# 54LS04/DM54LS04/DM74LS04 Hex Inverting Gates

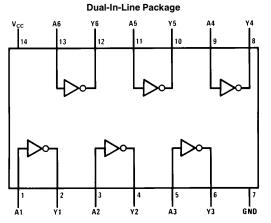
#### **General Description**

#### This device contains six independent gates each of which performs the logic INVERT function.

# **Features**

■ Alternate Military/Aerospace device (54LS04) is available. Contact a National Semiconductor Sales Office/ Distributor for specifications.

# **Connection Diagram**



TL/F/6345-1

Order Number 54LS04DMQB, 54LS04FMQB, 54LS04LMQB, DM54LS04J, DM54LS04W, DM74LS04M or DM74LS04N See NS Package Number E20A, J14A, M14A, N14A or W14B

## **Function Table**

1 - A					
Input	Output				
Α	Y				
L	Н				
	1 1				

 $V = \overline{\Lambda}$ 

 $H \,=\, High\,\, Logic\,\, Level$ 

#### **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

Operating Free Air Temperature Range

 $\begin{array}{ccc} \text{DM54LS and 54LS} & -55^{\circ}\text{C to} + 125^{\circ}\text{C} \\ \text{DM74LS} & 0^{\circ}\text{C to} + 70^{\circ}\text{C} \\ \text{Storage Temperature Range} & -65^{\circ}\text{C to} + 150^{\circ}\text{C} \\ \end{array}$ 

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	DM54LS04			DM74LS04			Units
		Min	Nom	Max	Min	Nom	Max	Oilits
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
Іон	High Level Output Current			-0.4	4		-0.4	mA
loL	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
VI	Input Clamp Voltage	$V_{CC} = Min, I_I = -18 \text{ mA}$				-1.5	٧
V <sub>OH</sub>	V <sub>OH</sub> High Level Output Voltage	$V_{CC} = Min, I_{OH} = Max, DM5$		2.5	3.4		V
		V <sub>IL</sub> = Max	DM74	2.7	3.4		
V <sub>OL</sub>	V <sub>OL</sub> Low Level Output	$V_{CC} = Min, I_{OL} = Max,$	DM54		0.25	0.4	
Voltage	V <sub>IH</sub> = Min	DM74		0.35	0.5	V	
		$I_{OL} = 4 \text{ mA}, V_{CC} = Min$	DM74		0.25	0.4	1
I <sub>I</sub>	Input Current @ Max Input Voltage	$V_{CC} = Max, V_I = 7V$				0.1	mA
I <sub>IH</sub>	High Level Input Current	$V_{CC} = Max, V_I = 2.7V$				20	μΑ
I <sub>IL</sub>	Low Level Input Current	$V_{CC} = Max, V_I = 0.4V$				-0.36	mA
los	Short Circuit	V <sub>CC</sub> = Max	DM54	-20		-100	- mA
Output Current	Output Current	(Note 2)	DM74	-20		-100	
Іссн	Supply Current with Outputs High	V <sub>CC</sub> = Max			1.2	2.4	mA
ICCL	Supply Current with Outputs Low	V <sub>CC</sub> = Max			3.6	6.6	mA

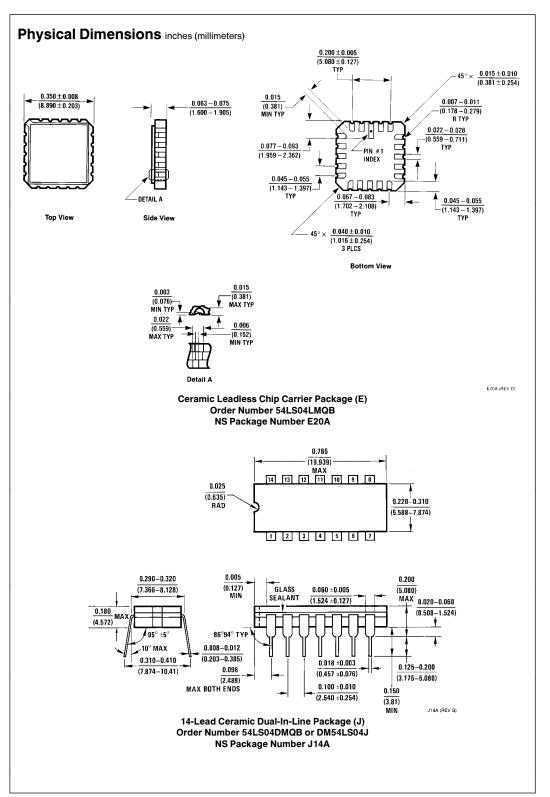
#### Switching Characteristics at V<sub>CC</sub> = 5V and T<sub>A</sub> = 25°C (See Section 1 for Test Waveforms and Output Load)

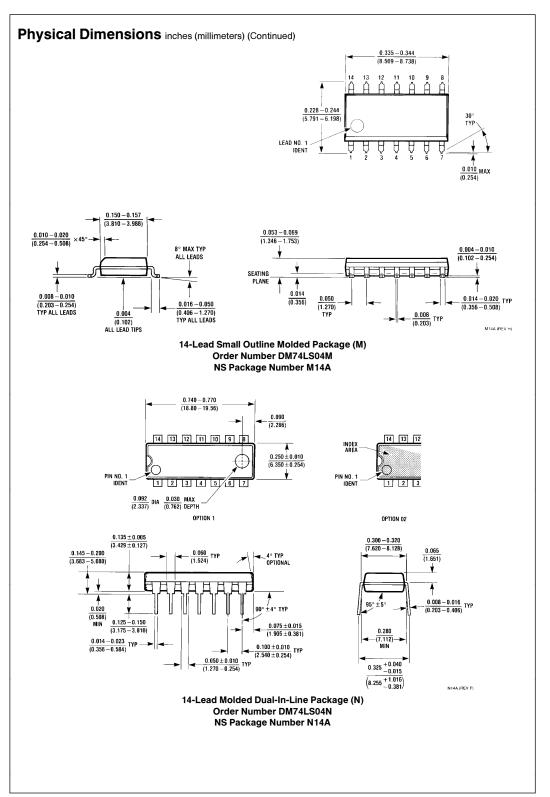
Symbol	Parameter	C <sub>L</sub> = 15 pF		C <sub>L</sub> =	Units	
		Min	Max	Min	Max	
t <sub>PLH</sub>	Propagation Delay Time Low to High Level Output	3	10	4	15	ns
t <sub>PHL</sub>	Propagation Delay Time High to Low Level Output	3	10	4	15	ns

Note 1: All typicals are at  $V_{CC} = 5V$ ,  $T_A = 25^{\circ}C$ .

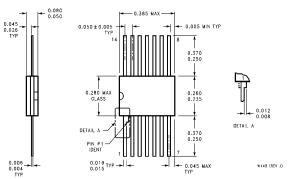
Note 2: Not more than one output should be shorted at a time, and the duration should not exceed one second.







## Physical Dimensions inches (millimeters) (Continued)



14-Lead Ceramic Flat Package (W) Order Number 54LS04FMQB or DM54LS04W NS Package Number W14B

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