.	TYPICAL EXTRAPOLATION FORMULA	
Propagation delays sum in → sum out HIGH to LOW	5	t_{PHL}		150	300	ns	123 ns + (0,55 ns/pF) C_L
	10			55	110	ns	44 ns + (0,23 ns/pF) C_L
	15			40	80	ns	32 ns + (0,16 ns/pF) C_L
LOW to HIGH	5	t_{PLH}		135	270	ns	108 ns + (0,55 ns/pF) C_L
	10			55	110	ns	44 ns + (0,23 ns/pF) C_L
	15			40	80	ns	32 ns + (0,16 ns/pF) C_L
sum in → C_{OUT} HIGH to LOW	5	t_{PHL}		125	250	ns	98 ns + (0,55 ns/pF) C_L
	10			50	100	ns	39 ns + (0,23 ns/pF) C_L
	15			35	70	ns	27 ns + (0,16 ns/pF) C_L
LOW to HIGH	5	t_{PLH}		100	200	ns	73 ns + (0,55 ns/pF) C_L
	10			45	90	ns	34 ns + (0,23 ns/pF) C_L
	15			30	60	ns	22 ns + (0,16 ns/pF) C_L
C_{IN} → sum out HIGH to LOW	5	t_{PHL}		130	260	ns	103 ns + (0,55 ns/pF) C_L
	10			50	100	ns	39 ns + (0,23 ns/pF) C_L
	15			35	70	ns	27 ns + (0,16 ns/pF) C_L
LOW to HIGH	5	t_{PLH}		115	230	ns	88 ns + (0,55 ns/pF) C_L
	10			50	100	ns	39 ns + (0,23 ns/pF) C_L
	15			35	70	ns	27 ns + (0,16 ns/pF) C_L
C_{IN} → C_{OUT} HIGH to LOW	5	t_{PHL}		90	180	ns	63 ns + (0,55 ns/pF) C_L
	10			35	70	ns	24 ns + (0,23 ns/pF) C_L
	15			25	50	ns	17 ns + (0,16 ns/pF) C_L
LOW to HIGH	5	t_{PLH}		75	150	ns	48 ns + (0,55 ns/pF) C_L
	10			35	70	ns	24 ns + (0,23 ns/pF) C_L
	15			25	50	ns	17 ns + (0,16 ns/pF) C_L
Output transition times HIGH to LOW	5	t_{THL}		60	120	ns	10 ns + (1,0 ns/pF) C_L
	10			30	60	ns	9 ns + (0,42 ns/pF) C_L
	15			20	40	ns	6 ns + (0,28 ns/pF) C_L
LOW to HIGH	5	t_{TLH}		60	120	ns	10 ns + (1,0 ns/pF) C_L
	10			30	60	ns	9 ns + (0,42 ns/pF) C_L
	15			20	40	ns	6 ns + (0,28 ns/pF) C_L

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	V _{DD} V	TYPICAL FORMULA FOR P (μW)	
Dynamic power dissipation per package (P)	5 10 15	1 500 f _i + Σ (f _o C _L) × V _{DD} ² 6 000 f _i + Σ (f _o C _L) × V _{DD} ² 13 500 f _i + Σ (f _o C _L) × V _{DD} ²	where f _i = input freq. (MHz) f _o = output freq. (MHz) C _L = load capacitance (pF) Σ (f _o C _L) = sum of outputs V _{DD} = supply voltage (V)

APPLICATION INFORMATION

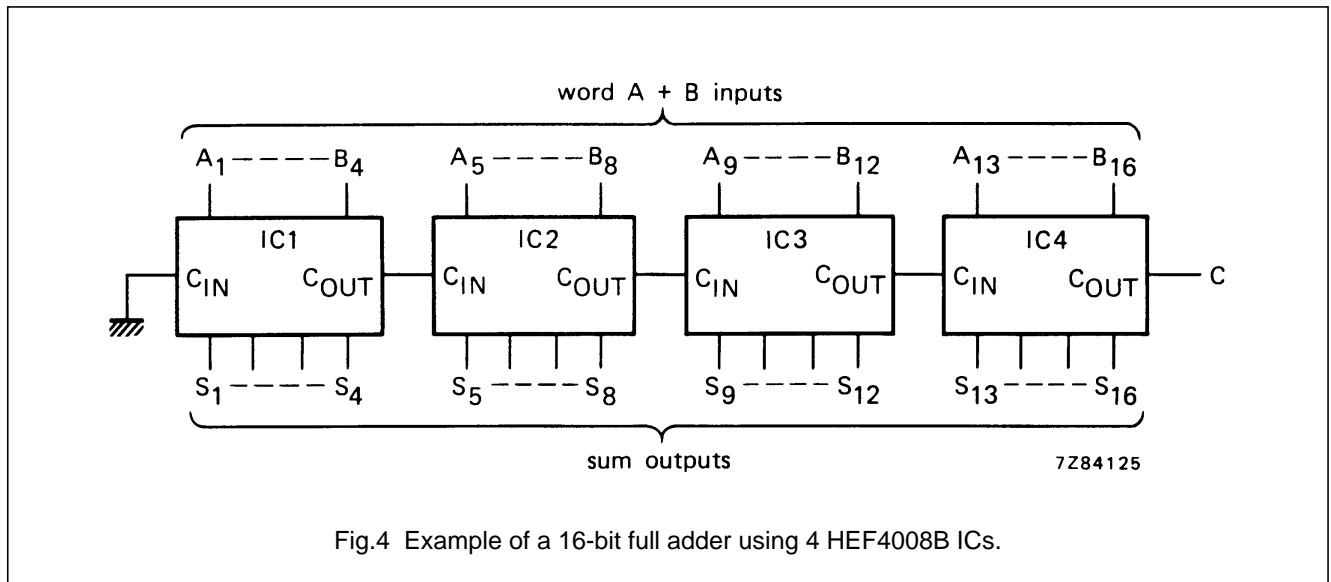


Fig.4 Example of a 16-bit full adder using 4 HEF4008B ICs.



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