

## DM74S157 • DM74S158

### Quad 1 of 2 Line Data Selector/Multiplexer

#### 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. The DM74S157 presents true data whereas the DM74S158 presents inverted data to minimize propagation delay time.

#### Applications

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

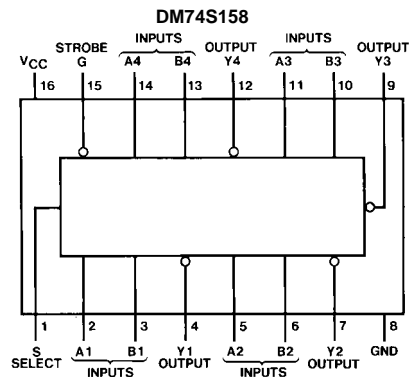
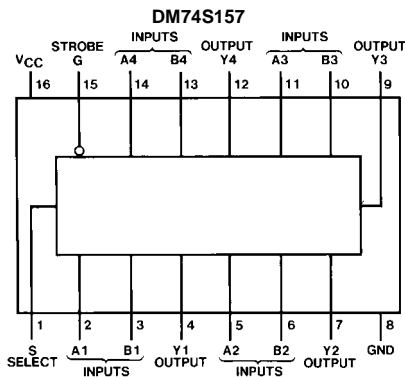
#### Features

- Buffered inputs and outputs
- Typical propagation time
  - DM74S157 5 ns
  - DM74S158 4 ns
- Typical power dissipation
  - DM74S157 250 mW
  - DM74S158 195 mW

#### Ordering Code:

| Order Number | Package Number | Package Description   |
|--------------|----------------|---|
| DM74S157N    | N16E           | 16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide |
| DM74S158N    | N16E           | 16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide |

#### Connection Diagrams

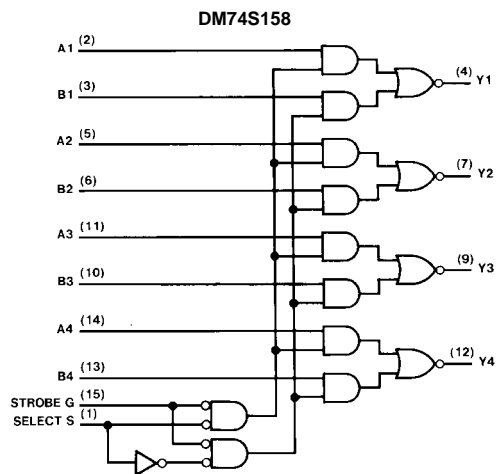
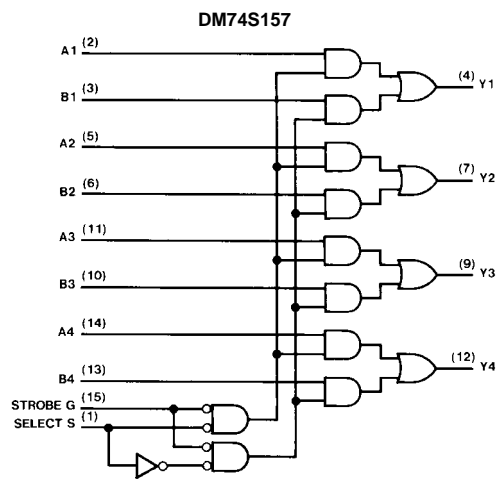


### Function Table

| Strobe | Inputs |   |   | Output Y |          |
|--------|--------|---|---|----------|----------|
|        | Select | A | B | DM74S157 | DM74S158 |
| H      | X      | X | X | L        | H        |
| L      | L      | L | X | L        | H        |
| L      | L      | H | X | H        | L        |
| L      | H      | X | L | L        | H        |
| L      | H      | X | H | H        | L        |

H = HIGH Level  
 L = LOW Level  
 X = Don't Care

### Logic Diagrams



**Absolute Maximum Ratings**(Note 1)

|                                      |                 |
|--------------------------------------|-----------------|
| Supply Voltage                       | 7V              |
| Input Voltage                        | 5.5V            |
| Operating Free Air Temperature Range | 0°C to +70°C    |
| Storage Temperature Range            | -65°C to +150°C |

**Note 1:** 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 tables are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

**DM74157 Recommended Operating Conditions**

| Symbol   | Parameter                      | Min  | Nom | Max  | Units |
|----------|--------------------------------|------|-----|------|-------|
| $V_{CC}$ | Supply Voltage                 | 4.75 | 5   | 5.25 | V     |
| $V_{IH}$ | HIGH Level Input Voltage       | 2    |     |      | V     |
| $V_{IL}$ | LOW Level Input Voltage        |      |     | 0.8  | V     |
| $I_{OH}$ | HIGH Level Output Current      |      |     | -1   | mA    |
| $I_{OL}$ | LOW Level Output Current       |      |     | 20   | mA    |
| $T_A$    | Free Air Operating Temperature | 0    |     | 70   | °C    |

**DM74S157 Electrical Characteristics**

over recommended operating free air temperature (unless otherwise noted)

| Symbol   | Parameter                         | Conditions   | Min    | Typ (Note 2) | Max  | Units         |
|----------|-----------------------------------|--|--------|--------------|------|---------------|
| $V_I$    | Input Clamp Voltage               | $V_{CC} = \text{Min}, I_I = -18 \text{ mA}$  |        |              | -1.2 | V             |
| $V_{OH}$ | HIGH Level Output Voltage         | $V_{CC} = \text{Min}, I_{OH} = \text{Max}$<br>$V_{IL} = \text{Max}, V_{IH} = \text{Min}$ | 2.7    | 3.4          |      | V             |
| $V_{OL}$ | LOW Level Output Voltage          | $V_{CC} = \text{Min}, I_{OL} = \text{Max}$<br>$V_{IH} = \text{Min}, V_{IL} = \text{Max}$ |        |              | 0.5  | V             |
| $I_I$    | Input Current @ Max Input Voltage | $V_{CC} = \text{Max}, V_I = 5.5V$  |        |              | 1    | mA            |
| $I_{IH}$ | HIGH Level Input Current          | $V_{CC} = \text{Max}$<br>$V_I = 2.7V$  | S or G |              | 100  | $\mu\text{A}$ |
|          |                                   |  | A or B |              | 50   |               |
| $I_{IL}$ | HIGH Level Input Current          | $V_{CC} = \text{Max}$<br>$V_I = 0.5V$  | S or G |              | -4   | mA            |
|          |                                   |  | A or B |              | -2   |               |
| $I_{OS}$ | Short Circuit Output Current      | $V_{CC} = \text{Max}$ (Note 3)   | -40    |              | -100 | mA            |
| $I_{CC}$ | Supply Current                    | $V_{CC} = \text{Max}$ (Note 4)   |        | 50           | 78   | mA            |

**Note 2:** All typicals are at  $V_{CC} = 5V, T_A = 25^\circ\text{C}$ .

**Note 3:** Not more than one output should be shorted at a time, and the duration should not exceed one second.

**Note 4:**  $I_{CC}$  is measured 4.5V applied to all inputs and all outputs OPEN.

**DM74S157 Switching Characteristics**

at  $V_{CC} = 5V$  and  $T_A = 25^\circ\text{C}$

| Symbol    | Parameter  | From (Input)<br>To (Output) | $R_L = 280\Omega$     |      |                       |     | Units |
|-----------|--|-----------------------------|-----------------------|------|-----------------------|-----|-------|
|           |  |                             | $C_L = 15 \text{ pF}$ |      | $C_L = 50 \text{ pF}$ |     |       |
|           |  |                             | Min                   | Max  | Min                   | Max |       |
| $t_{PLH}$ | Propagation Delay Time<br>LOW-to-HIGH Level Output | Data to Y                   |                       | 7.5  |                       | 10  | ns    |
| $t_{PHL}$ | Propagation Delay Time<br>HIGH-to-LOW Level Output | Data to Y                   |                       | 6.5  |                       | 10  | ns    |
| $t_{PLH}$ | Propagation Delay Time<br>LOW-to-HIGH Level Output | Strobe to Y                 |                       | 12.5 |                       | 15  | ns    |
| $t_{PHL}$ | Propagation Delay Time<br>HIGH-to-LOW Level Output | Strobe to Y                 |                       | 12   |                       | 15  | ns    |
| $t_{PLH}$ | Propagation Delay Time<br>LOW-to-HIGH Level Output | Select to Y                 |                       | 15   |                       | 17  | ns    |
| $t_{PHL}$ | Propagation Delay Time<br>HIGH-to-LOW Level Output | Select to Y                 |                       | 15   |                       | 17  | ns    |

### DM74S158 Recommended Operating Conditions

| Symbol   | Parameter                      | Min  | Nom | Max  | Units |
|----------|--------------------------------|------|-----|------|-------|
| $V_{CC}$ | Supply Voltage                 | 4.75 | 5   | 5.25 | V     |
| $V_{IH}$ | HIGH Level Input Voltage       | 2    |     |      | V     |
| $V_{IL}$ | LOW Level Input Voltage        |      |     | 0.8  | V     |
| $I_{OH}$ | HIGH Level Output Current      |      |     | -1   | mA    |
| $I_{OL}$ | LOW Level Output Current       |      |     | 20   | mA    |
| $T_A$    | Free Air Operating Temperature | 0    |     | 70   | °C    |

### DM74S158 Electrical Characteristics

over recommended operating free air temperature (unless otherwise noted)

| Symbol    | Parameter                         | Conditions   | Min    | Typ (Note 5) | Max  | Units         |
|-----------|-----------------------------------|--|--------|--------------|------|---------------|
| $V_I$     | Input Clamp Voltage               | $V_{CC} = \text{Min}, I_I = -18 \text{ mA}$  |        |              | -1.2 | V             |
| $V_{OH}$  | HIGH Level Output Voltage         | $V_{CC} = \text{Min}, I_{OH} = \text{Max}$<br>$V_{IL} = \text{Max}, V_{IH} = \text{Min}$ | 2.7    | 3.4          |      | V             |
| $V_{OL}$  | LOW Level Output Voltage          | $V_{CC} = \text{Min}, I_{OL} = \text{Max}$<br>$V_{IH} = \text{Min}, V_{IL} = \text{Max}$ |        |              | 0.5  | 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          | $V_{CC} = \text{Max}$<br>$V_I = 2.7\text{V}$   | S or G |              | 100  | $\mu\text{A}$ |
|           |                                   |  | A or B |              | 50   |               |
| $I_{IL}$  | LOW Level Input Current           | $V_{CC} = \text{Max}$<br>$V_I = 0.5\text{V}$   | S or G |              | -4   | mA            |
|           |                                   |  | A or B |              | -2   |               |
| $I_{OS}$  | Short Circuit Output Current      | $V_{CC} = \text{Max}$ (Note 6)   | -40    |              | -100 | mA            |
| $I_{CC1}$ | Supply Current                    | $V_{CC} = \text{Max}$ (Note 7)   |        | 39           | 61   | mA            |
| $I_{CC2}$ | Supply Current                    | $V_{CC} = \text{Max}$ (Note 8)   |        |              | 81   | mA            |

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

**Note 6:** Not more than one output should be shorted at a time, and the duration should not exceed one second.

**Note 7:**  $I_{CC1}$  is measured with all outputs OPEN and all inputs at 4.5V.

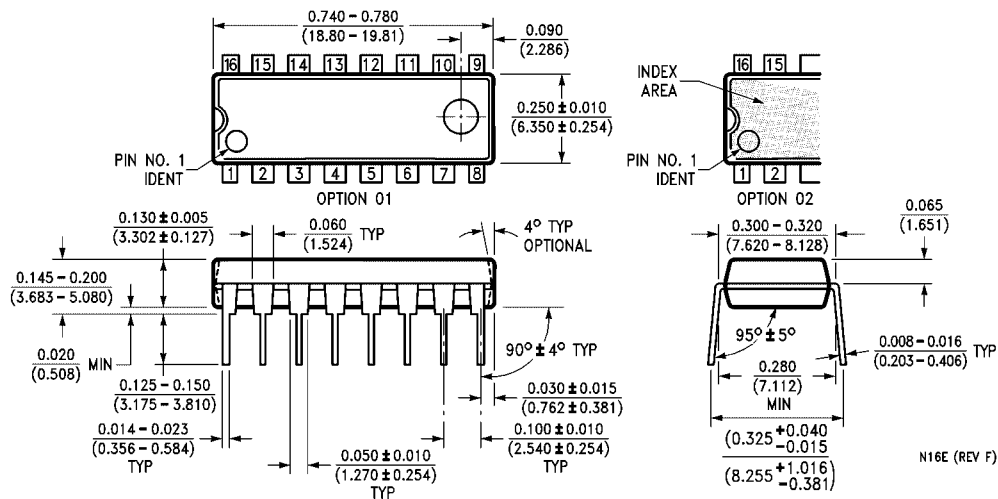
**Note 8:**  $I_{CC2}$  is measured with B, G, and S inputs grounded, A inputs at 4.5V, and all outputs OPEN.

### DM74S158 Switching Characteristics

at  $V_{CC} = 5\text{V}$  and  $T_A = 25^\circ\text{C}$

| Symbol    | Parameter  | From (Input)<br>To (Output) | $R_L = 280\Omega$     |      |                       |     | Units |
|-----------|--|-----------------------------|-----------------------|------|-----------------------|-----|-------|
|           |  |                             | $C_L = 15 \text{ pF}$ |      | $C_L = 50 \text{ pF}$ |     |       |
|           |  |                             | Min                   | Max  | Min                   | Max |       |
| $t_{PLH}$ | Propagation Delay Time<br>LOW-to-HIGH Level Output | Data to Y                   |                       | 6    |                       | 9   | ns    |
| $t_{PHL}$ | Propagation Delay Time<br>HIGH-to-LOW Level Output | Data to Y                   |                       | 6    |                       | 9   | ns    |
| $t_{PLH}$ | Propagation Delay Time<br>LOW-to-HIGH Level Output | Strobe to Y                 |                       | 11.5 |                       | 12  | ns    |
| $t_{PHL}$ | Propagation Delay Time<br>HIGH-to-LOW Level Output | Strobe to Y                 |                       | 12   |                       | 14  | ns    |
| $t_{PLH}$ | Propagation Delay Time<br>LOW-to-HIGH Level Output | Select to Y                 |                       | 12   |                       | 15  | ns    |
| $t_{PHL}$ | Propagation Delay Time<br>HIGH-to-LOW Level Output | Select to Y                 |                       | 12   |                       | 15  | ns    |

**Physical Dimensions** inches (millimeters) unless otherwise noted



**16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide Package Number N16E**

N16E (REV F)

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