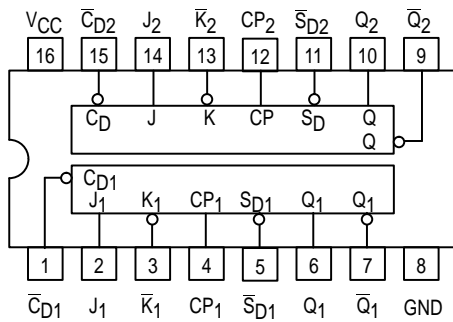




DUAL JK̄ POSITIVE EDGE-TRIGGERED FLIP-FLOP

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

CONNECTION DIAGRAM



FUNCTION TABLE (Each Half)

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

Asynchronous Inputs:

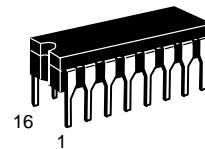
- LOW Input to S̄D sets Q to HIGH level
- LOW Input to C̄D sets Q to LOW level
- Clear and Set are independent of clock
- Simultaneous LOW on C̄D and S̄D makes both Q and Q̄ HIGH

H = HIGH Voltage Level
L = LOW Voltage Level
 t_n = Bit time before clock pulse
 $t_n + 1$ = Bit time after clock pulse

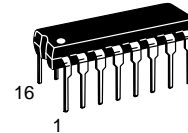
MC54/74F109

DUAL JK̄ POSITIVE EDGE-TRIGGERED FLIP-FLOP

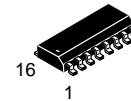
FAST™ SCHOTTKY TTL



J SUFFIX
CERAMIC
CASE 620-09



N SUFFIX
PLASTIC
CASE 648-08

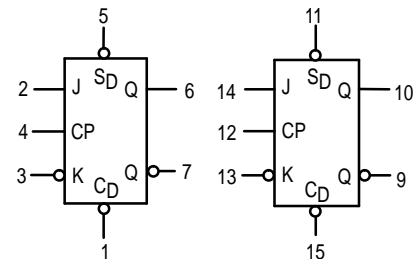


D SUFFIX
SOIC
CASE 751B-03

ORDERING INFORMATION

MC54FXXXJ Ceramic
MC74FXXXN Plastic
MC74FXXXD SOIC

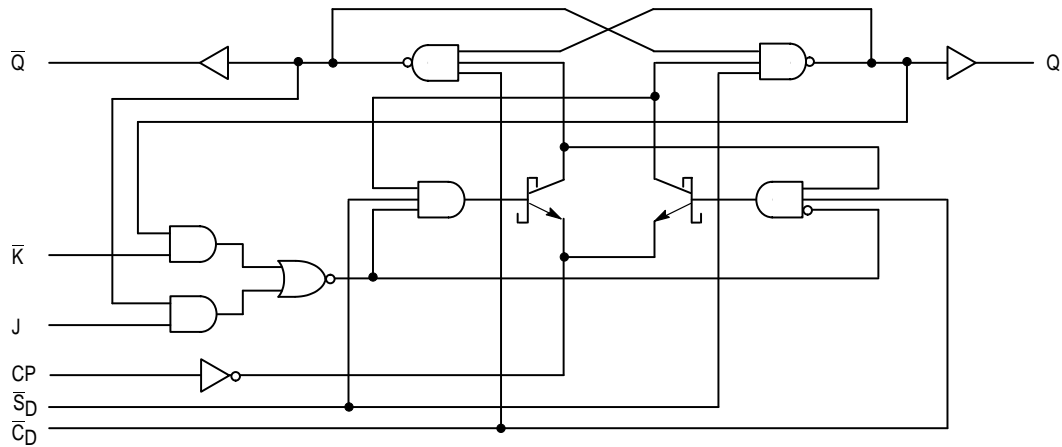
LOGIC SYMBOL



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
		74	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
		$T_A = +25^\circ\text{C}$ $V_{CC} = +5.0\text{ V}$ $C_L = 50\text{ pF}$			$T_A = -55^\circ\text{C to } +125^\circ\text{C}$ $V_{CC} = 5.0\text{ V} \pm 10\%$ $C_L = 50\text{ pF}$		$T_A = 0^\circ\text{C to } +70^\circ\text{C}$ $V_{CC} = 5.0\text{ V} \pm 10\%$ $C_L = 50\text{ pF}$		
		Min	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 \bar{Q}_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}	\bar{C}_{Dn} or \bar{S}_{Dn} to Q_n or \bar{Q}_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
		$T_A = +25^\circ\text{C}$ $V_{CC} = +5.0\text{ V}$			$T_A = -55^\circ\text{C to } +125^\circ\text{C}$ $V_{CC} = 5.0\text{ V} \pm 10\%$		$T_A = 0^\circ\text{C to } +70^\circ\text{C}$ $V_{CC} = 5.0\text{ V} \pm 10\%$		
		Min	Typ	Max	Min	Max	Min	Max	
$t_{\text{S}}(\text{H})$	Setup Time, HIGH or LOW	3.0			3.0		3.0		ns
$t_{\text{S}}(\text{L})$	J_n or \bar{K}_n to CP_n	3.0			3.0		3.0		
$t_{\text{H}}(\text{H})$	Hold Time, HIGH or LOW	1.0			1.0		1.0		
$t_{\text{H}}(\text{L})$	J_n or \bar{K}_n to CP_n	1.0			1.0		1.0		ns
$t_{\text{W}}(\text{H})$	CP_n Pulse Width, HIGH	4.0			4.0		4.0		
$t_{\text{W}}(\text{L})$	or LOW	5.0			5.0		5.0		
$t_{\text{W}}(\text{L})$	\bar{C}_{Dn} or \bar{S}_{Dn} Pulse Width, LOW	4.0			4.0		4.0		ns
t_{rec}	Recovery Time \bar{C}_{Dn} or \bar{S}_{Dn} to CP	2.0			2.0		2.0		ns