

LS366A



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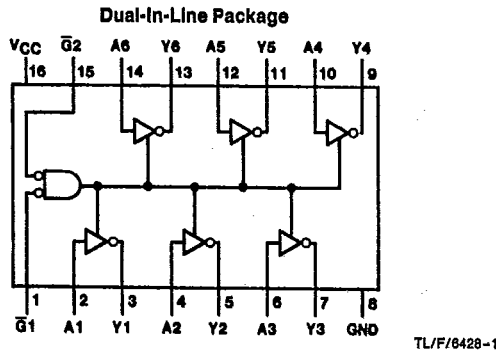
# 54LS366A/DM74LS366A Hex TRI-STATE® Inverting Buffers

## General Description

This device contains six independent gates each of which performs an inverting buffer function. The outputs have the TRI-STATE feature. When enabled, the outputs exhibit the low impedance characteristics of a standard LS output with additional drive capability to permit the driving of bus lines without external resistors. When disabled, both the output

transistors are turned off presenting a high-impedance state to the bus line. Thus the output will act neither as a significant load nor as a driver. To minimize the possibility that two outputs will attempt to take a common bus to opposite logic levels, the disable time is shorter than the enable time of the outputs.

## Connection Diagram



Order Number 54LS366ADMQB, 54LS366AFMQB,  
54LS366ALMQB, DM74LS366AM or DM74LS366AN  
See NS Package Number E20A, J16A, M16A, N16E or W16A

## Function Table

$$Y = \bar{A}$$

Inputs			Output
$\bar{G}1$	$\bar{G}2$	A	Y
H	X	X	Hi-Z
X	H	X	Hi-Z
L	L	L	H
L	L	H	L

H = High Logic Level  
L = Low Logic Level  
X = Either Low or High Logic Level  
Hi-Z = TRI-STATE (Outputs are disabled)

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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
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	54LS366A			DM74LS366A			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
I <sub>OH</sub>	High Level Output Current			-1			-2.6	mA
I <sub>OL</sub>	Low Level Output Current			12			24	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
V <sub>OH</sub>	High Level Output Voltage	V <sub>CC</sub> = Min, I <sub>OH</sub> = Max V <sub>IL</sub> = Max, V <sub>IH</sub> = Min	2.4	3.4		V
V <sub>OL</sub>	Low Level Output Voltage	V <sub>CC</sub> = Min, I <sub>OL</sub> = Max V <sub>IL</sub> = Max, V <sub>IH</sub> = Min	54LS	0.25	0.4	V
			DM74	0.35	0.5	
		I <sub>OL</sub> = 12 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	DM74		0.1	mA
		V <sub>CC</sub> = Max, V <sub>I</sub> = 10.0V	54LS			
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> = 0.5V (Note 4)	A Input		-20	μA
		V <sub>CC</sub> = Max, V <sub>I</sub> = 0.4V (Note 5)	A Input		-0.4	mA
		V <sub>CC</sub> = Max, V <sub>I</sub> = 0.4V	$\bar{G}$ Input		-0.4	
I <sub>OZH</sub>	Off-State Output Current with High Level Output Voltage Applied	V <sub>CC</sub> = Max, V <sub>O</sub> = 2.4V V <sub>IH</sub> = Min, V <sub>IL</sub> = Max			20	μA
I <sub>OZL</sub>	Off-State Output Current with Low Level Output Voltage Applied	V <sub>CC</sub> = Max, V <sub>O</sub> = 0.4V V <sub>IH</sub> = Min, V <sub>IL</sub> = Max			-20	μA
I <sub>OS</sub>	Short Circuit Output Current	V <sub>CC</sub> = Max (Note 2)	54LS	-30	-130	mA
			DM74	-20	-100	
I <sub>CC</sub>	Supply Current	V <sub>CC</sub> = Max (Note 3)		12	21	mA

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

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

Note 3: I<sub>CC</sub> is measured with the DATA inputs grounded and the OUTPUT CONTROLS at 4.5V.

Note 4: Both  $\bar{G}$  inputs are at 2V.

Note 5: Both  $\bar{G}$  inputs at 0.4V.

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**Switching Characteristics** at  $V_{CC} = 5V$  and  $T_A = 25^\circ C$  (See Section 1 for Test Waveforms and Output Load)

Symbol	Parameter	54LS		DM74LS		Units
		$C_L = 50 \text{ pF}$		$C_L = 150 \text{ pF}$ $R_L = 667\Omega$		
		Min	Max	Min	Max	
$t_{PLH}$	Propagation Delay Time Low to High Level Output		12		25	ns
$t_{PHL}$	Propagation Delay Time High to Low Level Output		22		25	ns
$t_{PZH}$	Output Enable Time to High Level Output		24		35	ns
$t_{PZL}$	Output Enable Time to Low Level Output		30		40	ns
$t_{PHZ}$	Output Disable Time from High Level Output (Note 6)		25			ns
$t_{PLZ}$	Output Disable Time from Low Level Output (Note 6)		20			ns

Note 6:  $C_L = 5 \text{ pF}$ .