

# SN54LS183, SN74LS183 DUAL CARRY-SAVE FULL ADDERS

SDLS137

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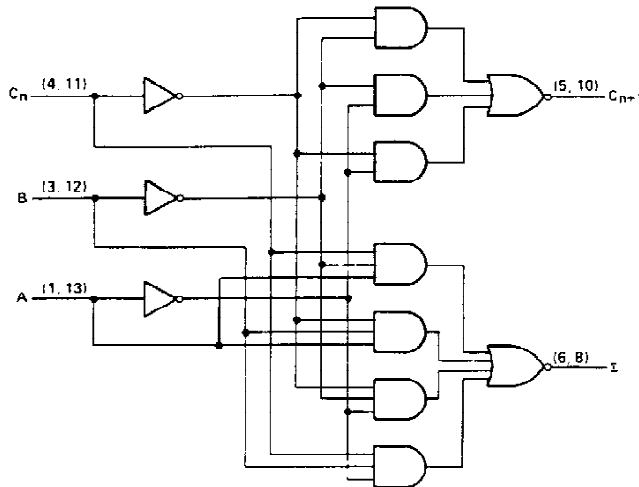
- For Use in High-Speed Wallace-Tree Summing Networks
- High-Speed, High-Fan-Out Darlington Outputs
- Input Clamping Diodes Simplify System Design

TYPES	TYPICAL AVERAGE PROPAGATION DELAY TIME	TYPICAL POWER DISSIPATION
'LS183	15 ns	23 mW per bit

## description

These dual full adders feature an individual carry output from each bit for use in multiple-input, carry-save techniques to produce the true sum and true carry outputs with no more than two gate delays. The circuits utilize high-speed, high-fan-out, transistor-transistor logic (TTL), but are compatible with both DTL and TTL families. SN54LS183 is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ ; SN74LS183 is characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

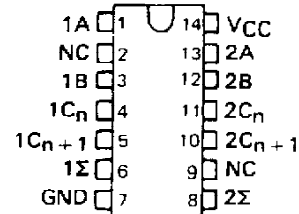
## logic diagram (each adder)



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

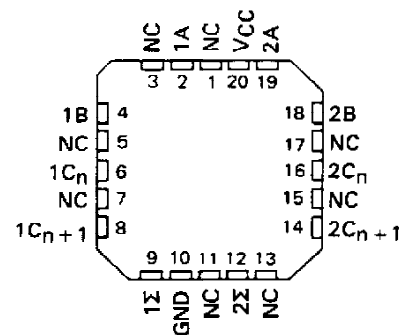
SN54LS183 . . . J OR W PACKAGE  
SN74LS183 . . . D OR N PACKAGE

(TOP VIEW)



SN54LS183 . . . FK PACKAGE

(TOP VIEW)



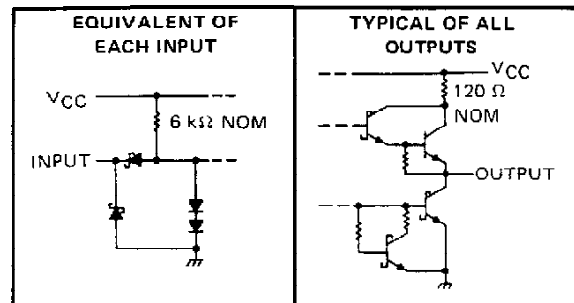
NC - No internal connection

FUNCTION TABLE  
(EACH ADDER)

INPUTS			OUTPUTS	
$C_n$	B	A	$\Sigma$	$C_{n+1}$
L	L	L	L	L
L	L	H	H	L
L	H	L	H	L
L	H	H	L	H
H	L	L	H	L
H	L	H	L	H
H	H	L	L	H
H	H	H	H	H

H = high level, L = low level

## schematics of inputs and outputs



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# SN54LS183, SN74LS183

## DUAL CARRY-SAVE FULL ADDERS

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

Supply voltage $V_{CC}$ (see Note 1)	7 V
Input voltage	7 V
Operating free-air temperature range: SN54LS183 Circuits	$-55^{\circ}\text{C}$ to $125^{\circ}\text{C}$
SN74LS183 Circuits	$0^{\circ}\text{C}$ to $70^{\circ}\text{C}$
Storage temperature range	$-65^{\circ}\text{C}$ to $150^{\circ}\text{C}$

NOTE 1: Voltage values, except interemitter voltage, are with respect to network ground terminal.

recommended operating conditions

	SN54LS183			SN74LS183			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
Supply voltage, $V_{CC}$	4.5	5	5.5	4.75	5	5.25	V
High-level output current, $I_{OH}$			-400			-400	$\mu\text{A}$
Low-level output current, $I_{OL}$			4			8	mA
Operating free-air temperature, $T_A$	-55		125	0		70	$^{\circ}\text{C}$

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

PARAMETER	TEST CONDITIONS†	MIN	TYP‡	MAX	MIN	TYP‡	MAX	UNIT
$V_{IH}$ High-level input voltage		2			2			V
$V_{IL}$ Low-level input voltage				0.7			0.8	V
$V_{IK}$ Input clamp voltage	$V_{CC} = \text{MIN}$ , $I_I = -18 \text{ mA}$			-1.5			-1.5	V
$V_{OH}$ High-level output voltage	$V_{CC} = \text{MIN}$ , $V_{IH} = 2 \text{ V}$ , $V_{IL} = V_{IL \text{ max}}$ , $I_{OH} = -400 \mu\text{A}$	2.5	3.4		2.7	3.4		V
$V_{OL}$ Low-level output voltage	$V_{CC} = \text{MIN}$ , $V_{IH} = 2 \text{ V}$ , $V_{IL} = V_{IL \text{ max}}$ , $I_{OL} = 4 \text{ mA}$		0.25	0.4		0.25	0.4	V
	$V_{CC} = \text{MIN}$ , $V_{IH} = 2 \text{ V}$ , $V_{IL} = V_{IL \text{ max}}$ , $I_{OL} = 8 \text{ mA}$					0.35	0.5	
$I_I$ Input current at maximum input voltage	$V_{CC} = \text{MAX}$ , $V_I = 7 \text{ V}$			0.3			0.3	mA
$I_{IH}$ High-level input current	$V_{CC} = \text{MAX}$ , $V_I = 2.7 \text{ V}$			60			60	$\mu\text{A}$
$I_{IL}$ Low-level input current	$V_{CC} = \text{MAX}$ , $V_I = 0.4 \text{ V}$			-1.2			-1.2	mA
$I_{OS}$ Short-circuit output current§	$V_{CC} = \text{MAX}$	-20		-100	-20		-100	mA
$I_{CCL}$ Supply current, all outputs low	$V_{CC} = \text{MAX}$ , See Note 3		10	17		10	17	mA
$I_{CCH}$ Supply current, all outputs high	$V_{CC} = \text{MAX}$ , See Note 4		8	14		8	14	mA

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

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

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

NOTES: 3.  $I_{CCL}$  is measured with all outputs open and all inputs grounded.

4.  $I_{CCH}$  is measured with all outputs open and all inputs at 4.5 V.

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

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$t_{PLH}$ Propagation delay time, low-to-high-level output	$C_L = 15 \text{ pF}$ , $R_L = 2 \text{ k}\Omega$ ,		9	15	ns
$t_{PHL}$ Propagation delay time, high-to-low-level output	See Note 5		20	33	ns

NOTE 5: Load circuits and voltage waveforms are shown in Section 1.

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