

HD14008B

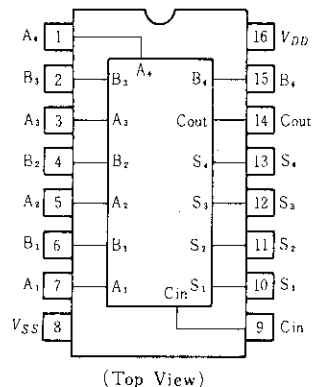
4-bit Full Adder

The HD14008B 4-bit full adder consists of four full adders with fast internal look-ahead carry output. It is useful in binary addition and other arithmetic applications. The fast parallel carry output bit allows high-speed operation when used with other adders in a system.

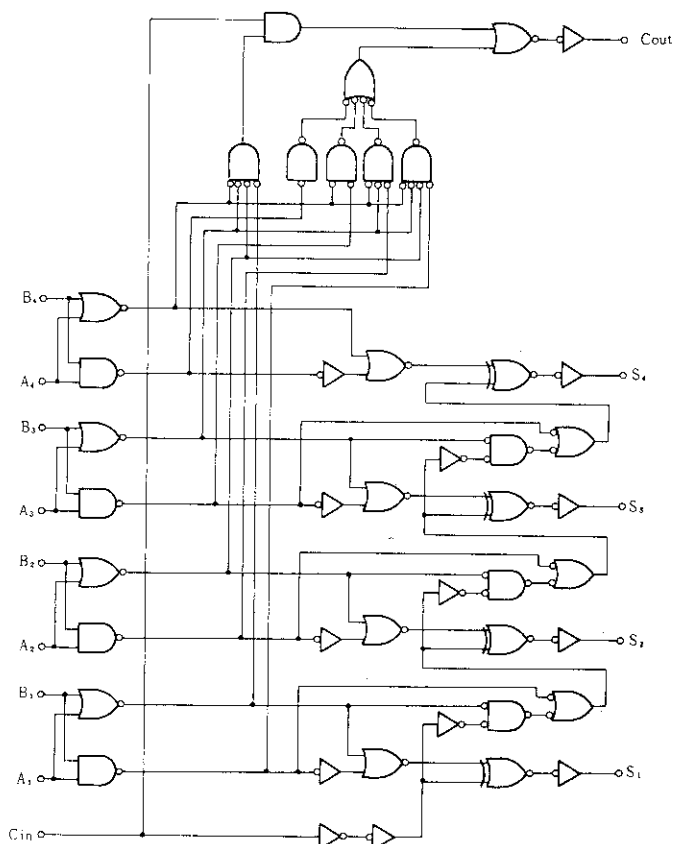
FEATURES

- Look-Ahead Carry Output
- High-Speed Operation; 160ns typ. from Sum_{in} to Sum_{out}
- Quiescent Current; 5nA/pkg typ @5V
- Supply Voltage Range = 3 to 18V
- Pin-for-Pin Replacement for CD4008B and MC14008B

PIN ARRANGEMENT



LOGIC DIAGRAM



TRUTH TABLE (1 Stage)

Cin	B	A	Cout	S
0	0	0	0	0
0	0	1	0	1
0	1	0	0	1
0	1	1	1	0
1	0	0	0	1
1	0	1	1	0
1	1	0	1	0
1	1	1	1	1

ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	$V_{DD}(V)$	Test Conditions	-40°C		25°C			85°C		Unit
				min	max	min	typ	max	min	max	
Output Voltage	V_{OL}	5.0	$V_{in} = V_{DD}$ or 0	—	0.05	—	0	0.05	—	0.05	V
		10		—	0.05	—	0	0.05	—	0.05	
		15		—	0.05	—	0	0.05	—	0.05	
	V_{OH}	5.0	$V_{in} = 0$ or V_{DD}	4.95	—	4.95	5.0	—	4.95	—	V
		10		9.95	—	9.95	10	—	9.95	—	
		15		14.95	—	14.95	15	—	14.95	—	
Input Voltage	V_{IL}	5.0	$V_{out} = 4.5$ or $0.5V$	—	1.5	—	2.25	1.5	—	1.5	V
		10	$V_{out} = 9.0$ or $1.0V$	—	3.0	—	4.50	3.0	—	3.0	
		15	$V_{out} = 13.5$ or $1.5V$	—	4.0	—	6.75	4.0	—	4.0	
	V_{IH}	5.0	$V_{out} = 0.5$ or $4.5V$	3.5	—	3.5	2.75	—	3.5	—	V
		10	$V_{out} = 1.0$ or $9.0V$	7.0	—	7.0	5.50	—	7.0	—	
		15	$V_{out} = 1.5$ or $13.5V$	11.0	—	11.0	8.25	—	11.0	—	
Output Drive Current	I_{OH}	5.0	$V_{OH} = 2.5V$	-1.0	—	-0.8	-1.7	—	-0.6	—	mA
		5.0	$V_{OH} = 4.6V$	-0.2	—	-0.16	-0.36	—	-0.12	—	
		10	$V_{OH} = 9.5V$	-0.5	—	-0.4	-0.9	—	-0.3	—	
		15	$V_{OH} = 13.5V$	-1.4	—	-1.2	-3.5	—	-1.0	—	
	I_{OL}	5.0	$V_{OL} = 0.4V$	0.52	—	0.44	0.88	—	0.36	—	mA
		10	$V_{OL} = 0.5V$	1.3	—	1.1	2.25	—	0.9	—	
		15	$V_{OL} = 1.5V$	3.6	—	3.0	8.8	—	2.4	—	
Input Current	I_{in}	15		—	± 0.3	—	± 0.00001	± 0.3	—	± 1.0	μA
Input Capacitance	C_{in}	—	$V_{in} = 0$	—	—	—	5.0	7.5	—	—	pF
Quiescent Current	I_{DD}	5.0	Zero Signal, per Package	—	20	—	0.005	20	—	150	μA
		10		—	40	—	0.010	40	—	300	
		15		—	80	—	0.015	80	—	600	
Total Supply Current*	I_T	5.0	Dynamic + I_{DD} , $C_L = 50pF$	—	—	—	1.7	—	—	—	μA
		10	$f = 1 kHz$,	—	—	—	3.4	—	—	—	
		15	Per Gate	—	—	—	5.0	—	—	—	

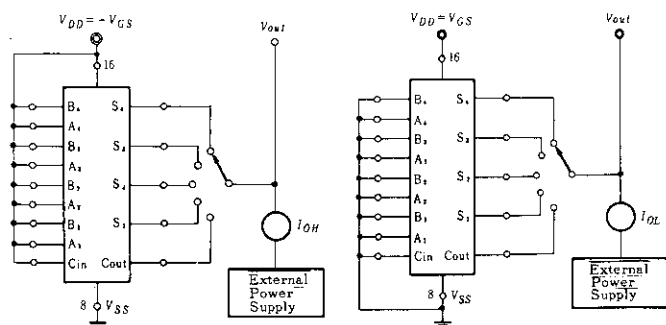
* To calculate total supply current at frequency other than 1kHz.

@ $V_{DD} = 5.0V$ $I_T = (1.7\mu A/kHz)f + I_{DD}$ @ $V_{DD} = 10V$ $I_T = (3.4\mu A/kHz)f + I_{DD}$ @ $V_{DD} = 15V$ $I_T = (5.0\mu A/kHz)f + I_{DD}$

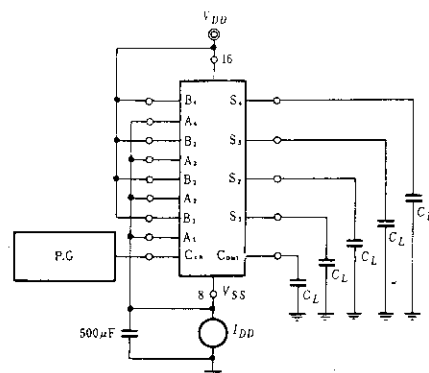
DC CHARACTERISTIC TEST CIRCUIT

● I_{OH}

● I_{OL}



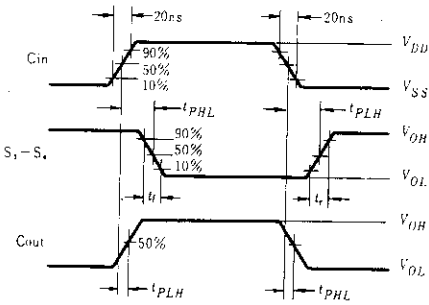
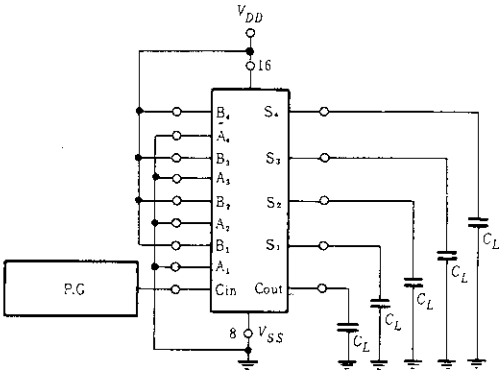
POWER DISSIPATION TEST CIRCUIT AND WAVEFORM



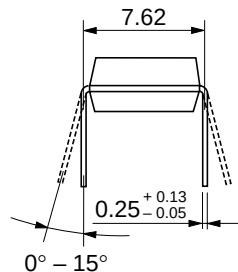
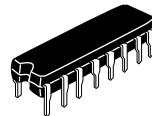
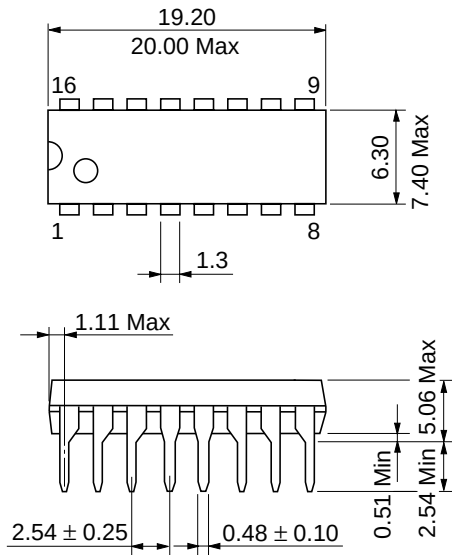
■ SWITCHING CHARACTERISTICS (CL=50pF, Ta=25°C)

Characteristic		Symbol	$V_{DD}(V)$	min	typ	max	Unit	
Output Rise Time		t_r	5.0	—	180	360	ns	
			10	—	90	180		
			15	—	65	130		
Output Fall Time		t_f	5.0	—	100	200	ns	
			10	—	50	100		
			15	—	40	80		
Propagation Delay Time	Sum In-to-Sum Out	$t_{PLH},$ t_{PHL}	5.0	—	400	800	ns	
			10	—	160	320		
			15	—	115	230		
	Sum In-to-Carry Out		5.0	—	305	610		
			10	—	145	290		
			15	—	110	220		
	Carry In-to-Sum Out		5.0	—	375	750		
			10	—	155	310		
			15	—	115	230		
	Carry In-to-Carry Out		5.0	—	170	340		
			10	—	75	150		
			15	—	55	110		

■ SWITCHING TIME TEST CIRCUIT



Unit: mm



Hitachi Code	DP-16
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	1.07 g

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