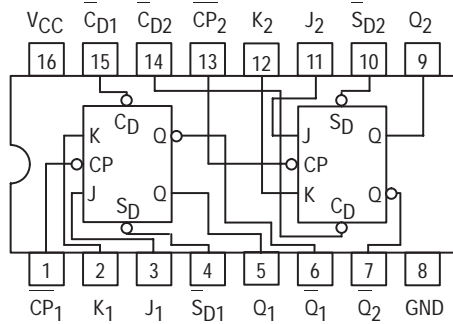


**MOTOROLA**

## DUAL JK NEGATIVE EDGE-TRIGGERED FLIP-FLOP

The MC74F112 contains two independent, high-speed JK flip-flops with Direct Set and Clear inputs. Synchronous state changes are initiated by the falling edge of the clock. Triggering occurs at a voltage level of the clock and is not directly related to the transition time. The J and K inputs can change when the clock is in either state without affecting the flip-flop, provided that they are in the desired state during the recommended setup and hold times relative to the falling edge of the clock. A LOW signal on  $\bar{S}_D$  or  $\bar{C}_D$  prevents clocking and forces Q or  $\bar{Q}$  HIGH, respectively. Simultaneous LOW signals on  $\bar{S}_D$  and  $\bar{C}_D$  force both Q and  $\bar{Q}$  HIGH.

### CONNECTION DIAGRAM



**FUNCTION TABLE (Each Half)**

Inputs		Output
@ $t_n$		@ $t_n + 1$
J	K	Q
L	L	$Q_n$
L	H	L
H	L	H
H	H	$\bar{Q}_n$

Asynchronous Inputs:

LOW Input to  $\bar{S}_D$  sets Q to HIGH level

LOW Input to  $\bar{C}_D$  sets Q to LOW level

Clear and Set are independent of clock

Simultaneous LOW on  $\bar{C}_D$  and  $\bar{S}_D$  makes both Q and  $\bar{Q}$  HIGH

H = HIGH Voltage Level

L = LOW Voltage Level

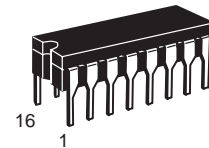
$t_n$  = Bit time before clock pulse

$t_n + 1$  = Bit time after clock pulse

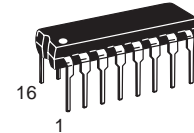
**MC74F112**

**DUAL JK NEGATIVE  
EDGE-TRIGGERED FLIP-FLOP**

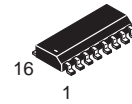
**FAST™ SCHOTTKY TTL**



**J SUFFIX**  
CERAMIC  
CASE 620-08



**N SUFFIX**  
PLASTIC  
CASE 648-08

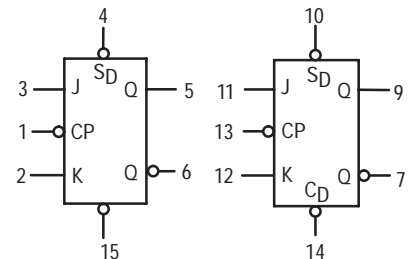


**D SUFFIX**  
SOIC  
CASE 751B-03

### ORDERING INFORMATION

MC74FXXXJ Ceramic  
MC74FXXXN Plastic  
MC74FXXXD SOIC

### LOGIC SYMBOL



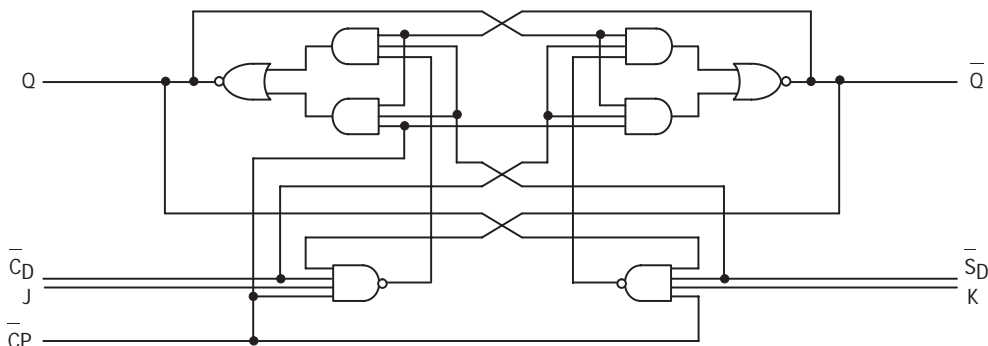
VCC = PIN 16  
GND = PIN 8

LIFETIME BUY

LAST ORDER 31/03/99 LAST SHIP 30/09/99

## MC74F112

LOGIC DIAGRAM (one half shown)



## GUARANTEED OPERATING RANGES

Symbol	Parameter		Min	Typ	Max	Unit
V <sub>CC</sub>	Supply Voltage	74	4.5	5.0	5.5	V
T <sub>A</sub>	Operating Ambient Temperature Range	74	0	25	70	°C
I <sub>OH</sub>	Output Current — High	74			−1.0	mA
I <sub>OL</sub>	Output Current — Low	74			20	mA

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

Symbol	Parameter		Limits			Unit	Test Conditions	
			Min	Typ	Max			
V <sub>IH</sub>	Input HIGH Voltage		2.0			V	Guaranteed Input HIGH Voltage	
V <sub>IL</sub>	Input LOW Voltage				0.8	V	Guaranteed Input LOW Voltage	
V <sub>IK</sub>	Input Clamp Diode Voltage				−1.2	V	I <sub>IN</sub> = −18 mA	V <sub>CC</sub> = MIN
V <sub>OH</sub>	Output HIGH Voltage	74	2.5	3.4		V	I <sub>OH</sub> = −1.0 mA	V <sub>CC</sub> = 4.50 V
		74	2.7	3.4		V	I <sub>OH</sub> = −1.0 mA	V <sub>CC</sub> = 4.75 V
V <sub>OL</sub>	Output LOW Voltage			0.35	0.5	V	I <sub>OL</sub> = 20 mA	V <sub>CC</sub> = MIN
I <sub>IH</sub>	Input HIGH Current				20	μA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 2.7 V	
					100	μA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 7.0 V	
I <sub>IL</sub>	Input LOW Current (J and K Inputs)				−0.6	mA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 0.5 V	
	(CP Inputs)				−2.4	mA		
	(C <sub>D</sub> and S <sub>D</sub> Inputs)				−3.0	mA		
I <sub>OS</sub>	Output Short Circuit Current (Note 2)		−60		−150	mA	V <sub>CC</sub> = MAX, V <sub>OUT</sub> = 0 V	
I <sub>CC</sub>	Power Supply Current			12	19	mA	V <sub>CC</sub> = MAX, V <sub>CP</sub> = 0 V	

## NOTES:

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

# MC74F112


## AC CHARACTERISTICS

Symbol	Parameter	74F		74F		Unit
		$T_A = +25^{\circ}\text{C}$ $V_{CC} = +5.0\text{ V}$ $C_L = 50\text{ pF}$		$T_A = 0^{\circ}\text{C to } +70^{\circ}\text{C}$ $V_{CC} = 5.0\text{ V} \pm 10\%$ $C_L = 50\text{ pF}$		
		Min	Max	Min	Max	
f <sub>max</sub>	Maximum Clock Frequency	110				MHz
t <sub>PLH</sub>	Propagation Delay	2.0	6.5	2.0	7.5	ns
t <sub>PHL</sub>	$\overline{\text{CP}}_N$ to $Q_N$ or $\overline{Q}_N$	2.0	6.5	2.0	7.5	
t <sub>PLH</sub>	Propagation Delay	2.0	6.5	2.0	7.5	ns
t <sub>PHL</sub>	$\overline{\text{C}}_{DN}$ or $\overline{\text{S}}_{DN}$ to $Q_N$ or $\overline{Q}_N$	2.0	6.5	2.0	7.5	

## AC OPERATING REQUIREMENTS

Symbol	Parameter	74F			74F		Unit
		T <sub>A</sub> = +25°C V <sub>CC</sub> = +5.0 V			T <sub>A</sub> = 0°C to +70°C V <sub>CC</sub> = 5.0 V ± 10%		
		Min	Typ	Max	Min	Max	
t <sub>S</sub> (H)	Setup Time, HIGH or LOW	4.0			4.0		ns
t <sub>S</sub> (L)	J <sub>N</sub> or K <sub>N</sub> to $\overline{\text{CP}}_N$	3.0			3.0		
t <sub>H</sub> (H)	Hold Time, HIGH or LOW	0			0		
t <sub>H</sub> (L)	J <sub>N</sub> or K <sub>N</sub> to $\overline{\text{CP}}_N$	0			0		
t <sub>W</sub> (H)	CP <sub>N</sub> Pulse Width, HIGH	4.5			4.5		ns
t <sub>W</sub> (L)	or LOW	4.5			4.5		
t <sub>W</sub> (L)	CD <sub>N</sub> or SD <sub>N</sub> Pulse Width, LOW	4.5			4.5		ns
t <sub>rec</sub>	<u>Recovery</u> Time CD <sub>N</sub> or SD <sub>N</sub> to CP	4.0			5.0		ns

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