

June 1989

54LS365A/DM54LS365A/DM74LS365A Hex TRI-STATE® Buffers

General Description

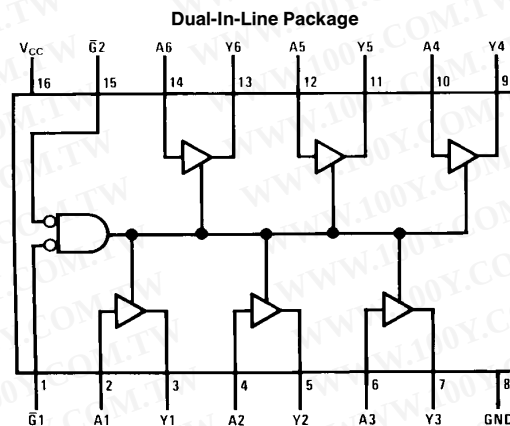
This device contains six independent gates each of which performs a non-inverting buffer function. The outputs have the TRI-STATE feature. When enabled, the outputs exhibit the low impedance characteristics of a standard LS output with additional drive capability to permit the driving of bus lines without 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 (54LS365A) is available. Contact a National Semiconductor Sales Office/Distributor for specifications.

Connection Diagram



TL/F/6427-1

Order Number 54LS365ADMQB, 54LS365AFMQB, 54LS365ALMQB,
 DM54LS365AJ, DM54LS365AW, DM74LS265AM or DM74LS365AN
 See NS Package Number E20A, J16A, M16A, N16E or W16A

Function Table

Y = A

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

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.

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	DM54LS365A			DM74LS365A			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	$\bar{G}$ 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)		14	24	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 $\bar{G}$ inputs are at 2V.

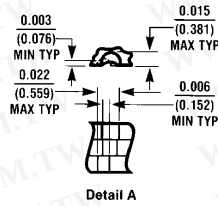
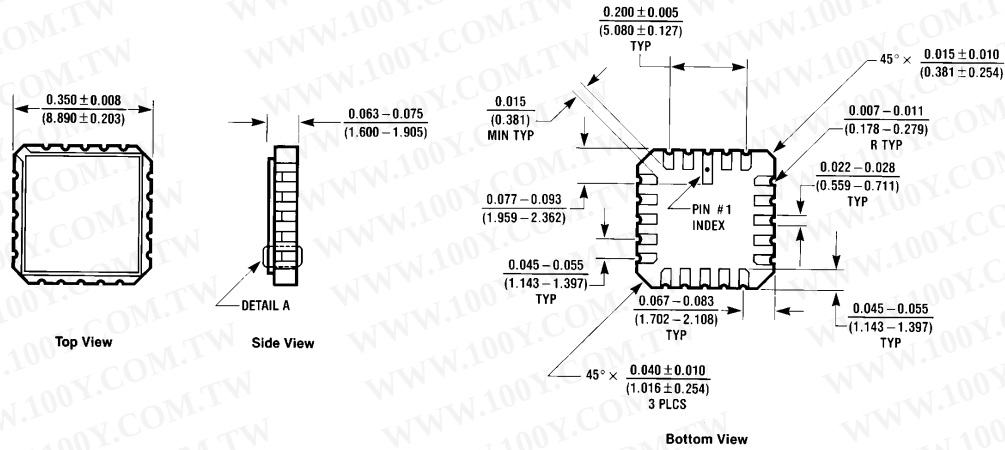
Note 5: Both $\bar{G}$ inputs at 0.4V.

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

Symbol	Parameter	$R_L = 667\Omega$				Units
		$C_L = 50\text{ pF}$		$C_L = 150\text{ pF}$		
		Min	Max	Min	Max	
t_{PLH}	Propagation Delay Time Low to High Level Output		16		25	ns
t_{PHL}	Propagation Delay Time High to Low Level Output		16		25	ns
t_{PZH}	Output Enable Time to High Level Output		30		40	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

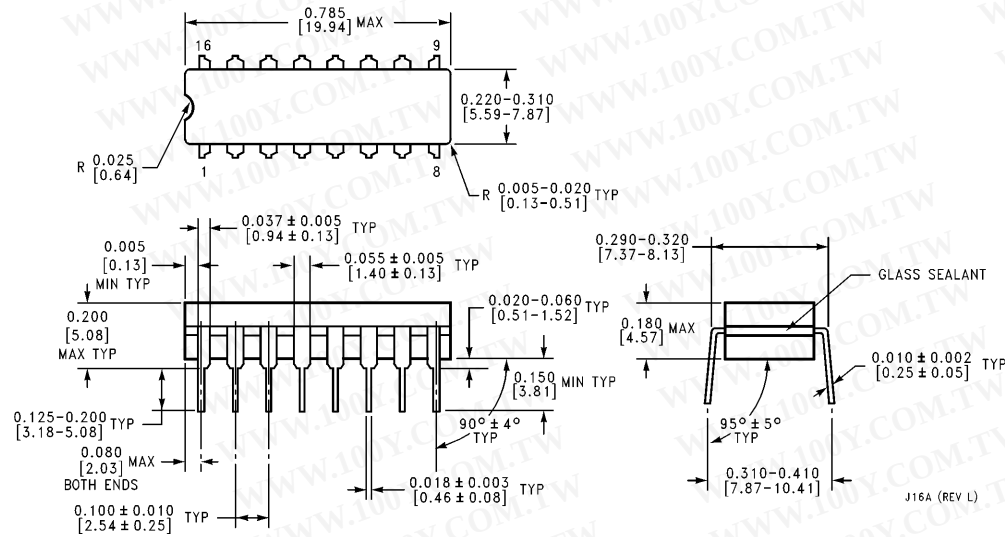
Note 6: $C_L = 5\text{ pF}$.

Physical Dimensions inches (millimeters) (Continued)



Ceramic Leadless Chip Carrier Package (E)
 Order Number 54LS365ALMQB
 NS Package Number E20A

E20A (REV D)



J16A (REV L)

Technical drawing of a 16-pin connector. The drawing includes a side view on the left and a top view on the right. Dimensions are provided in inches and millimeters.

Side View Dimensions:

- Top width: $0.050 - 0.080$ (1.270 - 2.032)
- Bottom width: $0.026 - 0.040$ (0.660 - 1.016)
- Top thickness: $0.004 - 0.006$ (0.102 - 0.152) TYP
- Bottom thickness: $0.007 - 0.018$ (0.178 - 0.457) TYP
- Pin height: 0.050 ± 0.005 (1.270 $\pm$ 0.127) TYP
- Pin pitch: $0.015 - 0.019$ (0.381 - 0.482) TYP

Top View Dimensions:

- Overall width: $0.371 - 0.390$ (9.423 - 9.906)
- Pin pitch: $0.015 - 0.019$ (0.381 - 0.482) TYP
- Pin width: $0.007 - 0.018$ (0.178 - 0.457) TYP
- Pin height: 0.050 ± 0.005 (1.270 $\pm$ 0.127) TYP
- Pin pitch: 0.000 MIN TYP
- Pin height: $0.250 - 0.370$ (6.350 - 9.398)
- Pin height: $0.245 - 0.275$ (6.223 - 6.985)
- Pin height: $0.250 - 0.370$ (6.350 - 9.398)
- Pin height: $0.015 - 0.019$ (0.381 - 0.482) TYP

Other Labels:

- MAX GLASS
- DETAIL A
- PIN NO. 1 IDENT
- W16A (REV H)

LIFE SUPPORT POLICY

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.

