

## 54153/DM54153/DM74153 Dual 4-Line to 1-Line Data Selectors/Multiplexers

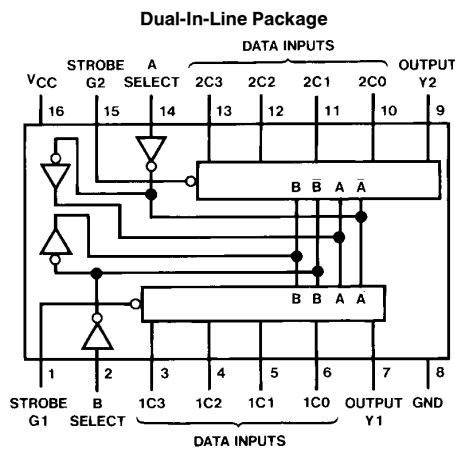
### General Description

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

- 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 11 ns
  - From strobe 18 ns
  - From select 20 ns
- Typical power dissipation 170 mW
- Alternate Military/Aerospace device (54153) is available. Contact a National Semiconductor Sales Office/Distributor for specifications.

### Connection Diagram



TL/F/6547-1

Order Number 54153DMQB, 54153FMQB, DM54153J,  
DM54153W or DM74153N  
See NS Package Number J16A, 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      | L      |
| L             | L | L           | X  | X  | X  | L      | L      |
| L             | L | H           | X  | X  | X  | L      | H      |
| L             | H | X           | L  | X  | X  | L      | L      |
| L             | H | X           | H  | X  | X  | L      | H      |
| H             | L | X           | X  | L  | X  | L      | L      |
| H             | L | X           | X  | H  | X  | L      | H      |
| H             | H | X           | X  | X  | L  | L      | L      |
| H             | H | X           | X  | X  | H  | L      | H      |

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                        | 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                      | DM54153 |     |      | DM74153 |     |      | 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        |         |     | 0.8  |         |     | 0.8  | V     |
| I <sub>OH</sub> | High Level Output Current      |         |     | −0.8 |         |     | −0.8 | mA    |
| I <sub>OL</sub> | Low Level Output Current       |         |     | 16   |         |     | 16   | 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> = −12 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 | 2.4         | 3.2          |      | V     |
| V <sub>OL</sub> | Low Level Output Voltage          | V <sub>CC</sub> = Min, I <sub>OL</sub> = Max<br>V <sub>IH</sub> = Min, V <sub>IL</sub> = Max |             | 0.2          | 0.4  | V     |
| I <sub>I</sub>  | Input Current @ Max Input Voltage | V <sub>CC</sub> = Max, V <sub>I</sub> = 5.5V   |             |              | 1    | mA    |
| I <sub>IH</sub> | High Level Input Current          | V <sub>CC</sub> = Max, V <sub>I</sub> = 2.4V   |             |              | 40   | μA    |
| I <sub>IL</sub> | Low Level Input Current           | V <sub>CC</sub> = Max, V <sub>I</sub> = 0.4V   |             |              | −1.6 | mA    |
| I <sub>OS</sub> | Short Circuit Output Current      | V <sub>CC</sub> = Max (Note 2)   | DM54<br>−20 |              | −55  | mA    |
|                 |                                   |  | DM74<br>−18 |              | −57  |       |
| I <sub>CC</sub> | Supply Current                    | V <sub>CC</sub> = Max (Note 3)   | DM54        | 34           | 52   | mA    |
|                 |                                   |  | DM74        | 34           | 60   |       |

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

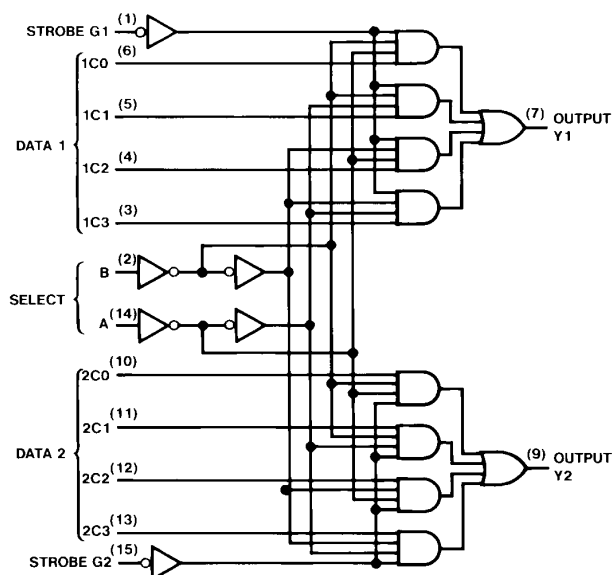
Note 2: Not more than one output should be shorted at a time.

Note 3: I<sub>CC</sub> is measured with the outputs open and all inputs grounded.

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

| Symbol    | Parameter  | From (Input)<br>To (Output) | $R_L = 400\Omega, C_L = 30\text{ pF}$ |     | Units |
|-----------|--|-----------------------------|---------------------------------------|-----|-------|
|           |  |                             | Min                                   | Max |       |
| $t_{PLH}$ | Propagation Delay Time<br>Low to High Level Output | Data to Y                   |                                       | 18  | ns    |
| $t_{PHL}$ | Propagation Delay Time<br>High to Low Level Output | Data to Y                   |                                       | 23  | ns    |
| $t_{PLH}$ | Propagation Delay Time<br>Low to High Level Output | Select to Y                 |                                       | 34  | ns    |
| $t_{PHL}$ | Propagation Delay Time<br>High to Low Level Output | Select to Y                 |                                       | 34  | ns    |
| $t_{PLH}$ | Propagation Delay Time<br>Low to High Level Output | Strobe to Y                 |                                       | 30  | ns    |
| $t_{PHL}$ | Propagation Delay Time<br>High to Low Level Output | Strobe to Y                 |                                       | 23  | ns    |

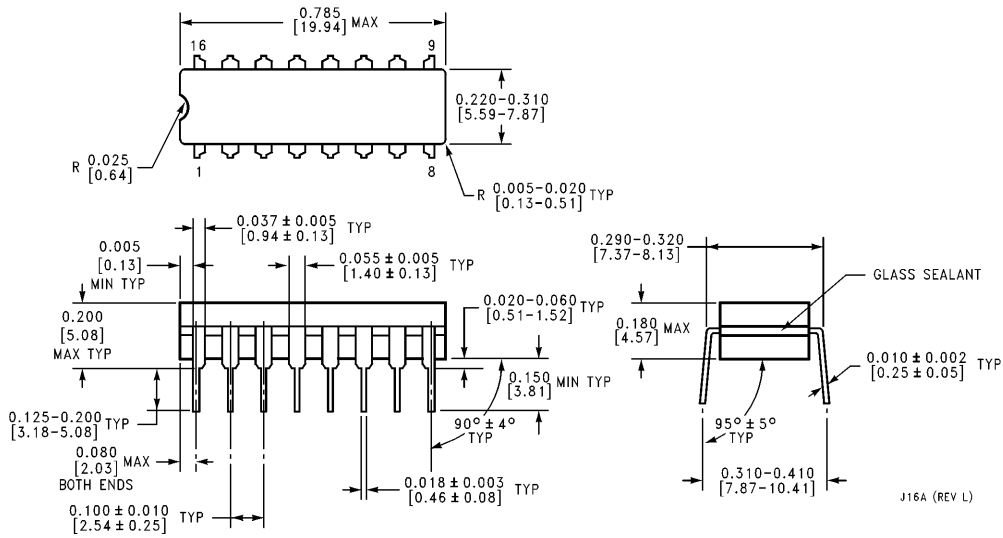
**Logic Diagram**



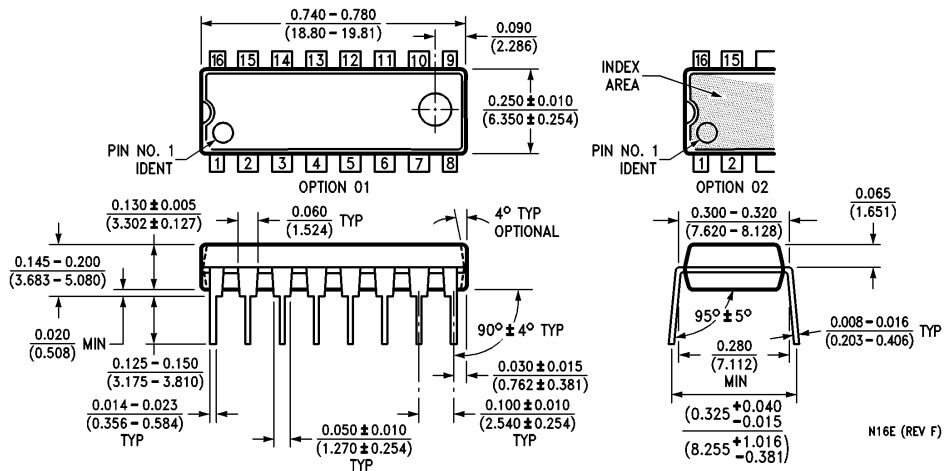
TL/F/6547-2



**Physical Dimensions** inches (millimeters)

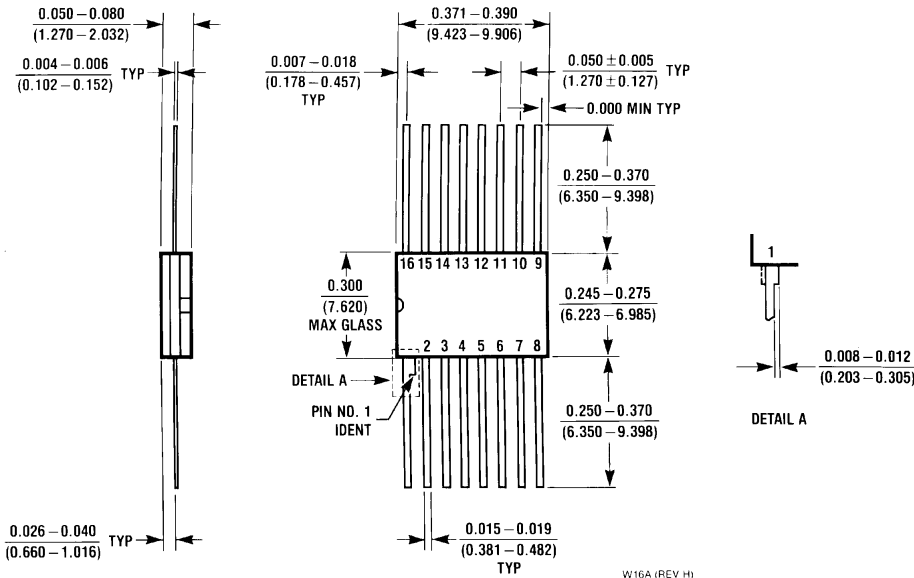


**16-Lead Ceramic Dual-In-Line Package (J)**  
**Order Number 54153DMQB or DM54153J**  
**NS Package Number J16A**



**16-Lead Molded Dual-In-Line Package (N)**  
**Order Number DM74153N**  
**NS Package Number N16E**

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



**16-Lead Ceramic Flat Package (W)**  
**Order Number 54153FMQB or DM54153W**  
**NS Package Number W16A**

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