

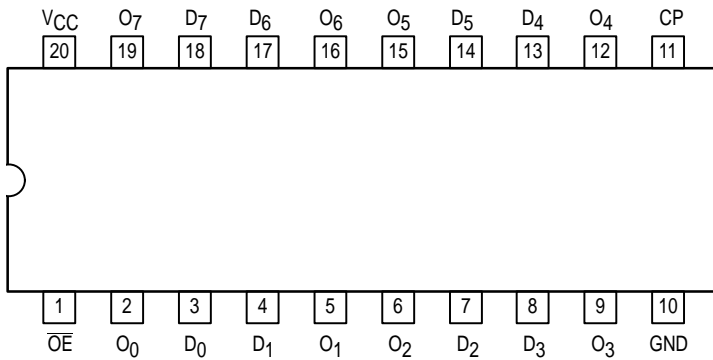


# OCTAL D-TYPE FLIP-FLOP WITH 3-STATE OUTPUTS

The MC54/74F374 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.

- Edge-triggered D-Type Inputs
- Buffered Positive Edge-triggered Clock
- 3-State Outputs for Bus-Oriented Applications
- ESD > 4000 Volts

CONNECTION DIAGRAM (TOP VIEW)



FUNCTION TABLE

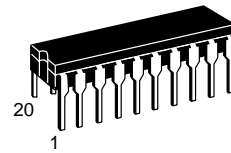
| Inputs |    | Outputs         |       |
|--------|----|-----------------|-------|
| $D_n$  | CP | $\overline{OE}$ | $O_n$ |
| H      |    | L               | H     |
| L      |    | L               | L     |
| X      | X  | H               | Z     |

H = HIGH Voltage Level  
 L = LOW Voltage Level  
 X = Don't Care  
 Z = High Impedance

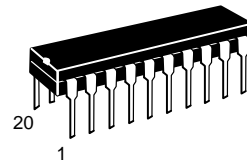
## MC54/74F374

### OCTAL D-TYPE FLIP-FLOP WITH 3-STATE OUTPUTS

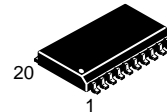
FAST™ SCHOTTKY TTL



J SUFFIX  
 CERAMIC  
 CASE 732-03



N SUFFIX  
 PLASTIC  
 CASE 738-03

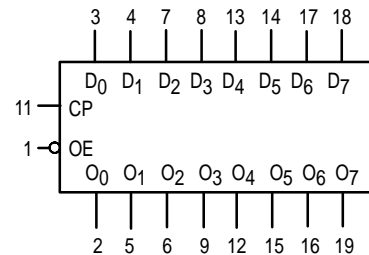


DW SUFFIX  
 SOIC  
 CASE 751D-03

#### ORDERING INFORMATION

MC54FXXXJ Ceramic  
 MC74FXXXN Plastic  
 MC74FXXXDW SOIC

#### LOGIC SYMBOL



$V_{CC}$  = PIN 20  
 $GND$  = PIN 10

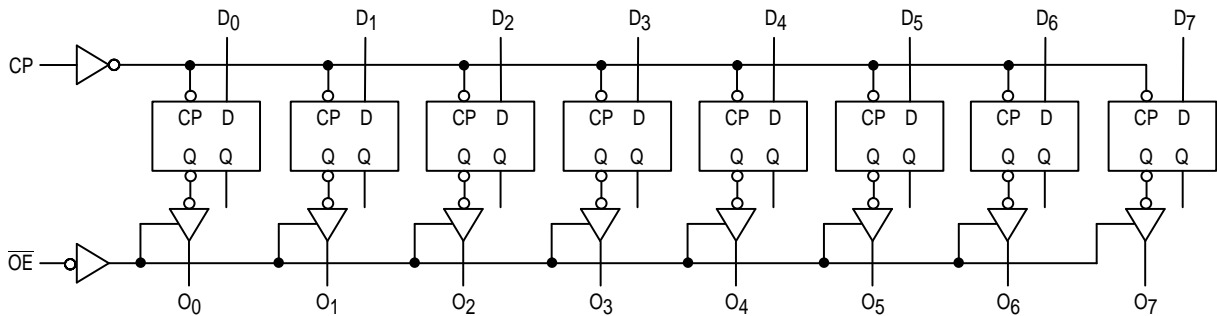
# MC54/74F374

## FUNCTIONAL DESCRIPTION

The F374 consists of eight edge-triggered flip-flops with individual D-type inputs and 3-state true 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 time 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



## DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (unless otherwise specified)

| Symbol    | Parameter                              | Limits |      |      | Unit    | Test Conditions                               |                       |
|-----------|--|--------|------|------|---------|---|-----------------------|
|           |  | Min    | Typ  | Max  |         |   |                       |
| $V_{IH}$  | Input HIGH Voltage                     | 2.0    |      |      | V       | Guaranteed Input HIGH Voltage                 |                       |
| $V_{IL}$  | Input LOW Voltage                      |        |      | 0.8  | V       | Guaranteed Input LOW Voltage                  |                       |
| $V_{IK}$  | Input Clamp Diode Voltage              |        |      | -1.2 | V       | $I_{IN} = -18$ mA                             | $V_{CC} = \text{MIN}$ |
| $V_{OH}$  | Output HIGH Voltage                    | 54, 74 | 2.4  | 3.3  | V       | $I_{OH} = -3.0$ mA                            | $V_{CC} = 4.5$ V      |
|           |  | 74     | 2.7  | 3.3  | V       | $I_{OH} = -3.0$ mA                            | $V_{CC} = 4.75$ V     |
| $V_{OL}$  | Output LOW Voltage                     |        | 0.35 | 0.5  | V       | $I_{OL} = 24$ mA                              | $V_{CC} = \text{MIN}$ |
| $I_{OZH}$ | Output OFF Current — HIGH              |        |      | 50   | $\mu$ A | $V_{OUT} = 2.7$ V                             | $V_{CC} = \text{MAX}$ |
| $I_{OZL}$ | Output OFF Current — LOW               |        |      | -50  | $\mu$ A | $V_{OUT} = 0.5$ V                             | $V_{CC} = \text{MAX}$ |
| $I_{IH}$  | Input HIGH Current                     |        |      | 20   | $\mu$ A | $V_{IN} = 2.7$ V                              | $V_{CC} = \text{MAX}$ |
|           |  |        |      | 100  | $\mu$ A | $V_{IN} = 7.0$ V                              | $V_{CC} = \text{MAX}$ |
| $I_{IL}$  | Input LOW Current                      |        |      | -0.6 | mA      | $V_{IN} = 0.5$ V                              | $V_{CC} = \text{MAX}$ |
| $I_{OS}$  | Output Short Circuit Current (Note 2)  | -60    |      | -150 | mA      | $V_{OUT} = 0$ V                               | $V_{CC} = \text{MAX}$ |
| $I_{CCZ}$ | Power Supply Current (All Outputs OFF) |        | 55   | 86   | mA      | $D_n = \text{GND}$<br>$\overline{OE} = 4.5$ V | $V_{CC} = \text{MAX}$ |

### NOTES:

- For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable device type.
- Not more than one output should be shorted at a time, nor for more than 1 second.

# MC54/74F374

## GUARANTEED OPERATING RANGES

| Symbol          | Parameter                           |        | Min | Typ | Max  | Unit |
|-----------------|-------------------------------------|--------|-----|-----|------|------|
| V <sub>CC</sub> | Supply Voltage                      | 54, 74 | 4.5 | 5.0 | 5.5  | V    |
| T <sub>A</sub>  | Operating Ambient Temperature Range | 54     | -55 | 25  | 125  | °C   |
|                 |                                     | 74     | 0   | 25  | 70   |      |
| I <sub>OH</sub> | Output Current — HIGH               | 54, 74 |     |     | -3.0 | mA   |
| I <sub>OL</sub> | Output Current — LOW                | 54, 74 |     |     | 24   | mA   |

## AC CHARACTERISTICS

| Symbol           | Parameter               | 54/74F   |     |      | 54F   |      | 74F  |      | Unit |
|------------------|-------------------------|--|-----|------|---|------|--|------|------|
|                  |                         | T <sub>A</sub> = +25°C<br>V <sub>CC</sub> = +5.0 V<br>C <sub>L</sub> = 50 pF |     |      | T <sub>A</sub> = -55°C to +125°C<br>V <sub>CC</sub> = 5.0 V ± 10%<br>C <sub>L</sub> = 50 pF |      | T <sub>A</sub> = 0°C to +70°C<br>V <sub>CC</sub> = 5.0 V ± 10%<br>C <sub>L</sub> = 50 pF |      |      |
|                  |                         | Min  | Typ | Max  | Min   | Max  | Min  | Max  |      |
| f <sub>max</sub> | Maximum Clock Frequency | 100  |     |      | 60  |      | 70   |      | MHz  |
| t <sub>PLH</sub> | Propagation Delay       | 4.0  | 6.5 | 8.5  | 4.0   | 10.5 | 4.0  | 10   | ns   |
| t <sub>PHL</sub> | CP to O <sub>n</sub>    | 4.0  | 6.5 | 8.5  | 4.0   | 11   | 4.0  | 10   |      |
| t <sub>PZH</sub> | Output Enable Time      | 2.0  | 9.0 | 11.5 | 2.0   | 14   | 2.0  | 12.5 | ns   |
| t <sub>PZL</sub> |                         | 2.0  | 5.8 | 7.5  | 2.0   | 10   | 2.0  | 8.5  |      |
| t <sub>PHZ</sub> | Output Disable Time     | 2.0  | 5.3 | 7.0  | 2.0   | 8.0  | 2.0  | 8.0  | ns   |
| t <sub>PLZ</sub> |                         | 2.0  | 4.3 | 5.5  | 2.0   | 7.5  | 2.0  | 6.5  |      |

## AC OPERATING REQUIREMENTS

| Symbol             | Parameter               | 54/74F   |     |     | 54F   |     | 74F  |     | Unit |
|--------------------|-------------------------|--|-----|-----|---|-----|--|-----|------|
|                    |                         | T <sub>A</sub> = +25°C<br>V <sub>CC</sub> = +5.0 V |     |     | T <sub>A</sub> = -55°C to +125°C<br>V <sub>CC</sub> = 5.0 V ± 10% |     | T <sub>A</sub> = 0°C to +70°C<br>V <sub>CC</sub> = 5.0 V ± 10% |     |      |
|                    |                         | Min  | Typ | Max | Min   | Max | Min  | Max |      |
| t <sub>S</sub> (H) | Setup Time, HIGH or LOW | 2.0  |     |     | 2.5   |     | 2.0  |     | ns   |
| t <sub>S</sub> (L) | D <sub>n</sub> to CP    | 2.0  |     |     | 2.0   |     | 2.0  |     |      |
| t <sub>H</sub> (H) | Hold Time, HIGH or LOW  | 2.0  |     |     | 2.0   |     | 2.0  |     |      |
| t <sub>H</sub> (L) | D <sub>n</sub> to CP    | 2.0  |     |     | 2.5   |     | 2.0  |     |      |
| t <sub>W</sub> (H) | CP Pulse Width,         | 7.0  |     |     | 7.0   |     | 7.0  |     | ns   |
| t <sub>W</sub> (L) | HIGH or LOW             | 6.0  |     |     | 6.0   |     | 6.0  |     |      |