

GD54/74LS15

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

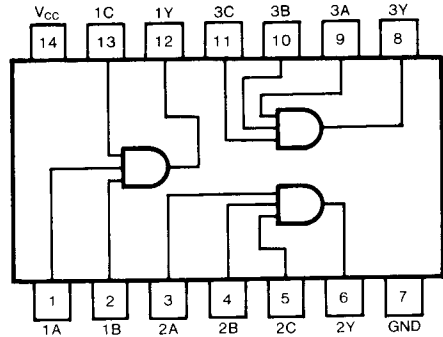
Description

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.

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

Pin Configuration



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

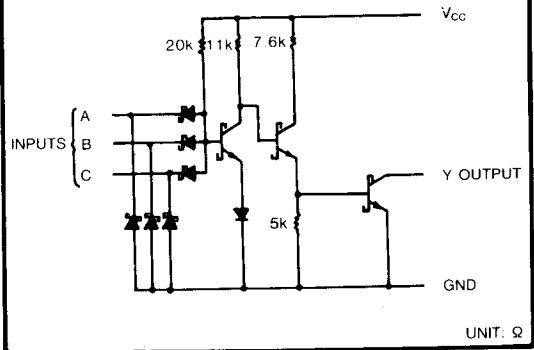
Pull-Up Resistor Equations

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

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

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)



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, I _{OL} =4mA	54, 74	0.25	0.4	V	
		V _{IL} =Max, 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 current	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	

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