SN54283, SN54LS283, SN54S283, SN74283, SN74LS283, SN74S283 4-BIT BINARY FULL ADDERS WITH FAST CARRY SDLS095A – OCTOBER 1976 – REVISED MARCH 1988

- Full-Carry Look-Ahead Across the Four Bits
- Systems Achieve Partial Look-Ahead Performance with the Economy of Ripple Carry
- Supply Voltage and Ground on Corner Pins to Simplify P-C Board Layout

TYPICAL ADD TIMES

түре	TWO 8-BIT WORDS	TWO 16-BIT WORDS	TYPICAL POWER DISSIPATION PER ADDER
'283	23ns	43ns	310 mW
'LS283	25ns	45ns	95 mW
ʻS283	15ns	30ns	510 mW

description

The '283 and 'LS283 adders are electrically and functionally identical to the '83A and 'LS83A, respectively; only the arrangement of the terminals has been changed. The 'S283 high performance versions are also functionally identical.

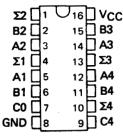
These improved full adders perform the addition of two 4-bit binary words. The sum (Σ) outputs are provided for each bit and the resultant carry (C4) is obtained from the fourth bit. These adders feature full internal look-ahead across all four bits generating the carry term in ten nanoseconds, typically, for the '283 and 'LS283, and 7.5 nanoseconds for the 'S283. This capability provides the system designer with partial look-ahead performance at the economy and reduced package count of а 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.

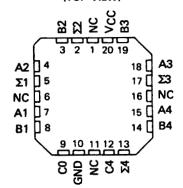
Series 54, Series 54LS, and Series 54S circuits are characterized for operation over the full temperature range of -55° C to 125° C. Series 74, Series 74LS, and Series 74S circuits are characterized for 0° C to 70° C operation.

SN54283, SN54LS283...J OR W PACKAGE SN54S283...J PACKAGE SN74283...N PACKAGE SN74LS283, SN74S283...D OR N PACKAGE

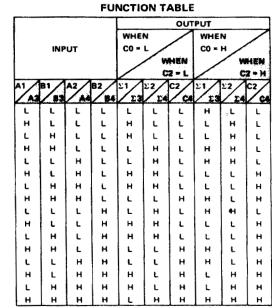
(TOP VIEW)



SN54LS283, SN54S283 . . . FK PACKAGE (TOP VIEW)



NC - No internal connection



H = high level, L = low level

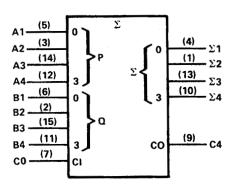
NOTE: Input conditions at A1, B1, A2, B2, and C0 are used to determine outputs Σ1 and Σ2 and the value of the internal carry C2. The values at C2, A3, B3, A4, and B4 are then used to determine outputs Σ3, Σ4, and C4.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

SN54283, SN54LS283, SN54S283, SN74283, SN74LS283, SN74S283 4-BIT BINARY FULL ADDERS WITH FAST CARRY

SDLS095A - OCTOBER 1976 - REVISED MARCH 1988

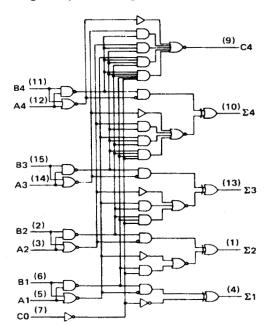
logic symbol[†]

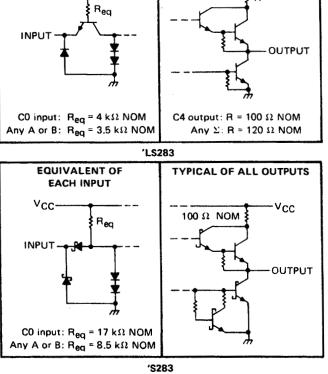


[†]This symbol is in accordance with ANSI/IEEE Std. 91-1984 and IEC Publication 617-12.

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

logic diagram (positive logic)





283

TYPICAL OF ALL

OUTPUTS

R

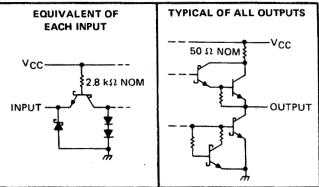
Vcc

schematics of inputs and outputs

EQUIVALENT OF

EACH INPUT

v_{cc}



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

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

Supply voltage, VCC (see Note 1)																					7V
Input voltage: '283, 'S283																					
'LS283																					7V
Interemitter voltage (see Note 2) .																					
Operating free-air temperature range:	5	IN5	42	83,	SN	541	_S2	283	, SI	N54	4S2	83						5	5°C	C to	125°C
																					o 70°C
Storage temperature range																		6	5° (C to	150°C
NOTES: 1. Voltage values, except interemitter																					

2. This is the voltage between two emitters of a multiple-emitter transistor. This rating applies for the '283 and 'S283 only between the following pairs: A1 and B1, A2 and B2, A3 and B3, A4 and B4.



recommended operating conditions

		5	SN54283			SN74283			
	· · · · · · · · · · · · · · · · · · ·	MIN	NOM	MAX	MIN	NOM	MAX	UNIT	
Supply Voltage, VCC		4.5	5	5.5	4.75	5	5.25	V	
High-level output current, IOH	Any output except C4			-800			800		
High-level output current, IOH	Output C4	•		-400			- 400	μA	
	Any output except C4			16			16		
Low-level output current, IOL	Output C4		1.11	8			8	mA	
Operating free-air temperature, TA		55		125	0		70	°C	

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

	PARAM	ETED	TEST CO	NDITIONS		SN5428	3		SN7428	3	
	FANAW		TEST CO	NDITIONS.	MIN	TYP‡	MAX	MIN	TYP‡	MAX	UNIT
VIH	High-level input volt	age			2			2			V
VIL	Low-level input volta	age					0.8	1		0.8	v
VIK	Input clamp voltage		V _{CC} = MIN,	l _l =12 mA			-1.5			-1.5	V
v _{он}	High-level output vo	itage	V _{CC} = MIN, V _{IL} = 0.8 V,	V _{IH} = 2 V, I _{OH} = MAX	2.4	3.6		2.4	3.6	>	v
VOL	Low-level output vol	tage	V _{CC} = MIN, V _{IL} = 0.8 V,		· · · ·	0.2	0.4		0.2	0.4	v
4	Input current at max input voltage	limum	V _{CC} = MAX,	V _I = 5.5 V			1			1	mA
ŧн	High-level input curr	ent	V _{CC} = MAX,	V1 = 2.4 V			40			40	μA
μL	Low-level input curr	ent	V _{CC} = MAX,	VI = 0.4 V			-1.6			-1.6	mA
los	Short-circuit	Any output except C4	V _{CC} = MAX		-20		-55	-18		55	<u> </u>
.02	output current §	Output C4			-20		-70	-18		70	mA ·
loo	Supply current		V _{CC} = MAX,	All B low, other inputs at 4.5 V		56			56		
'cc			Outputs open	All inputs at 4.5 V		66	99		66	110	- mA

[†]For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

[‡]All typical values are at $V_{CC} = 5 V$, $T_A = 25$ °C.

Sonly one output should be shorted at a time.

switching characteristics, V_{CC} = 5 V, T_A = 25°C

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN TYP	MAX	UNIT
^t PLH	со	Antis		14	21	<u> </u>
tΡΗL		Any Σ	$C_{L} = 15 pF, R_{L} = 400 \Omega,$	12	21	ns
^t PLH	Ai or Bi	5.	See Note 3	16	24	<u>†</u>
^t PHL		Σį		16	24	ns
TPLH	- CO			9	14	<u> </u>
^t PHL		C4	C _L = 15 pF, R _L = 780 Ω,	11	16	ns
^t PLH	At or Bi	C4	See Note 3	9	14	1
^t PHL	A _i or B _i	64		11	16	ns ns

 \P_{tPLH} = propagation delay time, low-to-high-level output

tpHL = propagation delay time, high-to-low-level output

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.



SN54LS283, SN74LS283 4-BIT BINARY FULL ADDERS WITH FAST CARRY

SDLS095A – OCTOBER 1976 – REVISED MARCH 1988

recommended operating conditions

	S	SN54LS283			SN74LS283			
	MIN	NOM	MAX	MIN	NOM	MAX	UNIT	
Supply voltage, V _{CC}	4.5	5	5.5	4.75	5	5.25	V	
High-level output current, IOH			-400			400	μA	
Low-level output current, IOL			4			8	mA	
Operating free-air temperature, TA	-55		125	0		70	°C	

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

	PARAMET	E0			Net	SI	V54LS2	83	S	N74LS2	83	
	PARAMET	EK .	I E	ST CONDITIO	NS	MIN	TYP [‡]	MAX	MIN	TYP [‡]	MAX	UNIT
VIH	High-level input v	voltage				2			2			V
VIL	Low-level input v	oltage						0.7			0.8	V
VIK	Input clamp volta	age	V _{CC} = MIN,	1j = -18 mA				-1.5		•	-1.5	V
VOH	High-level output	t voltage	V _{CC} = MIN, I _{OH} ≕400 μA		V _{IL} = V _{IL} max,	2.5	3.4		2.7	3.4		v
N.s.			V _{CC} = MIN,	V _{IH} = 2 V,	I _{OL} = 4 mA		0.25	0.4		0.25	0.4	
VOL	Low-level output	voitage	VIL = VIL max		I _{OL} = 8 mA					0.35	0.5	v
1.	Input current at maximum	Any A or B	V _{CC} = MAX,	V. 7 V				0.2			0.2	
1	input voltage	CO		V -/V				0.1			0.1	mA
1	High-level	Any A or B	Vee = MAX	V. = 27.V	•			40			40	
ЧΗ	input current	CO	V _{CC} = MAX,	V ₁ = 2.7 V				20			20	μA
1	Low-level	Any A or B	V _{CC} = MAX,	V _I ≖ 0.4 V				-0.8			-0.8	
11L	input current	CO		v] = 0.4 v				-0.4			0.4	mA
los	Short-circuit out	put current§	V _{CC} ≖ MAX			-20		-100	-20		-100	mA
				<u>,</u>	All inputs grounded		22	39		22	39	
Icc	Supply current		V _{CC} = MAX, Outputs open		All B low, other inputs at 4.5 V		19	34		19	34	mA
					All inputs at 4.5 V		19	34		19	34	1

[†]For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

[‡]All typical values are at $V_{CC} = 5 V$, $T_A = 25^{\circ}C$.

§Only one output should be shorted at a time and duration of the short-circuit should not exceed one second,

switching characteristics, $V_{CC} = 5 V$, $T_A = 25^{\circ}C$

PARAMETER¶	FROM (INPUT)	TO (OUTPUT)	TEST COM	DITIONS	MIN	TYP	MAX	UNIT
tPLH	СО	Ant				16	24	
tPHL		Αηγ Σ				15	24	ns
tPLH .	A _i or B _i	Σ.	1			15	24	
^t PHL		Σi	CL = 15 pF,	RL = 2 kΩ,		15	24	ns
^t PLH	СО	C4	See Note 3			11	17	
^t PHL		~~~~				11	22	ns
^t PLH	A _i or B _i	C4				11	17	
^t PHL		, ~~				12	17	ns

¶tpLH = propagation delay time, low-to-high-level output

tpHL = propagation delay time, high-to-low-level output

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.



recommended operating conditions

			SN54S28	3		SN74S283			
		MIN	NOM	MAX	MIN	NOM	MAX		
Supply voltage, VCC		4.5	5	5.5	4.75	5	5.25	V	
	Any output except C4			-1			-1	mA	
High-level output current, IOH	Output C4			500	1		-500	μΑ	
	Any output except C4			20			20		
Low-level output current, IOL	Output C4			10			10	- mA	
Operating free-air temperature,	TA	-55		125	0		70	°C	

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

	PARAMETER			TEST CO		MIN	TYPŦ	MAX	UNIT
VIH	High-level input vo	oltage				2			V
VIL	Low-level input vo	ltage						0.8	V
VIK	Input clamp voltag	ge		V _{CC} = MIN,	l _l = -18 mA			-1.2	v
			SN54S283	V _{CC} = MIN,	V _{IH} = 2 V,	2.5	3.4	• • • • • • • • • • • • • • • • • • • •	
VOH	High-level output	voitage	SN74S283	V _{IL} = 0.8 V,	IOH = MAX	2.7	3.4		1 V
VOL	Low-level output v	voltage		V _{CC} = MIN, V _{IL} = 0.8 V,	V _{IH} = 2 V, I _{OL} = MAX			0.5	v
ł ₁	Input current at m input voltage	aximum		V _{CC} ≖ MAX,	V _I = 5.5 V			1	mA
[†] IH	High-level input cu	urrent		V _{CC} = MAX,	V1 = 2.7 V			50	μA
4L	Low-level input cu	irrent		V _{CC} = MAX,	Vi = 0.5 V			-2	mA
1	Short-circuit	Any outp	out except C4			-40		-100	1 .
IOS	output current§	Output C	4	V _{CC} ≖ MAX		20		-100	- mA
lcc	Supply current			V _{CC} = MAX,	All B low, other inputs at 4.5 V		80		
100	oupply current			Outputs open	All inputs at 4.5 V		95	160	- mA

[†]For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable device type.

[†]All typical values are at V_{CC} = 5 V, T_A = 25°C.

§ Only one output should be shorted at a time, and duration of the short-circuit should not exceed one second.

switching characteristics, V_{CC} = 5 V, T_A = 25°C

PARAMETER¶	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	ТҮР	MAX	UNIT
tPLH	CO	Anu D			11	18	1
ΨHL	CU	Any Σ	$C_{L} = 15 pF, R_{L} = 280 \Omega,$		12	18	ns ns
ΨLH	At at Br	5.	See Note 3		12	18	1
^t PHL	A _i or B _i	Σi			11.5	18	- ns
TPLH	CO	C4		[6	11	
ሞዘL	CU	C4	CL = 15 pF, RL = 560 Ω,		7.5	11	ns ns
^t PLH	A. or P.	C4	See Note 3		7.5	12	
tPHL	A _i or B _i	C4			8.5	12	ns ns

¶tpLH = propagation delay time, low-to-high-level output

tpHL = propagation delay time, high-to-low-level output

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.





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25-Jan-2012

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/ Ball Finish	MSL Peak Temp ⁽³⁾	Samples (Requires Login)
5962-7604301VEA	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	
76043012A	ACTIVE	LCCC	FK	20	1	TBD	Call TI	Call TI	
7604301EA	ACTIVE	CDIP	J	16	1	TBD	Call TI	Call TI	
7604301FA	ACTIVE	CFP	W	16	1	TBD	Call TI	Call TI	
JM38510/31202B2A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	
JM38510/31202BEA	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	
JM38510/31202BFA	ACTIVE	CFP	W	16	1	TBD	A42	N / A for Pkg Type	
M38510/31202B2A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	
M38510/31202BEA	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	
M38510/31202BFA	ACTIVE	CFP	W	16	1	TBD	A42	N / A for Pkg Type	
SN54LS283J	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	
SN54S283J	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	
SN74283N	OBSOLETE	PDIP	Ν	16		TBD	Call TI	Call TI	
SN74LS283D	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74LS283DE4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74LS283DG4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74LS283N	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SN74LS283N3	OBSOLETE	PDIP	Ν	16		TBD	Call TI	Call TI	
SN74LS283NE4	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SN74LS283NSR	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74LS283NSRE4	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74LS283NSRG4	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74S283D	OBSOLETE	SOIC	D	16		TBD	Call TI	Call TI	
SN74S283N	ACTIVE	PDIP	Ν	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SN74S283N3	OBSOLETE	PDIP	Ν	16		TBD	Call TI	Call TI	



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Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/ Ball Finish	MSL Peak Temp ⁽³⁾	Samples (Requires Login)
SN74S283NE4	ACTIVE	PDIP	Ν	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SNJ54LS283FK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	
SNJ54LS283J	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	
SNJ54LS283W	ACTIVE	CFP	W	16	1	TBD	A42	N / A for Pkg Type	
SNJ54S283FK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	
SNJ54S283J	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	
SNJ54S283W	ACTIVE	CFP	W	16	1	TBD	A42	N / A for Pkg Type	

⁽¹⁾ The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

⁽³⁾ MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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OTHER QUALIFIED VERSIONS OF SN54283, SN54LS283, SN54LS283-SP, SN54S283, SN74283, SN74LS283, SN74S283 :

• Catalog: SN74283, SN74LS283, SN54LS283, SN74S283





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25-Jan-2012

• Military: SN54283, SN54LS283, SN54S283

• Space: SN54LS283-SP

NOTE: Qualified Version Definitions:

- Catalog TI's standard catalog product
- Military QML certified for Military and Defense Applications
- Space Radiation tolerant, ceramic packaging and qualified for use in Space-based application

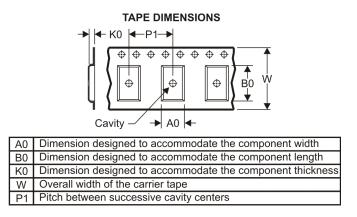
PACKAGE MATERIALS INFORMATION

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TAPE AND REEL INFORMATION





QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal	
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Device	Package Type	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74LS283NSR	SO	NS	16	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1

TEXAS INSTRUMENTS

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PACKAGE MATERIALS INFORMATION

29-Jul-2009



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74LS283NSR	SO	NS	16	2000	346.0	346.0	33.0

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