

GD54/74LS26

QUAD 2-INPUT NAND GATES WITH HIGH VOLTAGE OPEN-COLLECTOR OUTPUTS

Features

- Usable in AND-Tie connection
- High Output Voltage (15V)

Description

This device contains four independent gates each of which performs the logic NAND function. The open-collector outputs require external pull-up resistors for proper logical operation.

Function Table (each gate)

$$Y = \overline{AB}$$

Inputs		Output
A	B	Y
L	L	H
L	H	H
H	L	H
H	H	L

Pull-Up Resistor Equations

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

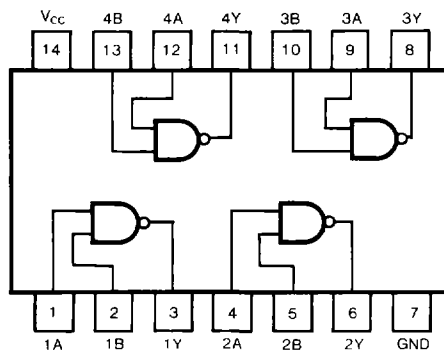
$$R_{MIN} = \frac{V_{CC(Max)} - V_{OL}}{I_{OL} - N_3(I_{IL})}$$

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

Absolute Maximum Ratings

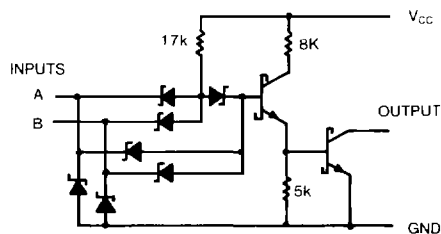
- Supply voltage, V_{CC} 7V
- Input voltage 7V
- Output voltage 15V
- Operating free-air temperature range 54LS -55°C to 125°C
74LS 0°C to 70°C
- Storage temperature range -65°C to 150°C

Pin Configuration



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

Circuit Schematics (each gate)



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			15	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				0.8	V	
V_{IK}	Input clamp voltage	$V_{CC} = \text{Min}, I_I = -12\text{mA}$			-1.5	V	
I_{OH}	High-level output current	$V_{CC} = \text{Min},$ $V_{IL} = \text{Max}$	$V_{OH} = 12\text{V}$		50	μA	
			$V_{OH} = 15\text{V}$		1000		
V_{OL}	Low-level output voltage	$V_{CC} = \text{Min},$ $V_{IL} = \text{Max},$	$I_{OL} = 4\text{mA}$	0.25	0.4	V	
			$I_{OL} = \text{Max}$	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	$V_{CC} = \text{Max}, V_{IH} = 2.7\text{V}$			20	μA	
I_{IL}	Low-level input current	$V_{CC} = \text{Max}, V_{IL} = 0.4\text{V}$			-0.4	mA	
I_{CCH}	Supply current total with outputs high	$V_{CC} = 5.25\text{V}$			0.8	1.6	mA
I_{CCL}	Supply current total with outputs low				2.4	4.4	mA

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

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	$C_L = 15\text{pF}, R_L = 2\text{k}\Omega$		17	32	ns
t_{PHL}	Propagation delay time, high-to-low-level output			15	28	ns

*For load circuit and voltage wave forms, see page 3-11.