



## 54157/DM54157/DM74157

### Quad 2-Line to 1-Line Data Selectors/Multiplexers

#### General Description

These data selectors/multiplexers contain inverters and drivers to supply full on-chip data selection to the four output gates. A separate strobe input is provided. A 4-bit word is selected from one of two sources and is routed to the four outputs.

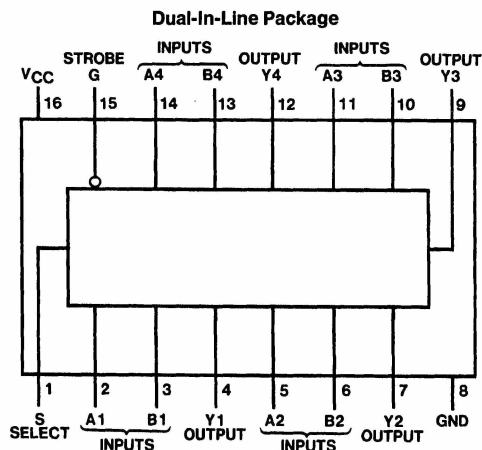
#### Applications

- Expand any data input point
- Multiplex dual data buses
- Generate four functions of two variables (one variable is common)
- Source programmable counters

#### Features

- Buffered inputs and outputs
- Typical propagation time 9 ns
- Typical power dissipation 150 mW
- Alternate Military/Aerospace device (54157) is available. Contact a National Semiconductor Sales Office/Distributor for specifications.

#### Connection Diagram



TL/F/6550-1

Order Number 54157DMQB, 54157FMQB, DM54157J, DM54157W or DM74157N  
See NS Package Number J16A, N16E or W16A

#### Function Table

| Inputs |        |   |   | Output Y |
|--------|--------|---|---|----------|
| Strobe | Select | A | B |          |
| H      | X      | X | X | L        |
| L      | L      | L | X | L        |
| L      | L      | H | X | H        |
| L      | H      | X | L | L        |
| L      | H      | X | H | H        |

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                      | DM54157 |     |      | DM74157 |     |      | 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      |         |     | −0.8 |         |     | −0.8 | 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<br>(Note 1) | Max  | Units |
|----------|-----------------------------------|------------------------------------------------------------------------------------------|------|-----------------|------|-------|
| $V_I$    | Input Clamp Voltage               | $V_{CC} = \text{Min}, I_I = -12 \text{ mA}$                                              |      |                 | −1.5 | V     |
| $V_{OH}$ | High Level Output Voltage         | $V_{CC} = \text{Min}, I_{OH} = \text{Max}$<br>$V_{IL} = \text{Max}, V_{IH} = \text{Min}$ | 2.4  | 3.4             |      | V     |
| $V_{OL}$ | Low Level Output Voltage          | $V_{CC} = \text{Min}, I_{OL} = \text{Max}$<br>$V_{IH} = \text{Min}, V_{IL} = \text{Max}$ |      |                 | 0.4  | V     |
| $I_I$    | Input Current @ Max Input Voltage | $V_{CC} = \text{Max}, V_I = 5.5 \text{ V}$                                               |      |                 | 1    | mA    |
| $I_{IH}$ | High Level Input Current          | $V_{CC} = \text{Max}, V_I = 2.4 \text{ V}$                                               |      |                 | 40   | μA    |
| $I_{IL}$ | Low Level Input Current           | $V_{CC} = \text{Max}, V_I = 0.4 \text{ V}$                                               |      |                 | −1.6 | mA    |
| $I_{OS}$ | Short Circuit Output Current      | $V_{CC} = \text{Max}$<br>(Note 2)                                                        | DM54 | −20             | −55  | mA    |
|          |                                   |                                                                                          | DM74 | −18             | −55  |       |
| $I_{CC}$ | Supply Current                    | $V_{CC} = \text{Max}$ (Note 3)                                                           |      | 30              | 48   | mA    |

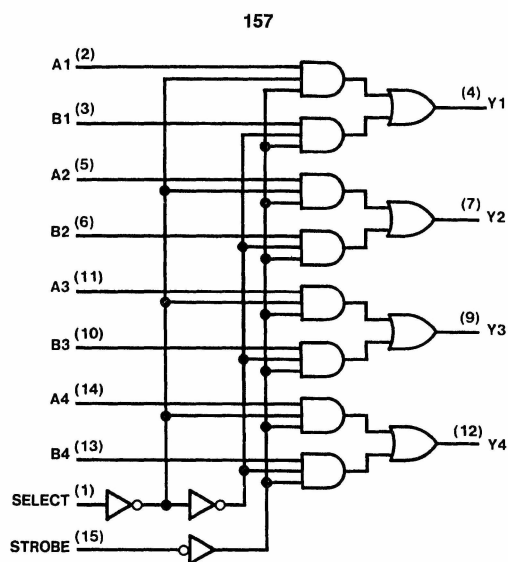
Note 1: All typicals are at  $V_{CC} = 5 \text{ V}$ ,  $T_A = 25^\circ \text{C}$ .

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

Note 3:  $I_{CC}$  is measured with 4.5V applied to all inputs and 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) | $R_L = 400\Omega, C_L = 15\text{ pF}$ |     | Units |
|-----------|----------------------------------------------------|-----------------------------|---------------------------------------|-----|-------|
|           |                                                    |                             | Min                                   | Max |       |
| $t_{PLH}$ | Propagation Delay Time<br>Low to High Level Output | Data<br>to Y                |                                       | 14  | ns    |
| $t_{PHL}$ | Propagation Delay Time<br>High to Low Level Output | Data<br>to Y                |                                       | 14  | ns    |
| $t_{PLH}$ | Propagation Delay Time<br>Low to High Level Output | Strobe<br>to Y              |                                       | 20  | ns    |
| $t_{PHL}$ | Propagation Delay Time<br>High to Low Level Output | Strobe<br>to Y              |                                       | 21  | ns    |
| $t_{PLH}$ | Propagation Delay Time<br>Low to High Level Output | Select<br>to Y              |                                       | 23  | ns    |
| $t_{PHL}$ | Propagation Delay Time<br>High to Low Level Output | Select<br>to Y              |                                       | 27  | ns    |

**Logic Diagram**


TL/F/6550-2