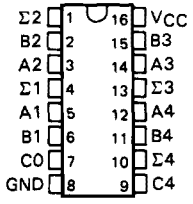
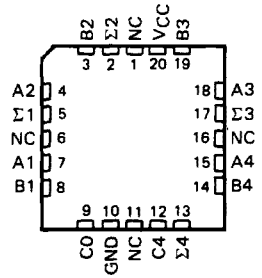
D2932, MARCH 1987—REVISED JANUARY 1989

- **Full-Carry Look-Ahead Across the Four Bits**
- **Systems Achieve Partial Look-Ahead Performance with the Economy of Ripple Carry**
- **Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs**
- **Dependable Texas Instruments Quality and Reliability**

SN54F283 . . . J PACKAGE
SN74F283 . . . D OR N PACKAGE
(TOP VIEW)



SN54F283 . . . FK PACKAGE
(TOP VIEW)



NC—No internal connection

description

The SN54F283 and SN74F283 are full adders that perform the addition of two 4-bit binary words. The sum (Σ) outputs are provided for each bit and the resultant carry (C4) is obtained from the fourth bit.

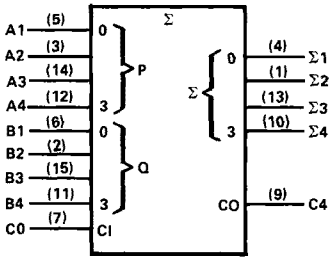
These adders feature full internal look-ahead across all four bits generating the carry term C4 in typically 5.7 nanoseconds. This capability provides the system designer with partial look-ahead performance at the economy and reduced package count of a ripple-carry implementation.

The adder logic, including the carry, is implemented in its true form. End-around carry can be accomplished without the need for logic or level inversion.

The 'F283 can be used with either all-active-high (positive logic) or all-active-low (negative logic) operands.

The SN54F283 is characterized for operation over the full military temperature range of −55°C to 125°C. The SN74F283 is characterized for operation from −40°C to 85°C.

logic symbol†



†This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.
Pin numbers shown are for D, J, and N packages.

FUNCTION TABLE

INPUT				OUTPUT					
				WHEN C0 = L			WHEN C0 = H		
				WHEN C2 = L			WHEN C2 = H		
A1 / A3	B1 / B3	A2 / A4	B2 / B4	Σ1 / Σ3	Σ2 / Σ4	C2 / C4	Σ1 / Σ3	Σ2 / Σ4	C2 / C4
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 A1, B1, A2, B2, and C0 are used to determine outputs Σ1 and Σ2 and the value of the internal carry C2. The values at C2, A3, B3, A4, and B4 are then used to determine outputs Σ3, Σ4, and C4.

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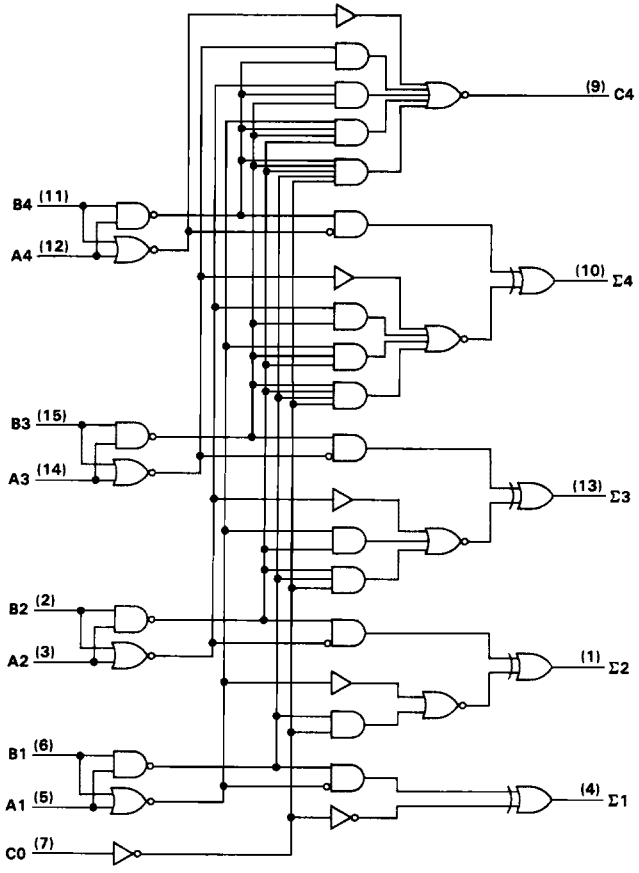
logic diagram (positive logic)



Pin numbers shown are for D, J, and N packages.

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltage, V_{CC} . . . . . −0.5 V to 7 V
Input voltage† . . . . . −1.2 V to 7 V
Input current . . . . . −30 mA to 5 mA
Voltage applied to any output in the high state . . . . . −0.5 V to V_{CC}
Current into any output in the low state . . . . . 40 mA
Operating free-air temperature range: SN54F283 . . . . . −55°C to 125°C
SN74F283 . . . . . 0°C to 70°C
Storage temperature range . . . . . −65°C to 150°C

†The input voltage ratings may be exceeded provided the input current ratings are observed.

recommended operating conditions

		SN54F283			SN74F283			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	4.5	5	5.5	V
V_{IH}	High-level input voltage	2			2			V
V_{IL}	Low-level input voltage			0.8			0.8	V
I_{IK}	Input clamp current			−18			−18	mA
I_{OH}	High-level output current			−1			−1	mA
I_{OL}	Low-level output current			20			20	mA
T_A	Operating free-air temperature	−55		125	0		70	°C

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER		TEST CONDITIONS		SN54F283			SN74F283			UNIT
				MIN	TYP†	MAX	MIN	TYP†	MAX	
V_{IK}		V_{CC} = 4.5 V,	I_{IK} = −18 mA			−1.2			−1.2	V
V_{OH}		V_{CC} = 4.5 V,	I_{OH} = −1 mA	2.5	3.4		2.5	3.4		V
		V_{CC} = 4.75 V,	I_{OH} = −1 mA				2.7			
V_{OL}		V_{CC} = 4.5 V,	I_{OL} = 20 mA		0.30	0.5		0.30	0.5	V
I_I		V_{CC} = 5.5 V,	V_I = 7 V			0.1			0.1	mA
I_{IH}		V_{CC} = 5.5 V,	V_I = 2.7 V			20			20	μA
I_{IL}	Any A or B	V_{CC} = 5.5 V,	V_I = 0.5 V			−1.2			−1.2	mA
	CO					−0.6			−0.6	
I_{OS}‡		V_{CC} = 5.5 V,	V_O = 0	−60		−150	−60		−150	mA
I_{CC}		V_{CC} = 5.5 V,	V_I = 4.5 V		36	55		36	55	mA

switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 5 V, C_L = 50 pF, R_L = 500 Ω, T_A = 25°C			V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R_L = 500 Ω, T_A = MIN to MAX§				UNIT
			'F283			SN54F283		SN74F283		
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	CO	Σi	2.7	6.6	9.5	2.7	14	2.7	10.5	ns
t_{PHL}			3.2	6.6	9.5	3.2	14	3.2	10.5	
t_{PLH}	Ai or Bi	Σi	3.2	6.6	9.5	3.2	14	3.2	10.5	ns
t_{PHL}			2.7	6.6	9.5	2.7	14	2.7	10.5	
t_{PLH}	CO	C4	2.7	5.3	7.5	2.7	10.5	2.7	8.5	ns
t_{PHL}			2.2	5	7	2.2	10	2.2	8	
t_{PLH}	Ai or Bi	C4	2.7	5.3	7.5	2.7	10.5	2.7	8.5	ns
t_{PHL}			2.2	4.9	7	2.2	10	2.2	8	

† All typical values are at V_{CC} = 5 V, T_A = 25°C.
‡ Not more than one output should be shorted at a time, and the duration of the short circuit should not exceed one second.
§ For conditions shown as MIN or MAX, use the appropriate value specified under Recommended Operating Conditions.
NOTE 1: See General Information for load circuits and waveforms.

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