

## 74ACT534

### Octal D-Type Flip-Flop with 3-STATE Outputs

#### General Description

The ACT534 is a high-speed, low-power octal D-type flip-flop featuring separate D-type inputs for each flip-flop and 3-STATE outputs for bus-oriented applications. A buffered Clock (CP) and Output Enable ( $\overline{OE}$ ) are common to all flip-flops. The ACT534 is the same as the ACT374 except that the outputs are inverted.

#### Features

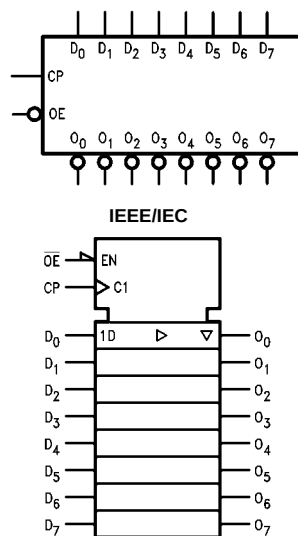
- $I_{CC}$  and  $I_{OZ}$  reduced by 50%
- Edge-triggered D-type inputs
- Buffered positive edge-triggered clock
- 3-STATE outputs for bus-oriented applications
- Outputs source/sink 24 mA
- ACT534 has TTL-compatible inputs
- Inverted output version of ACT374

#### Ordering Code:

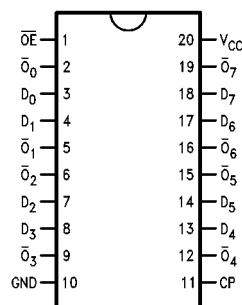
| Order Number | Package Number | Package Description                                                             |
|--------------|----------------|---------------------------------------------------------------------------------|
| 74ACT534SC   | M20B           | 20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide Body |
| 74ACT534SJ   | M20D           | 20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide                   |
| 74ACT534PC   | N20A           | 20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide          |

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

#### Logic Symbols



#### Connection Diagram



#### Pin Descriptions

| Pin Names                           | Description                   |
|-------------------------------------|-------------------------------|
| $D_0$ – $D_7$                       | Data Inputs                   |
| CP                                  | Clock Pulse Input             |
| $\overline{OE}$                     | 3-STATE Output Enable Input   |
| $\overline{Q_0}$ – $\overline{Q_7}$ | Complementary 3-STATE Outputs |

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# Functional Description

The ACT534 consists of eight edge-triggered flip-flops with individual D-type inputs and 3-STATE complementary outputs. The buffered clock and buffered Output Enable are common to all flip-flops. The eight flip-flops will store the state of their individual D inputs that meet the setup and hold times requirements on the LOW-to-HIGH Clock (CP)

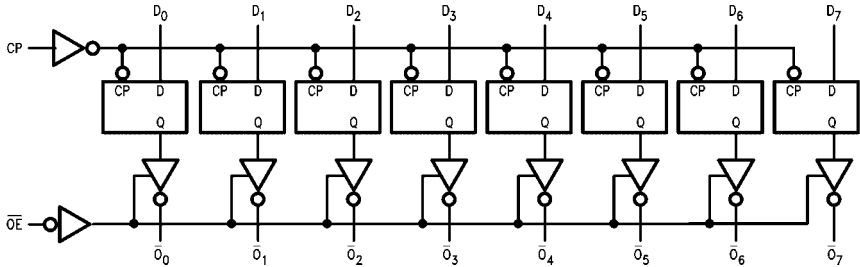
transition. With the Output Enable ( $\overline{OE}$ ) LOW, the contents of the eight flip-flops are available at the outputs. When the  $\overline{OE}$  is HIGH, the outputs go to the high impedance state. Operation of the  $\overline{OE}$  input does not affect the state of the flip-flops.

## Function Table

| Inputs |    |   | Output           |
|--------|----|---|------------------|
| CP     | OE | D | $\overline{O}$   |
| ↗      | L  | H | L                |
| ↗      | L  | L | H                |
| L      | L  | X | $\overline{O}_0$ |
| X      | H  | X | Z                |

H = HIGH Voltage Level  
L = LOW Voltage Level  
X = Immaterial  
↗ = LOW-to-HIGH Clock Transition  
Z = High Impedance  
 $\overline{O}_0$  = Value stored from previous clock cycle

## Logic Diagram



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

**Absolute Maximum Ratings**(Note 1)

|                                                                           |                          |
|---------------------------------------------------------------------------|--------------------------|
| Supply Voltage ( $V_{CC}$ )                                               | −0.5V to +7.0V           |
| DC Input Diode Current ( $I_{IK}$ )                                       |                          |
| $V_I = -0.5V$                                                             | −20 mA                   |
| $V_I = V_{CC} + 0.5V$                                                     | +20 mA                   |
| DC Input Voltage ( $V_I$ )                                                | −0.5V to $V_{CC} + 0.5V$ |
| DC Output Diode Current ( $I_{OK}$ )                                      |                          |
| $V_O = -0.5V$                                                             | −20 mA                   |
| $V_O = V_{CC} + 0.5V$                                                     | +20 mA                   |
| DC Output Voltage ( $V_O$ )                                               | −0.5V to $V_{CC} + 0.5V$ |
| DC Output Source<br>or Sink Current ( $I_O$ )                             | ±50 mA                   |
| DC $V_{CC}$ or Ground Current<br>per Output Pin ( $I_{CC}$ or $I_{GND}$ ) | ±50 mA                   |
| Storage Temperature ( $T_{STG}$ )                                         | −65°C to +150°C          |
| Junction Temperature ( $T_J$ )                                            |                          |
| PDIP                                                                      | 140°C                    |

**Recommended Operating Conditions**

|                                                 |                |
|-------------------------------------------------|----------------|
| Supply Voltage ( $V_{CC}$ )                     | 4.5V to 5.5V   |
| Input Voltage ( $V_I$ )                         | 0V to $V_{CC}$ |
| Output Voltage ( $V_O$ )                        | 0V to $V_{CC}$ |
| Operating Temperature ( $T_A$ )                 | −40°C to +85°C |
| Minimum Input Edge Rate ( $\Delta V/\Delta t$ ) |                |
| $V_{IN}$ from 0.8V to 2.0V                      |                |
| $V_{CC}$ @ 4.5V, 5.5V                           | 125 mV/ns      |

**Note 1:** Absolute maximum ratings are those values beyond which damage to the device may occur. The databook specifications should be met, without exception, to ensure that the system design is reliable over its power supply, temperature, and output/input loading variables. Fairchild does not recommend operation of FACT™ circuits outside databook specifications.

**DC Electrical Characteristics**

| Symbol           | Parameter                         | V <sub>CC</sub><br>(V) | T <sub>A</sub> = +25°C |                   | T <sub>A</sub> = −40°C to +85°C | Units | Conditions                                                                                                            |
|------------------|-----------------------------------|------------------------|------------------------|-------------------|---------------------------------|-------|-----------------------------------------------------------------------------------------------------------------------|
|                  |                                   |                        | 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> = 0.1V<br>or V <sub>CC</sub> − 0.1V                                                                  |
|                  |                                   | 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> = 0.1V<br>or V <sub>CC</sub> − 0.1V                                                                  |
|                  |                                   | 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>I <sub>OH</sub> = −24 mA<br>I <sub>OH</sub> = −24 mA (Note 2) |
|                  |                                   | 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>I <sub>OL</sub> = 24 mA<br>I <sub>OL</sub> = 24 mA (Note 2)   |
|                  |                                   | 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                                                                                |
| I <sub>OZ</sub>  | Maximum 3-STATE Current           | 5.5                    |                        | ±0.25             | ±2.5                            | μA    | V <sub>I</sub> = V <sub>IL</sub> , V <sub>IH</sub><br>V <sub>O</sub> = V <sub>CC</sub> , GND                          |
| I <sub>CCT</sub> | Maximum I <sub>CC</sub> /Input    | 5.5                    | 0.6                    |                   | 1.5                             | mA    | V <sub>I</sub> = V <sub>CC</sub> − 2.1V                                                                               |
| I <sub>OLD</sub> | Minimum Dynamic                   | 5.5                    |                        |                   | 75                              | mA    | V <sub>OLD</sub> = 1.65V Max                                                                                          |
| I <sub>OHD</sub> | Output Current (Note 3)           | 5.5                    |                        |                   | −75                             | mA    | V <sub>OHD</sub> = 3.85V Min                                                                                          |
| I <sub>CC</sub>  | Maximum Quiescent Supply Current  | 5.5                    |                        | 4.0               | 40.0                            | μA    | V <sub>IN</sub> = V <sub>CC</sub><br>or GND                                                                           |

**Note 2:** All outputs loaded; thresholds on input associated with output under test.

**Note 3:** Maximum test duration 2.0 ms, one output loaded at a time.

## AC Electrical Characteristics

| Symbol           | Parameter                                   | V <sub>CC</sub><br>(V)<br>(Note 4) | 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 |      | Units |
|------------------|---------------------------------------------|------------------------------------|--------------------------------------------------|-----|------|-----------------------------------------------------------|------|-------|
|                  |                                             |                                    | Min                                              | Typ | Max  | Min                                                       | Max  |       |
| t <sub>MAX</sub> | Maximum Clock Frequency                     | 5.0                                | 100                                              |     |      | 120                                                       |      | MHz   |
| t <sub>PLH</sub> | Propagation Delay<br>CP to $\overline{Q}_n$ | 5.0                                | 2.5                                              | 6.5 | 11.5 | 2.0                                                       | 12.5 | ns    |
| t <sub>PHL</sub> | Propagation Delay<br>CP to $\overline{Q}_n$ | 5.0                                | 2.0                                              | 6.0 | 10.5 | 2.0                                                       | 12.0 | ns    |
| t <sub>PZH</sub> | Output Enable Time                          | 5.0                                | 2.5                                              | 6.5 | 12.0 | 2.0                                                       | 12.5 | ns    |
| t <sub>PZL</sub> | Output Enable Time                          | 5.0                                | 2.0                                              | 6.0 | 11.0 | 2.0                                                       | 11.5 | ns    |
| t <sub>PHZ</sub> | Output Disable Time                         | 5.0                                | 1.5                                              | 7.0 | 12.5 | 1.0                                                       | 13.5 | ns    |
| t <sub>PLZ</sub> | Output Disable Time                         | 5.0                                | 1.5                                              | 5.5 | 10.5 | 1.0                                                       | 10.5 | ns    |

Note 4: Voltage Range 5.0 is 5.0V ± 0.5V

## AC Operating Requirements

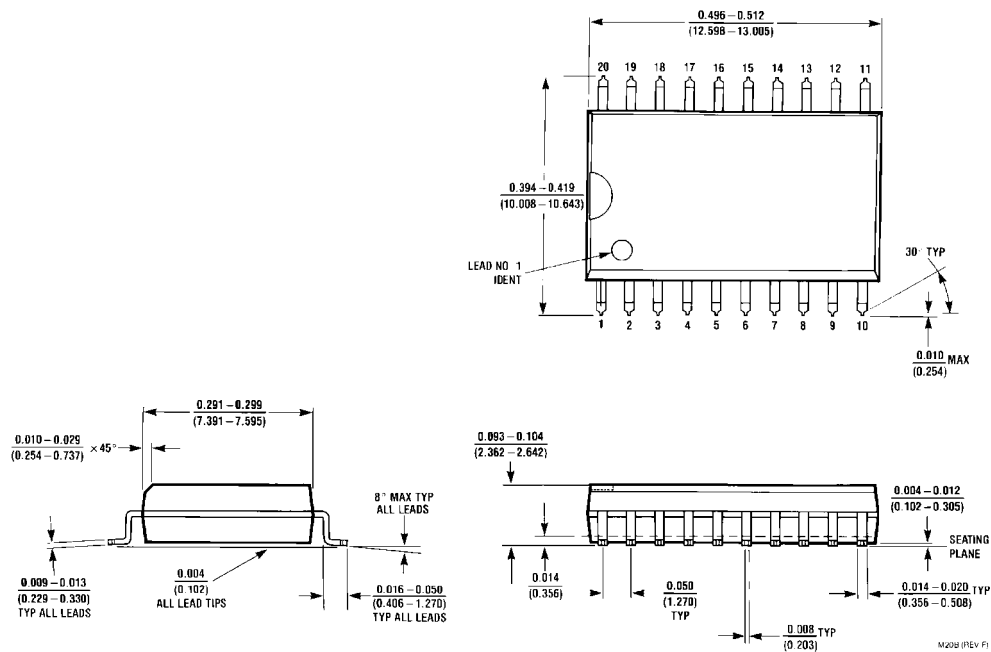
| Symbol         | Parameter                                       | V <sub>CC</sub><br>(V)<br>(Note 5) | T <sub>A</sub> = +25°C<br>C <sub>L</sub> = 50 pF |                    | T <sub>A</sub> = −40°C to +85°C<br>C <sub>L</sub> = 50 pF | Units |
|----------------|-------------------------------------------------|------------------------------------|--------------------------------------------------|--------------------|-----------------------------------------------------------|-------|
|                |                                                 |                                    | Typ                                              | Guaranteed Minimum |                                                           |       |
| t <sub>S</sub> | Setup Time, HIGH or LOW<br>D <sub>n</sub> to CP | 5.0                                | 1.0                                              | 3.5                | 4.0                                                       | ns    |
| t <sub>H</sub> | Hold Time, HIGH or LOW<br>D <sub>n</sub> to CP  | 5.0                                | −1.0                                             | 1.0                | 1.5                                                       | ns    |
| t <sub>W</sub> | CP Pulse Width<br>HIGH or LOW                   | 5.0                                | 2.0                                              | 3.5                | 3.5                                                       | ns    |

Note 5: Voltage Range 5.0 is 5.0V ± 0.5V

## Capacitance

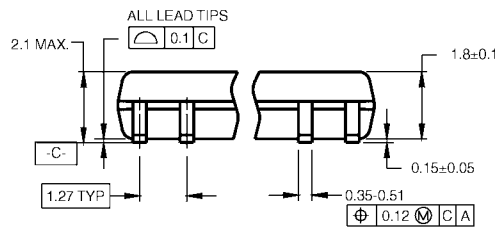
| Symbol          | Parameter                     | Typ  | Units | Conditions             |
|-----------------|-------------------------------|------|-------|------------------------|
| C <sub>IN</sub> | Input Capacitance             | 4.5  | pF    | V <sub>CC</sub> = OPEN |
| C <sub>PD</sub> | Power Dissipation Capacitance | 40.0 | pF    | V <sub>CC</sub> = 5.0V |

# Physical Dimensions inches (millimeters) unless otherwise noted



20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide Body  
Package Number M20B

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

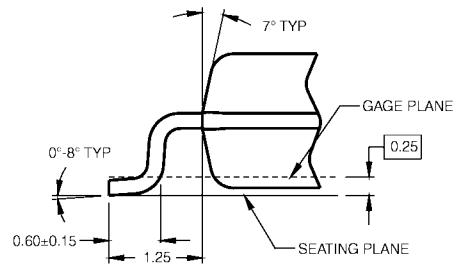


DIMENSIONS ARE IN MILLIMETERS

## NOTES:

- CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1998.
- DIMENSIONS ARE IN MILLIMETERS.
- DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

M20DRevB1



DETAIL A

**20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide  
Package Number M20D**

