

# MC74ACT241

## Octal Buffer/Line Driver with 3-State Outputs

The MC74ACT241 is an octal buffer and line driver designed to be employed as a memory address driver, clock driver and bus oriented transmitter or receiver which provides improved PC board density.

### Features

- 3-State Outputs Drive Bus Lines or Buffer Memory Address Registers
- Outputs Source/Sink 24 mA
- TTL Compatible Inputs
- These are Pb-Free Devices

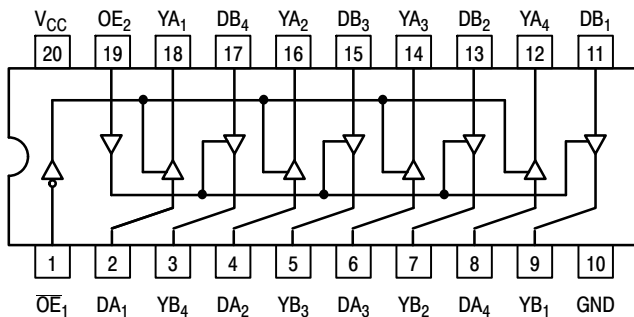


Figure 1. Pinout: 20-Lead Packages Conductors (Top View)

### TRUTH TABLE

| Inputs          |   | Outputs               |
|-----------------|---|-----------------------|
| OE <sub>1</sub> | D | (Pins 12, 14, 16, 18) |
| L               | L | L                     |
| L               | H | H                     |
| H               | X | Z                     |

H = HIGH Voltage Level  
 L = LOW Voltage Level  
 X = Immaterial  
 Z = High Impedance

### TRUTH TABLE

| Inputs          |   | Outputs           |
|-----------------|---|-------------------|
| OE <sub>2</sub> | D | (Pins 3, 5, 7, 9) |
| H               | L | L                 |
| H               | H | H                 |
| L               | X | Z                 |

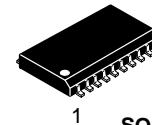
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 Z = High Impedance



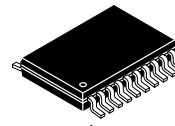
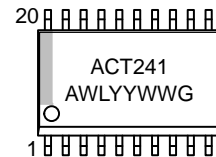
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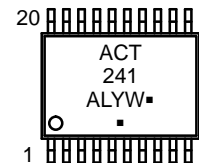
### MARKING DIAGRAMS



1 SOIC-20W  
 DW SUFFIX  
 CASE 751D



1 TSSOP-20  
 DT SUFFIX  
 CASE 948E



A = Assembly Location  
 WL, L = Wafer Lot  
 YY, Y = Year  
 WW, 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 5 of this data sheet.

# MC74ACT241

## 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) (Note 1)  | -0.5 to $V_{CC} + 0.5$  | V                           |
| $I_{IK}$      | DC Input Diode Current                          | $\pm 20$  | mA                          |
| $I_{OK}$      | DC Output Diode Current                         | $\pm 50$  | mA                          |
| $I_{OUT}$     | DC Output Sink/Source Current                   | $\pm 50$  | mA                          |
| $I_{CC}$      | DC Supply Current, per Output Pin               | $\pm 50$  | mA                          |
| $I_{GND}$     | DC Ground Current, per Output Pin               | $\pm 100$   | mA                          |
| $T_{STG}$     | Storage Temperature Range                       | -65 to +150   | $^{\circ}\text{C}$          |
| $T_L$         | Lead temperature, 1 mm from Case for 10 Seconds | 260   | $^{\circ}\text{C}$          |
| $T_J$         | Junction Temperature Under Bias                 | 140   | $^{\circ}\text{C}$          |
| $\theta_{JA}$ | Thermal Resistance (Note 2)                     | SOIC<br>TSSOP<br>65.8<br>110.7  | $^{\circ}\text{C}/\text{W}$ |
| MSL           | Moisture Sensitivity                            | Level 1   |                             |
| $F_R$         | Flammability Rating                             | Oxygen Index: 30% – 35%<br>UL 94 V-0 @ 0.125 in   |                             |
| $V_{ESD}$     | ESD Withstand Voltage                           | Human Body Model (Note 3)<br>Machine Model (Note 4)<br>Charged Device Model (Note 5)<br>> 2000<br>> 200<br>> 1000 | V                           |
| $I_{Latchup}$ | Latchup Performance                             | Above $V_{CC}$ and Below GND at 85 $^{\circ}\text{C}$ (Note 6)  | $\pm 100$<br>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.  $I_{OUT}$  absolute maximum rating must be observed.
2. The package thermal impedance is calculated in accordance with JESD 51-7.
3. Tested to EIA/JESD22-A114-A.
4. Tested to EIA/JESD22-A115-A.
5. Tested to JESD22-C101-A.
6. Tested to EIA/JESD78.

## RECOMMENDED OPERATING CONDITIONS

| Symbol            | Parameter  | Min  | Typ            | Max             | Unit               |
|-------------------|--|--|----------------|-----------------|--------------------|
| $V_{CC}$          | DC Input Voltage (Referenced to GND)                 | 4.5  |                | 5.5             | V                  |
| $V_{IN}, V_{OUT}$ | DC Input Voltage, Output Voltage (Referenced to GND) | 0  |                | $V_{CC}$        | V                  |
| $T_A$             | Operating Temperature, All Package Types             | -40  | 25             | +85             | $^{\circ}\text{C}$ |
| $t_r, t_f$        | Input Rise and Fall Time (Note 8)                    | $V_{CC} = 4.5\text{ V}$<br>$V_{CC} = 5.5\text{ V}$ | 0<br>10<br>8.0 | 10<br>10<br>8.0 | ns/V               |
| $I_{OH}$          | Output Current – High                                | -  | -              | -24             | mA                 |
| $I_{OL}$          | 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.

7. Unused Inputs may not be left open. All inputs must be tied to a high voltage level or low logic voltage level.
8.  $V_{in}$  from 0.8 V to 2.0 V; refer to individual Data Sheets for devices that differ from the typical input rise and fall times.

# MC74ACT241

## DC CHARACTERISTICS

| Symbol                               | Parameter                                 | V <sub>CC</sub> (V) | T <sub>A</sub> = +25°C |                   | T <sub>A</sub> = -40°C to +85°C |      | Unit  | Conditions   |
|--------------------------------------|---|---------------------|------------------------|-------------------|---------------------------------|------|---|--|
|                                      |   |                     | Typ                    | Guaranteed Limits |                                 |      |   |  |
| V <sub>IH</sub>                      | Minimum High Level Input Voltage          | 4.5                 | 1.5                    | 2.0               | 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                             | 2.0  |   |  |
| V <sub>IL</sub>                      | Maximum Low Level Input Voltage           | 4.5                 | 1.5                    | 0.8               | 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                             | 0.8  |   |  |
| V <sub>OH</sub>                      | Minimum High Level Output Voltage         | 4.5                 | 4.49                   | 4.4               | 4.4                             | 4.4  | V   | I <sub>OUT</sub> = -50 μA  |
|                                      |   | 5.5                 | 5.49                   | 5.4               | 5.4                             | 5.4  |   |  |
|                                      |   | 4.5                 | -                      | 3.86              | 3.76                            | 3.76 | V   | *V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> -24 mA<br>I <sub>OH</sub> -24 mA |
|                                      |   | 5.5                 | -                      | 4.86              | 4.76                            | 4.76 |   |  |
| V <sub>OL</sub>                      | Maximum Low Level Output Voltage          | 4.5                 | 0.001                  | 0.1               | 0.1                             | 0.1  | V   | I <sub>OUT</sub> = 50 μA   |
|                                      |   | 5.5                 | 0.001                  | 0.1               | 0.1                             | 0.1  |   |  |
|                                      |   | 4.5                 | -                      | 0.36              | 0.44                            | 0.44 | V   | *V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> 24 mA<br>I <sub>OL</sub> 24 mA   |
|                                      |   | 5.5                 | -                      | 0.36              | 0.44                            | 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>CCCT</sub>                   | Additional Maximum 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>OZ</sub>                      | Maximum 3-State Current                   | 5.5                 | -                      | ±0.5              | ±5.0                            | μA   | V <sub>I</sub> (OE) = V <sub>IL</sub> , V <sub>IH</sub><br>V <sub>I</sub> = V <sub>CC</sub> , GND<br>V <sub>O</sub> = V <sub>CC</sub> , GND |  |
| I <sub>OLD</sub><br>I <sub>OHD</sub> | †Minimum Dynamic Output Current           | 5.5                 | -                      | -                 | 75                              | mA   | V <sub>OLD</sub> = 1.65 V Max<br>V <sub>OHD</sub> = 3.85 V Min  |  |
|                                      |   | 5.5                 | -                      | -                 | -75                             | mA   |   |  |
| I <sub>CC</sub>                      | Maximum Quiescent Supply Current          | 5.5                 | -                      | 8.0               | 80                              | μA   | V <sub>IN</sub> = V <sub>CC</sub> or GND  |  |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

\*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 t<sub>r</sub> = t<sub>f</sub> = 3.0 ns (For Figures and Waveforms, See Figures 2, 3, and 4.)

| Symbol           | Parameter                        | V <sub>CC</sub> * (V) | 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 |      | Unit |
|------------------|----------------------------------|-----------------------|--|-----|------|---|------|------|
|                  |                                  |                       | Min  | Typ | Max  | Min   | Max  |      |
| t <sub>PLH</sub> | Propagation Delay Data to Output | 5.0                   | 1.5  | 6.5 | 9.0  | 1.5   | 10.0 | ns   |
| t <sub>PHL</sub> | Propagation Delay Data to Output | 5.0                   | 1.5  | 7.0 | 9.0  | 1.5   | 10.0 | ns   |
| t <sub>PZH</sub> | Output Enable Time               | 5.0                   | 1.5  | 6.0 | 9.0  | 1.0   | 10.0 | ns   |
| t <sub>PZL</sub> | Output Enable Time               | 5.0                   | 1.5  | 7.0 | 10.0 | 1.5   | 11.0 | ns   |
| t <sub>PHZ</sub> | Output Disable Time              | 5.0                   | 1.5  | 8.0 | 10.5 | 1.5   | 11.5 | ns   |
| t <sub>PLZ</sub> | Output Disable Time              | 5.0                   | 2.0  | 7.0 | 10.5 | 1.5   | 11.5 | ns   |

\*Voltage Range 5.0 V is 5.0 V ±0.5 V

## CAPACITANCE

| Symbol          | Parameter                     | Value 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 | 45        | pF   | V <sub>CC</sub> = 5.0 V |

# MC74ACT241

## SWITCHING WAVEFORMS

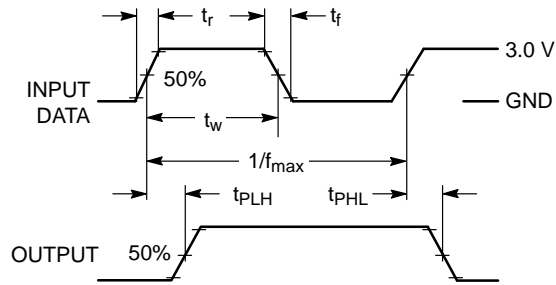


Figure 2.

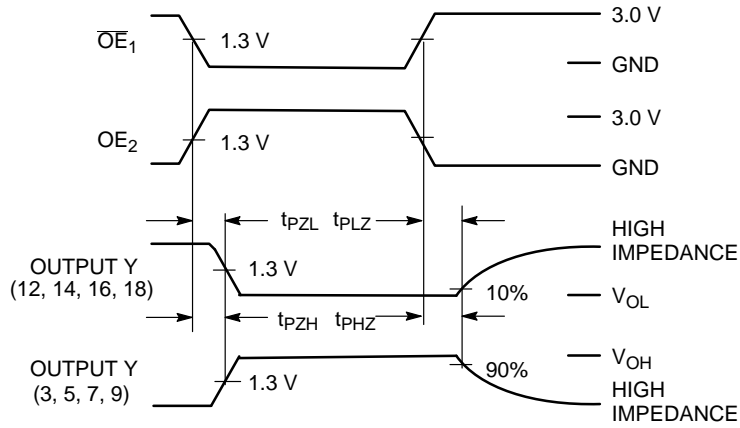
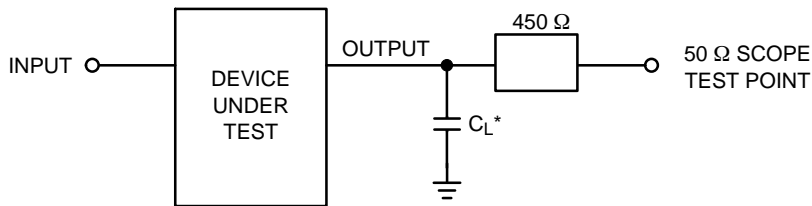


Figure 3.



\*Includes all probe and jig capacitance

Figure 4. Test Circuit

# MC74ACT241

## ORDERING INFORMATION

| Device          | Package               | Shipping†          |
|-----------------|-----------------------|--------------------|
| MC74ACT241DWG   | SOIC-20<br>(Pb-Free)  | 38 Units / Rail    |
| MC74ACT241DWR2G | SOIC-20<br>(Pb-Free)  | 1000 / Tape & Reel |
| MC74ACT241DTR2G | TSSOP-20<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



SCALE 1:1

SOIC-20 WB  
CASE 751D-05  
ISSUE H

DATE 22 APR 2015



NOTES:

1. DIMENSIONS ARE IN MILLIMETERS.
2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
5. DIMENSION B DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF B DIMENSION AT MAXIMUM MATERIAL CONDITION.

| DIM | MILLIMETERS |       |
|-----|-------------|-------|
|     | MIN         | MAX   |
| A   | 2.35        | 2.65  |
| A1  | 0.10        | 0.25  |
| b   | 0.35        | 0.49  |
| c   | 0.23        | 0.32  |
| D   | 12.65       | 12.95 |
| E   | 7.40        | 7.60  |
| e   | 1.27 BSC    |       |
| H   | 10.05       | 10.55 |
| h   | 0.25        | 0.75  |
| L   | 0.50        | 0.90  |
| θ   | 0°          | 7°    |

RECOMMENDED  
SOLDERING FOOTPRINT\*



DIMENSIONS: MILLIMETERS

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

GENERIC  
MARKING DIAGRAM\*



- XXXXXX = Specific Device Code
- A = Assembly Location
- WL = Wafer Lot
- YY = Year
- WW = Work Week
- G = 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. Some products may not follow the Generic Marking.

|                  |             |  |
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# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

ON Semiconductor®



TSSOP-20 WB  
CASE 948E  
ISSUE D

DATE 17 FEB 2016

SCALE 2:1



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   | 6.40        | 6.60 | 0.252     | 0.260 |
| 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   | 0.27        | 0.37 | 0.011     | 0.015 |
| 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°    |

**GENERIC MARKING DIAGRAM\***



- A = Assembly Location
- L = Wafer Lot
- Y = Year
- W = Work Week
- = Pb-Free Package

(Note: Microdot may be in either location)

\*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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