- Full-Carry Look-Ahead across the Four Bits
- Systems Achieve Partial Look-Ahead Performance with the Economy of Ripple Carry
- SN54283/SN74283 and SN54LS283/SN74LS283
 Are Recommended For New Designs as They
 Feature Supply Voltage and Ground on Corner
 Pins to Simplify Board Layout

	TYPICAL /	ADD TIMES	TV01041 000000
TVOE	TWO	TWO	TYPICAL POWER
TYPE	8-BIT	16-8IT	DISSIPATION PER
	WORDS	WORDS	4-BIT ADDER
'83A	23 ns	43 ns	310 mW
'LS83A	25 ns	45 ns	95 mW

description

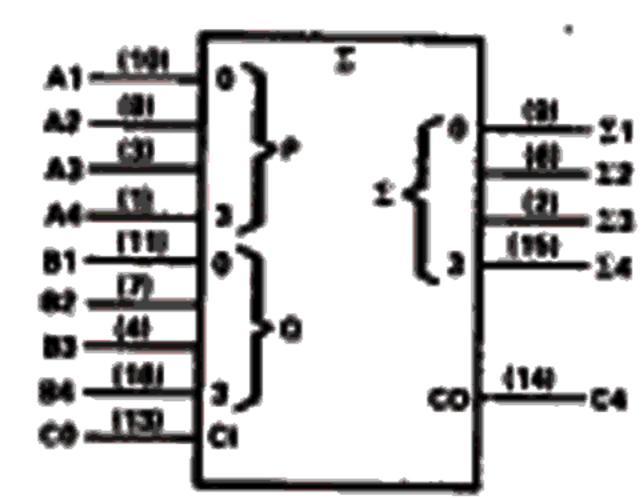
These improved full adders perform the addition of two 4-bit binary numbers. The sum (Σ) outputs are provided for each bit and the resultant carry (C4) is obtained from the fourth bit. These adders feature full internal look ahead across all four bits generating the carry term in ten nanoseconds typically. This provides the system designer with partial look-ahead performance at the economy and reduced package count of a ripple-carry implementation.

The adder logic, including the carry, is implemented in its true form meaning that the end-around carry can be accomplished without the need for logic or level inversion.

Designed for medium-speed applications, the circuits utilize transistor-transistor logic that is compatible with most other TTL families and other saturated low-level logic families.

Series 54 and 54LS circuits are characterized for operation over the full military temperature range of -55°C to 125°C, and Series 74 and 74LS circuits are characterized for operation from 0°C to 70°C.

logic symbol†



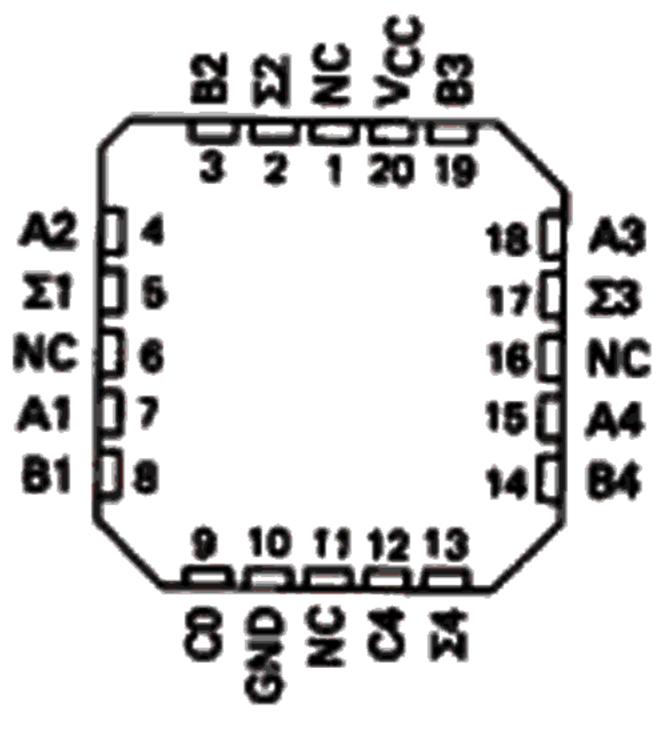
[†]This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

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

SN5483A,SN54LS83A . . . J OR W PACKAGE SN7483A . . . N PACKAGE SN74LS83A . . . D OR N PACKAGE (TOP VIEW)

A4 [न्	J16	B4
Z3 (]2	15	Σ4
A3 []₃	14	C4
B3 [_4	13	CO
VCC] 6	12	GND
Σ2 [] 6	11	B1
B2 [٦,	10	A1
A2 [38	9	Σ1

SN54LS83A . . . FK PACKAGE (TOP VIEW)



NC - No internal connection

FUNCTION TABLE

		-												
							OU	דטידו						
					WHI	in.		WHI	N					
	İ	IN	PUT		Co -			CO - H						
	A1 AB1 A2 AB2 A						e pull	A STATE OF THE PARTY OF THE PAR						
		b.	42 /	50	(5-2	2010	0.0					
	/			Γ⁄						F //				
	الكبار		400	۲.5	الخبكا	4.6		A 32	ARS	AC.				
		•	l .	ויו	15	١.	L	н	-	L				
	Н	"	۱ ۲	-	"	L	-	L	н	L				
	L	н	L	-	н	L	L	L	н	L				
1	н	H	L L	L	L	Н	L	Н	н	L				
	L	L	н	L	L	н	L	н	н	L				
ı	н	L	н	L	н	н	L	ι	L	н				
	L	н	н	ا د ا	н	н	L	L	L	н				
١	м	н	н	ا د ا	L	L	н	н	Ĺ	н				
ı	L	l L	L	ж	L.	н	ا يا	н	н	L				
	н	L	lı	H I	н	H	انا	L	l ï	н				
١	L	н	L	н	н	H	ايا	[1.	н				
ı	H	н	ایا	н	L	L L	н	н	[н				
	L	L	н	н		-		H		н				
	н		н	н	H	-		7						
	-7						н		н	P4				
		H	н	H	н	•		<u>ا</u> ا	H	*				
	H	H	н	H	L	H	H	н	H	и				

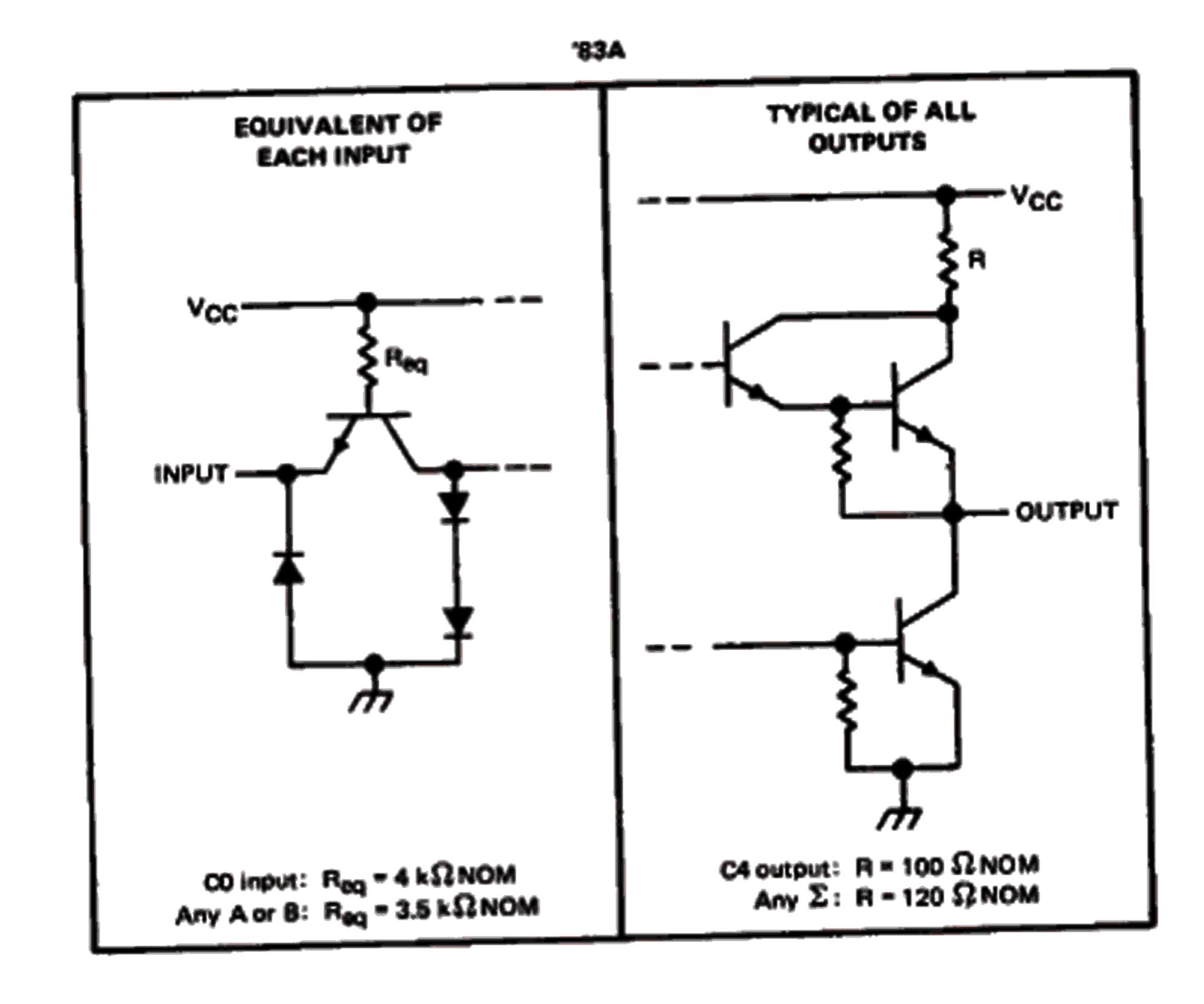
H = high level. L = low level

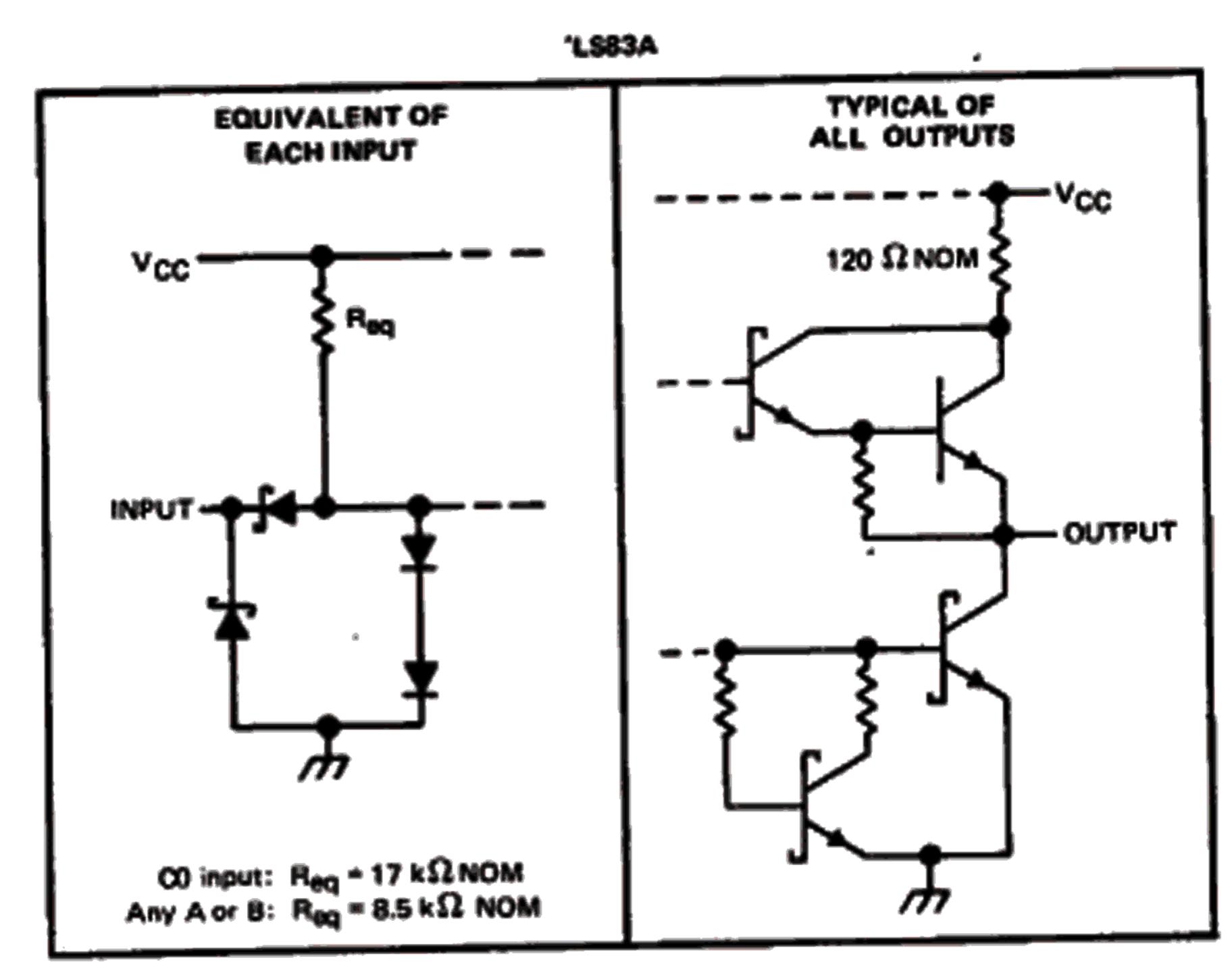
NOTE: Input conditions at A1, B1, A2, B2, and C0 are used to determine outputs £1 and £2 and the value of the internal carry C2. The values at C2, A3, B3, A4, and B4 are then used to determine outputs £3, £4, and C4.

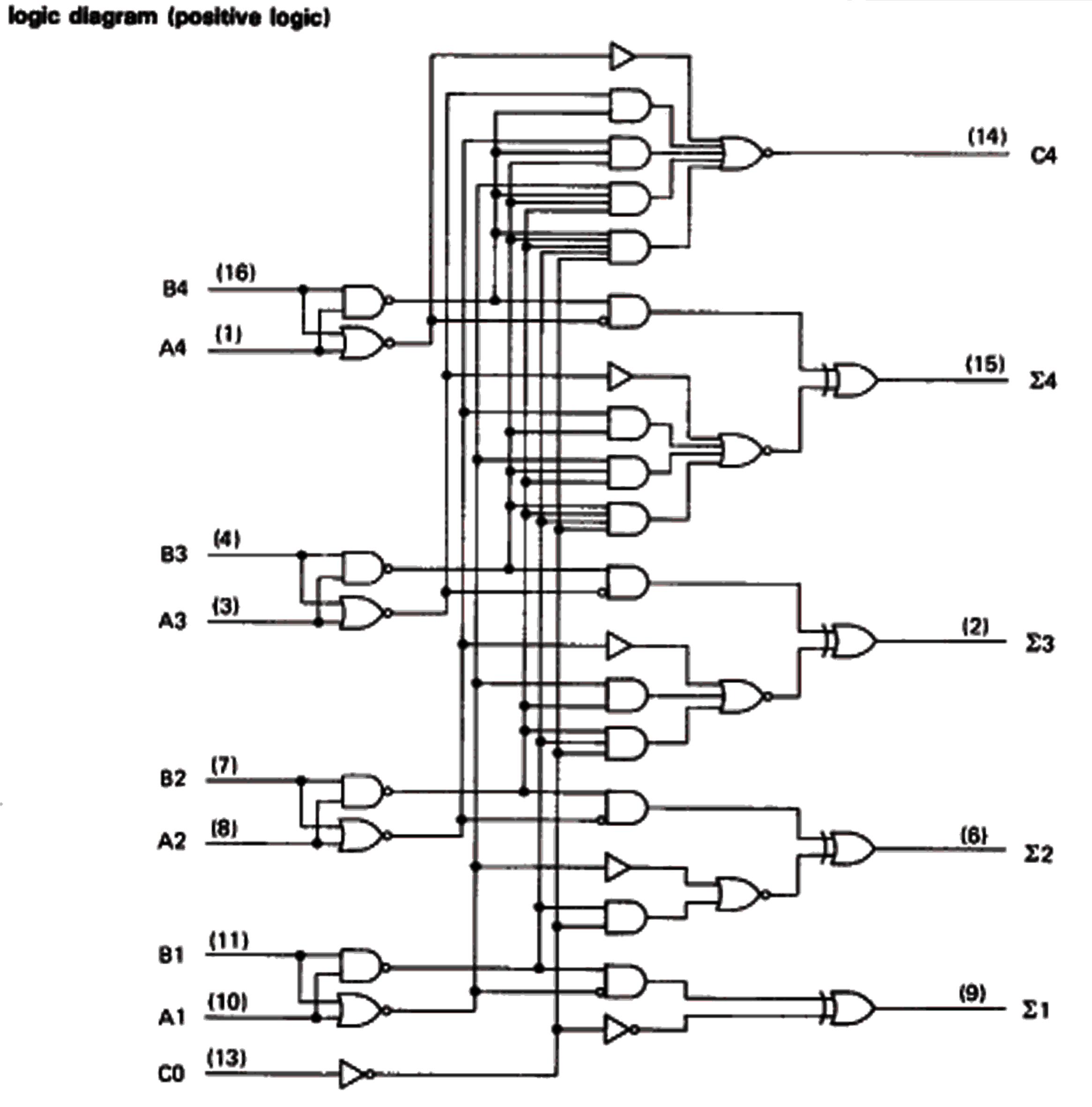
PRODUCTION DATA documents contain information current or of publication date. Products conform to specifications per the terms of Texas instruments standard warranty. Production processing does not secondarily include texting of all personners.



schematics of inputs and outputs







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

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

Supply voltage, VCC (see Note 1)																							7 1	V
Input voltage: '83A	•														8								5.5	v
'LS83A																								
Interemitter voitage (see Note 2)									æ				4										5.5 \	٧
Operating free-air temperature range:	1	SN	154	18	3А	, S	N5	41	.SE	3/	A.			*					-	55	°C	to	125°	С
	•	SN	174	18	3A	, S	N7	4L	SE	3/	4									- (0°	C t	o 70°	C
Storage temperature range																								

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 '83A only between the following pairs: A1 and B1, A2 and B2, A3 and B3, A4 and B4.

recommended operating conditions

					5	Α	UNIT	
		MIN	NOM	MAX	MIN	NOM	MAX	
	8	4.5	5	5.5	4.75	5	5.25	
Supply Voltage, VCC	Any output except C4	1		-800			-800	میر ا
High-level output current, IOH	Output C4			-400			400	-
	Any output except C4			16			16_	mA
Low-level output current, IOL	Output C4						- 8	 -
Operating free-air temperature, TA		55		125	0		70	rc.

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

						N5483	A		UNIT		
	PARAM	ETER	TEST CON	IDITIONS	MIN	TYP‡	MAX	MIN	TYP#	MAX	
					2			2			٧
VIH	High-level input volt						0.8			0.8	V
VIL	Low-level input volt	ege	3400 - 38181	I ₁ = -12 mA			-1.5			-1.5	٧
VIK	Input clamp voltage		***								
			VCC - MIN.	VIH = 2 V.	2.4	3.4		2.4	3.4		l v
νон	High-level output vo	Itage	VIL = 0.8 V.	IOH - MAX				<u> </u>			}
			VCC - MIN.	VIH = 2 V.		Λ2	0.4	1	0.2	0.4	١v
VOL	Low-level output vo	ltage	VIL - 0.8 V.			0.2					↓
	Input current at ma	ximum	VCC - MAX,				1	ì		1	mA
r _i	input voltage		ACC - IMAY	V - 0.0 V						40	
1	High-level input our	rent	VCC - MAX.	V ₁ = 2.4 V			40			40	μA
1H	Low-level input cur		VCC - MAX.	V1 - 0.4 V			-1.6			-1.6	
JIL.		Any output except C4			-20		-55	-18		-55	a ma
108	Short-circuit	Output C4	VCC = MAX		-20		-70	-18		~70	
	output current 9	Output C4		All B low, other	T	60			56		
			VCC - MAX.	inputs at 4.5 V	1	56					- ma
Icc	Supply current			All inputs at			99		66	110	1
				4.5 V		66	99	<u> </u>			Ь.

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

switching characteristics, VCC = 5 V, TA = 25°C

	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
PARAMETER					14	21	٠
†PLH	CO CO	Any Σ CL = 15 pF, RL = 400 Ω,		12	21	rvs	
tPHL			See Note 3	\vdash	16	24	
tPLH	A; or B;	$\Sigma_{\mathbf{i}}$	See idom 2	-	16	24	ns
tPHL			+-	9	14		
трын	CO	C4	CL = 15 pF, RL = 780 \Quad \Quad \text{.}		11	16	ns
tPHL			See Note 3	<u> </u>	9	14	
TPLH	A _i or B _i	C4	366 14016 2		11	16	ns
TPHL							

TtpLH = propagation delay time, low-to-high-level output

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



^{\$}An typical values are at VCC = 5 V, TA = 25°C.

Sonly one output should be shorted at a time.

tPHL = propagation delay time, high-to-low-level output

recommended operating conditions

	SI	N54LS8	3A	SP			
	MIN	NOM	MAX	MIN	NOM	MAX	UNIT
Supply voltage, VCC	4.5	5	5.6	4.75	5	5.25	V
High-level output current, IOH			-400			-400	μА
Low-level output current, IOL			4			8	mA
Operating free-air temperature, TA	-66		125	0		70	°C

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

l			Te	ST CONDITIO	wet	SI	V54LS8	3A	St			
				31 CONDITIO	JI43.	MIN	TYP	MAX	MIN	TYP\$	MAX	UNIT
	High-level input	voltage				2			2			V
VIL	Low-level input	voltage						0.7			0.8	V
VIK	Input clamp volt	age	VCC = MIN,	I _I = -18 mA				-1.5			-1.5	V
VOH	High-level outpu	t voltage	VCC = MIN, IOH = -400 #A		VIL - VIL max,	2.5	3.4		2.7	3.4	<u>, : ==</u>	v
Vai	Low-level output	tualtana	VCC - MIN,	VIH = 2 V.	lot = 4 mA		0.25	0.4		0.25	0.4	
-00	COTT ICTOL CO IDO	· voitage	VIL = VIL mex		IOL = 8 mA	_				0.35	0.5	'
1.	Input current at maximum	Any A or B	V					0.2			0.2	
<u>'</u>	input voltage	Co	VCC - MAX.	A1 - 1 A				0.1			0.1	mA
lus	High-level	Any A or B	V	V 2 7 V			***	40			40	
411	input current	CO	VCC = MAX.	V ₁ = 2.7 V				20			20	μА
11L	Low-level	Any A or B	VCC - MAX.	VI = 0.4 V			_	-0.8		-	-0.8	
-16	input current	CO	VCC - Imma,	41-044				-0.4			-0.4	mA
los	Short-circuit out	put current \$	VCC = MAX			-20		-100	-20		-100	mA
					All inputs grounded		22	39		22	39	
Icc	Supply current		VCC = MAX, Outputs open	C = MAX,			19	34		19	34	mA
							19	34		19	34	

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

switching characteristics, VCC = 5 V, TA = 25°C

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CO	VDITIONS	MIN	TYP	MAX	UNIT		
†PLH	CO	A V				16	24	+		
TPHL		Any Σ				15	24	ns		
[‡] PLH	A _i or B _i	V *.	1			15	24			
tPHL_	7,0,0,	$\Sigma_!$	CL = 15 pF.	RL - 2 ks.		15	24	ns		
^T PLH	CO	C4	See Note 3			11	17	\vdash		
tPHŁ.		~				15	22	ne .		
tPLH .	A . a. B .	~				11	17			
TPHL	A _i or B _i	Ç4		C4			<u> </u>	12	17	ns

TIPLH = propagation delay time, low-to-high-level output



All typical values are at VCC = 5 V, TA = 26 C.

RONLY one output should be shorted at a time, and duration of the short-circuit should not exceed one second,

tpHL = propagation delay time, high-to-low-level output

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