# SN54LS183, SN74LS183
# DUAL CARRY-SAVE FULL ADDERS

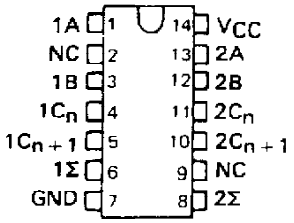
SDLS137

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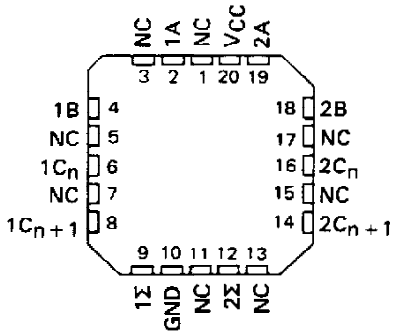
- For Use in High-Speed Wallace-Tree Summing Networks
- High-Speed, High-Fan-Out Darlington Outputs
- Input Clamping Diodes Simplify System Design

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

**SN54LS183 . . . J OR W PACKAGE**
**SN74LS183 . . . D OR N PACKAGE**
**(TOP VIEW)**




**SN54LS183 . . . FK PACKAGE**
**(TOP VIEW)**

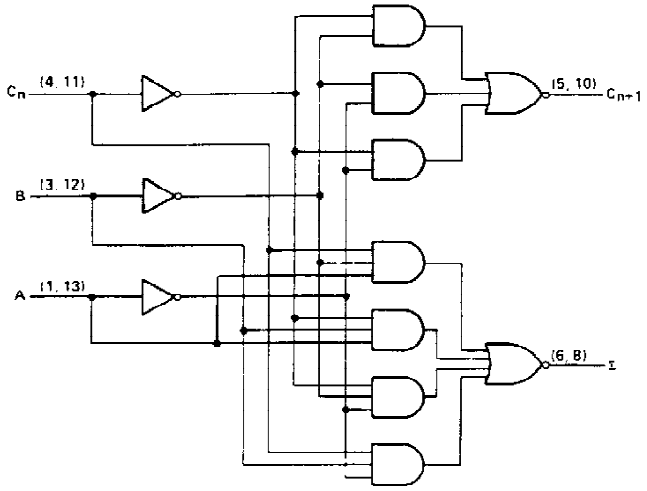



NC – No internal connection

## 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°C to 125°C; SN74LS183 is characterized for operation from 0°C to 70°C.

## logic diagram (each adder)



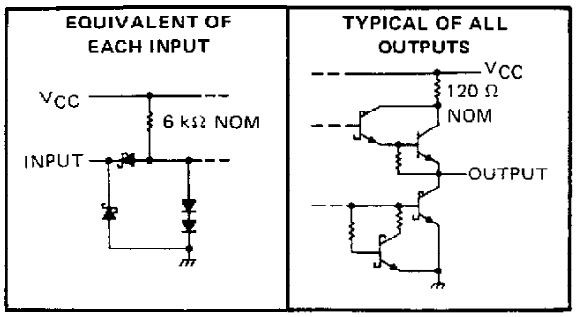

Pin numbers shown are for D, J, N, and W packages.

**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




**PRODUCTION DATA** documents contain information 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.

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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, See Note 5 | | 9 | 15 | ns |
| $t_{PHL}$ | Propagation delay time, high-to-low-level output | | | 20 | 33 | ns |

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

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