National Semiconductor

May 1989

54LS368A/DM54LS368A/DM74LS368A Hex TRI-STATE® Inverting Buffers

General Description

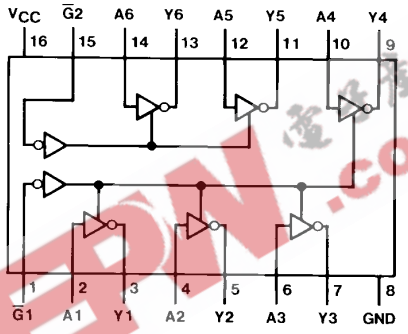
This device contains six independent gates each of which performs an inverting buffer function. The outputs have the TRI-STATE feature. When enabled, the outputs exhibit the low impedance characteristics of a standard LS output with additional drive capability to permit the driving of bus lines without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

Features

- Alternate Military/Aerospace device (54LS368) is available. Contact a National Semiconductor Sales Office/ Distributor for specifications.

Connection Diagram

Dual-In-Line Package



TL/F/6430–1

Order Number 54LS368ADMQB, 54LS368AFMQB, 54LS368ALMQB, DM54LS368AJ, DM54LS368AW, DM74LS368AM or DM74LS368AN
See NS Package Number E20A, J16A, M16A, N16E or W16A

Function Table

$Y = \overline{A}$

Inputs		Output
A	$\overline{G}$	Y
L	L	H
H	L	L
X	H	Hi-Z

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

TRI-STATE® is a registered trademark of National Semiconductor Corporation.

©1995 National Semiconductor Corporation

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

54LS368A/DM54LS368A/DM74LS368A Hex TRI-STATE Inverting Buffers

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 and 54LS	−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	DM54LS368A			DM74LS368A			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
I_{OH}	High Level Output Current			−1			−2.6	mA
I_{OL}	Low Level Output Current			12			24	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
V_{OH}	High Level Output Voltage	V_{CC} = Min, I_{OH} = Max, V_{IL} = Max, V_{IH} = Min		2.4	3.4		V
V_{OL}	Low Level Output Voltage	V_{CC} = Min, I_{OL} = Max, V_{IL} = Max, V_{IH} = Min	DM54		0.25	0.4	V
			DM74		0.35	0.5	
		I_{OL} = 12 mA, V_{CC} = Min	DM74		0.25	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 = 0.5V (Note 4)	A Input			−20	μA
		V_{CC} = Max, V_I = 0.4V (Note 5)	A Input			−0.4	mA
		V_{CC} = Max, V_I = 0.4V	$\overline{G}$ Input			−0.4	
I_{OZH}	Off-State Output Current with High Level Output Voltage Applied	V_{CC} = Max, V_O = 2.4V, V_{IH} = Min, V_{IL} = Max				20	μA
I_{OZL}	Off-State Output Current with Low Level Output Voltage Applied	V_{CC} = Max, V_O = 0.4V, V_{IH} = Min, V_{IL} = Max				−20	μA
I_{OS}	Short Circuit Output Current	V_{CC} = Max (Note 2)	DM54	−20		−100	mA
			DM74	−20		−100	
I_{CC}	Supply Current	V_{CC} = Max (Note 3)			12	21	mA

Note 1: All typicals are at V_{CC} = 5V, T_A = 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_{CC} is measured with the DATA inputs grounded and the OUTPUT CONTROLS at 4.5V.

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

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

EEPW .com.cn

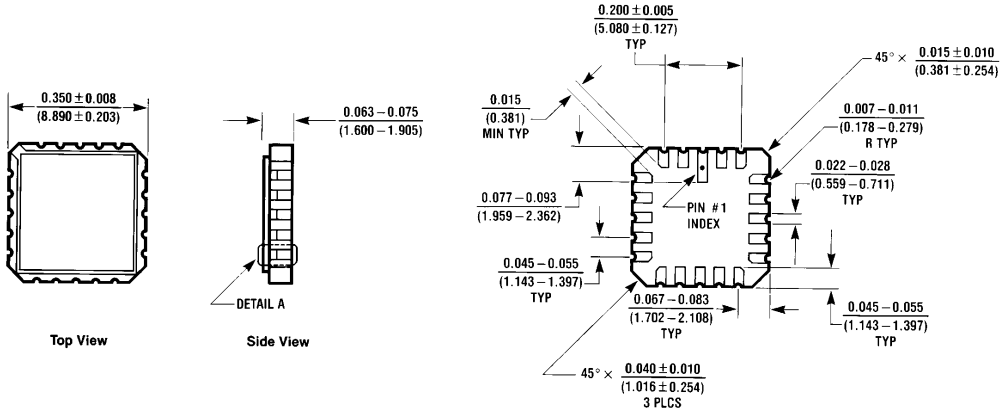
Switching Characteristics at $V_{CC} = 5V$ and $T_A = 25°C$ (See Section 1 for Test Waveforms and Output Load)

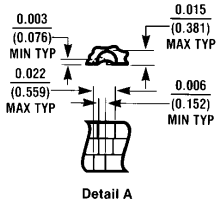
Symbol	Parameter	$R_L = 667\Omega$				Units
		$C_L = 50$ pF		$C_L = 150$ pF		
		Min	Max	Min	Max	
t_{PLH}	Propagation Delay Time Low to High Level Output		15		25	ns
t_{PHL}	Propagation Delay Time High to Low Level Output		18		25	ns
t_{PZH}	Output Enable Time to High Level Output		30		35	ns
t_{PZL}	Output Enable Time to Low Level Output		30		40	ns
t_{PHZ}	Output Disable Time from High Level Output (Note 6)		20			ns
t_{PLZ}	Output Disable Time from Low Level Output (Note 6)		20			ns

Note 6: $C_L = 5$ pF.

EEPW 電子產品世界 .com.cn

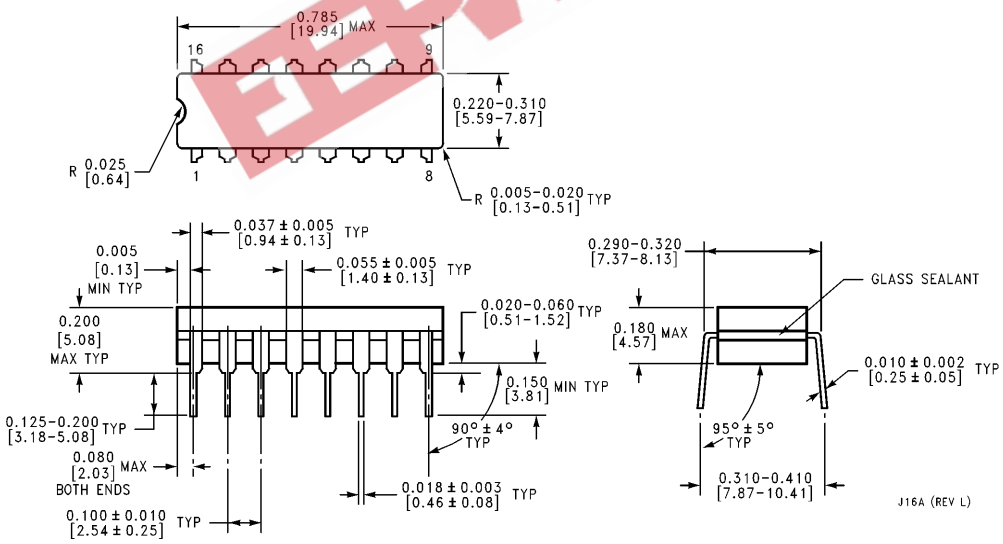
Physical Dimensions inches (millimeters)





E20A (REV D)

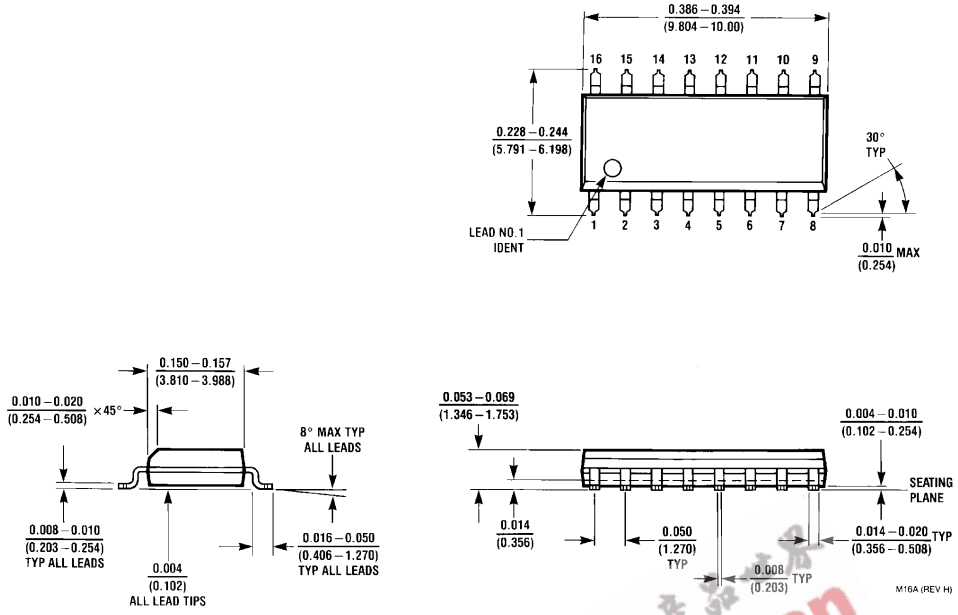
Ceramic Leadless Chip Carrier Package (E)
Order Number 54LS368ALMQB
NS Package Number E20A



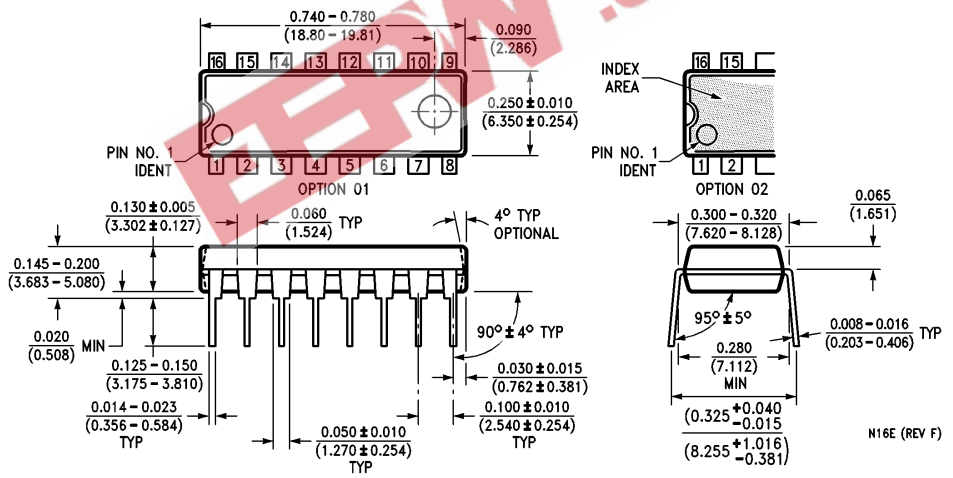
16-Lead Ceramic Dual-In-Line Package (J)
Order Number 54LS368ADMQB or DM54LS368AJ
NS Package Number J16A

EEPW 电子产品世界 .com.cn

Physical Dimensions inches (millimeters) (Continued)



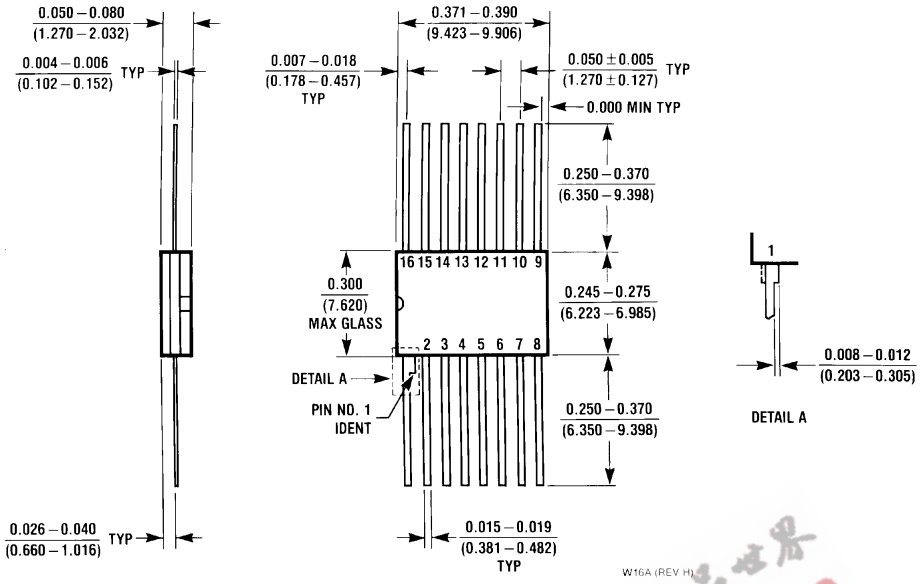
16-Lead Small Outline Molded Package (M)
Order Number DM74LS368AM
NS Package Number M16A



16-Lead Molded Dual-In-Line Package (N)
Order Number DM74LS368AN
NS Package Number N16E

EEPW .com.cn

Physical Dimensions inches (millimeters) (Continued)



16-Lead Ceramic Flat Package (W)
Order Number 54LS368AFMQB or DM54LS368AW
NS Package Number W16A

EEPW .com.cn

LIFE SUPPORT POLICY

NATIONAL'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF NATIONAL SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

National Semiconductor Corporation
1111 West Bardin Road
Arlington, TX 76017
Tel: 1(800) 272-9959
Fax: 1(800) 737-7018

National Semiconductor Europe
Fax: (+49) 0-180-530 85 86
Email: cnjwge@tevm2.nsc.com
Deutsch Tel: (+49) 0-180-530 85 85
English Tel: (+49) 0-180-532 78 32
Français Tel: (+49) 0-180-532 93 58
Italiano Tel: (+49) 0-180-534 16 80

National Semiconductor Hong Kong Ltd.
13th Floor, Straight Block,
Ocean Centre, 5 Canton Rd.
Tsimshatsui, Kowloon
Hong Kong
Tel: (852) 2737-1600
Fax: (852) 2736-9960

National Semiconductor Japan Ltd.
Tel: 81-043-299-2309
Fax: 81-043-299-2408

National does not assume any responsibility for use of any circuitry described, no circuit patent licenses are implied and National reserves the right at any time without notice to change said circuitry and specifications.