**MOTOROLA**

## MC74AC259 MC74ACT259

**8-BIT ADDRESSABLE LATCH**
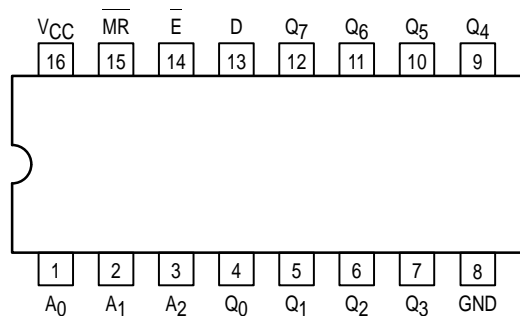
# 8-Bit Addressable Latch

The MC74AC259/74ACT259 is a high-speed 8-bit addressable latch designed for general purpose storage applications in digital systems. It is a multifunctional device capable of storing single line data in eight addressable latches, and also a 1-of-8 decoder and demultiplexer with active HIGH outputs. The device also incorporates an active LOW Common Clear for resetting all latches, as well as an active LOW Enable. It is functionally identical to the ALS259 8-bit addressable latch.

- Serial-to-Parallel Conversion
- Eight Bits of Storage with Output of Each Bit Available
- Random (Addressable) Data Entry
- Active High Demultiplexing or Decoding Capability
- Easily Expandable
- Common Clear

## FUNCTIONAL DESCRIPTION

The MC74AC259/74ACT259 has four modes of operation as shown in the Mode Selection Table. In the addressable latch mode, data on the Data line (D) is written into the addressed latch. The addressed latch will follow the data input with all non-addressed latches remaining in their previous states in the memory mode. All latches remain in their previous state and are unaffected by the Data or Address inputs.

In the one-of-eight decoding or demultiplexing mode, the addressed output will follow the state of the D input with all other outputs in the LOW state. In the clear mode all outputs are LOW and unaffected by the address and data inputs. When operating the MC74AC/ACT259 as an addressable latch, changing more than one bit of the address could impose a transient wrong address. Therefore, this should only be done while in the memory mode. The Mode Select Function Table summarizes the operations of the MC74AC/ACT259.
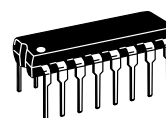
**N SUFFIX
CASE 648-08
PLASTIC**
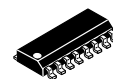
**D SUFFIX
CASE 751B-05
PLASTIC**

**LOGIC SYMBOL**



| $V_{CC}$ | $\overline{MR}$ | $\overline{E}$ | D | $Q_7$ | $Q_6$ | $Q_5$ | $Q_4$ |
|---|---|---|---|---|---|---|---|
| 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| $A_0$ | $A_1$ | $A_2$ | $Q_0$ | $Q_1$ | $Q_2$ | $Q_3$ | GND |
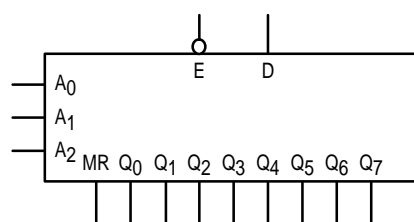
# MC74AC259 MC74ACT259

## MODE SELECT TABLE

| E | MR | Mode |
|---|---|---|
| L | H | Addressable Latch |
| H | H | Memory |
| L | L | Active HIGH 8-Channel Demultiplexer |
| H | L | Clear |

H = HIGH Voltage Level
L = LOW Voltage Level

## MODE SELECT-FUNCTION TABLE

| Operating Mode | Inputs | | | | | | Outputs | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MR | E | D | $A_0$ | $A_1$ | $A_2$ | $Q_0$ | $Q_1$ | $Q_2$ | $Q_3$ | $Q_4$ | $Q_5$ | $Q_6$ | $Q_7$ |
| Master Reset | L | H | X | X | X | X | L | L | L | L | L | L | L | L |
| Demultiplex (Active HIGH Decoder when D = H) | L | L | d | L | L | L | Q = d | L | L | L | L | L | L | L |
| | L | L | d | H | L | L | L | Q = d | L | L | L | L | L | L |
| | L | L | d | L | H | L | L | L | Q = d | L | L | L | L | L |
| | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| | L | L | d | H | H | H | L | L | L | L | L | L | L | Q = d |
| Store (Do Nothing) | H | H | X | X | X | X | $q_0$ | $q_1$ | $q_2$ | $q_3$ | $q_4$ | $q_5$ | $q_6$ | $q_7$ |
| Addressable Latch | H | L | d | L | L | L | Q = d | $q_1$ | $q_2$ | $q_3$ | $q_4$ | $q_5$ | $q_6$ | $q_7$ |
| | H | L | d | H | L | L | $q_0$ | Q = d | $q_2$ | $q_3$ | $q_4$ | $q_5$ | $q_6$ | $q_7$ |
| | H | L | d | L | H | L | $q_0$ | $q_1$ | Q = d | $q_3$ | $q_4$ | $q_5$ | $q_6$ | $q_7$ |
| | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| | H | L | d | H | H | H | $q_0$ | $q_1$ | $q_2$ | $q_3$ | $q_4$ | $q_5$ | $q_6$ | Q = d |

H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial
d = HIGH or LOW Data one setup time prior to the LOW-to-HIGH Enable transition
q = Lower case letters indicate the state of the referenced output established during the last cycle in which it was addressed or cleared.

# MC74AC259 MC74ACT259
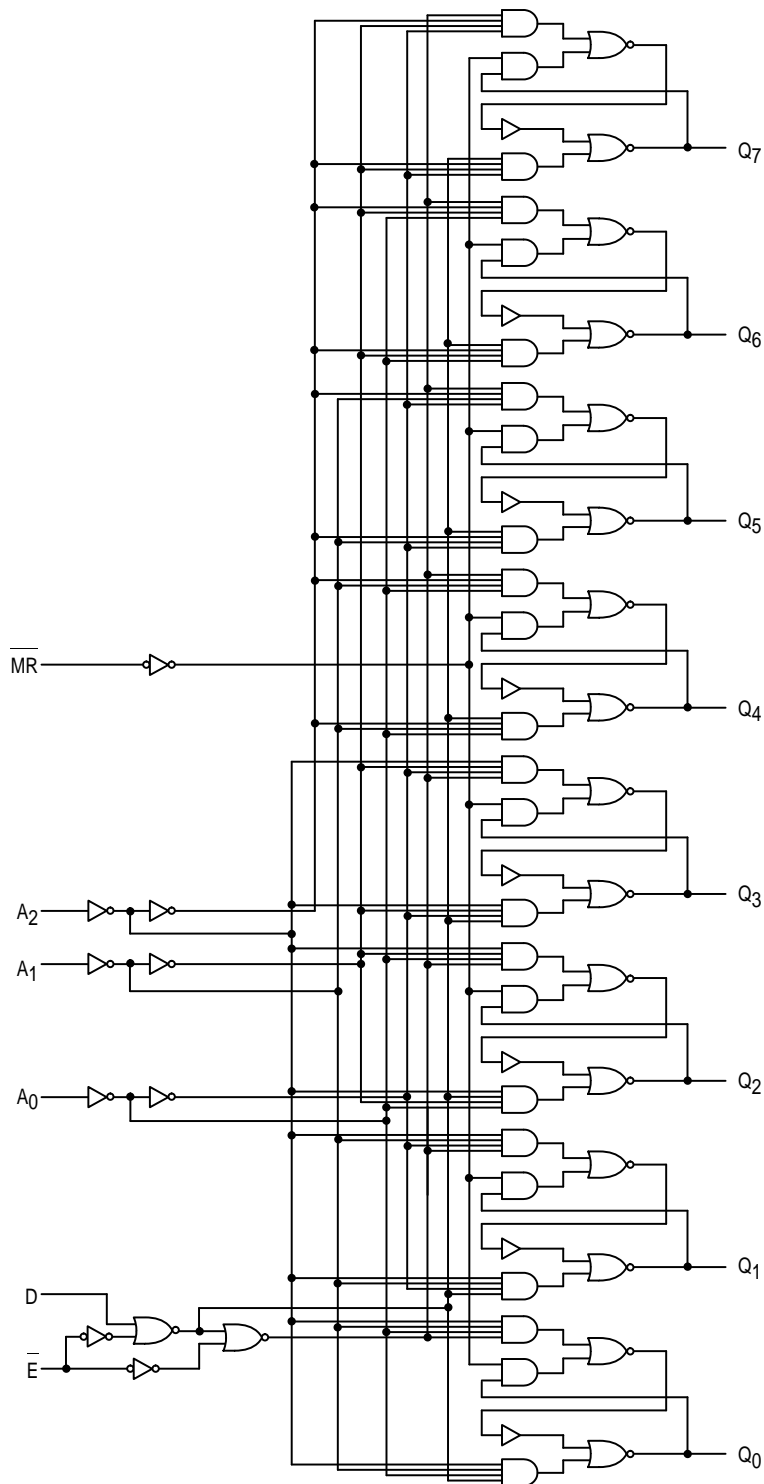
Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

# MC74AC259 MC74ACT259

**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 | 6.0 | V |
| | | 'ACT | 4.5 | 5.0 | 5.5 | |
| $V_{in}$, $V_{out}$ | DC Input Voltage, Output Voltage (Ref. to GND) | | 0 | | $V_{CC}$ | V |
| $t_r$, $t_f$ | Input Rise and Fall Time (Note 1) 'AC Devices except Schmitt Inputs | $V_{CC}$ @ 3.0 V | | 150 | | ns/V |
| | | $V_{CC}$ @ 4.5 V | | 40 | | |
| | | $V_{CC}$ @ 5.5 V | | 25 | | |
| $t_r$, $t_f$ | Input Rise and Fall Time (Note 2) 'ACT Devices except Schmitt Inputs | $V_{CC}$ @ 4.5 V | | 10 | | ns/V |
| | | $V_{CC}$ @ 5.5 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.

# MC74AC259 MC74ACT259

**DC CHARACTERISTICS**

| Symbol | Parameter | $V_{CC}$ (V) | 74AC $T_A$ = +25°C | | 74AC $T_A$ = −40°C to +85°C | Unit | Conditions |
|---|---|---|---|---|---|---|---|
| | | | Typ | Guaranteed Limits | | | |
| $V_{IH}$ | Minimum High Level Input Voltage | 3.0<br>4.5<br>5.5 | 1.5<br>2.25<br>2.75 | 2.1<br>3.15<br>3.85 | 2.1<br>3.15<br>3.85 | V | $V_{OUT}$ = 0.1 V or $V_{CC}$ − 0.1 V |
| $V_{IL}$ | Maximum Low Level Input Voltage | 3.0<br>4.5<br>5.5 | 1.5<br>2.25<br>2.75 | 0.9<br>1.35<br>1.65 | 0.9<br>1.35<br>1.65 | V | $V_{OUT}$ = 0.1 V or $V_{CC}$ − 0.1 V |
| $V_{OH}$ | Minimum High Level Output Voltage | 3.0<br>4.5<br>5.5 | 2.99<br>4.49<br>5.49 | 2.9<br>4.4<br>5.4 | 2.9<br>4.4<br>5.4 | V | $I_{OUT}$ = −50 μA |
| | | 3.0<br>4.5<br>5.5 | | 2.56<br>3.86<br>4.86 | 2.46<br>3.76<br>4.76 | V | *$V_{IN}$ = $V_{IL}$ or $V_{IH}$<br>$I_{OH}$    −12 mA<br>−24 mA<br>−24 mA |
| $V_{OL}$ | Maximum Low Level Output Voltage | 3.0<br>4.5<br>5.5 | 0.002<br>0.001<br>0.001 | 0.1<br>0.1<br>0.1 | 0.1<br>0.1<br>0.1 | V | $I_{OUT}$ = 50 μA |
| | | 3.0<br>4.5<br>5.5 | | 0.36<br>0.36<br>0.36 | 0.44<br>0.44<br>0.44 | V | *$V_{IN}$ = $V_{IL}$ or $V_{IH}$<br>12 mA<br>$I_{OL}$    24 mA<br>24 mA |
| $I_{IN}$ | Maximum Input Leakage Current | 5.5 | | ±0.1 | ±1.0 | μA | $V_I$ = $V_{CC}$, GND |
| $I_{OLD}$ | †Minimum Dynamic Output Current | 5.5 | | | 75 | mA | $V_{OLD}$ = 1.65 V Max |
| $I_{OHD}$ | | 5.5 | | | −75 | mA | $V_{OHD}$ = 3.85 V Min |
| $I_{CC}$ | Maximum Quiescent Supply Current | 5.5 | | 8.0 | 80 | μA | $V_{IN}$ = $V_{CC}$ 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: $I_{IN}$ and $I_{CC}$ @ 3.0 V are guaranteed to be less than or equal to the respective limit @ 5.5 V $V_{CC}$.

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

| Symbol | Parameter | $V_{CC}$* (V) | 74AC $T_A$ = +25°C $C_L$ = 50 pF | | | 74AC $T_A$ = −40°C to +85°C $C_L$ = 50 pF | | Unit | Fig. No. |
|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Max | | |
| $t_{PLH}$ | Propagation Delay $D_n$ to $Q_n$ | 3.3 5.0 | 2.0 2.0 | 9.0 6.5 | 14.5 10.0 | 1.5 1.5 | 17.0 11.5 | ns | 3-5 |
| $t_{PHL}$ | Propagation Delay $D_n$ to $Q_n$ | 3.3 5.0 | 2.0 2.0 | 9.0 6.0 | 13.5 9.5 | 1.5 1.5 | 16.0 11.0 | ns | 3-5 |
| $t_{PLH}$ | Propagation Delay $\overline{E}$ to $Q_n$ | 3.3 5.0 | 2.0 2.0 | 10.5 7.0 | 15.0 10.5 | 1.5 1.5 | 17.5 12.5 | ns | 3-6 |
| $t_{PHL}$ | Propagation Delay $\overline{E}$ to $Q_n$ | 3.3 5.0 | 2.0 2.0 | 8.0 7.5 | 12.5 9.0 | 1.5 1.5 | 15.0 11.0 | ns | 3-6 |
| $t_{PLH}$ | Propagation Delay Address to $Q_n$ | 3.3 5.0 | 2.0 2.0 | 12.0 8.0 | 19.0 13.0 | 1.5 1.5 | 22.5 15.5 | ns | 3-6 |
| $t_{PHL}$ | Propagation Delay Address to $Q_n$ | 3.3 5.0 | 2.0 2.0 | 10.0 7.0 | 16.0 11.0 | 1.5 1.5 | 19.0 13.0 | ns | 3-6 |
| $t_{PHL}$ | Propagation Delay $\overline{MR}$ to Q | 3.3 5.0 | 2.0 2.0 | 8.0 6.0 | 12.0 9.0 | 1.5 1.5 | 13.5 10.0 | ns | 3-7 |

\* Voltage Range 3.3 V is 3.3 V ±0.3 V.
  Voltage Range 5.0 V is 5.0 V ±0.5 V.

**AC OPERATING REQUIREMENTS**

| Symbol | Parameter | $V_{CC}$* (V) | 74AC $T_A$ = +25°C $C_L$ = 50 pF | | 74AC $T_A$ = −40°C to +85°C $C_L$ = 50 pF | Unit | Fig. No. |
|---|---|---|---|---|---|---|---|
| | | | Typ | Guaranteed Minimum | | | |
| $t_s$ | Setup Time, HIGH or LOW $D_n$ to $\overline{E}$ | 3.3 5.0 | | 3.5 2.5 | 4.5 3.5 | ns | 3-9 |
| $t_h$ | Hold Time, HIGH or LOW $D_n$ to $\overline{E}$ | 3.3 5.0 | | 2.5 2.0 | 2.5 2.0 | ns | 3-9 |
| $t_s$ | Setup Time Address to $\overline{E}$ | 3.3 5.0 | | 7.0 4.0 | 9.0 6.0 | ns | 3-6 |
| $t_h$ | Hold Time Address to $\overline{E}$ | 3.3 5.0 | | 2.0 2.0 | 2.0 2.0 | ns | 3-6 |
| $t_w$ | Minimum Pulse Width $\overline{MR}$ | 3.3 5.0 | | 6.0 5.5 | 6.5 6.0 | ns | 3-6 |
| $t_w$ | Minimum Pulse Width $\overline{E}$ | 3.3 5.0 | | 6.5 5.5 | 7.0 6.0 | ns | 3-6 |

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

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

| Symbol | Parameter | $V_{CC}$* (V) | 74ACT $T_A = +25°C$ $C_L = 50$ pF | | | 74ACT $T_A = -40°C$ to +85°C $C_L = 50$ pF | | Unit | Fig. No. |
|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Max | | |
| $t_{PLH}$ | Propagation Delay $D_n$ to $Q_n$ | 5.0 | 2.0 | 6.5 | 11.0 | 1.5 | 12.5 | ns | 3-5 |
| $t_{PHL}$ | Propagation Delay $D_n$ or $Q_n$ | 5.0 | 2.0 | 7.0 | 10.5 | 1.5 | 12.0 | ns | 3-5 |
| $t_{PLH}$ | Propagation Delay E to $Q_n$ | 5.0 | 2.0 | 10.5 | 14.0 | 1.5 | 16.5 | ns | 3-6 |
| $t_{PHL}$ | Propagation Delay E or $Q_n$ | 5.0 | 2.0 | 9.0 | 12.0 | 1.5 | 14.0 | ns | 3-6 |
| $t_{PLH}$ | Propagation Delay Address to $Q_n$ | 5.0 | 2.0 | 8.0 | 11.5 | 1.5 | 13.5 | ns | 3-6 |
| $t_{PHL}$ | Propagation Delay Address to $Q_n$ | 5.0 | 2.0 | 6.0 | 10.0 | 1.5 | 12.0 | ns | 3-6 |
| $t_{PHL}$ | Propagation Delay MR to Q | 5.0 | 2.0 | | 10.0 | 1.5 | 11.0 | ns | 3-7 |

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

**AC OPERATING REQUIREMENTS**

| Symbol | Parameter | $V_{CC}$* (V) | 74ACT $T_A = +25°C$ $C_L = 50$ pF | 74ACT $T_A = -40°C$ to +85°C $C_L = 50$ pF | Unit | Fig. No. |
|---|---|---|---|---|---|---|
| | | | Typ | Guaranteed Minimum | | |
| $t_s$ | Setup Time, HIGH or LOW $D_n$ to E | 5.0 | | 3.0 | 4.0 | ns | 3-9 |
| $t_h$ | Hold Time, HIGH or LOW $D_n$ to E | 5.0 | | 2.5 | 2.5 | ns | 3-9 |
| $t_s$ | Setup Time Address to E | 5.0 | | 4.5 | 6.5 | ns | 3-6 |
| $t_h$ | Hold Time Address to E | 5.0 | | 2.5 | 2.5 | ns | 3-6 |
| $t_w$ | Minimum Pulse Width MR | 5.0 | | 7.0 | 7.5 | ns | 3-6 |
| $t_w$ | Minimum Pulse Width E | 5.0 | | 7.0 | 7.5 | ns | 3-6 |

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

**CAPACITANCE**

| Symbol | Parameter | Value Typ | Unit | Test Conditions |
|---|---|---|---|---|
| $C_{IN}$ | Input Capacitance | 4.5 | pF | $V_{CC} = 5.0$ V |
| $C_{PD}$ | Power Dissipation Capacitance | 50.0 | pF | $V_{CC} = 5.0$ V |

# MC74AC259 MC74ACT259

## OUTLINE DIMENSIONS

**N SUFFIX**
PLASTIC DIP PACKAGE
CASE 648–08
ISSUE R
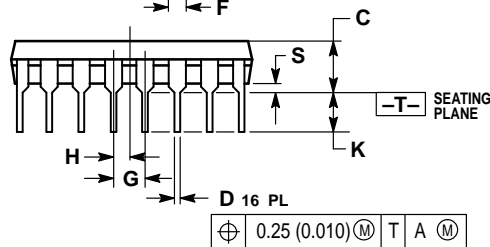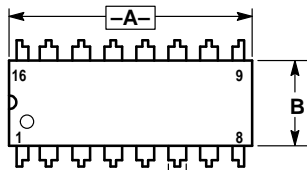
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
5. ROUNDED CORNERS OPTIONAL.

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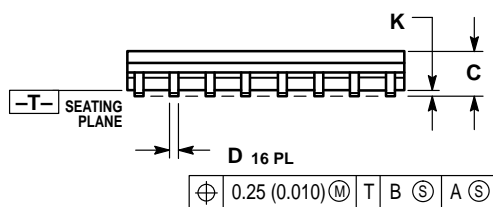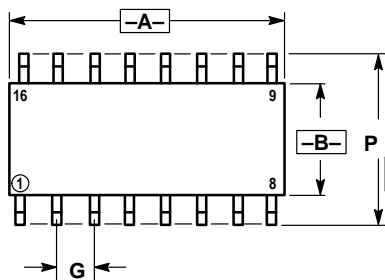
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005)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

| DIM | MILLIMETERS MIN | MILLIMETERS MAX | INCHES MIN | INCHES 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 |

## MOTOROLA

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