

# HD14008B

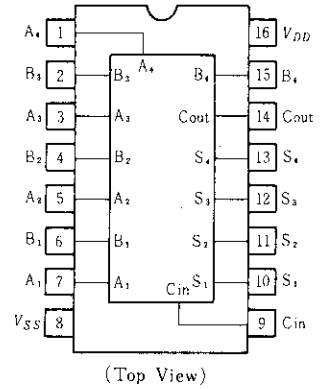
## 4-bit Full Adder

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.

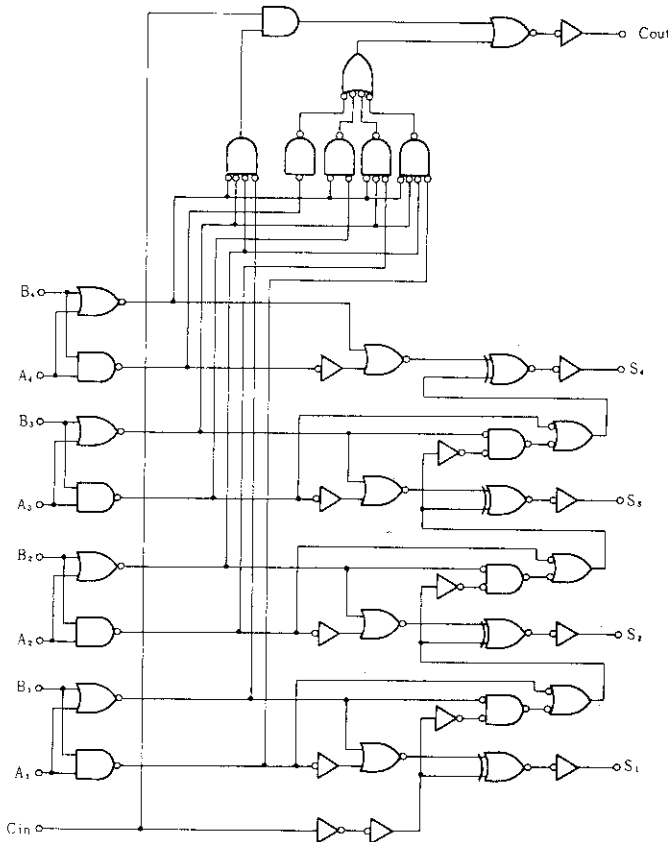
### FEATURES

- Look-Ahead Carry Output
- High-Speed Operation; 160ns typ. from Sum<sub>in</sub> to Sum<sub>out</sub>
- 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**

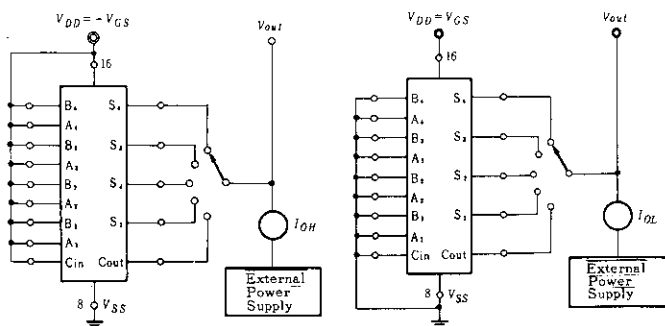
Characteristic	Symbol	V <sub>DD</sub> (V)	Test Conditions	-40°C		25°C			85°C		Unit
				min	max	min	typ	max	min	max	
Output Voltage	V <sub>OL</sub>	5.0	V <sub>in</sub> = V <sub>DD</sub> or 0	-	0.05	-	0	0.05	-	0.05	V
		10		-	0.05	-	0	0.05	-	0.05	
		15		-	0.05	-	0	0.05	-	0.05	
	V <sub>OH</sub>	5.0	V <sub>in</sub> = 0 or V <sub>DD</sub>	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 <sub>IL</sub>	5.0	V <sub>out</sub> = 4.5 or 0.5V	-	1.5	-	2.25	1.5	-	1.5	V
		10	V <sub>out</sub> = 9.0 or 1.0V	-	3.0	-	4.50	3.0	-	3.0	
		15	V <sub>out</sub> = 13.5 or 1.5V	-	4.0	-	6.75	4.0	-	4.0	
	V <sub>IH</sub>	5.0	V <sub>out</sub> = 0.5 or 4.5V	3.5	-	3.5	2.75	-	3.5	-	V
		10	V <sub>out</sub> = 1.0 or 9.0V	7.0	-	7.0	5.50	-	7.0	-	
		15	V <sub>out</sub> = 1.5 or 13.5V	11.0	-	11.0	8.25	-	11.0	-	
Output Drive Current	I <sub>OH</sub>	5.0	V <sub>OH</sub> = 2.5V	-1.0	-	-0.8	-1.7	-	-0.6	-	mA
		5.0	V <sub>OH</sub> = 4.6V	-0.2	-	-0.16	-0.36	-	-0.12	-	
		10	V <sub>OH</sub> = 9.5V	-0.5	-	-0.4	-0.9	-	-0.3	-	
	I <sub>OL</sub>	5.0	V <sub>OL</sub> = 0.4V	0.52	-	0.44	0.88	-	0.36	-	mA
		10	V <sub>OL</sub> = 0.5V	1.3	-	1.1	2.25	-	0.9	-	
		15	V <sub>OL</sub> = 1.5V	3.6	-	3.0	8.8	-	2.4	-	
Input Current	I <sub>in</sub>	15		-	±0.3	-	±0.00001	±0.3	-	±1.0	μA
Input Capacitance	C <sub>in</sub>	-	V <sub>in</sub> = 0	-	-	-	5.0	7.5	-	-	pF
Quiescent Current	I <sub>DD</sub>	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 <sub>T</sub>	5.0	Dynamic + I <sub>DD</sub> , C <sub>L</sub> = 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<sub>DD</sub> = 5.0V I<sub>T</sub> = (1.7μA/kHz)f + I<sub>DD</sub> @ V<sub>DD</sub> = 10V I<sub>T</sub> = (3.4μA/kHz)f + I<sub>DD</sub> @ V<sub>DD</sub> = 15V I<sub>T</sub> = (5.0μA/kHz)f - I<sub>DD</sub>

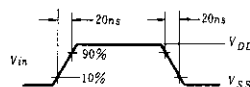
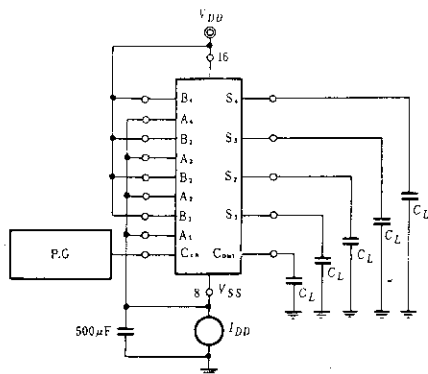
**DC CHARACTERISTIC TEST CIRCUIT**

● I<sub>OH</sub>

● I<sub>OL</sub>



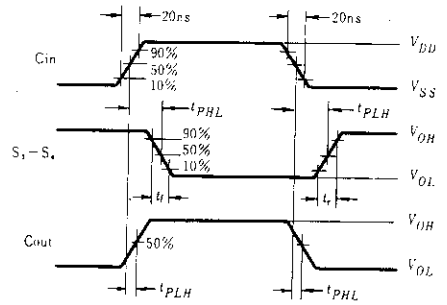
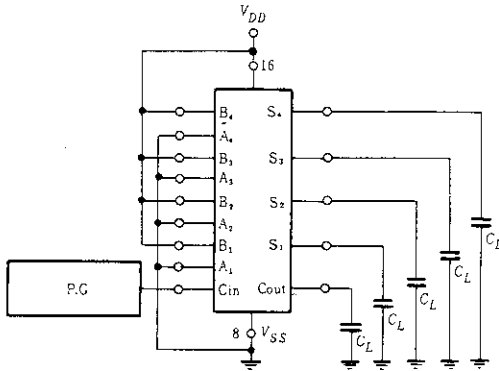
**POWER DISSIPATION TEST CIRCUIT AND WAVEFORM**



■ SWITCHING CHARACTERISTICS ( $C_L=50\text{pF}$ ,  $T_a=25^\circ\text{C}$ )

Characteristic		Symbol	$V_{DD}(\text{V})$	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		5.0	—	400	800	ns
			10	—	160	320	
			15	—	115	230	
	Sum In-to-Carry Out	$t_{PLH}$	5.0	—	305	610	
			10	—	145	290	
			15	—	110	220	
	Carry In-to-Sum Out	$t_{PHL}$	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





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

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