

# GD54/74S20

## DUAL 4-INPUT POSITIVE NAND GATES

### Description

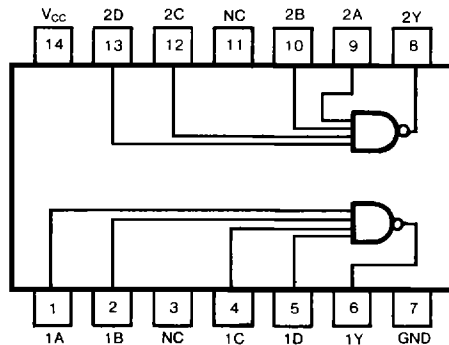
This device contains two independent 4-input NAND gates. It performs the Boolean functions ,  $Y = \overline{A \cdot B \cdot C \cdot D}$  or  $Y = \overline{A + B + C + D}$  in positive logic.

### Function Table (each gate)

INPUTS		OUTPUT
A	N*	Y
L	L	H
H	L	H
L	H	H
H	H	L

\*N=B·C·D

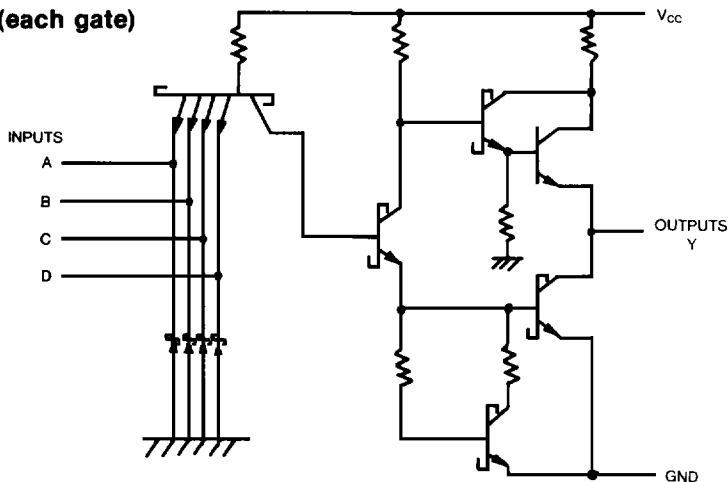
### Pin Configuration



NC: No internal connection

Suffix-Blank: Plastic Dual In Line Package  
 Suffix-J : Ceramic Dual In Line Package

### Schematic (each gate)



### Absolute Maximum Ratings

- Supply voltage,  $V_{CC}$  ..... 7V
- Input voltage ..... 5.5V
- Operating free-air temperature range 54S .....  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$   
 74S .....  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$
- Storage temperature range .....  $-65^{\circ}\text{C}$  to  $150^{\circ}\text{C}$

**Recommended Operating Conditions**

SYMBOL	PARAMETER		MIN	NOM	MAX	UNIT
V <sub>CC</sub>	Supply voltage	54	4.5	5	5.5	V
		74	4.75	5	5.25	
I <sub>OH</sub>	High-level output current				-1	mA
I <sub>OL</sub>	Low-level output current				20	mA
T <sub>A</sub>	Operating free-air temperature	54	-55		125	°C
		74	0		70	

**Electrical Characteristics** over recommended operating free-air temperature range (unless otherwise noted)

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP (Note 1)	MAX	UNIT	
V <sub>IH</sub>	High-level input voltage		2			V	
V <sub>IL</sub>	Low-level input voltage		54		0.8	V	
			74		0.8		
V <sub>IK</sub>	Input clamp voltage	V <sub>CC</sub> =Min, I <sub>I</sub> =-18mA			-1.2	V	
V <sub>OH</sub>	High-level output voltage	V <sub>CC</sub> =Min, V <sub>IL</sub> =Max I <sub>OH</sub> =Max.	54	2.5	3.4	V	
			74	2.7	3.4		
V <sub>OL</sub>	Low-level output voltage	V <sub>CC</sub> =Min, V <sub>IH</sub> =Min I <sub>OL</sub> =Max.			0.5	V	
I <sub>I</sub>	Input current at maximum input voltage	V <sub>CC</sub> =Max, V <sub>I</sub> =5.5V			1	mA	
I <sub>IH</sub>	High-level input current	V <sub>CC</sub> =Max, V <sub>I</sub> =2.7V			50	μA	
I <sub>IL</sub>	Low-level input current	V <sub>CC</sub> =Max, V <sub>I</sub> =0.5V			-2	mA	
I <sub>OS</sub>	Short-circuit output current	V <sub>CC</sub> =Max (Note 2)	-40		-100	mA	
I <sub>CC</sub>	Supply current	Total with outputs high	V <sub>CC</sub> =Max		5	8	mA
		Total with outputs low	V <sub>CC</sub> =Max		10	18	

Note 1. All typical values are at V<sub>CC</sub>=5V, T<sub>A</sub>=25°C.

Note 2. Not more than one output should be shorted at a time, and the duration should not exceed one second.

**Switching Characteristics, V<sub>CC</sub> = 5V, T<sub>A</sub> = 25°C**

SYMBOL	PARAMETER	TEST CONDITION#	MIN	TYP	MAX	UNIT
t <sub>PLH</sub>	Propagation delay time, low-to-high-level output	C <sub>L</sub> =15pF, R <sub>L</sub> =280Ω		3	4.5	ns
t <sub>PHL</sub>	Propagation delay time, high-to-low-level output			3	5	

#For load circuit and voltage waveforms, see page 3-12