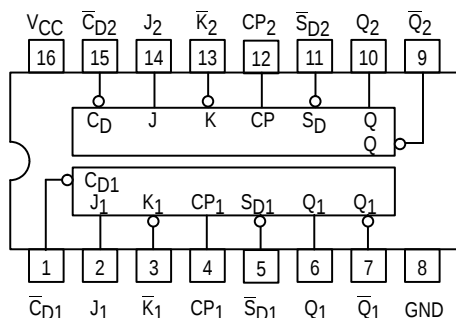




DUAL JK POSITIVE EDGE-TRIGGERED FLIP-FLOP

The MC54/74F109 consists of two high-speed, completely independent transition clocked JK flip-flops. The clocking operation is independent of rise and fall times of the clock waveform. The JK design allows operation as a D flip-flop (refer to F74 data sheet) by connecting the J and K inputs together.

CONNECTION DIAGRAM



FUNCTION TABLE (Each Half)

Input		Output	
@ t_n		@ $t_n + 1$	
J	K	Q	Q
L	H	No Change	
L	L	L	H
H	H	H	L
H	L	Toggles	

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

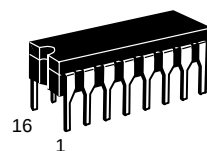
t_n = Bit time before clock pulse

$t_n + 1$ = Bit time after clock pulse

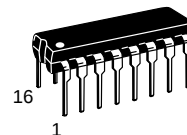
MC54/74F109

DUAL JK POSITIVE EDGE-TRIGGERED FLIP-FLOP

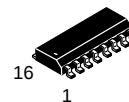
FAST™ SCHOTTKY TTL



J SUFFIX
CERAMIC
CASE 620-09



N SUFFIX
PLASTIC
CASE 648-08

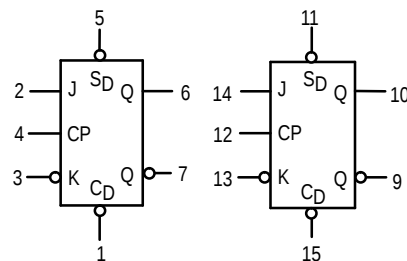


D SUFFIX
SOIC
CASE 751B-03

ORDERING INFORMATION

MC54FXXXJ Ceramic
MC74FXXXN Plastic
MC74FXXXD SOIC

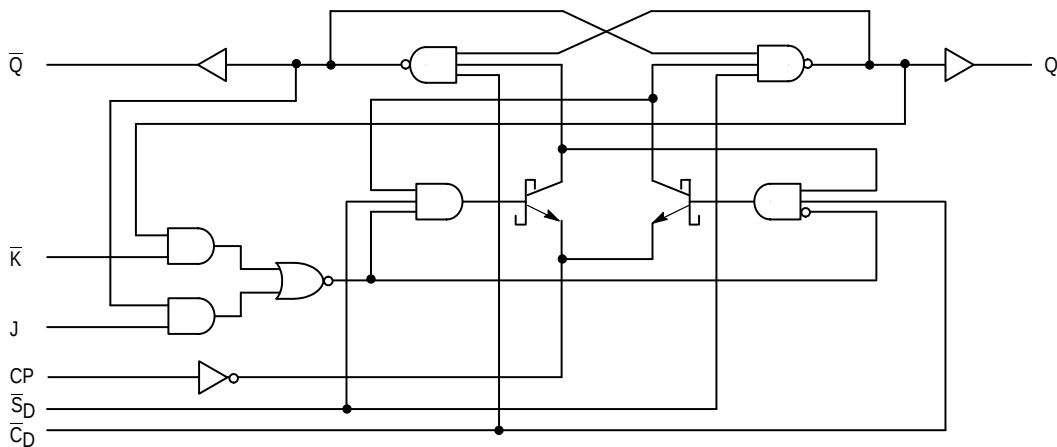
LOGIC SYMBOL



VCC = PIN 16
GND = PIN 8

MC54/74F109

LOGIC DIAGRAM (one half shown)



NOTE:
This diagram is provided only for the understanding of logic operations
and should not be used to estimate propagation delays.

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
		54	0	25	70	
I _{OH}	Output Current — High	54, 74			−1.0	mA
I _{OL}	Output Current — Low	54, 74			20	mA

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} = MIN
V _{OH}	Output HIGH Voltage	54, 74	2.5	3.4	V	I _{OH} = −1.0 mA	V _{CC} = 4.50 V
		74	2.7	3.4	V	I _{OH} = −1.0 mA	V _{CC} = 4.75 V
V _{OL}	Output LOW Voltage		0.35	0.5	V	I _{OL} = 20 mA	V _{CC} = MIN
I _{IH}	Input HIGH Current			20	μA	V _{IN} = 2.7 V	V _{CC} = MAX
				100	μA	V _{IN} = 7.0 V	
I _{IL}	Input LOW Current (J, K and CP Inputs) (C _D and S _D Inputs)			−0.6	mA	V _{IN} = 0.5 V	V _{CC} = MAX
				−1.8	mA		
I _{OS}	Output Short Circuit Current (Note 2)	−60		−150	mA	V _{OUT} = 0 V	V _{CC} = MAX
I _{CC}	Power Supply Current		11.7	17	mA	V _{CP} = 0 V	V _{CC} = MAX

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.

MC54/74F109

AC CHARACTERISTICS

Symbol	Parameter	54/74F			54F		74F		Unit
		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		
		Min	Typ	Max	Min	Max	Min	Max	
f _{max}	Maximum Clock Frequency	100	125		70		90		MHz
t _{PLH}	Propagation Delay	3.8	5.3	7.0	3.8	9.0	3.8	8.0	ns
t _{PHL}	CP _N to Q _N or Q̄ _N	4.4	6.2	8.0	4.4	10.5	4.4	9.2	
t _{PLH}	Propagation Delay	2.5	5.2	7.0	2.5	9.0	2.5	8.0	ns
t _{PHL}	C̄ _{DN} or S̄ _{DN} to Q _N or Q̄ _N	3.5	7.0	9.0	3.5	11.5	3.5	10.5	

AC OPERATING REQUIREMENTS

Symbol	Parameter	54/74F			54F		74F		Unit
		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%		
		Min	Typ	Max	Min	Max	Min	Max	
t _S (H)	Setup Time, HIGH or LOW	3.0			3.0		3.0		ns
t _S (L)	J _N or $\overline{K}_N$ to CP _N	3.0			3.0		3.0		
t _H (H)	Hold Time, HIGH or LOW	1.0			1.0		1.0		
t _H (L)	J _N or $\overline{K}_N$ to CP _N	1.0			1.0		1.0		
t _W (H)	CP _N Pulse Width, HIGH	4.0			4.0		4.0		ns
t _W (L)	or LOW	5.0			5.0		5.0		
t _W (L)	$\overline{C}_{DN}$ or $\overline{S}_{DN}$ Pulse Width, LOW	4.0			4.0		4.0		ns
t _{rec}	Recovery Time $\overline{C}_{DN}$ or $\overline{S}_{DN}$ to CP	2.0			2.0		2.0		ns