

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

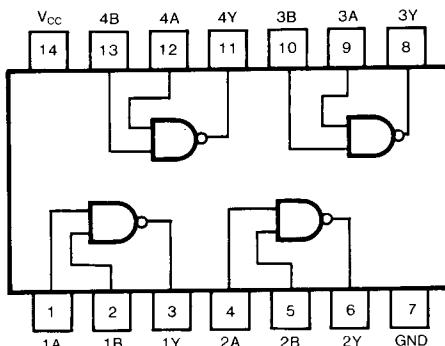
Pull-Up Resistor Equations

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

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

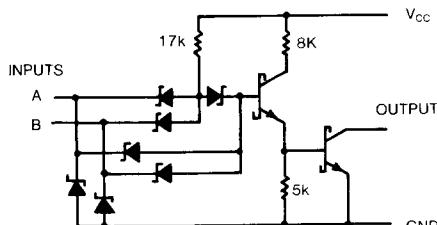
Where:
N₁(I_{OH})=total maximum output high current for all outputs tied to pull-up resistor
N₂(I_{IH})=total maximum input high current for all inputs tied to pull-up resistor
N₃(I_{IL})=total maximum input low current for all inputs tied to pull-up resistor

Pin Configuration



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
- 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

Recommended Operating Conditions

SYMBOL	PARAMETER	MIN	NOM	MAX	UNIT
V_{CC}	Supply voltage	54	4.5	5	5.5
		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	$V_{CC} = \text{Min}$,	$V_{OH} = 12\text{V}$	50		μA
		$V_{IL} = \text{Max}$	$V_{OH} = 15\text{V}$	1000		
V_{OL}	Low-level output voltage	$V_{CC} = \text{Min}$,	$I_{OL} = 4\text{mA}$	0.25	0.4	V
		$V_{IL} = \text{Max}$,	$I_{OL} = \text{Max}$	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 waveforms, see page 3-11.