

## DM54LS26/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

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

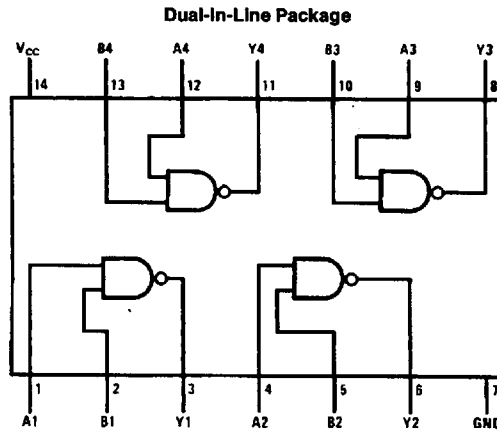
$$R_{MIN} = \frac{V_O (Max) - V_{OL}}{I_{OL} - N_3 (I_{IL})}$$

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 DM54LS26J, DM74LS26M, DM74LS26N or DM54LS26W  
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

### 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	
DM54LS	-55°C to +125°C
DM74LS	0°C to +70°C
Storage Temperature Range	-65°C to +150°C

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	DM54LS26			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)

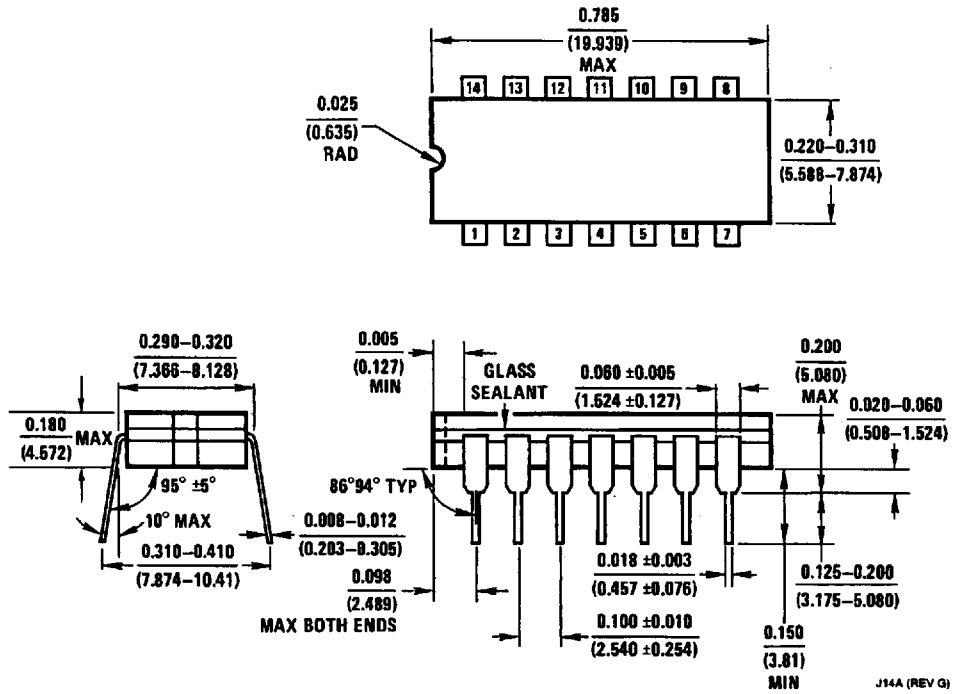
Symbol	Parameter	Conditions	Min	Typ (Note 1)	Max	Units
V <sub>I</sub>	Input Clamp Voltage	V <sub>CC</sub> = Min, I <sub>I</sub> = -18 mA			-1.5	V
I <sub>CEX</sub>	High Level Output Current	V <sub>CC</sub> = Min V <sub>IL</sub> = Max	V <sub>O</sub> = 15V		1000	μA
			V <sub>O</sub> = 12V		50	
V <sub>OL</sub>	Low Level Output Voltage	V <sub>CC</sub> = Min, I <sub>OL</sub> = Max V <sub>IH</sub> = Min	DM54		0.4	V
			DM74	0.35	0.5	
		I <sub>OL</sub> = 4 mA, V <sub>CC</sub> = Min	DM74	0.25	0.4	
I <sub>I</sub>	Input Current @ Max Input Voltage	V <sub>CC</sub> = Max, V <sub>I</sub> = 7V V <sub>I</sub> = 5.5V	DM74		0.1	mA
			DM54			
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	DM54		-0.40	mA
			DM74		-0.36	
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

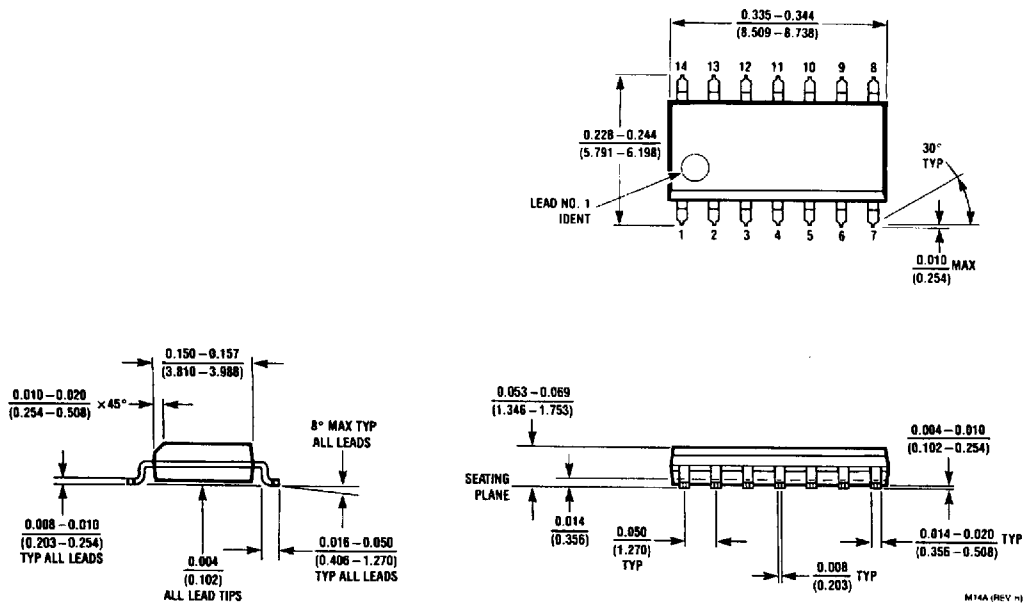
Symbol	Parameter	DM54		DM74				Units
		R <sub>L</sub> = 2 kΩ		R <sub>L</sub> = 2 kΩ				
		C <sub>L</sub> = 15 pF		C <sub>L</sub> = 15 pF		C <sub>L</sub> = 50 pF		
		Min	Max	Min	Max	Min	Max	
t <sub>PLH</sub>	Propagation Delay Time Low to High Level Output		27		20		45	ns
t <sub>PHL</sub>	Propagation Delay Time High to Low Level Output		18		15		20	ns

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

**Physical Dimensions** inches (millimeters)



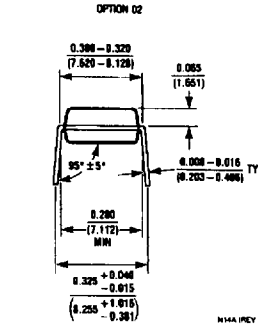
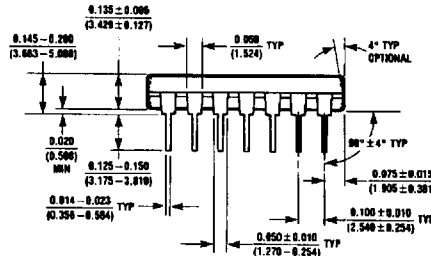
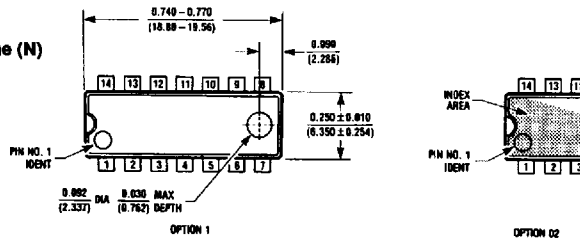
**14-Lead Ceramic Dual-In-Line Package (J)**  
**Order Number DM54LS26J**  
**NS Package Number J14A**



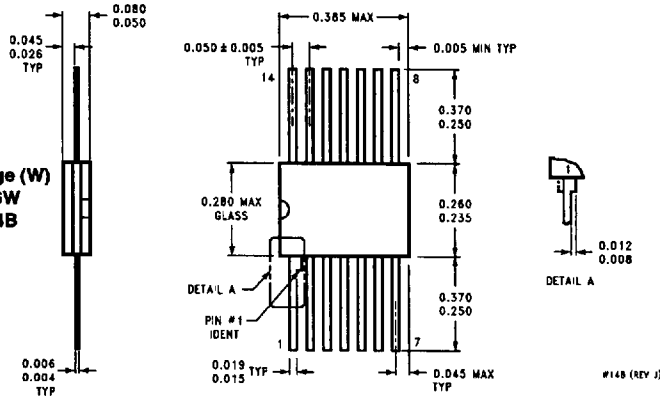
**14-Lead Small Outline Molded Package (M)**  
**Order Number DM74LS26M**  
**NS Package Number M14A**

**Physical Dimensions** inches (millimeters) (Continued)

**14-Lead Molded Dual-In-Line Package (N)**  
 Order Number DM74LS26N  
 NS Package Number N14A



**14-Lead Ceramic Flat Package (W)**  
 Order Number DM54LS26W  
 NS Package Number W14B



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