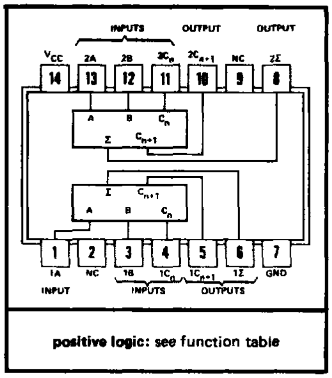
TYPES SN54H183, SN54LS183, SN74H183, SN74LS183
DUAL CARRY-SAVE FULL ADDERS

BULLETIN NO. DL-S 7711848, OCTOBER 1976—REVISED AUGUST 1977

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

SN54H183, SN54LS183 . . . J OR W PACKAGE
SN74H183, SN74LS183 . . . J OR N PACKAGE
(TOP VIEW)

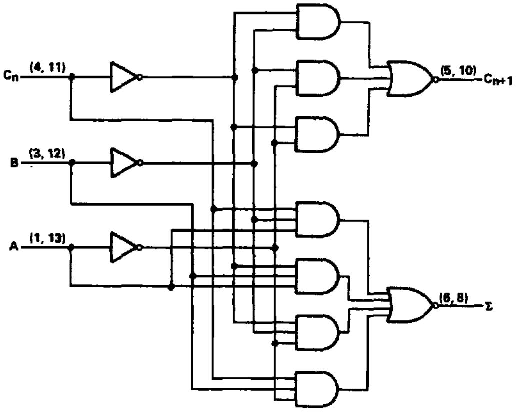


positive logic: see function table

NC—No internal connection

TYPES	TYPICAL AVERAGE PROPAGATION DELAY TIME	TYPICAL POWER DISSIPATION
'H183	11 ns	110 mW per bit
'LS183	15 ns	23 mW per bit

functional block diagram (each adder)



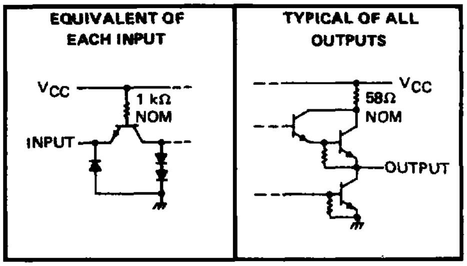
FUNCTION TABLE (EACH ADDER)

INPUTS			OUTPUTS	
C_n	B	A	Σ	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

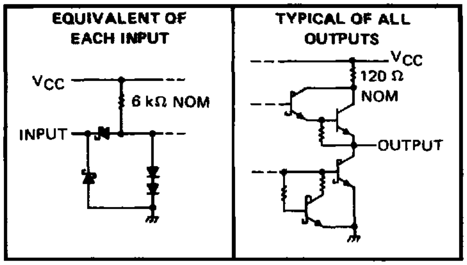
H = high level, L = low level

schematics of inputs and outputs

'H183



'LS183



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. Series 54H and 54LS devices are characterized for operation over the full military temperature range of −55°C to 125°C; Series 74H and 74LS devices are characterized for operation from 0°C to 70°C.

TEXAS INSTRUMENTS
INCORPORATED
POST OFFICE BOX 5012 • DALLAS, TEXAS 75222

TYPES SN54H183, SN74H183
DUAL CARRY-SAVE FULL ADDERS

REVISED AUGUST 1977

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

Supply voltage V_{CC} (see Note 1)		7 V
Input voltage		5.5 V
Interemitter voltage (see Note 2)		5.5 V
Operating free-air temperature range:	SN54H183 Circuits	−55°C to 125°C
	SN74H183 Circuits	0°C to 70°C
Storage temperature range		−65°C to 150°C

NOTES: 1. Voltage values, except interemitter voltage, are with respect to network ground terminal.
2. This is the voltage between two emitters of a multiple-emitter transistor. For this circuit, this rating applies between any two inputs to the same adder.

recommended operating conditions

	SN54H183			SN74H183			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}			−1			−1	mA
Low-level output current, I_{OL}			20			20	mA
Operating free-air temperature, T_A	−55		125	0		70	°C

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

PARAMETER		TEST CONDITIONS†		MIN	TYP‡	MAX	UNIT
V_{IH}	High-level input voltage			2			V
V_{IL}	Low-level input voltage					0.8	V
V_{IK}	Input clamp voltage	V_{CC} = MIN,	I_I = −8 mA			−1.5	V
V_{OH}	High-level output voltage	V_{CC} = MIN, V_{IL} = 0.8 V,	V_{IH} = 2 V, I_{OH} = −1 mA	2.4	3.5		V
V_{OL}	Low-level output voltage	V_{CC} = MIN, V_{IL} = 0.8 V,	V_{IH} = 2 V, I_{OL} = 20 mA		0.2	0.4	V
I_I	Input current at maximum input voltage	V_{CC} = MAX,	V_I = 5.5 V			1	mA
I_{IH}	High-level input current	V_{CC} = MAX,	V_I = 2.4 V			150	µA
I_{IL}	Low-level input current	V_{CC} = MAX,	V_I = 0.4 V			−6	mA
I_{OS}	Short-circuit output current§	V_{CC} = MAX		−40		−100	mA
I_{CCL}	Supply current, all outputs low	V_{CC} = MAX, See Note 3	SN54H183		48	69	mA
			SN74H183		48	75	
I_{CCH}	Supply current, all outputs high	V_{CC} = MAX,	See Note 4		40	65	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 V, T_A = 25°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 V, T_A = 25°C

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH}	Propagation delay time, low-to-high-level output	C_L = 25 pF, R_L = 280 Ω,		10	15	ns
t_{PHL}	Propagation delay time, high-to-low-level output	See Note 5		12	18	ns

NOTE 5: Load circuit and waveforms are shown on page 3-10.

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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°C to 125°C
SN74LS183 Circuits . . . . 0°C to 70°C
Storage temperature range . . . . −65°C to 150°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	μA
Low-level output current, I_{OL}			4			8	mA
Operating free-air temperature, T_A	−55		125	0		70	°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} = MIN,	I_I = −18 mA			−1.5			−1.5	V
V_{OH}	High-level output voltage	V_{CC} = MIN, V_{IL} = V_{IL}max,	V_{IH} = 2 V, I_{OH} = −400 μA	2.5	3.4		2.7	3.4		V
V_{OL}	Low-level output voltage	V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = V_{IL}max,	I_{OL} = 4 mA		0.25	0.4		0.25	0.4	V
			I_{OL} = 8 mA					0.35	0.5	
I_I	Input current at maximum input voltage	V_{CC} = MAX,	V_I = 7 V			0.3			0.3	mA
I_{IH}	High-level input current	V_{CC} = MAX,	V_I = 2.7 V			60			60	μA
I_{IL}	Low-level input current	V_{CC} = MAX,	V_I = 0.4 V			−1.2			−1.2	mA
I_{OS}	Short-circuit output current§	V_{CC} = MAX		−20		−100	−20		−100	mA
I_{CCL}	Supply current, all outputs low	V_{CC} = MAX,	See Note 3		10	17		10	17	mA
I_{CCH}	Supply current, all outputs high	V_{CC} = 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 V, T_A = 25°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 V, T_A = 25°C

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH}	Propagation delay time, low-to-high-level output	C_L = 15 pF, R_L = 2 kΩ,		9	15	ns
t_{PHL}	Propagation delay time, high-to-low-level output	See Note 6		20	33	ns

NOTE 6: Load circuit and waveforms are shown on page 3-11.