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# HD74HC283

## 4-bit Binary Full Adder

# HITACHI

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### Description

The sum (S) outputs are provided for each bit and the resultant carry (C<sub>4</sub>) is obtained from the fourth bit. This adder features full internal look ahead across all four bits. This provides the system designer with partial look-ahead performance at the economy and reduced package count of a ripple-carry implementation. The adder logic, including the carry, is implemented in its true form meaning that the end-around carry can be accomplished without the need for logic or level inversion.

### Features

- High Speed Operation:  $t_{pd} = 19 \text{ ns typ (} C_L = 50 \text{ pF)}$
- High Output Current: Fanout of 10 LSTTL Loads
- Wide Operating Voltage:  $V_{CC} = 2 \text{ to } 6 \text{ V}$
- Low Input Current:  $1 \mu\text{A max}$
- Low Quiescent Supply Current:  $I_{CC} \text{ (static)} = 4 \mu\text{A max (} T_a = 25^\circ\text{C)}$

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## Function Table

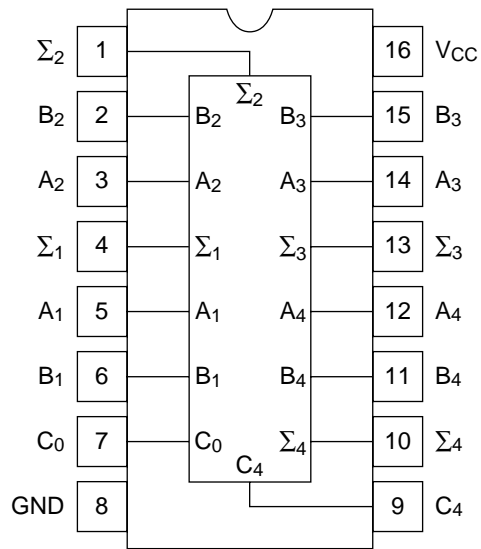
Inputs				Outputs					
				When $C_0 = L$ /When $C_2 = L$			When $C_0 = H$ /When $C_2 = H$		
$A_1/A_3$	$B_1/B_3$	$A_2/A_4$	$B_2/B_4$	$\Sigma_1/\Sigma_3$	$\Sigma_2/\Sigma_4$	$C_2/C_4$	$\Sigma_1/\Sigma_3$	$\Sigma_1/\Sigma_4$	$C_2/C_4$
L	L	L	L	L	L	L	H	L	L
H	L	L	L	H	L	L	L	H	L
L	H	L	L	H	L	L	L	H	L
H	H	L	L	L	H	L	H	H	L
L	L	H	L	L	H	L	H	H	L
H	L	H	L	H	H	L	L	L	H
L	H	H	L	H	H	L	L	L	H
H	H	H	L	L	L	H	H	L	H
L	L	L	H	L	H	L	H	H	L
H	L	L	H	H	H	L	L	L	H
L	H	L	H	H	H	L	L	L	H
H	H	L	H	L	L	H	H	L	H
L	L	H	H	L	L	H	H	L	H
H	L	H	H	H	L	H	L	H	H
L	H	H	H	H	L	H	L	H	H
H	H	H	H	L	H	H	H	H	H

H : high level

L : low level

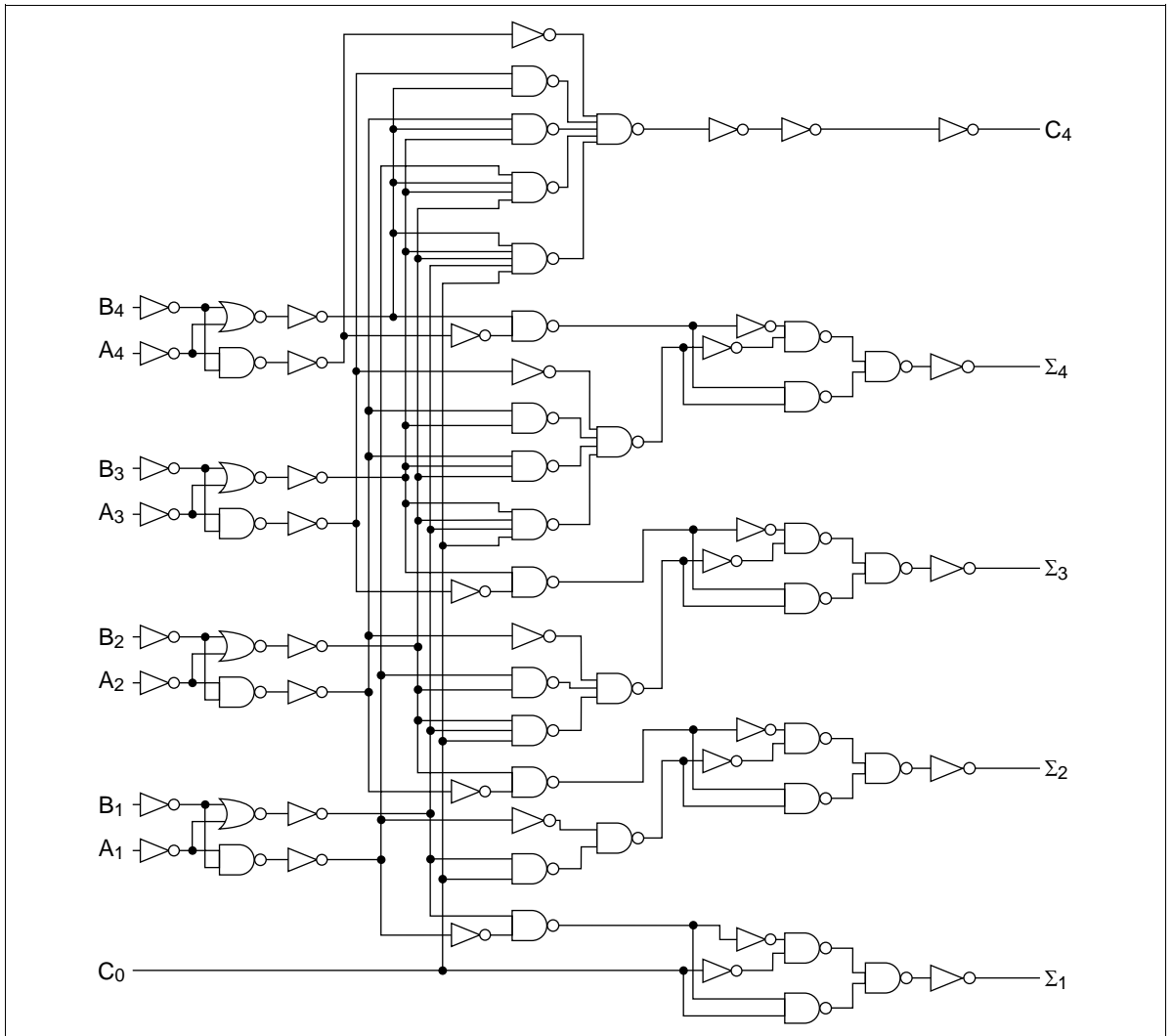
Note: Input conditions at  $A_1$ ,  $B_1$ ,  $A_2$ ,  $B_2$ , and  $C_0$  are used to determine outputs  $\Sigma_1$  and  $\Sigma_2$  and the value of the internal carry  $C_2$ . The values at  $C_2$ ,  $A_3$ ,  $B_3$ ,  $A_4$  and  $B_4$  are then used to determine outputs  $\Sigma_3$ ,  $\Sigma_4$  and  $C_4$ .

Pin Arrangement



(Top view)

## Block Diagram



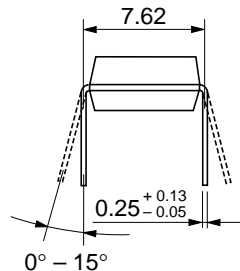
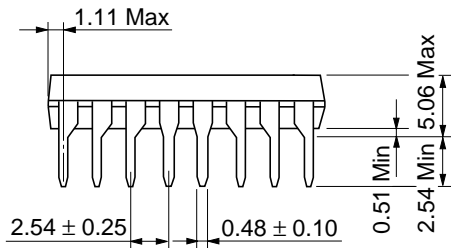
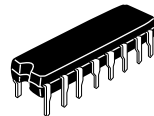
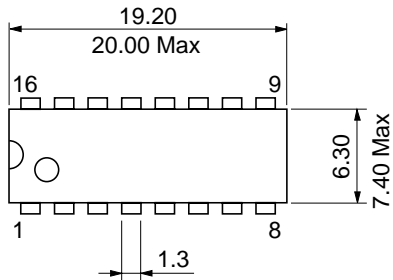
DC Characteristics

Item	Symbol	V <sub>CC</sub> (V)	Ta = 25°C			Ta = -40 to +85°C		Unit	Test Conditions	
			Min	Typ	Max	Min	Max			
Input voltage	V <sub>IH</sub>	2.0	1.5	—	—	1.5	—	V		
		4.5	3.15	—	—	3.15	—			
		6.0	4.2	—	—	4.2	—			
	V <sub>IL</sub>	2.0	—	—	0.5	—	0.5	V		
		4.5	—	—	1.35	—	1.35			
		6.0	—	—	1.8	—	1.8			
Output voltage	V <sub>OH</sub>	2.0	1.9	2.0	—	1.9	—	V	Vin = V <sub>IH</sub> or V <sub>IL</sub> I <sub>OH</sub> = -20 μA	
		4.5	4.4	4.5	—	4.4	—			
		6.0	5.9	6.0	—	5.9	—			
		4.5	4.18	—	—	4.13	—			I <sub>OH</sub> = -4 mA
		6.0	5.68	—	—	5.63	—			I <sub>OH</sub> = -5.2 mA
		6.0	—	0.0	0.1	—	0.1			V
	4.5	—	0.0	0.1	—	0.1				
	6.0	—	0.0	0.1	—	0.1				
	4.5	—	—	0.26	—	0.33	I <sub>OL</sub> = 4 mA			
	6.0	—	—	0.26	—	0.33	I <sub>OL</sub> = 5.2 mA			
Input current	I <sub>in</sub>	6.0	—	—	±0.1	—	±1.0	μA	Vin = V <sub>CC</sub> or GND	
Quiescent supply current	I <sub>CC</sub>	6.0	—	—	4.0	—	40	μA	Vin = V <sub>CC</sub> or GND, I <sub>out</sub> = 0 μA	

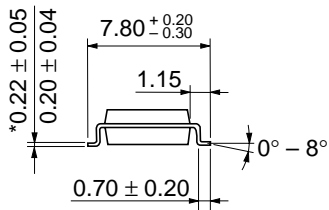
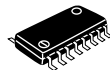
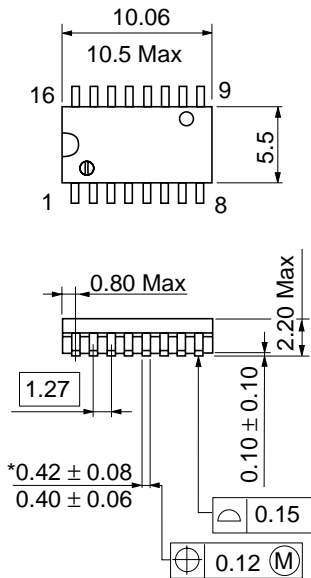
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AC Characteristics ( $C_L = 50$  pF, Input  $t_r = t_f = 6$  ns)

Item	Symbol	$V_{CC}$ (V)	$T_a = 25^\circ\text{C}$		$T_a = -40$ to $+85^\circ\text{C}$		Unit	Test Conditions	
			Min	Typ	Max	Min			Max
Propagation delay time	$t_{PLH}$	2.0	—	—	150	—	190	ns	$C_0$ to $\Sigma_1$
		4.5	—	19	30	—	38		
		6.0	—	—	26	—	33		
	$t_{PHL}$	2.0	—	—	150	—	190	ns	$A_1$ or $B_1$ to $\Sigma_1$
		4.5	—	19	30	—	38		
		6.0	—	—	26	—	33		
	$t_{PLH}$	2.0	—	—	150	—	190	ns	$C_0$ to $C_4$
		4.5	—	19	30	—	38		
		6.0	—	—	26	—	33		
	$t_{PHL}$	2.0	—	—	150	—	190	ns	$A_1$ or $B_1$ to $C_4$
		4.5	—	19	30	—	38		
		6.0	—	—	26	—	33		
Output rise/fall time	$t_{TLH}$	2.0	—	—	75	—	95	ns	
		4.5	—	5	15	—	19		
		6.0	—	—	13	—	16		
Input capacitance	$C_{in}$	—	—	5	10	—	10	pF	



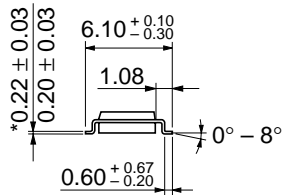
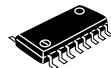
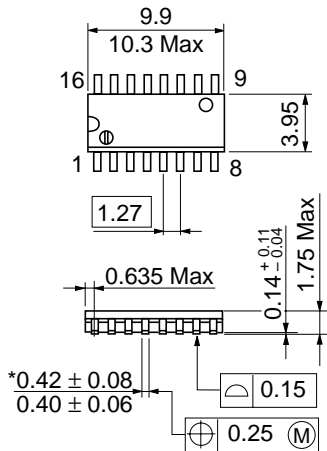
Hitachi Code	DP-16
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	1.07 g



\*Dimension including the plating thickness  
Base material dimension

Hitachi Code	FP-16DA
JEDEC	—
EIAJ	Conforms
Weight (reference value)	0.24 g





\*Dimension including the plating thickness  
Base material dimension

Hitachi Code	FP-16DN
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	0.15 g

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