

Available Q2, 1995

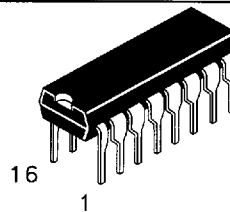
4-Bit Full Adder

These devices are high-speed 4-bit binary Full Adders with internal carry look-a-head. The device adds two 4-bit words (A and B) plus the Carry-In bit. The binary sum appears at the Sum outputs (S), and any resulting carries appear at the Carry-Out pin.

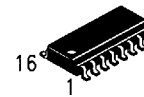
The '283 can be used either with all inputs and outputs active-high (positive logic) or active-low (negative logic). With active-high inputs, Carry In must be held low when no carry-in is intended.

- **Output Drive Capability:** 10 LSTTL Loads
- **Outputs Directly Interface to CMOS, NMOS, and TTL**
- **Operating Voltage Range:** 2 to 6 V for HC Devices
- **Low Input Current:** 1 μ A
- **DC, AC parameters guaranteed from -55°C to 125°C**

DV74HC283
DV74HCT283

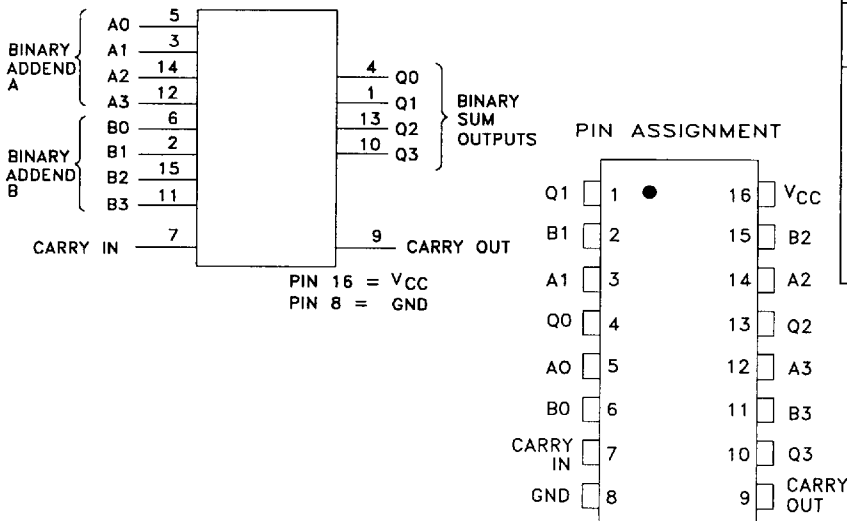


N Suffix
Plastic DIP
AVG-003 Case



D Suffix
Plastic SOP
AVG-004 Case

TRUTH TABLE



Inputs			Outputs	
A _n	B _n	C _{in} =C _{0n-1}	Q _n	C _{0n} =C _{1n+1}
L	L	L	L	L
L	L	H	H	L
L	H	L	H	L
L	H	H	L	H
H	L	L	L	H
H	L	H	L	H
H	H	L	L	H
H	H	H	H	H

n=0, 1, 2, 3 (A3, B3, and Q3 are the most significant bits)
H = High Logic Level
L = Low Logic Level

ABSOLUTE MAXIMUM RATINGS

Maximum ratings are those values beyond which damage to the device may occur.

Symbol	Parameter	Value	Unit
V _{CC}	DC Supply Voltage (Referenced to GND)	-0.5 to +7.0	V
V _{IN}	DC Input Voltage (Referenced to GND)	-1.5 to V _{CC} +1.5	V
V _{OUT}	DC Output Voltage (Referenced to GND)	-0.5 to V _{CC} +0.5	V
I _{IN}	DC Input Current, per Pin	± 20	mA
I _{OUT}	DC Output Current, per Pin	± 25	mA
I _{CC}	DC Supply Current, V _{CC} and GND Pins	± 50	mA
P _D	Power Dissipation in Still Air, Plastic DIP SOP Package	750 500	mW
T _{STG}	Storage Temperature Range	-65 to +150	°C
T _L	Lead Temperature, 1mm from Case for 10 Seconds)	260	°C

GUARANTEED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V _{CC}	DC Supply Voltage HC(HCT), Referenced to GND	2.0(4.5)	6.0(5.5)	V
V _{IN} , V _{OUT}	DC Input Voltage, Output Voltage, Referenced to GND	0	V _{CC}	V
T _A	Ambient Temperature	-55	+125	°C
t _r , t _f	Input Rise and Fall Time: HC: V _{CC} =2.0V HCT: V _{CC} =5.5V / HC: V _{CC} =4.5V HC: V _{CC} =6.0V	0 0 0	1000 500 400	ns

HC- 283

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	V _{CC} V	Guaranteed Limits			Unit
				25°C to -55°C	≤85°C	≤125°C	
V _{IH}	Minimum High-Level Input Voltage	V _{OUT} = 0.1 V, I _{OUT} ≤ 20 μA or V _{OUT} = V _{CC} - 0.1 V	2.0 4.5 6.0	1.5 3.15 4.2	1.5 3.15 4.2	1.5 3.15 4.2	V
V _{IL}	Maximum Low-Level Input Voltage	V _{OUT} = 0.1 V, I _{OUT} ≤ 20 μA or V _{OUT} = V _{CC} - 0.1 V	2.0 4.5 6.0	0.3 0.9 1.2	0.3 0.9 1.2	0.3 0.9 1.2	V
V _{OH}	Minimum High-Level Output Voltage	V _{IN} = V _{IH} or V _{IL} I _{OUT} ≤ 20 μA	2.0 4.5 6.0	1.9 4.4 5.9	1.9 4.4 5.9	1.9 4.4 5.9	V
		V _{IN} = V _{IH} or V _{IL} , I _{OUT} ≤ 4.0 mA I _{OUT} ≤ 5.2 mA	4.5 6.0	3.98 5.48	3.84 5.34	3.7 5.2	
V _{OL}	Maximum Low-Level Output Voltage	V _{IN} = V _{IH} or V _{IL} I _{OUT} ≤ 20 μA	2.0 4.5 6.0	0.1 0.1 0.1	0.1 0.1 0.1	0.1 0.1 0.1	V
		V _{IN} = V _{IH} or V _{IL} , I _{OUT} ≤ 4.0 mA I _{OUT} ≤ 5.2 mA	4.5 6.0	0.26 0.26	0.33 0.33	0.40 0.40	
I _{IN}	Maximum Input Leakage Current	V _{IN} = V _{CC} or GND	6.0	± 0.1	± 1.0	± 1.0	μA
I _{CC}	Maximum Quiescent Supply Current	V _{IN} = V _{CC} or GND, I _{OUT} = 0 μA (Per Package)	6.0	8.0	80	160	μA

AC ELECTRICAL CHARACTERISTICS over full operating conditions (C_L=50pF, Input t_r=t_f=6ns)

Symbol	Parameter	V _{CC} V	Guaranteed Limit			Unit
			25°C to -55°C	≤85°C	≤125°C	
t _{PLH} , t _{PHL}	Maximum Propagation Delay Time, Carry In to Sum Out	2.0	210	265	315	ns
		4.5	42	53	63	
		6.0	36	45	54	
t _{PLH} , t _{PHL}	Maximum Propagation Delay Time, A or B to Sum Out	2.0	270	340	405	ns
		4.5	54	68	81	
		6.0	46	58	69	
t _{PLH} , t _{PHL}	Maximum Propagation Delay Time, Carry In to Carry Out	2.0	195	245	295	ns
		4.5	39	49	59	
		6.0	33	42	50	
t _{PLH} , t _{PHL}	Maximum Propagation Delay Time, A or B to Carry Out	2.0	225	280	340	ns
		4.5	45	56	68	
		6.0	38	48	58	
t _{TLH} , t _{THL}	Maximum Output Transition Time Any Output	2.0	75	95	110	ns
		4.5	15	19	22	
		6.0	13	16	19	
C _{IN}	Maximum Input Capacitance	—	10	10	10	pF

C _{PD}	Power Dissipation Capacitance (Per Package) Used to determine the no-load dynamic power consumption, $P_D = C_{PD} V_{CC}^2 f + I_{CC} V_{CC}$	Typical @ 25°C, V _{CC} = 5 V	pF
		130	

HCT- 283

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	V _{CC} V	Guaranteed Limits						Unit
				25°C to -55°C		≤85°C		≤125°C		
				Min	Max	Min	Max	Min	Max	
V _{IH}	Minimum High-Level Input Voltage	V _{OUT} = 0.1 V or V _{CC} -0.1 V I _{OUT} ≤ 20 μA	4.5 5.5	2.00 2.00		2.00 2.00		2.00 2.00		V
V _{IL}	Maximum Low- Level Input Voltage	V _{OUT} =0.1 V or V _{CC} - 0.1 V I _{OUT} ≤ 20 μA	4.5 5.5		0.80 0.80		0.80 0.80		0.80 0.80	V
V _{OH}	Minimum High-Level Output Voltage	V _{IN} = V _{IL} or V _{IH} I _{OUT} ≤ 20 μA	4.5 5.5	4.40 5.40		4.40 5.40		4.40 5.40		V
		V _{IN} =V _{IL} or V _{IH} I _{OUT} ≤4.0 mA	4.5	3.98		3.84		3.70		V
V _{OL}	Maximum Low Level Output Voltage	V _{IN} = V _{IH} or V _{IL} I _{OUT} ≤ 20 μA	4.5 5.5		0.1 0.1		0.1 0.1		0.1 0.1	V
		V _{IN} = V _{IH} or V _{IL} I _{OUT} ≤ 4.0mA	4.5		0.26		0.33		0.40	V
I _{IN}	Maximum Input Leakage Current	V _{IN} = V _{CC} or GND	5.5		± 0.1		± 1.0		± 1.0	μA
I _{CC}	Maximum Quiescent Supply Current	V _{IN} = V _{CC} or GND I _{OUT} = 0 μA	5.5		8.0		80		80	μA

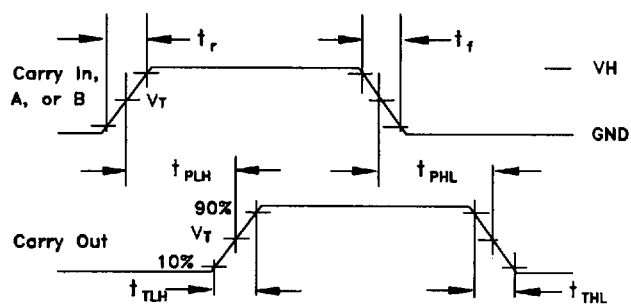
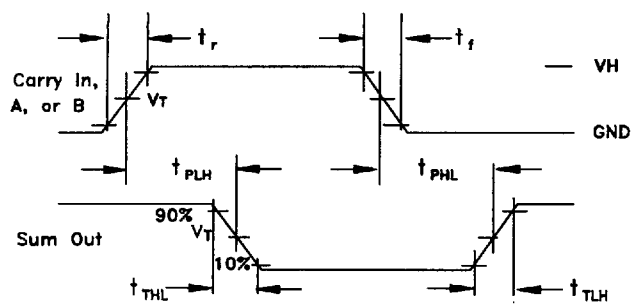
ΔI_{CC}	Additional Quiescent Supply Current	$V_{IN}=2.4V$, Any One Input $V_{IN}=V_{CC}$ or GND, Other Inputs $I_{OUT}=0\ \mu A$	5.5	$\geq -55^{\circ}C$	$25^{\circ}C$ to $125^{\circ}C$	mA
				2.9	2.4	

AC ELECTRICAL CHARACTERISTICS over full operating conditions (C_L = 50pF, Input t_r = 6ns)

Symbol	Parameter	V _{CC} V	Guaranteed Limit			Unit
			25°C to -55°C	≤85°C	≤125°C	
t _{PLH} , t _{PHL}	Maximum Propagation Delay Time, Carry In to Sum Out	5.0 ± 10%	42	53	63	ns
t _{PLH} , t _{PHL}	Maximum Propagation Delay Time, A or B to Sum Out		54	68	81	ns
t _{PLH} , t _{PHL}	Maximum Propagation Delay Time, Carry In to Carry Out		39	49	59	ns
t _{PLH} , t _{PHL}	Maximum Propagation Delay Time, A or B to Carry Out		45	56	68	ns
t _{TLH} , t _{THL}	Maximum Output Transition Time Any Output		15	19	22	ns
C _{IN}	Maximum Input Capacitance	—	10	10	10	pF

C _{PD}	Power Dissipation Capacitance (Per Package) Used to determine the no-load dynamic power consumption, $P_D = C_{PD} V_{CC}^2 f + I_{CC} V_{CC}$	Typical @ 25°C, V _{CC} = 5 V	pF
		130	

SWITCHING WAVEFORMS



Input and output threshold voltage:
 $V_T = 50\% V_{CC}$ for HC; 1.3V for HCT;
 $V_H = V_{CC}$ for HC, 3V for HCT