



**THE DATASHEET OF  
74F534PC**



# 74F534

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

### General Description

The 74F534 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 74F534 is the same as the 74F374 except that the outputs are inverted.

### Features

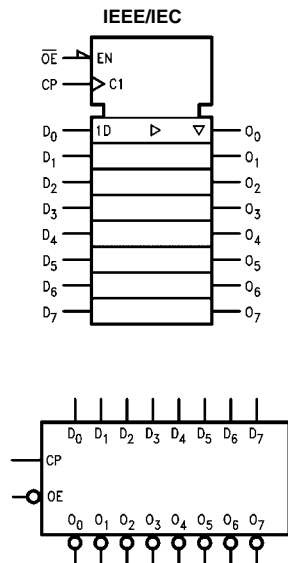
- Edge-triggered D-type inputs
- Buffered positive edge-triggered clock
- 3-STATE outputs for bus-oriented applications

### Ordering Code:

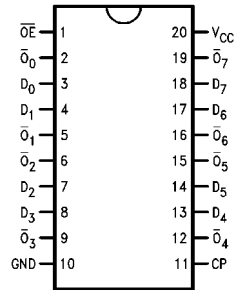
| Order Number | Package Number | Package Description   |
|--------------|----------------|---|
| 74F534SC     | M20B           | 20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide |
| 74F534SJ     | M20D           | 20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide             |
| 74F534PC     | N20A           | 20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide     |

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

### Logic Symbols



### Connection Diagram



74F534 Octal D-Type Flip-Flop with 3-STATE Outputs

### Unit Loading/Fan Out

| Pin Names                           | Description                              | U.L.         |   |
|-------------------------------------|--|--------------|---|
|                                     |  | HIGH/LOW     | Input I <sub>IH</sub> /I <sub>IL</sub><br>Output I <sub>OH</sub> /I <sub>OL</sub> |
| D <sub>0</sub> -D <sub>7</sub>      | Data Inputs                              | 1.0/1.0      | 20 μA/-0.6 mA   |
| CP                                  | Clock Pulse Input (Active Rising Edge)   | 1.0/1.0      | 20 μA/-0.6 mA   |
| $\overline{OE}$                     | 3-STATE Output Enable Input (Active LOW) | 1.0/1.0      | 20 μA/-0.6 mA   |
| $\overline{O_0}$ - $\overline{O_7}$ | Complementary 3-STATE Outputs            | 150/40(33.3) | -3 mA/24 mA (20 mA)   |

### Function Table

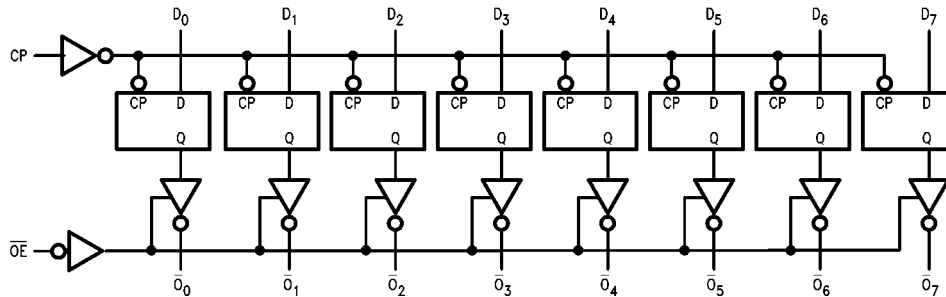
| Inputs |                 |   | Output           |
|--------|-----------------|---|------------------|
| CP     | $\overline{OE}$ | D | $\overline{O}$   |
| ↗      | L               | H | L                |
| ↗      | L               | L | H                |
| L      | L               | X | $\overline{O_0}$ |
| X      | H               | X | Z                |

H = HIGH Voltage Level      L = LOW Voltage Level  
 X = Immaterial                  Z = High Impedance  
 ↗ = LOW-to-HIGH Clock Transition  
 $\overline{O_0}$  = Value stored from previous clock cycle

### Functional Description

The 74F534 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.

### 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)

|  |                                      |
|--|--------------------------------------|
| Storage Temperature  | -65°C to +150°C                      |
| Ambient Temperature under Bias   | -55°C to +125°C                      |
| Junction Temperature under Bias  | -55°C to +150°C                      |
| V <sub>CC</sub> Pin Potential to Ground Pin                            | -0.5V to +7.0V                       |
| Input Voltage (Note 2)   | -0.5V to +7.0V                       |
| Input Current (Note 2)   | -30 mA to +5.0 mA                    |
| Voltage Applied to Output<br>in HIGH State (with V <sub>CC</sub> = 0V) |                                      |
| Standard Output  | -0.5V to V <sub>CC</sub>             |
| 3-STATE Output   | -0.5V to +5.5V                       |
| Current Applied to Output<br>in LOW State (Max)                        | twice the rated I <sub>OL</sub> (mA) |
| ESD Last Passing Voltage (Min)   | 4000V                                |

**Recommended Operating Conditions**

|                              |                |
|------------------------------|----------------|
| Free Air Ambient Temperature | 0°C to +70°C   |
| Supply Voltage               | +4.5V to +5.5V |

**Note 1:** Absolute maximum ratings are values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

**Note 2:** Either voltage limit or current limit is sufficient to protect inputs.

**DC Electrical Characteristics**

| Symbol           | Parameter                         | Min  | Typ                      | Max  | Units | V <sub>CC</sub> | Conditions   |
|------------------|-----------------------------------|--|--------------------------|------|-------|-----------------|--|
| V <sub>IH</sub>  | Input HIGH Voltage                | 2.0  |                          |      | V     |                 | Recognized as a HIGH Signal  |
| V <sub>IL</sub>  | Input LOW Voltage                 |  |                          | 0.8  | V     |                 | Recognized as a LOW Signal   |
| V <sub>CD</sub>  | Input Clamp Diode Voltage         |  |                          | -1.2 | V     | Min             | I <sub>IN</sub> = -18 mA   |
| V <sub>OH</sub>  | Output HIGH Voltage               | 10% V <sub>CC</sub><br>10% V <sub>CC</sub><br>5% V <sub>CC</sub><br>5% V <sub>CC</sub> | 2.5<br>2.4<br>2.7<br>2.7 |      | V     | Min             | I <sub>OH</sub> = -1 mA<br>I <sub>OH</sub> = -3 mA<br>I <sub>OH</sub> = -1 mA<br>I <sub>OH</sub> = -3 mA |
| V <sub>OL</sub>  | Output LOW Voltage                | 10% V <sub>CC</sub>  |                          | 0.5  | V     | Min             | I <sub>OL</sub> = 24 mA  |
| I <sub>IH</sub>  | Input HIGH Current                |  |                          | 5.0  | μA    | Max             | V <sub>IN</sub> = 2.7V   |
| I <sub>BVI</sub> | Input HIGH Current Breakdown Test |  |                          | 7.0  | μA    | Max             | V <sub>IN</sub> = 7.0V   |
| I <sub>CEX</sub> | Output HIGH Leakage Current       |  |                          | 50   | μA    | Max             | V <sub>OUT</sub> = V <sub>CC</sub>   |
| V <sub>ID</sub>  | Input Leakage Test                | 4.75   |                          |      | V     | 0.0             | I <sub>ID</sub> = 1.9 μA<br>All Other Pins Grounded  |
| I <sub>OD</sub>  | Output Leakage Circuit Current    |  |                          | 3.75 | μA    | 0.0             | V <sub>IOD</sub> = 1.50 μA<br>All Other Pins Grounded  |
| I <sub>IL</sub>  | Input LOW Current                 |  |                          | -0.6 | mA    | Max             | V <sub>IN</sub> = 0.5V   |
| I <sub>OZH</sub> | Output Leakage Current            |  |                          | 50   | μA    | Max             | V <sub>OUT</sub> = 2.7V  |
| I <sub>OZL</sub> | Output Leakage Current            |  |                          | -50  | μA    | Max             | V <sub>OUT</sub> = 0.5V  |
| I <sub>OS</sub>  | Output Short-Circuit Current      | -60  |                          | -150 | mA    | Max             | V <sub>OUT</sub> = 0V  |
| I <sub>ZZ</sub>  | Bus Drainage Test                 |  |                          | 500  | μA    | 0.0V            | V <sub>OUT</sub> = 5.25V   |
| I <sub>CCZ</sub> | Power Supply Current              |  | 55                       | 86   | mA    | Max             | V <sub>O</sub> = HIGH Z  |

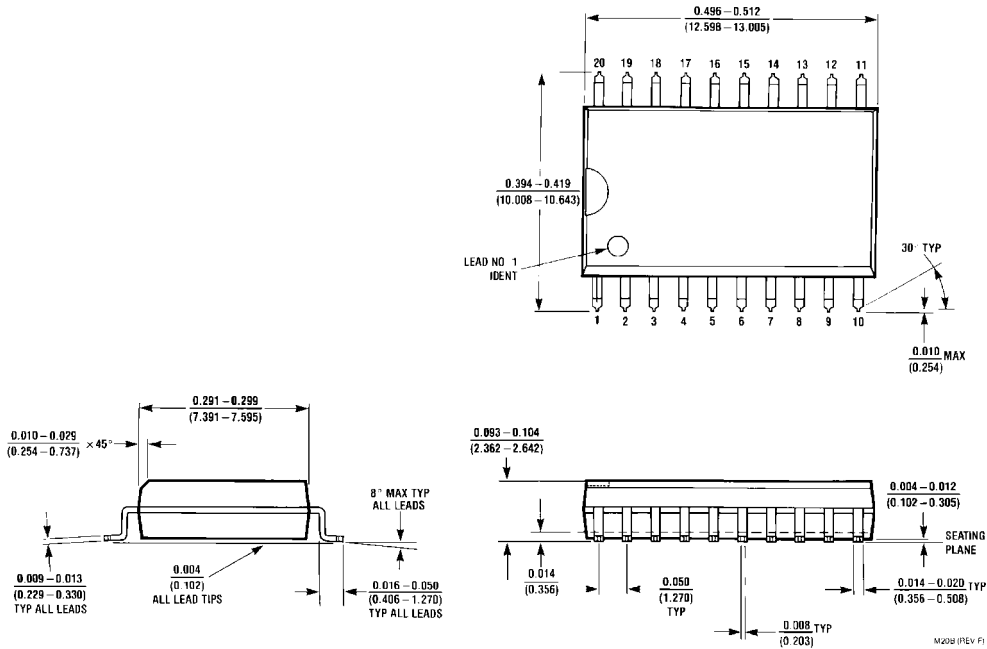
### AC Electrical Characteristics

| Symbol    | Parameter               | $T_A = +25^\circ\text{C}$<br>$V_{CC} = +5.0\text{V}$<br>$C_L = 50\text{ pF}$ |     |      | $T_A = -55^\circ\text{C to } +125^\circ\text{C}$<br>$V_{CC} = +5.0\text{V}$<br>$C_L = 50\text{ pF}$ |      | $T_A = 0^\circ\text{C to } +70^\circ\text{C}$<br>$V_{CC} = +5.0\text{V}$<br>$C_L = 50\text{ pF}$ |      | Units |
|-----------|-------------------------|--|-----|------|---|------|--|------|-------|
|           |                         | Min  | Typ | Max  | Min   | Max  | Min  | Max  |       |
| $f_{MAX}$ | Maximum Clock Frequency | 100  |     |      | 60  |      | 70   |      | MHz   |
| $t_{PLH}$ | Propagation Delay       | 4.0  | 6.5 | 8.5  | 4.0   | 10.5 | 4.0  | 10.0 | ns    |
| $t_{PHL}$ | CP to $\bar{O}_n$       | 4.0  | 6.5 | 8.5  | 4.0   | 11.0 | 4.0  | 10.0 |       |
| $t_{PZH}$ | Output Enable Time      | 2.0  | 9.0 | 11.5 | 2.0   | 14.0 | 2.0  | 12.5 | ns    |
| $t_{PZL}$ |                         | 2.0  | 5.8 | 7.5  | 2.0   | 10.0 | 2.0  | 8.5  |       |
| $t_{PHZ}$ | Output Disable Time     | 1.5  | 5.3 | 7.0  | 1.5   | 8.0  | 1.5  | 8.0  | ns    |
| $t_{PLZ}$ |                         | 1.5  | 4.3 | 5.5  | 1.5   | 7.5  | 1.5  | 6.5  |       |

### AC Operating Requirements

| Symbol   | Parameter               | $T_A = +25^\circ\text{C}$<br>$V_{CC} = +5.0\text{V}$ |     | $T_A = -55^\circ\text{C to } +125^\circ\text{C}$<br>$V_{CC} = +5.0\text{V}$ |     | $T_A = 0^\circ\text{C to } +70^\circ\text{C}$<br>$V_{CC} = +5.0\text{V}$ |     | Units |
|----------|-------------------------|--|-----|---|-----|--|-----|-------|
|          |                         | Min  | Max | Min   | Max | Min  | Max |       |
| $t_S(H)$ | Setup Time, HIGH or LOW | 2.0  |     | 2.0   |     | 2.0  |     | ns    |
| $t_S(L)$ | $D_n$ to CP             | 2.0  |     | 2.5   |     | 2.0  |     |       |
| $t_H(H)$ | Hold Time, HIGH or LOW  | 2.0  |     | 2.0   |     | 2.0  |     | ns    |
| $t_H(L)$ | $D_n$ to CP             | 2.0  |     | 2.5   |     | 2.0  |     |       |
| $t_W(H)$ | CP Pulse Width          | 7.0  |     | 7.0   |     | 7.0  |     | ns    |
| $t_W(L)$ | HIGH or LOW             | 6.0  |     | 6.0   |     | 6.0  |     |       |

**Physical Dimensions** inches (millimeters) unless otherwise noted

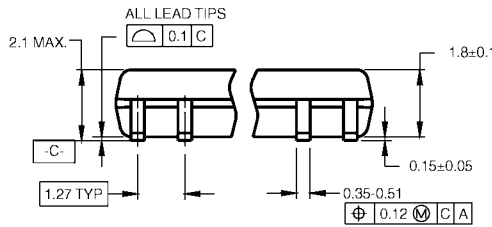


**20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide  
Package Number M20B**

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



LAND PATTERN RECOMMENDATION



DIMENSIONS ARE IN MILLIMETERS



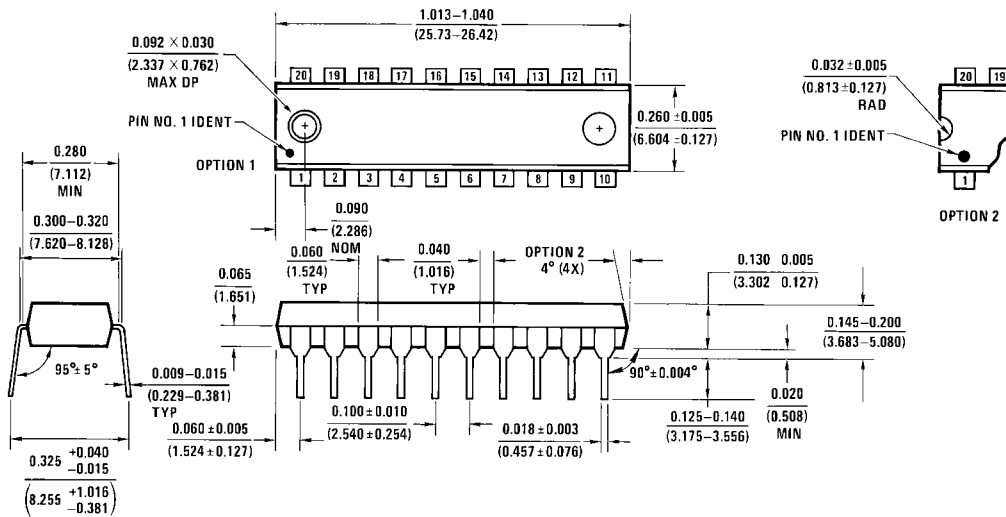
DETAIL A

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

M20DRevB1

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

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



20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide Package Number N20A

N20A (REV G)

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