



T-43-15-00

LS26

## 54LS26/DM74LS26 Quad 2-Input NAND Gates with High Voltage Open-Collector Outputs

### General 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.

These gates feature high-voltage output ratings (up to 15V) for interfacing with 12V systems. Although the outputs are rated for 15V, the device supply is still rated for 5V.

### Pull-Up Resistor Equations

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

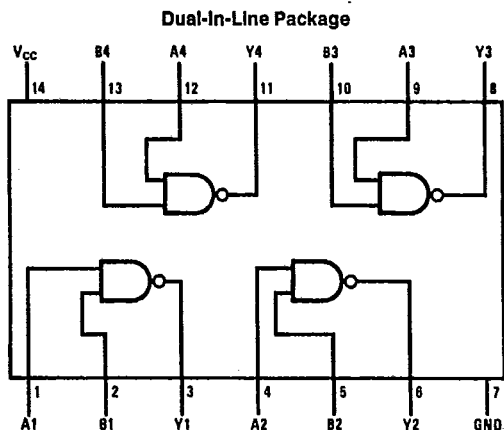
$$R_{MIN} = \frac{V_O (Max) - V_{OL}}{I_{OL} - N_3 (I_{IL})}$$

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

### Connection Diagram



TL/F/6358-1

Order Number 54LS26DMQB, 54LS26FMQB, DM74LS26M or DM74LS26N  
See NS Package Number J14A, M14A, N14A or W14B

### Function Table

$$Y = \overline{AB}$$

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

H = High Logic Level

L = Low Logic Level

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**Absolute Maximum Ratings** (Note)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage	7V
Input Voltage	7V
Output Voltage	15V
Operating Free Air Temperature Range	
54LS	-55°C to +125°C
DM74LS	0°C to +70°C
Storage Temperature Range	-65°C to +150°C

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Note: The "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the "Electrical Characteristics" table are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

**Recommended Operating Conditions**

Symbol	Parameter	54LS26			DM74LS26			Units
		Min	Nom	Max	Min	Nom	Max	
V <sub>CC</sub>	Supply Voltage	4.5	5	5.5	4.75	5	5.25	V
V <sub>IH</sub>	High Level Input Voltage	2			2			V
V <sub>IL</sub>	Low Level Input Voltage			0.7			0.8	V
V <sub>OH</sub>	High Level Output Voltage			15			15	V
I <sub>OL</sub>	Low Level Output Current			4			8	mA
T <sub>A</sub>	Free Air Operating Temperature	-55		125	0		70	°C

**Electrical Characteristics** over recommended operating free air temperature range (unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ (Note 1)	Max	Units
V <sub>I</sub>	Input Clamp Voltage	V <sub>CC</sub> = Min, I <sub>I</sub> = -18 mA			-1.5	V
I <sub>CEX</sub>	High Level Output Current	V <sub>CC</sub> = Min V <sub>IL</sub> = Max			1000	μA
		V <sub>O</sub> = 15V V <sub>O</sub> = 12V			50	
V <sub>OL</sub>	Low Level Output Voltage	V <sub>CC</sub> = Min, I <sub>OL</sub> = Max V <sub>IH</sub> = Min			0.4	V
		I <sub>OL</sub> = 4 mA, V <sub>CC</sub> = Min	54LS	0.35	0.5	
			DM74	0.25	0.4	
I <sub>I</sub>	Input Current @ Max Input Voltage	V <sub>CC</sub> = Max, V <sub>I</sub> = 5.5V			0.1	mA
I <sub>IH</sub>	High Level Input Current	V <sub>CC</sub> = Max, V <sub>I</sub> = 2.7V			20	μA
I <sub>IL</sub>	Low Level Input Current	V <sub>CC</sub> = Max, V <sub>I</sub> = 0.4V			-0.40	mA
			54LS		-0.36	
			DM74			
I <sub>CCH</sub>	Supply Current with Outputs High	V <sub>CC</sub> = Max		0.8	1.6	mA
I <sub>CCL</sub>	Supply Current with Outputs Low	V <sub>CC</sub> = Max		2.4	4.4	mA

**Switching Characteristics** at V<sub>CC</sub> = 5V and T<sub>A</sub> = 25°C (See Section 1 for Test Waveforms and Output Load)

Symbol	Parameter	R <sub>L</sub> = 2 kΩ, C <sub>L</sub> = 15 pF		Units
		Max		
		54LS	DM74	
t <sub>PLH</sub>	Propagation Delay Time Low to High Level Output	27	32	ns
t <sub>PHL</sub>	Propagation Delay Time High to Low Level Output	18	28	ns

Note 1: All typicals are at V<sub>CC</sub> = 5V, T<sub>A</sub> = 25°C.