

54125/DM54125/DM74125 Quad TRI-STATE® Buffers

General Description

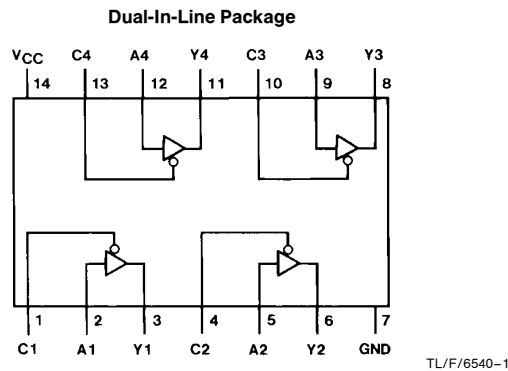
This device contains four independent gates each of which performs a non-inverting buffer function. The outputs have the TRI-STATE feature. When enabled, the outputs exhibit the low impedance characteristics of a standard TTL output with additional drive capability at the high Logic level to permit the driving of bus lines without external pull-up 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 (54125) is available. Contact a National Semiconductor Sales Office/Distributor for specifications.

Connection Diagram



Order Number 54125DMQB, 54125FMQB, DM54125J, DM54125W or DM74125N
See NS Package Number J14A, N14A or W14B

Function Table

$$Y = A$$

| Inputs | | Output |
|--------|---|--------|
| A | C | Y |
| L | L | L |
| H | L | H |
| 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)

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 | 5.5V |
| Operating Free Air Temperature Range | |
| DM54 and 54 | –55°C to +125°C |
| DM74 | 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 | DM54125 | | | DM74125 | | | 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 | | | 0.8 | | | 0.8 | V |
| I _{OH} | High Level Output Current | | | –2 | | | –5.2 | mA |
| I _{OL} | Low Level Output Current | | | 16 | | | 16 | 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 = –12 mA | | | –1.5 | V |
| V _{OH} | High Level Output Voltage | V _{CC} = Min, I _{OH} = Max V _{IL} = Max, V _{IH} = Min | 2.4 | 3.3 | | V |
| V _{OL} | Low Level Output Voltage | V _{CC} = Min, I _{OL} = Max V _{IH} = Min, V _{IL} = Max | | 0.2 | 0.4 | V |
| I _I | Input Current @ Max Input Voltage | V _{CC} = Max, V _I = 5.5V | | | 1 | mA |
| I _{IH} | High Level Input Current | V _{CC} = Max, V _I = 2.4V | | | 40 | μA |
| I _{IL} | Low Level Input Current | V _{CC} = Max, V _I = 0.4V | | | –1.6 | mA |
| I _{IzL} | Off-State Input Current with Low Level Input Voltage Applied | V _{CC} = Max, V _I = 0.4V | | | –40 | μA |
| 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 | | | 40 | 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 | | | –40 | μA |
| I _{OS} | Short Circuit Output Current | V _{CC} = Max (Note 2) | DM54 | –30 | –70 | mA |
| | | | DM74 | –28 | –70 | |
| I _{CC} | Supply Current | V _{CC} = Max (Note 3) | | 36 | 54 | mA |

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

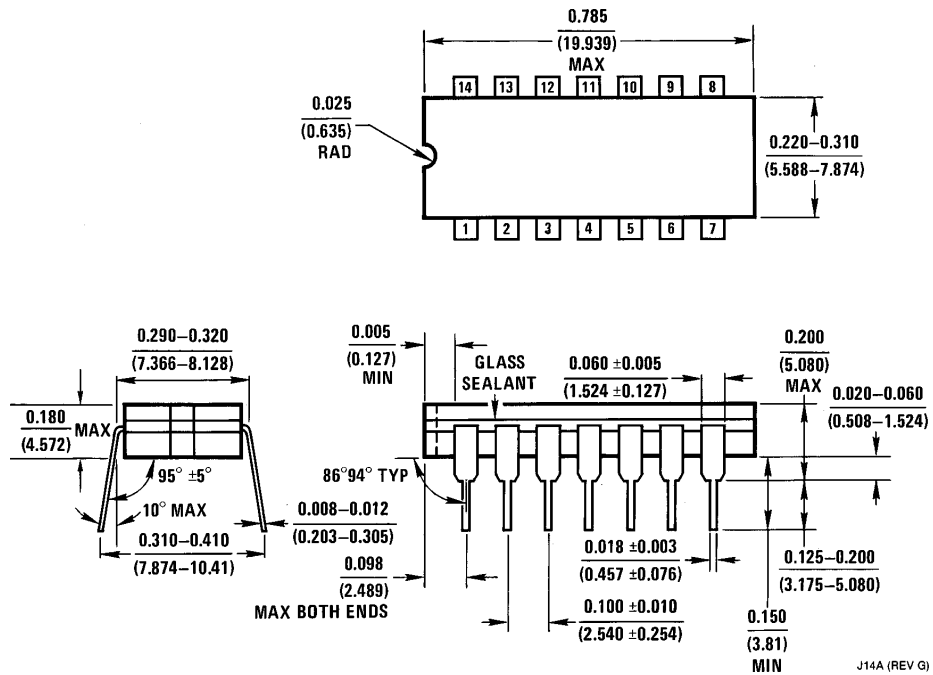
Note 2: Not more than one output should be shorted at a time.

Note 3: I_{CC} is measured with the output control (C) inputs at 4.5V, the data inputs grounded, and the outputs open.

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

| Symbol | Parameter | $R_L = 400\Omega$ | | | | Units |
|-----------|--|---------------------|-----|----------------------|-----|-------|
| | | $C_L = 5\text{ pF}$ | | $C_L = 50\text{ pF}$ | | |
| | | Min | Max | Min | Max | |
| t_{PLH} | Propagation Delay Time Low to High Level Output | | | | 15 | ns |
| t_{PHL} | Propagation Delay Time High to Low Level Output | | | | 18 | ns |
| t_{PZH} | Output Enable Time to High Level Output | | | | 18 | ns |
| t_{PZL} | Output Enable Time to Low Level Output | | | | 25 | ns |
| t_{PHZ} | Output Disable Time from High Level Output | | 8 | | | ns |
| t_{PLZ} | Output Disable Time from Low Level Output | | 14 | | | ns |

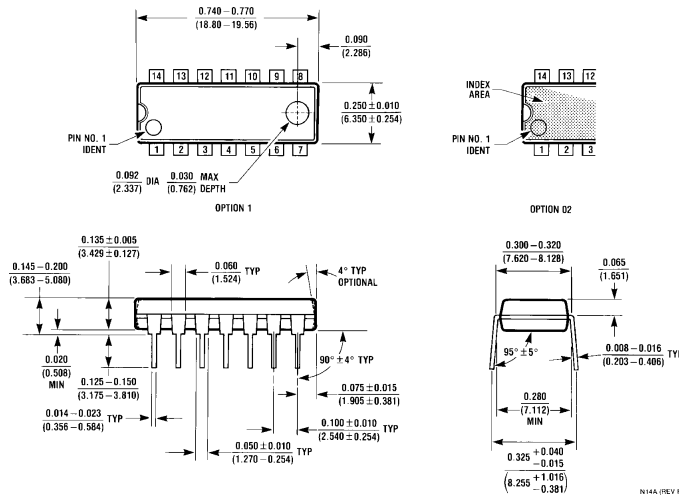
Physical Dimensions inches (millimeters)



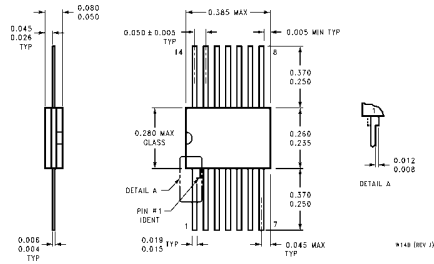
14-Lead Ceramic Dual-In-Line Package (J)
Order Number 54125DMQB or DM54125J
NS Package Number J14A

J14A (REV G)

Physical Dimensions inches (millimeters) (Continued)



14-Lead Molded Dual-In-Line Package (N)
Order Number DM74125N
NS Package Number N14A




14-Lead Ceramic Flat Package (W)
Order Number 54125FMQB or DM54125W
NS Package Number W14B

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