MOTOROLA

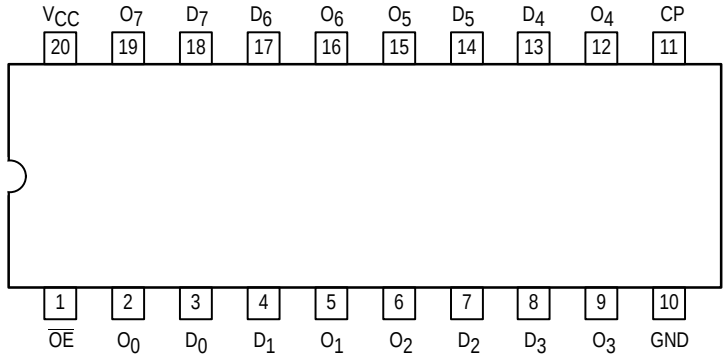
MC54/74F374

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)



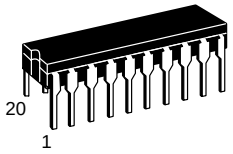
FUNCTION TABLE

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

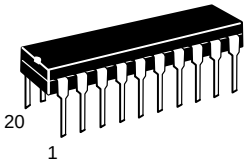
H = HIGH Voltage Level
L = LOW Voltage Level
X = Don't Care
Z = High Impedance

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

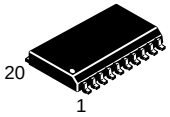
FAST™ SCHOTTKY TTL



J SUFFIX
CERAMIC
CASE 732-03



N SUFFIX
PLASTIC
CASE 738-03

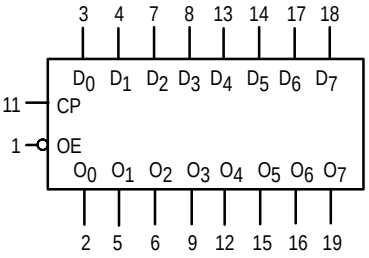


DW SUFFIX
SOIC
CASE 751D-03

ORDERING INFORMATION

MC54FXXXJ	Ceramic
MC74FXXXN	Plastic
MC74FXXXDW	SOIC

LOGIC SYMBOL

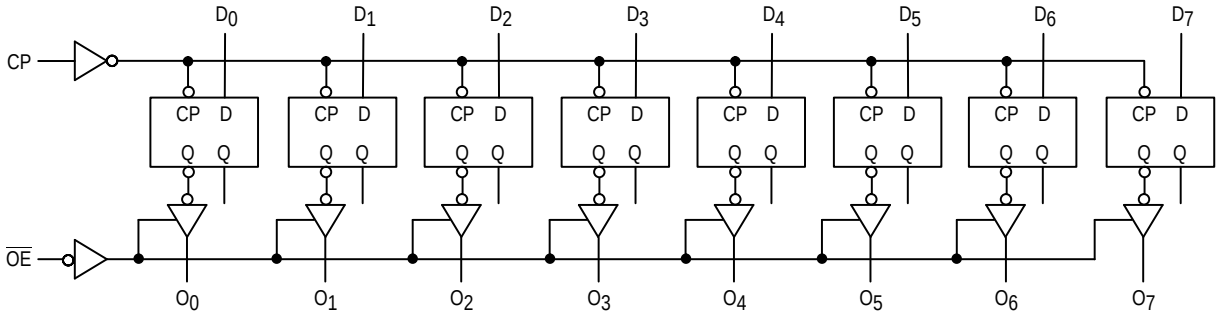


V_{CC} = PIN 20
GND = PIN 10

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 Min	Limits Typ	Limits Max	Unit	Test Conditions	
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} = 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} = MIN
I_{OZH}	Output OFF Current — HIGH				50	µA	V_{OUT} = 2.7 V	V_{CC} = MAX
I_{OZL}	Output OFF Current — LOW				–50	µA	V_{OUT} = 0.5 V	V_{CC} = MAX
I_{IH}	Input HIGH Current				20	µA	V_{IN} = 2.7 V	V_{CC} = MAX
					100	µA	V_{IN} = 7.0 V	V_{CC} = MAX
I_{IL}	Input LOW Current				–0.6	mA	V_{IN} = 0.5 V	V_{CC} = MAX
I_{OS}	Output Short Circuit Current (Note 2)		–60		–150	mA	V_{OUT} = 0 V	V_{CC} = MAX
I_{CCZ}	Power Supply Current (All Outputs OFF)			55	86	mA	D_n, = GND $\overline{OE}$ = 4.5 V	V_{CC} = MAX

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

GUARANTEED OPERATING RANGES

Symbol	Parameter		Min	Typ	Max	Unit
V_{CC}	Supply Voltage	54, 74	4.5	5.0	5.5	V
T_A	Operating Ambient Temperature Range	54	–55	25	125	°C
		74	0	25	70	
I_{OH}	Output Current — HIGH	54, 74			–3.0	mA
I_{OL}	Output Current — LOW	54, 74			24	mA

AC CHARACTERISTICS

		54/74F			54F		74F		
		T_A = +25°C V_{CC} = +5.0 V C_L = 50 pF			T_A = –55°C to +125°C V_{CC} = 5.0 V ± 10% C_L = 50 pF		T_A = 0°C to +70°C V_{CC} = 5.0 V ± 10% C_L = 50 pF		
Symbol	Parameter	Min	Typ	Max	Min	Max	Min	Max	Unit
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	ns
t_{PHL}	CP to O_n	4.0	6.5	8.5	4.0	11	4.0	10	
t_{PZH}	Output Enable Time	2.0	9.0	11.5	2.0	14	2.0	12.5	ns
t_{PZL}		2.0	5.8	7.5	2.0	10	2.0	8.5	
t_{PHZ}	Output Disable Time	2.0	5.3	7.0	2.0	8.0	2.0	8.0	ns
t_{PLZ}		2.0	4.3	5.5	2.0	7.5	2.0	6.5	

AC OPERATING REQUIREMENTS

		54/74F			54F		74F		
		T_A = +25°C V_{CC} = +5.0 V			T_A = –55°C to +125°C V_{CC} = 5.0 V ± 10%		T_A = 0°C to +70°C V_{CC} = 5.0 V ± 10%		
Symbol	Parameter	Min	Typ	Max	Min	Max	Min	Max	Unit
t_s (H)	Setup Time, HIGH or LOW	2.0			2.5		2.0		
t_s (L)	D_n to CP	2.0			2.0		2.0		ns
t_h (H)	Hold Time, HIGH or LOW	2.0			2.0		2.0		
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		