

## 74F352 Dual 4-Input Multiplexer

### General Description

The 74F352 is a very high-speed dual 4-input multiplexer with common Select inputs and individual Enable inputs for each section. It can select two bits of data from four sources. The two buffered outputs present data in the inverted (complementary) form. The 74F352 is the functional equivalent of the 74F153 except with inverted outputs.

### Features

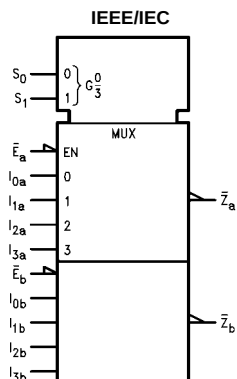
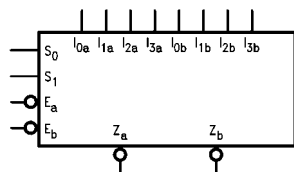
- Inverted version of 74F153
- Separate enables for each multiplexer
- Input clamp diode limits high speed termination effects

### Ordering Code:

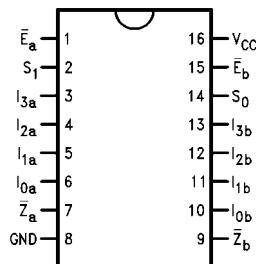
| Order Number | Package Number | Package Description                                                   |
|--------------|----------------|-----------------------------------------------------------------------|
| 74F352SJ     | M16D           | 16-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide         |
| 74F352PC     | N16E           | 16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide |

Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

### Logic Symbols



### Connection Diagram



### Truth Table

| Select Inputs  |                | Inputs (a or b) |                |                |                |                |           | Output |
|----------------|----------------|-----------------|----------------|----------------|----------------|----------------|-----------|--------|
| S <sub>0</sub> | S <sub>1</sub> | $\bar{E}$       | I <sub>0</sub> | I <sub>1</sub> | I <sub>2</sub> | I <sub>3</sub> | $\bar{Z}$ |        |
| X              | X              | H               | X              | X              | X              | X              | H         |        |
| L              | L              | L               | L              | X              | X              | X              | H         |        |
| L              | L              | L               | H              | X              | X              | X              | L         |        |
| H              | L              | L               | X              | L              | X              | X              | H         |        |
| H              | L              | L               | X              | H              | X              | X              | L         |        |
| L              | H              | L               | X              | X              | L              | X              | H         |        |
| L              | H              | L               | X              | X              | H              | X              | L         |        |
| H              | H              | L               | X              | X              | X              | L              | H         |        |
| H              | H              | L               | X              | X              | X              | H              | L         |        |

H = HIGH Voltage Level  
L = LOW Voltage Level  
X = Immaterial

## Unit Loading/Fan Out

| Pin Names              | Description                      | U.L.<br>HIGH/LOW | Input $I_{IH}/I_{IL}$<br>Output $I_{OH}/I_{OL}$ |
|------------------------|----------------------------------|------------------|-------------------------------------------------|
| $I_{0a}-I_{3a}$        | Side A Data Inputs               | 1.0/1.0          | 20 $\mu A$ /–0.6 mA                             |
| $I_{0b}-I_{3b}$        | Side B Data Inputs               | 1.0/1.0          | 20 $\mu A$ /–0.6 mA                             |
| $S_0-S_1$              | Common Select Inputs             | 1.0/1.0          | 20 $\mu A$ /–0.6 mA                             |
| $\bar{E}_a$            | Side A Enable Input (Active LOW) | 1.0/1.0          | 20 $\mu A$ /–0.6 mA                             |
| $\bar{E}_b$            | Side B Enable Input (Active LOW) | 1.0/1.0          | 20 $\mu A$ /–0.6 mA                             |
| $\bar{Z}_a, \bar{Z}_b$ | Multiplexer Outputs (Inverted)   | 50/33.3          | –1 mA/20 mA                                     |

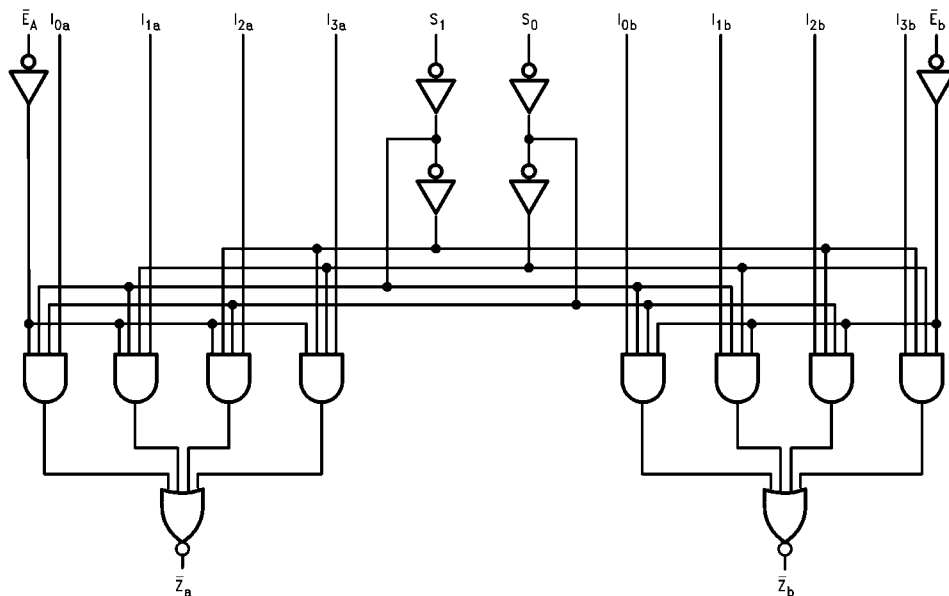
## Functional Description

The 74F352 is a dual 4-input multiplexer. It selects two bits of data from up to four sources under the control of the common Select inputs ( $S_0, S_1$ ). The two 4-input multiplexer circuits have individual active LOW Enables ( $\bar{E}_a, \bar{E}_b$ ) which can be used to strobe the outputs independently. When the Enables ( $\bar{E}_a, \bar{E}_b$ ) are HIGH, the corresponding outputs ( $\bar{Z}_a, \bar{Z}_b$ ) are forced HIGH. The logic equations for the outputs are shown below:

$$\begin{aligned}\bar{Z}_a &= \bar{E}_a \cdot (I_{0a} \cdot \bar{S}_1 \cdot \bar{S}_0 + I_{1a} \cdot \bar{S}_1 \cdot S_0 + \\ &\quad I_{2a} \cdot S_1 \cdot \bar{S}_0 + I_{3a} \cdot S_1 \cdot S_0) \\ \bar{Z}_b &= \bar{E}_b \cdot (I_{0b} \cdot \bar{S}_1 \cdot \bar{S}_0 + I_{1b} \cdot \bar{S}_1 \cdot S_0 + \\ &\quad I_{2b} \cdot S_1 \cdot \bar{S}_0 + I_{3b} \cdot S_1 \cdot S_0)\end{aligned}$$

The 74F352 can be used to move data from a group of registers to a common output bus. The particular register from which the data came would be determined by the state of the Select inputs. A less obvious application is as a function generator. The 74F352 can generate two functions of three variables. This is useful for implementing highly irregular random logic.

## Logic Diagram



Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

**Absolute Maximum Ratings**(Note 1)

|                                             |                   |
|---------------------------------------------|-------------------|
| Storage Temperature                         | −65°C to +150°C   |
| Ambient Temperature under Bias              | −55°C to +125°C   |
| Junction Temperature under Bias             | −55°C to +150°C   |
| V <sub>CC</sub> Pin Potential to Ground Pin | −0.5V to +7.0V    |
| Input Voltage (Note 2)                      | −0.5V to +7.0V    |
| Input Current (Note 2)                      | −30 mA to +5.0 mA |

Voltage Applied to Output  
in HIGH State (with V<sub>CC</sub> = 0V)

Standard Output −0.5V to V<sub>CC</sub>

3-STATE Output −0.5V to +5.5V

Current Applied to Output

in LOW State (Max) twice the rated I<sub>OL</sub> (mA)

**Recommended Operating Conditions**

|                              |                |
|------------------------------|----------------|
| Free Air Ambient Temperature | 0°C to +70°C   |
| Supply Voltage               | +4.5V to +5.5V |

**Note 1:** Absolute maximum ratings are values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

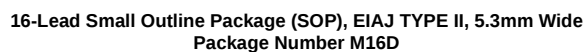
**Note 2:** Either voltage limit or current limit is sufficient to protect inputs.

**DC Electrical Characteristics**

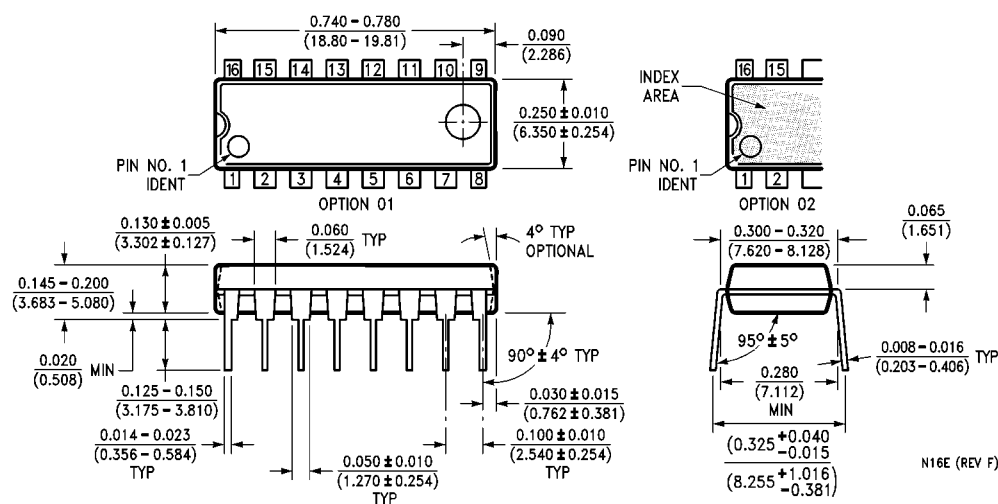
| Symbol           | Parameter                         | Min                                       | Typ        | Max  | Units | V <sub>CC</sub> | Conditions                                           |
|------------------|-----------------------------------|-------------------------------------------|------------|------|-------|-----------------|------------------------------------------------------|
| V <sub>IH</sub>  | Input HIGH Voltage                | 2.0                                       |            |      | V     |                 | Recognized as a HIGH Signal                          |
| V <sub>IL</sub>  | Input LOW Voltage                 |                                           |            | 0.8  | V     |                 | Recognized as a LOW Signal                           |
| V <sub>CD</sub>  | Input Clamp Diode Voltage         |                                           |            | −1.2 | V     | Min             | I <sub>IN</sub> = −18 mA                             |
| V <sub>OH</sub>  | Output HIGH Voltage               | 10% V <sub>CC</sub><br>5% V <sub>CC</sub> | 2.5<br>2.7 |      | V     | Min             | I <sub>OH</sub> = −1 mA<br>I <sub>OH</sub> = −1 mA   |
| V <sub>OL</sub>  | Output LOW Voltage                | 10% V <sub>CC</sub>                       |            | 0.5  | V     | Min             | I <sub>OL</sub> = 20 mA                              |
| I <sub>IH</sub>  | Input HIGH Current                |                                           |            | 5.0  | μA    | Max             | V <sub>IN</sub> = 2.7V                               |
| I <sub>BVI</sub> | Input HIGH Current Breakdown Test |                                           |            | 7.0  | μA    | Max             | V <sub>IN</sub> = 7.0V                               |
| I <sub>CEx</sub> | Output HIGH Leakage Current       |                                           |            | 50   | μA    | Max             | V <sub>OUT</sub> = V <sub>CC</sub>                   |
| V <sub>ID</sub>  | Input Leakage Test                | 4.75                                      |            |      | V     | 0.0             | I <sub>ID</sub> = 1.9 μA<br>All Other Pins Grounded  |
| I <sub>OD</sub>  | Output Leakage Circuit Current    |                                           |            | 3.75 | μA    | 0.0             | V <sub>IOD</sub> = 150 mV<br>All Other Pins Grounded |
| I <sub>IL</sub>  | Input LOW Current                 |                                           |            | −0.6 | mA    | Max             | V <sub>IN</sub> = 0.5V                               |
| I <sub>OS</sub>  | Output Short-Circuit Current      | −60                                       |            | −150 | mA    | Max             | V <sub>OUT</sub> = 0V                                |
| I <sub>CCH</sub> | Power Supply Current              |                                           | 9.3        | 14   | mA    | Max             | V <sub>O</sub> = HIGH                                |
| I <sub>CCL</sub> | Power Supply Current              |                                           | 13.3       | 20   | mA    | Max             | V <sub>O</sub> = LOW                                 |

**AC Electrical Characteristics**

| Symbol           | Parameter                     | T <sub>A</sub> = +25°C<br>V <sub>CC</sub> = +5.0V<br>C <sub>L</sub> = 50 pF |     |      | T <sub>A</sub> = 0°C to +70°C<br>V <sub>CC</sub> = +5.0V<br>C <sub>L</sub> = 50 pF |      | Units |
|------------------|-------------------------------|-----------------------------------------------------------------------------|-----|------|------------------------------------------------------------------------------------|------|-------|
|                  |                               | Min                                                                         | Typ | Max  | Min                                                                                | Max  |       |
| t <sub>PLH</sub> | Propagation Delay             | 4.0                                                                         | 8.0 | 11.0 | 3.5                                                                                | 12.5 | ns    |
| t <sub>PHL</sub> | S <sub>n</sub> to $\bar{Z}_n$ | 3.5                                                                         | 6.5 | 8.5  | 3.0                                                                                | 9.5  |       |
| t <sub>PLH</sub> | Propagation Delay             | 3.0                                                                         | 4.5 | 6.0  | 2.5                                                                                | 7.0  | ns    |
| t <sub>PHL</sub> | $\bar{E}_n$ to $\bar{Z}_n$    | 3.0                                                                         | 5.0 | 7.0  | 2.5                                                                                | 8.0  |       |
| t <sub>PLH</sub> | Propagation Delay             | 2.0                                                                         | 5.2 | 7.0  | 2.0                                                                                | 8.0  | ns    |
| t <sub>PHL</sub> | I <sub>n</sub> to $\bar{Z}_n$ | 1.3                                                                         | 2.5 | 4.0  | 1.0                                                                                | 4.5  |       |



# Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



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

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