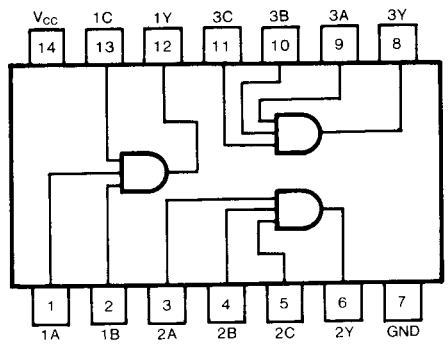
GD54/74LS15

TRIPLE 3-INPUT POSITIVE AND GATES WITH OPEN-COLLECTOR OUTPUTS

Description

This device contains three independent gates each of which performs the logic AND function. Y=ABC The open-collector outputs require external pull-up resistors for proper logical operation.

Pin Configuration



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

Function Table (each gate)

Inputs			Output
A	B	C	Y
X	X	L	L
X	L	X	L
L	X	X	L
H	H	H	H

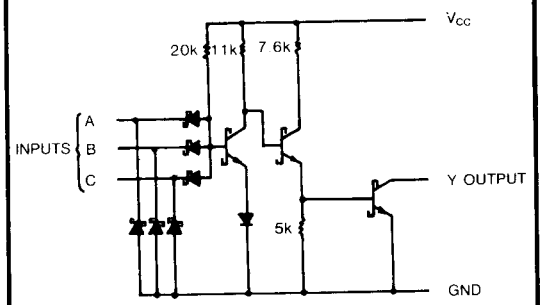
Pull-Up Resistor Equations

$$R_{MAX} = \frac{V_{CC}(Min) - V_{OH}}{N_1(I_{OH}) + N_2(I_{IH})}$$

$$R_{MIN} = \frac{V_{CC}(Max) - V_{OL}}{I_{OL} - N_3(I_{IL})}$$

Where: N_1 (I_{OH})=total maximum output high current for all outputs tied to pull-up resistor
N_2 (I_{IH})=total maximum input high current for all inputs tied to pull-up resistor
N_3(I_{IL})=total maximum input low current for all inputs tied to pull-up resistor

Circuit Schematics (each gate)



UNIT: Ω

Absolute Maximum Ratings

- Supply voltage, V_{CC} 7V
- Input voltage 7V
- Output 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	
V_{OH}	High-level output voltage	54, 74			5.5	V
I_{OL}	Low-level output current	54			4	mA
		74			8	
T_A	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_{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}=Min, I_I=−18mA					−1.5	V
I_{OH}	High-level output current		V_{CC}=Min, V_{OH}=Max, V_{IH}=2V					100	μA
V_{OL}	Low-level output Voltage		V_{CC}=Min, V_{IL}=Max	I_{OL}=4mA	54, 74		0.25	0.4	V
				I_{OL}=8mA	74		0.35	0.5	
I_I	Input current at maximum input voltage		V_{CC}=Max, V_I=7V					0.1	mA
I_{IH}	High-level input current		V_{CC}=Max, V_I=2.7V					20	μA
I_{IL}	Low-level input current		V_{CC}=Max, V_I=0.4V					−0.4	mA
I_{CCH}	Supply curret	Total with outputs high	V_{CC}=Max				1.8	3.6	mA
I_{CCL}		Total with outputs low	V_{CC}=Max				3.3	6.6	mA

Note 1: All typical values are at V_{CC}=5V, T_A=25°C.

Switching Characteristics, V_{CC} = 5V, T_A = 25°C

SYMBOL	PARAMETER	TEST CONDITION#	MIN	TYP	MAX	UNIT
t_{PLH}	Propagation delay time, low-to-high-level output	C_L=15pF, R_L=2kΩ		20	35	ns
t_{PHL}	Propagation delay time, high-to-low-level output			17	35	ns

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