

# MC74AC138, MC74ACT138

## 1-of-8 Decoder/Demultiplexer

The MC74AC138/74ACT138 is a high-speed 1-of-8 decoder/demultiplexer. This device is ideally suited for high-speed bipolar memory chip select address decoding.

The multiple input enables allow parallel expansion to a 1-of-24 decoder using just three MC74AC138/74ACT138 devices or a 1-of-32 decoder using four MC74AC138/74ACT138 devices and one inverter.

- Demultiplexing Capability
- Multiple Input Enable for Easy Expansion
- Active LOW Mutually Exclusive Outputs
- Outputs Source/Sink 24 mA
- 'ACT138 Has TTL Compatible Inputs
- These are Pb-Free Devices

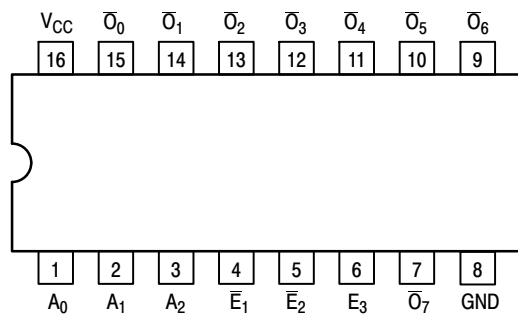


Figure 1. Pinout: 16-Lead Packages Conductors (Top View)

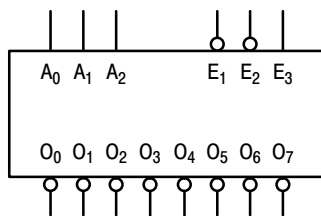


Figure 2. Logic Symbol

### PIN ASSIGNMENT

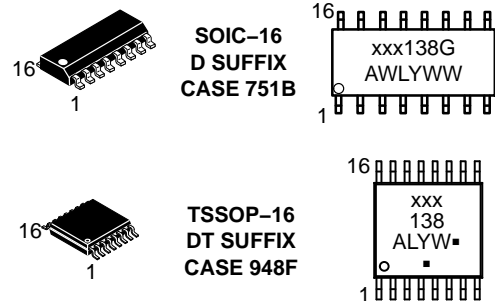
| PIN                       | FUNCTION       |
|---------------------------|----------------|
| $A_0$ – $A_2$             | Address Inputs |
| $\bar{E}_1$ – $\bar{E}_2$ | Enable Inputs  |
| $E_3$                     | Enable Input   |
| $\bar{O}_0$ – $\bar{O}_7$ | Outputs        |



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### MARKING DIAGRAMS



xxx = AC or ACT  
 A = Assembly Location  
 WL or L = Wafer Lot  
 Y = Year  
 WW or W = Work Week  
 G or ■ = Pb-Free Package

(Note: Microdot may be in either location)

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 7 of this data sheet.

# MC74AC138, MC74ACT138

## FUNCTIONAL DESCRIPTION

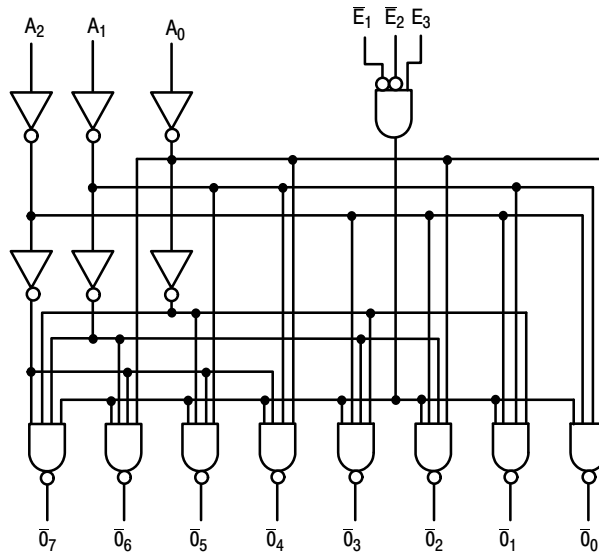
The MC74AC138/74ACT138 high-speed 1-of-8 decoder/demultiplexer accepts three binary weighted inputs ( $A_0, A_1, A_2$ ) and, when enabled, provides eight mutually exclusive active-LOW outputs ( $\overline{O}_0-\overline{O}_7$ ). The MC74AC138/74ACT138 features three Enable inputs, two active-LOW ( $\overline{E}_1, \overline{E}_2$ ) and one active-HIGH ( $E_3$ ). All outputs will be HIGH unless  $\overline{E}_1$  and  $\overline{E}_2$  are LOW and  $E_3$  is

HIGH. This multiple enabled function allows easy parallel expansion of the device to a 1-of-32 (5 lines to 32 lines) decoder with just four MC74AC138/74ACT138 devices and one inverter (See Figure 4). The MC74AC138/74ACT138 can be used as an 8-output demultiplexer by using one of the active LOW Enable inputs as the data input and the other Enable inputs as strobes. The Enable inputs which are not used must be permanently tied to their appropriate active-HIGH or active-LOW state.

## TRUTH TABLE

| Inputs           |                  |       |       |       |       | Outputs          |                  |                  |                  |                  |                  |                  |                  |
|------------------|------------------|-------|-------|-------|-------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| $\overline{E}_1$ | $\overline{E}_2$ | $E_3$ | $A_0$ | $A_1$ | $A_2$ | $\overline{O}_0$ | $\overline{O}_1$ | $\overline{O}_2$ | $\overline{O}_3$ | $\overline{O}_4$ | $\overline{O}_5$ | $\overline{O}_6$ | $\overline{O}_7$ |
| H                | X                | X     | X     | X     | X     | H                | H                | H                | H                | H                | H                | H                | H                |
| X                | H                | X     | X     | X     | X     | H                | H                | H                | H                | H                | H                | H                | H                |
| X                | X                | L     | X     | X     | X     | H                | H                | H                | H                | H                | H                | H                | H                |
| L                | L                | H     | L     | L     | L     | L                | H                | H                | H                | H                | H                | H                | H                |
| L                | L                | H     | H     | L     | L     | H                | L                | H                | H                | H                | H                | H                | H                |
| L                | L                | H     | L     | H     | L     | H                | H                | L                | H                | H                | H                | H                | H                |
| L                | L                | H     | H     | H     | L     | H                | H                | H                | L                | H                | H                | H                | H                |
| L                | L                | H     | L     | L     | H     | H                | H                | H                | H                | L                | H                | H                | H                |
| L                | L                | H     | H     | L     | H     | H                | H                | H                | H                | H                | L                | H                | H                |
| L                | L                | H     | L     | H     | H     | H                | H                | H                | H                | H                | H                | L                | H                |
| L                | L                | H     | H     | H     | H     | H                | H                | H                | H                | H                | H                | H                | L                |

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



NOTE: This diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

Figure 3. Logic Diagram

# MC74AC138, MC74ACT138

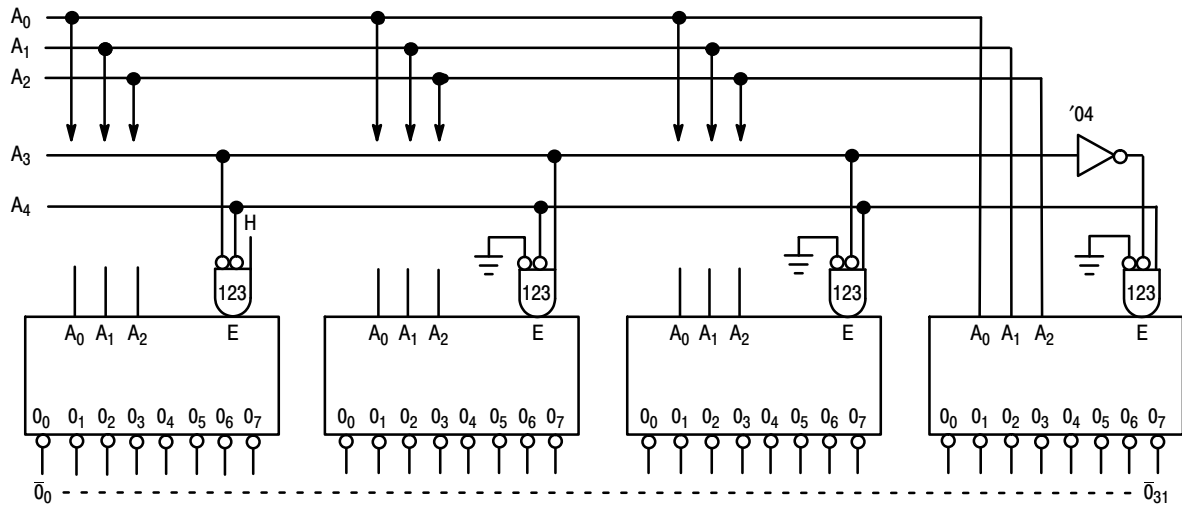


Figure 4. Expansion to 1-of-32 Decoding

# MC74AC138, MC74ACT138

## MAXIMUM RATINGS

| Symbol                | Parameter   | Value   | Unit |
|-----------------------|---|---|------|
| V <sub>CC</sub>       | DC Supply Voltage   | -0.5 to +7.0  | V    |
| V <sub>I</sub>        | DC Input Voltage  | -0.5 ≤ V <sub>I</sub> ≤ V <sub>CC</sub> + 0.5   | V    |
| V <sub>O</sub>        | DC Output Voltage (Note 1)  | -0.5 ≤ V <sub>O</sub> ≤ V <sub>CC</sub> + 0.5   | V    |
| I <sub>IK</sub>       | DC Input Diode Current  | ±20   | mA   |
| I <sub>OK</sub>       | DC Output Diode Current   | ±50   | mA   |
| I <sub>O</sub>        | DC Output Sink/Source Current   | ±50   | mA   |
| I <sub>CC</sub>       | DC Supply Current per Output Pin  | ±50   | mA   |
| I <sub>GND</sub>      | DC Ground Current per Output Pin  | ±50   | mA   |
| T <sub>STG</sub>      | Storage Temperature Range   | -65 to +150   | °C   |
| T <sub>L</sub>        | Lead temperature, 1 mm from Case for 10 Seconds                           | 260   | °C   |
| T <sub>J</sub>        | Junction temperature under Bias   | +150  | °C   |
| θ <sub>JA</sub>       | Thermal Resistance (Note 2)   | SOIC<br>TSSOP<br>69.1<br>103.8  | °C/W |
| P <sub>D</sub>        | Power Dissipation in Still Air at 65°C (Note 3)                           | SOIC<br>TSSOP<br>500<br>500   | mW   |
| MSL                   | Moisture Sensitivity  | Level 1   |      |
| F <sub>R</sub>        | Flammability Rating   | Oxygen Index: 30% – 35%<br>UL 94 V-0 @ 0.125 in   |      |
| V <sub>ESD</sub>      | ESD Withstand Voltage   | Human Body Model (Note 4)<br>Machine Model (Note 5)<br>Charged Device Model (Note 6)<br>> 2000<br>> 200<br>> 1000 | V    |
| I <sub>Latch-Up</sub> | Latch-Up Performance Above V <sub>CC</sub> and Below GND at 85°C (Note 7) | ±100  | mA   |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. I<sub>O</sub> absolute maximum rating must be observed.
2. The package thermal impedance is calculated in accordance with JESD51-7.
3. 500 mW at 65°C; derate to 300 mW by 10 mW/ from 65°C to 85°C.
4. Tested to EIA/JESD22-A114-A.
5. Tested to EIA/JESD22-A115-A.
6. Tested to JESD22-C101-A.
7. Tested to EIA/JESD78.

## RECOMMENDED OPERATING CONDITIONS

| Symbol                             | Parameter   | Min                     | Typ | Max             | Unit |      |
|------------------------------------|---|-------------------------|-----|-----------------|------|------|
| V <sub>CC</sub>                    | Supply Voltage  | 'AC                     | 2.0 | 5.0             | 6.0  | V    |
|                                    |   | 'ACT                    | 4.5 | 5.0             | 5.5  |      |
| V <sub>IN</sub> , V <sub>OUT</sub> | DC Input Voltage, Output Voltage (Ref. to GND)                          | 0                       | -   | V <sub>CC</sub> | V    |      |
| t <sub>r</sub> , t <sub>f</sub>    | Input Rise and Fall Time (Note 1)<br>'AC Devices except Schmitt Inputs  | V <sub>CC</sub> @ 3.0 V | -   | 150             | -    | ns/V |
|                                    |   | V <sub>CC</sub> @ 4.5 V | -   | 40              | -    |      |
|                                    |   | V <sub>CC</sub> @ 5.5 V | -   | 25              | -    |      |
| t <sub>r</sub> , t <sub>f</sub>    | Input Rise and Fall Time (Note 2)<br>'ACT Devices except Schmitt Inputs | V <sub>CC</sub> @ 4.5 V | -   | 10              | -    | ns/V |
|                                    |   | V <sub>CC</sub> @ 5.5 V | -   | 8.0             | -    |      |
| T <sub>J</sub>                     | Junction Temperature (PDIP)   | -                       | -   | 140             | °C   |      |
| T <sub>A</sub>                     | Operating Ambient Temperature Range                                     | -40                     | 25  | 85              | °C   |      |
| I <sub>OH</sub>                    | Output Current – High   | -                       | -   | -24             | mA   |      |
| I <sub>OL</sub>                    | Output Current – Low  | -                       | -   | 24              | mA   |      |

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

1. V<sub>IN</sub> from 30% to 70% V<sub>CC</sub>; see individual Data Sheets for devices that differ from the typical input rise and fall times.
2. V<sub>IN</sub> from 0.8 V to 2.0 V; see individual Data Sheets for devices that differ from the typical input rise and fall times.

# MC74AC138, MC74ACT138

## DC CHARACTERISTICS

| Symbol           | Parameter                         | V <sub>CC</sub><br>(V) | 74AC                   |                   | 74AC                            |      | Unit | Conditions  |   |
|------------------|-----------------------------------|------------------------|------------------------|-------------------|---------------------------------|------|------|---|---|
|                  |                                   |                        | T <sub>A</sub> = +25°C |                   | T <sub>A</sub> = -40°C to +85°C |      |      |   |   |
|                  |                                   |                        | Typ                    | Guaranteed Limits |                                 |      |      |   |   |
| V <sub>IH</sub>  | Minimum High Level Input Voltage  | 3.0                    | 1.5                    | 2.1               | 2.1                             |      | V    | V <sub>OUT</sub> = 0.1 V 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 Input Voltage   | 3.0                    | 1.5                    | 0.9               | 0.9                             |      | V    | V <sub>OUT</sub> = 0.1 V 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 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                               | 4.5                    | 5.5                    | -                 | 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 |
|                  |                                   |                        |                        | -                 | 3.86                            | 3.76 |      |   |   |
|                  |                                   |                        |                        | -                 | 4.86                            | 4.76 |      |   |   |
| V <sub>OL</sub>  | Maximum Low Level 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                               | 4.5                    | 5.5                    | -                 | 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    |
|                  |                                   |                        |                        | -                 | 0.36                            | 0.44 |      |   |   |
|                  |                                   |                        |                        | -                 | 0.36                            | 0.44 |      |   |   |
| I <sub>IN</sub>  | Maximum Input Leakage Current     | 5.5                    | -                      | ±0.1              | ±1.0                            |      | μA   | V <sub>I</sub> = V <sub>CC</sub> , GND              |   |
| I <sub>OLD</sub> | †Minimum Dynamic 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 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>.

## AC CHARACTERISTICS

| 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 to +85°C<br>C <sub>L</sub> = 50 pF |      |      |          |
|                  |  |                          | Min  | Typ  | Max  | Min   | Max  |      |          |
| t <sub>PLH</sub> | Propagation Delay<br>A <sub>n</sub> to $\bar{O}_n$             | 3.3                      | 1.5  | 8.5  | 13.0 | 1.5   | 15.0 | ns   | 3-6      |
|                  |  | 5.0                      | 1.5  | 6.5  | 9.5  | 1.5   | 10.5 |      |          |
| t <sub>PHL</sub> | Propagation Delay<br>A <sub>n</sub> to $\bar{O}_n$             | 3.3                      | 1.5  | 8.0  | 12.5 | 1.5   | 14.0 | ns   | 3-6      |
|                  |  | 5.0                      | 1.5  | 6.0  | 9.0  | 1.5   | 10.5 |      |          |
| t <sub>PLH</sub> | Propagation Delay<br>$\bar{E}_1$ or $\bar{E}_2$ to $\bar{O}_n$ | 3.3                      | 1.5  | 11.0 | 15.0 | 1.5   | 16.0 | ns   | 3-6      |
|                  |  | 5.0                      | 1.5  | 8.0  | 11.0 | 1.5   | 12.0 |      |          |
| t <sub>PHL</sub> | Propagation Delay<br>$\bar{E}_1$ or $\bar{E}_2$ to $\bar{O}_n$ | 3.3                      | 1.5  | 9.5  | 13.5 | 1.5   | 15.0 | ns   | 3-6      |
|                  |  | 5.0                      | 1.5  | 7.0  | 9.5  | 1.5   | 10.5 |      |          |
| t <sub>PLH</sub> | Propagation Delay<br>E <sub>3</sub> to $\bar{O}_n$             | 3.3                      | 1.5  | 11.0 | 15.5 | 1.5   | 16.5 | ns   | 3-6      |
|                  |  | 5.0                      | 1.5  | 8.0  | 11.0 | 1.5   | 12.5 |      |          |
| t <sub>PHL</sub> | Propagation Delay<br>E <sub>3</sub> to $\bar{O}_n$             | 3.3                      | 1.5  | 8.5  | 13.0 | 1.5   | 14.0 | ns   | 3-6      |
|                  |  | 5.0                      | 1.5  | 6.0  | 8.0  | 1.0   | 9.5  |      |          |

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

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

# MC74AC138, MC74ACT138

## DC CHARACTERISTICS

| Symbol            | Parameter                              | V <sub>CC</sub><br>(V) | 74ACT                  |                   | 74ACT                           |  | Unit | Conditions  |
|-------------------|--|------------------------|------------------------|-------------------|---------------------------------|--|------|---|
|                   |  |                        | T <sub>A</sub> = +25°C |                   | T <sub>A</sub> = -40°C to +85°C |  |      |   |
|                   |  |                        | Typ                    | Guaranteed Limits |                                 |  |      |   |
| V <sub>IH</sub>   | Minimum High Level Input Voltage       | 4.5                    | 1.5                    | 2.0               | 2.0                             |  | V    | V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> - 0.1 V                                       |
|                   |  | 5.5                    | 1.5                    | 2.0               | 2.0                             |  |      |   |
| V <sub>IL</sub>   | Maximum Low Level Input Voltage        | 4.5                    | 1.5                    | 0.8               | 0.8                             |  | V    | V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> - 0.1 V                                       |
|                   |  | 5.5                    | 1.5                    | 0.8               | 0.8                             |  |      |   |
| V <sub>OH</sub>   | Minimum High Level Output Voltage      | 4.5                    | 4.49                   | 4.4               | 4.4                             |  | V    | I <sub>OUT</sub> = -50 μA   |
|                   |  | 5.5                    | 5.49                   | 5.4               | 5.4                             |  |      |   |
|                   |  | 4.5                    | -                      | 3.86              | 3.76                            |  | V    | *V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub><br>-24 mA<br>I <sub>OH</sub> -24 mA |
|                   |  | 5.5                    | -                      | 4.86              | 4.76                            |  |      |   |
| V <sub>OL</sub>   | Maximum Low Level Output Voltage       | 4.5                    | 0.001                  | 0.1               | 0.1                             |  | V    | I <sub>OUT</sub> = 50 μA  |
|                   |  | 5.5                    | 0.001                  | 0.1               | 0.1                             |  |      |   |
|                   |  | 4.5                    | -                      | 0.36              | 0.44                            |  | V    | *V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub><br>24 mA<br>I <sub>OL</sub> 24 mA   |
|                   |  | 5.5                    | -                      | 0.36              | 0.44                            |  |      |   |
| I <sub>IN</sub>   | Maximum Input 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 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 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.

## AC CHARACTERISTICS

| 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 to +85°C<br>C <sub>L</sub> = 50 pF |      |      |          |
|                  |   |                          | Min  | Typ | Max  | Min   | Max  |      |          |
| t <sub>PLH</sub> | Propagation Delay<br>A <sub>n</sub> to O <sub>n</sub>                   | 5.0                      | 1.5  | 7.0 | 10.5 | 1.5   | 11.5 | ns   | 3-6      |
| t <sub>PHL</sub> | Propagation Delay<br>A <sub>n</sub> to O <sub>n</sub>                   | 5.0                      | 1.5  | 6.5 | 10.5 | 1.5   | 11.5 | ns   | 3-6      |
| t <sub>PLH</sub> | Propagation Delay<br>E <sub>1</sub> or E <sub>2</sub> to O <sub>n</sub> | 5.0                      | 2.5  | 8.0 | 11.5 | 2.0   | 12.5 | ns   | 3-6      |
| t <sub>PHL</sub> | Propagation Delay<br>E <sub>1</sub> or E <sub>2</sub> to O <sub>n</sub> | 5.0                      | 2.0  | 7.5 | 11.5 | 2.0   | 12.5 | ns   | 3-6      |
| t <sub>PLH</sub> | Propagation Delay<br>E <sub>3</sub> to O <sub>n</sub>                   | 5.0                      | 2.5  | 8.0 | 12.0 | 2.0   | 13.0 | ns   | 3-6      |
| t <sub>PHL</sub> | Propagation Delay<br>E <sub>3</sub> to O <sub>n</sub>                   | 5.0                      | 2.0  | 6.5 | 10.5 | 1.5   | 11.5 | ns   | 3-6      |

\*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 | 60           | pF   | V <sub>CC</sub> = 5.0 V |

# MC74AC138, MC74ACT138

## ORDERING INFORMATION

| Device Order Number | Package               | Shipping†        |
|---------------------|-----------------------|------------------|
| MC74AC138DG         | SOIC-16<br>(Pb-Free)  | 48 Units / Rail  |
| MC74AC138DR2G       | SOIC-16<br>(Pb-Free)  | 2500 Tape & Reel |
| MC74AC138DTR2G      | TSSOP-16<br>(Pb-Free) | 2500 Tape & Reel |
| MC74ACT138DG        | SOIC-16<br>(Pb-Free)  | 48 Units / Rail  |
| MC74ACT138DR2G      | SOIC-16<br>(Pb-Free)  | 2500 Tape & Reel |
| MC74ACT138DTR2G     | TSSOP-16<br>(Pb-Free) | 2500 Tape & Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS

ON Semiconductor®



SCALE 1:1

## SOIC-16 CASE 751B-05 ISSUE K

DATE 29 DEC 2006



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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| <p>STYLE 1:</p> <p>PIN 1. COLLECTOR</p> <p>2. BASE</p> <p>3. EMITTER</p> <p>4. NO CONNECTION</p> <p>5. EMITTER</p> <p>6. BASE</p> <p>7. COLLECTOR</p> <p>8. COLLECTOR</p> <p>9. BASE</p> <p>10. EMITTER</p> <p>11. NO CONNECTION</p> <p>12. EMITTER</p> <p>13. BASE</p> <p>14. COLLECTOR</p> <p>15. EMITTER</p> <p>16. COLLECTOR</p>                           | <p>STYLE 2:</p> <p>PIN 1. CATHODE</p> <p>2. ANODE</p> <p>3. NO CONNECTION</p> <p>4. CATHODE</p> <p>5. CATHODE</p> <p>6. NO CONNECTION</p> <p>7. ANODE</p> <p>8. CATHODE</p> <p>9. CATHODE</p> <p>10. ANODE</p> <p>11. NO CONNECTION</p> <p>12. CATHODE</p> <p>13. CATHODE</p> <p>14. NO CONNECTION</p> <p>15. ANODE</p> <p>16. CATHODE</p> | <p>STYLE 3:</p> <p>PIN 1. COLLECTOR, DYE #1</p> <p>2. BASE, #1</p> <p>3. EMITTER, #1</p> <p>4. COLLECTOR, #1</p> <p>5. COLLECTOR, #2</p> <p>6. BASE, #2</p> <p>7. EMITTER, #2</p> <p>8. COLLECTOR, #2</p> <p>9. COLLECTOR, #3</p> <p>10. BASE, #3</p> <p>11. EMITTER, #3</p> <p>12. COLLECTOR, #3</p> <p>13. COLLECTOR, #4</p> <p>14. BASE, #4</p> <p>15. EMITTER, #4</p> <p>16. COLLECTOR, #4</p>   | <p>STYLE 4:</p> <p>PIN 1. COLLECTOR, DYE #1</p> <p>2. COLLECTOR, #1</p> <p>3. COLLECTOR, #2</p> <p>4. COLLECTOR, #2</p> <p>5. COLLECTOR, #3</p> <p>6. COLLECTOR, #3</p> <p>7. COLLECTOR, #4</p> <p>8. COLLECTOR, #4</p> <p>9. BASE, #4</p> <p>10. EMITTER, #4</p> <p>11. BASE, #3</p> <p>12. EMITTER, #3</p> <p>13. BASE, #2</p> <p>14. EMITTER, #2</p> <p>15. BASE, #1</p> <p>16. EMITTER, #1</p> |
| <p>STYLE 5:</p> <p>PIN 1. DRAIN, DYE #1</p> <p>2. DRAIN, #1</p> <p>3. DRAIN, #2</p> <p>4. DRAIN, #2</p> <p>5. DRAIN, #3</p> <p>6. DRAIN, #3</p> <p>7. DRAIN, #4</p> <p>8. DRAIN, #4</p> <p>9. GATE, #4</p> <p>10. SOURCE, #4</p> <p>11. GATE, #3</p> <p>12. SOURCE, #3</p> <p>13. GATE, #2</p> <p>14. SOURCE, #2</p> <p>15. GATE, #1</p> <p>16. SOURCE, #1</p> | <p>STYLE 6:</p> <p>PIN 1. CATHODE</p> <p>2. CATHODE</p> <p>3. CATHODE</p> <p>4. CATHODE</p> <p>5. CATHODE</p> <p>6. CATHODE</p> <p>7. CATHODE</p> <p>8. CATHODE</p> <p>9. ANODE</p> <p>10. ANODE</p> <p>11. ANODE</p> <p>12. ANODE</p> <p>13. ANODE</p> <p>14. ANODE</p> <p>15. ANODE</p> <p>16. ANODE</p>                                 | <p>STYLE 7:</p> <p>PIN 1. SOURCE N-CH</p> <p>2. COMMON DRAIN (OUTPUT)</p> <p>3. COMMON DRAIN (OUTPUT)</p> <p>4. GATE P-CH</p> <p>5. COMMON DRAIN (OUTPUT)</p> <p>6. COMMON DRAIN (OUTPUT)</p> <p>7. COMMON DRAIN (OUTPUT)</p> <p>8. SOURCE P-CH</p> <p>9. SOURCE P-CH</p> <p>10. COMMON DRAIN (OUTPUT)</p> <p>11. COMMON DRAIN (OUTPUT)</p> <p>12. COMMON DRAIN (OUTPUT)</p> <p>13. GATE N-CH</p> <p>14. COMMON DRAIN (OUTPUT)</p> <p>15. COMMON DRAIN (OUTPUT)</p> <p>16. SOURCE N-CH</p> |  |

### SOLDERING FOOTPRINT



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# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

ON Semiconductor®



TSSOP-16  
CASE 948F-01  
ISSUE B

DATE 19 OCT 2006



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH. PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
5. DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE K DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
7. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE -W-.

| DIM | MILLIMETERS |      | INCHES    |       |
|-----|-------------|------|-----------|-------|
|     | MIN         | MAX  | MIN       | MAX   |
| A   | 4.90        | 5.10 | 0.193     | 0.200 |
| B   | 4.30        | 4.50 | 0.169     | 0.177 |
| C   | ---         | 1.20 | ---       | 0.047 |
| D   | 0.05        | 0.15 | 0.002     | 0.006 |
| F   | 0.50        | 0.75 | 0.020     | 0.030 |
| G   | 0.65 BSC    |      | 0.026 BSC |       |
| H   | 0.18        | 0.28 | 0.007     | 0.011 |
| J   | 0.09        | 0.20 | 0.004     | 0.008 |
| J1  | 0.09        | 0.16 | 0.004     | 0.006 |
| K   | 0.19        | 0.30 | 0.007     | 0.012 |
| K1  | 0.19        | 0.25 | 0.007     | 0.010 |
| L   | 6.40 BSC    |      | 0.252 BSC |       |
| M   | 0°          | 8°   | 0°        | 8°    |

SOLDERING FOOTPRINT



GENERIC MARKING DIAGRAM\*



- XXXX = Specific Device Code
- A = Assembly Location
- L = Wafer Lot
- Y = Year
- W = Work Week
- G or ■ = Pb-Free Package

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "■", may or may not be present.

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