National Semiconductor

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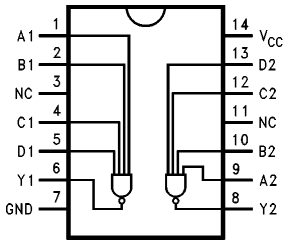
DM74LS40
Dual 4-Input NAND Buffer

General Description

This device contains two independent gates each of which perform the logic NAND function.

Connection Diagrams

Dual-In-Line Package



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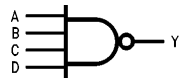
Order Number DM74LS40M or DM74LS40N
See NS Package Number M14A or N14A

Function Table

(Each Gate)

Inputs				Outputs
A	B	C	D	Y
H	H	H	H	L
L	X	X	X	H
X	L	X	X	H
X	X	L	X	H
X	X	X	L	H

Logic Diagram (Each Gate)



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Positive Logic

$Y = \overline{A \bullet B \bullet C \bullet D}$ or $Y = \overline{A} + \overline{B} + \overline{C} + \overline{D}$

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

Absolute Maximum Ratings (Note)

Supply Voltage	7V
Input Voltage	7V
Operating Free Air Temperature Range	
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	DM74LS40			Units
		Min	Nom	Max	
V_{CC}	Supply Voltage	4.75	5	5.25	V
V_{IH}	High Level Input Voltage	2			V
V_{IL}	Low Level Input Voltage			0.8	V
I_{OH}	High Level Output Current			−1.2	mA
I_{OL}	Low Level Output Current			24	mA
T_A	Free Air Operating Temperature	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
V_{OH}	High Level Output Voltage	V_{CC} = Min, I_{OH} = Max, V_{IL} = Max	2.7			V
V_{OL}	Low Level Output Voltage	V_{CC} = Min, I_{OL} = Max, V_{IH} = Min			0.5	V
		I_{OL} = 12 mA, V_{CC} = Min			0.4	
I_I	Input Current @ Max Input Voltage	V_{CC} = Max, V_I = 7V			0.1	mA
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			−0.4	mA
I_{OS}	Short Circuit Output Current	V_{CC} = Max (Note 2)	−30		−130	mA
I_{CCH}	Supply Current with Outputs High	V_{CC} = Max, V_{IN} = GND			1.0	mA
I_{CCL}	Supply Current with Outputs Low	V_{CC} = Max, V_{IN} = OPEN			6.0	mA

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

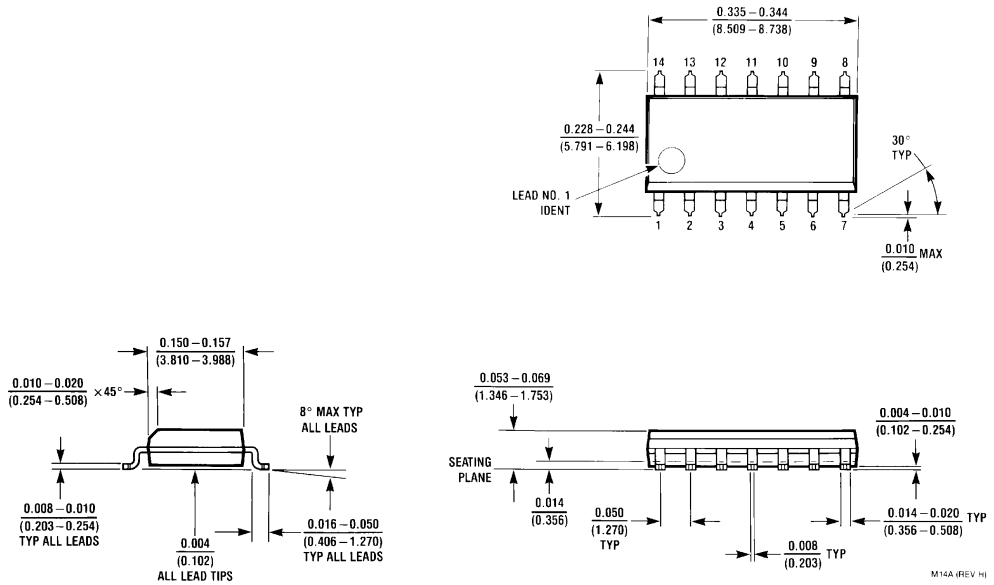
Note 2: Note more than one output should be shorted at a time, and the duration should not exceed one second.

Switching Characteristics

$V_{CC} = +5.0V, T_A = +25°C$

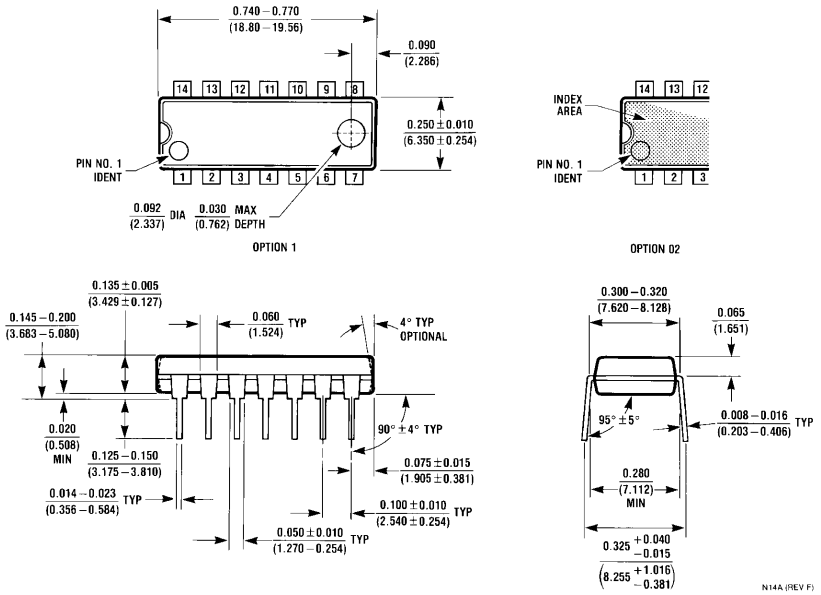
Symbol	Parameter	$R_L = 2\ k\Omega$ $C_L = 15\ pF$		Units
		Min	Max	
t_{PLH}	Propagation Delay Time Low to High Level Output		24	ns
t_{PHL}	Propagation Delay Time High to Low Level Output		24	ns

Physical Dimensions inches (millimeters)



14-Lead Small Outline Molded Package (M)
Order Number DM74LS40M
NS Package Number M14A

Physical Dimensions inches (millimeters) (Continued)



14-Lead Molded Dual-In-Line Package (N)
Order Number DM74LS40N
NS Package Number N14A

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