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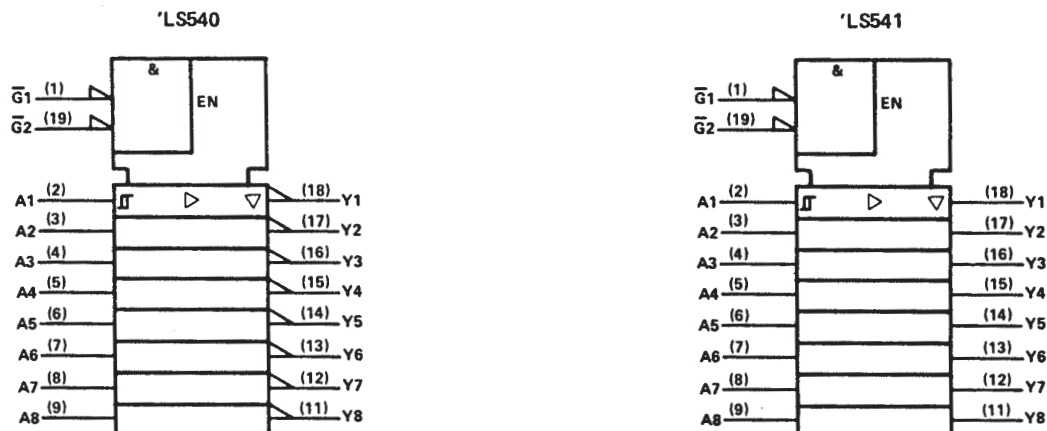
# SN54LS540, SN54LS541, SN74LS540, SN74LS541

## OCTAL BUFFERS AND LINE DRIVERS

### WITH 3-STATE OUTPUTS

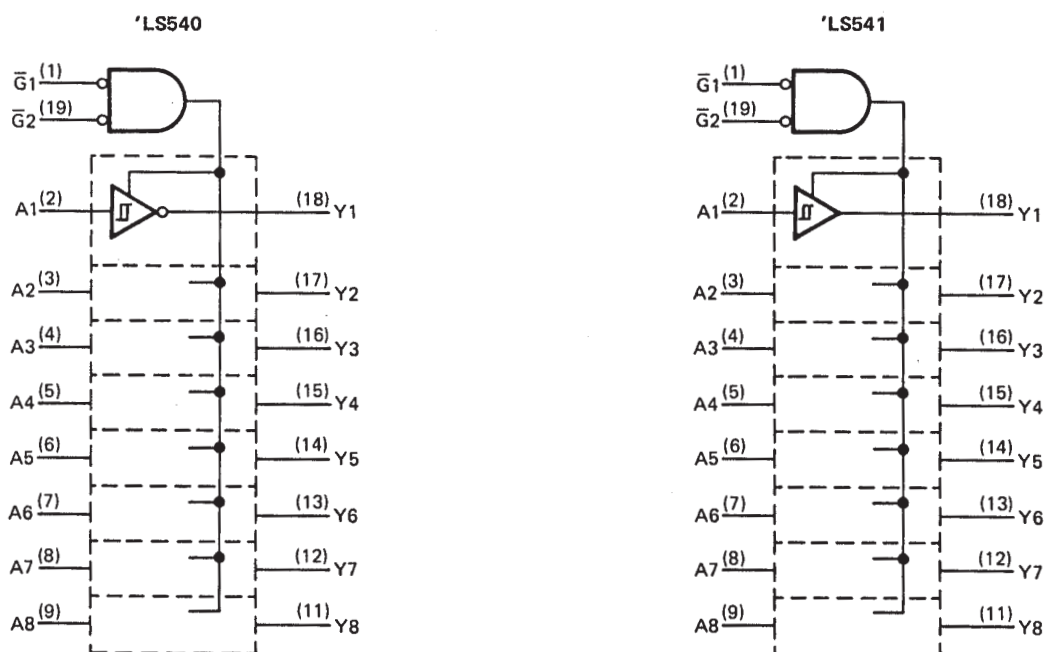
SDLS180 – AUGUST 1979 – REVISED MARCH 1988

#### logic symbols†



† These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

#### logic diagram (positive logic)



#### 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: SN54LS540, SN54LS541	– 55°C to 125°C
SN74LS540, SN74LS541	0°C to 70°C
Storage temperature range	– 65°C to 150°C

NOTE 1: Voltage values are with respect to the network ground terminal.

# SN54LS540, SN54LS541, SN74LS540, SN74LS541

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#### recommended operating conditions

PARAMETER	SN54LS'			SN74LS'			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
Supply voltage, $V_{CC}$ (see Note 1)	4.5	5	5.5	4.75	5	5.25	V
High-level output current, $I_{OH}$			-12			-15	mA
Low-level output current, $I_{OL}$			12			24	mA
Operating free-air temperature, $T_A$	-55		125	0		70	°C

NOTE 1: Voltage values are with respect to network ground terminal.

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

PARAMETER		TEST CONDITIONS†	SN54LS'			SN74LS'			UNIT
			MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V <sub>IH</sub>	High-level input voltage		2			2			V
V <sub>IL</sub>	Low-level input voltage		0.6			0.6			V
V <sub>IK</sub>	Input clamp voltage	V <sub>CC</sub> = MIN, I <sub>I</sub> = -18 mA	-1.5			-1.5			V
	Hysteresis (V <sub>T+</sub> - V <sub>T-</sub> )	V <sub>CC</sub> = MIN	0.2	0.4		0.2	0.4		V
V <sub>OH</sub>	High-level output voltage	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = V <sub>IL max</sub> , I <sub>OH</sub> = -3 mA	2.4	3.4		2.4	3.4		V
		V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2V, V <sub>IL</sub> = 0.5 V, I <sub>OH</sub> = MAX	2			2			
V <sub>OL</sub>	Low-level output voltage	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = V <sub>IL max</sub> I <sub>OL</sub> = 12 mA	0.25		0.4	0.25		0.4	V
		I <sub>OL</sub> = 24 mA				0.35		0.5	
I <sub>OZH</sub>	Off-state output current, high-level voltage applied	V <sub>CC</sub> = MAX, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = V <sub>IL max</sub>	V <sub>O</sub> = 2.7 V		20		20		μA
I <sub>OZL</sub>	Off-state output current, low-level voltage applied		V <sub>O</sub> = 0.4 V		-20		-20		
I <sub>I</sub>	Input current at maximum input voltage	V <sub>CC</sub> = MAX, V <sub>I</sub> = 7 V	0.1			0.1			mA
I <sub>IH</sub>	High-level input current, any input	V <sub>CC</sub> = MAX, V <sub>I</sub> = 2.7 V	20			20			μA
I <sub>IL</sub>	Low-level input current	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4 V	-0.2			-0.2			mA
I <sub>OS</sub>	Short-circuit output current <sup>§</sup>	V <sub>CC</sub> = MAX	-40		-225	-40		-225	mA
I <sub>CC</sub>	Outputs high	V <sub>CC</sub> = MAX, Outputs open	'LS540	13	25	13		25	mA
			'LS541	18	32	18		32	
	Outputs low		'LS540	24	45	24		45	
			'LS541	30	52	30		52	
	All outputs disabled		'LS540	30	52	30		52	
			'LS541	32	55	32		55	

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

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

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

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

PARAMETER	TEST CONDITIONS	'LS540			'LS541			UNIT
		MIN	TYP	MAX	MIN	TYP	MAX	
$t_{PLH}$ Propagation delay time, low-to-high-level output	$C_L = 45\text{ pF}$ , $R_L = 667\ \Omega$ , See Note 2		9	15		9	15	ns
$t_{PHL}$ Propagation delay time, high-to-low-level output			9	15		10	18	ns
$t_{PZL}$ Output enable time to low level			25	38		25	38	ns
$t_{PZH}$ Output enable time to high level			15	25		20	32	ns
$t_{PLZ}$ Output disable time from low level	$C_L = 5\text{ pF}$ , $R_L = 667\ \Omega$ , See Note 2		10	18		10	18	ns
$t_{PHZ}$ Output disable time from high level			15	25		18	29	ns

NOTE 2: Load circuits and voltage waveforms are shown in Section 1.

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