

TYPES SN54H183, SN74H183 DUAL CARRY-SAVE FULL ADDERS

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 .

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	$^{\circ}\text{C}$

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	$V_{CC} = \text{MIN}, I_I = -8 \text{ mA}$			-1.5	V
V_{OH} High-level output voltage	$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = 0.8 \text{ V}, I_{OH} = -1 \text{ mA}$	2.4	3.5		V
V_{OL} Low-level output voltage	$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = 0.8 \text{ V}, I_{OL} = 20 \text{ mA}$		0.2	0.4	V
I_I Input current at maximum input voltage	$V_{CC} = \text{MAX}, V_I = 5.5 \text{ V}$			1	mA
I_{IH} High-level input current	$V_{CC} = \text{MAX}, V_I = 2.4 \text{ V}$			150	μA
I_{IL} Low-level input current	$V_{CC} = \text{MAX}, V_I = 0.4 \text{ V}$			-6	mA
I_{OS} Short-circuit output current [§]	$V_{CC} = \text{MAX}$	-40		-100	mA
I_{CCL} Supply current, all outputs low	$V_{CC} = \text{MAX}, \text{SN54H183}$		48	69	mA
	See Note 3, SN74H183		48	75	
I_{CCH} Supply current, all outputs high	$V_{CC} = \text{MAX}, \text{See Note 4}$		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 $V_{CC} = 5 \text{ V}, T_A = 25^{\circ}\text{C}$.

[§] 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	$C_L = 25 \text{ pF}, R_L = 280 \Omega,$		10	15	ns
t_{PHL} Propagation delay time, high-to-low-level output	See Note 5		12	18	

NOTE 5: See General Information Section for load circuits and voltage waveforms.

3

TTL DEVICES

TYPES 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°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	μ A
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	$V_{CC} = \text{MIN}, I_I = -18 \text{ mA}$			-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
	$I_{OL} = 8 \text{ mA}$					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	μ 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: See General Information Section for load circuits and voltage waveforms.