



**DESCRIPTION** — The SN54LS/74LS385 is a general-purpose adder/subtractor which is useful as a companion part to the SN54LS/74LS384 two's-complement multiplier. The LS385 contains four independent adder/subtractor elements with common clock and clear.

Each of four independent sum ( $\Sigma$ ) outputs reflects the respective A and B input and is controlled by the  $S/\bar{A}$  pin.

When low, the clear input asynchronously resets the sum flip-flop low and the carry flip-flop either high in the subtract mode or low in the add mode. The clock is positive-edge triggered and controls the sum and carry flip-flops.

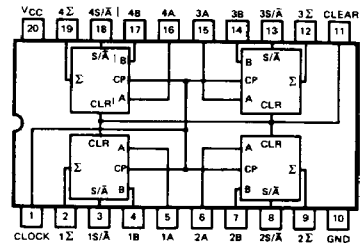
- FOUR SYNCHRONOUS ELEMENTS IN A SINGLE 20-PIN PACKAGE
- INDEPENDENT TWO'S-COMPLEMENT ADDITION/SUBTRACTION
- BUFFERED CLOCK AND DIRECT CLEAR INPUTS

## SN54LS385 SN74LS385

### QUADRUPLE SERIAL ADDERS/SUBTRACTORS

LOW POWER SCHOTTKY

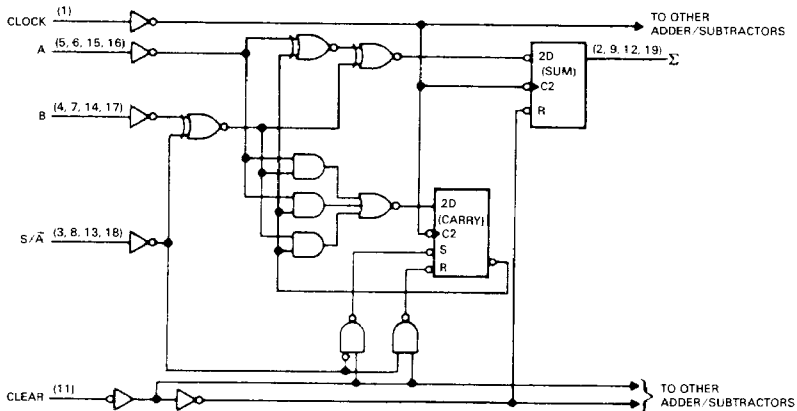
#### CONNECTION DIAGRAM DIP (TOP VIEW)



J Suffix — Case 732-03 (Ceramic)  
N Suffix — Case 738-01 (Plastic)

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#### BLOCK DIAGRAM



FUNCTION TABLE

SELECTED FUNCTION	INPUTS				INTERNAL CARRY D INPUT		OUTPUT	
	CLEAR	S/ $\bar{A}$	A	B	CLOCK	BEFORE $\uparrow$	AFTER $\uparrow$	AFTER $\uparrow$
Clear	L	L	X	X	X	L	L	L
	L	H	X	X	X	H	H	L
Add	H	L	L	L	$\uparrow$	L	L	L
	H	L	L	L	$\uparrow$	H	L	H
	H	L	L	H	$\uparrow$	L	L	H
	H	L	L	H	$\uparrow$	H	H	L
	H	L	H	L	$\uparrow$	L	L	H
	H	L	H	L	$\uparrow$	H	H	L
	H	L	H	H	$\uparrow$	L	H	L
Subtract	H	H	L	L	$\uparrow$	L	L	H
	H	H	L	L	$\uparrow$	H	H	L
	H	H	L	H	$\uparrow$	L	L	L
	H	H	L	H	$\uparrow$	H	L	H
	H	H	H	L	$\uparrow$	L	H	L
	H	H	H	L	$\uparrow$	H	H	H
	H	H	H	H	$\uparrow$	L	L	H

H = high level, L = low level, X = irrelevant,  
 $\uparrow$  = transition from low to high level at the clock input

GUARANTEED OPERATING RANGES

SYMBOL	PARAMETER		MIN	TYP	MAX	UNIT
VCC	Supply Voltage	54	4.5	5.0	5.5	V
		74	4.75	5.0	5.25	
TA	Operating Ambient Temperature Range	54	-55	25	125	°C
		74	0	25	70	
IOH	Output Current — High	54,74			-0.4	mA
IOL	Output Current — Low	54			4.0	mA
		74			8.0	

**DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE** (unless otherwise specified)

SYMBOL	PARAMETER	LIMITS			UNITS	TEST CONDITIONS	
		MIN	TYP	MAX			
V <sub>IH</sub>	Input HIGH Voltage	2.0			V	Guaranteed Input HIGH Voltage for All Inputs	
V <sub>IL</sub>	Input LOW Voltage	54		0.7	V	Guaranteed Input LOW Voltage for All Inputs	
		74		0.8			
V <sub>IK</sub>	Input Clamp Diode Voltage		-0.65	-1.5	V	V <sub>CC</sub> = MIN, I <sub>IN</sub> = -18 mA	
V <sub>OH</sub>	Output HIGH Voltage	54	2.5	3.5	V	V <sub>CC</sub> = MIN, I <sub>OH</sub> = MAX, V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> per Truth Table	
		74	2.7	3.5	V		
V <sub>OL</sub>	Output LOW Voltage	54,74		0.25	0.4	I <sub>OL</sub> = 4.0 mA I <sub>OL</sub> = 8.0 mA	V <sub>CC</sub> = V <sub>CC</sub> MIN, V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> per Truth Table
		74		0.35	0.5		
I <sub>IH</sub>	Input HIGH Current			20	μA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 2.7 V	
I <sub>IL</sub>	Input LOW Current			0.1	mA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 7.0 V	
I <sub>OS</sub>	Short Circuit Current	-20		-100	mA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 0.4 V	
I <sub>CC</sub>	Power Supply Current			75	mA	V <sub>CC</sub> = MAX	

**AC CHARACTERISTICS:** T<sub>A</sub> = 25°C, V<sub>CC</sub> = 5.0 V

SYMBOL	PARAMETER	LIMITS			UNITS	TEST CONDITIONS
		MIN	TYP	MAX		
f <sub>MAX</sub>	Maximum Clock Frequency	30	40		MHz	V <sub>CC</sub> = 5.0 V C <sub>L</sub> = 15 pF
t <sub>PLH</sub>	Propagation Delay, Clock to Σ		14	22	ns	
t <sub>PHL</sub>	Propagation Delay, Clear to Σ		18	30	ns	

**AC SETUP REQUIREMENTS:** T<sub>A</sub> = 25°C, V<sub>CC</sub> = 5.0 V

SYMBOL	PARAMETER	LIMITS			UNITS	TEST CONDITIONS
		MIN	TYP	MAX		
t <sub>W</sub>	Clock Pulse Width	16			ns	V <sub>CC</sub> = 5.0 V
t <sub>s</sub>	Setup Time	10			ns	
t <sub>h</sub>	Hold Time	0			ns	

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