National Semiconductor

May 1992

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

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

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

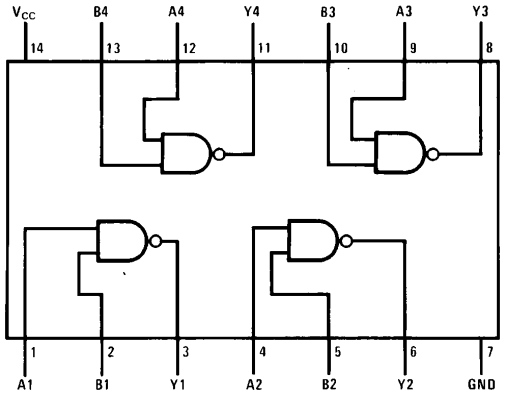
Where: $N_1\,(I_{OH})$ = total maximum output high current for all outputs tied to pull-up resistor

$N_2\,(I_{IH})$ = 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

Dual-In-Line Package



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

 TL/F/6358

RRD-B30M105/Printed in U. S. A.

DM54LS26/DM74LS26 Quad 2-Input NAND Gates with High Voltage Open-Collector Outputs

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_{CC}	Supply Voltage	4.5	5	5.5	4.75	5	5.25	V
V_{IH}	High Level Input Voltage	2			2			V
V_{IL}	Low Level Input Voltage			0.7			0.8	V
V_{OH}	High Level Output Voltage			15			15	V
I_{OL}	Low Level Output Current			4			8	mA
T_A	Free Air Operating Temperature	−55		125	0		70	°C

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

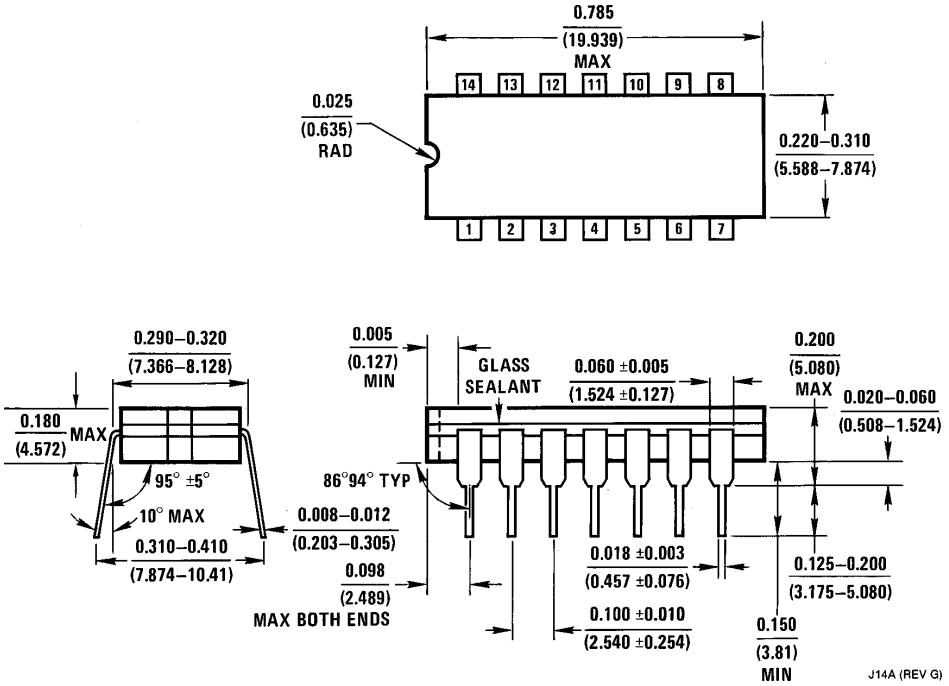
Symbol	Parameter	Conditions		Min	Typ (Note 1)	Max	Units
V_I	Input Clamp Voltage	V_{CC} = Min, I_I = −18 mA				−1.5	V
I_{CEX}	High Level Output Current	V_{CC} = Min, V_{IL} = Max	V_O = 15V			1000	μA
			V_O = 12V			50	
V_{OL}	Low Level Output Voltage	V_{CC} = Min, I_{OL} = Max, V_{IH} = Min	DM54			0.4	V
			DM74		0.35	0.5	
		I_{OL} = 4 mA, V_{CC} = Min	DM74		0.25	0.4	
I_I	Input Current @ Max Input Voltage	V_{CC} = Max, V_I = 7V	DM74			0.1	mA
		V_I = 5.5V	DM54				
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	DM54			−0.40	mA
			DM74			−0.36	
I_{CCH}	Supply Current with Outputs High	V_{CC} = Max			0.8	1.6	mA
I_{CCL}	Supply Current with Outputs Low	V_{CC} = Max			2.4	4.4	mA

Switching Characteristics at V_{CC} = 5V and T_A = 25°C

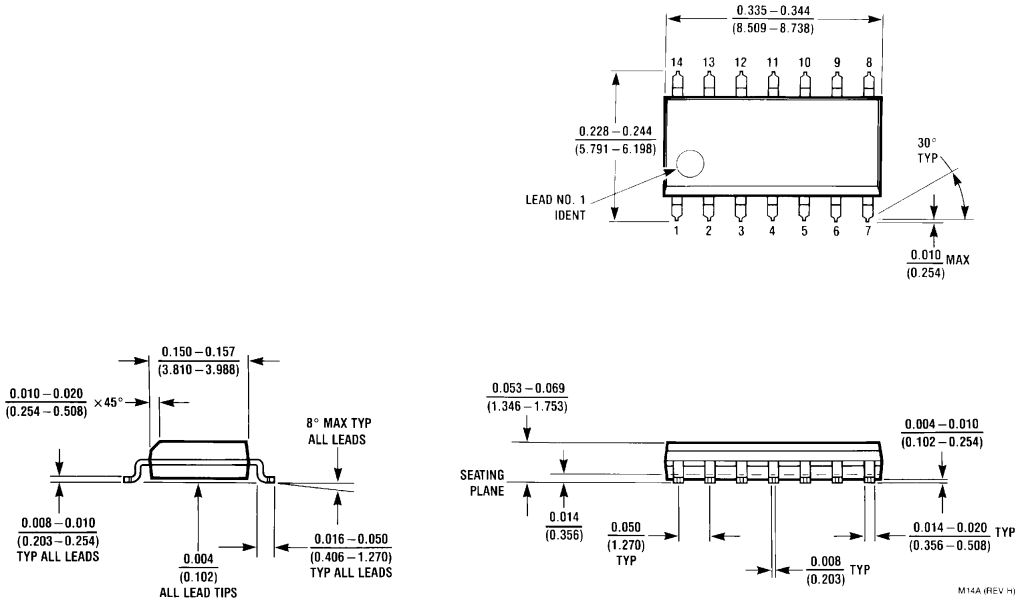
Symbol	Parameter	DM54		DM74				Units
		R_L = 2 kΩ		R_L = 2 kΩ				
		C_L = 15 pF		C_L = 15 pF		C_L = 50 pF		
		Min	Max	Min	Max	Min	Max	
t_{PLH}	Propagation Delay Time Low to High Level Output		27		20		45	ns
t_{PHL}	Propagation Delay Time High to Low Level Output		18		15		20	ns

Note 1: All typicals are at V_{CC} = 5V, T_A = 25°C.

Physical Dimensions inches (millimeters)



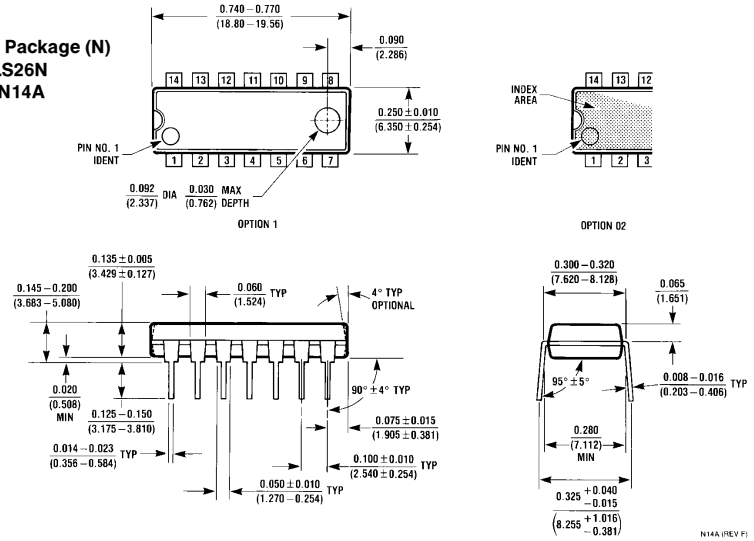
14-Lead Ceramic Dual-In-Line Package (J)
Order Number DM54LS26J
NS Package Number J14A



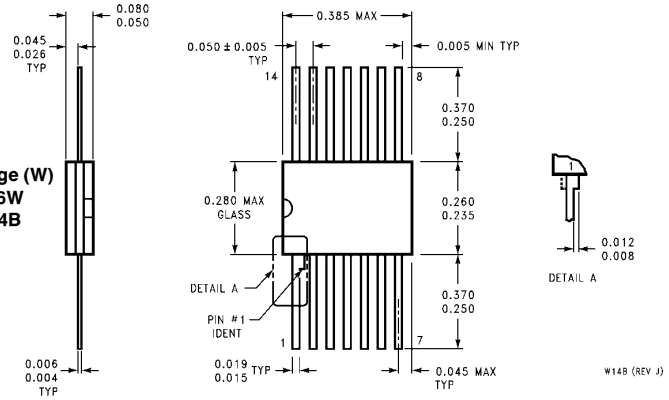
14-Lead Small Outline Molded Package (M)
Order Number DM74LS26M
NS Package Number M14A

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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