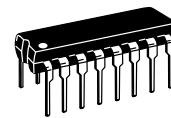


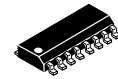


# MC74AC352 MC74ACT352

DUAL 4-INPUT  
MULTIPLEXER



N SUFFIX  
CASE 648-08  
PLASTIC

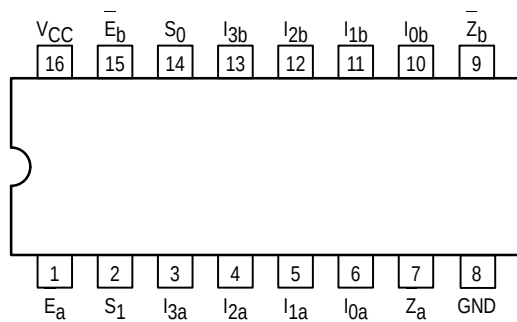


D SUFFIX  
CASE 751B-05  
PLASTIC

## Dual 4-Input Multiplexer

The MC74AC352/74ACT352 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 MC74AC352/74ACT352 is the functional equivalent of the MC74AC153/74ACT153 except with inverted outputs.

- Inverted Version of the MC74AC153/74ACT153
- Separate Enables for Each Multiplexer
- Outputs Source/Sink 24 mA
- 'ACT352 Has TTL Compatible Inputs



### PIN NAMES

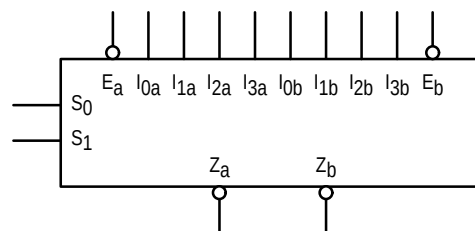
- $I_{0a}$ – $I_{3a}$  Side A Data Inputs
- $I_{0b}$ – $I_{3b}$  Side B Data Inputs
- $S_0, S_1$  Common Select Inputs
- $E_a$  Side A Enable Input
- $E_b$  Side B Enable Input
- $Z_a, Z_b$  Multiplexer Outputs

### TRUTH TABLE

| Select Inputs |       | $\bar{E}$ | Inputs (a or b) |       |       |       | Output |
|---------------|-------|-----------|-----------------|-------|-------|-------|--------|
| $S_0$         | $S_1$ |           | $I_0$           | $I_1$ | $I_2$ | $I_3$ |        |
| 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

### LOGIC SYMBOL



# MC74AC352 MC74ACT352

## FUNCTIONAL DESCRIPTION

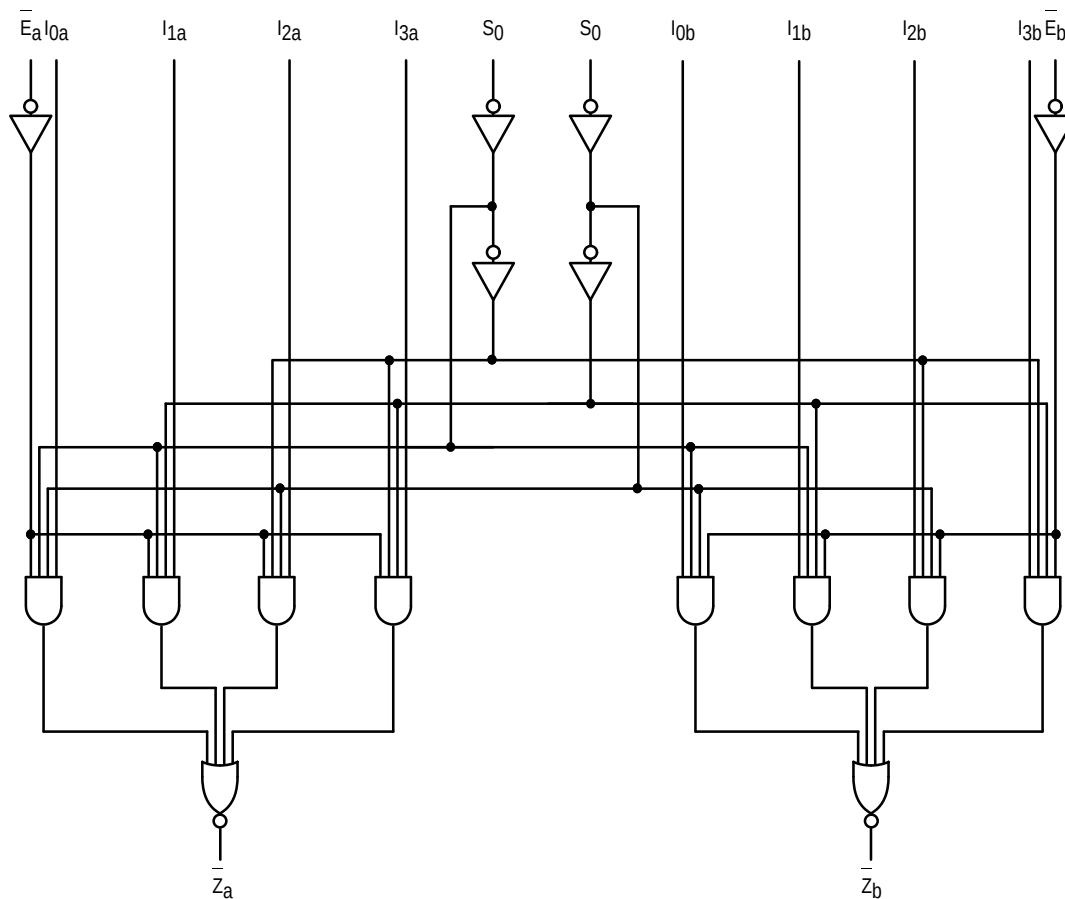
The MC74AC352/74ACT352 is a dual 4-input multiplexer. It selects two bits of data from up to four sources under the control of the common Select inputs ( $S_0, S_1$ ). The two 4-input multiplexer circuits have individual active LOW Enables ( $\bar{E}_a, \bar{E}_b$ ) which can be used to strobe the outputs independently. When the Enables ( $\bar{E}_a, \bar{E}_b$ ) are HIGH, the corresponding outputs ( $Z_a, Z_b$ ) 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 MC74AC352/74ACT352 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 MC74AC352/74ACT352 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.

# MC74AC352 MC74ACT352

## MAXIMUM RATINGS\*

| Symbol    | Parameter                                 | Value                  | Unit |
|-----------|-------------------------------------------|------------------------|------|
| $V_{CC}$  | DC Supply Voltage (Referenced to GND)     | −0.5 to +7.0           | V    |
| $V_{in}$  | DC Input Voltage (Referenced to GND)      | −0.5 to $V_{CC} + 0.5$ | V    |
| $V_{out}$ | DC Output Voltage (Referenced to GND)     | −0.5 to $V_{CC} + 0.5$ | V    |
| $I_{in}$  | DC Input Current, per Pin                 | ±20                    | mA   |
| $I_{out}$ | DC Output Sink/Source Current, per Pin    | ±50                    | mA   |
| $I_{CC}$  | DC $V_{CC}$ or GND Current per Output Pin | ±50                    | mA   |
| $T_{stg}$ | Storage Temperature                       | −65 to +150            | °C   |

\* Maximum Ratings are those values beyond which damage to the device may occur. Functional operation should be restricted to the Recommended Operating Conditions.

## RECOMMENDED OPERATING CONDITIONS

| Symbol            | Parameter                                                               | Min                     | Typ | Max      | Unit |
|-------------------|-------------------------------------------------------------------------|-------------------------|-----|----------|------|
| $V_{CC}$          | Supply Voltage                                                          | 'AC                     | 2.0 | 5.0      | V    |
|                   |                                                                         | 'ACT                    | 4.5 | 5.0      |      |
| $V_{in}, V_{out}$ | DC Input Voltage, Output Voltage (Ref. to GND)                          | 0                       |     | $V_{CC}$ | V    |
| $t_r, t_f$        | Input Rise and Fall Time (Note 1)<br>'AC Devices except Schmitt Inputs  | $V_{CC} @ 3.0\text{ V}$ | 150 |          | ns/V |
|                   |                                                                         | $V_{CC} @ 4.5\text{ V}$ | 40  |          |      |
|                   |                                                                         | $V_{CC} @ 5.5\text{ V}$ | 25  |          |      |
| $t_r, t_f$        | Input Rise and Fall Time (Note 2)<br>'ACT Devices except Schmitt Inputs | $V_{CC} @ 4.5\text{ V}$ | 10  |          | ns/V |
|                   |                                                                         | $V_{CC} @ 5.5\text{ V}$ | 8.0 |          |      |
| $T_J$             | Junction Temperature (PDIP)                                             |                         |     | 140      | °C   |
| $T_A$             | Operating Ambient Temperature Range                                     | −40                     | 25  | 85       | °C   |
| $I_{OH}$          | Output Current — High                                                   |                         |     | −24      | mA   |
| $I_{OL}$          | Output Current — Low                                                    |                         |     | 24       | mA   |

1.  $V_{in}$  from 30% to 70%  $V_{CC}$ ; see individual Data Sheets for devices that differ from the typical input rise and fall times.

2.  $V_{in}$  from 0.8 V to 2.0 V; see individual Data Sheets for devices that differ from the typical input rise and fall times.

# MC74AC352 MC74ACT352

## DC CHARACTERISTICS

| Symbol           | Parameter                            | V <sub>CC</sub><br>(V) | 74AC                   |                   | 74AC                               |    | Unit                                                                                                | Conditions |
|------------------|--------------------------------------|------------------------|------------------------|-------------------|------------------------------------|----|-----------------------------------------------------------------------------------------------------|------------|
|                  |                                      |                        | T <sub>A</sub> = +25°C |                   | T <sub>A</sub> =<br>–40°C to +85°C |    |                                                                                                     |            |
|                  |                                      |                        | Typ                    | Guaranteed Limits |                                    |    |                                                                                                     |            |
| V <sub>IH</sub>  | Minimum High Level<br>Input Voltage  | 3.0                    | 1.5                    | 2.1               | 2.1                                | V  | V <sub>OUT</sub> = 0.1 V<br>or V <sub>CC</sub> – 0.1 V                                              |            |
|                  |                                      | 4.5                    | 2.25                   | 3.15              | 3.15                               |    |                                                                                                     |            |
|                  |                                      | 5.5                    | 2.75                   | 3.85              | 3.85                               |    |                                                                                                     |            |
| V <sub>IL</sub>  | Maximum Low Level<br>Input Voltage   | 3.0                    | 1.5                    | 0.9               | 0.9                                | V  | V <sub>OUT</sub> = 0.1 V<br>or V <sub>CC</sub> – 0.1 V                                              |            |
|                  |                                      | 4.5                    | 2.25                   | 1.35              | 1.35                               |    |                                                                                                     |            |
|                  |                                      | 5.5                    | 2.75                   | 1.65              | 1.65                               |    |                                                                                                     |            |
| V <sub>OH</sub>  | Minimum High Level<br>Output Voltage | 3.0                    | 2.99                   | 2.9               | 2.9                                | V  | I <sub>OUT</sub> = –50 μA                                                                           |            |
|                  |                                      | 4.5                    | 4.49                   | 4.4               | 4.4                                |    |                                                                                                     |            |
|                  |                                      | 5.5                    | 5.49                   | 5.4               | 5.4                                |    |                                                                                                     |            |
|                  |                                      | 3.0                    |                        | 2.56              | 2.46                               | V  | *V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub><br>–12 mA<br>I <sub>OH</sub> –24 mA<br>–24 mA |            |
|                  |                                      | 4.5                    |                        | 3.86              | 3.76                               |    |                                                                                                     |            |
|                  |                                      | 5.5                    |                        | 4.86              | 4.76                               |    |                                                                                                     |            |
| V <sub>OL</sub>  | Maximum Low Level<br>Output Voltage  | 3.0                    | 0.002                  | 0.1               | 0.1                                | V  | I <sub>OUT</sub> = 50 μA                                                                            |            |
|                  |                                      | 4.5                    | 0.001                  | 0.1               | 0.1                                |    |                                                                                                     |            |
|                  |                                      | 5.5                    | 0.001                  | 0.1               | 0.1                                |    |                                                                                                     |            |
|                  |                                      | 3.0                    |                        | 0.36              | 0.44                               | V  | *V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub><br>12 mA<br>I <sub>OL</sub> 24 mA<br>24 mA    |            |
|                  |                                      | 4.5                    |                        | 0.36              | 0.44                               |    |                                                                                                     |            |
|                  |                                      | 5.5                    |                        | 0.36              | 0.44                               |    |                                                                                                     |            |
| I <sub>IN</sub>  | Maximum Input<br>Leakage Current     | 5.5                    |                        | ±0.1              | ±1.0                               | μA | V <sub>I</sub> = V <sub>CC</sub> , GND                                                              |            |
| I <sub>OLD</sub> | †Minimum Dynamic<br>Output Current   | 5.5                    |                        |                   | 75                                 | mA | V <sub>OLD</sub> = 1.65 V Max                                                                       |            |
| I <sub>OHD</sub> |                                      | 5.5                    |                        |                   | –75                                | mA | V <sub>OHD</sub> = 3.85 V Min                                                                       |            |
| I <sub>CC</sub>  | Maximum Quiescent<br>Supply Current  | 5.5                    |                        | 8.0               | 80                                 | μA | V <sub>IN</sub> = V <sub>CC</sub> or GND                                                            |            |

\* All outputs loaded; thresholds on input associated with output under test.

† Maximum test duration 2.0 ms, one output loaded at a time.

Note: I<sub>IN</sub> and I<sub>CC</sub> @ 3.0 V are guaranteed to be less than or equal to the respective limit @ 5.5 V V<sub>CC</sub>.

# MC74AC352 MC74ACT352

## AC CHARACTERISTICS (For Figures and Waveforms — See Section 3)

| Symbol           | Parameter                                             | V <sub>CC</sub> *<br>(V) | 74AC                                             |            |              | 74AC                                                         |              | Unit | Fig. No. |
|------------------|-------------------------------------------------------|--------------------------|--------------------------------------------------|------------|--------------|--------------------------------------------------------------|--------------|------|----------|
|                  |                                                       |                          | T <sub>A</sub> = +25°C<br>C <sub>L</sub> = 50 pF |            |              | T <sub>A</sub> = –40°C<br>to +85°C<br>C <sub>L</sub> = 50 pF |              |      |          |
|                  |                                                       |                          | Min                                              | Typ        | Max          | Min                                                          | Max          |      |          |
| t <sub>PLH</sub> | Propagation Delay<br>S <sub>N</sub> to Z <sub>N</sub> | 3.3<br>5.0               | 2.0<br>2.0                                       | 8.5<br>6.5 | 15.0<br>11.0 | 1.0<br>1.0                                                   | 17.5<br>12.5 | ns   | 3-6      |
| t <sub>PHL</sub> | Propagation Delay<br>S <sub>N</sub> to Z <sub>N</sub> | 3.3<br>5.0               | 2.0<br>2.0                                       | 8.0<br>6.0 | 14.5<br>11.0 | 1.0<br>1.0                                                   | 16.5<br>12.0 | ns   | 3-6      |
| t <sub>PLH</sub> | Propagation Delay<br>E <sub>N</sub> to Z <sub>N</sub> | 3.3<br>5.0               | 2.0<br>2.0                                       | 6.0<br>4.5 | 13.5<br>9.5  | 1.0<br>1.0                                                   | 16.0<br>11.0 | ns   | 3-6      |
| t <sub>PHL</sub> | Propagation Delay<br>E <sub>N</sub> to Z <sub>N</sub> | 3.3<br>5.0               | 2.0<br>2.0                                       | 5.5<br>4.0 | 11.0<br>8.0  | 1.0<br>1.0                                                   | 12.5<br>9.0  | ns   | 3-6      |
| t <sub>PLH</sub> | Propagation Delay<br>I <sub>N</sub> to Z <sub>N</sub> | 3.3<br>5.0               | 2.0<br>2.0                                       | 7.0<br>5.0 | 12.5<br>9.0  | 1.0<br>1.0                                                   | 14.5<br>10.5 | ns   | 3-5      |
| t <sub>PHL</sub> | Propagation Delay<br>I <sub>N</sub> to Z <sub>N</sub> | 3.3<br>5.0               | 2.0<br>2.0                                       | 7.0<br>5.0 | 11.5<br>8.5  | 1.0<br>1.0                                                   | 13.0<br>10.0 | ns   | 3-5      |

\* Voltage Range 3.3 V is 3.3 V ±0.3 V.

Voltage Range 5.0 V is 5.0 V ±0.5 V.

## DC CHARACTERISTICS

| Symbol            | Parameter                              | V <sub>CC</sub><br>(V) | 74ACT                  |                   | 74ACT                              |    | Unit                                                                      | Conditions |
|-------------------|----------------------------------------|------------------------|------------------------|-------------------|------------------------------------|----|---------------------------------------------------------------------------|------------|
|                   |                                        |                        | T <sub>A</sub> = +25°C |                   | T <sub>A</sub> =<br>–40°C to +85°C |    |                                                                           |            |
|                   |                                        |                        | Typ                    | Guaranteed Limits |                                    |    |                                                                           |            |
| V <sub>IH</sub>   | Minimum High Level<br>Input Voltage    | 4.5<br>5.5             | 1.5<br>1.5             | 2.0<br>2.0        | 2.0<br>2.0                         | V  | V <sub>OUT</sub> = 0.1 V<br>or V <sub>CC</sub> – 0.1 V                    |            |
| V <sub>IL</sub>   | Maximum Low Level<br>Input Voltage     | 4.5<br>5.5             | 1.5<br>1.5             | 0.8<br>0.8        | 0.8<br>0.8                         | V  | V <sub>OUT</sub> = 0.1 V<br>or V <sub>CC</sub> – 0.1 V                    |            |
| V <sub>OH</sub>   | Minimum High Level<br>Output Voltage   | 4.5<br>5.5             | 4.49<br>5.49           | 4.4<br>5.4        | 4.4<br>5.4                         | V  | I <sub>OUT</sub> = –50 μA                                                 |            |
|                   |                                        | 4.5<br>5.5             |                        | 3.86<br>4.86      | 3.76<br>4.76                       | V  | *V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub><br>–24 mA<br>–24 mA |            |
| V <sub>OL</sub>   | Maximum Low Level<br>Output Voltage    | 4.5<br>5.5             | 0.001<br>0.001         | 0.1<br>0.1        | 0.1<br>0.1                         | V  | I <sub>OUT</sub> = 50 μA                                                  |            |
|                   |                                        | 4.5<br>5.5             |                        | 0.36<br>0.36      | 0.44<br>0.44                       | V  | *V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub><br>24 mA<br>24 mA   |            |
| I <sub>IN</sub>   | Maximum Input<br>Leakage Current       | 5.5                    |                        | ±0.1              | ±1.0                               | μA | V <sub>I</sub> = V <sub>CC</sub> , GND                                    |            |
| ΔI <sub>CCT</sub> | Additional Max. I <sub>CC</sub> /Input | 5.5                    | 0.6                    |                   | 1.5                                | mA | V <sub>I</sub> = V <sub>CC</sub> – 2.1 V                                  |            |
| I <sub>OLD</sub>  | †Minimum Dynamic<br>Output Current     | 5.5                    |                        |                   | 75                                 | mA | V <sub>OLD</sub> = 1.65 V Max                                             |            |
| I <sub>OHD</sub>  |                                        | 5.5                    |                        |                   | –75                                | mA | V <sub>OHD</sub> = 3.85 V Min                                             |            |
| I <sub>CC</sub>   | Maximum Quiescent<br>Supply Current    | 5.5                    |                        | 8.0               | 80                                 | μA | V <sub>IN</sub> = V <sub>CC</sub> or GND                                  |            |

\* All outputs loaded; thresholds on input associated with output under test.

† Maximum test duration 2.0 ms, one output loaded at a time.

# MC74AC352 MC74ACT352

## AC CHARACTERISTICS (For Figures and Waveforms — See Section 3)

| Symbol           | Parameter                                             | V <sub>CC</sub> *<br>(V) | 74ACT                                            |     |      | 74ACT                                                        |      | Unit | Fig. No. |
|------------------|-------------------------------------------------------|--------------------------|--------------------------------------------------|-----|------|--------------------------------------------------------------|------|------|----------|
|                  |                                                       |                          | T <sub>A</sub> = +25°C<br>C <sub>L</sub> = 50 pF |     |      | T <sub>A</sub> = -40°C<br>to +85°C<br>C <sub>L</sub> = 50 pF |      |      |          |
|                  |                                                       |                          | Min                                              | Typ | Max  | Min                                                          | Max  |      |          |
| t <sub>PLH</sub> | Propagation Delay<br>S <sub>N</sub> to Z <sub>N</sub> | 5.0                      | 3.0                                              | 6.0 | 10.5 | 1.0                                                          | 11.5 | ns   | 3-6      |
| t <sub>PHL</sub> | Propagation Delay<br>S <sub>N</sub> to Z <sub>N</sub> | 5.0                      | 3.0                                              | 6.0 | 10.0 | 1.0                                                          | 11.5 | ns   | 3-6      |
| t <sub>PLH</sub> | Propagation Delay<br>E <sub>N</sub> to Z <sub>N</sub> | 5.0                      | 2.0                                              | 4.5 | 8.0  | 1.0                                                          | 8.5  | ns   | 3-6      |
| t <sub>PHL</sub> | Propagation Delay<br>E <sub>N</sub> to Z <sub>N</sub> | 5.0                      | 2.0                                              | 4.5 | 8.0  | 1.0                                                          | 8.5  | ns   | 3-6      |
| t <sub>PLH</sub> | Propagation Delay<br>I <sub>N</sub> to Z <sub>N</sub> | 5.0                      | 2.0                                              | 5.5 | 10.0 | 1.0                                                          | 11.0 | ns   | 3-5      |
| t <sub>PHL</sub> | Propagation Delay<br>I <sub>N</sub> to Z <sub>N</sub> | 5.0                      | 2.0                                              | 6.5 | 8.5  | 1.0                                                          | 9.0  | ns   | 3-5      |

\* Voltage Range 5.0 V is 5.0 V ±0.5 V.

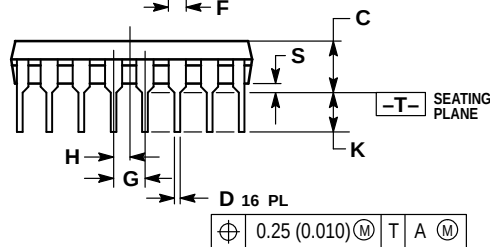
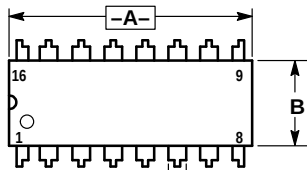
## CAPACITANCE

| Symbol          | Parameter                     | Value<br>Typ | Unit | Test Conditions         |
|-----------------|-------------------------------|--------------|------|-------------------------|
| C <sub>IN</sub> | Input Capacitance             | 4.5          | pF   | V <sub>CC</sub> = 5.0 V |
| C <sub>PD</sub> | Power Dissipation Capacitance | 50           | pF   | V <sub>CC</sub> = 5.0 V |

# MC74AC352 MC74ACT352

## OUTLINE DIMENSIONS

### N SUFFIX PLASTIC DIP PACKAGE CASE 648-08 ISSUE R

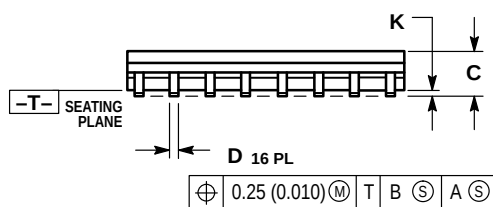
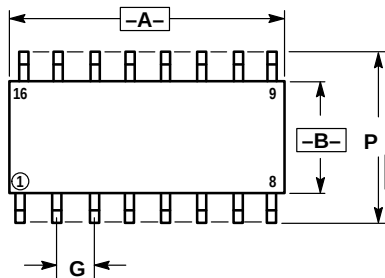


#### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
5. ROUNDED CORNERS OPTIONAL.

| DIM | INCHES    |       | MILLIMETERS |       |
|-----|-----------|-------|-------------|-------|
|     | MIN       | MAX   | MIN         | MAX   |
| A   | 0.740     | 0.770 | 18.80       | 19.55 |
| B   | 0.250     | 0.270 | 6.35        | 6.85  |
| C   | 0.145     | 0.175 | 3.69        | 4.44  |
| D   | 0.015     | 0.021 | 0.39        | 0.53  |
| F   | 0.040     | 0.70  | 1.02        | 1.77  |
| G   | 0.100 BSC |       | 2.54 BSC    |       |
| H   | 0.050 BSC |       | 1.27 BSC    |       |
| J   | 0.008     | 0.015 | 0.21        | 0.38  |
| K   | 0.110     | 0.130 | 2.80        | 3.30  |
| L   | 0.295     | 0.305 | 7.50        | 7.74  |
| M   | 0°        | 10°   | 0°          | 10°   |
| S   | 0.020     | 0.040 | 0.51        | 1.01  |

### D SUFFIX PLASTIC SOIC PACKAGE CASE 751B-05 ISSUE J



#### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

| DIM | MILLIMETERS |       | INCHES    |       |
|-----|-------------|-------|-----------|-------|
|     | MIN         | MAX   | MIN       | MAX   |
| A   | 9.80        | 10.00 | 0.386     | 0.393 |
| B   | 3.80        | 4.00  | 0.150     | 0.157 |
| C   | 1.35        | 1.75  | 0.054     | 0.068 |
| D   | 0.35        | 0.49  | 0.014     | 0.019 |
| F   | 0.40        | 1.25  | 0.016     | 0.049 |
| G   | 1.27 BSC    |       | 0.050 BSC |       |
| J   | 0.19        | 0.25  | 0.008     | 0.009 |
| K   | 0.10        | 0.25  | 0.004     | 0.009 |
| M   | 0°          | 7°    | 0°        | 7°    |
| P   | 5.80        | 6.20  | 0.229     | 0.244 |
| R   | 0.25        | 0.50  | 0.010     | 0.019 |

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#### How to reach us:

USA/EUROPE: Motorola Literature Distribution;  
P.O. Box 20912; Phoenix, Arizona 85036. 1-800-441-2447

JAPAN: Nippon Motorola Ltd.; Tatsumi-SPD-JLDC, Toshikatsu Otsuki,  
6F Seibu-Butsuryu-Center, 3-14-2 Tatsumi Koto-Ku, Tokyo 135, Japan. 03-3521-8315

MFAX: RMFA00@email.sps.mot.com -TOUCHTONE (602) 244-6609  
INTERNET: <http://Design-NET.com>

HONG KONG: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,  
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298



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