

GD54/74LS21

DUAL 4-INPUT POSITIVE AND GATES

Description

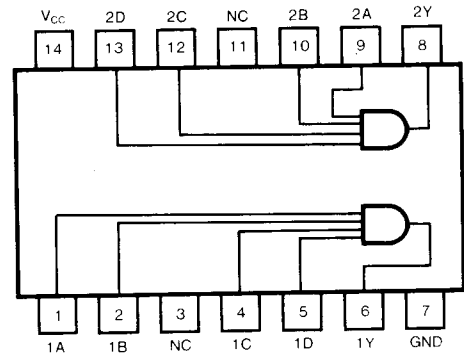
This device contains two independent 4-input AND gates. It performs the Boolean functions $Y = A \cdot B \cdot C \cdot D$ or $Y = \overline{A} + \overline{B} + \overline{C} + \overline{D}$ in positive logic.

Function Table (each gate)

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

* $N = B \cdot C \cdot D$

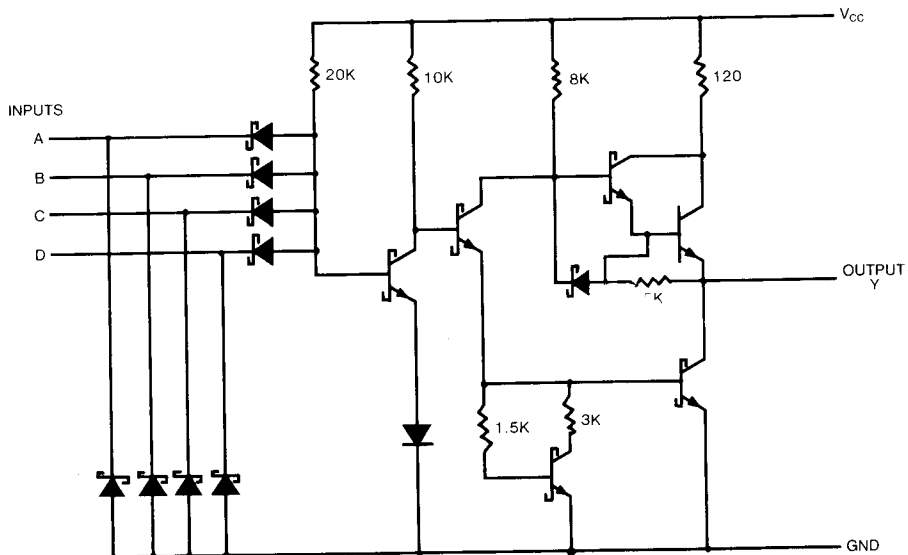
Pin Configuration



NC: No internal connection

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

Circuit Schematics (each gate)



Absolute Maximum Ratings

- Supply voltage, V_{CC} 7V
- Input voltage 7V
- Operating free-air temperature range 54LS -55°C to 125°C
74LS 0°C to 70°C
- Storage temperature range -65°C to 150°C

Recommended Operating Conditions

SYMBOL	PARAMETER		MIN	NOM	MAX	UNIT
V_{CC}	Supply voltage	54	4.5	5	5.5	V
		74	4.75	5	5.25	
I_{OH}	High-level output current	54,74			-400	μA
I_{OL}	Low-level output current	54			4	mA
		74			8	
T_A	Operating free-air temperature	54	-55		125	$^{\circ}\text{C}$
		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_{IH}	High-level input voltage			2		V
V_{IL}	Low-level input voltage	54		0.7		V
		74		0.8		
V_{IK}	Input clamp voltage	$V_{CC}=\text{Min}, I_I=-18\text{mA}$			-1.5	V
V_{OH}	High-level output voltage	$V_{CC}=\text{Min}, V_{IH}=\text{Min}$	54	2.5	3.4	V
		$I_{OH}=\text{Max}$	74	2.7	3.4	
V_{OL}	Low-level output voltage	$V_{CC}=\text{Min}, I_{OL}=4\text{mA}$	54,74	0.25	0.4	V
		$V_{IL}=\text{Max}, I_{OL}=8\text{mA}$	74	0.35	0.5	
I_I	Input current at maximum input voltage	$V_{CC}=\text{Max}, V_I=7\text{V}$			0.1	mA
I_{IH}	High-level input current	$V_{CC}=\text{Max}, V_I=2.7\text{V}$			20	μA
I_{IL}	Low-level input current	$V_{CC}=\text{Max}, V_I=0.4\text{V}$			-0.4	mA
I_{OS}	Short-circuit output current	$V_{CC}=\text{Max}$ (Note 2)	-20		-100	mA
I_{CCH}	Supply current	Total with outputs high $V_{CC}=\text{Max}$		1.2	2.4	mA
I_{CCL}		Total with outputs low $V_{CC}=\text{Max}$		2.2	4.4	mA

Note 1: All typical values are at $V_{CC}=5\text{V}$, $T_A=25^{\circ}\text{C}$.

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

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

SYMBOL	PARAMETER	TEST CONDITION#	MIN	TYP	MAX	UNIT
t_{PLH}	Propagation delay time, low-to-high-level output	$C_L=15\text{pF}, R_L=2\text{k}\Omega$		8	15	ns
t_{PHL}	Propagation delay time, high-to-low-level output			10	20	ns

#For load circuit and voltage waveforms, see page 3-11.