



## DM54S253/DM74S253

### Dual TRI-STATE® 1 of 4 Line Data Selectors/Multiplexers

#### General Description

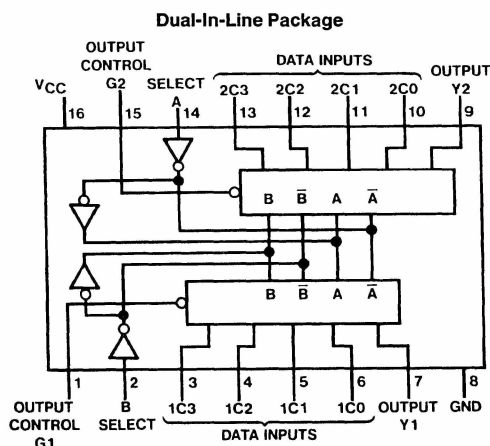
Each of these Schottky-clamped data selectors/multiplexers contains inverters and drivers to supply fully complementary, on-chip, binary decoding data selection to the AND-OR gates. Separate output control inputs are provided for each of the two four-line sections.

The TRI-STATE outputs can interface directly with data lines of bus-organized systems. With all but one of the common outputs disabled (at a high impedance state), the low impedance of the single enable output will drive the bus line to a high or low logic level.

#### Features

- TRI-STATE version of S153 with same pin-out
- Schottky-diode-clamped transistors
- Permits multiplexing from N lines to 1 line
- Performs parallel-T-serial conversion
- Strobe/output control
- High fan-out totem-pole outputs
- Typical propagation delay
  - From data to output 6 ns
  - From select to output 12 ns
- Typical power dissipation 275 mW

#### Connection Diagram



TL/F/6481-1

Order Number DM54S253J, DM54S253W or DM74S253N  
NS Package Number J16A, N16E or W16A

#### Function Table

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

Address inputs A and B are common to both sections.

H = High Level, L = Low Level, X = Don't Care, Z = High Impedance

## 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

DM54S -55°C to +125°C

DM74S 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                      | DM54S253 |     |     | DM74S253 |     |      | 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      |          |     | -2  |          |     | -6.5 | mA    |
| I <sub>OL</sub> | Low Level Output Current       |          |     | 20  |          |     | 20   | mA    |
| T <sub>A</sub>  | Free Air Operating Temperature | -55      |     | 125 | 0        |     | 70   | °C    |

## Electrical Characteristics over recommended operating free air temperature (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                                               |      |                 | -1.2 | V     |
| V <sub>OH</sub>  | High Level Output Voltage                                       | V <sub>CC</sub> = Min, I <sub>OH</sub> = Max                                                 | DM54 | 2.4             | 3.4  | V     |
|                  |                                                                 | V <sub>IL</sub> = Max, V <sub>IH</sub> = Min                                                 | DM74 | 2.4             | 3.2  |       |
| 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 |      |                 | 0.5  | 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> = 2.7V                                                 |      |                 | 50   | μA    |
| I <sub>IL</sub>  | Low Level Input Current                                         | V <sub>CC</sub> = Max, V <sub>I</sub> = 0.5V                                                 |      |                 | -2   | mA    |
| I <sub>OZH</sub> | Off-State Output Current with High Level Output Voltage Applied | V <sub>CC</sub> = Max, V <sub>O</sub> = 2.4V<br>V <sub>IH</sub> = Min, V <sub>IL</sub> = Max |      |                 | 50   | μA    |
| I <sub>OZL</sub> | Off-State Output Current with Low Level Output Voltage Applied  | V <sub>CC</sub> = Max, V <sub>O</sub> = 0.5V<br>V <sub>IH</sub> = Min, V <sub>IL</sub> = Max |      |                 | -50  | μA    |
| I <sub>OS</sub>  | Short Circuit Output Current                                    | V <sub>CC</sub> = Max (Note 2)                                                               | DM54 | -40             | -100 | mA    |
|                  |                                                                 |                                                                                              | DM74 | -40             | -100 |       |
| I <sub>CC</sub>  | Supply Current                                                  | V <sub>CC</sub> = Max (Note 3)                                                               |      | 55              | 70   | mA    |

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

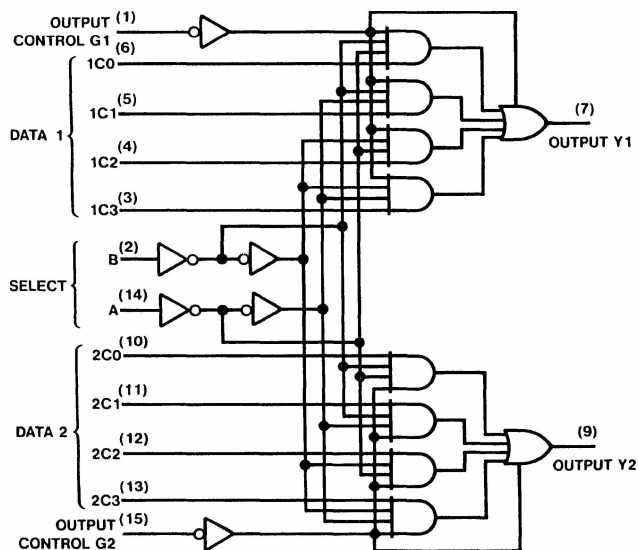
Note 2: Not more than one output should be shorted at a time, and the duration should not exceed one second.

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

**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 <sub>L</sub> = 280Ω  |      |                        |      | Units |
|------------------|------------------------------------------------------|-----------------------------|------------------------|------|------------------------|------|-------|
|                  |                                                      |                             | C <sub>L</sub> = 15 pF |      | C <sub>L</sub> = 50 pF |      |       |
|                  |                                                      |                             | Min                    | Max  | Min                    | Max  |       |
| t <sub>PLH</sub> | Propagation Delay Time<br>Low to High Level Output   | Data<br>to Y                |                        | 9    |                        | 12   | ns    |
| t <sub>PHL</sub> | Propagation Delay Time<br>High to Low Level Output   | Data<br>to Y                |                        | 9    |                        | 12   | ns    |
| t <sub>PLH</sub> | Propagation Delay Time<br>Low to High Level Output   | Select<br>to Y              |                        | 18   |                        | 21   | ns    |
| t <sub>PHL</sub> | Propagation Delay Time<br>High to Low Level Output   | Select<br>to Y              |                        | 18   |                        | 21   | ns    |
| t <sub>PZH</sub> | Output Enable Time<br>to High Level Output           | Output Control<br>to Y      |                        | 16.5 |                        | 19.5 | ns    |
| t <sub>PZL</sub> | Output Enable Time<br>to Low Level Output            | Output Control<br>to Y      |                        | 18   |                        | 21   | ns    |
| t <sub>PHZ</sub> | Output Disable Time to<br>High Level Output (Note 1) | Output Control<br>to Y      |                        | 9.5  |                        |      | ns    |
| t <sub>PLZ</sub> | Output Disable Time<br>to Low Level Output (Note 1)  | Output Control<br>to Y      |                        | 15   |                        |      | ns    |

Note 1:  $C_L = 5\text{ pF}$ .

**Logic Diagram**


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