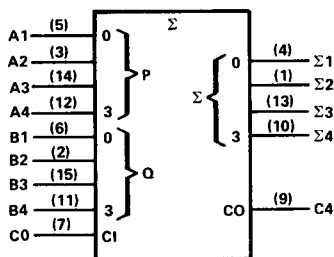




# SN54283, SN54LS283, SN54S283, SN74283, SN74LS283, SN74S283 4-BIT BINARY FULL ADDERS WITH FAST CARRY

## logic symbol †

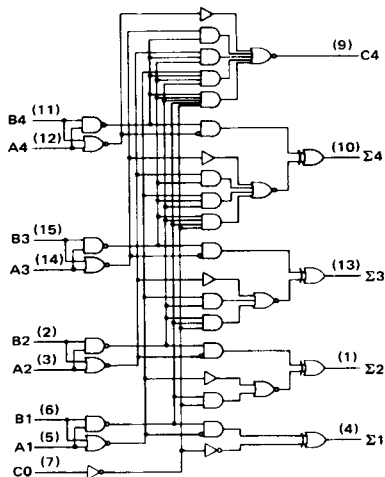


† This symbol is in accordance with ANSI/IEEE Std. 91-1984 and IEC Publication 617-12.

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

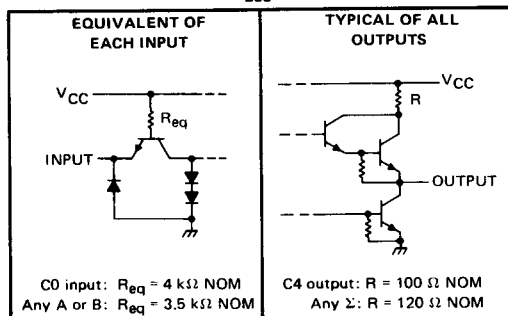
2

## logic diagram (positive logic)

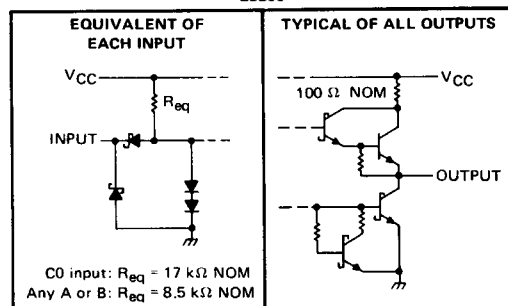


Pin numbers shown are for D, J, N, and W packages.

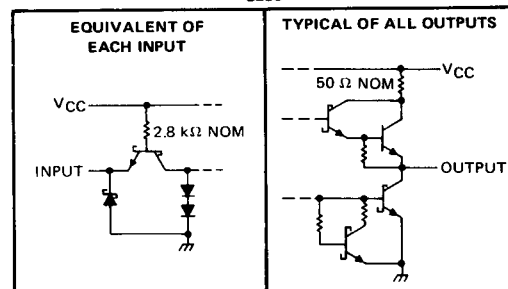
## schematics of inputs and outputs



'LS283



'S283



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

Supply voltage, $V_{CC}$ (see Note 1)	7V
Input voltage: '283, 'S283	5.5V
'LS283	7V
Interemitter voltage (see Note 2)	5.5V
Operating free-air temperature range: SN54283, SN54LS283, SN54S283	$-55^{\circ}\text{C}$ to $125^{\circ}\text{C}$
SN74283, SN74LS283, SN74S283	$0^{\circ}\text{C}$ to $70^{\circ}\text{C}$
Storage temperature range	$-65^{\circ}\text{C}$ to $150^{\circ}\text{C}$

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. 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.

**PC Board Layout Considerations (continued)**

T-51-09-08

# SN54LS283, SN74LS283

## 4-BIT BINARY FULL ADDERS WITH FAST CARRY

### recommended operating conditions

	SN54LS283			SN74LS283			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			$\mu$ A
Low-level output current, $I_{OL}$	4			8			mA
Operating free-air temperature, $T_A$	-55			125			$^{\circ}$ C

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

PARAMETER		TEST CONDITIONS†	SN54LS283			SN74LS283			UNIT
			MIN	TYP‡	MAX	MIN	TYP‡	MAX	
$V_{IH}$	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	$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = V_{IL \text{ max}}, I_{OL} = 8 \text{ mA}$	0.25 0.4			0.25 0.4			V
$I_I$	Input current at maximum input voltage	Any A or B	0.2			0.2			mA
		C0	0.1			0.1			
$I_{IH}$	High-level input current	Any A or B	40			40			$\mu$ A
		C0	20			20			
$I_{IL}$	Low-level input current	Any A or B	-0.8			-0.8			mA
		C0	-0.4			-0.4			
$I_{OS}$	Short-circuit output current§	$V_{CC} = \text{MAX}$	-20	-100	-20	-100	mA		
$I_{CC}$	Supply current	$V_{CC} = \text{MAX},$ Outputs open	All inputs grounded	22	39	22	39	mA	
			All B low, other inputs at 4.5 V	19	34	19	34		
			All inputs at 4.5 V	19	34	19	34		

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

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

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

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

PARAMETER¶	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$t_{PLH}$	C0	Any $\Sigma$	$C_L = 15 \text{ pF}, R_L = 2 \text{ k}\Omega,$ See Note 3	16 24		ns	
$t_{PHL}$				15 24			
$t_{PLH}$	$A_i$ or $B_i$	$\Sigma_i$		15 24		ns	
$t_{PHL}$				15 24			
$t_{PLH}$	C0	C4		11 17		ns	
$t_{PHL}$				11 22			
$t_{PLH}$	$A_i$ or $B_i$	C4		11 17		ns	
$t_{PHL}$				12 17			

¶  $t_{PLH}$  = propagation delay time, low-to-high-level output

$t_{PHL}$  = propagation delay time, high-to-low-level output

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

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TTL Devices

# SN54S283, SN74S283 4-BIT BINARY FULL ADDERS WITH FAST CARRY

## recommended operating conditions

		SN54S283			SN74S283			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, $I_{OH}$	Any output except C4	-1			-1			mA
	Output C4	-600			-500			$\mu$ A
Low-level output current, $I_{OL}$	Any output except C4	20			20			mA
	Output C4	10			10			
Operating free-air temperature, $T_A$		-55		125	0		70	$^{\circ}$ C

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

PARAMETER		TEST CONDITIONS <sup>†</sup>		MIN	TYP <sup>‡</sup>	MAX	UNIT
$V_{IH}$	High-level input voltage			2			V
$V_{IL}$	Low-level input voltage					0.8	V
$V_{IK}$	Input clamp voltage	$V_{CC} = \text{MIN}, I_I = -18 \text{ mA}$				-1.2	V
$V_{OH}$	High-level output voltage	SN54S283	$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V},$	2.5	3.4		V
		SN74S283	$V_{IL} = 0.8 \text{ V}, I_{OH} = \text{MAX}$	2.7	3.4		
$V_{OL}$	Low-level output voltage	$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V},$ $V_{IL} = 0.8 \text{ V}, I_{OL} = \text{MAX}$				0.5	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	$V_{CC} = \text{MAX}, V_i = 2.7 \text{ V}$				50	$\mu$ A
$I_{IL}$	Low-level input current	$V_{CC} = \text{MAX}, V_i = 0.5 \text{ V}$				-2	mA
$I_{OS}$	Short-circuit output current <sup>§</sup>	Any output except C4		$V_{CC} = \text{MAX}$		-40	mA
		Output C4				-20	
$I_{CC}$	Supply current	$V_{CC} = \text{MAX},$ Outputs open	All B low, other inputs at 4.5 V	80			mA
			All inputs at 4.5 V	95	160		

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

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

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

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

PARAMETER <sup>†</sup>	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$t_{PLH}$	C0	Any $\Sigma$	$C_L = 15 \text{ pF}, R_L = 280 \Omega,$ See Note 3		11	18	ns
$t_{PHL}$					12	18	
$t_{PLH}$	$A_i$ or $B_j$	$\Sigma_i$			12	18	ns
$t_{PHL}$					11.5	18	
$t_{PLH}$	C0	C4	$C_L = 15 \text{ pF}, R_L = 560 \Omega,$ See Note 3		6	11	ns
$t_{PHL}$					7.5	11	
$t_{PLH}$	$A_i$ or $B_j$	C4			7.5	12	ns
$t_{PHL}$					8.5	12	

<sup>†</sup> $t_{PLH}$  = propagation delay time, low-to-high-level output

$t_{PHL}$  = propagation delay time, high-to-low-level output

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

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TTL Devices