

## 54LS352/DM74LS352 Dual 4-Line to 1-Line Data Selectors/Multiplexers

### General Description

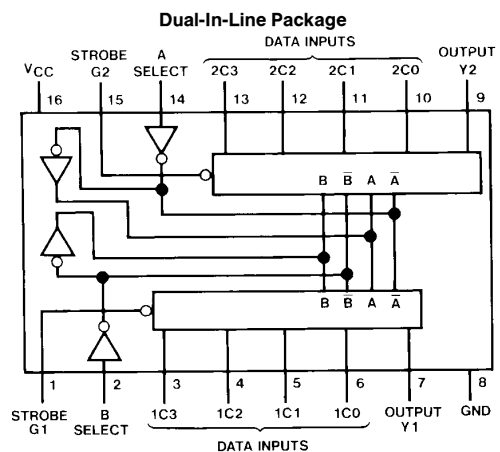
Each of these data selectors/multiplexers contains inverters and drivers to supply fully complementary, on-chip, binary decoding data selection to the AND-OR-invert gates. Separate strobe inputs are provided for each of the two four-line sections.

### Features

- Inverting version of DM54/74LS153
- Permits multiplexing from N lines to 1 line

- Performs parallel-to-serial conversion
- Strobe (enable) line provided for cascading (N lines to n lines)
- High fan-out, low-impedance, totem-pole outputs
- Typical average propagation delay times
  - From data 15 ns
  - From strobe 19 ns
  - From select 22 ns
- Typical power dissipation 31 mW

### Connection Diagram



Order Number 54LS352DMQB, 54LS352FMQB,  
DM74LS352M or DM74LS352N  
See NS Package Number J16A, M16A, N16E or W16A

### Function Table

| Select Inputs |   | Data Inputs |    |    |    | Strobe | Output |
|---------------|---|-------------|----|----|----|--------|--------|
| B             | A | C0          | C1 | C2 | C3 | G      | Y      |
| X             | X | X           | X  | X  | X  | H      | H      |
| L             | L | L           | X  | X  | X  | L      | H      |
| L             | L | H           | X  | X  | X  | L      | L      |
| L             | H | X           | L  | X  | X  | L      | H      |
| L             | H | X           | H  | X  | X  | L      | L      |
| H             | L | X           | X  | L  | X  | L      | H      |
| H             | L | X           | X  | H  | X  | L      | L      |
| H             | H | X           | X  | X  | L  | L      | H      |
| H             | H | X           | X  | X  | H  | L      | L      |

Select inputs A and B are common to both sections.  
H = High Level, L = Low Level, X = Don't Care

## 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 |                   |
| 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                      | 54LS352 |     |      | DM74LS352 |     |      | 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      |         |     | −0.4 |           |     | −0.4 | mA    |
| I <sub>OL</sub> | Low Level Output Current       |         |     | 12   |           |     | 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<br>(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<br>V <sub>IL</sub> = Max, V <sub>IH</sub> = Min | 54LS<br>2.5<br>DM74<br>2.7 |                 |                    | V     |
| V <sub>OL</sub> | Low Level Output Voltage          | V <sub>CC</sub> = Min, I <sub>OL</sub> = Max<br>V <sub>IL</sub> = Max, V <sub>IH</sub> = Min | 54LS<br>DM74               |                 | 0.4<br>0.35<br>0.5 | V     |
|                 |                                   | I <sub>OL</sub> = 4 mA<br>V <sub>CC</sub> = Min                                              | DM74                       |                 | 0.25<br>0.4        |       |
| I <sub>I</sub>  | Input Current @ Max Input Voltage | V <sub>CC</sub> = Max, V <sub>I</sub> = 10V<br>V <sub>CC</sub> = Max, V <sub>I</sub> = 7V    | 54LS<br>DM74               |                 | 0.1                | mA    |
| 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> = 0.4V                                                 |                            |                 | −0.4               | mA    |
| I <sub>OS</sub> | Short Circuit Output Current      | V <sub>CC</sub> = Max<br>(Note 2)                                                            | 54LS<br>DM74               | −20<br>−20      | −100<br>−100       | mA    |
| I <sub>CC</sub> | Supply Current                    | V <sub>CC</sub> = Max (Note 3)                                                               |                            | 6.2             | 10                 | mA    |

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

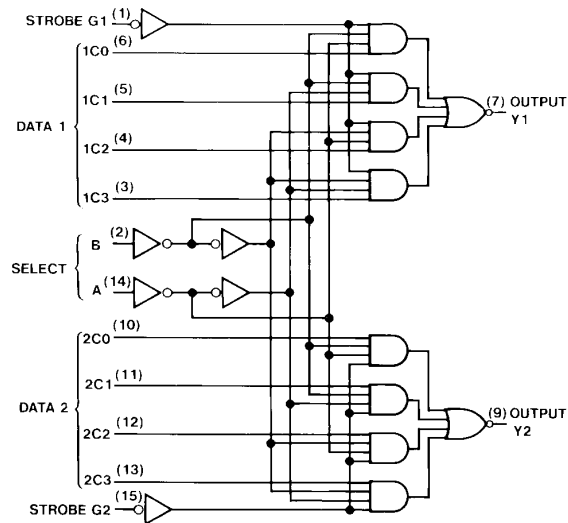
Note 2: Not more than one output should be shorted at a time, and the duration should not exceed one second.

Note 3: I<sub>CC</sub> is measured with all outputs open and all other inputs at ground.

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

| Symbol           | Parameter                                          | From<br>(Input)<br>To<br>(Output) | 54LS                   |     | DM74LS                                          |     | Units |
|------------------|----------------------------------------------------|-----------------------------------|------------------------|-----|-------------------------------------------------|-----|-------|
|                  |                                                    |                                   | C <sub>L</sub> = 15 pF |     | C <sub>L</sub> = 50 pF<br>R <sub>L</sub> = 2 kΩ |     |       |
|                  |                                                    |                                   | Min                    | Max | Min                                             | Max |       |
| t <sub>PLH</sub> | Propagation Delay Time<br>Low to High Level Output | Data to Y                         |                        | 12  |                                                 | 24  | ns    |
| t <sub>PHL</sub> | Propagation Delay Time<br>High to Low Level Output | Data to Y                         |                        | 12  |                                                 | 35  | ns    |
| t <sub>PLH</sub> | Propagation Delay Time<br>Low to High Level Output | Select to Y                       |                        | 22  |                                                 | 33  | ns    |
| t <sub>PHL</sub> | Propagation Delay Time<br>High to Low Level Output | Select to Y                       |                        | 38  |                                                 | 47  | ns    |
| t <sub>PLH</sub> | Propagation Delay Time<br>Low to High Level Output | Strobe to Y                       |                        | 15  |                                                 | 29  | ns    |
| t <sub>PHL</sub> | Propagation Delay Time<br>High to Low Level Output | Strobe to Y                       |                        | 20  |                                                 | 41  | ns    |

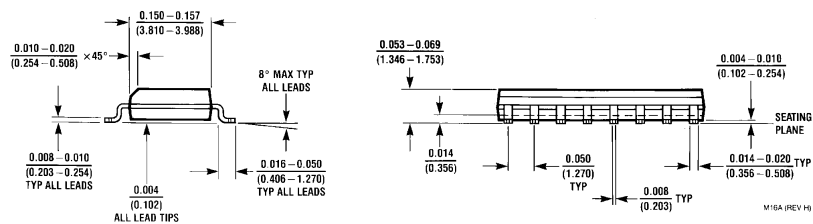
## Logic Diagram



TL/F/6425-2

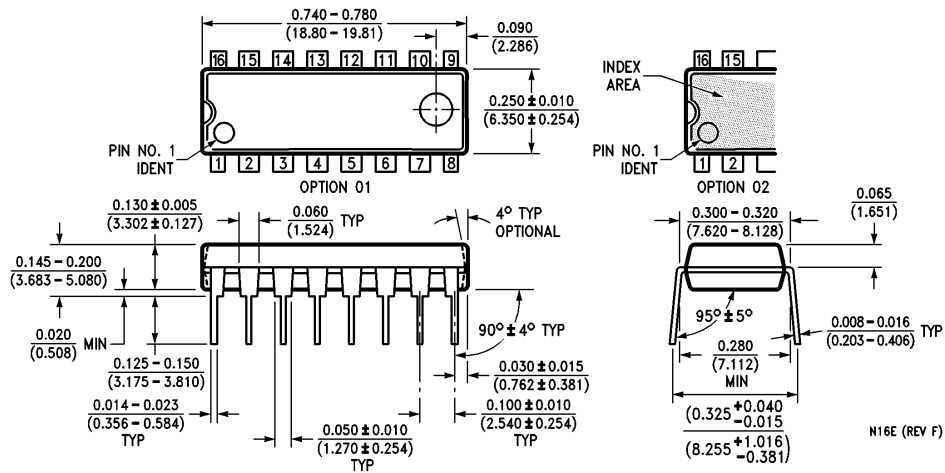
The drawing shows three views of the J16A package:

- Top View:** Shows a rectangular package with 16 pins. Dimensions include a total length of  $0.785 \pm 0.005$  [19.94] MAX, a pin pitch of  $0.037 \pm 0.005$  TYP [0.94 ± 0.13], and a pin width of  $0.025$  [0.64]. The package width is  $0.220 - 0.310$  [5.59 - 7.87].
- Side View:** Shows the package height and pin height. The package height is  $0.005$  [0.13] MIN TYP. The pin height is  $0.200$  [5.08] MAX TYP. The pin pitch is  $0.055 \pm 0.005$  TYP [1.40 ± 0.13]. The pin width is  $0.020 - 0.060$  TYP [0.51 - 1.52]. The pin angle is  $90^\circ \pm 4^\circ$  TYP. The pin length is  $0.125 - 0.200$  TYP [3.18 - 5.08]. The pin thickness is  $0.080$  MAX [2.03]. The pin width at the base is  $0.100 \pm 0.010$  TYP [2.54 ± 0.25].
- End View:** Shows the package width and pin width. The package width is  $0.290 - 0.320$  [7.37 - 8.13]. The pin width is  $0.180$  [4.57] MAX. The pin angle is  $95^\circ \pm 5^\circ$  TYP. The pin length is  $0.310 - 0.410$  [7.87 - 10.41]. The pin thickness is  $0.010 \pm 0.002$  TYP [0.25 ± 0.05].



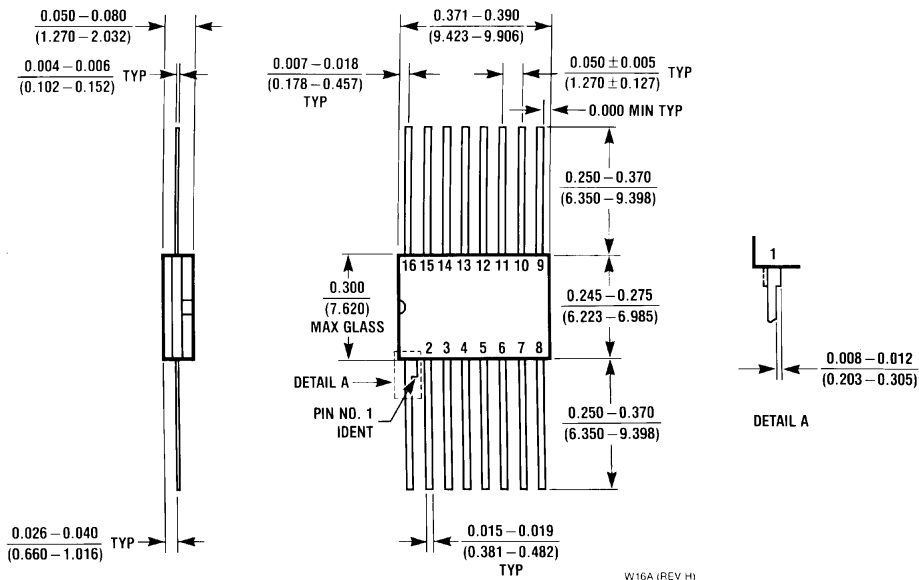
4

# Physical Dimensions inches (millimeters) (Continued)



**16-Lead Molded Dual-In-Line Package (N)**  
**Order Number DM74LS352N**  
**NS Package Number N16E**

N16E (REV F)

**Physical Dimensions** inches (millimeters) (Continued)

**16-Lead Ceramic Flat Package (W)**  
**Order Number 54LS352FMQB**  
**NS Package Number W16A**

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